DRIVESHAFT

DIAGNOSIS AND TESTING

For additional information.

REFER to: Driveline System (205-00, Diagnosis and Testing).

2012.0 RANGE ROVER (LM), 205-01

DRIVESHAFT

FRONT DRIVESHAFT – V8 5.0L PETROL/V8 S/C 5.0L PETROL (G1225388)

47.15.02	DRIVESHAFT – FRONT – RENEW	5000 CC, AJ V8	1.6	USED WITHINS	+

REMOVAL

NOTES:

- A small amount of oil may weep from the driveshaft joints during storage. The loss of this oil will not affect the operation or durability of the joint.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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.

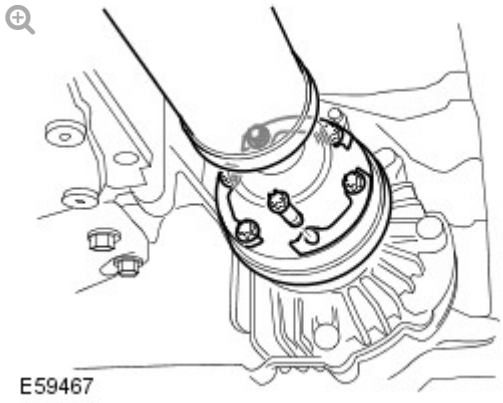
3. Remove the transmission support crossmember.
   For additional information, refer to: Transmission Support Crossmember - 5.0L (502-02, Removal and Installation).

4. **CAUTIONS:**

   - Mark the position of the driveshaft flange in relation to the

drive pinion flange.

- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.



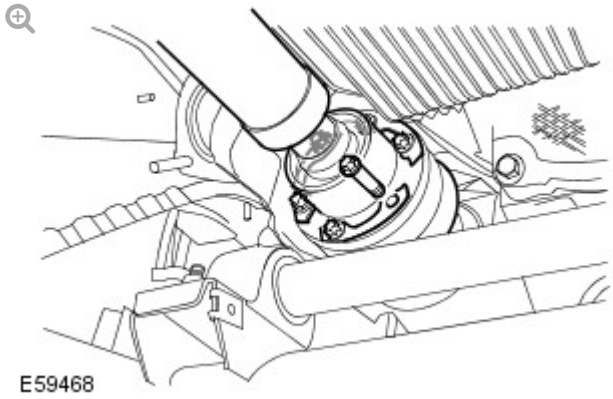
Release the driveshaft from the transfer case drive flange.

- Remove the 6 Torx bolts and washers, discard the bolts.

5.

CAUTIONS:

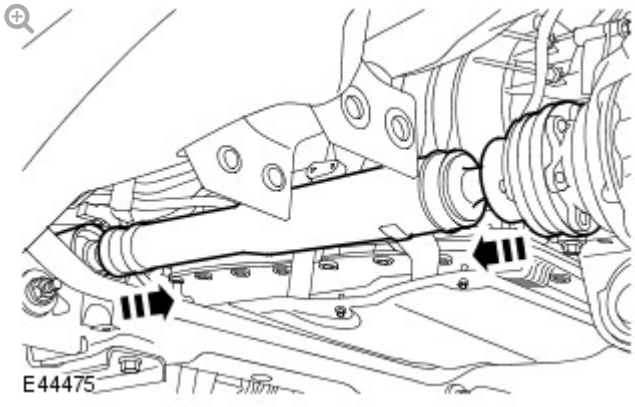
- Mark the position of the driveshaft flange in relation to the drive pinion flange.
- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.



Release the driveshaft from the front axle drive flange.

- Remove the 6 Torx bolts and washers, discard the bolts.

6.



Remove the front driveshaft.

- Compress the joints to disengage the drive flanges.

INSTALLATION

1.

NOTE:

A small amount of oil may weep from the driveshaft joints during storage. The loss of this oil will not affect the operation or durability of the joint.

Install the driveshaft.

- Clean the components.
- Compress the joints to engage the drive flanges.

2. Attach the driveshaft to the front axle drive flange.
   - Tighten the new Torx bolts to 45 Nm (33 lb.ft), then a further 90 degrees.

3. Attach the driveshaft to the transfer case drive flange.
   - Tighten the new Torx bolts to 45 Nm (33 lb.ft), then a further 90 degrees.

4. Install the transmission support crossmember.
   For additional information, refer to: Transmission Support

For additional information, refer to: Transmission Support Crossmember - 5.0L (502-02, Removal and Installation).

5. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

DRIVESHAFT

REAR DRIVESHAFT – V8 5.0L PETROL/V8 S/C 5.0L PETROL (G1225946)

REMOVAL AND INSTALLATION

47.15.03	DRIVESHAFT – REAR – RENEW	5000 CC, AJ V8	1.4	USED WITHINS	+

REMOVAL

NOTE:

A small amount of oil may weep from the driveshaft joints during

storage. The loss of this oil will not affect the operation or durability of the joint.

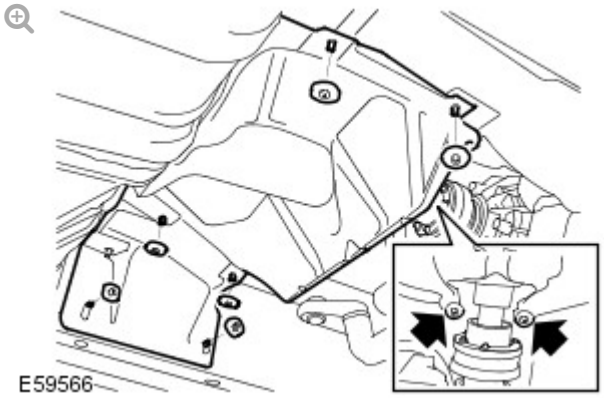
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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. Remove the exhaust system.
   For additional information, refer to: Exhaust System (309-00, Removal and Installation).

4. 

   Remove the center heat shield.

   - Remove the 8 nuts.

5. 

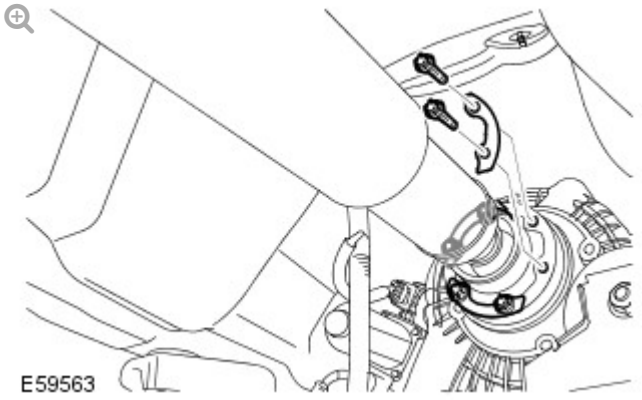
Remove the fuel tank heat shield.

- Remove the 8 screws.

6.

CAUTIONS:

- Mark the position of the driveshaft flange in relation to the drive pinion flange.
- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.



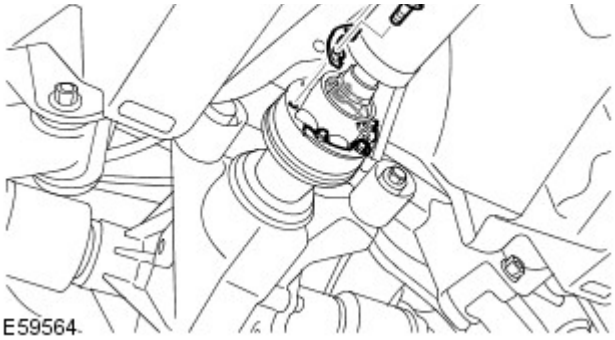
Release the driveshaft from the transfer case drive flange.

- Remove the 6 Torx bolts and washers.

7.

CAUTIONS:

- Mark the position of the driveshaft flange in relation to the drive pinion flange.
- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.



Release the driveshaft from the rear axle drive flange.

- Remove the 6 Torx bolts and washers.

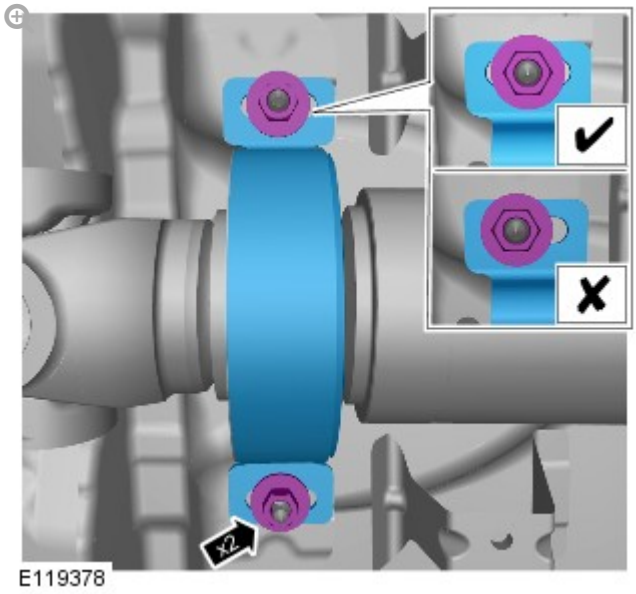
8.

CAUTION:

Note the fitted position of the component prior to removal.

NOTE:

With assistance remove the component.



Note the fitted position.

- Remove the 2 nuts.

INSTALLATION

1.

CAUTION:

It is possible to fit the driveshaft incorrectly. The universal joint must be rearward of the center bearing when installed in the vehicle.

NOTE:

A small amount of oil may weep from the driveshaft joints during storage. The loss of this oil will not affect the operation or durability of the joint.

Attach the driveshaft to the rear axle drive flange.

- Clean the component mating faces.
- Tighten the Torx bolts to 44 Nm (32 lb.ft), then a further 45 degrees.

2.

NOTE:

A small amount of oil may weep from the driveshaft joints during storage. The loss of this oil will not affect the operation or durability of the joint.

Attach the driveshaft to the transfer case drive flange.

- Clean the component mating faces.
- Tighten the Torx bolts to 44 Nm (32 lb.ft), then a further 45 degrees.

3.

CAUTION:

Make sure the center bearing mount is not under tension and

central within the slots.

Attach the driveshaft center bearing mount.

- Align the center bearing mount.
- Tighten the nuts to 21 Nm (15 lb.ft).

4. Install the fuel tank heat shield.
   - Tighten the screws.

5. Install the center heat shield.
   - Tighten the nuts.

6. Install the exhaust system.
   For additional information, refer to: Exhaust System (309-00, Removal and Installation).

7. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

REAR DRIVE AXLE/DIFFERENTIAL

SPECIFICATIONS

Sealers

ITEM	LAND ROVER PART NO.
Input shaft splines	STC 50554
Differential electronic torque managed (ETM) unit locking motor	STC 50550

Lubricants

ITEM	SPECIFICATION
*** Recommended lubricant:**	
Open unit	Castrol SAF-XO - 75W/90
ETM unit	Castrol SAF Carbon Mod Plus

*** Do not use any lubricant other than that specified**

Capacities

UNIT	SERVICE FILL CAPACITY
Open differential	1.14 liters (2.41 US pints) (1.20 US quarts)
ETM differential	1.55 liters (3.28 US pints) (1.64 US quarts)

Rear 'Open' Differential

Rear "Open" Differential

ITEM	SPECIFICATION
Reduction ratio:	
TDV8 Diesel engine	3.54:1
V8 Supercharged Petrol engine	3.54:1
V8 Naturally Aspirated Petrol engine	3.54:1

Rear Electronic Torque Managed (ETM) Differential

ITEM	SPECIFICATION
ETM range	Up to 2500 Nm (98.5 lbf/ft)
ETM motor	Operates the ball/ramp mechanism and wet clutch. Motor incorporates a temperature sensor and is controlled by an ECU
Differential type	4 pin
Reduction ratio:	
TDV8 Diesel engine	3.54:1
V8 Supercharged Petrol engine	3.54:1
V8 Naturally Aspirated Petrol engine	3.54:1

Torque Specifications

DESCRIPTION	NM	LB-FT
Oil drain plug	28	21
Oil filler plug	34	25
Oil temperature sensor	22	16
++ Differential locking motor	10	7
Differential front mounting bolts	100	74
** Differential rear mounting bolt		
Stage 1	120	89
Stage 2	Tighten a further 180 degrees	

* Driveshaft to rear axle drive flange bolts		
Stage 1	44	33
Stage 2	Tighten a further 45 degrees	

*** New ''Patchlok' Torx bolts must be installed**

**** New nut must be installed**

++ Apply sealant, Part No. STC 50550 to flange of locking motor

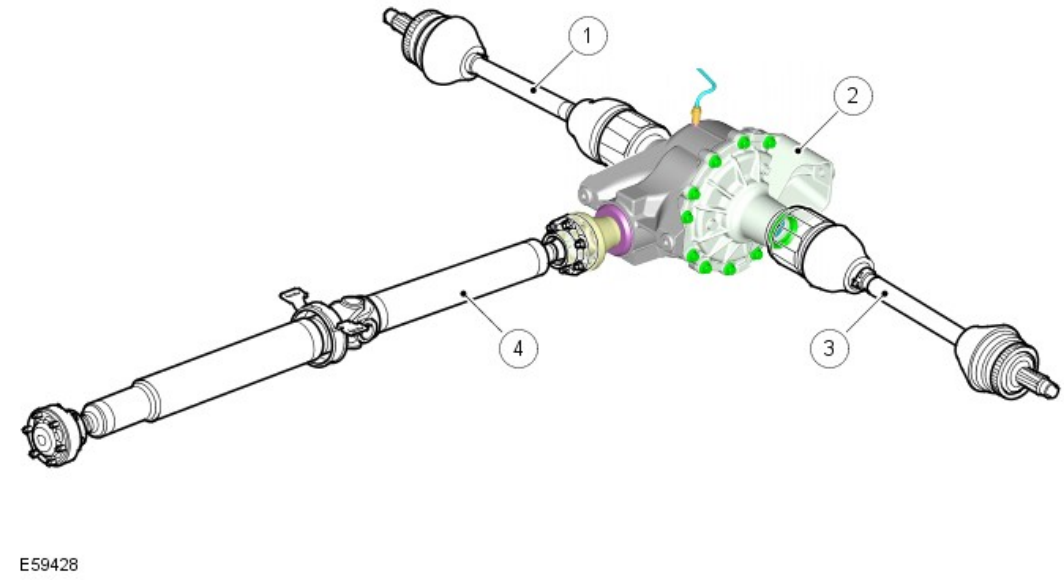
2012.0 RANGE ROVER (LM), 205-02

REAR DRIVE AXLE/DIFFERENTIAL

DESCRIPTION AND OPERATION

OPEN REAR DIFFERENTIAL

Component Location



E59428

ITEM	DESCRIPTION
1	RH rear drive halfshaft
2	Rear differential
3	LH rear drive halfshaft
4	Rear driveshaft assembly

OVERVIEW

The rear differential converts the 'angle of drive' through 90 degrees and distributes drive, via the rear drive halfshafts, to the rear wheels.

The output ratio of the rear differential varies depending on the engine variant.
For additional information, refer to: Specifications (205-02 Rear Drive Axle/Differential, Specifications).

The unit is located centrally in the rear of the chassis and is mounted to the chassis via rubber bushes and bolts; two mounting points at the front of the unit and one at the rear.

The cast iron casing comprises two parts; a cover and a carrier. The carrier provides locations for all the internal components. The carrier is sealed to the cover with sealant and secured with 12 bolts. The cover and carrier have cast ribs, which assist mobility. A breather tube is fitted to the top of the carrier. This allows a plastic tube to be fitted and routed to a high point under the vehicle body, preventing the ingress of water when the vehicle is wading.

The differential is a conventional design using a hypoid gear layout, similar to the front differential. The ratio is changed by changing the amount of teeth between the crown wheel drive gear and pinion gear. For example, with a ratio of 3.54:1, the crown wheel drive gear will have 3.54 times more teeth than the pinion gear.

The carrier contains an oil drain plug.

OPEN REAR DIFFERENTIAL INTERNAL COMPONENTS

The differential comprises a pinion shaft and hypoid pinion gear and a crown wheel drive gear with an integral cage, which houses 2 planet gears. Two sun wheels are also located in the cage and pass the rotational drive to the drive shafts.

The pinion shaft is mounted on two opposed taper roller bearings, with a collapsible spacer located between them. The spacer is used to hold the bearings in alignment and also collapses under the pressure applied to the pinion-flanged nut. This allows the flanged nut to be tightened by measuring the torque-to-turn, which collapses the spacer, setting the correct bearing preload.

The pinion shaft has an externally splined outer end, which accepts and locates the input flange, which is retained by the pinion nut. The input flange has four threaded holes and mates with the rear drive shaft. Four bolts secure the rear drive shaft to the input flange. An oil seal is pressed

into the pinion housing and seals the input flange to the pinion housing. The pinion shaft has a hypoid gear at its inner end, which mates with the crown wheel drive gear.

The crown wheel drive gear is located on the differential case and secured with 10 bolts. The differential case is mounted on taper roller bearings located in machined bores on each side of the pinion housing. Belleville washers are used to apply the correct bearing preload and hypoid backlash.

The differential carrier has a through hole, which provides location for the shaft. The shaft is supported by a sun gear and a needle roller bearing. The shaft is fitted with a snap ring at one end, which locates in a machined groove in the sun gear, locking the shaft in position.

The sun gears are located in pockets in the carrier cage and mesh with the planet gears. Spacers are fitted between the sun wheels and the carrier and set the correct mesh contact between the planet gears and the sun wheels. Each sun wheel has a machined bore with internal splines and machined groove near the splined end. The groove provides positive location for a snap ring fitted to the end of each output flange.

Each output shaft has a spline, which locates in each sun wheel. A snap ring fitted to the splined shaft locates in the groove of the sun wheel bore and positively locates the output shaft. Oil seals are pressed into each side of the pinion housing and seals the output shaft.

The operating principles of the front and rear differentials are the same. Rotational input from the drive shaft is passed via the input flange to the pinion shaft and pinion gear. The angles of the pinion gear to the crown wheel drive gear moves the rotational direction through 90 degrees.

The transferred rotational motion is now passed to the crown wheel drive gear, which in turn rotates the differential casing. The shaft, which is secured to the casing, also rotates at the same speed as the casing. The planet gears, which are mounted on the shaft, also rotate with the casing. In turn, the planet gears transfer their rotational motion to the left and right hand sun wheels, rotating the drive halfshafts.

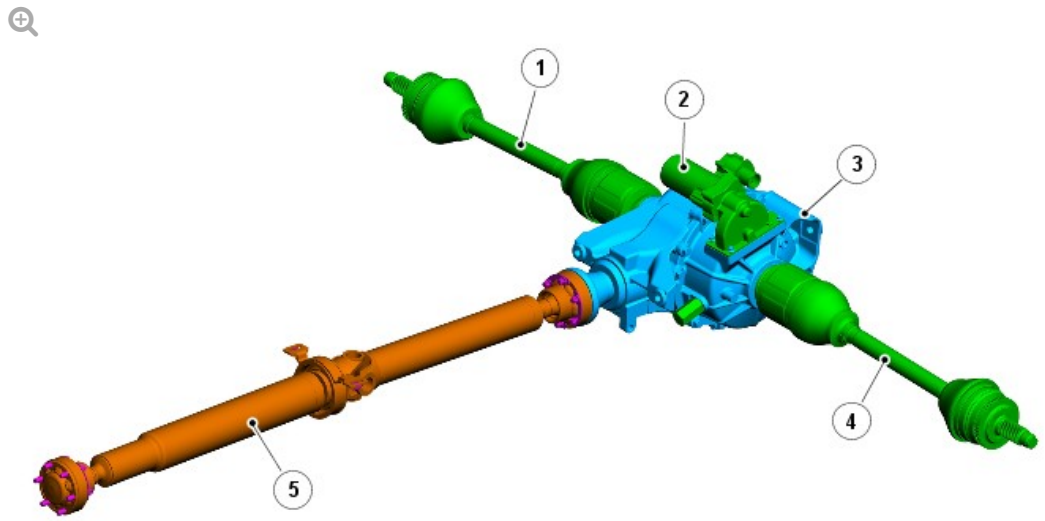
When the vehicle is moving in a forward direction, the torque applied through the differential to each sun wheel is equal. In this condition both

through the differential to each sun wheel is equal. In this condition both drive halfshafts rotate at the same speed. The planet gears do not rotate and effectively lock the sun wheels to the differential casing.

If the vehicle is turning, the outer wheel will be forced to rotate faster than the inner wheel by having a greater distance to travel. The differential senses the torque difference between the sun wheels. The planet gears rotate on their axes to allow the outer wheel to rotate faster than the inner one.

ELECTRONIC TORQUE MANAGED (ETM) REAR DIFFERENTIAL

Component Location



E84160

ITEM	DESCRIPTION
1	RH rear drive halfshaft
2	Actuator motor
3	Rear differential
4	LH rear drive halfshaft
5	Rear driveshaft assembly

OVERVIEW

The Electronic Torque Managed (ETM) rear differential is available as an option on both petrol and diesel derivatives. The output ratio for the ETM rear differential remains the same as the open differentials for both petrol and diesel derivatives.

The ETM differential has the same functionality as the open rear differential but incorporates a locking feature.

ELECTRONIC TORQUE MANAGED (ETM) REAR DIFFERENTIAL INTERNAL COMPONENTS

An electronically controlled multi-plate clutch provides a rear differential lock and torque biasing function to give improved traction performance and vehicle dynamic stability.

A strategy, to electronically control the rear differential multi-plate clutch assembly, has been developed to provide:

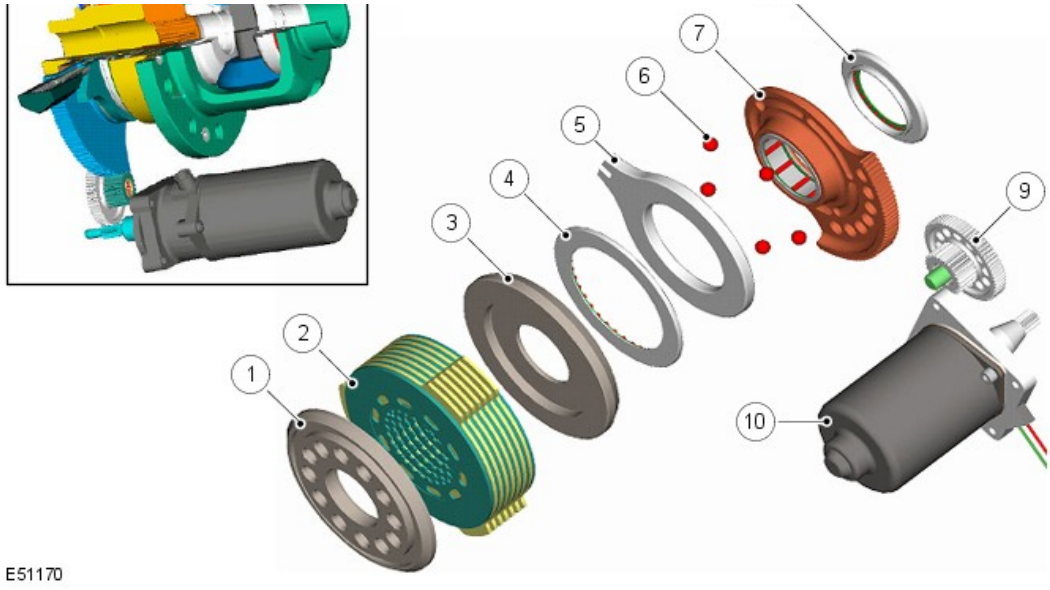
- a pre-loading function, increasing locking torque with increased driving torque
- a slip controller to increase locking torque under off-road conditions and decrease locking torque for optimum comfort, e.g. parking.

The unit receives a torque input from the transfer box output shaft, which is passed through the unit to two outputs for the rear drive halfshafts.

The unit detects wheel slip via various vehicle system inputs to the ETM rear differential control module and locks the differential accordingly.

The ETM differential locking and biasing feature is actuated via a Direct Current (DC) motor, which is controlled by the ETM rear differential control module, via a Pulse Width Modulation (PWM) signal.

MULTI-PLATE CLUTCH ASSEMBLY



ITEM	DESCRIPTION
1	Pressure disc
2	Clutch plate assembly
3	Pressure disc
4	Thrust race
5	Output actuator
6	Actuator balls
7	Input actuator
8	Bearing pre-load spacer
9	Reduction gearset
10	Actuator motor

The multi-plate clutch assembly for both center (transfer box) and ETM rear differentials act in a similar way. The aim of the multi-plate clutch assembly is to prevent excessive differential slip and therefore maximize the traction performance of the vehicle. This is fundamentally different from the 'braked' traction control, which can only counteract differential slip when it occurs.

A certain amount of differential slip is required to allow the vehicle to turn corners and to remain stable under control of the Anti-lock Braking System (ABS). The transfer box control module monitors the driver's demands through primary vehicle controls and automatically sets the slip torque at

the rear differential, via the ETM rear differential control module. The system is completely automatic and does not require any special driver input.

The multi-plate clutch assembly actively controls the torque flow through the rear differential and optimizes the torque distribution in the driveline. The clutch assembly biases the torque from the differential to the wheels with the higher grip and prevents the wheels with the lower grip from spinning.

By turning the input actuator disc, via the motor shaft, the output actuator is rotated. This movement acts on five balls in a ramp mechanism between the input and output actuators and gives a defined axial movement. The movement forces the pressure disc to induce friction between the sun gear and differential case via the clutch plates supported by the sun gear and the plates supported by the clutch basket on the differential case. This frictional force inhibits the differential rotation; the differential case and left hand differential side gear are locked together.

ELECTRONIC TORQUE MANAGED (ETM) REAR DIFFERENTIAL CONTROL MODULE

The ETM rear differential control module controls the multi-plate clutch actuation. The control module is mounted on a bracket located on the LH C-pillar, behind the trim.

The control module is connected on the Controller Area Network (CAN) bus and controls the differential operation using CAN messages from other control modules on the network.

The control module uses three connectors for all inputs and outputs. It receives a permanent power supply via a 40A fusible link located in the Battery Junction Box (BJB), and an ignition supply via fuse 24 located in the Central Junction Box (CJB).

The control module memorizes the position of the ETM rear differential motor when the ignition is switched off.

The control module controls the closed loop position sensing system within the motor and regulates the power supply to the motor.

If the control module is replaced, Land Rover recommends diagnostic tool

If the control module is replaced, a Land Rover approved diagnostic tool must be connected to the vehicle and the ETM rear differential control module self-calibration procedure must be performed. This procedure must also be performed if the motor or differential assembly is replaced.

If a fault occurs with the ETM rear differential, the control module or one of the required input signals, i.e. road speed signal, the control module records an error code and a warning lamp, in the instrument cluster, illuminates permanently.

CAN BUS MESSAGES

The CAN bus is a high speed broadcast network connected between various vehicle control modules. It allows the fast exchange of data between control modules every few microseconds. The bus comprises 2 wires, which are twisted together to minimize electromagnetic interference (noise) produced by the CAN messages.

The ETM rear differential control module is connected on the CAN bus, via the transfer box control module, and controls differential operation using CAN messages from other control units on the network. Wheel speed, steering angle, automatic transmission speed, temperature information, car configuration, axle ratios and mode inputs, are some of the main signals received by the control module.

The control module also sends messages via the CAN bus to tell other control modules on the network, the status of the ETM rear differential. The clutch torque and default mode status are some of the main signals sent out by the control module.

The following table shows the messages that can be displayed in the message center of a high-line instrument cluster relating to the ETM rear differential:

MESSAGE	DESCRIPTION	CHIME
'TRANSMISSION OVERHEAT' 'SLOW DOWN'	Rear differential temperature has reached or is approaching the overheat threshold	None
'TRANSMISSION FAULT' 'TRACTION REDUCED'	Transfer box control module has stopped transmitting CAN bus messages. Defaults to open center differential. Message also displayed when fault occurs with ETM rear differential	None

'TRANSMISSION FAULT' 'STOP SAFELY'	Fault has occurred with ETM rear differential. Stop vehicle at earliest opportunity	Single

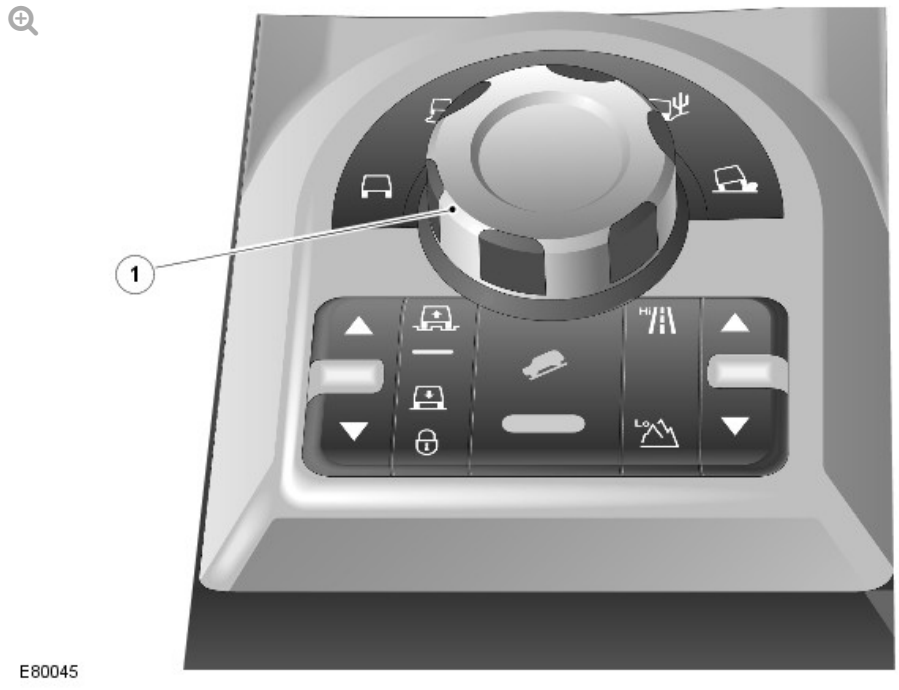
On vehicles fitted with the low line instrument cluster, in place of the message center there will be a status lamp, which has the following logic:

- Amber - Over temperature
- Red - Failure, stop vehicle

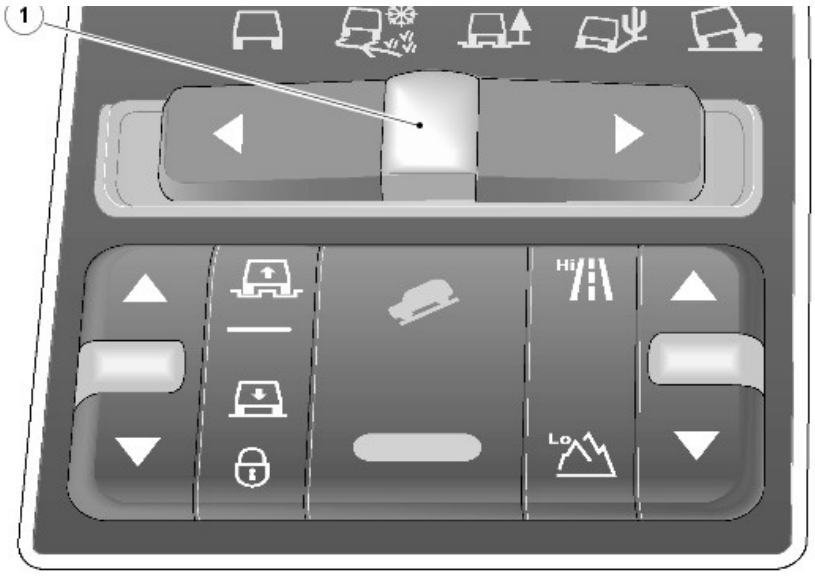
TERRAIN RESPONSE

The Terrain Response system allows the driver to select a program, which will provide the optimum settings for traction and performance for the prevailing terrain conditions.

Depending on vehicle specification the system is controlled by either a rotary control or rocker switch located on the floor console:



ITEM	DESCRIPTION
1	Terrain Response rotary control knob



E130458

ITEM	DESCRIPTION
1	Terrain Response rocker-switch

The system uses a combination of vehicle subsystems to achieve the required vehicle characteristics for the terrain selected. The following subsystems form the Terrain Response system:

- Engine management system (EMS)
- Automatic transmission
- Transfer box
- Brake system
- Air suspension

Each subsystem control module provides a feedback for the selected program so that the Terrain Response control module can check that all systems are controlling the system correctly. The exception to this is the ETM rear differential control module, which does not provide feedback to the Terrain Response system as it is a slave to the transfer box control module.
For additional information, refer to: Ride and Handling Optimization (204-06 Ride and Handling Optimization, Description and Operation).

SERVICE

The oil used in the ETM rear differential contains unique additives and friction modifiers, which enhance the differentials operation. No other oil must be used in the ETM rear differential.
For additional information, refer to: Specifications (205-02 Rear Drive Axle/Differential, Specifications).

ELECTRONIC TORQUE MANAGED (ETM) REAR DIFFERENTIAL SERVICEABLE COMPONENTS

- Halfshaft seals
- Needle roller bearing assembly
- Chassis bush/fixings
- Actuator motor
- Temperature sensor
- Control module and bracket
- Lubricant

DIAGNOSTICS

The ETM rear differential control module can store fault codes, which can be retrieved by connecting the Land Rover approved diagnostic tool using ISO-14229 protocol.

The information is communicated via a diagnostic socket.

The diagnostic socket allows the exchange of information between the various control modules on the bus systems and the Land Rover approved diagnostic tool. The information is communicated to the socket, via the CAN bus. This allows the retrieval of diagnostic information and programming of certain functions using the Land Rover approved diagnostic tool.

The ETM rear differential control module uses Diagnostic Trouble Codes (DTC), which relate to ETM rear differential electrical faults.

2012.0 RANGE ROVER (LM), 205-02

REAR DRIVE AXLE/DIFFERENTIAL

DIAGNOSIS AND TESTING

PRINCIPLES OF OPERATION

For additional information, refer to the relevant Description and Operation section of the workshop manual.

INSPECTION AND VERIFICATION

CAUTION:

Diagnosis by substitution from a donor vehicle is NOT acceptable.

Substitution of control modules does not guarantee confirmation of a fault, and may also cause additional faults in the vehicle being tested and/or the donor vehicle.

1. Verify the customer concern.

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

Visual Inspection

MECHANICAL	ELECTRICAL
▪ Differential oil leakage ▪ Sensor installation	▪ Power supply ▪ Fuse(s) ▪ Wiring harness physical damage or water ingress ▪ Loose or corroded electrical connectors ▪ Controller area network (CAN) circuits ▪ Sensors ▪ Rear Differential Control Module

1. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.

1. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart, alternatively check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

SYMPTOM CHART

SYMPTOM	POSSIBLE MESSAGE	POSSIBLE CAUSES	ACTION
Rumbling noise from the rear of the vehicle varying at different vehicle speed and load	▪ N/A	▪ Rear differential internal failure ▪ Road noise ▪ Worn or damaged driveshaft	Using the manufacturer approved diagnostic system run application Noise, vibration and harshness diagnostic test - Rear differential

		driveshaft joint ▪ Wheel bearing ▪ Another component contacting the front/rear drive halfshaft	
Running at reduced capability with fault present	▪ N/A	▪ Water ingress to wiring harness or connectors ▪ Reduced differential capability ▪ Differential increased tolerances ▪ Internal fault ▪ Rear Differential Control Module fault (Rear Differential Control Module)	Check for stored DTCs and refer to the DTC index. Visually inspect the wiring harness and connectors for water ingress. Refer to the warranty policy and procedures manual if a module is suspect.
Rear differential overheat	▪ Rear Axle Overheat	▪ Oil level incorrect ▪ Oil level incorrect specification ▪ Sensor fault ▪ Internal fault	Check for stored DTCs and refer to the DTC index. Check for correct oil quantity and specifications. Refer to the relevant section of the workshop manual.
Excessive steering effort	▪ Rear Axle Fault	▪ Sticking or stuck actuator	Check for stored fault codes and refer to 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: Module Name: Rear Differential Control Module (100-00 General Information, Description and Operation).

REAR DRIVE AXLE/DIFFERENTIAL

DIFFERENTIAL DRAINING AND FILLING (G899912)

GENERAL PROCEDURES

51.25.02	REAR AXLE - DRAIN AND REFILL	ALL DERIVATIVES	0.2	USED WITHINS	+

CAUTION:

Do not fill the differential with lubricant up to the filler plug. The filler plug is only used to fill the differential with lubricant, and not to act as a level indicator.

1. **WARNING:**

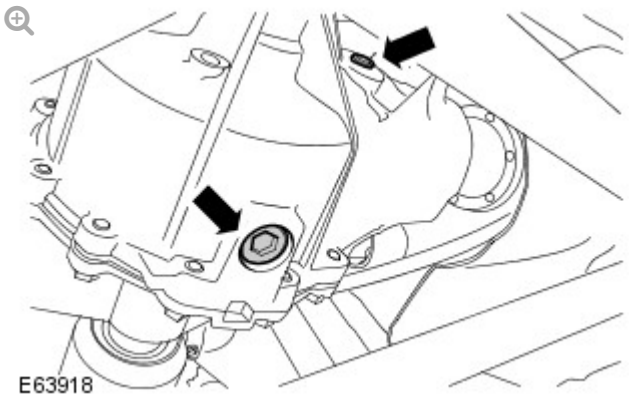
   Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the differential case fluid filler plug.

- Clean the area around the fluid filler plug.
- Position a container to collect spillage.

3.



Drain the differential fluid.

- Clean the area around the fluid drain plug.
- Remove the fluid drain plug.

4. Install the differential case fluid drain plug.
   - Clean the component mating faces.
   - Tighten the drain plug to 54 Nm (40 lb.ft).

5. **CAUTION:**

   Do not fill the differential case with fluid up to the filler plug hole. The filler plug is only used to fill the differential case with fluid, and not to act a level indicator.

   Fill the differential with the correct amount of fluid.
   For additional information, refer to: Specifications (205-02, Specifications).

6. Install the differential case fluid filler plug.
   - Clean the filler plug.
   - Tighten the filler plug to 34 Nm (25 lb.ft).

2012.0 RANGE ROVER (LM), 205-02

REAR DRIVE AXLE/DIFFERENTIAL

AXLE HOUSING BUSHING – V8 5.0L PETROL/V8 S/C 5.0L

V8 5.0L PETROL, V8 S/C 5.0L PETROL (G1225947)

IN-VEHICLE REPAIR

REMOVAL

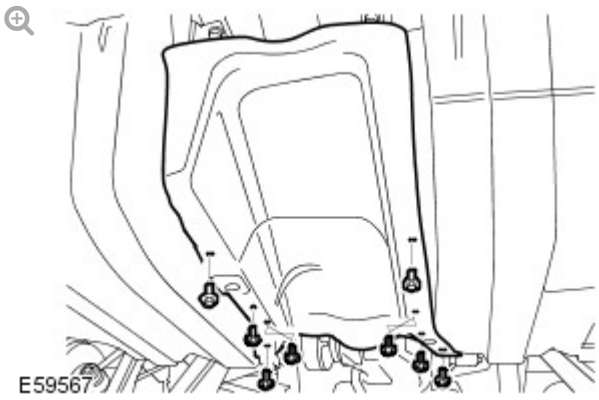
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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. Remove the exhaust system.
   For additional information, refer to: Exhaust System (309-00, Removal and Installation).

4. 

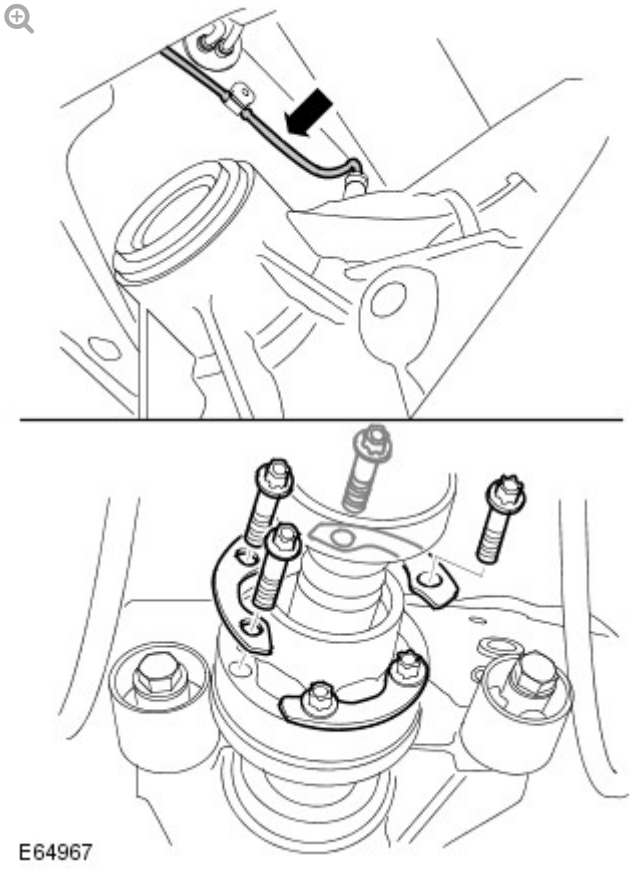
   Remove the fuel tank heat shield.

   - Remove the 8 screws.

5.

CAUTIONS:

- Mark the position of the driveshaft flange in relation to the drive pinion flange.
- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.



Release the driveshaft from the rear axle drive flange.

- Remove the 6 Torx bolts and washers.

6.

CAUTION:

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

Disconnect the axle case breather line.

7.

NOTE:

Allow the axle to rotate until the drive flange hangs down.

Lower the rear axle assembly.

- Using a transmission jack, support the axle.
- Remove and discard the nut and bolt.
- Remove the 2 bolts.

8.

CAUTION:

Note the fitted position of the bush and mark the sub-frame to aid assembly.

NOTE:

Move the axle case rearwards for access.

Using the special tools, remove the rear axle housing front bushing.

INSTALLATION

1.

CAUTIONS:

- Lubricate the new bush with rubber lubricant to aid assembly.
- Align the new bush to the mark on the sub-frame.

Using the special tools, install the rear axle housing front bushing.

- Clean the component mating faces.

2. Install the axle assembly.
   - Clean the component mating faces.
   - Tighten the bolts to 100 Nm (74 lb.ft).
   - Tighten the new nut and bolt to 120 Nm (89 lb.ft), then a further 180 degrees.
3. Connect the axle case breather line.
4. Attach the driveshaft to the rear axle drive flange.
   - Clean the component mating faces.
   - Install the washers.
   - Tighten the Torx bolts to 44 Nm (32 lb.ft), then a further 45 degrees.
5. Install the fuel tank heat shield.
   - Tighten the screws.
6. Install the exhaust system.
   For additional information, refer to: Exhaust System (309-00, Removal and Installation).
7. Install the wheels and tires.
   - Tighten the wheel nuts to 140 Nm (103 lb.ft).
8. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

AXLE SHAFT SEAL (G928074)

IN-VEHICLE REPAIR

SPECIAL TOOL(S)

204-506/1(LRT-60-030/1)

Halfshaft remover/replacer

204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer

204-506/3(LRT-60-030/3)

Halfshaft remover/replacer

204-506-01(LRT-60-030/4)

Halfshaft installer adapter

308-005(LRT-37-004/2)

Axle oil seal remover

100-012(LRT-99-004)

Impulse extractor

308-626/1

Installer halfshaft oil seal

308-626/2

Installer/Guide halfshaft oil seal

REMOVAL

CAUTIONS:

- Do not allow halfshafts to hang unsupported at one end or joint damage will occur.
- Do not store or install halfshafts with joints at maximum articulation

or damage may occur to the joint.

- Angularly Adjusted Roller (AAR) joints, used at the inboard end of some halfshafts have no internal retaining mechanism and can separate.

1. **WARNING:**

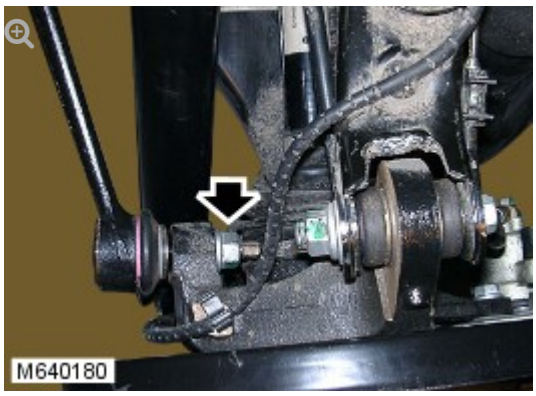
   Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the rear wheel and tire.

3. **NOTE:**

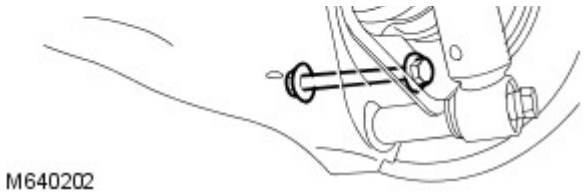
   Use an additional wrench to prevent the component from rotating.



   Release the tie rod.

   - Remove and discard the nut.

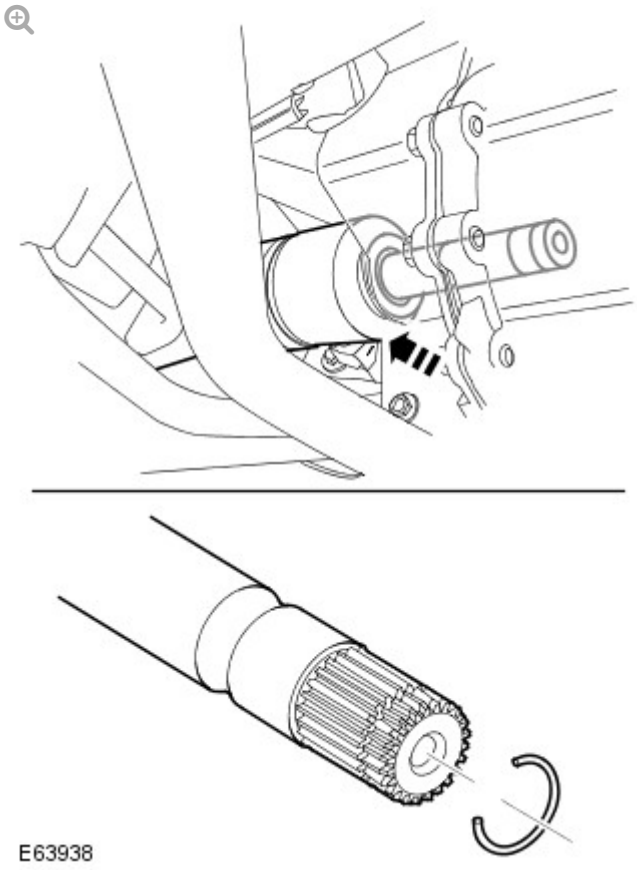
4. 



Release the lower arm.

- Using a suitable stand, support the lower arm.
- Remove and discard the nut and bolt.

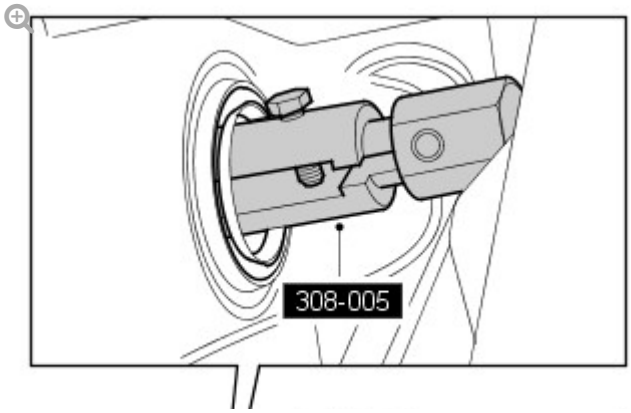
5.

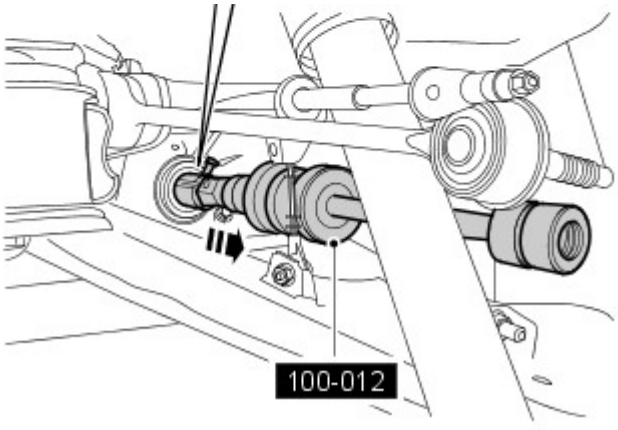


With assistance, release the halfshaft.

- Remove and discard the snap ring.

6.





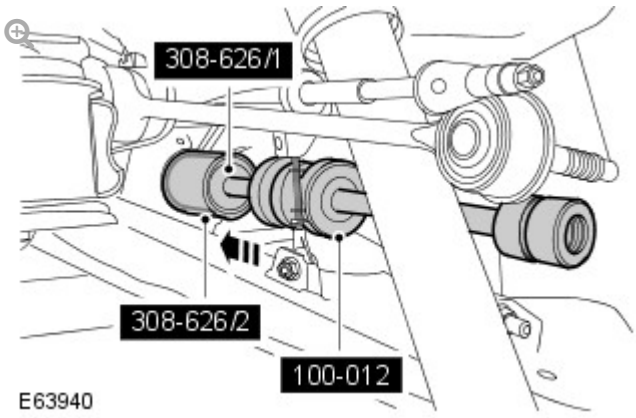
Using the special tools, remove and discard the axle shaft seal.

INSTALLATION

1.

CAUTION:

The axle shaft seal protector must be left in place until the halfshaft has been installed.



Using the special tools, install a new axle shaft seal.

- Clean the component mating faces.

2.

CAUTION:

Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within

the axle case.

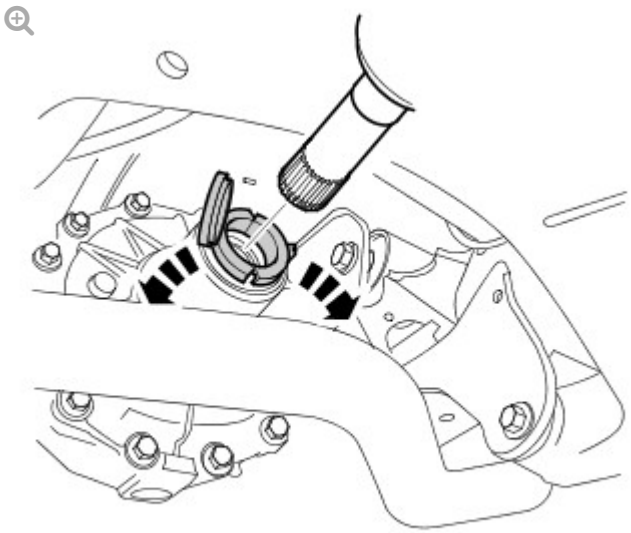
With assistance, secure the halfshaft.

- Clean the component mating faces.
- Install a new snap ring.
- Open the axle shaft seal protector.

3.

NOTES:

- LH illustration shown, RH is similar.
- The axle shaft seal protector is designed to break into two pieces.



E63941

Remove and discard the axle shaft seal protector.

4.

CAUTION:

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

Secure the lower arm.

- Install a new nut and bolt and tighten to 250 Nm (184 lb.ft).

5. **NOTE:**

   Use an additional wrench to prevent the component from rotating.

   Secure the tie rod.

   - Install a new nut and tighten to 165 Nm (121 lb.ft).

6. Install the wheel and tire.
   - Tighten the wheel nuts to 140 Nm (103 lb.ft).

REAR DRIVE AXLE/DIFFERENTIAL

DIFFERENTIAL LOCKING MOTOR (G877133)

IN-VEHICLE REPAIR

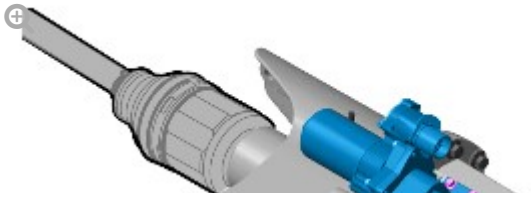
51.15.03	MOTOR – DIFFERENTIAL LOCKING – RENEW	ALL DERIVATIVES	0.4	USED WITHINS	+

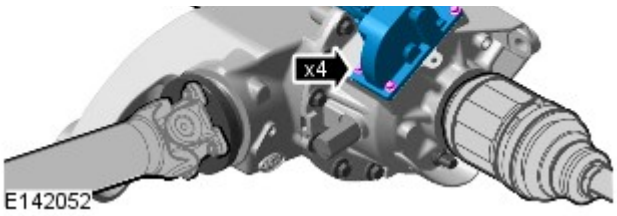
REMOVAL

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.

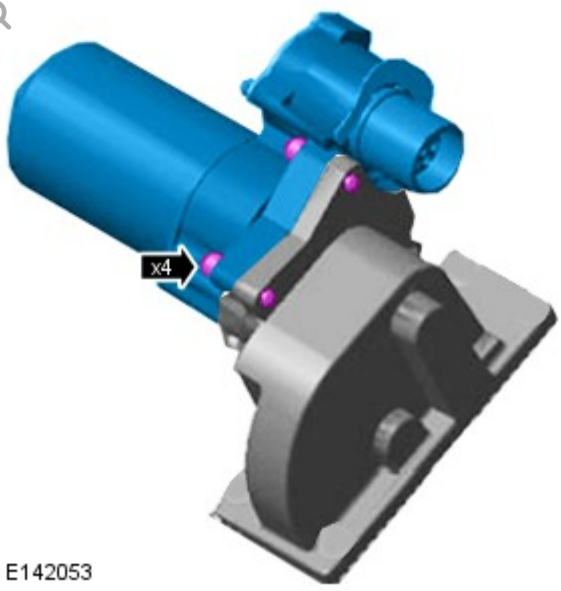
2. 



Remove the differential locking motor.

- Disconnect the electrical connector.
- Remove the 4 bolts.

3.



Remove the 4 bolts.

4.

Discard the motor.

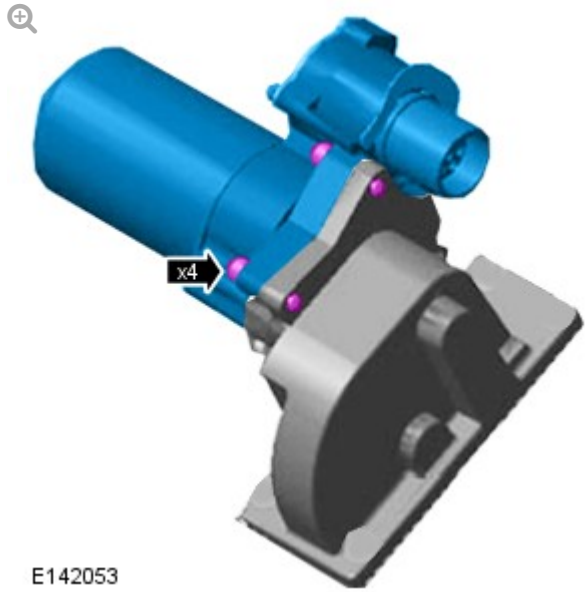
5. Check the gear set for damage to the gears.

INSTALLATION

1. Clean the component mating faces.

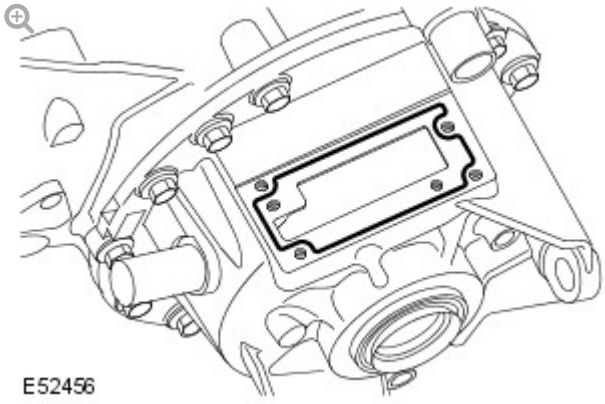
2. 
E142055

Install the new motor with new O ring seal.

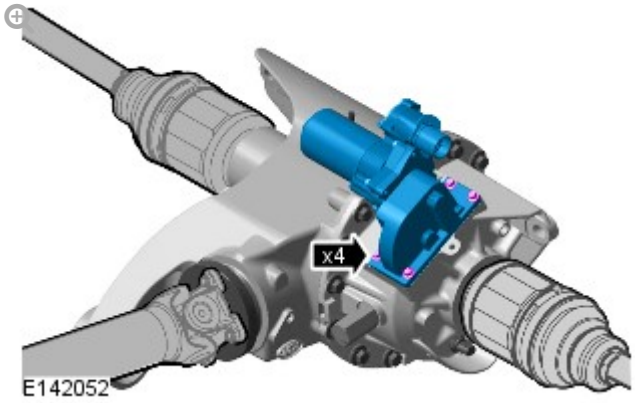
3. 

E142053

Install the 4 bolts 12 Nm.

4. 

   Clean the component mating faces and apply continuous bead of sealant to the motor mating face on the differential.

5. 

   Install the differential locking motor.

   - Tighten the bolts to 10 Nm.
   - Connect the electrical connector.

6. Using the Land Rover approved diagnostic system, calibrate the new differential locking motor.

2012.0 RANGE ROVER (LM), 205-02

REAR DRIVE AXLE/DIFFERENTIAL

DRIVE PINION SEAL (2011388)

DRIVE PINION SEAL (G914388)

IN-VEHICLE REPAIR

51.20.01	OIL SEAL – DRIVE PINION – RENEW	5000 CC, AJ V8	1.5	USED WITHINS	+

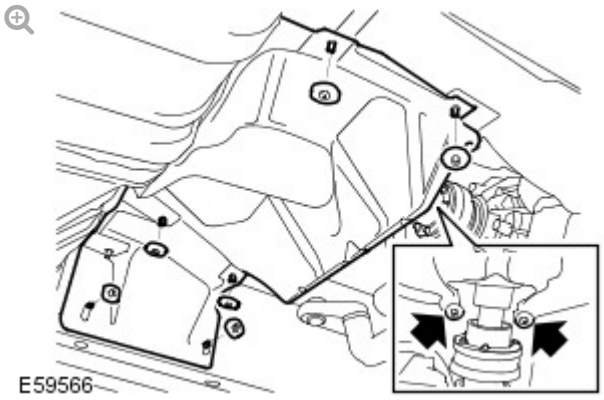
REMOVAL

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.

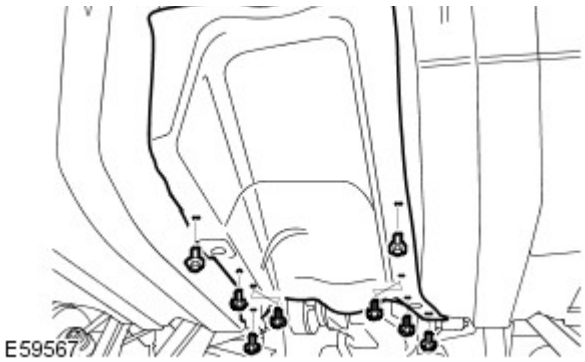
2. Remove the exhaust system.
   For additional information, refer to: Exhaust System (309-00, Removal and Installation).

3. 

   Remove the center heat shield.

   - Remove the 8 nuts.

4. 



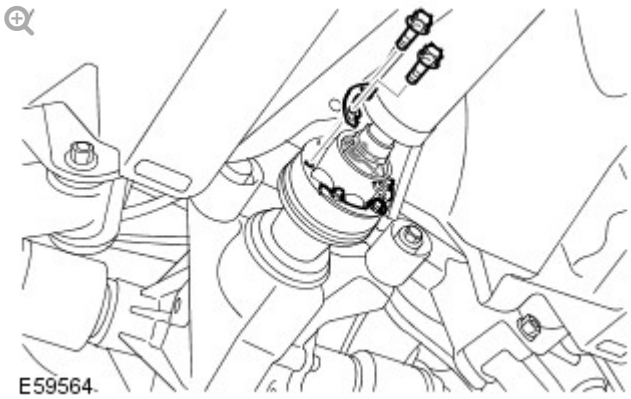
Remove the fuel tank heat shield.

- Remove the 8 screws.

5.

CAUTIONS:

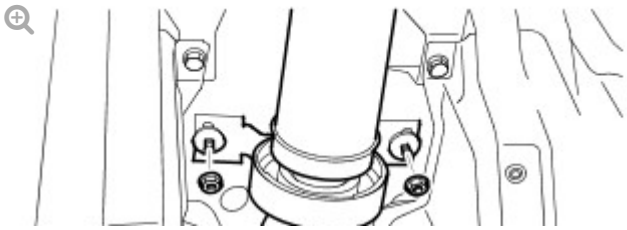
- Mark the position of the driveshaft flange in relation to the drive pinion flange.
- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.

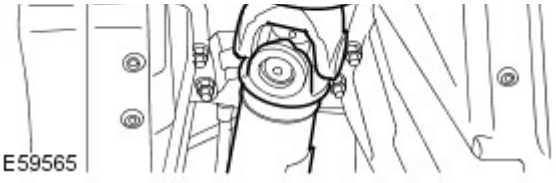


Release the driveshaft from the rear axle drive flange.

- Remove the 6 Torx bolts and washers.
- Discard the bolts.

6.

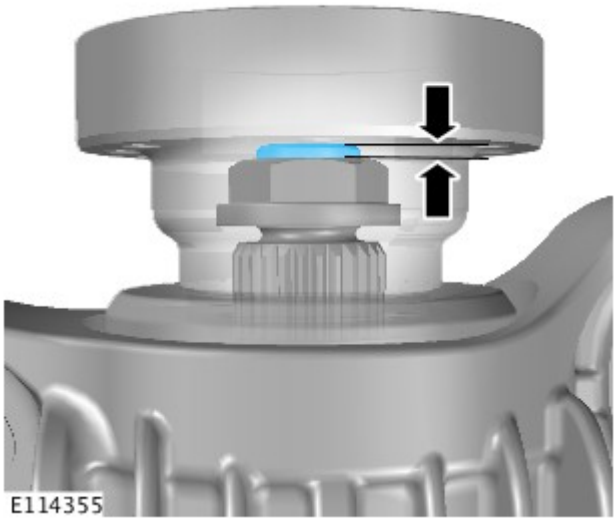




Remove the 2 driveshaft center bearing mount nuts.

- With assistance, release the driveshaft and tie aside.

7.



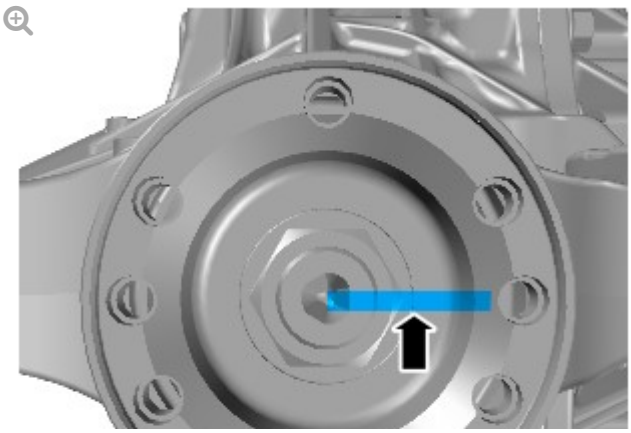
Measure the depth of the pinion nut on the pinion shaft.

- Note measurement for installation.

8.

CAUTION:

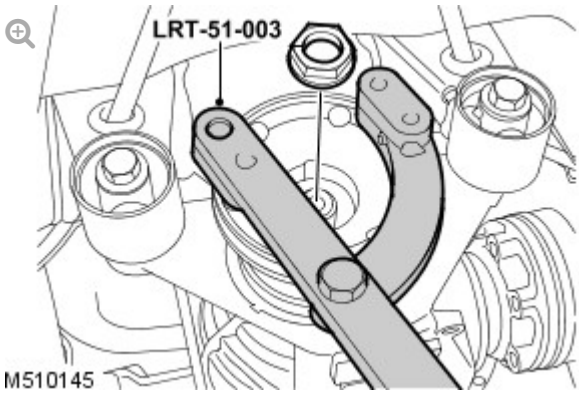
This step must be carried out to make sure that the drive pinion nut is correctly tightend on assembly.



E114354

Accurately scribe a line to mark the drive pinion shaft to the drive pinion nut and pinion flange.

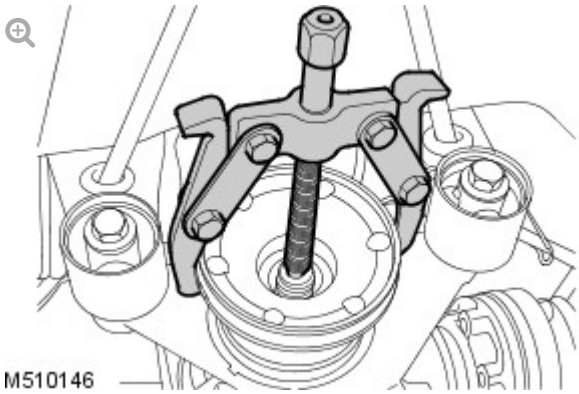
9.



Remove the drive pinion flange retaining nut.

- Using the special tool, counter hold the drive pinion flange.
- Note number of turns for installation.

10.



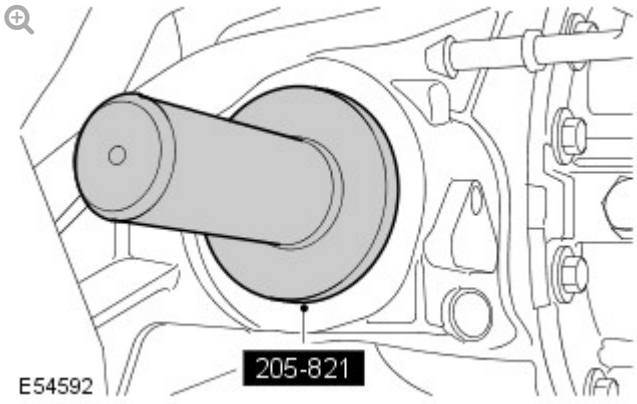
Using a two legged puller remove the pinion flange.

- Check flange seal journal for any damage.
- Carefully remove and discard the oil seal.

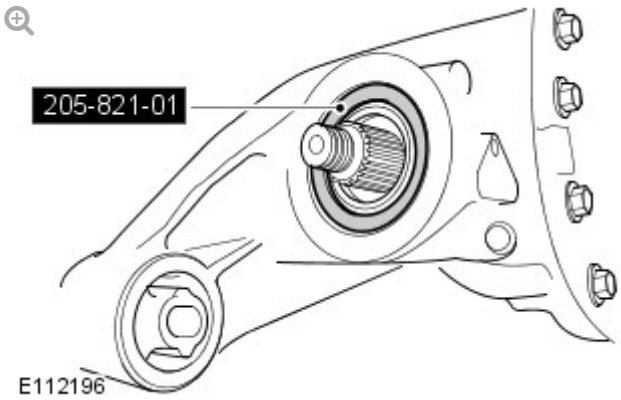
INSTALLATION

1. Clean the drive pinion flange.

2. Clean the drive pinion seal mating faces.

3. 

Using the special tool, install the new drive pinion seal.

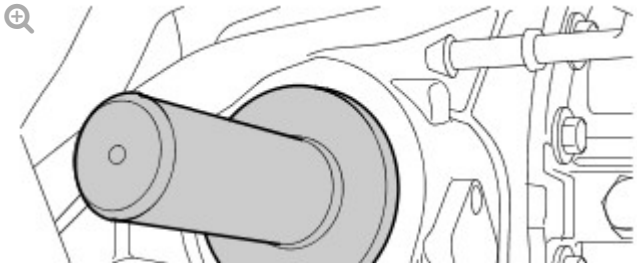
4. 

Remove the special tool.

- Install special tool 205-821-01 to the seal face.

5. **CAUTION:**

Make sure adaptor is removed or damage to the vehicle may occur.



Using the special tool, install the new drive pinion seal.

- Remove the special tools.

6.

CAUTION:

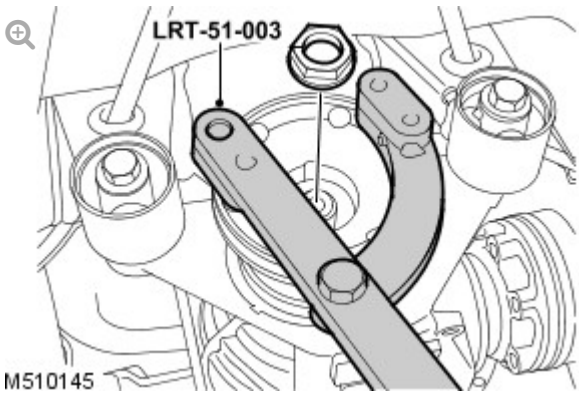
Make sure the drive pinion flange scribed marks are aligned.

Install the drive pinion flange.

7.

CAUTIONS:

- Make sure the mark on the drive pinion nut is never tightened short of the scribed mark on the drive pinion shaft.
- Make sure the drive pinion flange has no end float and is free to rotate.
- Make sure the scribed mark on the drive pinion nut is no more than a maximum of 5 degrees past the scribed mark on the drive pinion shaft.



Install the drive pinion flange retaining nut.

- Using the special tool, counter hold the drive pinion flange.

- Install nut to previously noted number of turns.
- Measure the depth of the pinion nut on the pinion shaft.

8.

CAUTION:

It is possible to fit the driveshaft incorrectly. The universal joint must be rearward of the center bearing when installed in the vehicle.

NOTE:

A small amount of oil may weep from the driveshaft joints during storage. The loss of this oil will not affect the operation or durability of the joint.

Attach the driveshaft to the rear axle drive flange.

- Remove the cable tie.
- Clean the component mating faces.
- Align the driveshaft to the previously noted position.
- Tighten the Torx bolts to 44 Nm (32 lb.ft), then a further 45 degrees.
- Remove the cable tie.

9.

CAUTION:

Make sure the center bearing mount is not under tension and central within the slots.

Attach the driveshaft center bearing mount.

- Align the center bearing mount.
- Tighten the nuts to 21 Nm (15 lb.ft).

10. Install the fuel tank heat shield.
    - Tighten the screws.

11. Install the center heat shield.
    - Tighten the nuts.

12. Install the exhaust system.
    For additional information, refer to: Exhaust System (309-00, Removal and Installation).

13. **CAUTION:**

    Make sure the correct specification and quanity of oil is used.

    Check the differential oil level and top up if necessary

2012.0 RANGE ROVER (LM), 205-02

REAR DRIVE AXLE/DIFFERENTIAL

AXLE ASSEMBLY (G1225897)

REMOVAL AND INSTALLATION

51.15.01	DIFFERENTIAL - RENEW	5000 CC, AJ V8	2.9	USED WITHINS	+

SPECIAL TOOL(S)

308-005(LRT-37-004/2)

Axle oil seal remover

100-012(LRT-99-004)

Impulse extractor

308-626/1

Installer halfshaft oil seal

308-626/2

Installer/Guide halfshaft oil seal

REMOVAL

REMOVAL

CAUTIONS:

- Do not allow halfshafts to hang unsupported at one end or joint damage will occur.
- Do not store or install halfshafts with joints at maximum articulation or damage may occur to the joint.
- Angularly Adjusted Roller (AAR) joints, used at the inboard end of some halfshafts have no internal retaining mechanism and can separate.

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

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. Remove both rear wheels and tires.

4. Remove the exhaust system.
   For additional information, refer to: Exhaust System (309-00, Removal and Installation).

5. 

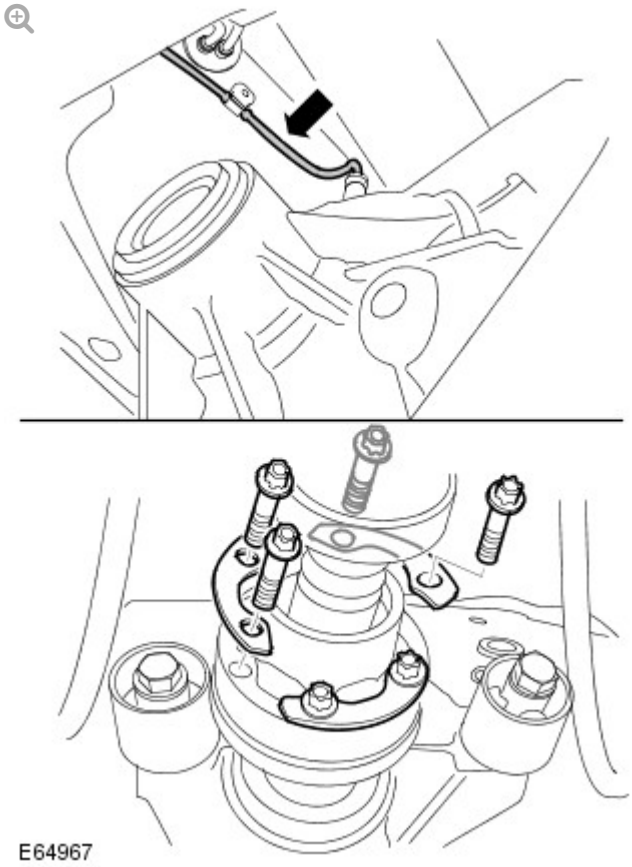
Remove the fuel tank heat shield.

- Remove the 8 screws.

6. Drain the differential fluid.
For additional information, refer to: Differential Draining and Filling (205-02, General Procedures).

7. **CAUTIONS:**

- Mark the position of the driveshaft flange in relation to the drive pinion flange.
- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.



Release the driveshaft from the rear axle drive flange.

- Remove and discard the 6 bolts.
- Remove the 3 washers.

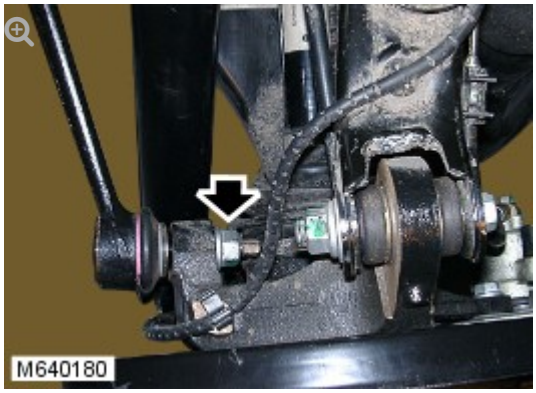
8. **CAUTION:**

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

Disconnect the axle case breather line.

9. **NOTE:**

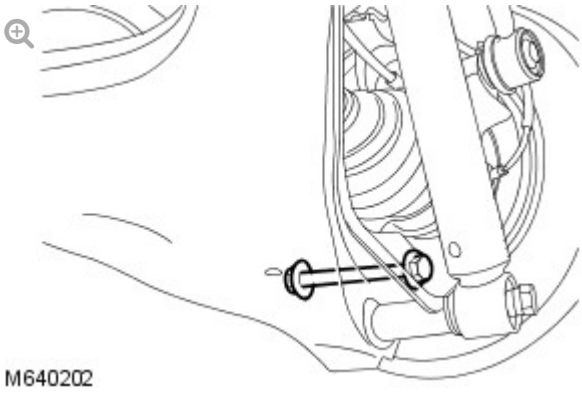
> Use an additional wrench to prevent the component from rotating.



Release the LH tie rod.

- Remove and discard the nut.

10.

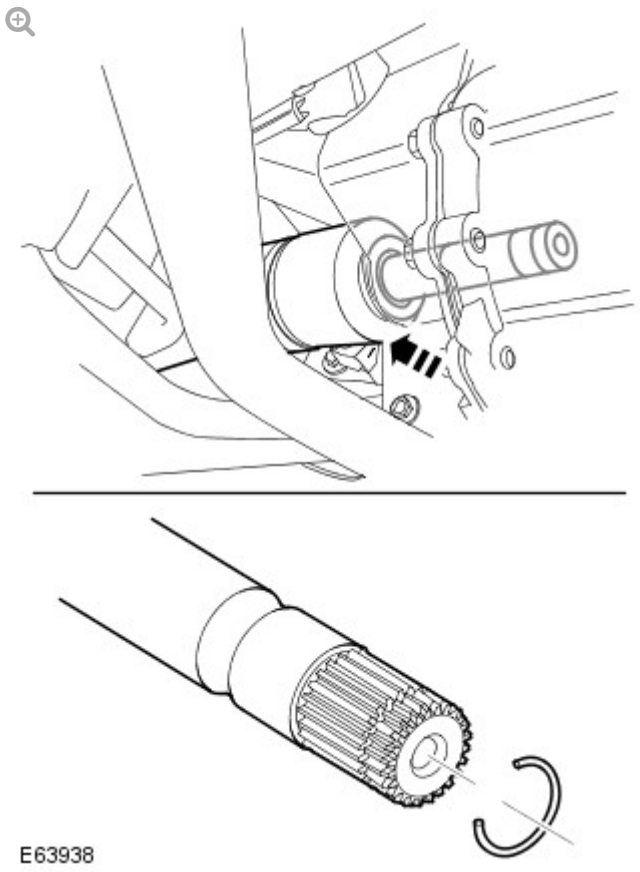


Release the LH lower arm.

Release the LH lower arm.

- Using a suitable stand, support the lower arm.
- Remove and discard the nut and bolt.

11.



With assistance, release the LH halfshaft.

- Remove and discard the snap ring.

12.

NOTES:

- Use an additional wrench to prevent the component from rotating.
- LH illustration shown, RH is similar.

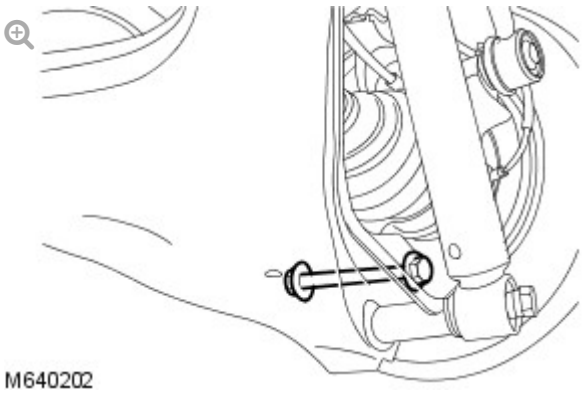
Release the RH tie rod.

- Remove and discard the nut.

13.

NOTE:

LH illustration shown, RH is similar.



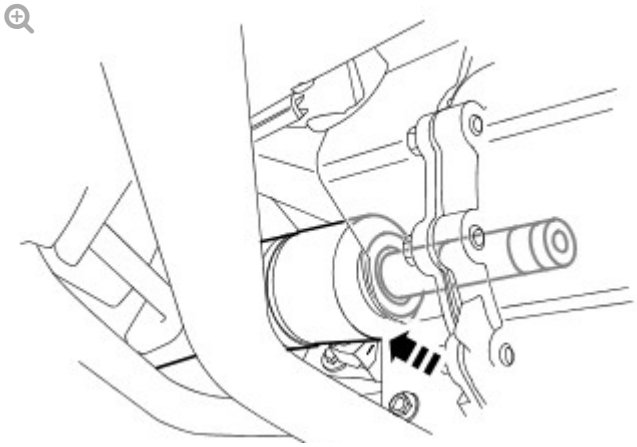
Release the RH lower arm.

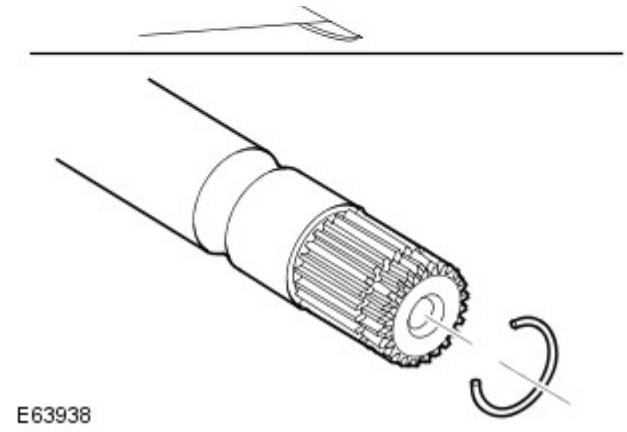
- Using a suitable stand, support the lower arm.
- Remove and discard the nut and bolt.

14.

NOTE:

LH illustration shown, RH is similar.

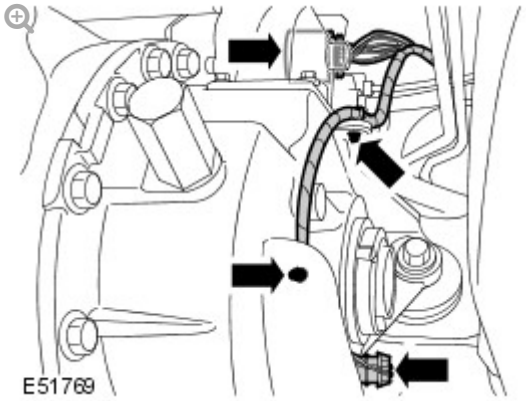




With assistance, release the RH halfshaft.

- Remove and discard the snap ring.

15.



Vehicles with differential locking motor.

- Release the 2 wiring harness clips.
- Disconnect the 2 electrical connectors.

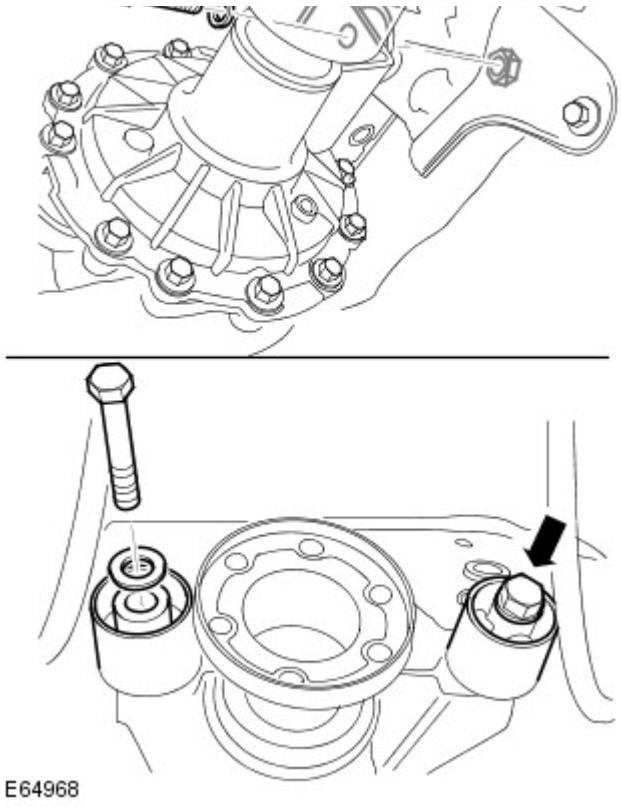
16.

WARNING:

Secure the component to the transmission jack.

NOTE:

Remove and discard the axle assembly rear nut and bolt.



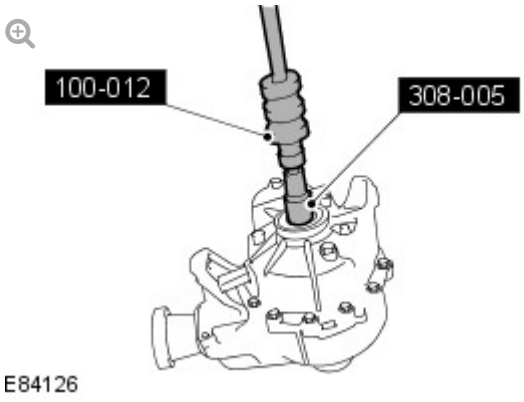
Remove the axle assembly.

- Using a transmission jack, support the axle.
- Remove the axle assembly front bolts.

17. With assistance, remove the axle from the transmission jack.

18. **NOTE:**

LH illustration shown, RH is similar.

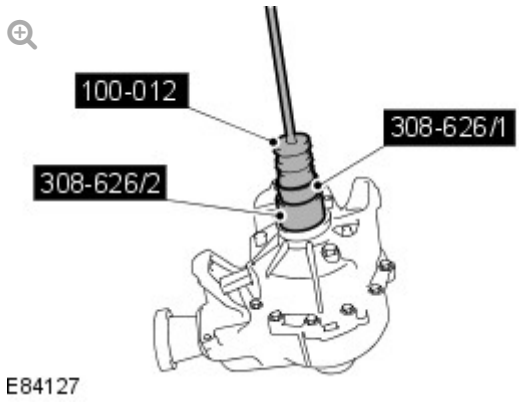


Using the special tools, remove and discard both halfshaft seals.

INSTALLATION

1. **CAUTION:**

   The halfshaft seal protector must be left in place until the halfshaft has been installed.



   Using the special tools, install new halfshaft seals.

   - Clean the component mating faces.

2. With assistance, secure the axle to the transmission jack.

Make sure that new nuts and bolts are installed.

3. Install the axle assembly.

   - Clean the component mating faces.
   - Tighten the new nut and bolt to 120 Nm (89 lb.ft), then a further 180 degrees.
   - Tighten the bolts to 100 Nm.

4. Vehicles with differential locking motor.

   - Connect the electrical connectors.
   - Secure the wiring harness clips.

5. **CAUTION:**

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

Secure the RH lower arm.

- Install a new nut and bolt and tighten to 250 Nm (184 lb.ft).

6.

NOTE:

Use an additional wrench to prevent the component from rotating.

Secure the RH tie rod.

- Install a new nut and tighten to 165 Nm (121 lb.ft).

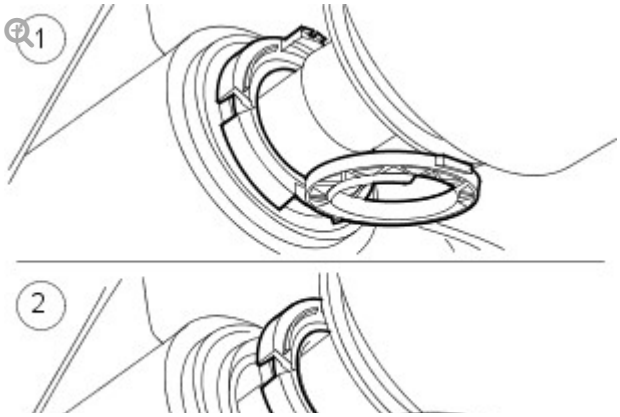
7.

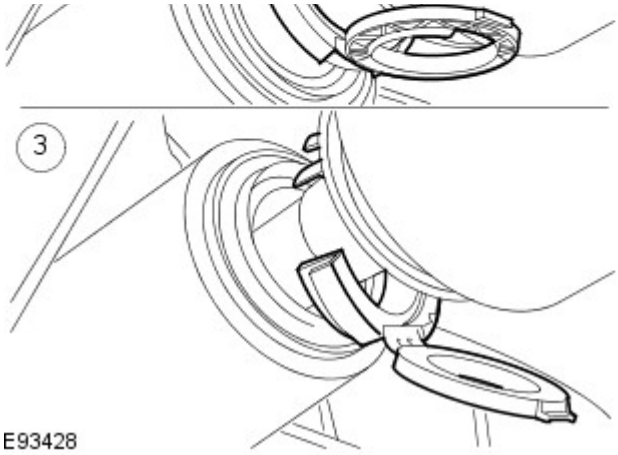
CAUTION:

Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the axle case.

NOTE:

Do not fully engage the halfshaft until the oil seal protector has been removed.





With assistance, secure the LH halfshaft.

- Open the halfshaft seal protector and install the halfshaft.
- Release the halfshaft seal protector from the halfshaft seal.
- Break the halfshaft seal protector in to two pieces and remove the halfshaft seal protector.
- Fully install the halfshaft.

8. Repeat the above procedure for the other side.

9. **CAUTION:**

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

Secure the LH lower arm.

- Install a new nut and bolt and tighten to 250 Nm (184 lb.ft).

10. **NOTE:**

> Use an additional wrench to prevent the component from rotating.

Secure the LH tie rod.

- Install a new nut and tighten to 165 Nm (121 lb.ft).

11. Connect the axle case breather line.

12. **NOTE:**

    Make sure that new bolts are installed.

    Secure the driveshaft to the rear axle drive flange.

    - Install the washers.
    - Stage 1: Tighten the bolts to 45 Nm (33 lb.ft).
    - Stage 2: Tighten the bolts a further 45 degrees.

13. Fill the differential with the correct amount of fluid.
    For additional information, refer to: Differential Draining and Filling (205-02, General Procedures).

14. Install the fuel tank heat shield.

    - Tighten the screws.

15. Install the exhaust system.
    For additional information, refer to: Exhaust System (309-00, Removal and Installation).

16. Install the wheels and tires.

    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

17. Connect the battery ground cable.
    For additional information, refer to: Specifications (414-00, Specifications).

Make sure that new nuts and bolts are installed.

1. Install the axle assembly.

- Clean the component mating faces.
- Tighten the new nut and bolt to 120 Nm (89 lb.ft), then a further 180 degrees.

- Tighten the bolts to 100 Nm.

REAR DRIVE AXLE/DIFFERENTIAL

DIFFERENTIAL SUPPORT INSULATOR – V8 5.0L PETROL/V8 S/C 5.0L PETROL (G1225616)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)

LRT-51-022

Remover/installer
205-707

REMOVAL

NOTE:

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

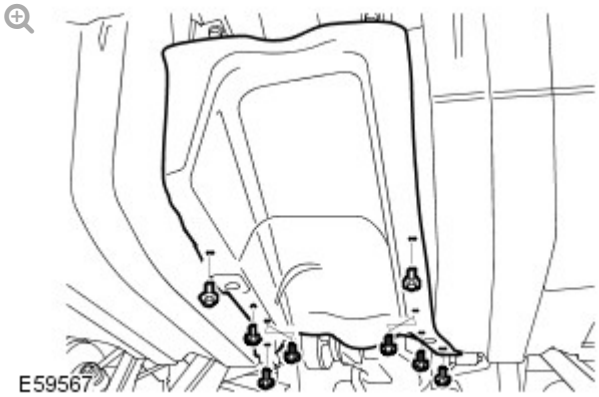
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Remove the exhaust system.
   For additional information, refer to: Exhaust System (309-00, Removal and Installation).

4. 

   Remove the fuel tank heat shield.

   - Remove the 8 screws.

5.

CAUTIONS:

- Mark the position of the driveshaft flange in relation to the drive pinion flange.
- To avoid damage to the joint or gaiter, do not allow the driveshaft to hang.

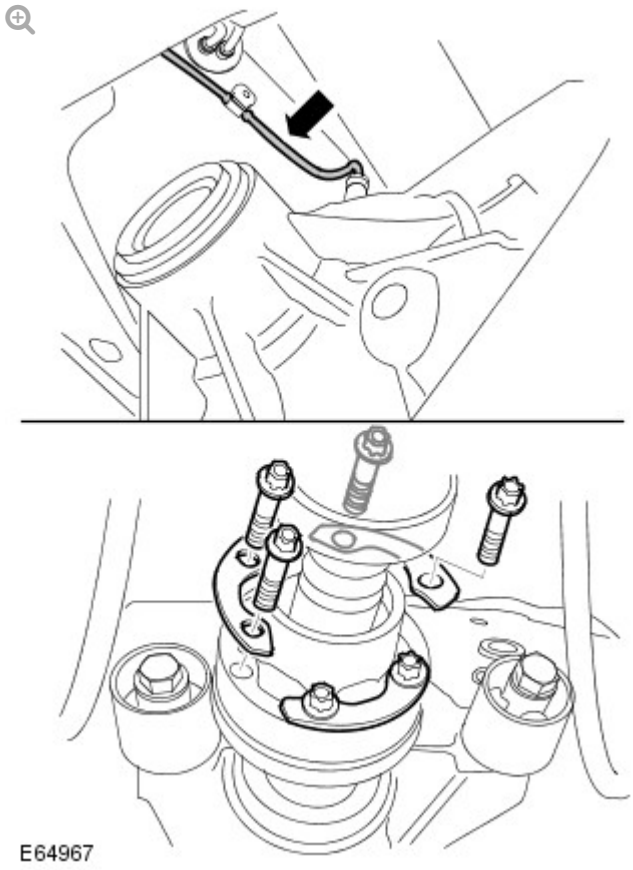
Release the driveshaft from the rear axle drive flange.

- Remove the 6 bolts and washers.

6.

CAUTION:

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



Disconnect the axle case breather line.

7. **NOTE:**

> Allow the axle to rotate until the drive flange hangs down.

Lower the rear axle assembly.

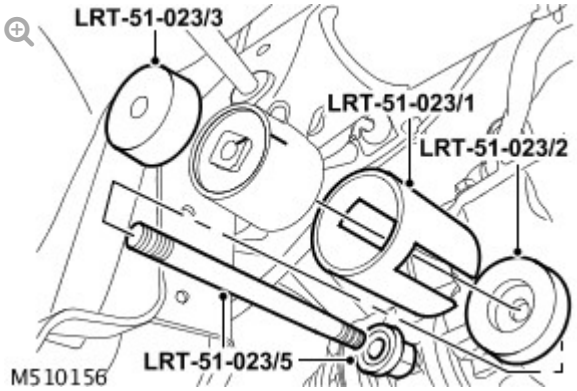
- Using a transmission jack, support the axle.
- Remove and discard the nut and bolt.
- Remove the 2 bolts.

8. **CAUTION:**

> Note the fitted position of the bush and mark the sub-frame to aid assembly.

NOTE:

> Move the axle case forwards for access.

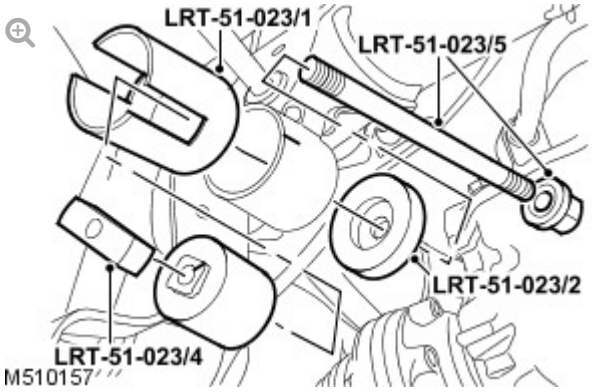


Using the special tools, remove the axle housing bushing.

INSTALLATION

1. **CAUTIONS:**

- Lubricate the new bush with rubber lubricant to aid assembly.
- Align the new bush to the mark on the sub-frame.



Using the special tools, install the axle housing bushing.

- Clean the component mating faces.

2. Install the axle assembly.
   - Clean the component mating faces.
   - Tighten the bolts to 100 Nm (74 lb.ft).
   - Tighten the new nut and bolt to 120 Nm (89 lb.ft), then a further 180 degrees.
3. Connect the axle case breather line.
4. Attach the driveshaft to the rear axle drive flange.
   - Clean the component mating faces.
   - Install the washers.
   - Tighten the bolts to 44 Nm (32 lb.ft), then a further 45 degrees.
5. Install the fuel tank heat shield.
   - Tighten the screws.
6. Install the exhaust system.

For additional information, refer to: Exhaust System (309-00, Removal and Installation).

7. Install the wheels and tires.
   - Tighten the wheel nuts to 140 Nm (103 lb.ft).

8. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00, Specifications).

2012.0 RANGE ROVER (LM), 205-03

FRONT DRIVE

FRONT DRIVE AXLE/DIFFERENTIAL

SPECIFICATIONS

Lubricants

ITEM	SPECIFICATION
* Recommended lubricant	Castrol SAF-XO - 75W/90
Capacity	0.75 liters refill (1.3 pints) (1.6 US pints)
	0.8 liters from dry (1.4 pints) (1.7 US pints)

*** Do not use any lubricant other than that specified**

Reduction Ratio

MODEL	SPECIFICATION
4.2L	3.73:1
4.4L	3.73:1
5.0L	3.54:1
3.6L Diesel engine	3.54:1

Torque Specifications

DESCRIPTION	BOLT LENGTH	NM	LB-FT
Oil drain plug	-	54	40
Oil filler plug	-	34	25
Front drive axle/differential to engine sump bolts	**100 mm**	-	
	Stage 1	50	37
	Stage 2	90°	90°
	55 mm		-
	Stage 1	50	37
	Stage 2	60°	60°

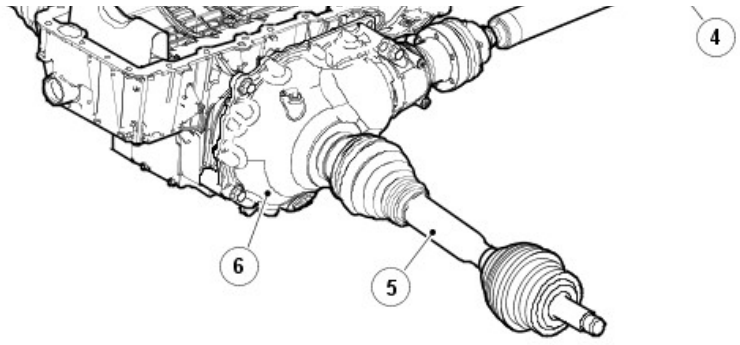
	Stage 2	60	60
*** Driveshaft to front axle drive flange Torx bolts:**	-	-	
	Stage 1	45	33
	Stage 2	Further 90°	Further 90°

*** New 'Patchlok' Torx bolts must be installed**

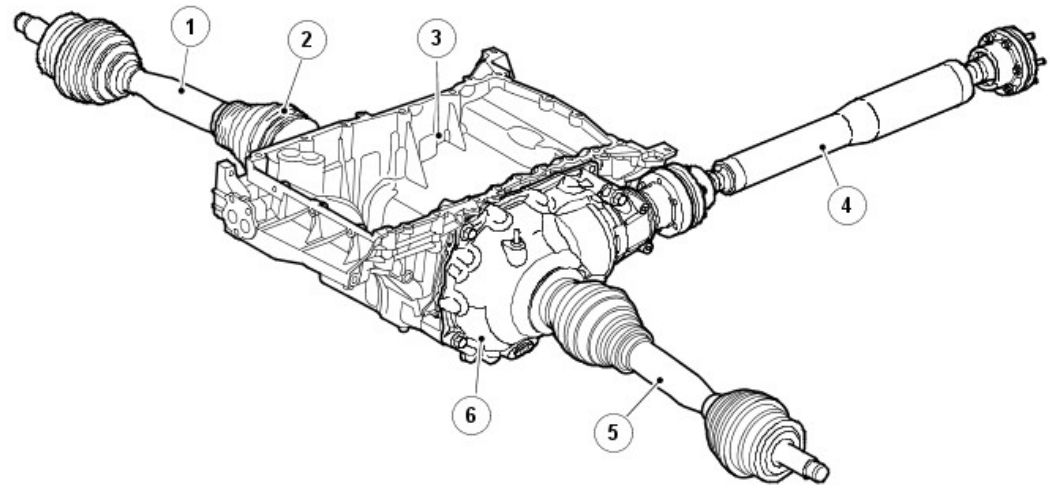
2012.0 RANGE ROVER (LM), 205-03

FRONT DRIVE AXLE/DIFFERENTIAL

DESCRIPTION AND OPERATION



B



E84164

ITEM	DESCRIPTION
A	Diesel version
B	Gasoline version
1	Front RH drive halfshaft
2	CV joint
3	Engine sump
4	Front drive shaft
5	Front LH drive halfshaft
6	Front differential

OVERVIEW

The front differential converts the 'angle of drive' through 90 degrees and distributes drive, via the drive halfshafts, to the front wheels.

The front differential is mounted on the LH side of the vehicle sump. The sump has a cast tube through it, which allows for the fitment of the RH drive halfshaft and separates the engine oil from the differential oil. The differential unit is secured to the engine sump with 4 bolts. The bolts pass through lugs in the differential casing and are secured into threaded holes in the sump. An O-ring seal is fitted to the casing and locates in the sump to provide a seal between the casing and the sump.

The casing comprises two halves with machined mating faces. When assembled, the iron casing halves are sealed with a thin film of Loctite 574 sealant and secured together with 12 bolts. The LH casing is the carrier for all the rotating parts and the RH casing is a cover to close the unit and a support for the RH carrier bearing. A breather tube is fitted to the casings. This allows a plastic tube to be fitted and routed to a high point in the engine compartment, preventing the ingress of water when the vehicle is wading.

The LH casing is fitted with a drain plug and a filler plug.

The differential is a conventional design using a hypoid gear layout. This employs a hypoid bevel pinion gear and crown wheel, with the pinion offset above the center line of the crown wheel. This design allows for a larger pinion gear to be used, which has the advantages of increased gear strength and reduced operating noise.

The output ratio of the front differential varies depending on the engine variant.
For additional information, refer to: Specifications (205-03, Specifications).

The ratio is changed by changing the amount of teeth between the crown wheel drive gear and pinion gear. For example, with a ratio of 3.54:1, the crown wheel drive gear will have 3.54 times more teeth than the pinion gear.

The differential comprises a pinion shaft and hypoid bevel gear, a crown wheel drive gear with an integral cage, which houses two planet gears. Two sun wheels are also located in the cage and pass the rotational drive to the drive halfshaft shafts.

The pinion shaft is mounted on two opposed taper roller bearings with a collapsible spacer located between them. The spacer is used to hold the bearings in alignment and collapses at a predetermined rate due the torque applied to the pinion nut. The remaining load is carried as preload in the bearings and is set with the pinion nut to give the desired assembly torque-to-turn. This can only be performed during first assembly when new bearings are coated with friction modifier.

An oil seal is pressed into the LH casing and seals the input flange to the differential unit. The pinion shaft has a hypoid bevel gear at its inner end, which mates with the crown wheel drive gear.

The crown wheel drive gear is located on the carrier and secured with 10 screws. The carrier is mounted on taper roller bearings located in each casing half. The bearings are press fitted into the casing and a spacer is located on the outside face to apply preload to the bearing.

The carrier is fitted with a shaft onto which the two planet gears are mounted. The shaft is secured in the carrier with a roll pin. The sun wheels are located in pockets within the carrier and mesh with the planet gears. Curved plates are located between the carrier and the sun wheels and hold the sun wheels in mesh with the planet gears. Each sun wheel has a machined, splined, bore to accept the drive halfshaft. A groove is machined in the bore to locate the snap ring fitted to the drive halfshaft, providing positive drive halfshaft location.

The operating principles of the front and rear differential are the same.
For additional information, refer to: Rear Drive Axle and Differential (205-02 Rear Drive Axle/Differential, Description and Operation).

2012.0 RANGE ROVER (LM), 205-03

FRONT DRIVE AXLE/DIFFERENTIAL

DIAGNOSIS AND TESTING

For additional information.

REFER to: Rear Drive Axle and Differential (205-02, Diagnosis and Testing).

FRONT DRIVE AXLE/DIFFERENTIAL

DIFFERENTIAL DRAINING AND FILLING (G528132)

GENERAL PROCEDURES

54.15.02	FRONT AXLE - DRAIN AND REFILL	ALL DERIVATIVES	0.4	USED WITHINS	+

CAUTION:

The fluid filler plug is not a fluid level plug.

1. Raise and support the vehicle.

2. Remove the engine undershield.
   For additional information, refer to: Engine Undershield (501-02, Removal and Installation).

3. Clean the area around the differential case, fluid drain and filler plugs.

4. **WARNING:**

   Observe due care when draining, as the fluid can be very hot.

   NOTE:

   Rotate the wheels and tires to drain excess oil collected in the differential casing.

Drain the differential fluid.

- Position a container to collect the fluid.
- Remove the differential case fluid drain plug.
- Allow the fluid to drain.

5. Install the differential case fluid drain plug.
   - Clean the drain plug.
   - Apply sealant to the thread.
   - Tighten the drain plug to 54 Nm (40 lb.ft).

6. 

   Remove the differential case fluid filler plug.

7. **CAUTIONS:**

   - The fluid filler plug is not a fluid level plug.

- If a thread of fluid runs/drips from the filler plug hole after refilling, the differential has been overfilled. Drain the fluid and refill with the correct amount.

Fill the front differential case with the correct amount of fluid.

- If the differential has been replaced, fill with 800 ml (1.7 US pints) of fluid.
- If the differential has been drained but not replaced, add 750 ml (1.6 US pints) of fluid.

8. Install the differential case fluid filler plug.
   - Clean the filler plug.
   - Apply sealant to the thread.
   - Tighten the plug to 35 Nm (26 lb.ft).

9. Install the engine undershield.
   For additional information, refer to: Engine Undershield (501-02, Removal and Installation).

DRIVE PINION SEAL – V8 5.0L PETROL/V8 S/C 5.0L PETROL (G1225390)

IN-VEHICLE REPAIR

OIL SEAL

51.20.01	- DRIVE PINION - RENEW	5000 CC, AJ V8	1.5	USED WITHINS	+
54.10.20	OIL SEAL - DRIVE PINION - RENEW	5000 CC, AJ V8	2.3	USED WITHINS	+

SPECIAL TOOL(S)

205-053

Flange holding tool

205-824

Remover drive flange

205-820

Installer - drive pinion oil seal

100-

012(LRT-99-004)

Impulse extractor

100-005A(LRT-99-500A)

General purpose puller

REMOVAL

CAUTION:

The drive pinion seal must only be renewed once.

NOTE:

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

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2. **WARNING:**

Make sure to support the vehicle with axle stands.

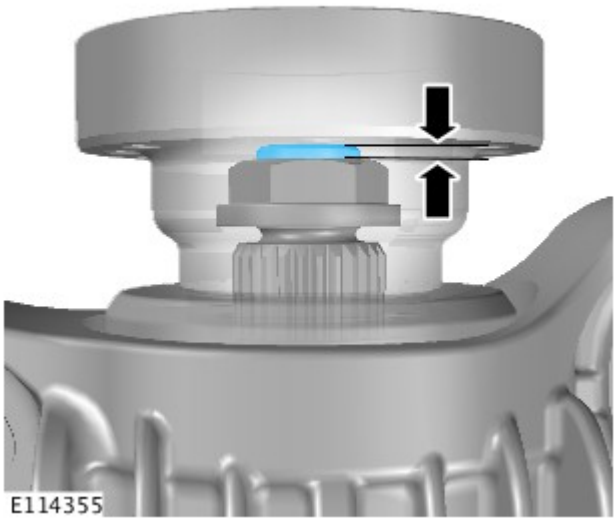
Raise and support the vehicle.

3. **NOTE:**

Drain the fluid into a suitable container.

Drain the differential lubricant.
For additional information, refer to: Differential Draining and Filling (205-03 Front Drive Axle/Differential, General Procedures).

4. Remove the front driveshaft.
For additional information, refer to: Front Driveshaft - 5.0L NA V8 - AJ133/5.0L SC V8 - AJ133 (205-01 Driveshaft, Removal and Installation).

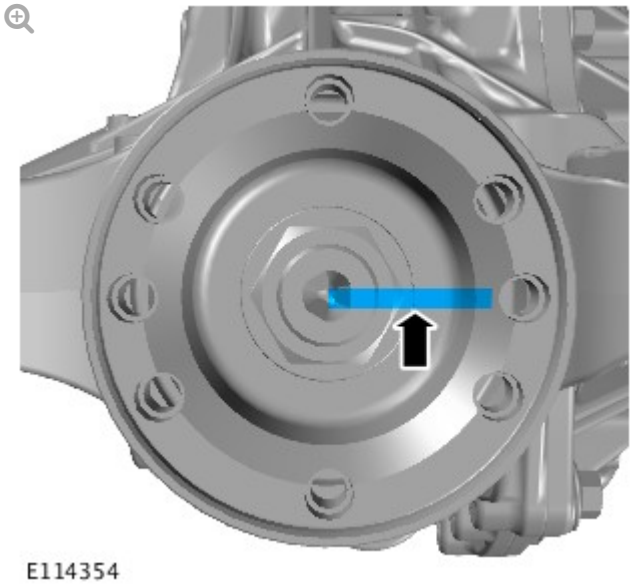
5. 

Measure the depth of the pinion nut on the pinion shaft.

- Note measurement for installation.

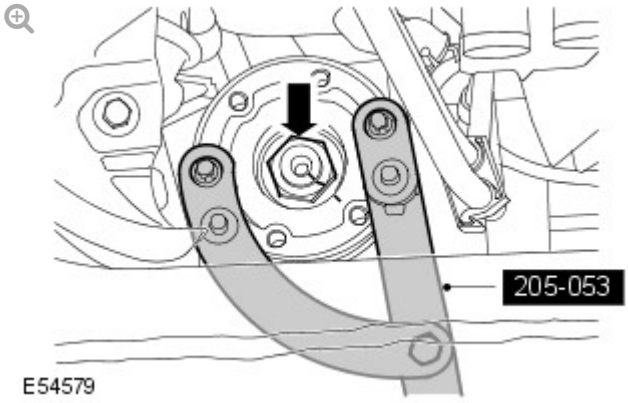
6. **CAUTION:**

This step must be carried out to make sure that the drive pinion nut is correctly tightend on assembly.



Accurately scribe a line to mark the drive pinion shaft to the drive pinion nut and pinion flange.

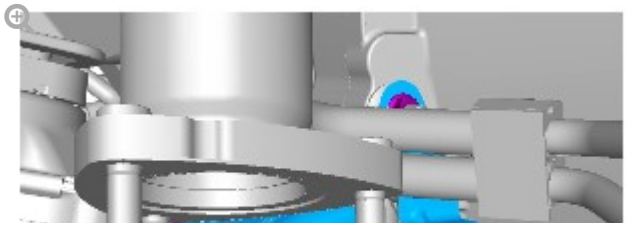
7.

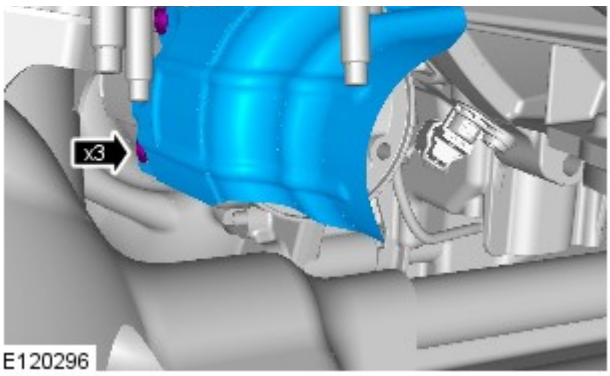


Remove the drive pinion flange retaining nut.

- Using the special tool, counter hold the drive pinion flange.
- Note number of turns for installation.

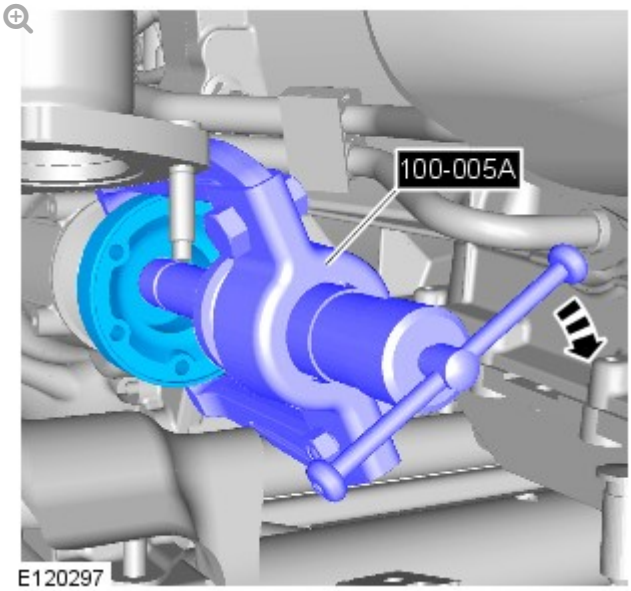
8.





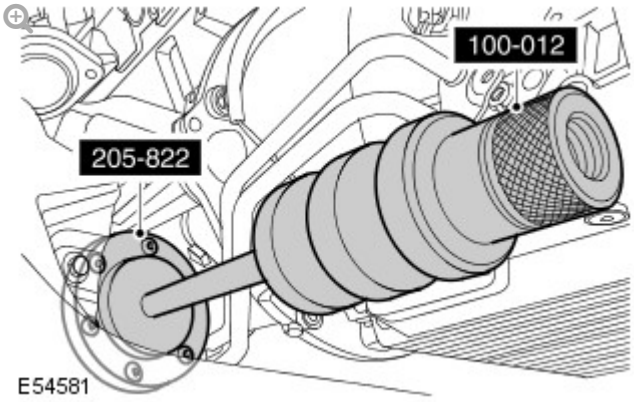
Remove the exhaust heat shield.

9.



Using the special tool, remove the drive pinion flange.

10.

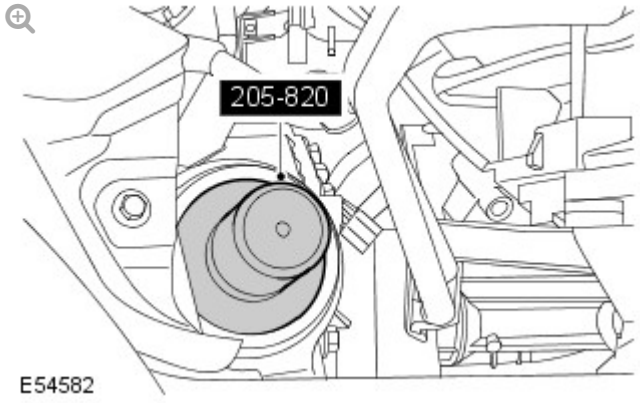


Using the special tool, remove the drive pinion seal.

INSTALLATION

1. Clean the drive pinion flange.

2. Clean the drive pinion seal mating faces.

3. 

Using the special tool, install the new drive pinion seal.

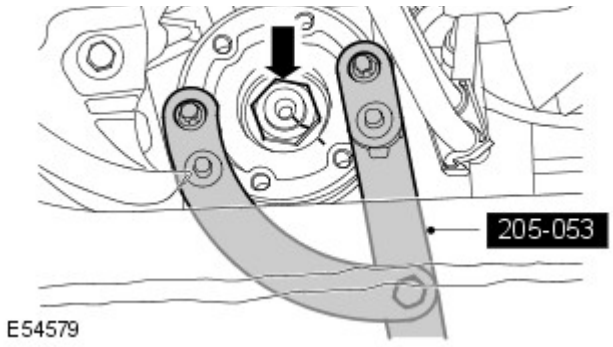
4. **CAUTION:**

Make sure the drive pinion flange scribed marks are aligned.

Install the drive pinion flange.

5. **CAUTIONS:**

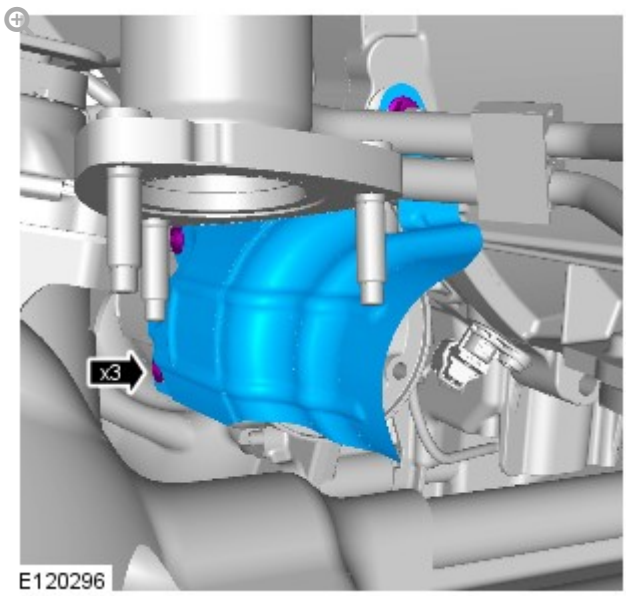
- Make sure the mark on the drive pinion nut is never tightened past the scribed mark on the drive pinion shaft.
- Make sure the drive pinion flange has no end float and is free to rotate.
- Make sure the scribed mark on the drive pinion nut is within the tollerance of 5 degrees before the scribed mark on the drive pinion shaft, and up to the scribed mark (zero degrees).



Install the drive pinion flange retaining nut.

- Using the special tool, counter hold the drive pinion flange.
- Install nut to previously noted number of turns.
- Measure the depth of the pinion nut on the pinion shaft.

6.



Install the exhaust heat shield.

- TORQUE: 10 Nm

7. Install the front driveshaft.
For additional information, refer to: Front Driveshaft - 5.0L NA V8 - AJ133/5.0L SC V8 - AJ133 (205-01 Driveshaft, Removal and Installation).

8. **CAUTION:**

Make sure the correct specification and quanity of oil is used.

Fill the differential with the correct amount of lubricant.
For additional information, refer to: Differential Draining and Filling (205-03 Front Drive Axle/Differential, General Procedures).

9. Connect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Charging System - General Information, Specifications).

2012.0 RANGE ROVER (LM), 205-03

FRONT DRIVE AXLE/DIFFERENTIAL

AXLE ASSEMBLY – V8 5.0L PETROL/V8 S/C 5.0L PETROL, RHD AWD (G1225884)

REMOVAL AND INSTALLATION

54.10.01	DIFFERENTIAL – RENEW	RIGHT HAND DRIVE, 5000 CC, AJ V8	4.6	USED WITHINS	+

SPECIAL TOOL(S)

205–735(LRT–54–026)

Remover halfshaft inboard joint

308-626/1

Installer halfshaft oil seal

308-626/2

Installer/Guide halfshaft oil seal

100-012(LRT-99-004)

Impulse extractor

205-754(LRT-54-027)

Ball joint separator

REMOVAL

NOTE:

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

1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications - Armoured (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Remove the front wheels and tires.

4. Secure the hood in the service position.
   - Release the support struts.

5. Remove the engine cover.
   For additional information, refer to: Engine Cover - V8 5.0L Petrol/V8 S/C 5.0L Petrol (501-05 Interior Trim and Ornamentation, Removal and Installation).

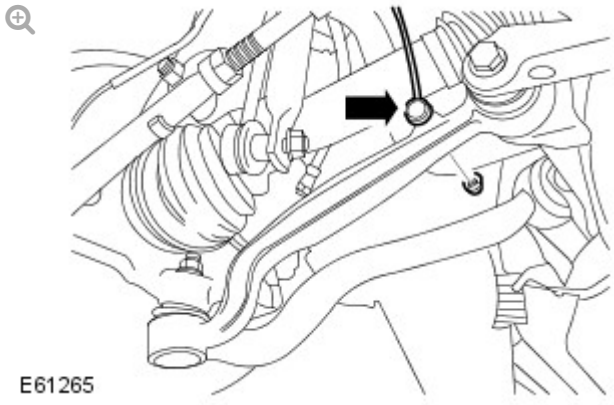
6. Remove the RH air cleaner assembly.
   For additional information, refer to: Air Cleaner Element (303-12D Intake Air Distribution and Filtering - V8 S/C 5.0L Petrol, Removal

and Installation).

7. Remove the front driveshaft.
   For additional information, refer to: Front Driveshaft - V8 5.0L Petrol/V8 S/C 5.0L Petrol (205-01 Driveshaft, Removal and Installation).

8. **NOTE:**

   Use an additional wrench to prevent the ball joint rotating.



RH front: Disconnect the suspension height sensor link arm.

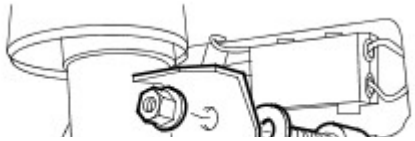
- Remove the nut.

9. **CAUTION:**

   Note the fitted position of the special washer.

NOTE:

Use an additional wrench to prevent the ball joint rotating.



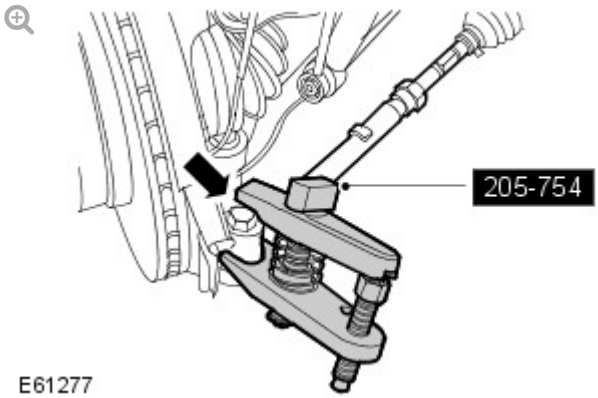
RH front: Disconnect the stabilizer bar link.

- Remove the nut.
- Remove the flat washer.

10.

CAUTION:

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



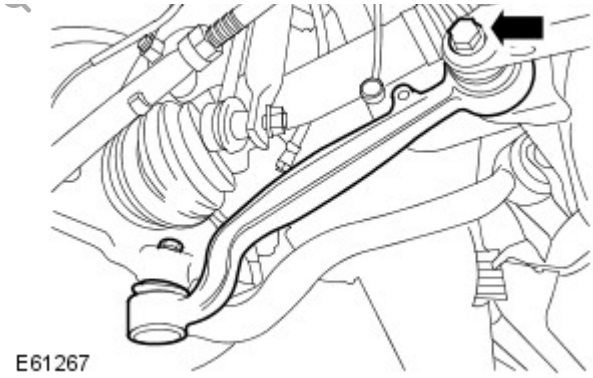
RH front: Disconnect the steering gear tie rod end ball joint.

- Use the special tool.
- Loosen the tie-rod end ball joint retaining nut.
- Discard the nut.

11.

CAUTION:

Support the lower arm.



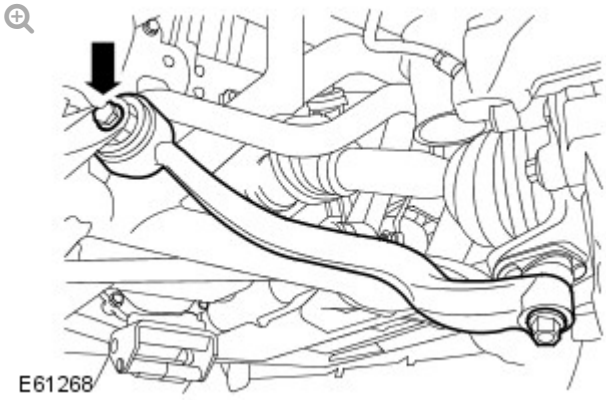
RH front: Disconnect the lower arm.

- Remove the bolt and discard the nut.

12.

CAUTION:

Support the tie rod.



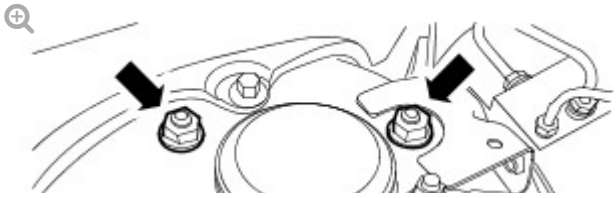
RH front: Disconnect the tie rod.

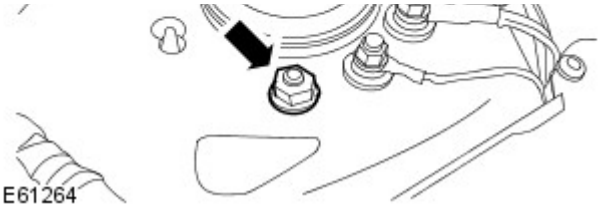
- Remove the bolt and discard the nut.

13.

WARNING:

Do not remove the nuts.





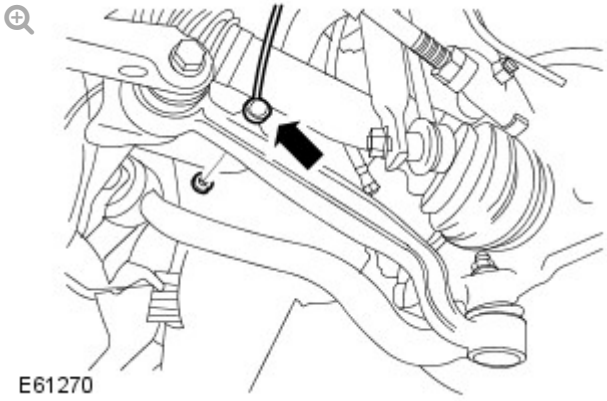
RH front: Release the air suspension spring.

- Loosen the 3 nuts.

14.

NOTE:

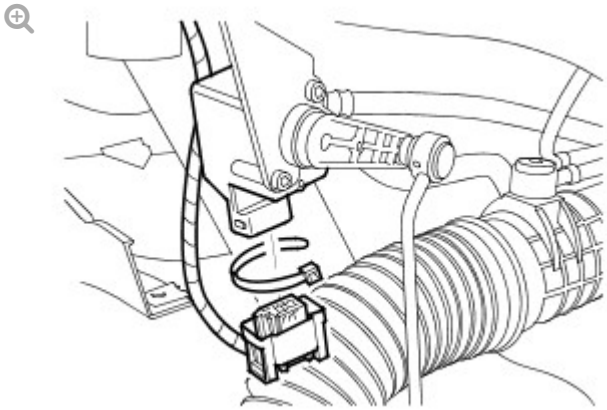
Use an additional wrench to prevent the ball joint rotating.

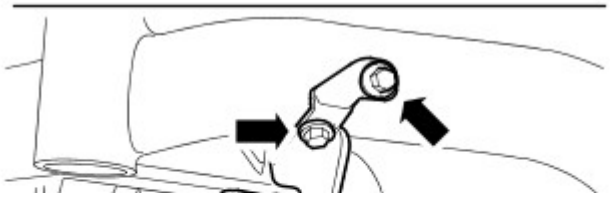


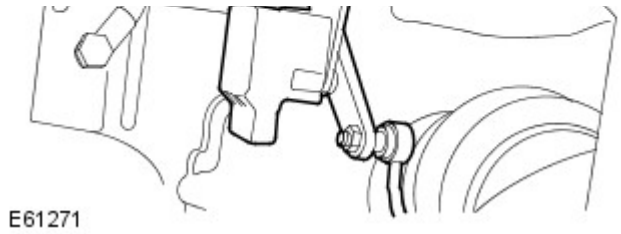
LH front: Disconnect the suspension height sensor link arm.

- Remove the nut.

15.







LH front: Remove the suspension height sensor.

- Remove the clip.
- Disconnect the electrical connector.
- Remove the 2 bolts.

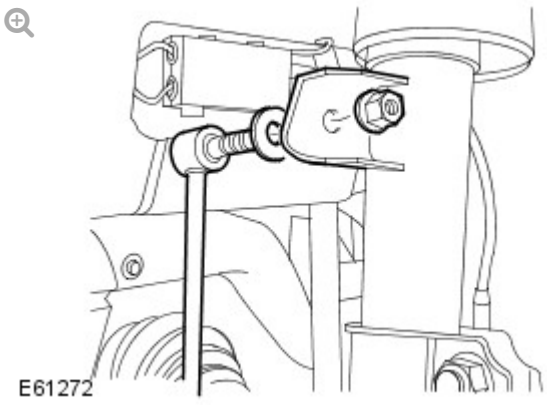
16.

CAUTION:

Note the fitted position of the special washer.

NOTE:

Use an additional wrench to prevent the ball joint rotating.



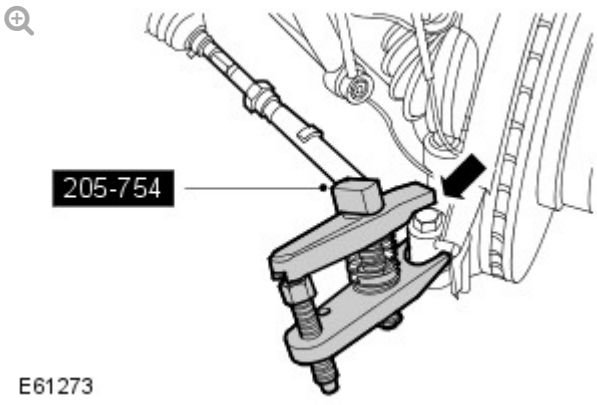
LH front: Disconnect the stabilizer bar link.

- Remove the nut.
- Remove the flat washer.

17.

CAUTION:

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

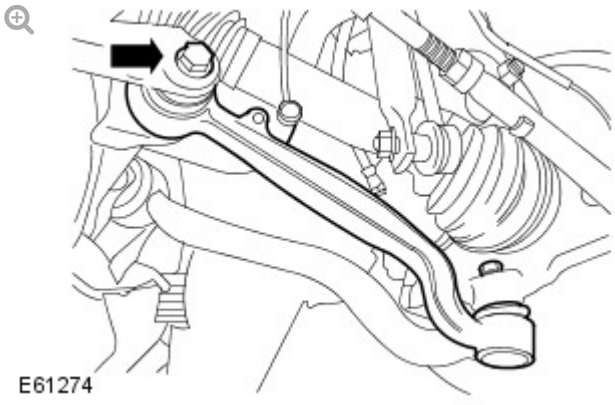


LH front: Disconnect the steering gear tie rod end ball joint.

- Use the special tool.
- Loosen the tie-rod end ball joint retaining nut.
- Discard the nut.

18. **CAUTION:**

Support the lower arm.

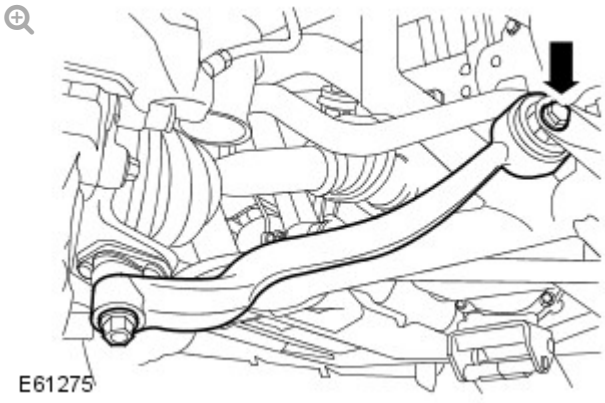


LH front: Disconnect the lower arm.

- Remove the bolt and discard the nut.

19. **CAUTION:**

Support the tie rod.

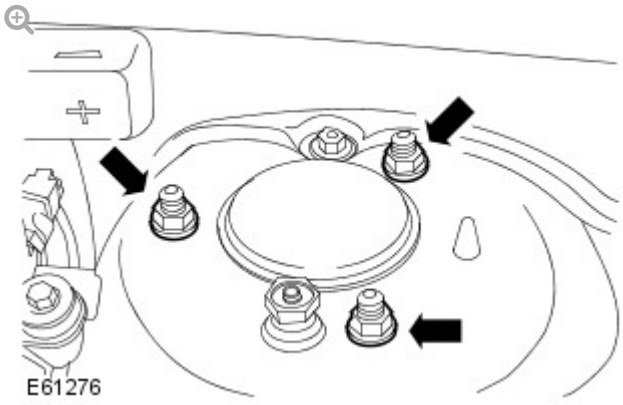


LH front: Disconnect the tie rod.

- Remove the bolt and discard the nut.

20. **WARNING:**

Do not remove the nuts.



LH front: Release the air suspension spring.

- Loosen the 3 nuts.

21. Drain the differential fluid.
For additional information, refer to: Differential Draining and Filling (205-03 Front Drive Axle/Differential, General Procedures).

22. **CAUTION:**

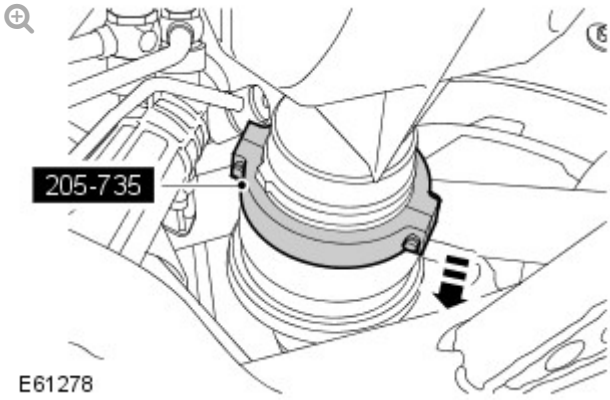
CAUTION:

Support the halfshaft.

RH front: Using the special tool, release the halfshaft from the differential.

23. **CAUTION:**

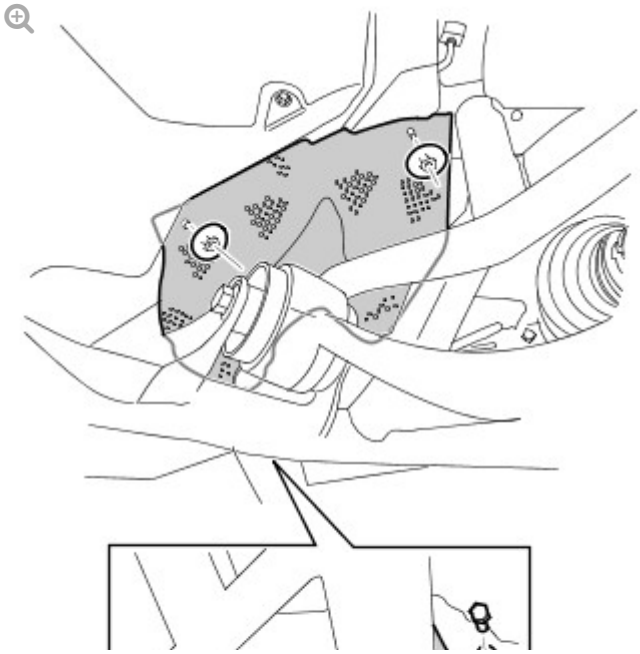
Support the halfshaft.

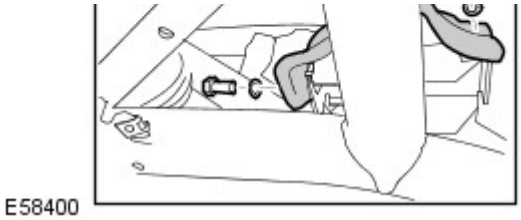


LH front: Using the special tool, disconnect the halfshaft from the differential.

- Remove and discard the retaining clip.

24.

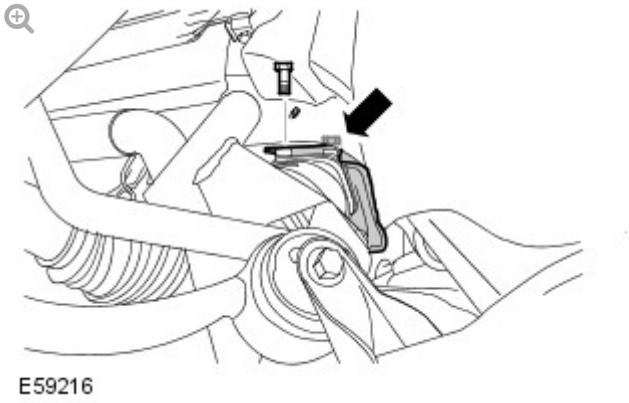




Remove the engine compartment LH heat shield.

- Remove the 2 nuts.
- Remove the 2 screws.

25.



Remove the LH engine mount heat shield.

- Remove the 2 screws.

26.

Release the LH engine mount.

- Remove the bolt.

27. Using a transmission jack, raise the engine clear of the engine mount.

28. LH front: Protect the power steering gear gaiter.

29. **CAUTION:**

> Always plug any open connections to prevent contamination.

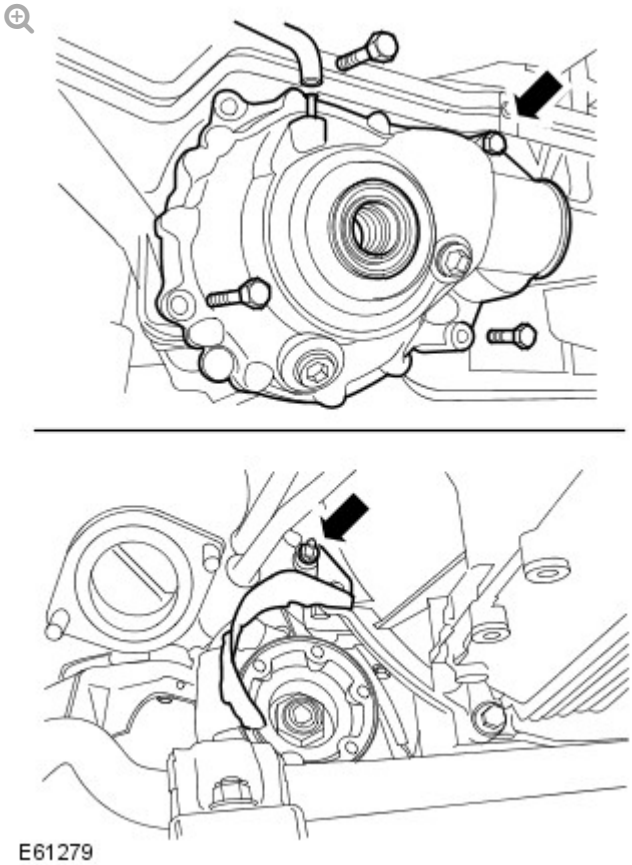
Disconnect the differential case breather line.

30. **WARNING:**

> Fluid loss is unavoidable, use absorbent cloth or a container to collect the fluid.

NOTE:

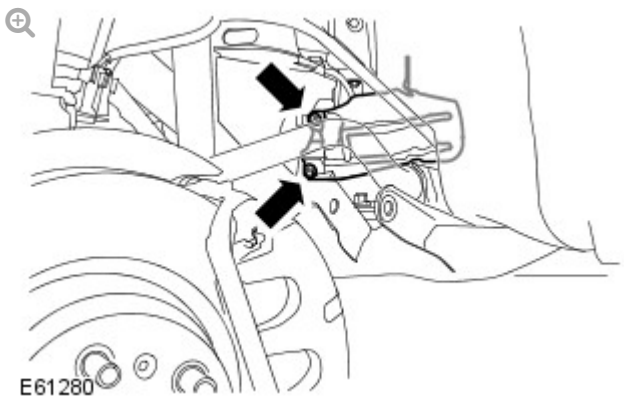
> The upper rear bolt will remain in the differential case.



Release the differential case.

- Remove the nut securing the front driveshaft, joint shield.
- Remove and discard the 4 bolts.

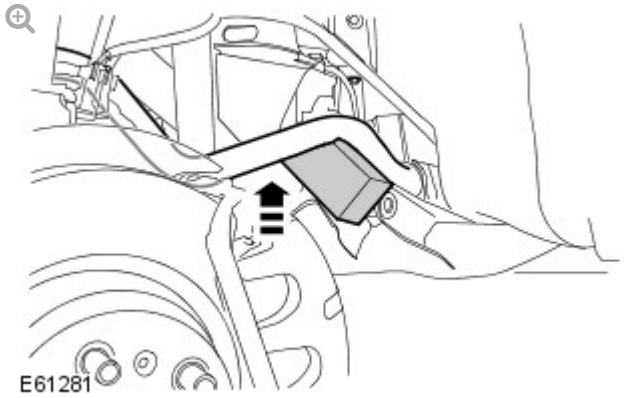
31.



Remove the front driveshaft joint shield.

- With assistance, position the front differential case rearward.
- Remove the 2 Torx screws.

32.



LH front: Raise the stablizer bar.

- Secure the stabilizer bar in the raised position.

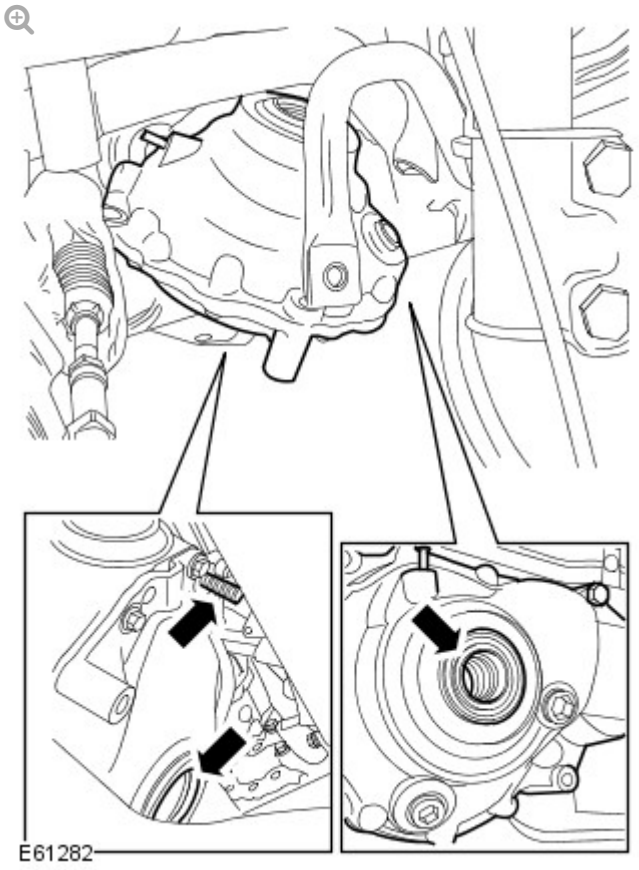
33.

CAUTION:

Make sure component mating faces are not damaged during removal.

NOTE:

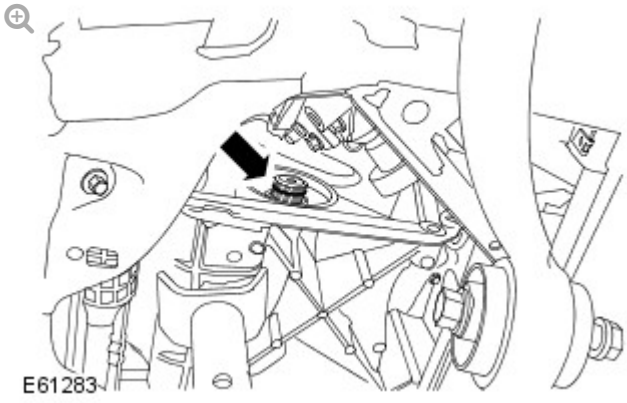
The differential case is rotated by 90 degrees, and removed through the sub-frame with the halfshaft oil seal uppermost.



With assistance, carefully remove the front differential case.

- Remove the bolt.
- Remove and discard the O-ring seal.
- Remove and discard the halfshaft oil seal.

34.



Remove the retaining clip from the RH halfshaft

Remove the retaining clip from the RH halfshaft.

INSTALLATION

1. Clean the component mating faces.
2. Install a new O-ring seal to the differential case.
   - Lubricate the O-ring seal with petroleum jelly.
3. Install a new clip to the RH halfshaft.
4. Install a new clip to the LH halfshaft.
5. **WARNING:**

   Make sure to support the vehicle with axle stands.

   CAUTION:

   Make sure that a new bolt is installed.

   NOTE:

   Install the upper rear bolt to its location in the differential case.

   With assistance, carefully install the front differential case.
   - Position the differential rearward of its location.
6. Install the front driveshaft joint shield.
   - Tighten the Torx screws to 3 Nm (2 lb.ft).
7. **CAUTIONS:**

CAUTIONS:

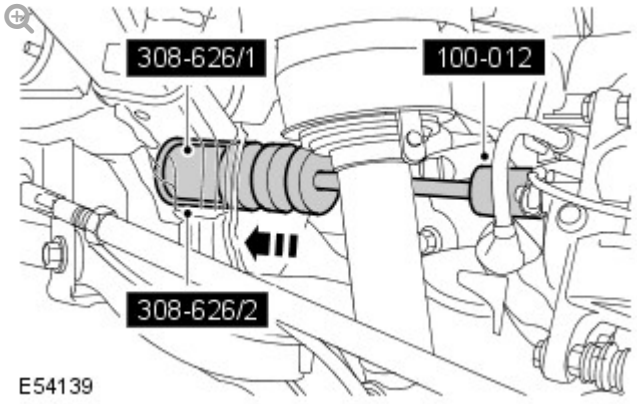
- Make sure the O ring seal remains in its fitted position.
- Make sure that new bolts are installed.

With assistance, align and secure the front differential case.

- Engage the front drive shaft joint shield with its securing stud.
- Tighten the front drive shaft joint shield nut to 10 Nm (7 lb.ft).

8. Tighten the 100 mm length bolts.
   - Stage 1: Tighten the bolts to 50 Nm (37 lb.ft).
   - Stage 2: Tighten the bolts a further 90 degrees.
9. Tighten the 55 mm length bolts.
   - Stage 1: Tighten the bolts to 50 Nm (37 lb.ft).
   - Stage 2: Tighten the bolts a further 60 degrees.
10. Remove the engine support.
11. Secure the engine to the LH engine mount.
    - Tighten the bolt to 100 Nm (74 lb.ft).
12. Install the LH engine mount heat shield.
    - Tighten the screws.
13. Connect the differential case breather line.
14. **CAUTION:**

    The seal protector must be left in place until the halfshaft has been installed.



LH front: Using the special tools, install a new halfshaft oil seal.

- Clean the component mating faces.

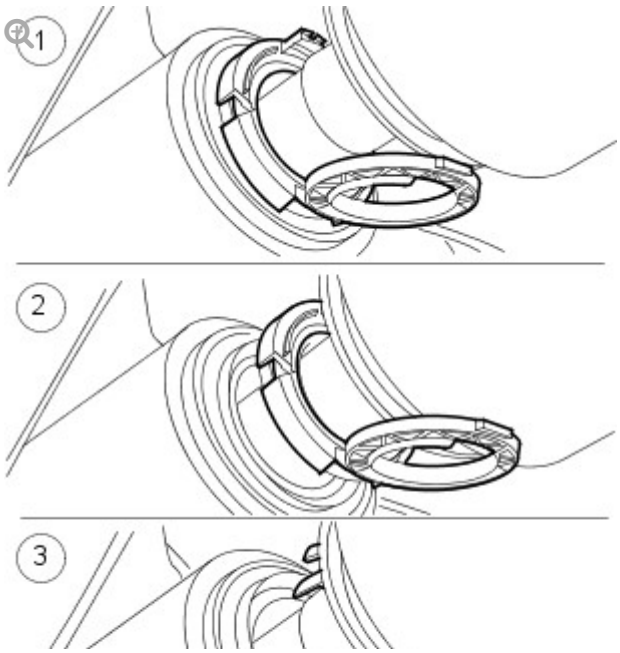
15.

CAUTION:

Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

NOTE:

Do not fully engage the halfshaft until the oil seal protector has been removed.



With assistance, secure the LH halfshaft.

- Open the halfshaft seal protector and install the halfshaft.
- Release the halfshaft seal protector from the halfshaft seal.
- Break the halfshaft seal protector in to two pieces and remove the halfshaft seal protector.
- Fully install the halfshaft.
- Clean the component mating faces.

16. **NOTE:**

Remove and discard the blanking caps.

Secure the RH inner halfshaft joint to the differential.

17. Release the stabilizer bar.

18. **NOTE:**

Do not fully tighten the locking nut at this stage.

LH front: Connect the tie rod.

- Install the bolt with a new nut.

19. **NOTE:**

Do not fully tighten the locking nut at this stage.

LH front: Connect the lower arm

LH front: Connect the lower arm.

- Install the bolt with a new nut.

20. **CAUTION:**

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

LH front: Connect the steering gear tie rod end ball joint.

- Clean the component mating faces.
- Tighten the new nut to 80 Nm (59 lb.ft).

21. **CAUTION:**

Make sure the hardened steel washer is fitted against the stabalizer bar link.

NOTE:

Use an additional wrench to prevent the ball joint rotating.

LH front: Connect the stabilizer bar link.

- Install the washer.
- Tighten the nut to 100 Nm (74 lb.ft).

22. LH front: Install the suspension height sensor.

- Tighten the bolts to 3.5 Nm (2.5 lb.ft).
- Connect the electrical connector.
- Install the clip.

23. **NOTE:**

Use an additional wrench to prevent the ball joint rotating.

LH front: Connect the suspension height sensor link arm.

- Tighten the nut to 8 Nm (6 lb.ft).

24.

NOTE:

Do not fully tighten the locking nut at this stage.

RH front: Connect the tie rod.

- Install the bolt with a new nut.

25.

NOTE:

Do not fully tighten the locking nut at this stage.

RH front: Connect the lower arm.

- Install the bolt with a new nut.

26.

CAUTION:

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

RH front: Connect the steering gear tie rod end ball joint.

- Clean the component mating faces.
- Tighten the new nut to 80 Nm (59 lb.ft).

27.

CAUTION:

Make sure the hardened steel washer is fitted against the stabalizer bar link.

NOTE:

Use an additional wrench to prevent the ball joint rotating.

RH front: Connect the stabilizer bar link.

- Install the washer.
- Tighten the nut to 100 Nm (74 lb.ft).

28. **NOTE:**

Use an additional wrench to prevent the ball joint rotating.

RH front: Connect the suspension height sensor link arm.

- Tighten the nut to 8 Nm (6 lb.ft).

29. Install the engine compartment LH heat shield.
    - Tighten the screws.
    - Tighten the nuts.

30. Install the front driveshaft.
    For additional information, refer to: Front Driveshaft - V8 5.0L Petrol/V8 S/C 5.0L Petrol (205-01 Driveshaft, Removal and Installation).

31. Fill the front differential case with the correct amount of fluid.
    For additional information, refer to: Differential Draining and Filling (205-03 Front Drive Axle/Differential, General Procedures).

32. Install the front wheels and tires.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

33. **CAUTION:**

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

Tighten the lower arm nuts and bolts to 165 Nm (122 lb.ft) plus a further 90 degrees.

34. **CAUTION:**

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

Tighten the tie rod nuts and bolts to 165 Nm (122 lb.ft) plus a further 90 degrees.

35. Secure the front air springs.
    - Tighten the nuts securing the air springs to 56 Nm (41 lb.ft).

36. Install the RH air cleaner assembly.

37. Install the engine cover. For additional information, refer to: Engine Cover - V8 5.0L Petrol/V8 S/C 5.0L Petrol (501-05 Interior Trim and Ornamentation, Removal and Installation).

38. Connect the hood support struts.

39. Connect the battery ground cable.
    For additional information, refer to: Specifications - Armoured (414-00 Battery and Charging System - General Information, Specifications).

40. Check, and if necessary, adjust the wheel alignment.
    For additional information, refer to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).

DIFFERENTIAL BREATHER TUBE – V8 5.0L PETROL/V8 S/C 5.0L PETROL (G1225769)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)

308–794

Installer, Differential Breather Tube

REMOVAL

NOTE:

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

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

2. **WARNING:**

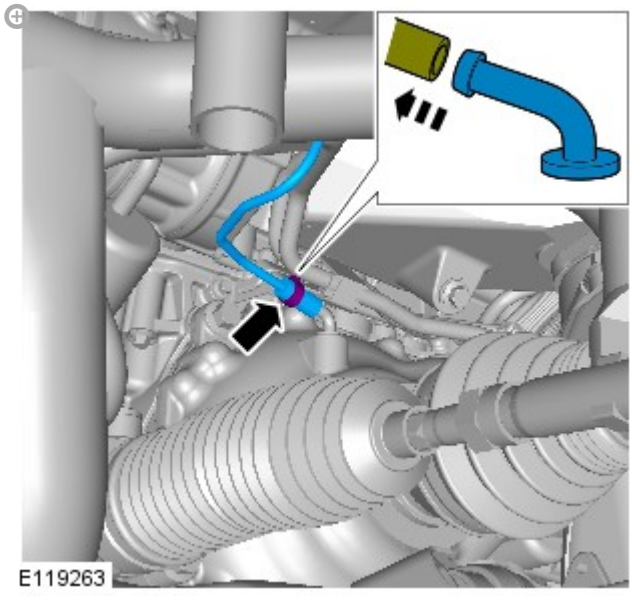
   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Remove the LH front wheel and tire.

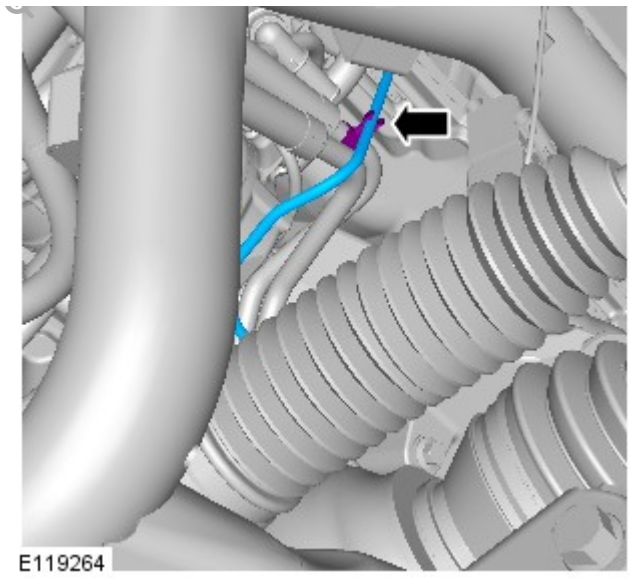
4. **CAUTION:**

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



5. **CAUTION:**

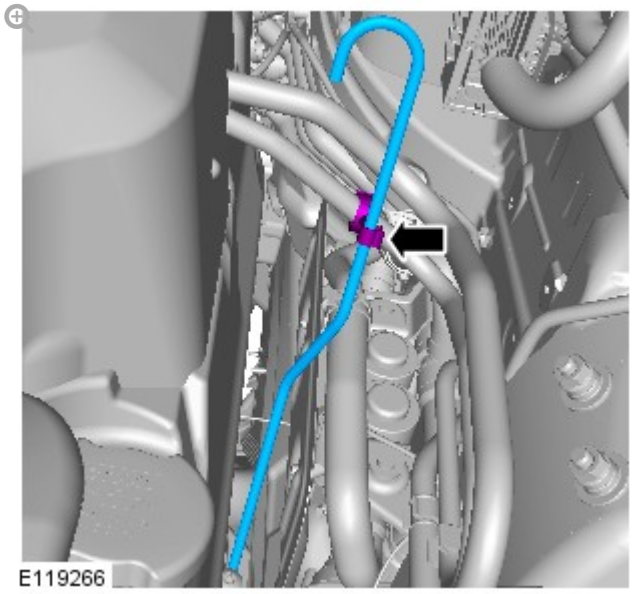
   Note the fitted position of the component prior to removal.



6.

CAUTION:

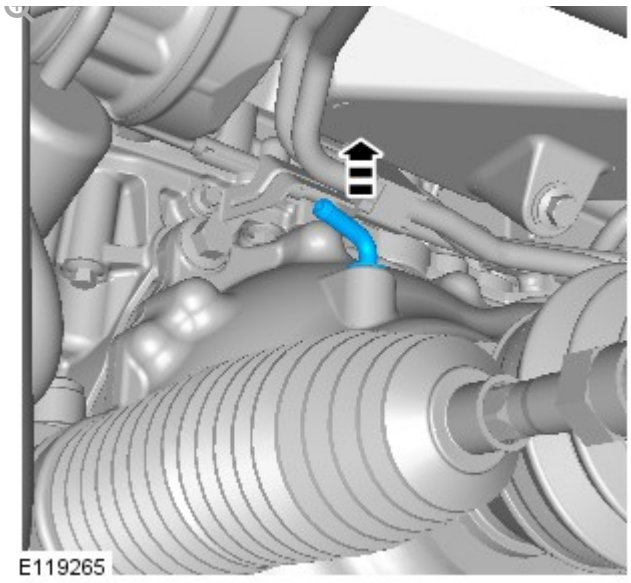
Note the fitted position of the component prior to removal.



7.

CAUTION:

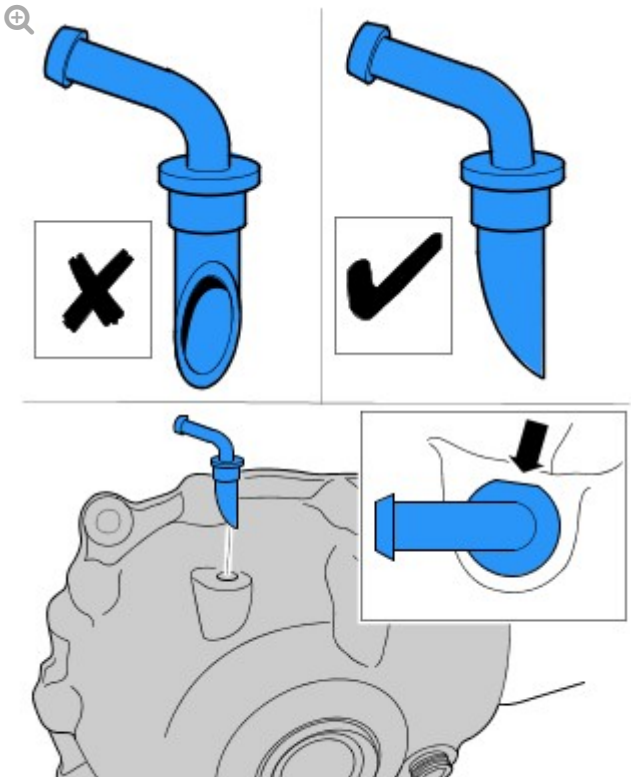
Take care not to damage the differential case when removing the breather.



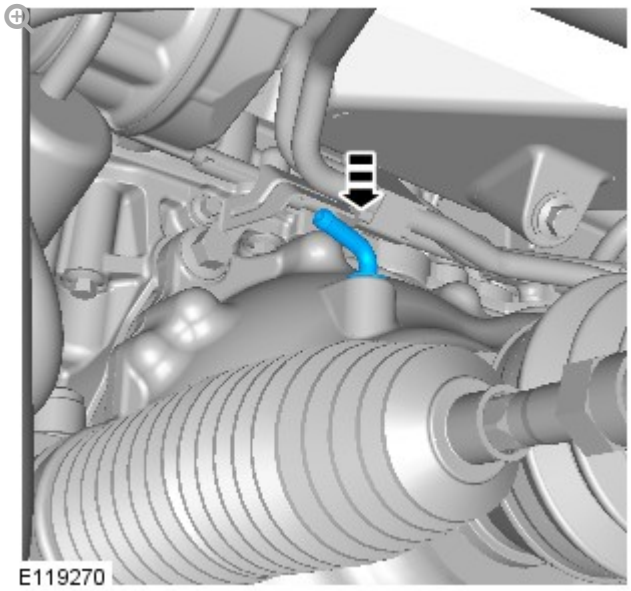
INSTALLATION

1. **CAUTIONS:**

   - Make sure that the area around the component is clean and free of foreign material.
   - Make sure the breather tube is installed in the correct orientation.



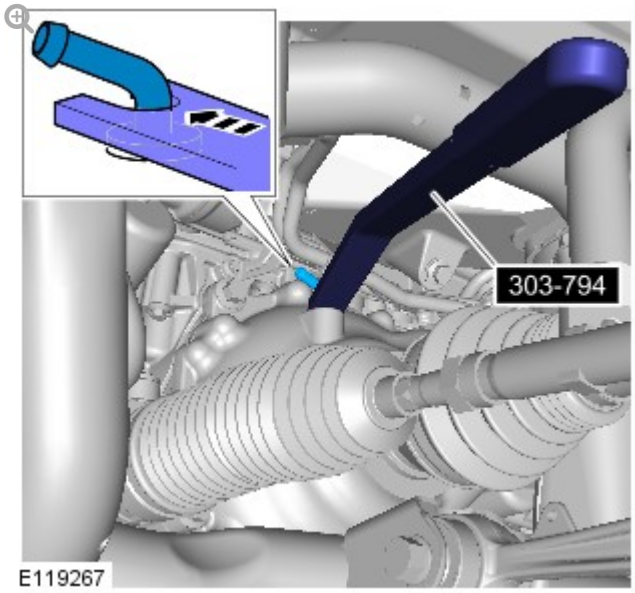
2.



3.

CAUTION:

Care must be taken not to damage the surrounding components when inserting the special tool.

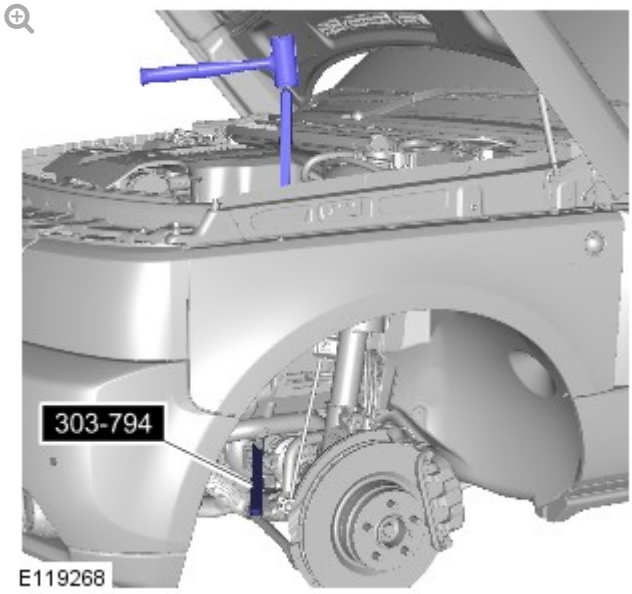


Special Tool(s): 308-794

4.

CAUTION:

Take extra care not to damage the component.

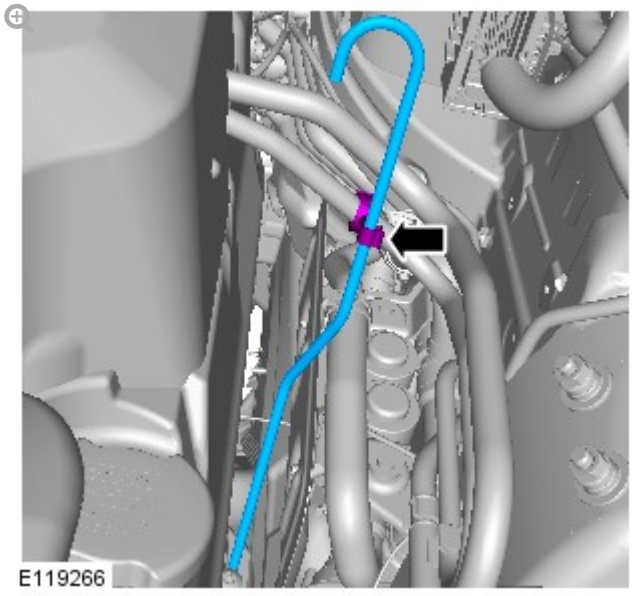


Special Tool(s): 308-794

5.

NOTE:

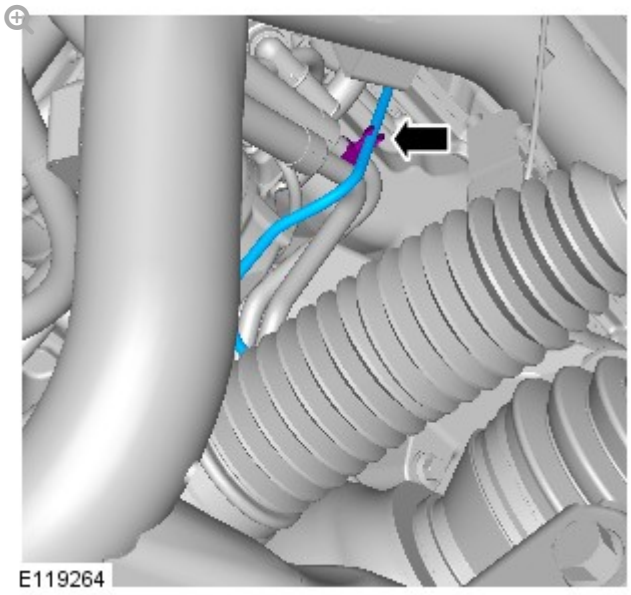
Make sure that this component is installed to the noted removal position.



6.

NOTE:

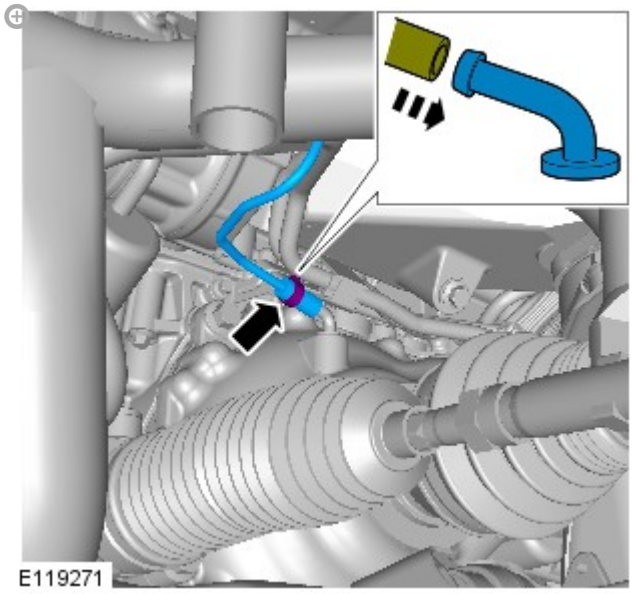
Make sure that this component is installed to the noted removal position.



7.

CAUTION:

Take extra care not to damage the component.



8. Install the LH front wheel and tire.
   Torque: **140 Nm**

9. Connect the battery ground cable.
   Refer to: Specifications (414-00 Charging System - General Information, Specifications).

2012.0 RANGE ROVER (LM), 205-04

FRONT DRIVE HALFSHAFTS

SPECIFICATIONS

General Specification

ITEM	SPECIFICATION
Type	Fully floating, fixed length, solid shafts incorporating constant velocity joints at each end of shaft

	each end of shaft

Lubricant

Outboard joint

ITEM	SPECIFICATION
Use grease supplied with replacement boot kit	
Inboard joint	Use grease supplied with replacement boot kit

Item	Specification
Type	Fully floating, solid shafts incorporating 'plug-in' constant velocity joint at inboard end and fixed constant velocity joint at outboard end of shaft

Torque Specifications

DESCRIPTION	NM	LB-FT
* Stabilizer bar link nut	100	74
* Stabilizer link nut	100	74
* Tie rod end ball joint nut	80	59
*+ Halfshaft retaining nut	420	311
Road wheel nuts	140	103

*** New nut must be fitted**

+ Stake nut on completion

2012.0 RANGE ROVER (LM), 205-04

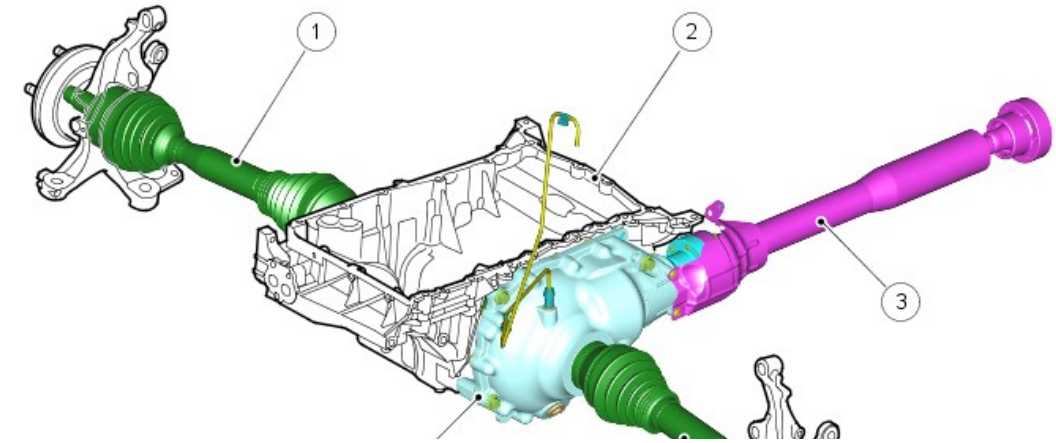
FRONT DRIVE HALFSHAFTS

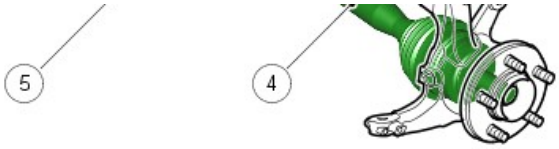
DESCRIPTION AND OPERATION

Front Drive Halfshaft Components

NOTE:

4.2/4.4L V8 petrol version shown





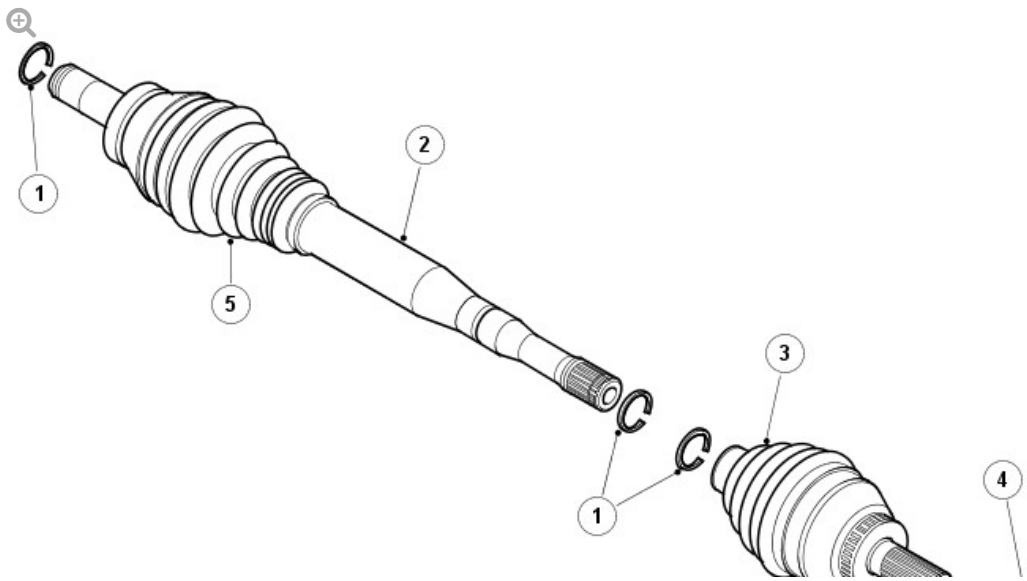
E59471

ITEM	DESCRIPTION
1	Front RH drive halfshaft
2	Engine sump
3	Front driveshaft
4	Front LH drive halfshaft
5	Front differential

GENERAL

The front drive halfshafts are handed components with the RH drive halfshaft being longer than the LH drive halfshaft. Both shafts are of similar construction with constant velocity (CV) joints at each end to allow for steering and suspension movement.

The front drive halfshafts are similar in their construction. The only difference is the lengths of each shaft. The LH drive halfshaft has a total length of 677 mm. The RH drive halfshaft is a longer shaft, which passes through a housing and the engine sump to the differential and has a total length of 1024 mm.



M470438

ITEM	DESCRIPTION
1	Snap ring (3 off)
2	Drive shaft
3	Outer CV joint
4	Stake nut
5	Inner CV joint.

The outer CV joint has a target on the outer diameter. This is used by the ABS wheel speed sensor for vehicle and wheel speed calculations.For additional information, refer to: (206-09A Anti-Lock Control - Traction Control)

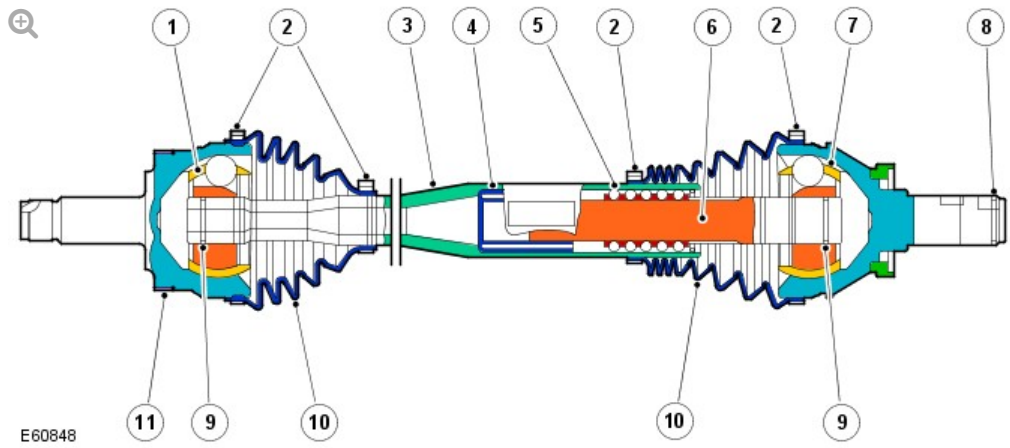
Anti-Lock Control - Traction Control (Description and Operation), Anti-Lock Control - Traction Control - 4.2L (Description and Operation), Anti-Lock Control - Traction Control - 4.4L (Description and Operation).

Each drive halfshaft comprises 2 CV joints and gaiters, an outer tube, a solid shaft and a ball cage assembly.

FRONT DRIVE HALFSHAFTS

DESCRIPTION AND OPERATION

Front Drive Halfshaft - Sectional View



ITEM	DESCRIPTION
1	Outer CV joint
2	Clamp
3	Outer tube
4	Sealing plug
5	Ball cage
6	Shaft
7	Inner CV joint
8	Snap ring - differential
9	Snap ring
10	Gaiter
11	ABS sensor target ring.

GENERAL

The CV joints are of the Birfield design. This design uses longitudinal, elliptical grooves, which retain 6 steel balls. The balls are further retained by a cage. The constant velocity is achieved by the position of the steel balls. If a centre line is drawn through the balls and the driven hub or differential shaft, the 2 centre lines always bisect each other at the angle of drive. This condition allows the rotational speed of the driven shaft to be passed to the driven hub or differential shaft with no loss of rotational speed regardless of the shaft angle. The CV joints are packed with grease, which is retained in the joint by a synthetic rubber gaiter. The gaiter is retained at each end by a metal clamp, which provides a water tight seal to prevent the ingress of dirt and moisture. The CV joints are retained on their respective shaft or tube by an internal snap ring. The snap rings are located in a groove on each shaft or tube end and locate in a mating groove in the CV joint. The CV joints can be removed by a sharp tap with a soft mallet on the CV joint housing, which releases the snap ring from the groove.

The shaft is a sliding fit inside the outer tube, which allows for the small length changes which occur with articulation of the suspension. The shaft is located in a ball cage, which is retained inside the outer tube. The ball cage ensures that the shaft is held rigidly in the outer tube whilst allowing it to freely move in and out of the tube as necessary. A sealing plug is pressed into the outer tube and retains grease around the balls in the cage.

The inner CV joint shaft is splined and mates with splines in the front differential. A snap ring is located around the inner shaft and, when fitted in the differential, locates in a mating groove in the differential splined bore. The CV joint shaft is removed from the differential in a similar manner as removing a CV joint.

2012.0 RANGE ROVER (LM), 205-04

FRONT DRIVE HALFSHAFTS

DIAGNOSIS AND TESTING

For additional information.

REFER to: Driveline System (205-00, Diagnosis and Testing).

2012.0 RANGE ROVER (LM), 205-04

FRONT DRIVE HALFSHAFTS

FRONT HALFSHAFT LH - VEHICLES WITH: HIGH PERFORMANCE BRAKES (G1225751)

REMOVAL AND INSTALLATION

47.10.01	SHAFT WITH BOTH JOINTS - RENEW	ALL DERIVATIVES	1.6	USED WITHINS	+

SPECIAL TOOL(S)

211-314(LRT-57-036)

Ball joint separator

205-754(LRT-54-027)

Ball joint separator

204-506/3(LRT-60-030/3)

Halfshaft remover/replacer

204-506/1(LRT-60-030/1)

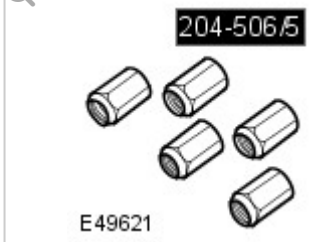
Halfshaft remover/replacer

204-506/2(LRT-60-030/2)

Halfshaft

E49619

remover/replacer



204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer

205-735(LRT-54-026)

Remover halfshaft inboard joint

308-005(LRT-37-004/2)

Axle oil seal remover

308-626/1

Installer halfshaft oil seal

308-626/2

Installer/Guide halfshaft oil seal

204-506/4

Installer, Halfshaft

REMOVAL

NOTE:

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

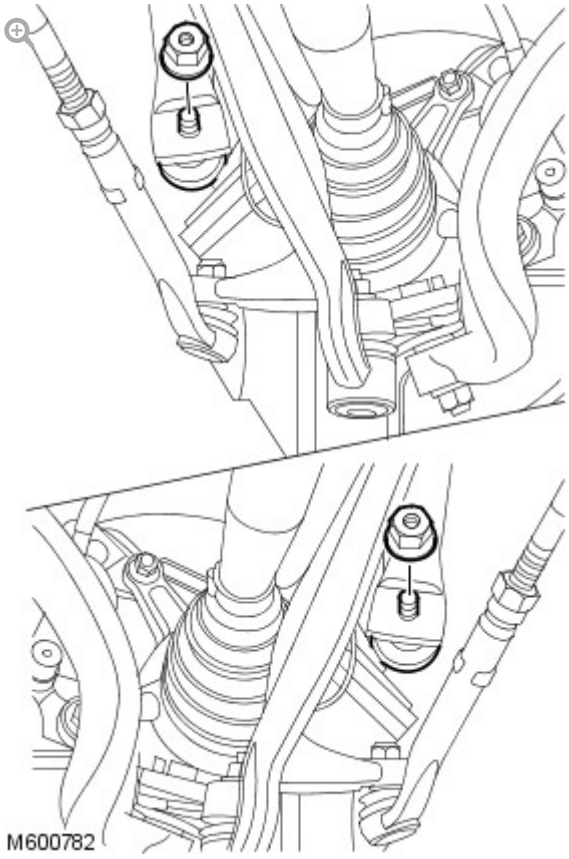
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

   Make sure to support the vehicle with axle stands.

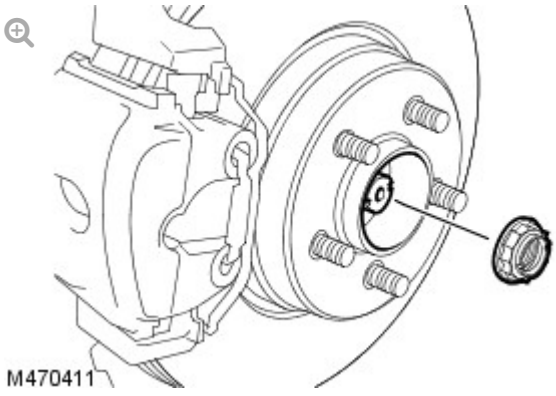
Raise the front of the vehicle.

3. Remove the LH front wheel and tire.

4. 

Release the stabilizer bar links from the stabilizer bar.

- Remove the 2 nuts.

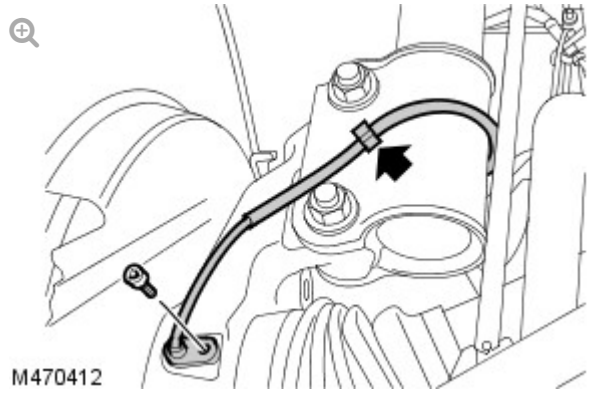
5. 

With assistance, remove and discard the halfshaft nut.

6. Remove the LH front brake disc.
For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and

Installation).

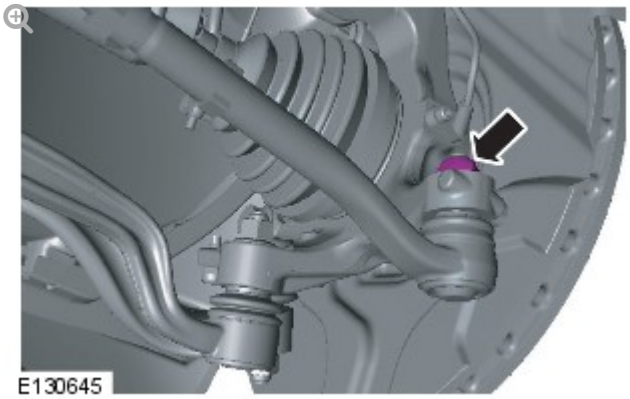
7.



Release the LH front anti-lock brake system (ABS) sensor and wiring harness.

- Release the clip.
- Remove the bolt.

8.

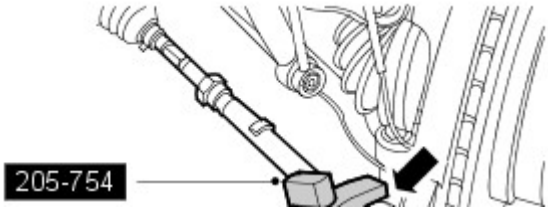


Loosen the LH tie rod end locking nut.

9.

CAUTION:

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

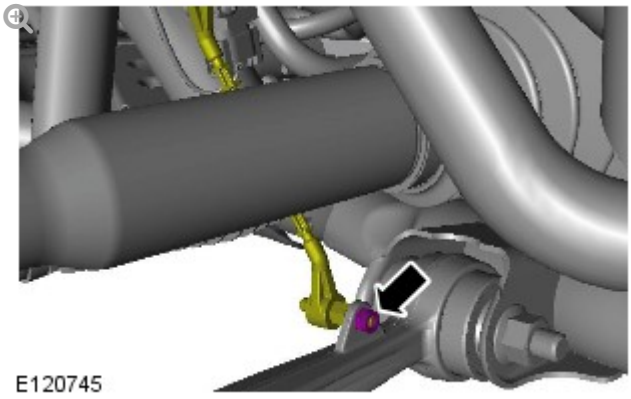


E61273

Using the special tool release the LH tie rod end.

- Remove and discard the nut.

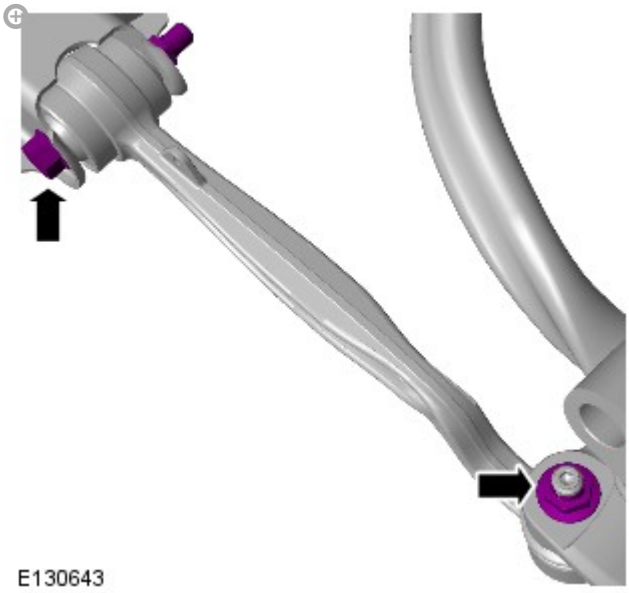
10.



E120745

LH side front: Release the suspension height sensor.

11.

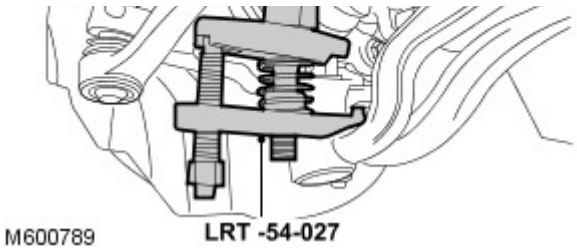


E130643

Loosen the front lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

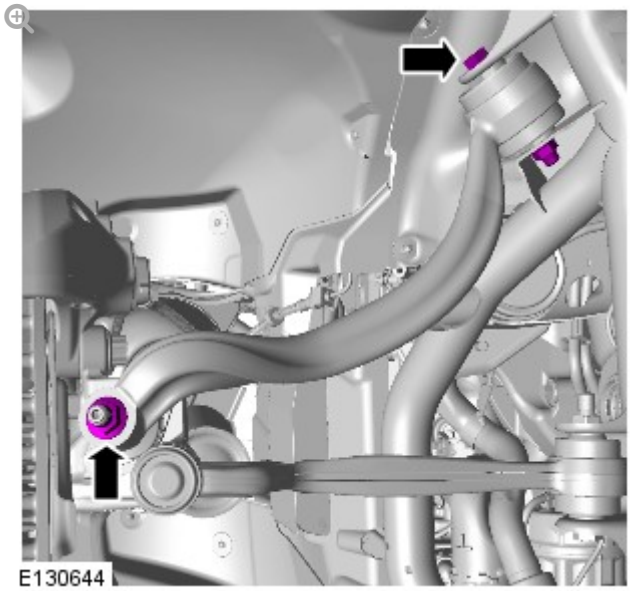
12.



Using the special tool release the LH front lower arm.

- Remove the nut.

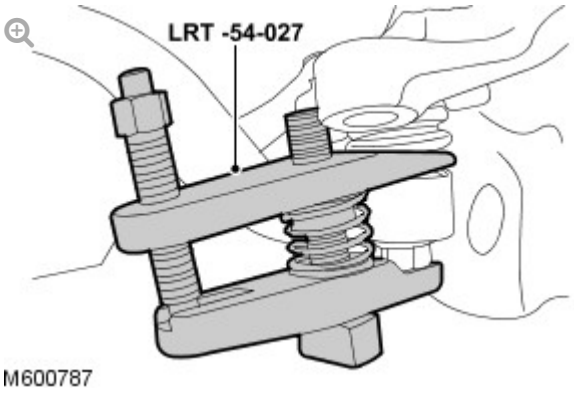
13.



Loosen the rear lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

14.



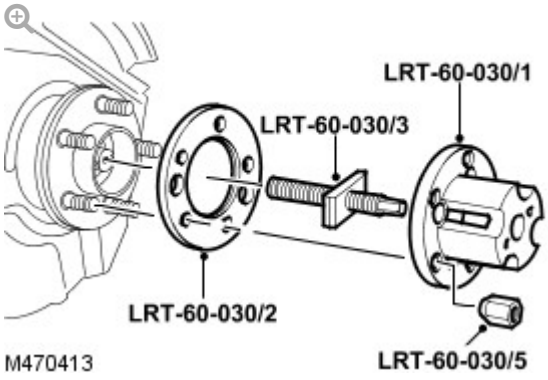
Using the special tool release the LH rear lower arm.

- Remove the nut.

15.

CAUTION:

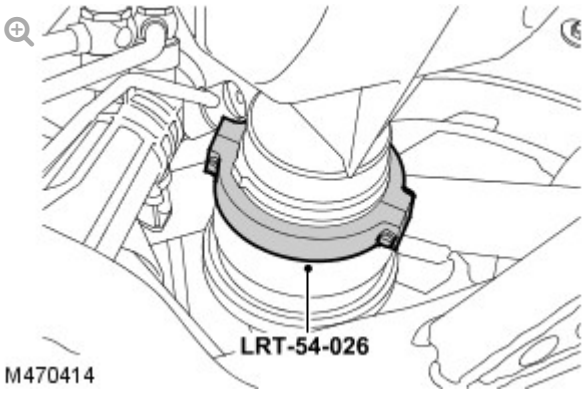
Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.



Using the special tools, release the halfshaft from the wheel hub.

16. Remove the special tools.

17. Position a container to collect the fluid spillage.

18. 

Install the special tool, to the inner halfshaft joint.

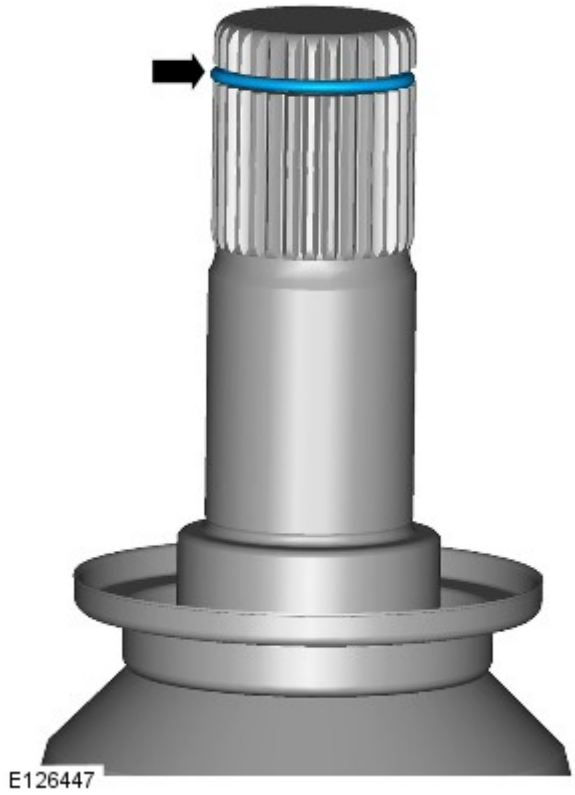
19. LH front: Release the halfshaft from the differential housing.

20. Release the halfshaft from the wheel hub.

21. Remove the halfshaft.

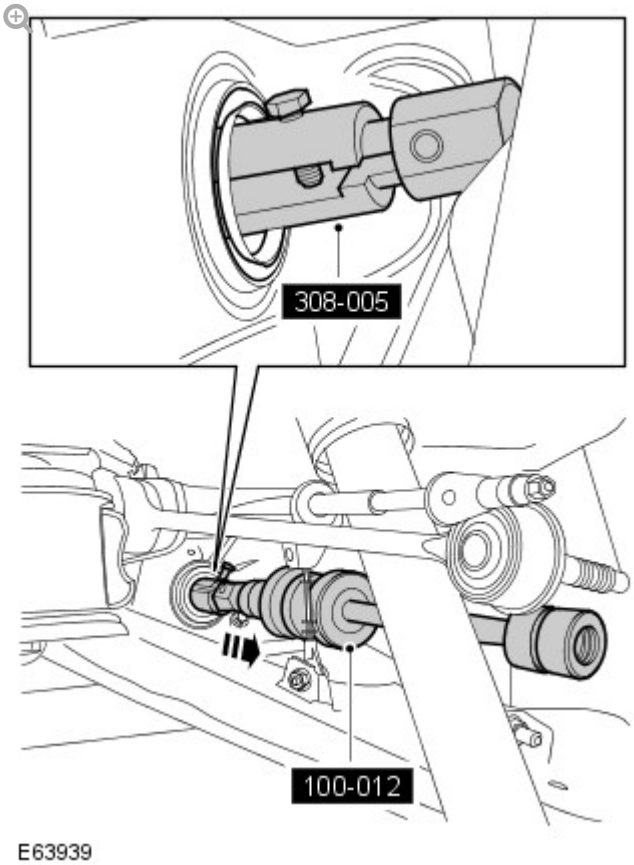
- Remove the special tool.

22.



Remove and discard the clip from the LH halfshaft.

23.



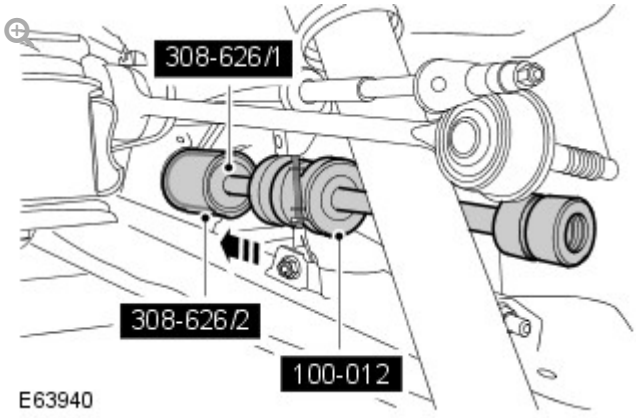
Using the special tools, remove and discard the halfshaft seal.

Using the special tools, remove and discard the halfshaft seal.

INSTALLATION

1. **CAUTION:**

   The seal protector must be left in place until the halfshaft has been installed.



   Using the special tools, install a new halfshaft seal.

   - Clean the component mating faces.

2. Install a new clip to the LH halfshaft.

3. Reposition the stabilizer bar.

4. **CAUTION:**

   Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

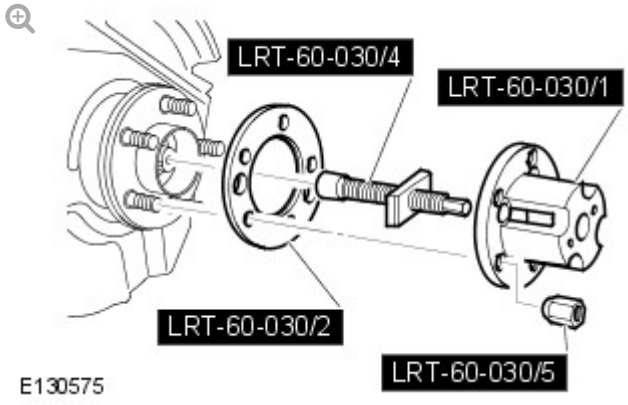
   Install the halfshaft.

   - Lubricate the oil seal.

5. Locate the halfshaft in the wheel hub.
   - Lightly lubricate the halfshaft splines.
   - Clean the halfshaft and wheel hub splines.

6. **CAUTION:**

   Install the halfshaft nut finger tight.



Using the special tools, pull the halfshaft in to the wheel hub.

7. Remove the special tools.

8. **CAUTION:**

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

Secure the LH rear lower arm.

- Tighten the nut to 80 Nm (59 lb.ft).
- Tighten the rear lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

9. **CAUTION:**

   Nuts and bolts must be tightened with the weight of the

vehicle on the suspension.

Secure the LH front lower arm.

- Tighten the nut to 80 Nm (59 lb.ft).
- Tighten the lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

10. LH side front: Secure the suspension height sensor.
    - Install the nut and tighten to 7 Nm (5 lb.ft).

11. Secure the LH tie rod end.
    - Install new nut and and tighten to 80 Nm (59 lb.ft).

12. Secure the LH front ABS sensor and wiring harness.
    - Apply anti-seize compound to the ABS sensor.
    - Tighten the bolt to 8 Nm (6 lb.ft)
    - Secure in the clip.

13. Install the LH front brake disc.
    For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and Installation).

14. **CAUTION:**

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

    With assistance tighten the wheel hub nut to 420Nm (311 lb.ft).
    - Use a new nut.
    - Stake the nut to the halfshaft.

15. Secure the stabilizer bar links.

- Tighten the nuts to 100 Nm (74 lb.ft).

16. Install the LH front road wheel and tire.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

17. Check and top-up the differential case.

18. Check, and if necessary, adjust the wheel alignment.
    For additional information, refer to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).

19. Connect the battery ground cable.
    For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

FRONT DRIVE HALFSHAFTS

FRONT HALFSHAFT LH – VEHICLES WITHOUT: HIGH PERFORMANCE BRAKES (G1225754)

REMOVAL AND INSTALLATION

47.10.01	SHAFT WITH BOTH JOINTS - RENEW	ALL DERIVATIVES	1.6	USED WITHINS	+

SPECIAL TOOL(S)

211-314(LRT-57-036)

Ball joint separator

205-754(LRT-54-027)

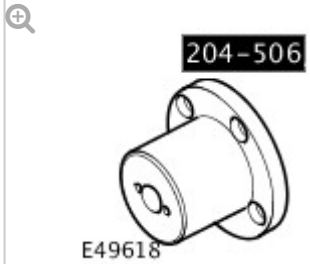
Ball joint separator

E45276

Ball joint separator

204-506/3(LRT-60-030/3)

Halfshaft remover/replacer



204-506/1(LRT-60-030/1)

Halfshaft remover/replacer

204-506/2(LRT-60-030/2)

Halfshaft remover/replacer

204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer

205-735(LRT-54-026)

Remover halfshaft inboard joint

308-005(LRT-37-004/2)

Axle oil seal remover

308-626/1

Installer halfshaft oil seal

308-626/2

Installer/Guide halfshaft oil seal

204-506/4

Installer

 E130576	Installer, Halfshaft

REMOVAL

NOTE:

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

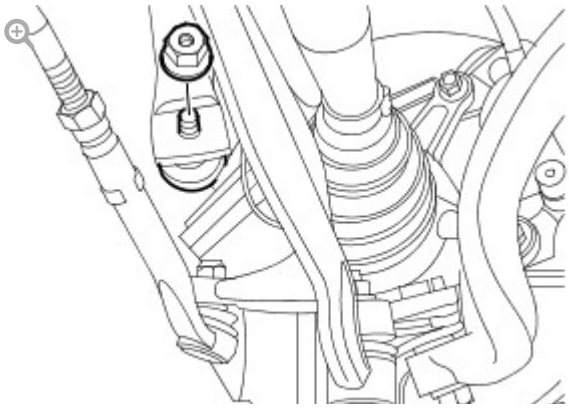
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

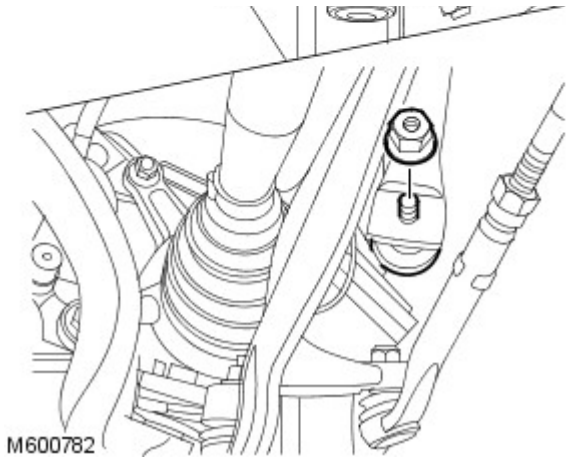
2. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise the front of the vehicle.

3. Remove the LH front wheel and tire.

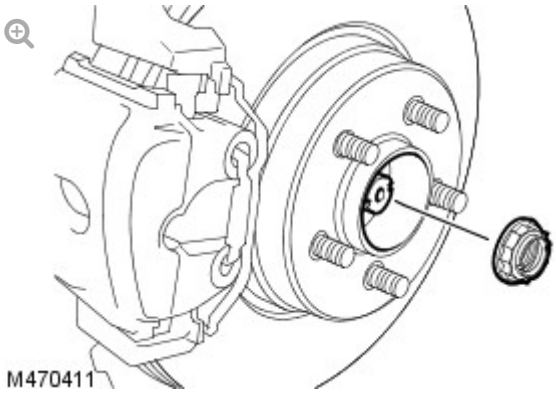
4. 



Release the stabilizer bar links from the stabilizer bar.

- Remove the 2 nuts.

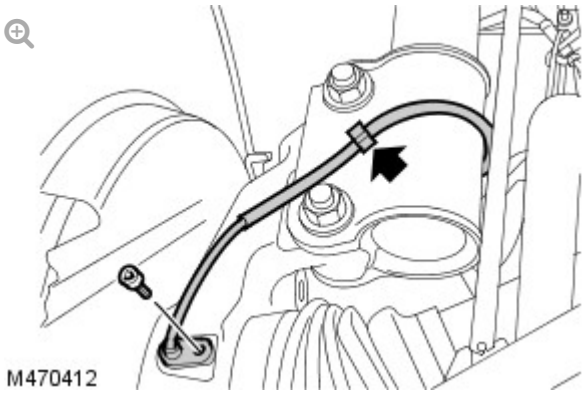
5.



With assistance, remove and discard the halfshaft nut.

6. Remove the LH front brake disc.
For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

7.

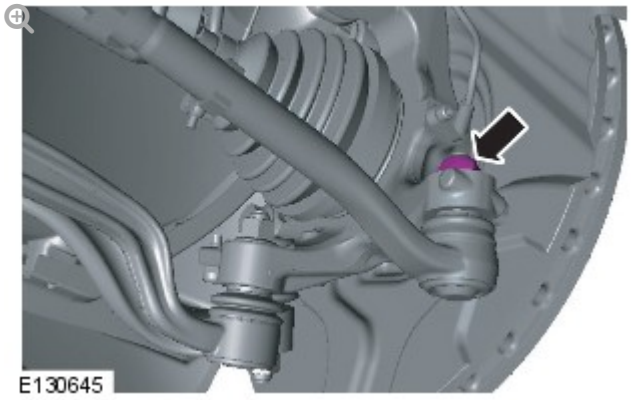


Release the LH front anti-lock brake system (ABS) sensor and wiring

harness.

- Release the clip.
- Remove the bolt.

8.

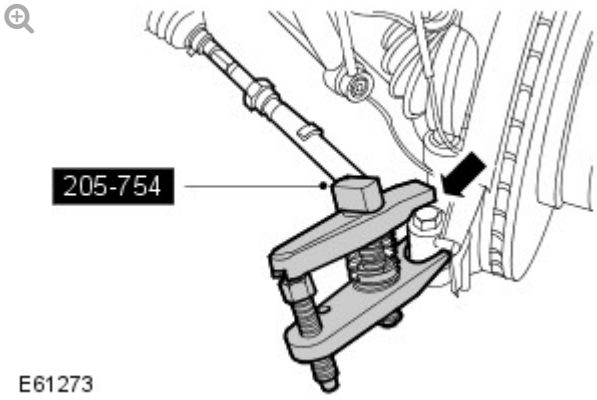


Loosen the LH tie rod end locking nut.

9.

CAUTION:

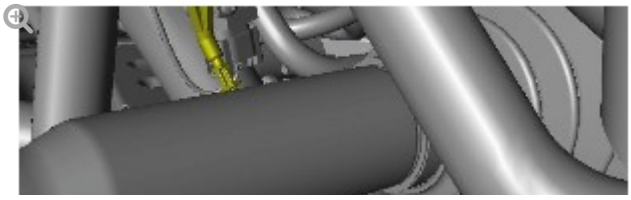
Make sure the ball joint seal is not damaged. A damaged seal will lead to the premature failure of the joint.



Using the special tool release the LH tie rod end.

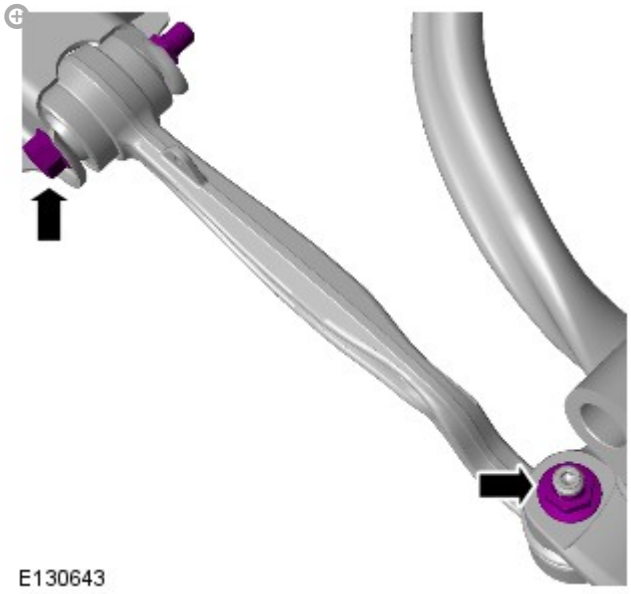
- Remove and discard the nut.

10.



LH side front: Release the suspension height sensor.

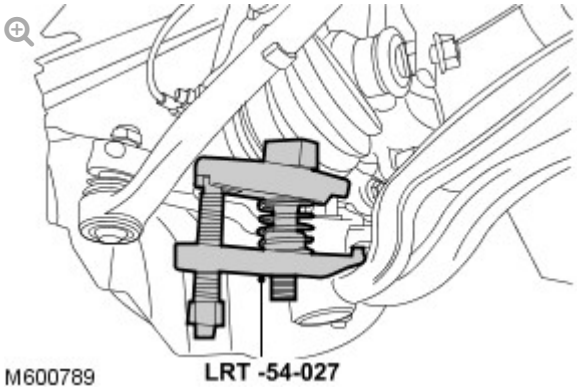
11.



Loosen the front lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

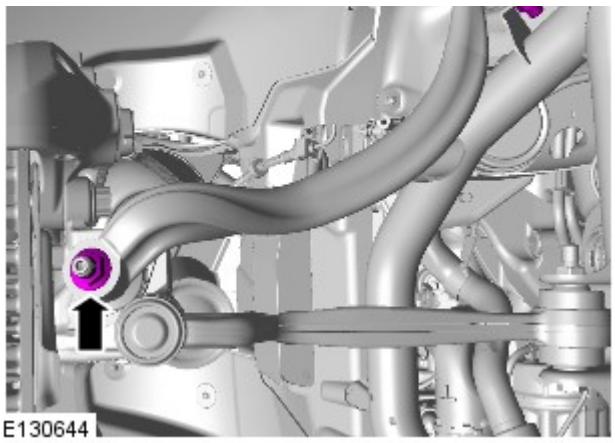
12.



Using the special tool release the LH front lower arm.

- Remove the nut.

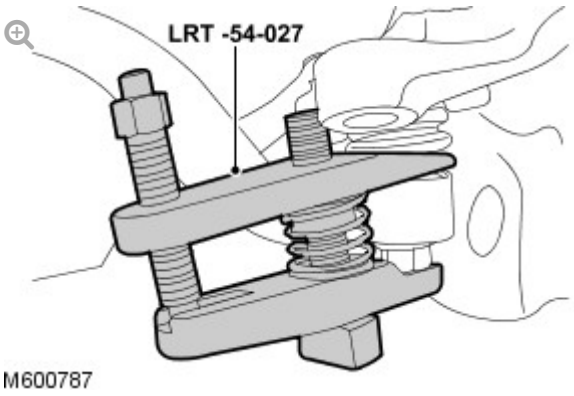
13.



Loosen the rear lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

14.



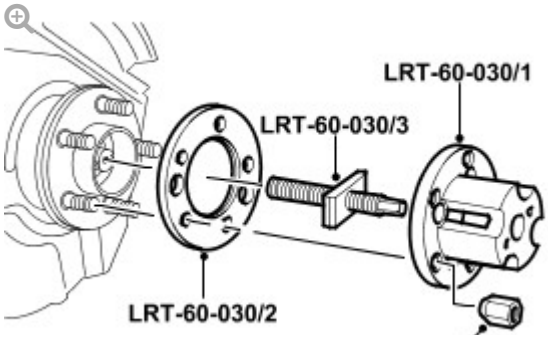
Using the special tool release the LH rear lower arm.

- Remove the nut.

15.

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.

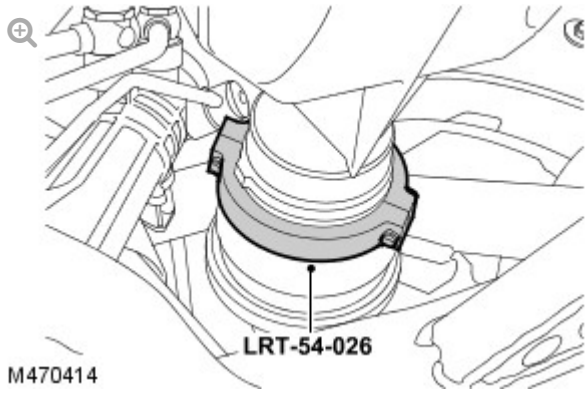


M470413 LRT-60-030/5

Using the special tools, release the halfshaft from the wheel hub.

16. Remove the special tools.

17. Position a container to collect the fluid spillage.

18. 

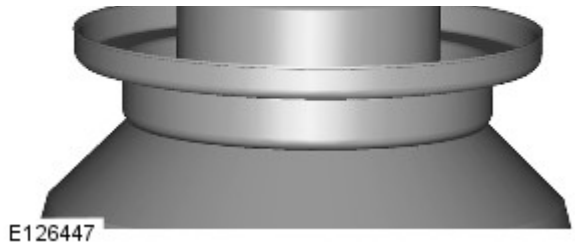
Install the special tool, to the inner halfshaft joint.

19. LH front: Release the halfshaft from the differential housing.

20. Release the halfshaft from the wheel hub.

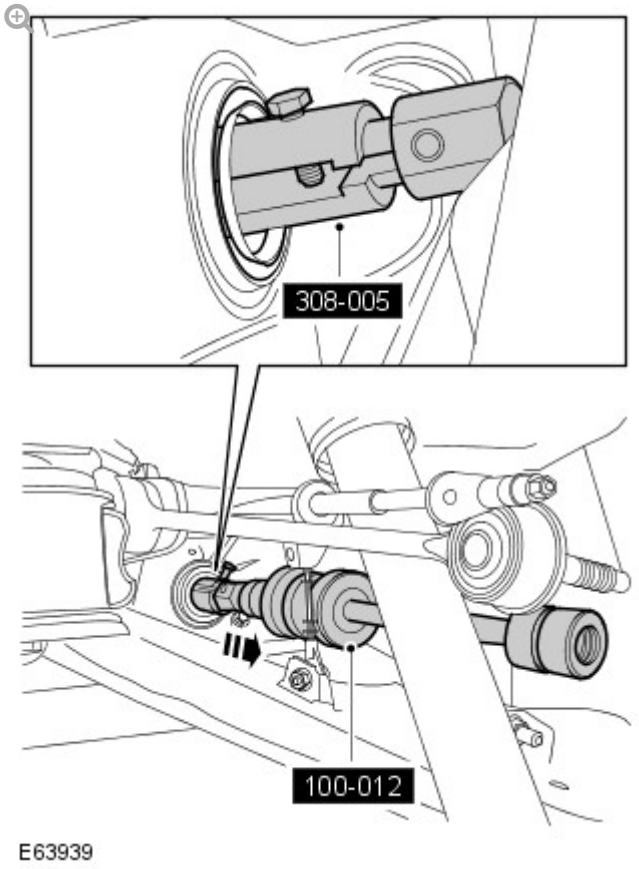
21. Remove the halfshaft.
    - Remove the special tool.

22. 



Remove and discard the clip from the LH halfshaft.

23.



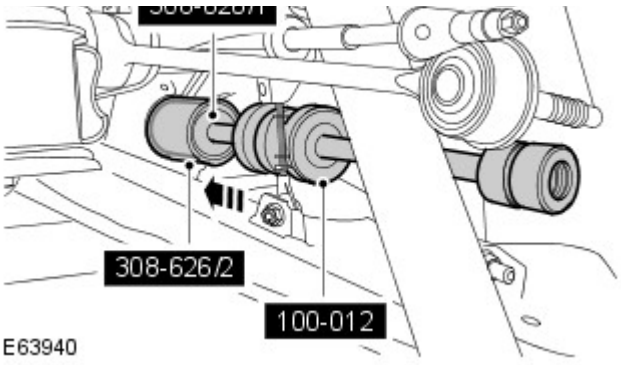
Using the special tools, remove and discard the halfshaft seal.

INSTALLATION

1.

CAUTION:

The seal protector must be left in place until the halfshaft has been installed.



Using the special tools, install a new halfshaft seal.

- Clean the component mating faces.

2. Install a new clip to the RH halfshaft.

3. Reposition the stabilizer bar.

4. **CAUTION:**

   Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

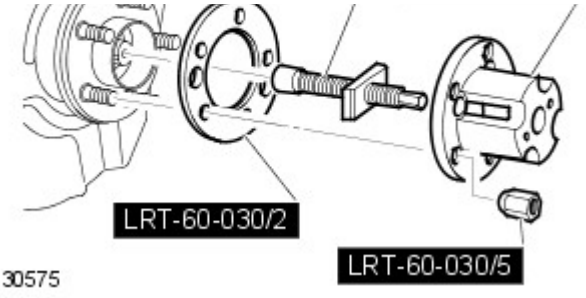
Install the halfshaft.

- Lubricate the oil seal.

5. Locate the halfshaft in the wheel hub.
   - Lightly lubricate the halfshaft splines.
   - Clean the halfshaft and wheel hub splines.

6. **CAUTION:**

   Install the halfshaft nut finger tight.



Using the special tools, pull the halfshaft in to the wheel hub.

7. Remove the special tools.

8. **CAUTION:**

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

   Secure the LH rear lower arm.

   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the rear lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

9. **CAUTION:**

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

   Secure the LH front lower arm.

   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

10. LH side front: Secure the suspension height sensor.
    - Install the 2 nuts and tighten to 7 Nm (5 lb.ft).

11. Secure the LH tie rod end.

11. Secure the LH tie rod end.
    - Install new nut and and tighten to 80 Nm (59 lb.ft).

12. Secure the LH front ABS sensor and wiring harness.
    - Apply anti-seize compound to the ABS sensor.
    - Tighten the bolt to 8 Nm (6 lb.ft)
    - Secure in the clip.

13. Install the LH front brake disc.
    For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

14. **CAUTION:**

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

    With assistance tighten the wheel hub nut to 420Nm (311 lb.ft).
    - Use a new nut.
    - Stake the nut to the halfshaft.

15. Secure the stabilizer bar links.
    - Tighten the nuts to 100 Nm (74 lb.ft).

16. Install the LH front road wheel and tire.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

17. Check and top-up the differential case.

18. Check, and if necessary, adjust the wheel alignment.
    For additional information, refer to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).

19. Connect the battery ground cable.

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

2012.0 RANGE ROVER (LM), 205-04

FRONT DRIVE HALFSHAFTS

FRONT HALFSHAFT RH – VEHICLES WITH: HIGH PERFORMANCE BRAKES (G1225752)

47.10.02	SHAFT WITH BOTH JOINTS - RH - RENEW	ALL DERIVATIVES	1.8	USED WITHINS	+

SPECIAL TOOL(S)

211-314(LRT-57-036)

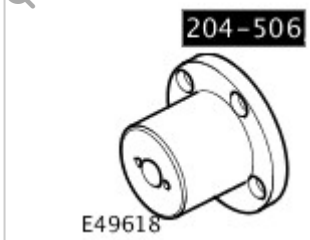
Ball joint separator

205-754(LRT-54-027)

Ball joint separator

204-506/3(LRT-60-030/3)

Halfshaft remover/replacer



204-506/1(LRT-60-030/1)

Halfshaft remover/replacer

204-506/2(LRT-60-030/2)

Halfshaft remover/replacer

204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer

205-735(LRT-54-026)

Remover halfshaft inboard joint

204-506/4

 E130576	Installer, Halfshaft

REMOVAL

NOTE:

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

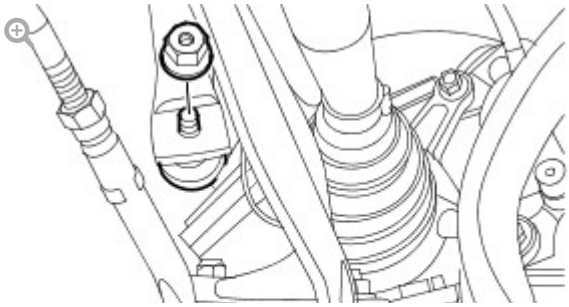
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

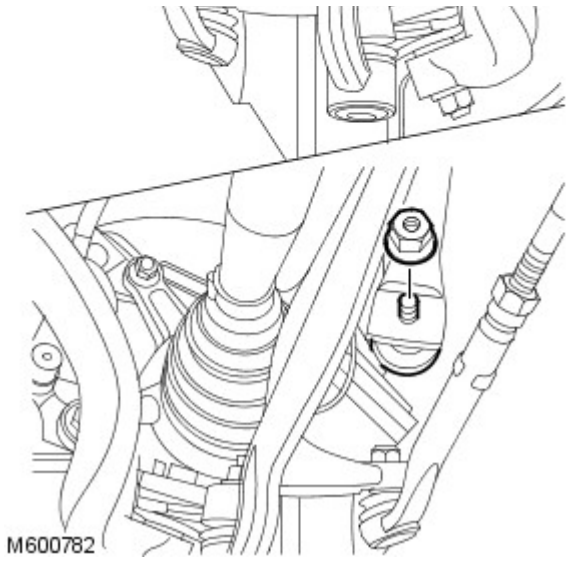
2. **WARNING:**

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

   Raise the front of the vehicle.

3. Remove the front road wheels and tires.

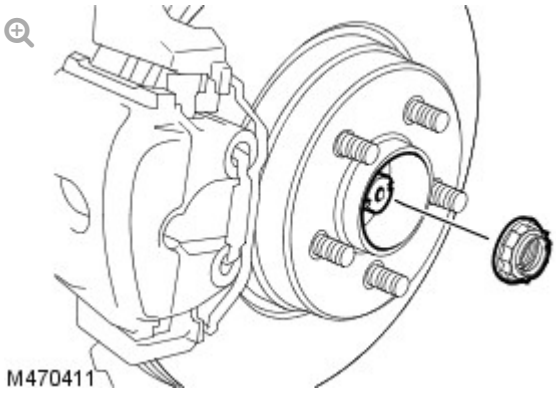
4. 



Release the stabilizer bar links from the stabilizer bar.

- Remove the 2 nuts.

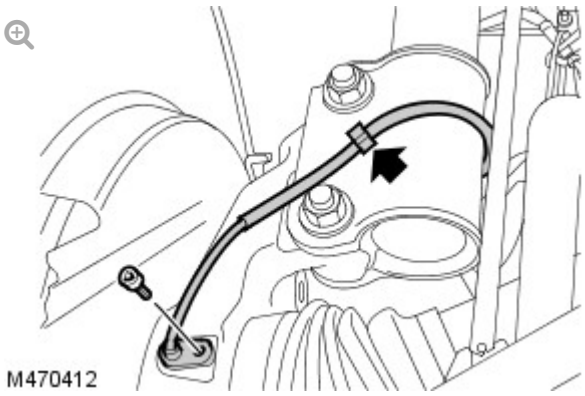
5.



With assistance, remove and discard the halfshaft nut.

6. Remove the RH front brake disc.
   For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and Installation).

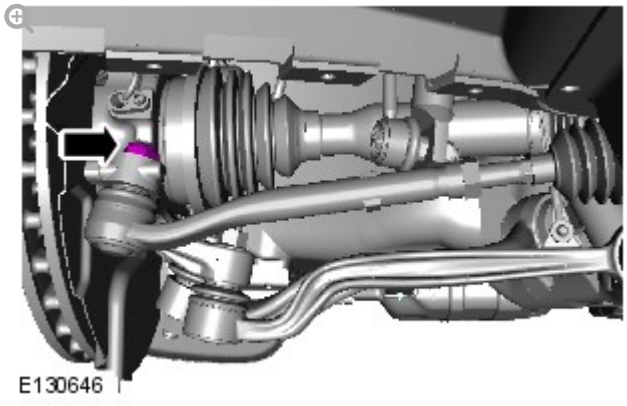
7.



Release the RH front anti-lock brake system (ABS) sensor and wiring harness.

- Release the clip.
- Remove the bolt.

8.

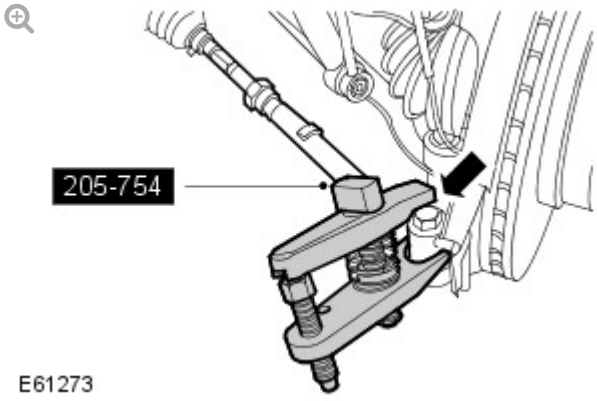


Loosen the RH tie rod end locking nut.

9.

CAUTION:

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



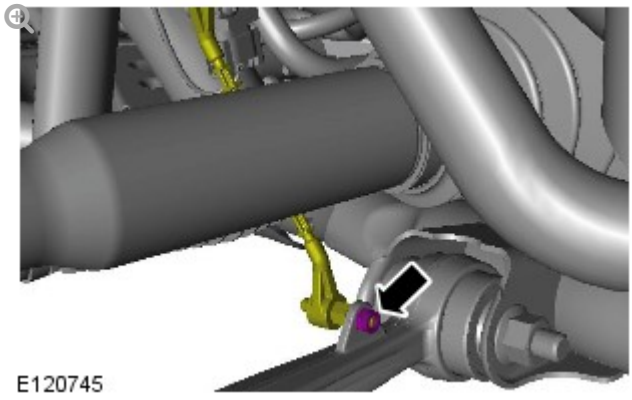
Using the special tool release the RH tie rod end.

- Remove and discard the nut.

10.

NOTE:

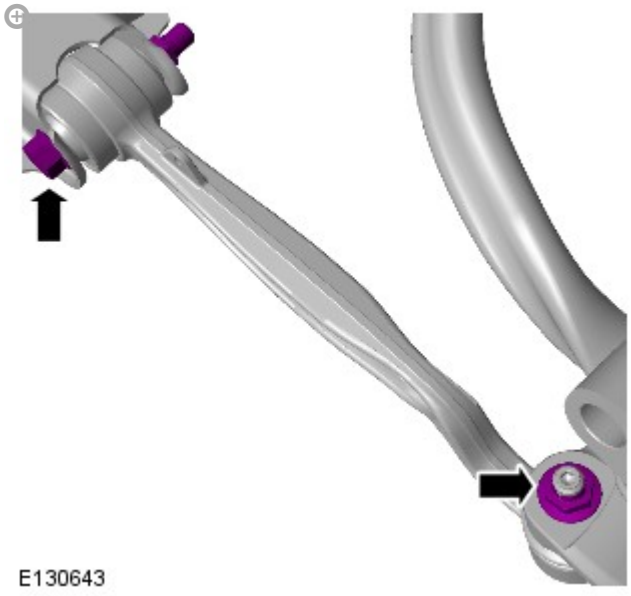
LH illustration shown, RH is similar.



RH side front: Release the suspension height sensor.

11. **NOTE:**

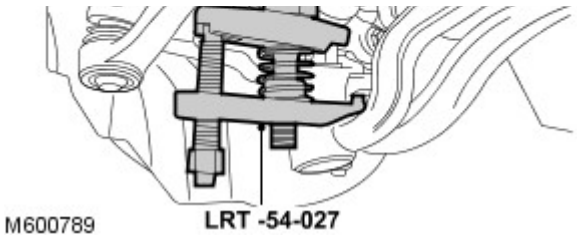
LH illustration shown, RH is similar.



Loosen the front lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

12.



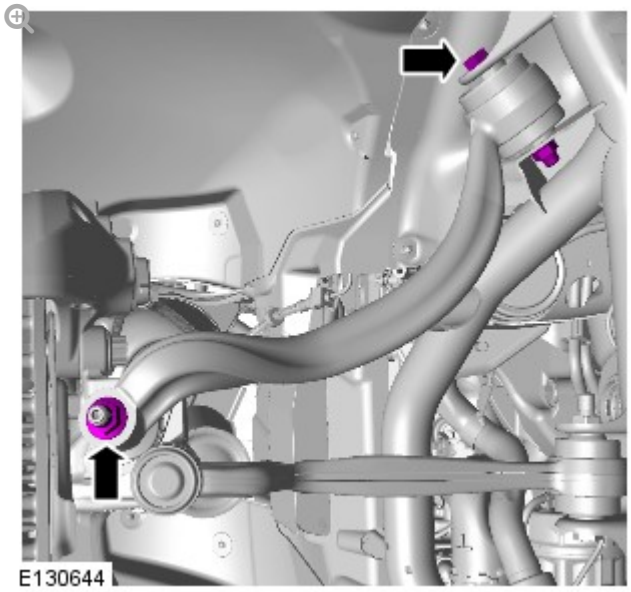
Using the special tool release the RH front lower arm.

- Remove the nut.

13.

NOTE:

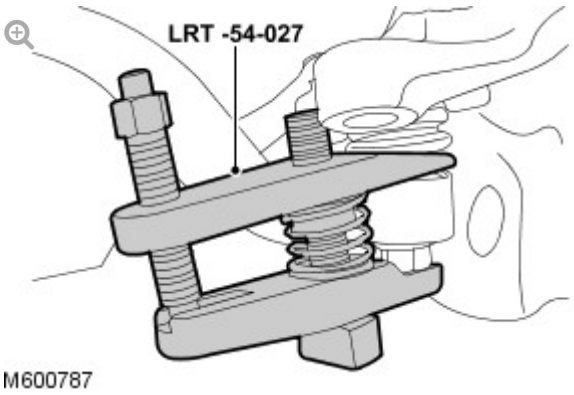
LH illustration shown, RH is similar.



Loosen the rear lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

14.

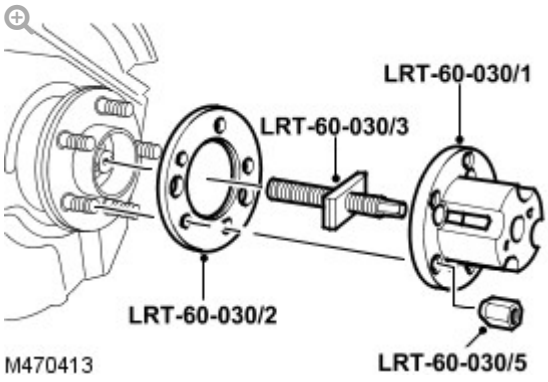


Using the special tool release the RH rear lower arm.

- Remove the nut.

15. **CAUTION:**

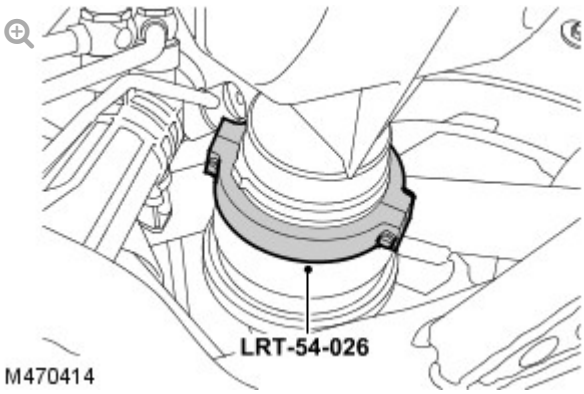
> Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.



Using the special tools, release the halfshaft from the wheel hub.

16. Remove the special tools.

17. Position a container to collect the fluid spillage.

18. 

Install the special tool, to the inner halfshaft joint.

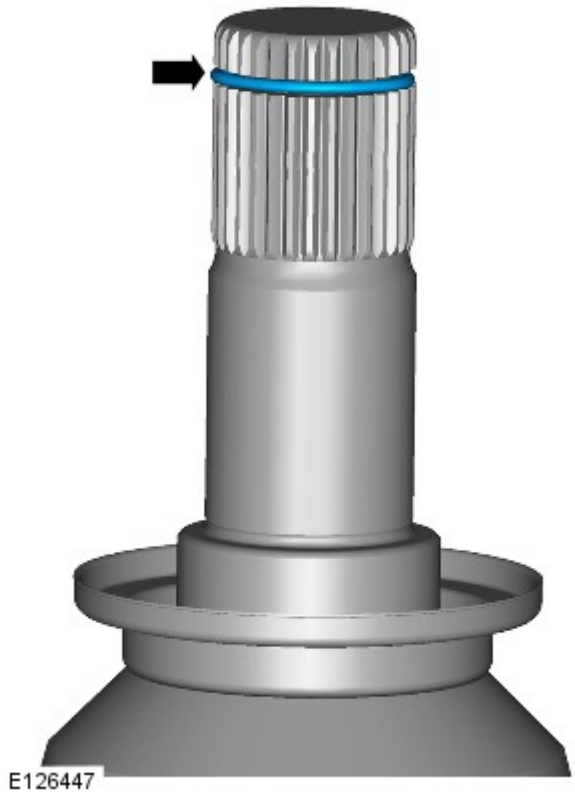
19. RH front: Release the halfshaft from the differential housing.

20. Release the halfshaft from the wheel hub.

21. Reposition the stabilizer bar.

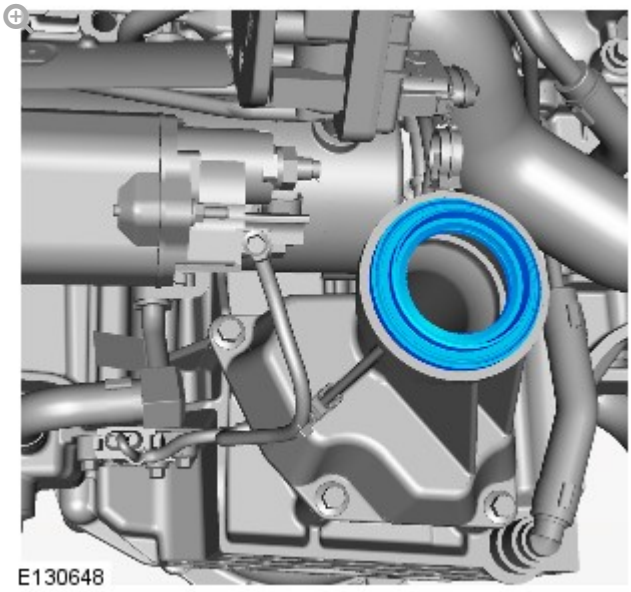
22. With assistance, remove the halfshaft.

23.



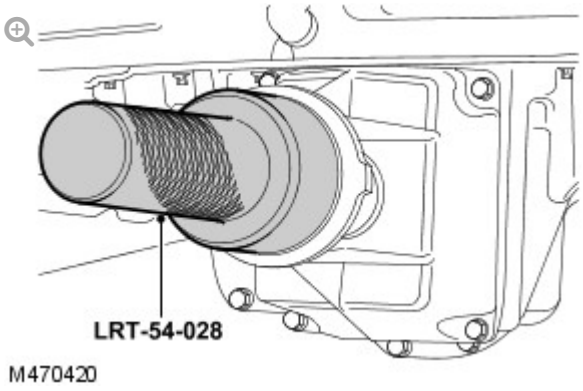
Remove and discard the clip from the RH halfshaft.

24.



RH front: Remove and discard the halfshaft seal.

INSTALLATION

1. 

   Using the special tool, install a new halfshaft seal.

   - Lubricate the seal with clean differential fluid.

2. Install a new clip to the RH halfshaft.

3. Reposition the stabilizer bar.

4. **CAUTION:**

   Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

   With assistance, install the halfshaft.

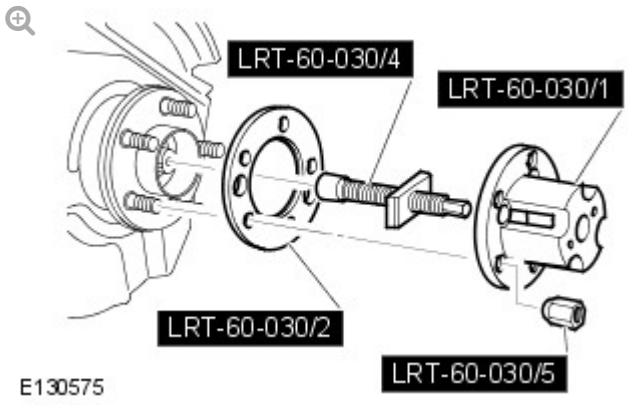
   - Lubricate the oil seal.

5. Locate the halfshaft in the wheel hub.

   - Lightly lubricate the halfshaft splines.
   - Clean the halfshaft and wheel hub splines.

6. **CAUTION:**

Install the halfshaft nut finger tight.



Using the special tools, pull the halfshaft in to the wheel hub.

7. Remove the special tools.

8. **CAUTION:**

Only tighten the nuts and bolts when the suspension is in the normal drive position.

Secure the RH rear lower arm.

- Tighten the nut to 80 Nm (59 lb.ft).
- Tighten the rear lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

9. **CAUTION:**

Only tighten the nuts and bolts when the suspension is in the normal drive position.

Secure the RH front lower arm.

- Tighten the nut to 80 Nm (59 lb.ft).
- Tighten the lower arm bolt to 165 Nm (122 lb.ft) plus a

- Tighten the lower arm bolt to 169 Nm (125 lb.ft) plus a further 90 degrees.

10. RH side front: Secure the suspension height sensor.

11. Secure the RH tie rod end.
    - Install a new nut and tighten to 80 Nm (59 lb.ft).

12. Secure the RH front ABS sensor and wiring harness.
    - Apply anti-seize compound to the ABS sensor.
    - Tighten the bolt to 8 Nm (6 lb.ft)
    - Secure in the clip.

13. Install the RH front brake disc.
    For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and Installation).

14. **CAUTION:**

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

    With assistance tighten the wheel hub nut to 420Nm (311 lb.ft).
    - Use a new nut.
    - Stake the nut to the halfshaft.

15. Secure the stabilizer bar links.
    - Tighten the nuts to 100 Nm (74 lb.ft).

16. Install the front wheels and tires.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

17. Check and top-up the differential case.

18. Check, and if necessary, adjust the wheel alignment.
    For additional information, refer to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).

19. Connect the battery ground cable.
    For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

FRONT DRIVE HALFSHAFTS

FRONT HALFSHAFT RH – VEHICLES WITHOUT: HIGH PERFORMANCE BRAKES (G1225756)

REMOVAL AND INSTALLATION

47.10.02	SHAFT WITH BOTH JOINTS – RH – RENEW	ALL DERIVATIVES	1.8	USED WITHINS	+

SPECIAL TOOL(S)

211-314(LRT-57-036)

Ball joint separator

205-754(LRT-54-027)

Ball joint separator

204-506/3(LRT-60-030/3)

Halfshaft remover/replacer

204-506/1(LRT-60-030/1)

Halfshaft remover/replacer

204-506/2(LRT-

60-030/2)

Halfshaft remover/replacer

204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer

205-735(LRT-54-026)

Remover halfshaft inboard joint

204-506/4

Installer, Halfshaft

REMOVAL

NOTE:

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

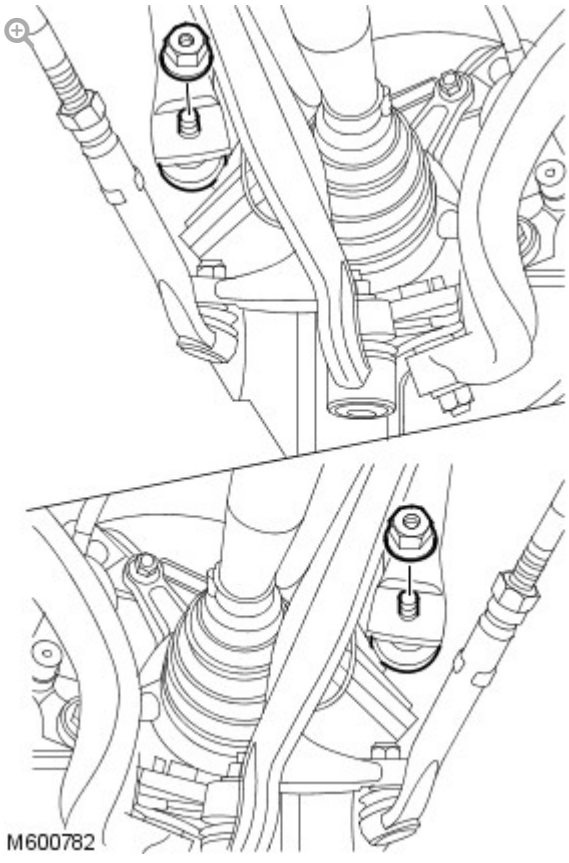
1. Disconnect the battery ground cable.
   For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

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

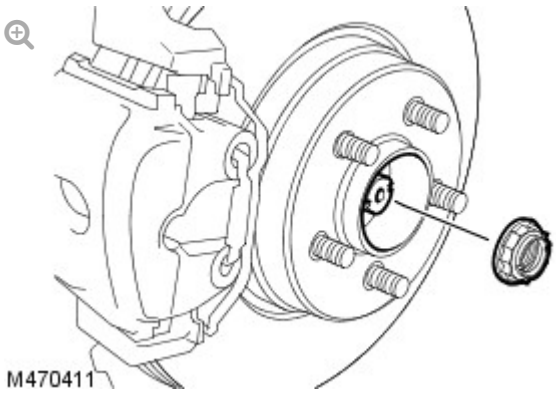
   Raise the front of the vehicle.

3. Remove the front road wheels and tires.

4. 

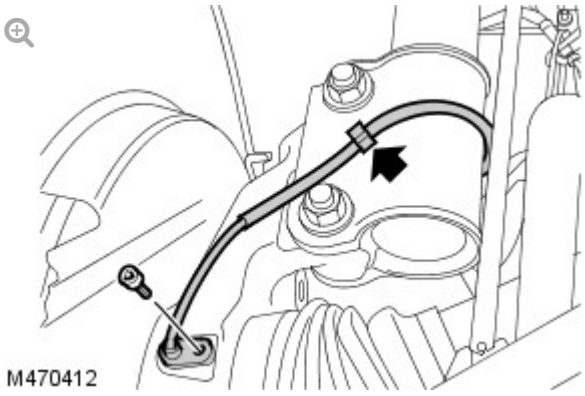
   Release the stabilizer bar links from the stabilizer bar.

- Remove the 2 nuts.

5. 

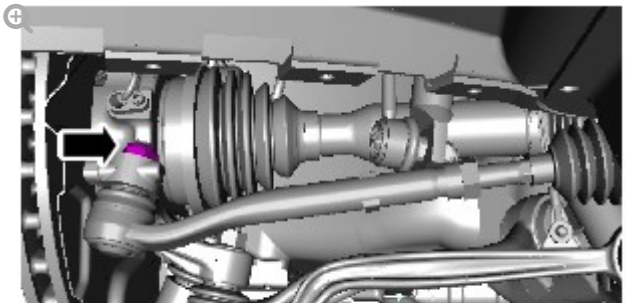
   With assistance, remove and discard the halfshaft nut.

6. Remove the RH front brake disc.
   For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

7. 

   Release the RH front anti-lock brake system (ABS) sensor and wiring harness.

   - Release the clip.
   - Remove the bolt.

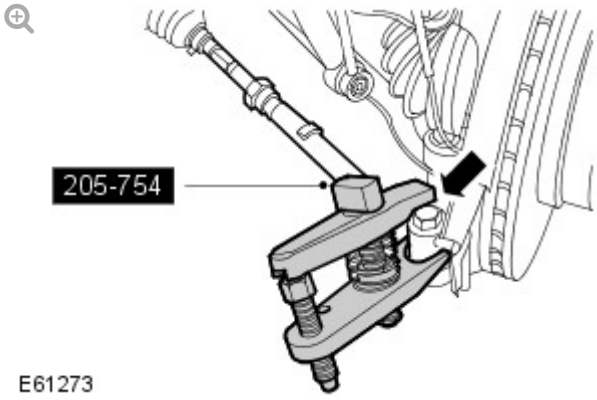
8. 

Loosen the RH tie rod end locking nut.

9.

CAUTION:

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



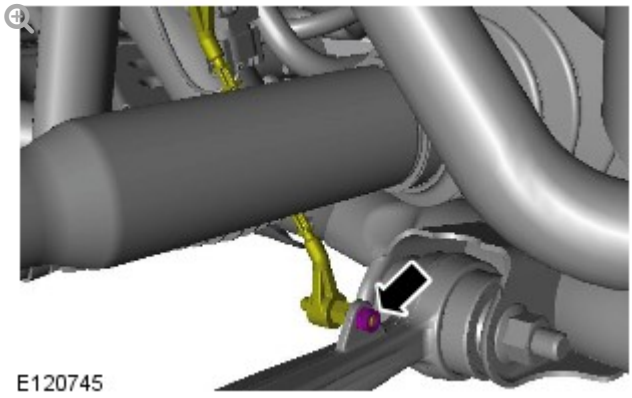
Using the special tool release the RH tie rod end.

- Remove and discard the nut.

10.

NOTE:

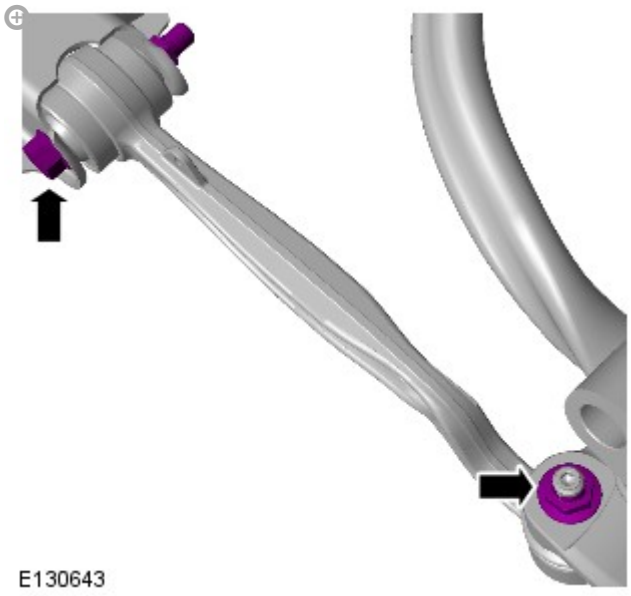
LH illustration shown, RH is similar.



RH side front: Release the suspension height sensor.

11. **NOTE:**

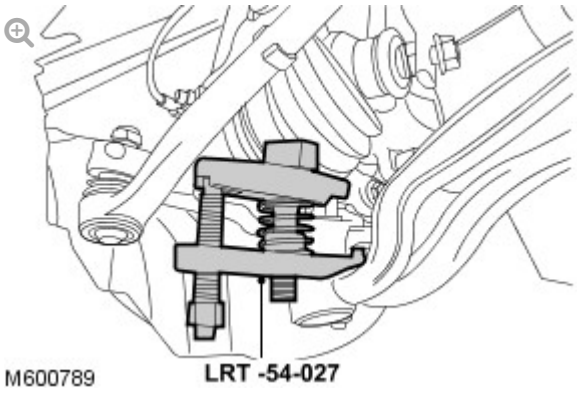
LH illustration shown, RH is similar.



Loosen the front lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

12.

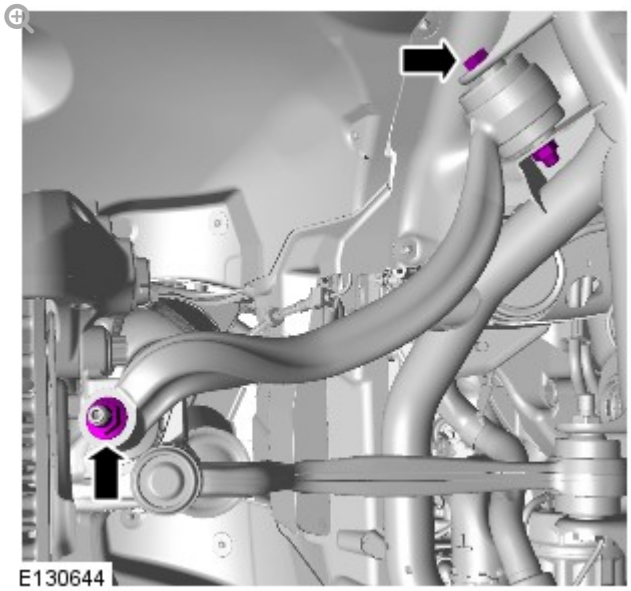


Using the special tool release the RH front lower arm.

- Remove the nut.

13. **NOTE:**

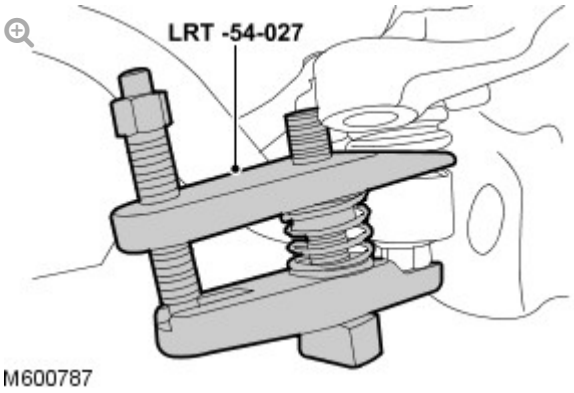
LH illustration shown, RH is similar.



Loosen the rear lower arm retaining nut and bolt.

- Loosen the lower arm ball joint retaining nut.

14.



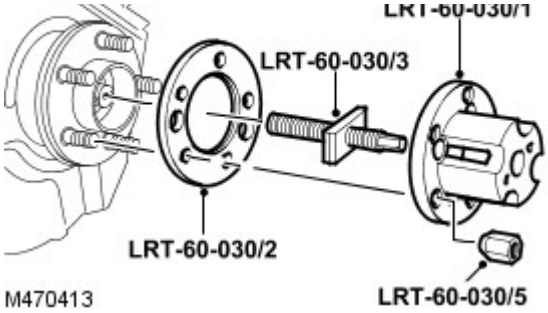
Using the special tool release the RH rear lower arm.

- Remove the nut.

15.

CAUTION:

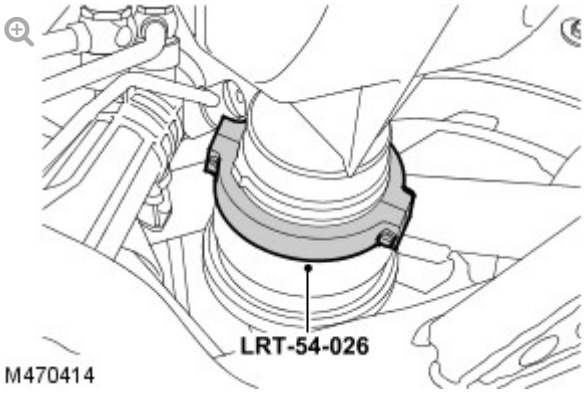
Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.



Using the special tools, release the halfshaft from the wheel hub.

16. Remove the special tools.

17. Position a container to collect the fluid spillage.

18. 

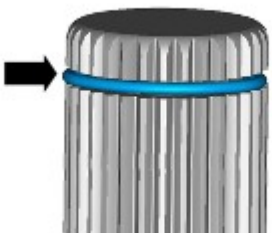
Install the special tool, to the inner halfshaft joint.

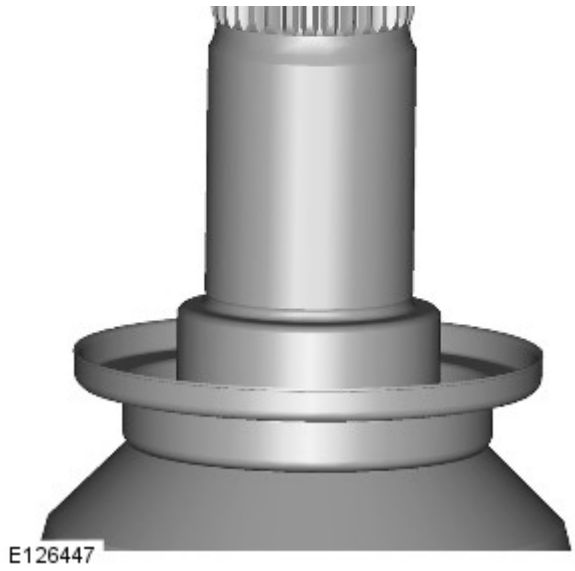
19. RH front: Release the halfshaft from the differential housing.

20. Release the halfshaft from the wheel hub.

21. Reposition the stabilizer bar.

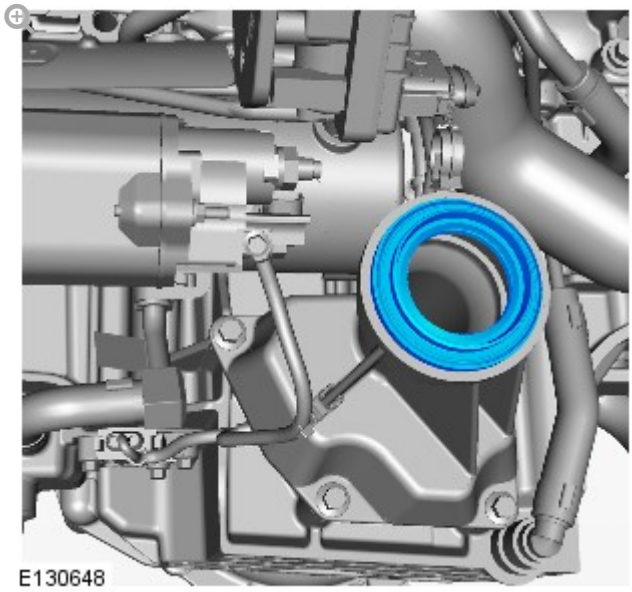
22. With assistance, remove the halfshaft.

23. 



Remove and discard the clip from the RH halfshaft.

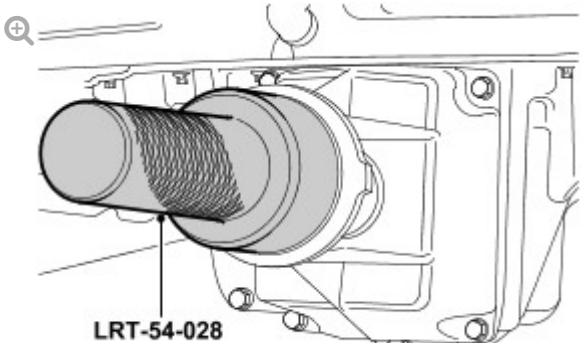
24.



RH front: Remove and discard the halfshaft seal.

INSTALLATION

1.



Using the special tool, install a new halfshaft seal.

- Lubricate the seal with clean differential fluid.

2. Install a new clip to the RH halfshaft.

3. Reposition the stabilizer bar.

4. **CAUTION:**

   Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

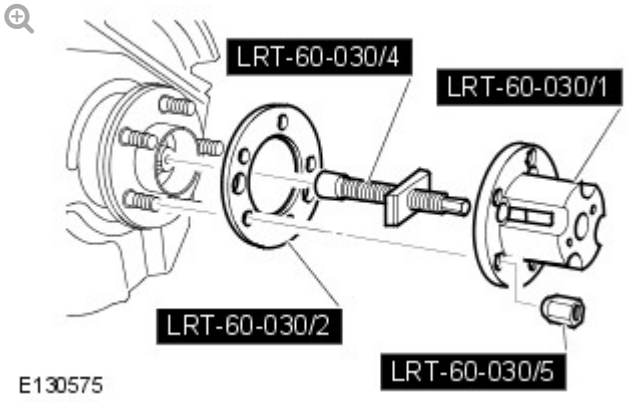
   With assistance, install the halfshaft.

   - Lubricate the oil seal.

5. Locate the halfshaft in the wheel hub.
   - Lightly lubricate the halfshaft splines.
   - Clean the halfshaft and wheel hub splines.

6. **CAUTION:**

   Install the halfshaft nut finger tight.



Using the special tools, pull the halfshaft in to the wheel hub.

7. Remove the special tools.

8. **CAUTION:**

> Only tighten the nuts and bolts when the suspension is in the normal drive position.

Secure the RH rear lower arm.

- Tighten the nut to 80 Nm (59 lb.ft).
- Tighten the rear lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

9. **CAUTION:**

> Only tighten the nuts and bolts when the suspension is in the normal drive position.

Secure the RH front lower arm.

- Tighten the nut to 80 Nm (59 lb.ft).
- Tighten the lower arm bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

10. RH side front: Secure the suspension height sensor.

11. Secure the RH tie rod end.
    - Install a new nut and tighten to 80 Nm (59 lb.ft).

12. Secure the RH front ABS sensor and wiring harness.
    - Apply anti-seize compound to the ABS sensor.
    - Tighten the bolt to 8 Nm (6 lb.ft)

- Secure in the clip.

13. Install the RH front brake disc.
    For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

14. **CAUTION:**

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

    With assistance tighten the wheel hub nut to 420Nm (311 lb.ft).
    - Use a new nut.
    - Stake the nut to the halfshaft.

15. Secure the stabilizer bar links.
    - Tighten the nuts to 100 Nm (74 lb.ft).

16. Install the front wheels and tires.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

17. Check and top-up the differential case.

18. Check, and if necessary, adjust the wheel alignment.
    For additional information, refer to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).

19. Connect the battery ground cable.
    For additional information, refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

FRONT DRIVE HALFSHAFTS

HALFSHAFT BEARING (G1241415)

REMOVAL AND INSTALLATION

47.10.41	BEARING HALFSHAFT SUPPORT - RENEW	ALL DERIVATIVES	1.4	USED WITHINS	+

SPECIAL TOOL(S)

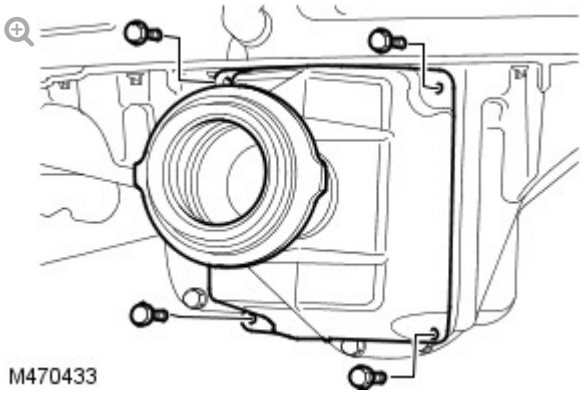
(LRT-54-031)

Halfshaft bearing installer 205-739

REMOVAL

1. Remove and discard the RH halfshaft seal.
   For additional information, refer to: Front Halfshaft RH - Vehicles Without: High Performance Brakes (205-04 Front Drive Halfshafts, Removal and Installation).

2. Remove and discard the RH halfshaft seal.
   For additional information, refer to: Front Halfshaft RH - Vehicles With: High Performance Brakes (205-04, Removal and Installation).

3. 

   Remove the halfshaft support bearing housing.

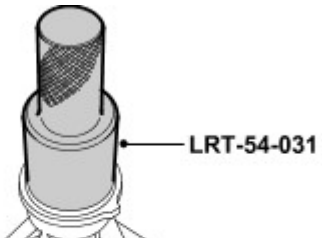
   - Remove the 4 bolts.
   - Remove and discard the O-ring seal.

4. **NOTE:**

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

   Remove the halfshaft bearing.

INSTALLATION

1. 

M470434

Using the special tool install the halfshaft bearing.

- Lubricate the halfshaft bearing with clean differential oil.

2. Install the halfshaft support bearing housing.
   - Install a new O-ring seal.
   - Tighten the 4 bolts to 22 Nm (16 lb.ft).

3. Install the RH halfshaft seal.
   For additional information, refer to: Front Halfshaft RH - Vehicles Without: High Performance Brakes (205-04 Front Drive Halfshafts, Removal and Installation).

2012.0 RANGE ROVER (LM), 205-04

FRONT DRIVE HALFSHAFTS

HALFSHAFT SEAL LH – VEHICLES WITH: HIGH PERFORMANCE BRAKES

54.10.18	OIL SEAL - DIFFERENTIAL HOUSING - ONE SIDE - RENEW	ALL DERIVATIVES	1.3	USED WITHINS	+

SPECIAL TOOL(S)

211-314(LRT-57-036)

Ball joint separator

205-754(LRT-54-027)

Ball joint separator

204-506/3(LRT-60-030/3)

Halfshaft remover/replacer

204-506/1(LRT-60-030/1)

Halfshaft remover/replacer

204-506/2(LRT-60-030/2)

Halfshaft remover/replacer

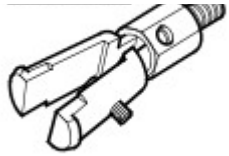
204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer

205-735(LRT-54-026)

Remover halfshaft inboard joint

308-



E54134

005(LRT-37-004/2)

Axle oil seal remover

E54136

308-626/1

Installer halfshaft oil seal

E54137

308-626/2

Installer/Guide halfshaft oil seal

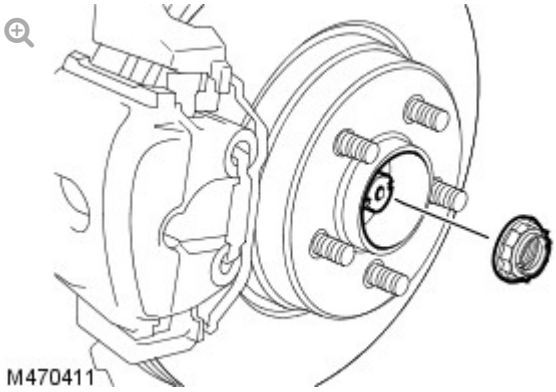
REMOVAL

1. **WARNING:**

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

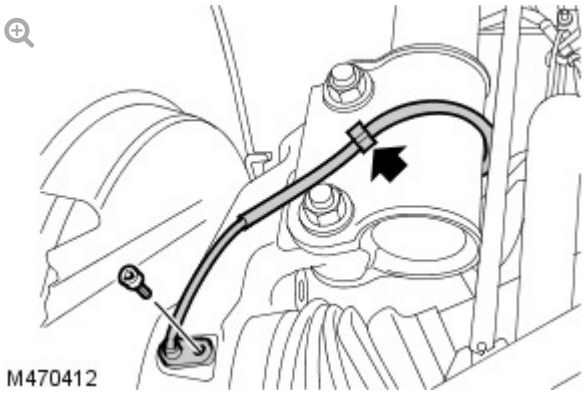
Raise the front of the vehicle.

2. Remove the LH front wheel and tire.

3. 

With assistance, remove and discard the halfshaft nut.

4. Remove the LH front brake disc.
For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and Installation).

5. 

Release the LH front anti-lock brake system (ABS) sensor and wiring harness.

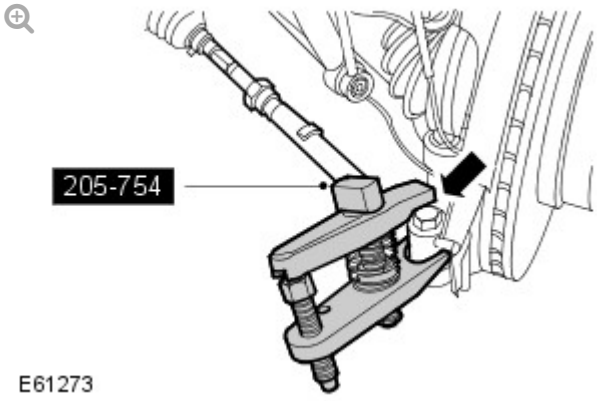
- Release the clip.
- Remove the bolt.

6. Loosen the LH tie rod end locking nut.

7. **CAUTION:**

Make sure the ball joint seal is not damaged. A damaged seal

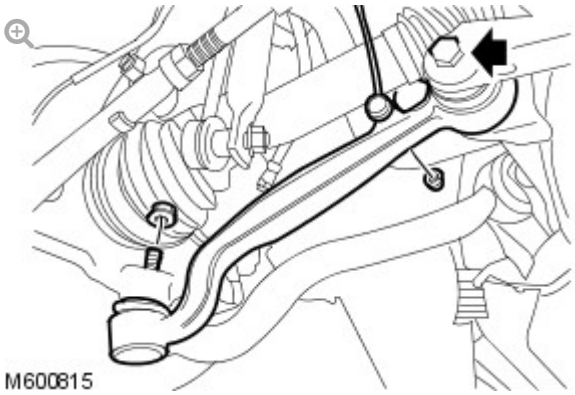
will lead to the premature failure of the joint.



Using the special tool release the LH tie rod end.

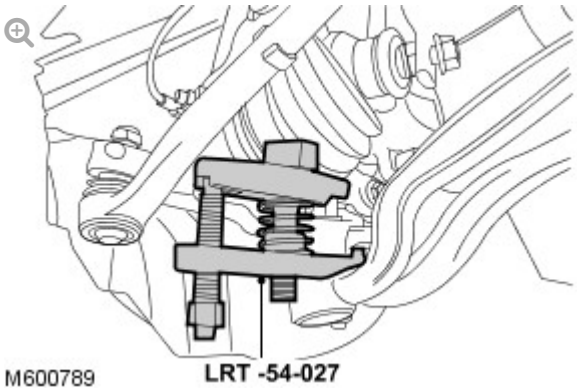
- Remove and discard the nut.

8.



LH side front: Release the suspension height sensor.

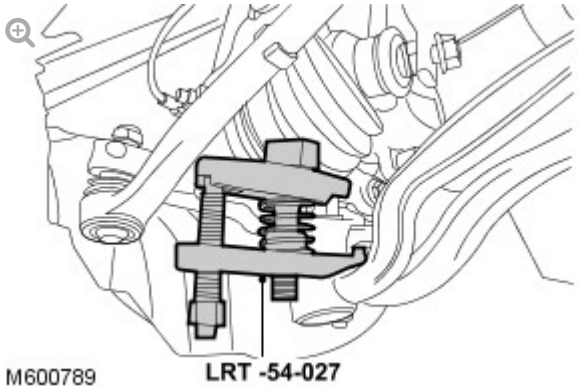
9.



Using the special tool release the LH front lower arm.

- Remove the nut.
- Loosen the nut and bolt.

10.

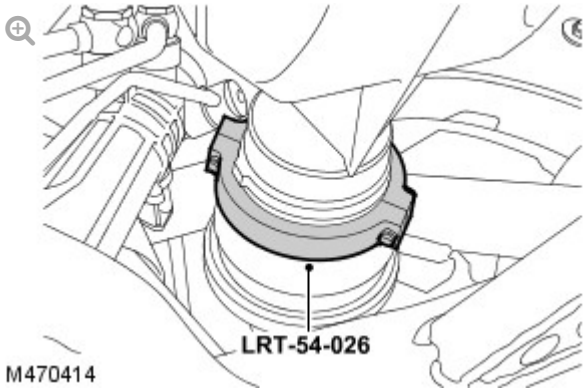


Using the special tool release the LH rear lower arm.

- Loosen the nut and bolt.
- Remove the nut.

11. Position a container to collect the fluid spillage.

12.



Install the special tool, to the inner halfshaft joint.

13. **CAUTION:**

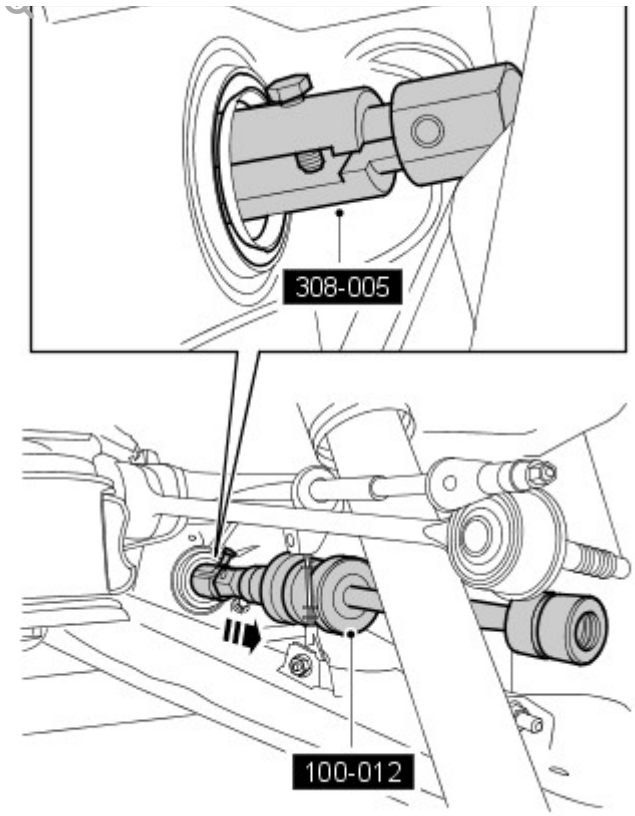
> Keep the halfshaft horizontal to avoid damaging the seal.

LH front: Release the halfshaft from the differential housing.

- Reposition the halfshaft.

14. Remove and discard the clip from the LH halfshaft.

15.



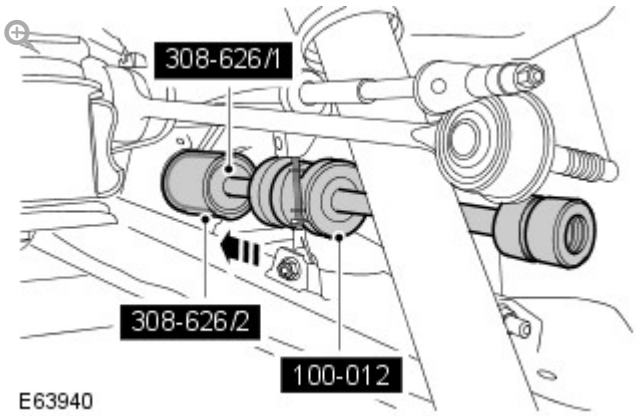
Using the special tools, remove and discard the halfshaft seal.

INSTALLATION

1.

CAUTION:

The halfshaft seal protector must be left in place until the halfshaft has been installed.



Using the special tools, install a new halfshaft seal.

- Clean the component mating faces.

2. **CAUTION:**

   Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

   Secure the halfshaft.

   - Install a new circlip.
   - Lubricate the seal.
   - Remove the halfshaft seal protector.

3. Remove the special tool.

4. **CAUTION:**

   Only tighten the nuts and bolts when the suspension is in the normal drive position.

   Secure the LH rear lower arm.

   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the rear lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

5. **CAUTION:**

   Only tighten the nuts and bolts when the suspension is in the normal drive position.

   Secure the LH front lower arm.

   - Tighten the nut to 80 Nm (59 lb.ft).

- Tighten the lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

6. LH side front: Secure the suspension height sensor.

7. Secure the LH tie rod end.
   - Install new nut and tighten to 80 Nm (59 lb.ft).

8. Secure the LH front ABS sensor and wiring harness.
   - Apply anti-seize compound to the ABS sensor.
   - Tighten the bolt to 8 Nm (6 lb.ft)
   - Secure in the clip.

9. Install the LH front brake disc.
   For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and Installation).

10. With assistance tighten the wheel hub nut to 420 Nm (311 lb.ft).
    - Use a new nut.
    - Stake the nut to the halfshaft.

11. Install the LH front wheel and tire.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

12. Check and top-up the differential case.

13. Check, and if necessary, adjust the wheel alignment.

FRONT DRIVE HALFSHAFTS

HALFSHAFT SEAL LH – VEHICLES WITHOUT: HIGH PERFORMANCE BRAKES (G1250055)

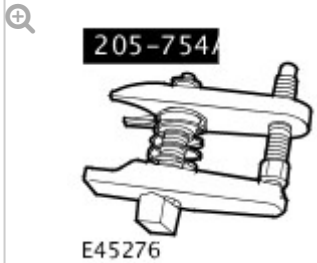
REMOVAL AND INSTALLATION

54.10.18	OIL SEAL – DIFFERENTIAL HOUSING – ONE SIDE – RENEW	ALL DERIVATIVES	1.3	USED WITHINS	+

SPECIAL TOOL(S)

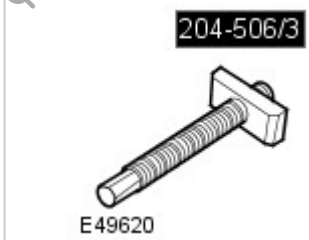
211-314(LRT-57-036)

Ball joint separator



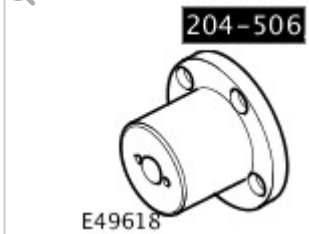
205-754(LRT-54-027)

Ball joint separator



204-506/3(LRT-60-030/3)

Halfshaft remover/replacer



204-506/1(LRT-60-030/1)

Halfshaft remover/replacer

204-

506/2(LRT-60-030/2)

Halfshaft remover/replacer

204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer

205-735(LRT-54-026)

Remover halfshaft inboard joint

308-005(LRT-37-004/2)

Axle oil seal remover

308-626/1

Installer halfshaft oil seal

308-626/2

Installer/Guide
halfshaft oil seal

REMOVAL

NOTE:

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

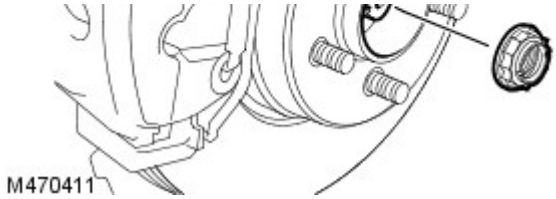
1. **WARNING:**

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

   Raise the front of the vehicle.

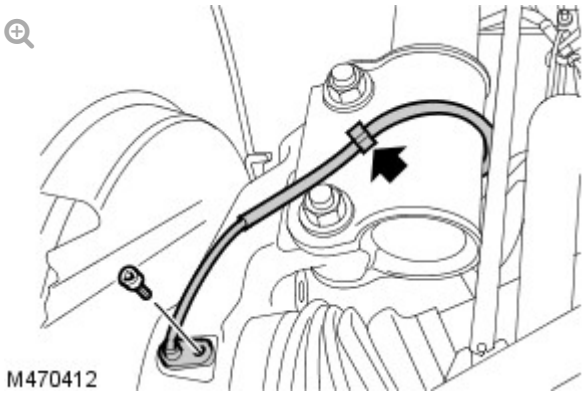
2. Remove the LH front wheel and tire.

3. 



With assistance, remove and discard the halfshaft nut.

4. Remove the LH front brake disc.
   For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

5. 

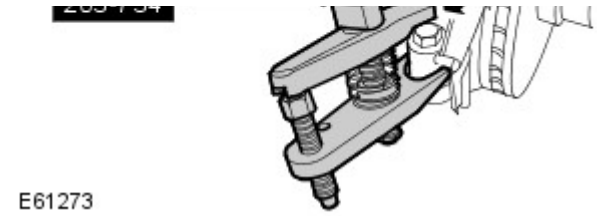
   Release the LH front anti-lock brake system (ABS) sensor and wiring harness.

   - Release the clip.
   - Remove the bolt.

6. Loosen the LH tie rod end locking nut.

7. **CAUTION:**

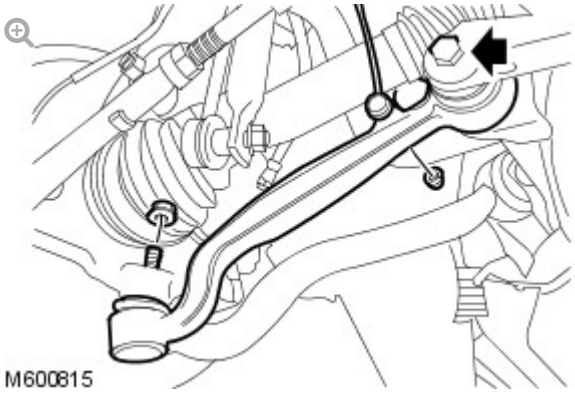
   Make sure the ball joint seal is not damaged. A damaged seal will lead to the premature failure of the joint.



Using the special tool release the LH tie rod end.

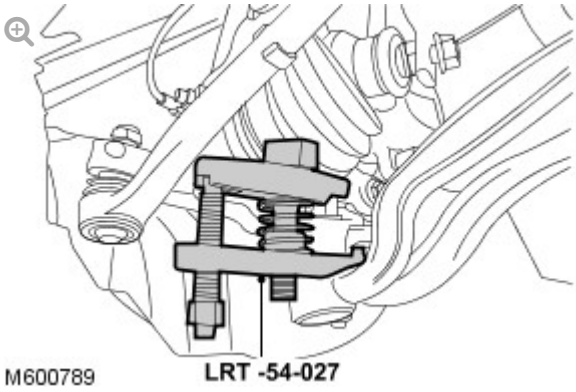
- Remove and discard the nut.

8.



LH side front: Release the suspension height sensor.

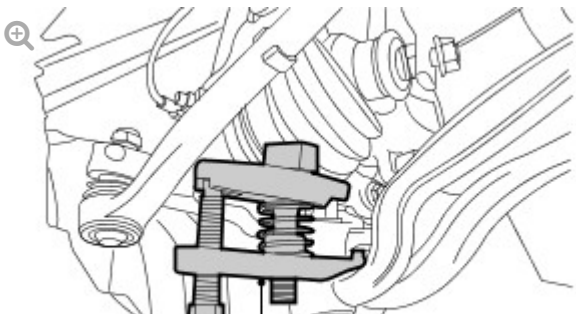
9.



Using the special tool release the LH front lower arm.

- Remove the nut.
- Loosen the nut and bolt.

10.

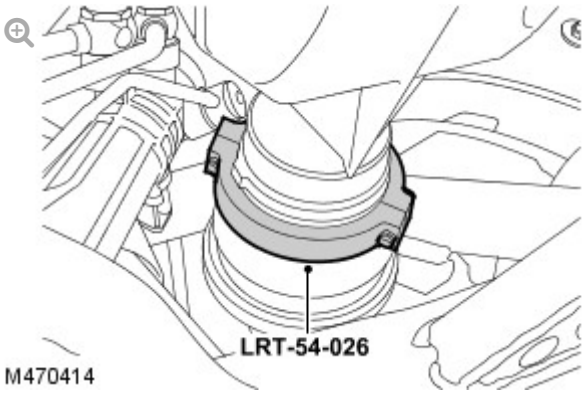


Using the special tool release the LH rear lower arm.

- Loosen the nut and bolt.
- Remove the nut.

11. Remove the special tools.

12. Position a container to collect the fluid spillage.

13. 

Install the special tool, to the inner halfshaft joint.

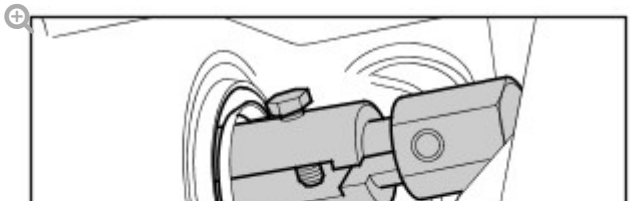
14. **CAUTION:**

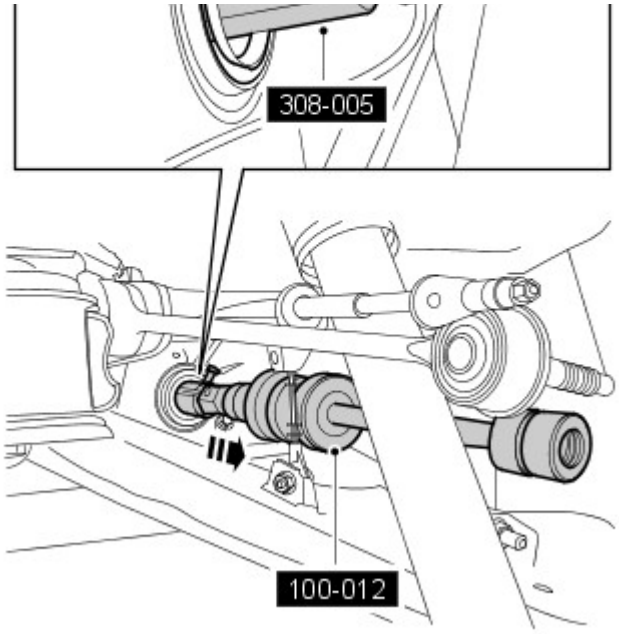
> Keep the halfshaft horizontal to avoid damaging the oil seal.

LH front: Release the halfshaft from the differential housing.

- Reposition the halfshaft.
- Remove the special tool.

15. Remove and discard the clip from the LH halfshaft.

16. 



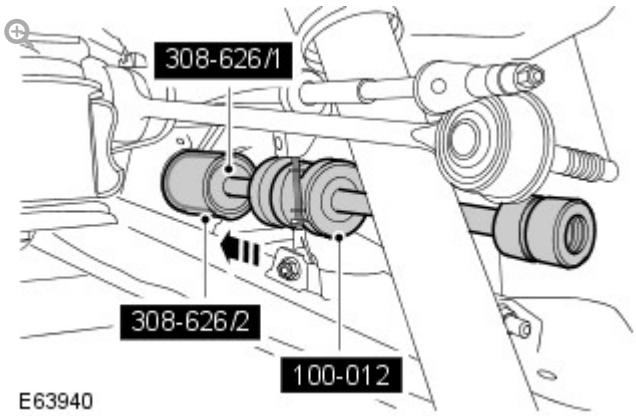
Using the special tools, remove and discard the halfshaft oil seal.

INSTALLATION

1.

CAUTION:

The seal protector must be left in place until the halfshaft has been installed.



Using the special tools, install a new halfshaft oil seal.

- Clean the component mating faces.

2.

CAUTION:

CAUTION:

Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

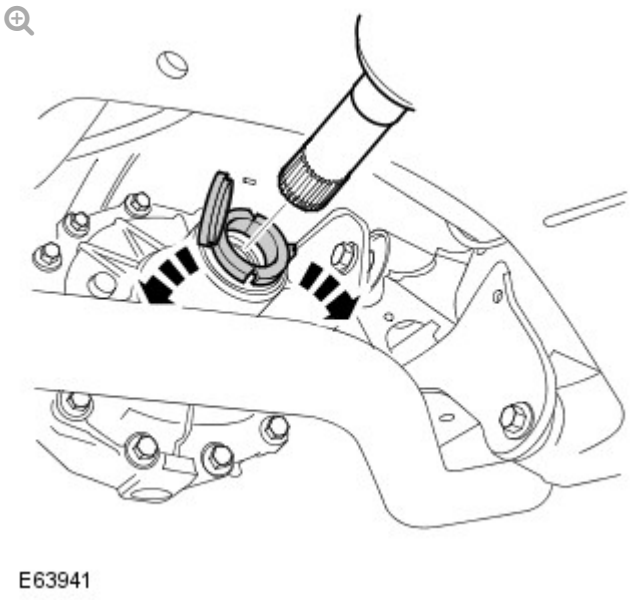
Secure the halfshaft.

- Install a new circlip.
- Lubricate the oil seal.

3.

NOTES:

- LH illustration shown, RH is similar.
- The halfshaft seal protector is designed to break into two pieces.



E63941

Remove and discard the halfshaft seal protector.

4. Remove the special tool.

5.

CAUTION:

Only tighten the nuts and bolts when the suspension is in the

Only tighten the nuts and bolts when the suspension is in the normal drive position.

Secure the LH rear lower arm.

- Tighten the nut to 80 Nm (59 lb.ft).
- Tighten the rear lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

6. **CAUTION:**

   Only tighten the nuts and bolts when the suspension is in the normal drive position.

   Secure the LH front lower arm.

   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the lower arm nut and bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

7. LH side front: Secure the suspension height sensor.

8. Secure the LH tie rod end.
   - Install new nut and and tighten to 80 Nm (59 lb.ft).

9. Secure the LH front ABS sensor and wiring harness.
   - Apply anti-seize compound to the ABS sensor.
   - Tighten the bolt to 8 Nm (6 lb.ft)
   - Secure in the clip.

10. Install the LH front brake disc.
    For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

11. **CAUTION:**

CAUTION:

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

With assistance tighten the wheel hub nut to 420Nm (311 lb.ft).

- Use a new nut.
- Stake the nut to the halfshaft.

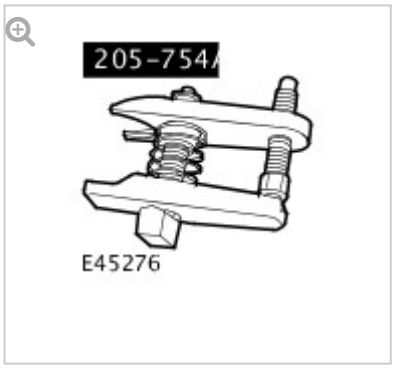
12. Install the LH front wheel and tire.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).
13. Check and top-up the differential case.
14. Check, and if necessary, adjust the wheel alignment.
    For additional information, refer to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).

FRONT DRIVE HALFSHAFTS

HALFSHAFT SEAL RH - VEHICLES WITH: HIGH PERFORMANCE BRAKES (G1225868)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)



205-754(LRT-54-027)

Ball joint separator

211-314(LRT-57-036)

Ball joint separator

205-735(LRT-54-026)

Remover halfshaft inboard joint

205-736(LRT-54-028)

Oil seal installer

REMOVAL

1. **WARNING:**

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

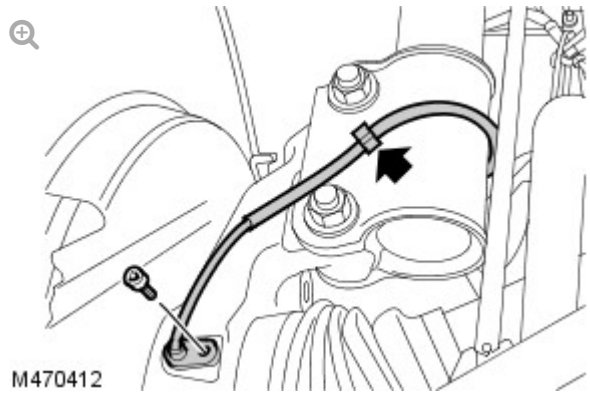
   Raise the front of the vehicle.

2. Remove the front road wheels and tires.

3. Remove the RH front brake disc.

For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and Installation).

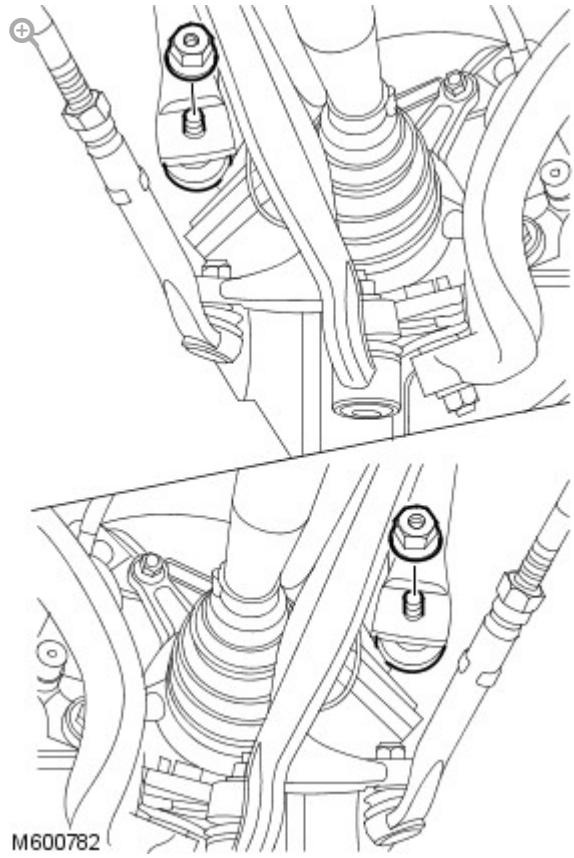
4.



Release the RH front anti-lock brake system (ABS) sensor and wiring harness.

- Release from the clip.
- Remove the bolt.

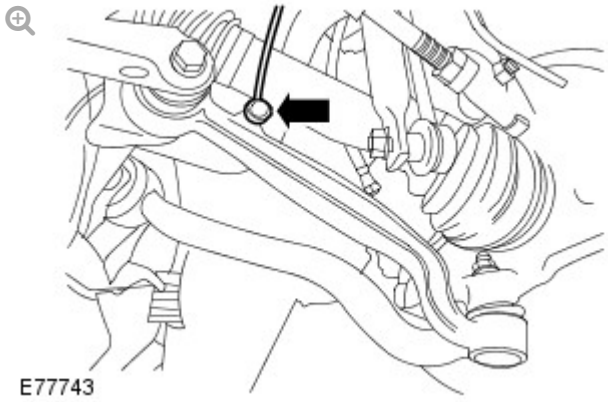
5.



Release the stabilizer bar links from the stabilizer bar.

- Remove the 2 nuts.

6.

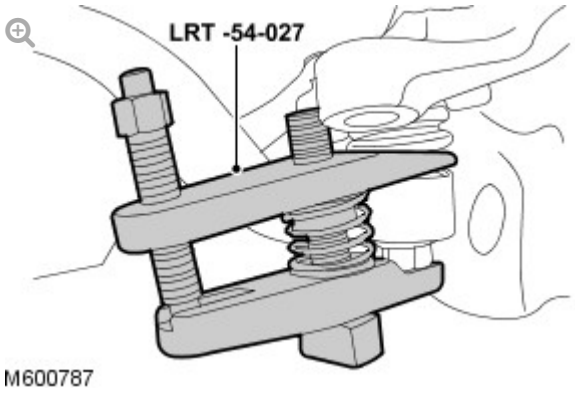


RH side front: Release the suspension height sensor.

7.

CAUTION:

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



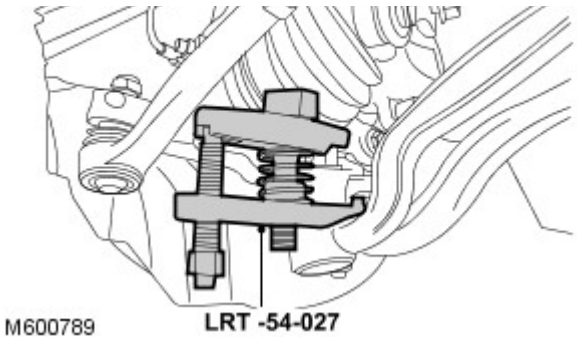
Using the special tool release the RH front lower arm.

- Remove the nut.
- Loosen the nut and bolt.

8.

CAUTION:

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



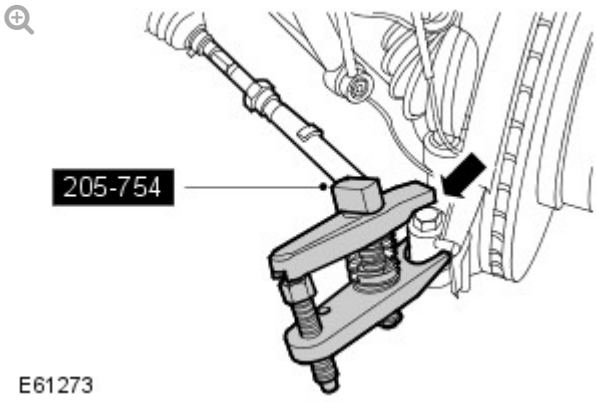
Using the special tool release the RH rear lower arm.

- Loosen the nut.
- Remove the nut.

9. Loosen the RH tie rod end locking nut.

10. **CAUTION:**

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

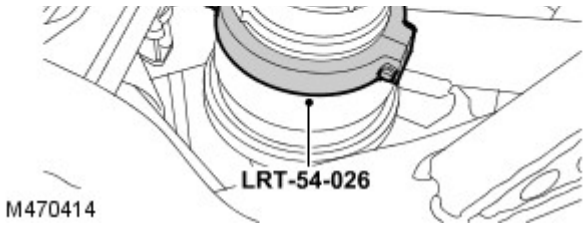


Using the special tool release the RH tie rod end.

- Remove and discard the nut.

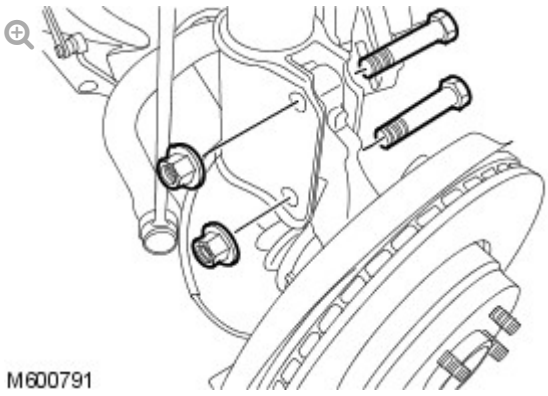
11. Position a container to collect the fluid spillage.

12. 



Install the special tool, to the inner halfshaft joint.

13. Release the clip.

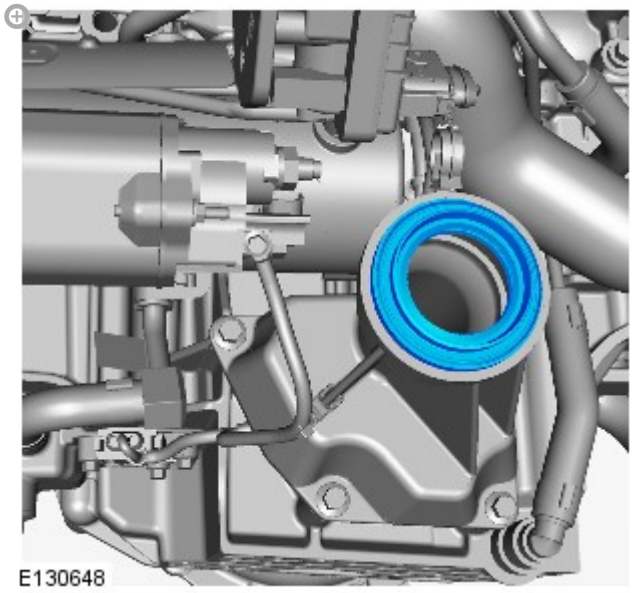
14. 

RH front: With assistance, remove the halfshaft and wheel knuckle assembly.

- Remove the 2 nuts and 2 bolts.

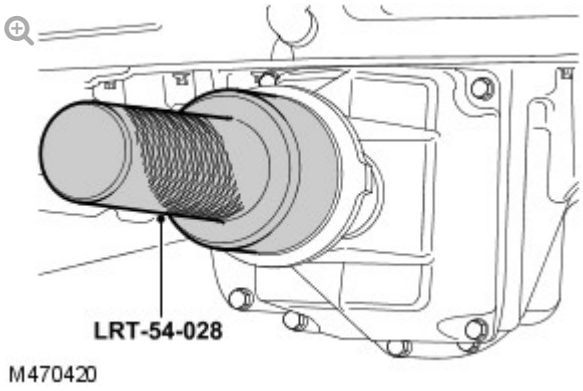
15. 

Remove and discard the clip from the RH halfshaft.

16. 

RH front: Remove and discard the halfshaft seal.

INSTALLATION

1. 

Using the special tool, install a new halfshaft seal.

- Lubricate the seal with clean differential fluid.

2. RH front: With assistance, install the wheel knuckle.
   - Install a new circlip.
3. Secure the wheel knuckle assembly to the shock absorber and spring assembly

spring assembly.

- Tighten the nuts and bolts to 250 Nm (184 lb.ft).

4. Secure the RH tie rod end.
   - Install a new nut and tighten to 80 Nm (59 lb.ft).

5. **CAUTION:**

   Only tighten the nuts and bolts when the suspension is in the normal drive position.

   Secure the RH rear lower arm.
   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the tie rod bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

6. **CAUTION:**

   Only tighten the nuts and bolts when the suspension is in the normal drive position.

   Secure the RH front lower arm.
   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the lower arm bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

7. RH side front: Secure the suspension height sensor.

8. Secure the stabilizer bar links.
   - Tighten the nuts to 100 Nm (74 lb.ft).

9. Secure the RH front ABS sensor and wiring harness.
   - Apply anti-seize compound to the ABS sensor.

   Tighten the bolt to 8 Nm (6 lb.ft).

- Tighten the bolt to 8 Nm (6 lb.ft)
- Secure the clip.

10. Install the RH front brake disc.
    For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03 Front Disc Brake, Removal and Installation).

11. Install the front wheels and tires.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

12. Check and top-up the differential case.
    - Remove the container.

13. Check, and if necessary, adjust the wheel alignment.

2012.0 RANGE ROVER (LM), 205-04

FRONT DRIVE HALFSHAFTS

HALFSHAFT SEAL RH - VEHICLES WITHOUT HIGH

VEHICLES WITHOUT: HIGH PERFORMANCE BRAKES (G1250056)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)

205-754(LRT-54-027)

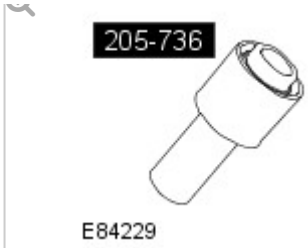
Ball joint separator

211-314(LRT-57-036)

Ball joint separator

205-735(LRT-54-026)

Remover halfshaft inboard joint



205-736(LRT-54-028)

Oil seal installer

REMOVAL

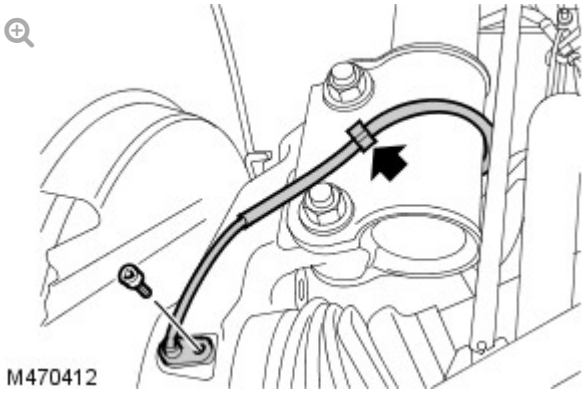
1. **WARNING:**

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

   Raise the front of the vehicle.

2. Remove the front road wheels and tires.

3. Remove the RH front brake disc.
   For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

4. 

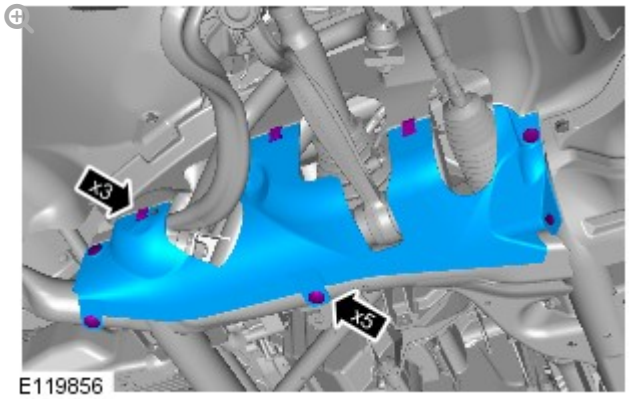
Release the RH front anti-lock brake system (ABS) sensor and wiring harness.

- Release from the clip.
- Remove the bolt.

5.

NOTE:

RH side only.

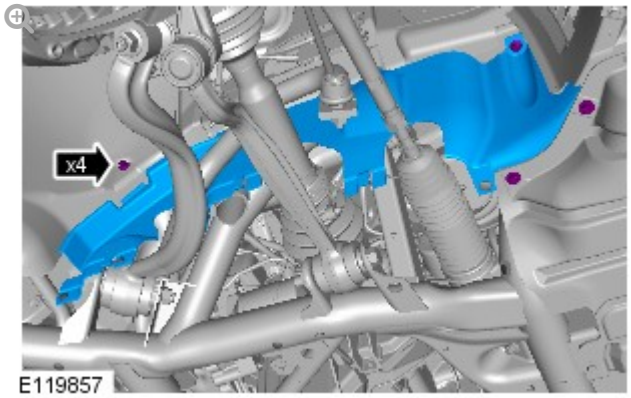


Remove the fender splash shield.

6.

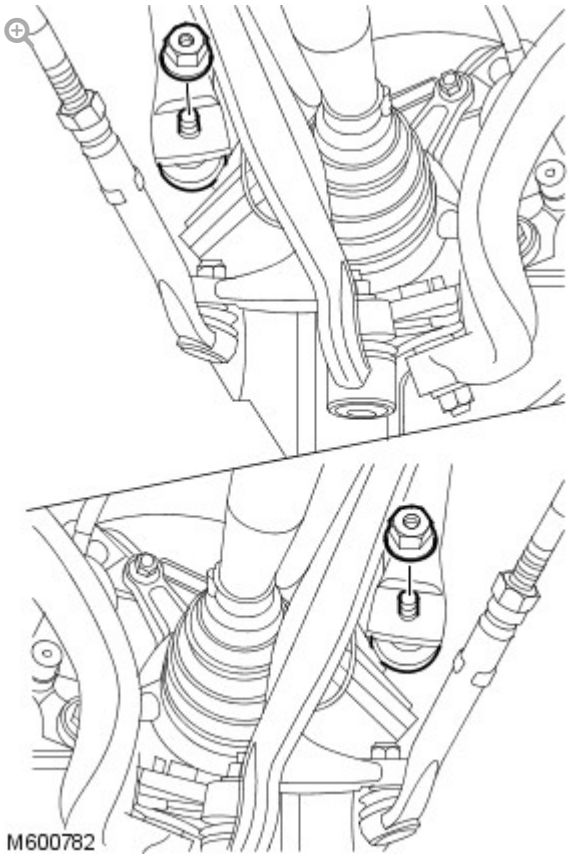
NOTE:

RH side only.



Remove the fender splash shield upper extension panel.

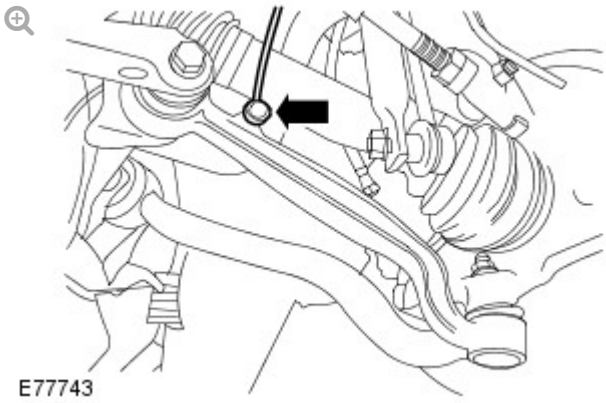
7.



Release the stabilizer bar links from the stabilizer bar.

- Remove the 2 nuts.

8.

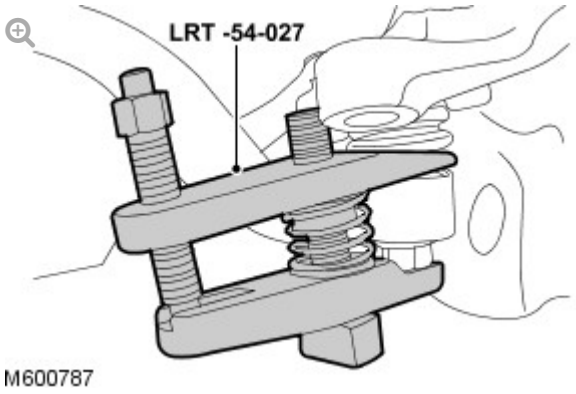


RH side front: Release the suspension height sensor.

9.

CAUTION:

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



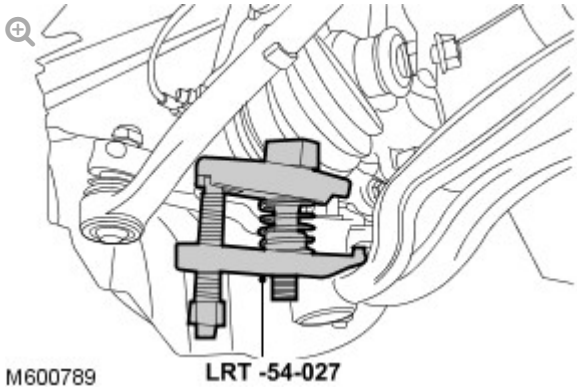
Using the special tool release the RH front lower arm.

- Remove the nut.
- Loosen the nut and bolt.

10.

CAUTION:

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



Using the special tool release the RH rear lower arm.

- Loosen the nut.
- Remove the nut.

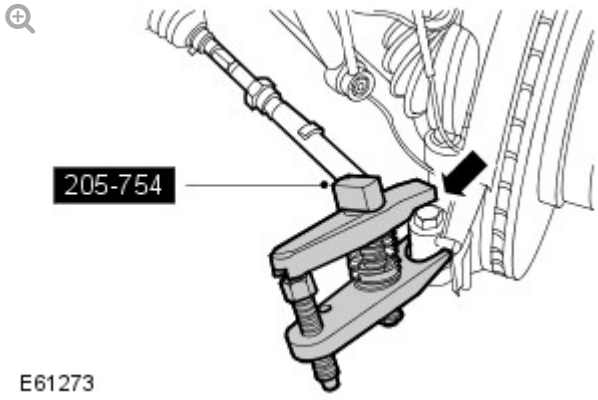
11. Loosen the RH tie rod end locking nut.

12.

CAUTION:

Make sure the ball joint seal is not damaged. A damaged seal

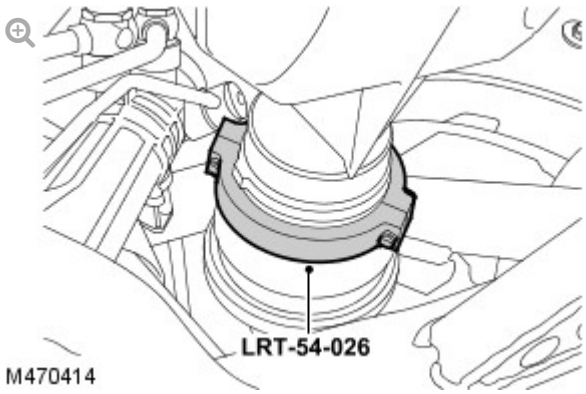
will lead to the premature failure of the joint.



Using the special tool release the RH tie rod end.

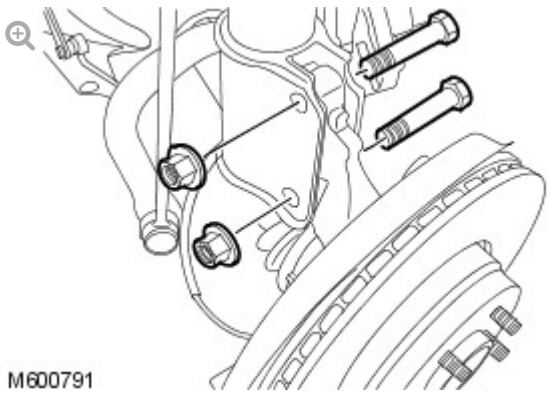
- Remove and discard the nut.

13. Position a container to collect the fluid spillage.

14. 

Install the special tool, to the inner halfshaft joint.

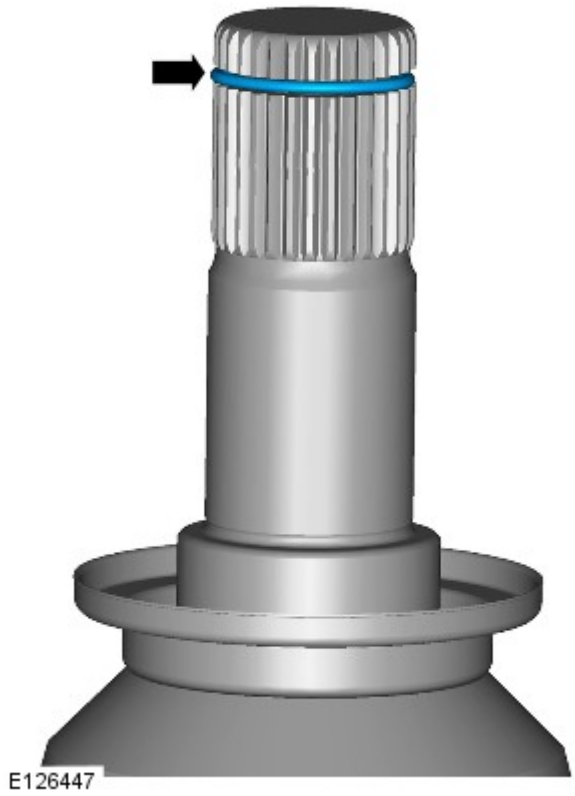
15. Release the clip.

16. 

RH front: With assistance, remove the halfshaft and wheel knuckle assembly.

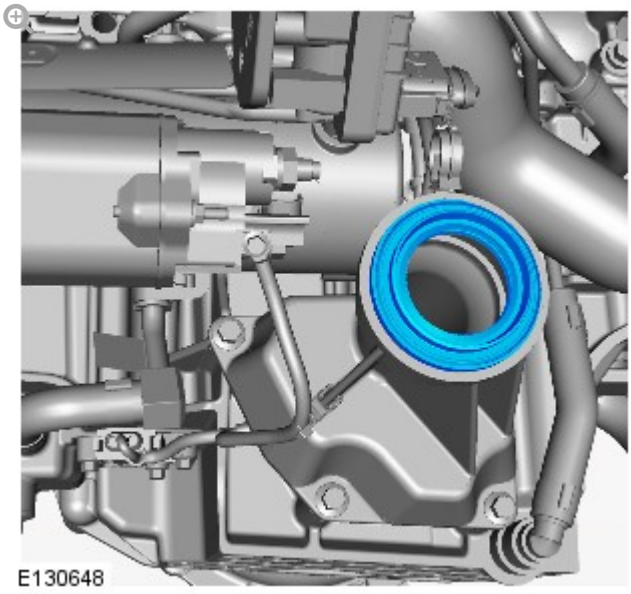
- Remove the 2 nuts and 2 bolts.

17.



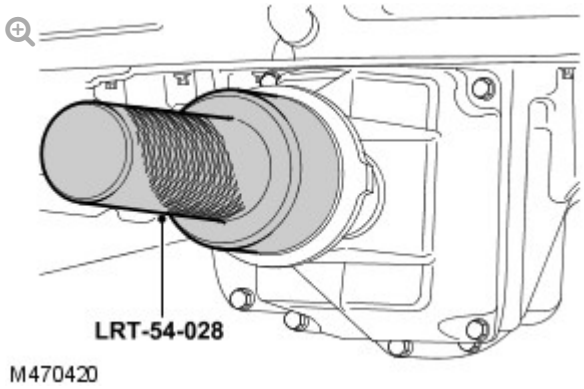
Remove and discard the clip from the RH halfshaft.

18.



RH front: Remove and discard the halfshaft seal.

INSTALLATION

1. 

   Using the special tool, install a new halfshaft seal.

   - Lubricate the seal with clean differential fluid.

2. RH front: With assistance, install the wheel knuckle.

   - Install a new circlip.

3. Secure the wheel knuckle assembly to the shock absorber and spring assembly.

   - Tighten the nuts and bolts to 250 Nm (184 lb.ft).

4. Secure the RH tie rod end.

   - Install a new nut and tighten to 80 Nm (59 lb.ft).

5. **CAUTION:**

   Only tighten the nuts and bolts when the suspension is in the normal drive position.

   Secure the RH rear lower arm.

   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the tie rod bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

6. **CAUTION:**

   Only tighten the nuts and bolts when the suspension is in the normal drive position.

   Secure the RH front lower arm.

   - Tighten the nut to 80 Nm (59 lb.ft).
   - Tighten the lower arm bolt to 165 Nm (122 lb.ft) plus a further 90 degrees.

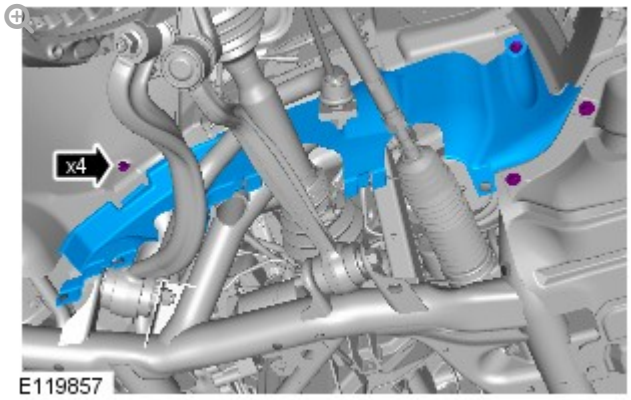
7. RH side front: Secure the suspension height sensor.

8. Secure the stabilizer bar links.

   - Tighten the nuts to 100 Nm (74 lb.ft).

9. **NOTE:**

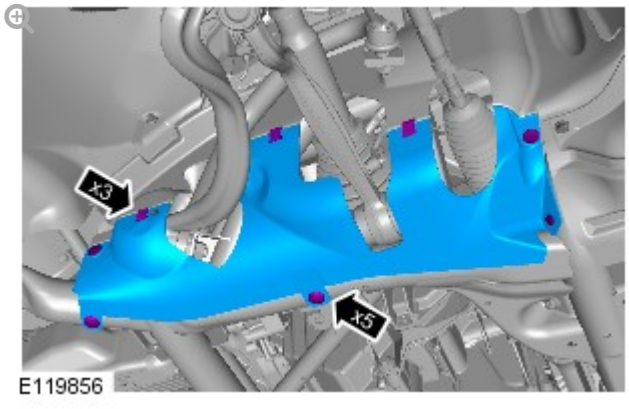
   RH side only.



   Install the fender splash shield upper extension panel.

10. **NOTE:**

    RH side only.



Install the fender splash shield.

11. Secure the RH front ABS sensor and wiring harness.
    - Apply anti-seize compound to the ABS sensor.
    - Tighten the bolt to 8 Nm (6 lb.ft)
    - Secure the clip.

12. Install the RH front brake disc.
    For additional information, refer to: Brake Disc - Vehicles With: Standard Brakes (206-03 Front Disc Brake, Removal and Installation).

13. Install the front wheels and tires.
    - Tighten the wheel nuts to 140 Nm (103 lb.ft).

14. Check and top-up the differential case.
    - Remove the container.

15. Check, and if necessary, adjust the wheel alignment.
    For additional information, refer to: Four-Wheel Alignment (204-00 Suspension System - General Information, General Procedures).

2012.0 RANGE ROVER (LM), 205-05

REAR DRIVE HALFSHAFTS

SPECIFICATIONS

Recommended Lubricant

Item	Specification
Outboard joint	Use grease supplied with replacement boot kit
Inboard joint	Use grease supplied with replacement boot kit

General Specification

Item	Specification

Type	Fully floating, solid shafts incorporating plunging constant velocity joint at inboard end and fixed constant velocity joint at outboard end of shaft

Torque Specifications

DESCRIPTION	NM	LB-FT
* Lower arm to wheel knuckle nut	250	184
Toe link bolt	165	121
*+ Halfshaft nut	420	311
Road wheel nuts	140	103

*** New nut must be fitted**

+ Stake nut on completion

2012.0 RANGE ROVER (LM), 205-05

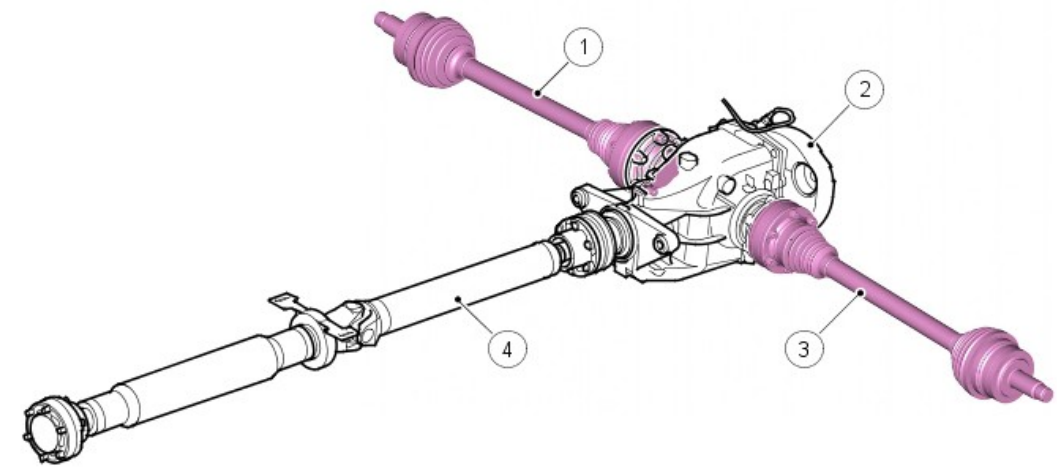
REAR DRIVE HALFSHAFTS

DESCRIPTION AND OPERATION

Rear Drive Halfshaft Components

NOTE:

TDV8 version shown



E59516

ITEM	DESCRIPTION
1	RH rear drive halfshaft
2	Rear differential
3	LH rear drive halfshaft
4	Rear driveshaft assembly

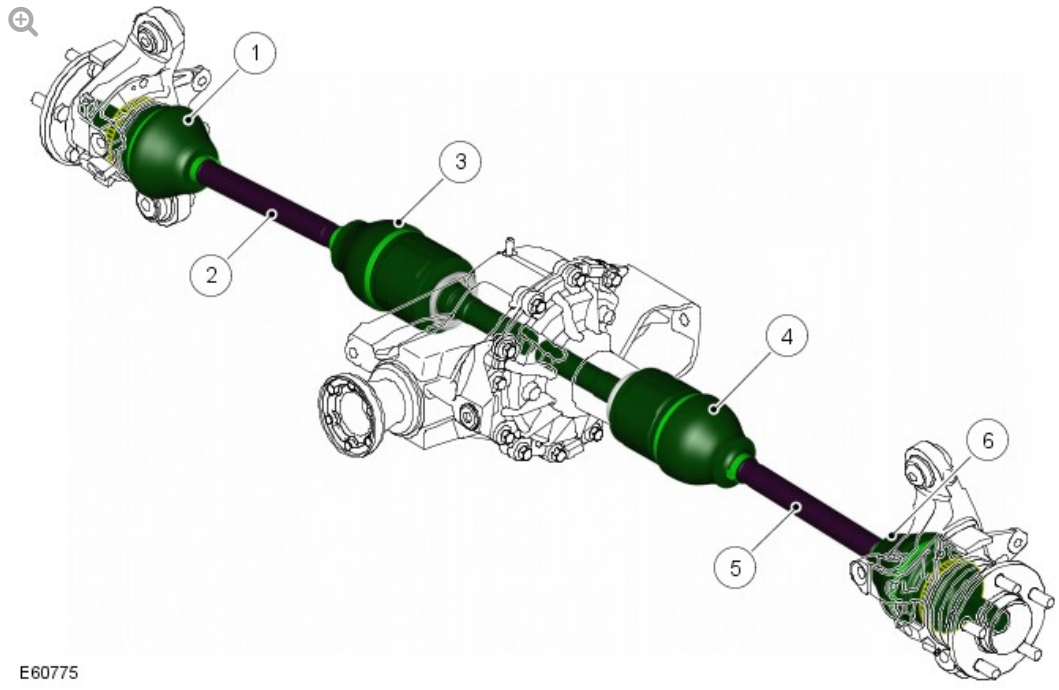
GENERAL

The rear drive halfshafts are identical in their construction with the LH shaft being slightly longer than the RH shaft. Each shaft has a constant velocity (CV) joint at each end to allow for suspension movement.

Rear Drive Halfshaft Assembly

NOTE:

4.2/4.4L V8 petrol version shown



ITEM	DESCRIPTION
1	RH outer CV joint

2	RH rear drive halfshaft
3	RH inner CV joint
4	LH inner CV joint
5	LH rear drive halfshaft
6	LH outer CV joint

Each outer CV joint has a target wheel on the outer diameter. This target is used by the ABS wheel speed sensor for vehicle and wheel speed calculations.For additional information, refer to: (206-09A Anti-Lock Control - Traction Control)

Anti-Lock Control - Traction Control (Description and Operation), Anti-Lock Control - Traction Control - 4.2L (Description and Operation), Anti-Lock Control - Traction Control - 4.4L (Description and Operation).

Each rear drive halfshaft comprises 2 CV joints (inner and outer), boots and a solid barshaft, which is retained in the rear differential by a circlip.

The CV joints used on the rear drive halfshafts share the same design and operating principles as the front drive halfshafts CV joints (see 'Halfshaft Joint' section for more information on CV joints). The rear drive halfshaft inner joint hubs are retained by peening over the lip of the joint body.

2012.0 RANGE ROVER (LM), 205-05

REAR DRIVE HALFSHAFTS

For additional information.

REFER to: Driveline System (205-00, Diagnosis and Testing).

2012.0 RANGE ROVER (LM), 205-05

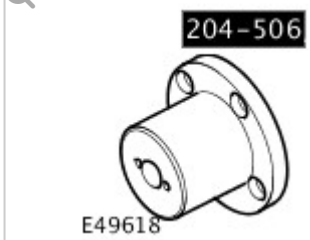
REAR DRIVE HALFSHAFTS

REAR HALFSHAFT (G1249871)

REMOVAL AND INSTALLATION

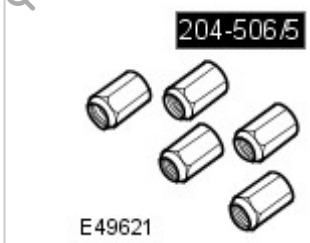
47.11.01	SHAFT WITH BOTH JOINTS – RENEW	ALL DERIVATIVES	2.3	USED WITHINS	+

SPECIAL TOOL(S)



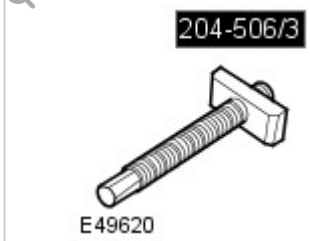
204-506/1(LRT-60-030/1)

Halfshaft remover/replacer



204-506/5(LRT-60-030/5)

Retainers - halfshaft remover/replacer



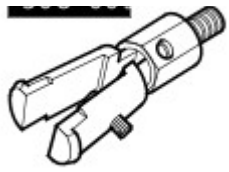
204-506/3(LRT-60-030/3)

Halfshaft remover/replacer

204-506-01(LRT-60-030/4)

Halfshaft installer adapter

308-



E54134

005(LRT-37-004/2)

Axle oil seal remover

E54135

100-012(LRT-99-004)

Impulse extractor

E54136

308-626/1

Installer halfshaft oil seal

E54137

308-626/2

Installer/Guide halfshaft oil seal

CAUTIONS:

- Do not allow halfshafts to hang unsupported at one end or joint damage will occur.
- Do not store or install halfshafts with joints at maximum articulation or damage may occur to the joint.
- Angularly Adjusted Roller (AAR) joints, used at the inboard end of some halfshafts have no internal retaining mechanism and can separate.

1. **WARNING:**

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

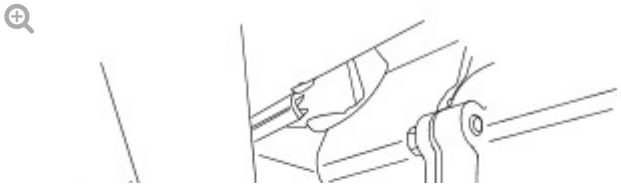
   Raise and support the vehicle.

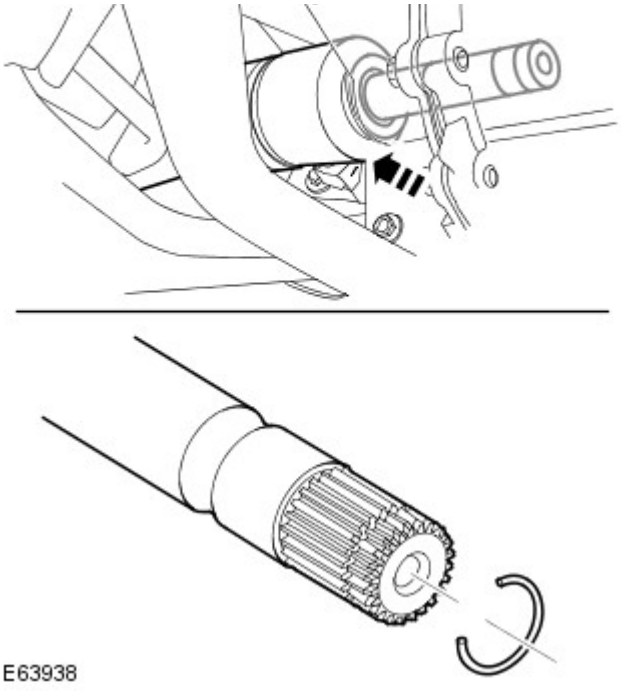
2. Drain the differential lubricant.
   For additional information, refer to: Differential Draining and Filling (205-02 Rear Drive Axle/Differential, General Procedures).

3. Remove the rear wheels and tires

4. Remove the wheel knuckle.
   For additional information, refer to: Wheel Knuckle (204-02 Rear Suspension, Removal and Installation).

5. Release the halfshaft from the differential housing.
   - Position a container to collect the oil spillage.

6. 

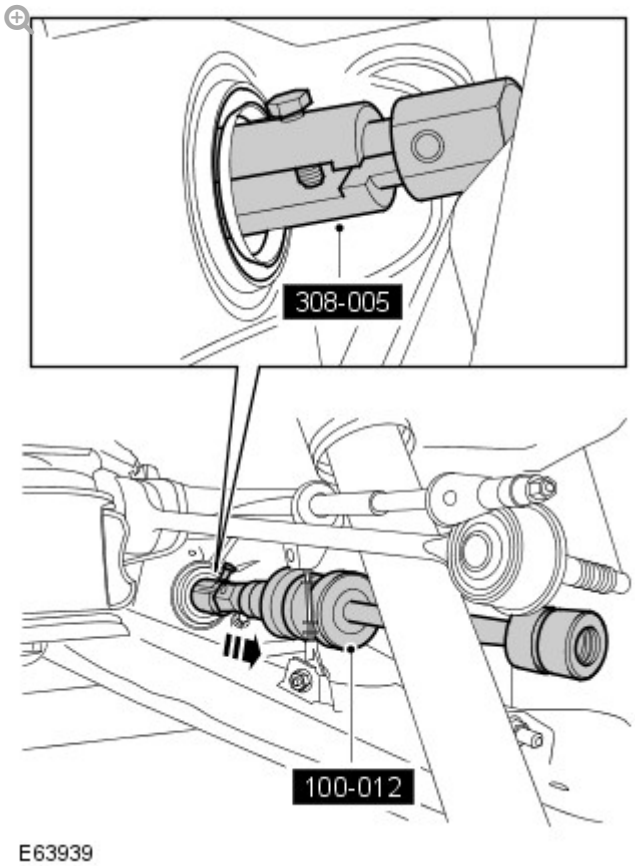


E63938

With assistance, remove the halfshaft.

- Remove and discard the snap ring.

7.



E63939

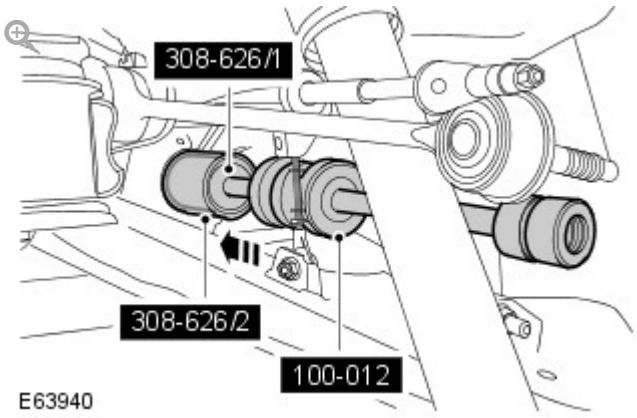
Using the special tools, remove and discard the halfshaft oil seal.

INSTALLATION

1.

CAUTION:

The seal protector must be left in place until the halfshaft has been installed.



Using the special tools, install a new halfshaft oil seal.

- Clean the component mating faces.

2.

CAUTION:

Pull on the halfshaft inboard joint to make sure the clip has fully engaged and retains the halfshaft inboard joint within the differential case.

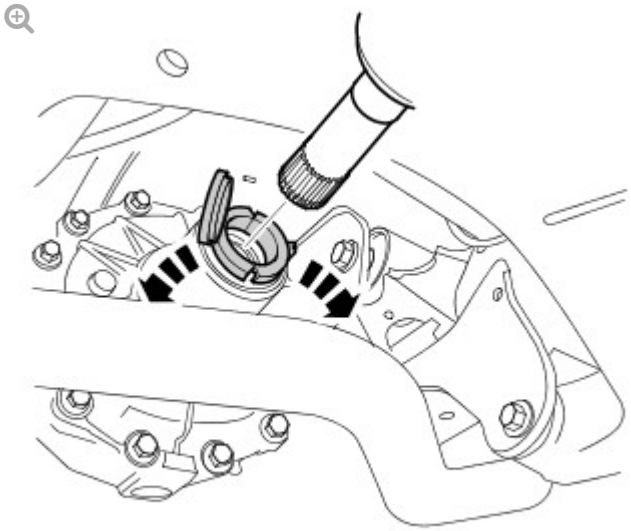
With assistance, install the halfshaft.

- Clean the component mating faces.
- Install the snap ring.
- Open the halfshaft oil seal protector.

3.

NOTE:

The oil seal protector is designed to break into two pieces.



E63941

Remove and discard the halfshaft oil seal protector.

4. Install the wheel knuckle.
   For additional information, refer to: Wheel Knuckle (204-02 Rear Suspension, Removal and Installation).

5. Install the wheels and tires.
   - Tighten the wheel nuts to 140 Nm (103 lb.ft).

6. **CAUTION:**

   Do not fill the differential with lubricant up to the filler plug. The filler plug is only used to fill the deferential with lubricant, and not to act as a level indicator.

   Fill the differential with the correct amount of lubricant.
   For additional information, refer to: Differential Draining and Filling (205-02 Rear Drive Axle/Differential, General Procedures).

REAR DRIVE HALFSHAFTS

OUTER CONSTANT VELOCITY (CV) JOINT BOOT (G1249872)

REMOVAL AND INSTALLATION

47.11.03	BOOT - CONSTANT VELOCITY (CV) JOINT AND HOUSING - OUTER - RENEW	ALL DERIVATIVES	2.4	USED WITHINS	+

REMOVAL

1.

WARNING:

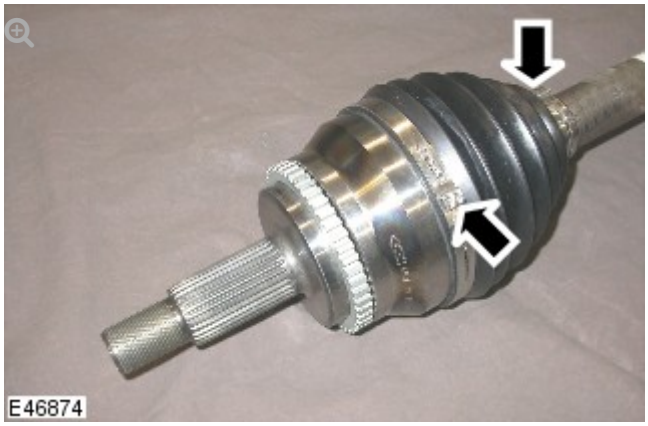
Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.

2. Remove the wheel and tire.

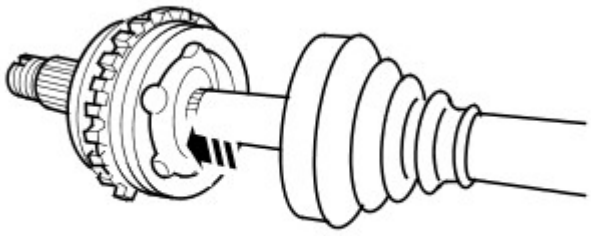
3. Remove the halfshaft.
   For additional information, refer to: Rear Halfshaft (205-05, Removal and Installation).

4. Clamp the halfshaft in a vise.

5. 

   Remove and discard the 2 clamps from the outer constant velocity (CV) joint boot.

6. Slide the outer CV joint boot along the halfshaft to gain access to the outer CV joint.

7. 

   Using a drift against the inner part of the CV joint, remove the CV joint from the halfshaft.

   - Remove and discard the snap ring.

8. Remove the outer CV joint boot.

INSTALLATION

1. Clean the components.

2. Install the outer CV joint boot.

3. **CAUTION:**

   Pull on the outer CV joint to make sure the snap ring has fully engaged.

   Install the outer CV joint.

   - Install a new snap ring.
   - Position the outer CV joint on to the halfshaft, press the snap ring into it's groove and push the outer CV joint fully on to the halfshaft.

4. Pack the outer CV joint with the grease supplied.

5. Secure the outer CV joint boot to the outer CV joint.

   - Secure with the new clamps.

6. Install the halfshaft.
   For additional information, refer to: Rear Halfshaft (205-05, Removal and Installation).

7. Install the wheel and tire.

   - Tighten the wheel nuts to 140 Nm (103 lb.ft).

INNER CONSTANT VELOCITY (CV) JOINT BOOT (G1249873)

REMOVAL AND INSTALLATION

47.10.16	BOOT - INNER JOINT - RENEW	ALL DERIVATIVES	1.7	USED WITHINS	+
47.11.16	BOOT - INNER JOINT - RENEW	ALL DERIVATIVES	2.4	USED WITHINS	+

REMOVAL

1. **WARNING:**

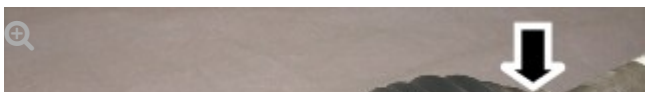
   Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

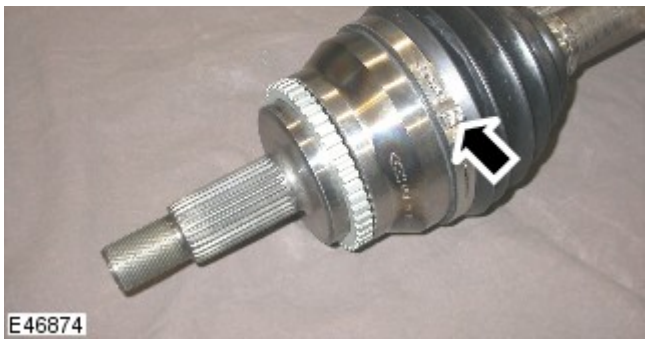
   Raise and support the vehicle.

2. Remove the wheel and tire.

3. Remove the halfshaft.
   For additional information, refer to: Rear Halfshaft (205-05, Removal and Installation).

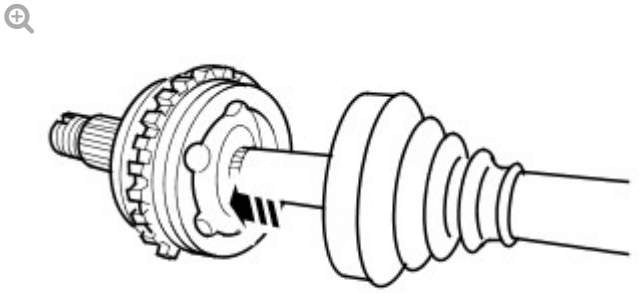
4. Clamp the halfshaft in a vise.

5. 



Remove and discard the 2 clamps from the inner constant velocity (CV) joint boot.

6. Slide the inner CV joint boot along the halfshaft to gain access to the inner CV joint.

7. 

Using a drift against the inner part of the CV joint, remove the CV joint from the halfshaft.

- Remove and discard the snap ring.

8. Remove the inner CV joint boot.

INSTALLATION

1. Clean the components.

2. Install the inner CV joint boot.

3. **CAUTION:**

Pull on the inner CV joint to make sure the snap ring has fully engaged.

Install the inner CV joint.

- Install a new snap ring.
- Position the inner CV joint on to the halfshaft, press the snap ring into it's groove and push the inner CV joint fully on to the halfshaft.

4. Pack the inner CV joint with the grease supplied.

5. Secure the inner CV joint boot to the inner CV joint.
   - Secure with the new clamps.

6. Install the halfshaft.
   For additional information, refer to: Rear Halfshaft (205-05, Removal and Installation).

7. Install the wheel and tire.
   - Tighten the wheel nuts to 140 Nm (103 lb.ft).

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REAR DRIVE HALFSHAFTS

HALFSHAFT BEARING (G1249874)

REMOVAL AND INSTALLATION

51.10.29	BEARING - HALFSHAFT - EACH - RENEW	ALL DERIVATIVES	2.2	USED WITHINS	+

SPECIAL TOOL(S)

308-005(LRT-37-004/2)

Axle oil seal remover

100-012(LRT-99-004)

Impulse extractor

205-819

Halfshaft bearing installer

REMOVAL

1. **WARNING:**

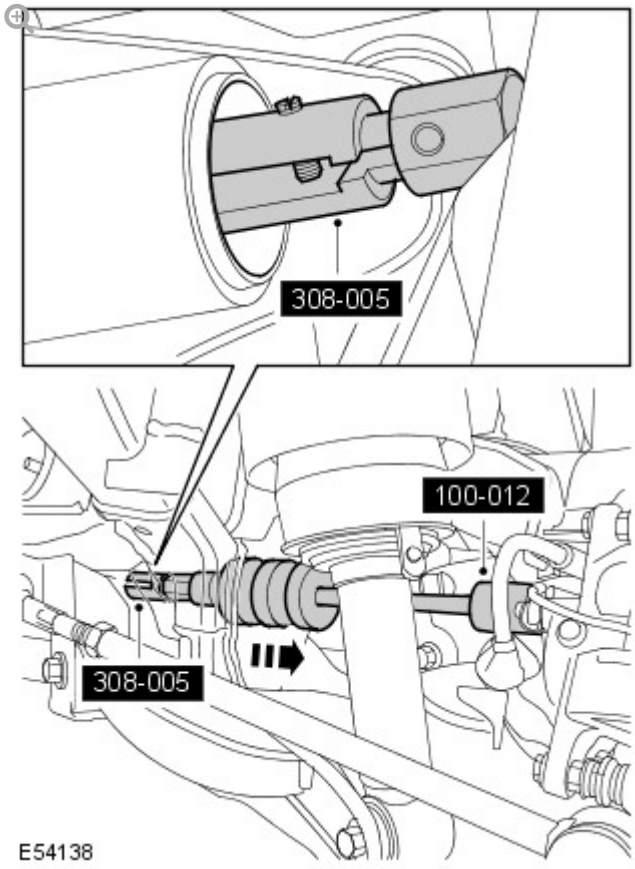
Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

Raise and support the vehicle.

2. Remove the wheel and tire.

3. Remove the halfshaft.
For additional information, refer to: Rear Halfshaft (205-05, Removal and Installation).

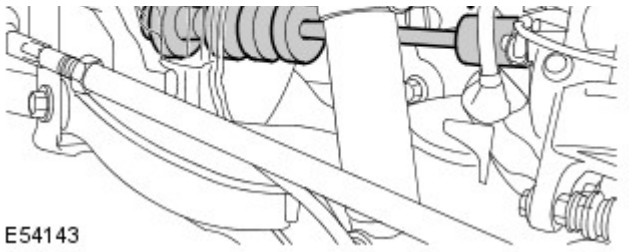
4.



Using the special tool, remove and discard the halfshaft bearing.

INSTALLATION

1.



Using the special tools, install a new halfshaft bearing.

2. Install the halfshaft.
   For additional information, refer to: Rear Halfshaft (205-05, Removal and Installation).

3. Install the wheel and tire.
   - Tighten the wheel nuts to 140 Nm (103 lb.ft).

2012.0 RANGE ROVER (LM), 206-00

BRAKE SYSTEM – GENERAL INFORMATION

SPECIFICATIONS

Brake Hydraulic Fluid

Item	Specification
* Recommended hydraulic fluid	SHELL DONAX YB DOT4 ESL FLUID

CAUTION:

* If the above fluid is not available, use a low viscosity DOT 4 brake fluid meeting ISO 4925 Class 6 and Land Rover LRES22BF03 requirements.

General Specification

Item	Specification
Footbrake type:	

Vehicles without Brembo brakes	Hydraulic, servo assisted, self-adjusting with front/rear split hydraulic system, twin piston sliding calipers to the front and single piston sliding calipers to the rear
Vehicles with Brembo brakes	Hydraulic, servo assisted, self-adjusting with front/rear split hydraulic system, opposed six piston calipers to the front and single piston sliding calipers to the rear
Parking brake type	Twin shoe (leading/trailing) operating on rear wheels and controlled from park brake lever in floor console via twin cables

BRAKE SYSTEM – GENERAL INFORMATION

SPECIFICATIONS

Type	Servo assisted, self-adjusting with front/rear split hydraulic system, horizontally opposed callipers and dynamic stability control
Disc type and diameter:	
Front - ventilated	378 mm (14.9 in)
Rear - ventilated	378 mm (14.9 in)
Front disc thickness:	
New	36.0 mm (1.42 in)
Service limit	33.6 mm (1.32 in)
Thickness variation	0.010 mm (0.0004 in)
Rear disc thickness:	
New	35.0 mm (1.38 in)
Service limit	32.6 mm (1.28 in)
Thickness variation	0.010 mm (0.0004 in)
Maximum disc run out:	
Front	0.073 mm (0.002 in) with wheel fitted
Rear	0.075 mm (0.003 in) with wheel fitted
Minimum pad material thickness - Front and rear:	3 mm (0.12 in)
Pad material	Asbestos free
Front Calliper	
Type	Six piston
Piston diameter - 1 and 2	30.2 mm (1.18 in)

Piston diameter - 3 and 4	34.9 mm (1.37 in)
Piston diameter - 5 and 6	38.1 mm (1.5 in)
Rear calliper	
Type	Four piston
Piston diameter	31.8 mm (1.5 in)

ITEM	NM	LBF/FT²
Brake caliper to mounting bracket bolts	108	79
Brake bleed screws	14	10
Brake bleed screw cover retaining screws	5	3.6

2012.0 RANGE ROVER (LM), 206-00

BRAKE SYSTEM – GENERAL INFORMATION

DIAGNOSIS AND TESTING

PRINCIPLE OF OPERATION

For a detailed description of the brake system, refer to the relevant

Description and Operation sections in the workshop manual.

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.

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

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

If the tires exhibit uneven wear or feathering, the cause must be corrected. Check the steering and suspension components for damage or wear and, if necessary, check and adjust front wheel alignment.

Visual Inspection

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

Road Test

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

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

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

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

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

If the concern becomes evident during this check, verify it fits the description given before the road test. If the concern is not evident, attempt

description given before the road test. If the concern is not evident, attempt to duplicate the condition using the information from the description.

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

SYMPTOM CHART

SYMPTOM	POSSIBLE CAUSE	ACTION
Brakes noisy	▪ Brake pads ▪ Brake discs	GO to Pinpoint Test **A.**
Vibration when brakes are applied	▪ Wheels/tires out of balance ▪ Wheel hub nuts loose ▪ Brake caliper mounting bolts loose ▪ Brake pads ▪ Foreign material/scratches/corrosion on brake disc contact surfaces ▪ Excessive brake disc thickness variation ▪ Excessive brake disc runout ▪ Wheel bearing wear or failure ▪ Suspension bushing wear or failure ▪ Steering bushing wear or failure	GO to Pinpoint Test **B.**
The brakes pull or drift	▪ Tire pressures/wear ▪ Brake calipers ▪ Brake pads ▪ Brake discs ▪ Wheel alignment adjustment ▪ Wheel bearing ▪ Suspension bushings and	GO to Pinpoint Test **C.**

	▪ Suspension bushings and ball joints	
The pedal feels spongy	▪ Air in brake hydraulic system ▪ Leak in hydraulic system ▪ Brake booster/master cylinder ▪ Brake pads	GO to Pinpoint Test **D.**
The pedal goes down fast	▪ Air in brake hydraulic system ▪ Leak in hydraulic system ▪ Brake booster/master cylinder ▪ Brake pads	GO to Pinpoint Test **E.**
The pedal goes down slowly	▪ Air in brake hydraulic system ▪ Brake booster/master cylinder	GO to Pinpoint Test **F.**
Excessive brake pedal effort required	▪ Brake pads ▪ Brake booster	GO to Pinpoint Test **G.**
Brake lockup during light brake pedal force	▪ Brake pads ▪ Brake calipers	GO to Pinpoint Test **H.**
Brakes drag	▪ Parking brake control applied/malfunction ▪ Seized parking brake cables ▪ Seized brake caliper slide pins ▪ Seized brake caliper ▪ Brake booster ▪ Pedal gear	GO to Pinpoint Test **I.**
Excessive/Erratic brake pedal travel	▪ Hydraulic system ▪ Brake pads ▪ Brake discs ▪ Hub and bearing assembly	GO to Pinpoint Test **J.**

The red brake warning indicator is always on	▪ Fluid level ▪ Brake master cylinder fluid level sensor ▪ Parking brake control ▪ Electrical circuit	Fill the system to specification. Check for leaks. Install a new brake master cylinder fluid reservoir as required. Refer to the relevant section in the workshop manual for parking brake control and circuit tests.
Slow or incomplete brake pedal return	▪ Brake pedal binding ▪ Brake booster/master cylinder	GO to Pinpoint Test **K.**

PINPOINT TESTS

PINPOINT TEST A : BRAKES NOISY	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	A1: INSPECT BRAKE PADS
	1 Inspect the condition of the front and rear brake pads. Check for damage to any anti-squeal shims.
	Are the brake pads OK? **Yes** GO to A2. **No** Clean/install new front and rear brake pads as required. Re-test vehicle for brake noise.
	A2: INSPECT BRAKE DISCS
	1 Inspect the brake discs for excessive corrosion, wear or disc thickness variation.
	Does excessive corrosion, wear or disc thickness variation exist? **Yes** Install new front and rear brake discs and brake pads as required. Re-test vehicle for brake noise. **No** No action required, vehicle is OK.

PINPOINT TEST B : VIBRATION WHEN BRAKES ARE APPLIED	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	B1: ROAD TEST VEHICLE
	1 Road test the vehicle between 48-80 km/h (25-50 mph) at a

	1 Road test the vehicle between 40-80 km/h (25-50 mph) without applying brakes.
	Is the vibration present? **Yes** Refer to the relevant section in the workshop manual for noise vibration and harshness tests. **No** GO to B2.
B2: CHECK FOR BRAKE VIBRATION	
	1 Road test the vehicle between 40-80 km/h (25-50 mph) with light and medium application on the brake pedal.
	Is a vibration present? **Yes** Check the brake caliper mounting bolts and wheel hub nuts and tighten to specification as required. Check the balance of all road wheels and tires and repair as required. Check the brake discs for excessive wear, runout, thickness variation or cracks. Install new brake discs and brake pads as required. GO to B3. **No** No action required, vehicle is OK.
B3: IS VIBRATION STILL PRESENT UNDER BRAKE APPLICATION?	
	1 Road test the vehicle between 40-80 km/h (25-50 mph) with light and medium application on the brake pedal.
	Is a vibration present? **Yes** Check for wear or failure of steering gear bushings. Check for wear or failure of steering gear ball joints. Check for wear or failure of front wheel bearings, suspension bushings and ball joints. Check for wear or failure of rear wheel bearings, suspension bushings and ball joints. Refer to relevant section in workshop manual and install new components as required. **No** No action required, vehicle is OK.

PINPOINT TEST C : THE BRAKES PULL OR DRIFT	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: ROAD TEST VEHICLE	
	1 Road test the vehicle and apply the brake pedal.
	Does the vehicle pull or drift? **Yes** GO to C2. **No** No action required, vehicle is OK.
C2: INSPECT TIRE CONDITION/PRESSURE	
	1 Check for excessive tire wear or incorrect pressures.

	Are the tires at the correct pressure and in good condition? **Yes** GO to C3. **No** Adjust the tire pressures or install new tires if excessively worn. Re-test the system for normal operation.
C3: CHECK CALIPERS	
	1 Check the disc brake caliper pistons and pins for binding, leaking or sticking.
	Do the disc brake caliper pistons and pins bind, leak or stick? **Yes** Rectify sticking pins and install new brake calipers as required. Re-test the system for normal operation. **No** GO to C4.
C4: INSPECT BRAKE DISCS	
	1 Check the brake discs for excessive damage, thickness variation or runout.
	Does excessive damage or runout exist? **Yes** Install new brake discs and brake pads as required. Re-test the system for normal operation. **No** GO to C5.
C5: INSPECT THE FRONT HUB AND WHEEL BEARING ASSEMBLY	
	1 Check the front hub and wheel bearing assembly.
	Are the wheel bearings OK? **Yes** GO to C6. **No** Install new wheel bearings as required. Re-test the system for normal operation.
C6: CHECK SUSPENSION BUSHINGS AND BALL JOINTS.	
	1 Check all suspension bushings and ball joints.
	Are the suspension bushings and ball joints OK? **Yes** GO to C7. **No** Install new front suspension bushings and ball joints as required. Install new rear suspension bushings and ball joints as required. Refer to the relevant section in the workshop manual.
C7: CHECK VEHICLE ALIGNMENT	
	1 Check the vehicle alignment.
	Is the alignment within specification?

	Yes No action is required, vehicle is OK. **No** Adjust the alignment as required.

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

	Bleed the brake system. Re-test the system for normal operation. **No** Check for leaking brake system and rectify as required. Add fluid and bleed the brake system. Re-test the system for normal operation.

PINPOINT TEST E : THE PEDAL GOES DOWN FAST	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: ROAD TEST VEHICLE	
	1 Road test the vehicle and apply the brake pedal.
	Is the brake pedal effort and brake pedal travel normal? **Yes** No action required, vehicle is OK. **No** GO to E2.
E2: CHECK BRAKE PEDAL TRAVEL-PRESSURIZE SYSTEM	
	1 Pump the brake pedal rapidly (five times).
	Does the brake pedal travel build up and then hold? **Yes** Bleed the brake system. Re-test the system for normal operation. **No** GO to E3.
E3: CHECK FOR BRAKE SYSTEM LEAKS	
	1 Check for external brake system leaks. For additional information, refer to brake master cylinder component test in this section.
	Is there a leak present? **Yes** Repair as necessary, add fluid and bleed brake system. Re-test the system for normal operation. **No** No action required, system is OK.

PINPOINT TEST F : THE PEDAL GOES DOWN SLOWLY	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F1: ROAD TEST VEHICLE - CHECK BRAKE PEDAL OPERATION	
	1 Check if the condition occurs during actual stopping application by applying the brake pedal while the vehicle is moving.
	Does the condition occur when the vehicle is moving? **Yes** GO to F2. **No** GO to F3.

F2: CHECK FOR BRAKE SYSTEM LEAKS	
	1 Check for external brake system leaks. For additional information, refer to brake master cylinder component test in this section.
	Are there any external brake system leaks? **Yes** Rectify as necessary. Add fluid and bleed the brake system. Re-test the system for normal operation. **No** GO to F3.

F3: CARRY OUT A BRAKE MASTER CYLINDER BYPASS TEST	
	1 Test for brake master cylinder bypass condition. Refer to Brake master cylinder component test in this section.
	Has a concern been identified? **Yes** Install a new brake master cylinder, add fluid and bleed the brake system. Re-test the system for normal operation. **No** No action required, system is OK.

PINPOINT TEST G : EXCESSIVE BRAKE PEDAL EFFORT	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G1: CHECK BRAKE PADS	
	1 Check the brake pads for wear, contamination, correct installation, damage and type.
	Has a concern been identified? **Yes** Correctly install or install new brake pads as required. Re-test the system for normal operation. **No** GO to G2.
G2: CHECK VACUUM	
	1 Disconnect the vacuum hose from the brake booster.
	2 Connect a vacuum/pressure tester to the vacuum hose.
	3 Run the engine at normal operating temperature.
	4 Record the vacuum reading.
	Is the reading 40.5 kPa (12 in-Hg) or greater? **Yes** GO to G3. **No** Locate and rectify the source of low vacuum. Re-test the system for normal operation.

G3: INSPECT SYSTEM	
	1 Switch the engine off.
	2 Reconnect the vacuum hose.
	3 Inspect the brake booster, rubber grommet, and all vacuum plumbing for cracks, holes, damaged connections, or missing clamps.
	4 Pump the brake pedal several times to exhaust the vacuum. Push down on the brake pedal and hold.
	Does the brake pedal move down when the engine is started? **Yes** Vacuum system is OK. **No** GO to G4.
G4: CHECK POWER BRAKE BOOSTER VALVE	
	1 Check the brake booster valve. For additional information, refer to Brake Booster component test in this section.
	Is the power brake booster valve OK? **Yes** Check the brake booster. For additional information, refer to Brake Booster component test in this section. Install a new brake booster as required. Re-test the system for normal operation. **No** Install a new brake booster valve. Re-test the system for normal operation.

PINPOINT TEST H : BRAKE LOCKUP DURING LIGHT BRAKE PEDAL FORCE	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
H1: TEST BRAKE LOCKUP	
	1 Road test the vehicle and apply the brake pedal lightly.
	Do the brakes lockup? **Yes** GO to H2. **No** No action required, vehicle is OK.
H2: INSPECT BRAKE PADS	
	1 Inspect brake pads for contamination, correct installation, damage and type.
	Has a concern been identified? **Yes** Correctly install or install new brake pads as required. Re-test the system for normal operation. **No**

	GO to H3.

H3: INSPECT BRAKE CALIPERS	
	1 Inspect brake calipers for binding, leaking or sticking.
	Has a concern been identified? **Yes** Correctly install or install new brake calipers as required. Re-test the system for normal operation. **No** No action required, vehicle is OK.

PINPOINT TEST I : BRAKES DRAG	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
I1: ROAD TEST VEHICLE	
	1 Road test the vehicle and apply the brakes.
	Are the brakes functioning correctly? **Yes** No action required, vehicle is OK. **No** GO to I2.
I2: CHECK BRAKE CALIPERS	
	1 Check the front and rear calipers pistons and pins for binding, leaking or sticking.
	Do the disc brake caliper pistons and pins bind, leak or stick? **Yes** Inspect the brake calipers and parking brake cables. Install new components as required. Re-test the system for normal operation. **No** GO to I3.
I3: CHECK BRAKE BOOSTER	
	1 Check the brake booster connecting rod alignment and travel.
	Is the connecting rod OK? **Yes** Vehicle is OK. **No** Install a new brake booster as required. Re-test the system for normal operation.

PINPOINT TEST J : EXCESSIVE/ERRATIC BRAKE PEDAL TRAVEL	
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
J1: TEST ON ROUGH ROAD	

	1 Road test the vehicle on rough road conditions.
	2 Apply the brakes slowly.
	Is the brake pedal effort and brake pedal travel normal? **Yes** No action required, vehicle is OK. **No** GO to J2.

J2: CHECK BRAKE FLUID LEVEL	
	1 Check the brake master cylinder reservoir fluid level.
	Is the fluid level OK? **Yes** GO to J3. **No** Check brake master cylinder reservoir sealing points. For additional information, refer to Brake master cylinder component test in this section. Add brake fluid and bleed the brake system. Re-test the system for normal operation.

J3: CHECK BRAKE PEDAL RESERVE	
	1 Run engine at idle speed.
	2 Apply the brake pedal lightly three or four times.
	3 Wait 15 seconds for the vacuum to replenish.
	4 Push down on the brake pedal until it stops moving downward or an increased resistance to the brake pedal travel occurs.
	5 Hold the brake pedal in the applied position while increasing the engine speed to 2000 revs/min.
	6 Release the accelerator pedal.
	Does the brake pedal move downward as the engine speed returns to idle? **Yes** GO to J4. **No** Check the vacuum to the brake booster.

J4: CHECK THE FRONT WHEEL BEARING ASSEMBLY	
	1 Check the front wheel bearing assembly.
	Are the front wheel bearings loose/damaged? **Yes** Tighten to specification or install a new front wheel bearing as required. Re-test the system for normal operation. **No** Check the front brake discs for thickness variances.

PINPOINT TEST K : SLOW OR INCOMPLETE BRAKE PEDAL RETURN

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
	K1: CHECK FOR BRAKE PEDAL RETURN
	1 Run the engine at idle while making several brake applications.
	2 Pull the brake pedal rearward with approximately 44.5 N (10lb) force.
	3 Release the brake pedal and measure the distance to the toe board.
	4 Make a hard brake application.
	5 Release the brake pedal and measure the brake pedal to toe board distance. The brake pedal should return to its original position.
	Does the brake pedal return to its original position? **Yes** No action required, vehicle is OK. **No** GO to K2.
	K2: CHECK FOR BRAKE PEDAL BINDING
	1 Disconnect the brake booster from the brake pedal. Check the brake pedal to ensure free operation.
	Is the brake pedal operating freely? **Yes** Install a new brake booster as required. Re-test the system for normal operation. **No** Repair or install new brake pedal. Re-test the system for normal operation.

COMPONENT TESTS

BRAKE BOOSTER

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

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

1. With the automatic transmission in PARK, stop the engine and apply the parking brake. Pump the brake pedal several times to exhaust all vacuum in the system. With the engine switched off and all vacuum in the system exhausted, apply the brake pedal and hold it down. Start

the system exhausted, apply the brake pedal and hold it down. Start the engine. If the vacuum system is operating, the brake pedal will tend to move downward under constant foot pressure. If no motion is felt, the vacuum booster system is not functioning.

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

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

BRAKE MASTER CYLINDER

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

Normal Conditions

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

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

year.

- The fluid level will fall with brake pad wear.

Abnormal Conditions

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

NOTE:

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

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

NON PRESSURE LEAKS

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

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

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

BRAKE SYSTEM – GENERAL INFORMATION

FRONT BRAKE DISC RUNOUT CHECK – VEHICLES WITHOUT: HIGH PERFORMANCE BRAKES (G1224854)

GENERAL PROCEDURES

70.12.15.01	DISC – FRONT – LEFT/EACH – CHECK RUN OUT AND THICKNESS – WITH WHEEL REMOVED	ALL DERIVATIVES	0.4	USED WITHINS	+

NOTES:

- Some variation in the illustrations may occur, but the essential

information is always correct.

- LH illustration shown, RH is similar.

1. **WARNING:**

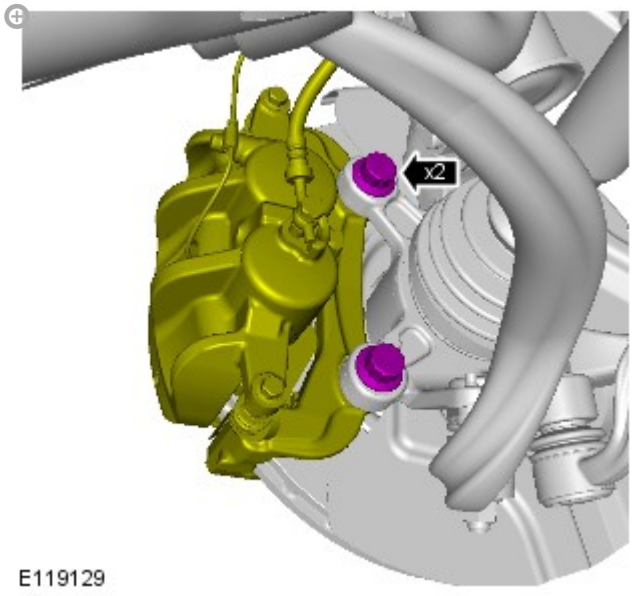
   Make sure to support the vehicle with axle stands.

   Raise the front of the vehicle.

2. Remove the road wheel.

3. **CAUTION:**

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

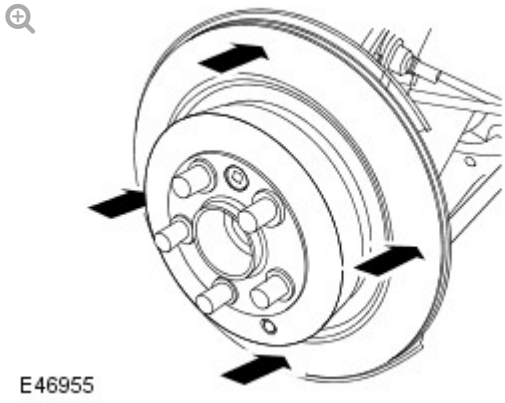


   Release the brake caliper and tie aside.

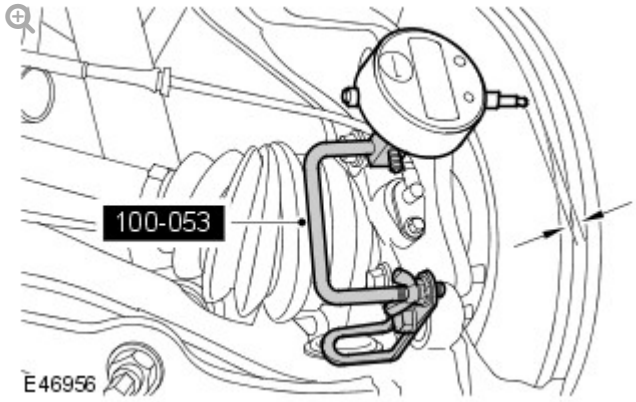
4. **CAUTION:**

   Brake discs must be renewed in pairs, unless one disc requires changing before 1000 miles (1600 kilometers) from

new.

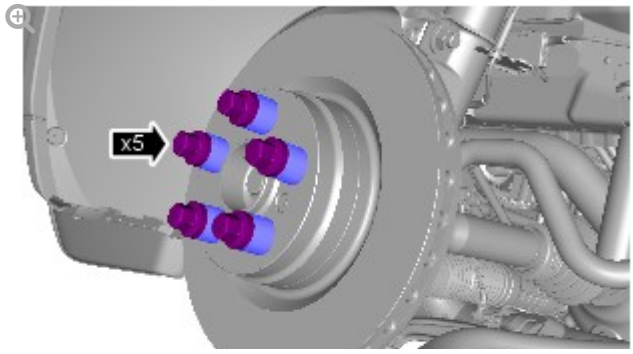


At 4 points around disc, measure disc thisckness using a micrometer; renew disc if less than service limit or if variation is exceeded: Disc thickness, NEW 30 mm, Service limit = 27 mm. Thickness variation maximum = 0.01.

5. 

Mount a Dial Test Indicator (DTI) to and secure to inboard side of hub using caliper assembly upper bolt hole

6. Position DTI probe 5 mm in from outer edge of disc.

7. 

Install spacer washers under the wheel nuts.

- Tighten the road wheel nuts to 140 Nm (103 lb.ft).

8. Zero DTI and rotate road wheel one complete revolution to measure disc runout. Disc runout must not exceed 0.05 mm (0.002 in).

9. If disc runout is outside limits:

10. Remove the wheel hub nuts.
    - Remove the spacers.

11. Remove Allen screw securing brake disc to drive flange.

12. Remove the brake disc.

13. Ensure mating surfaces of disc and drive flange are clean.

14. Fit disc to flange, fit Allen screw and tighten to 16 Nm (12 lbf.ft.).

15. Install spacer washers under the wheel nuts.
    - Tighten the road wheel nuts to 140 Nm (103 lb.ft).

16. Check disc runout as detailed above.

17. If runout is still outside limits, renew disc and/or hub.

18. Remove the wheel hub nuts.
    - Remove the spacers.

19. Remove the DTI.

20. Install the brake caliper and tighten the bolts. TORQUE: 275 Nm

21. Install the road wheel(s) and tighten nuts to 140Nm (103 lb-ft).

22. Depress brake pedal several times to set brake pads.

23. Lower the vehicle.

FRONT BRAKE DISC RUNOUT CHECK - VEHICLES WITH: HIGH PERFORMANCE BRAKES (G1225401)

GENERAL PROCEDURES

70.12.15.01	DISC - FRONT - LEFT/EACH - CHECK RUN OUT AND THICKNESS - WITH WHEEL REMOVED	ALL DERIVATIVES	0.4	USED WITHINS	+

NOTES:

- Some variation in the illustrations may occur, but the essential information is always correct.
- LH illustration shown, RH is similar.

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

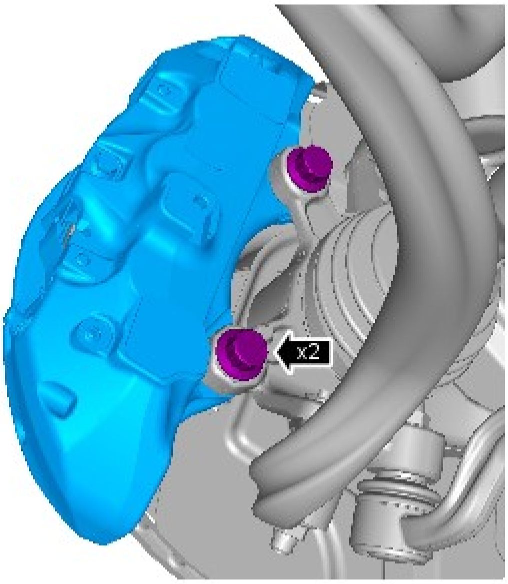
   Raise the front of the vehicle.

2. Remove the road wheel

2. Remove the road wheel.

3. **CAUTION:**

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



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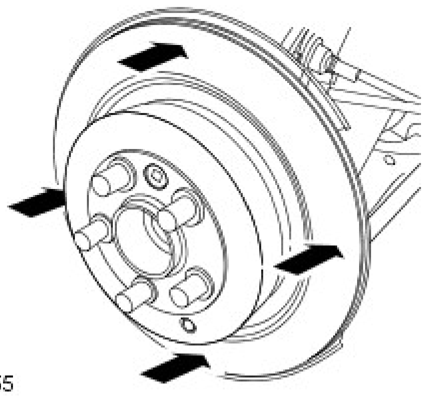
Release the brake caliper and tie aside.

4. **CAUTION:**

Brake discs must be renewed in pairs, unless one disc requires changing before 1000 miles (1600 kilometers) from new.



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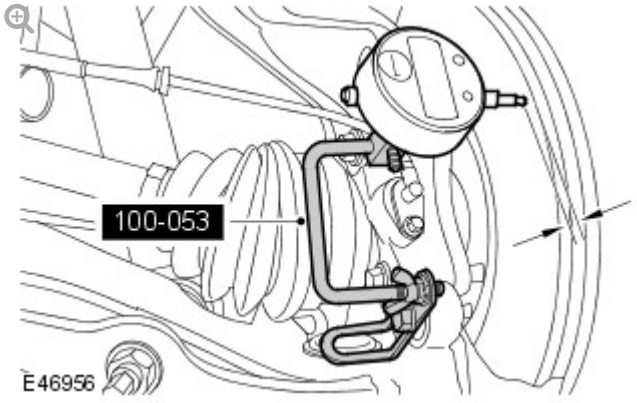
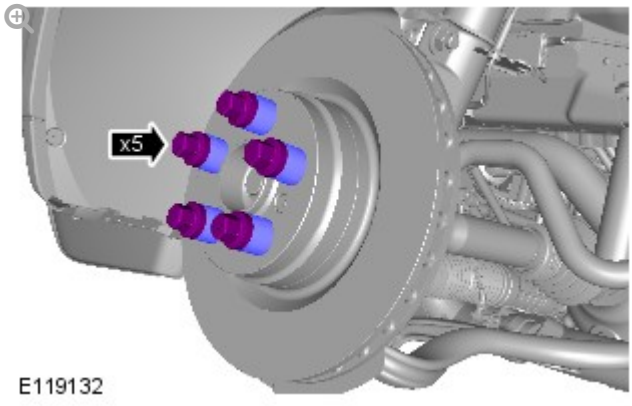
At 4 points around disc, measure disc thickness using a micrometer; renew disc if less than service limit or if variation is exceeded: Disc thickness, NEW 34 mm, Service limit 31 mm. Thickness variation maximum = 0.01 mm

5. 

Mount a Dial Test Indicator (DTI) to and secure to inboard side of hub using caliper assembly upper bolt hole

6. Position DTI probe 5 mm in from outer edge of disc.

7. 

Install spacer washers under the wheel nuts.

- Tighten the road wheel nuts to 140 Nm (103 lb.ft).

8. Zero DTI and rotate road wheel one complete revolution to measure disc runout. Disc runout must not exceed 0.05 mm (0.002 in).

9. If disc runout is outside limits:

10. Remove the wheel hub nuts.
    - Remove the spacers.
11. Remove Allen screw securing brake disc to drive flange.
12. Remove the brake disc.
13. Ensure mating surfaces of disc and drive flange are clean.
14. Fit disc to flange, fit Allen screw and tighten to 16 Nm (12 lbf.ft.).
15. Install spacer washers under the wheel nuts.
    - Tighten the road wheel nuts to 140 Nm (103 lb.ft).
16. Check disc runout as detailed above.
17. If runout is still outside limits, renew disc and/or hub.
18. Remove the wheel hub nuts.
    - Remove the spacers.
19. Remove the DTI.
20. Install the brake caliper and tighten the bolts to 275 Nm (203 lb.ft)
21. Install the road wheel(s) and tighten nuts to 140Nm (103 lb-ft).
22. Depress brake pedal several times to set brake pads.
23. Lower the vehicle.

2012.0 RANGE ROVER (LM), 206-00

BRAKE SYSTEM – GENERAL INFORMATION

REAR BRAKE DISC RUNOUT CHECK (G1224855)

GENERAL PROCEDURES

NOTES:

- Some variation in the illustrations may occur, but the essential information is always correct.
- RH illustration shown, LH is similar.
- It is not necessary to carry out the parking brake shoe 'bedding-in procedure' if the rear brake discs or parking brake shoes have been removed for access to other components.

1. **CAUTION:**

   Do not turn the ignition on when the parking brake service mode has been set, this will result in the parking brake being released from the service mode.

   Enter the parking brake into the service mode.

   - Turn the ignition on.
   - Apply, and hold, the footbrake.
   - Apply, and hold, the parking brake switch to the RELEASE position.
   - Turn the ignition off.
   - Release the footbrake.
   - Release the parking brake switch.

2. **WARNING:**

   Make sure to support the vehicle with axle stands.

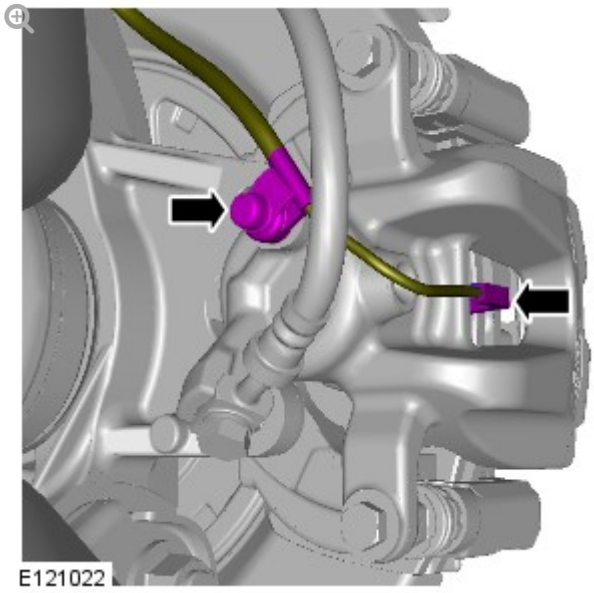
   Raise rear of vehicle.

3. Remove road wheel.

4.

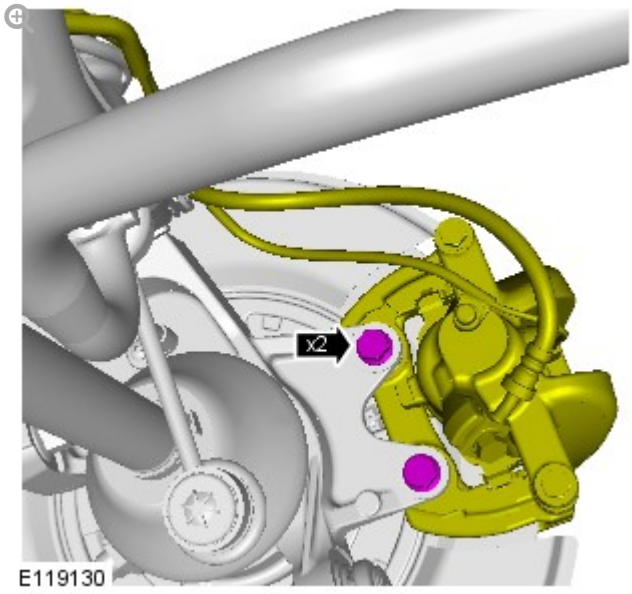
CAUTION:

The brake pad wear indicator sensor is easily damaged. Do not use a lever to remove the sensor. Use fingers only.



RH side rear only: Disconnect the brake pad wear indicator sensor lead.

5.

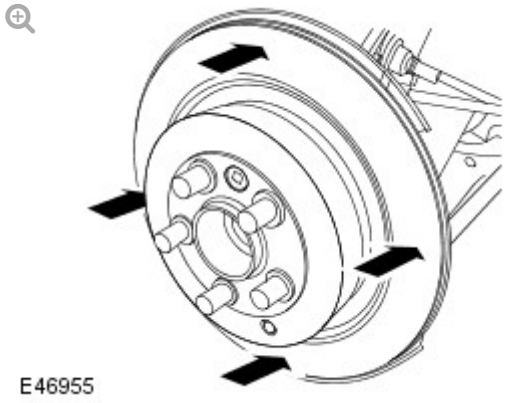


Remove 2 bolts securing brake caliper to hub. Release caliper from hub and tie aside.

6.

NOTE:

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

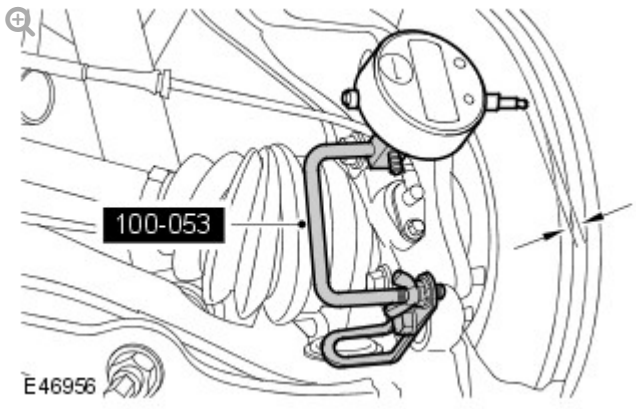


At 4 points around the disc, measure disc thickness using a micrometer; renew disc if less than service limit or if variation is exceeded: Disc thickness, NEW = 20 mm Service limit = 18 mm. Thickness variation maximum = 0.01 mm.

7.

NOTE:

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

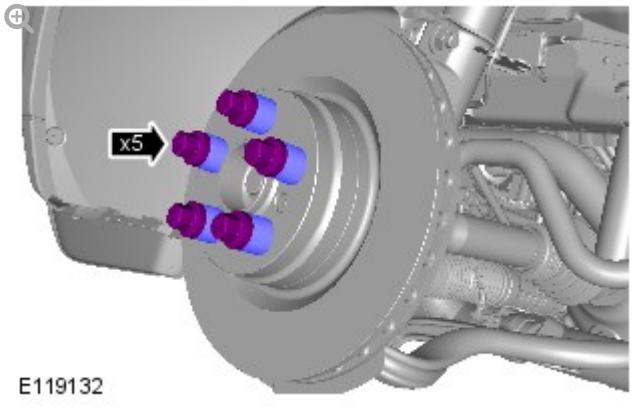


Mount a Dial Test Indicator (DTI) to and secure to inboard side of hub using caliper assembly upper bolt hole.

8. Position DTI probe 5 mm in from outer edge of disc.

9. **NOTE:**

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



Tighten the wheel nuts to 140 Nm (103 lb.ft).

- Install spacer washers under the wheel nuts.

10. Zero DTI and rotate wheel one complete revolution to measure disc runout. Disc runout must not exceed 0.09 mm (0.003 in).

11. If disc runout is outside limits:

12. Remove the wheel hub nuts.
    - Remove the spacer washers.

13. Remove Allen screw securing brake disc to drive flange.

14. Remove brake disc.

15. Ensure mating surfaces of disc and drive flange are clean.

16. Fit disc to flange, fit Allen screw and tighten to 16 Nm (12 lbf.ft).

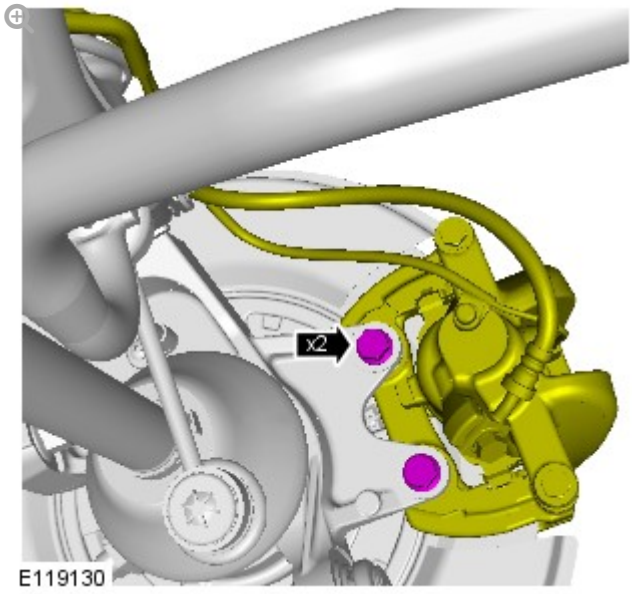
17. Tighten the wheel nuts to 140 Nm (103 lb.ft).
    - Install spacer washers under the wheel nuts.

18. Check disc runout as detailed above.

19. If runout is still outside limits, renew disc and/or hub.

20. Remove the wheel hub nuts.
    - Remove the spacer washers.

21. Remove the DTI.

22. 

    Install the brake caliper anchor bolts
    - Tighten the bolts to 115 Nm (85 lb.ft).

23. Tighten the wheel nuts to 140 Nm (103 lb.ft).

24. Depress brake pedal several times to set brake pads.

25. Remove stands and lower vehicle.

BRAKE SYSTEM - GENERAL INFORMATION

BRAKE SYSTEM BLEEDING - VEHICLES WITH: HIGH PERFORMANCE BRAKES (G1225239)

GENERAL PROCEDURES

70.25.02	BRAKES - COMPLETE SYSTEM - BLEED	ALL DERIVATIVES	0.7	USED WITHINS	+
70.25.02.36	BRAKES - COMPLETE SYSTEM - BLEED - BREMBO/SPORTS BRAKES FITTED	ALL DERIVATIVES	0.8	USED WITHINS	+

WARNING:

If any components upstream of the Hydraulic Control Unit (HCU), including the HCU itself are replaced, the brake system must be bled using Land Rover approved diagnostic equipment. This will ensure that all air is expelled from the new component(s).

NOTES:

- Bleeding of the complete brake system must be carried out using Land Rover approved diagnostic equipment. Where only the primary or secondary brake circuits have been disturbed in isolation, it should only be necessary to bleed that circuit. Partial bleeding of the hydraulic system is only permissible if a brake tube or hose has been disconnected with only minimal loss of fluid.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. **WARNING:**

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

   Raise and support the vehicle.

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

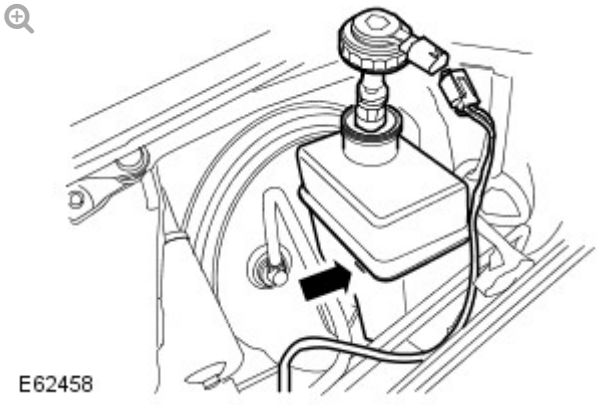
3. **WARNING:**

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

be compatible.

CAUTIONS:

- Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.
- The brake fluid reservoir must remain full with new, clean brake fluid at all times during bleeding.

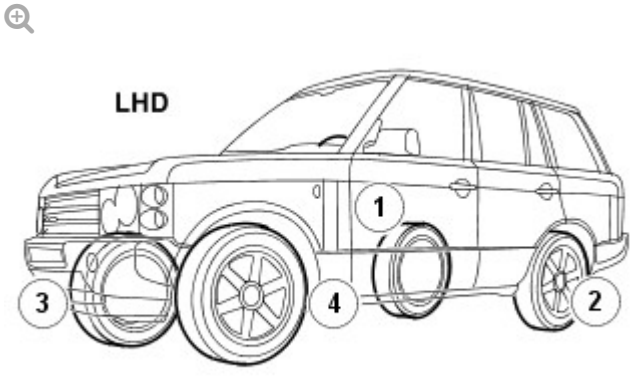


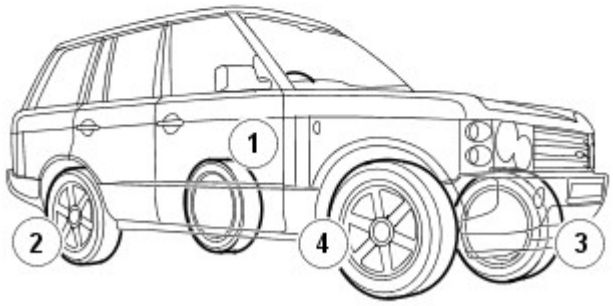
Fill the brake fluid reservoir to the MAX mark.

- Disconnect the brake fluid reservoir electrical connector.
- Remove the brake fluid reservoir cap.

4. Conduct the bleed procedure with the engine running.

5. Connect the diagnostic tool to the vehicle, select diagnostic and proceed as directed for bleeding the brake system.

6. 



Starting at the brake caliper furthest away from the brake master cylinder, loosen the bleed screw by one-half to three-quarters of a turn.

7. Install the bleed tube to the brake caliper bleed screw and immerse the free end of the bleed tube in a bleed jar containing a small quantity of approved brake fluid.
   - Hold the bleed container at least 300 mm above the Caliper that is being bled.

8. **CAUTION:**

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

   With assistance, depress the brake pedal steadily through to 2/3 of its full stroke.

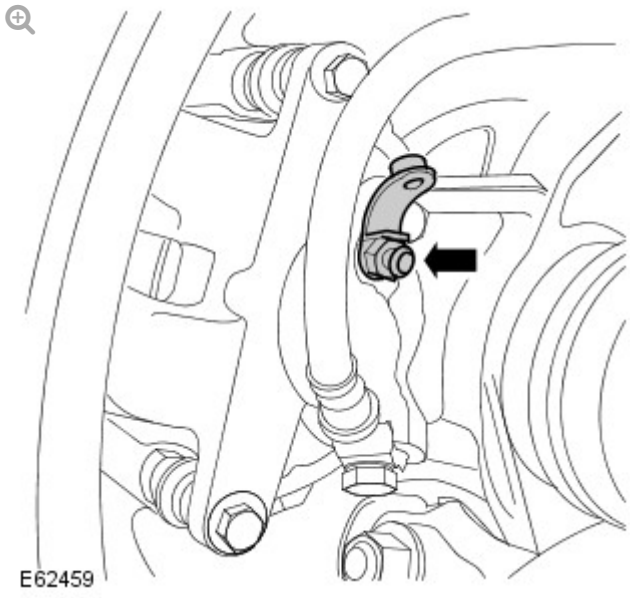
9. With the brake pedal held down, close bleed screw and then return the brake pedal to 1/3 of its full stroke and hold.

10. Repeat steps 8 and 9, 28 times for the rear brake and 10 times for the front brake.

11. At the end of the bleed process, depress and hold the brake pedal down.

12. **CAUTION:**

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



With the brake pedal fully depressed, tighten the bleed screw.

- Tighten the front caliper bleed screws to 19 Nm (14 lb.ft).
- Tighten the rear caliper bleed screws to 10 Nm (7 lb.ft).

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

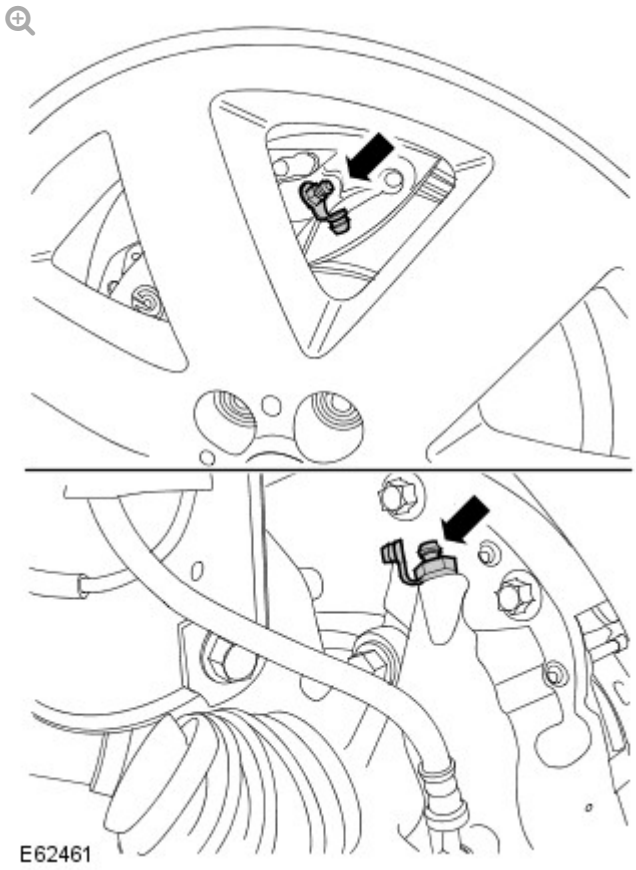
14. **WARNING:**

High performance front brake calipers have two bleed points. The inner bleed point must be bled before the outer bleed point. Braking efficiency may be seriously impaired if an incorrect bleed sequence is used.

CAUTION:

Make sure the bleed screw cap is installed after bleeding.

This will prevent corrosion to the bleed screw.



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

- If access is restricted to the front caliper outer bleed screws, rotate the road wheels to gain access.
- Tighten the bleed screws to 19 Nm (14 lb.ft).

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

16. Apply the brakes and check for leaks.

17. Install the brake fluid reservoir cap.
    - Connect the brake fluid reservoir electrical connector.

18. On completion, road test the vehicle and check the brake pedal operation. The pedal travel should be short with a firm feel.

BRAKE SYSTEM - GENERAL INFORMATION

BRAKE SYSTEM BLEEDING - VEHICLES WITH: STANDARD BRAKES (G1225240)

GENERAL PROCEDURES

70.25.02	BRAKES - COMPLETE SYSTEM - BLEED	ALL DERIVATIVES	0.7	USED WITHINS	+
70.25.02.36	BRAKES - COMPLETE SYSTEM - BLEED - BREMBO/SPORTS BRAKES FITTED	ALL DERIVATIVES	0.8	USED WITHINS	+

WARNING:

If any components upstream of the Hydraulic Control Unit (HCU), including the HCU itself are replaced, the brake system must be bled using Land Rover approved diagnostic equipment. This will ensure that all air is expelled from the new component(s).

NOTES:

- Bleeding of the complete brake system must be carried out using Land Rover approved diagnostic equipment. Where only the primary or secondary brake circuits have been disturbed in isolation, it should only be necessary to bleed that circuit. Partial

isolation, it should only be necessary to bleed that circuit. Partial bleeding of the hydraulic system is only permissible if a brake tube or hose has been disconnected with only minimal loss of fluid.

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

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

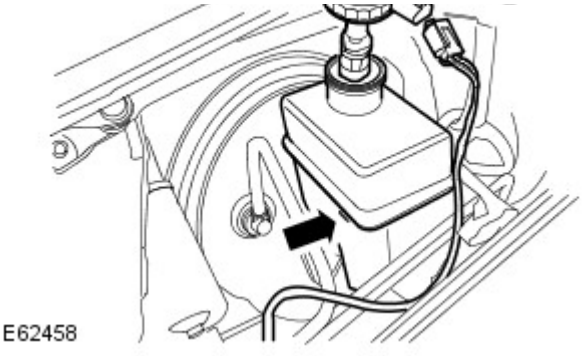
2. Check that the brake fluid lines are secure and that there are no signs of a brake fluid leak. If a brake fluid leak is detected, investigate and rectify the cause of the leak before bleeding the brakes.

3. **WARNING:**

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

   CAUTIONS:

   - Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.
   - The brake fluid reservoir must remain full with new, clean brake fluid at all times during bleeding.



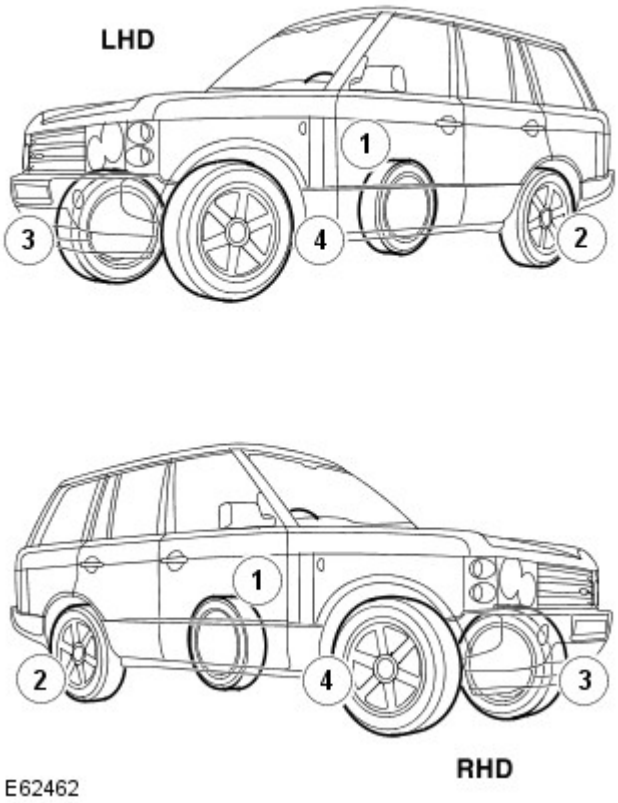
Fill the brake fluid reservoir to the MAX mark.

- Disconnect the brake fluid reservoir electrical connector.
- Remove the brake fluid reservoir cap.

4. Conduct the bleed procedure with the engine running.

5. Connect the diagnostic tool to the vehicle, select diagnostic and proceed as directed for bleeding the brake system.

6.



Starting at the brake caliper furthest away from the brake master cylinder, loosen the bleed screw by one-half to three-quarters of a turn.

7. Install the bleed tube to the brake caliper bleed screw and immerse the free end of the bleed tube in a bleed jar containing a small quantity of approved brake fluid.
   - Hold the bleed container at least 300 mm above the Caliper that is being bled.

8. **CAUTION:**

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

   With assistance, depress the brake pedal steadily through to 2/3 of its full stroke.

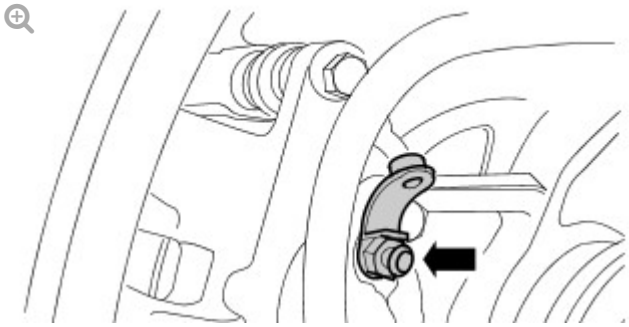
9. With the brake pedal held down, close bleed screw and then return the brake pedal to 1/3 of its full stroke and hold.

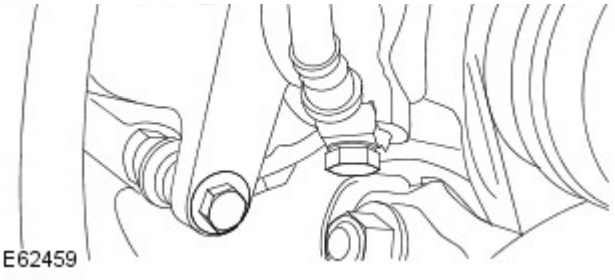
10. Repeat steps 8 and 9, 28 times for the rear brake and 10 times for the front brake.

11. At the end of the bleed process, depress and hold the brake pedal down.

12. **CAUTION:**

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





With the brake pedal fully depressed, tighten the bleed screw to 10 Nm (7 lb.ft).

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

14. **WARNING:**

> Braking efficiency may be seriously impaired if an incorrect bleed sequence is used.

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

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

16. Apply the brakes and check for leaks.

17. Install the brake fluid reservoir cap.
    - Connect the brake fluid reservoir electrical connector.

18. On completion, road test the vehicle and check the brake pedal operation. The pedal travel should be short with a firm feel.

BRAKE SYSTEM PRESSURE BLEEDING (G1225241)

GENERAL PROCEDURES

70.25.02	BRAKES - COMPLETE SYSTEM - BLEED	ALL DERIVATIVES	0.7	USED WITHINS	+
70.25.06	BRAKES - HIGH PRESSURE SYSTEM - BLEED	ALL DERIVATIVES	0.6	USED WITHINS	+

NOTE:

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

All vehicles

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

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

3. **WARNING:**

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

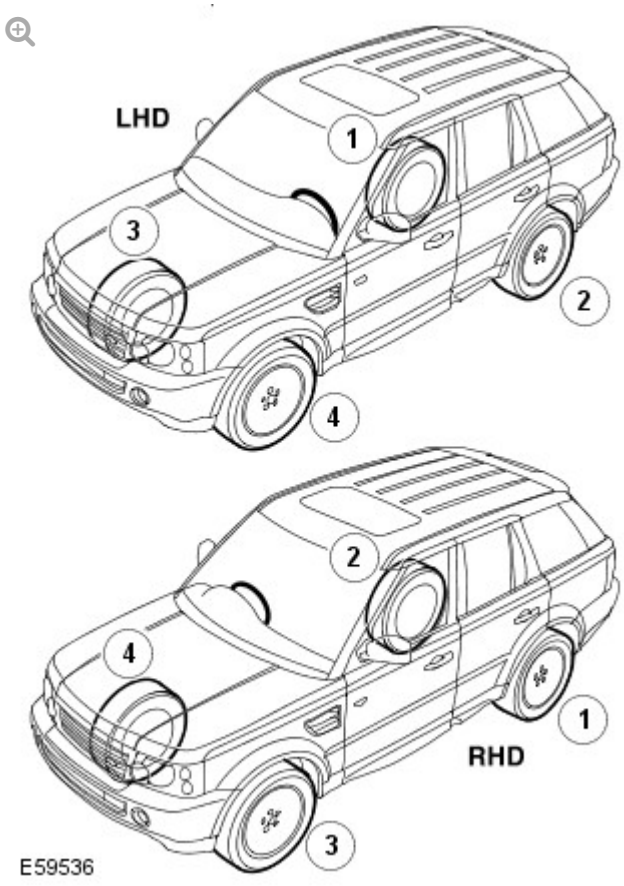
CAUTIONS:

- Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.
- The brake fluid reservoir must remain full with new, clean brake fluid at all times during bleeding.

Fill the brake fluid reservoir to the MAX mark.

- Disconnect the brake fluid reservoir electrical connector.
- Remove the brake fluid reservoir cap.

4. Conduct the bleed procedure with the engine running.

5. 

Starting at the brake caliper furthest away from the brake master cylinder, loosen the bleed screw by one-half to three-quarters of a turn.

6.
   - Install the bleed tube to the brake caliper bleed screw and immerse the free end of the bleed tube in a bleed jar containing a small quantity of approved brake fluid.
   - Hold the bleed container at least 300 mm above the Caliper that is being bled.

7. **CAUTION:**

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

   With assistance, depress the brake pedal steadily through to 2/3 of its full stroke.

8. With the brake pedal held down, close bleed screw and then return the brake pedal to 1/3 of its full stroke and hold.

9. Repeat steps 7 and 8, 28 times for the rear brake and 10 times for the front brake.

10. At the end of the bleed process, depress and hold the brake pedal down.

11. **CAUTION:**

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

    With the brake pedal fully depressed, tighten the bleed screw.

    - On vehicles with high performance brakes, tighten the front caliper bleed screw to 19 Nm (14 lb.ft).
    - On vehicles with standard brakes, tighten the front caliper bleed screw to 10 Nm (7 lb.ft).

- Tighten the rear caliper bleed screws to 10 Nm (7 lb.ft).

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

13. **WARNING:**

> Braking efficiency may be seriously impaired if an incorrect bleed sequence is used.

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

Vehicles with supercharger

1. **WARNING:**

> High performance front brake calipers have two bleed points. The inner bleed point must be bled before the outer bleed point. Braking efficiency may be seriously impaired if an incorrect bleed sequence is used.

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

- If access is restricted to the front caliper outer bleed screws, rotate the road wheels to gain access.
- Tighten the bleed screws to 19 Nm (14 lb.ft).

All vehicles

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

2. Apply the brakes and check for leaks.

3. Install the brake fluid reservoir cap

3. Install the brake fluid reservoir cap.
    - Connect the brake fluid reservoir electrical connector.

4. On completion, road test the vehicle and check the brake pedal operation. The pedal travel should be short with a firm feel.

BRAKE SYSTEM - GENERAL INFORMATION

COMPONENT BLEEDING - VEHICLES WITH: HIGH PERFORMANCE BRAKES (G1225242)

GENERAL PROCEDURES

WARNING:

If any components upstream of the Hydraulic Control Unit (HCU), including the HCU itself are replaced, the brake system must be bled using Land Rover approved diagnostic equipment. This will ensure that all air is expelled from the new component(s).

CAUTION:

CAUTION:

LH illustration shown, RH is similar.

NOTES:

- Bleeding of the complete brake system must be carried out using Land Rover approved diagnostic equipment. The following manual procedure covers bleeding the brake system for components down stream of the HCU, where only the primary or secondary brake circuits have been disturbed in isolation. Partial bleeding of the hydraulic system is only permissible if a brake tube or hose has been disconnected with only minimal loss of fluid.
- Some variation in the illustrations may occur, but the essential information is always correct.

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

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

3. Conduct the bleed procedure with the engine running.

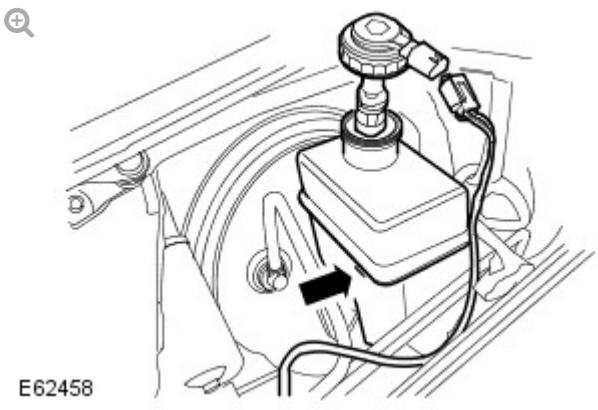
4. **WARNING:**

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

be compatible.

CAUTIONS:

- Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.
- The brake fluid reservoir must remain full with new, clean brake fluid at all times during bleeding.



- Disconnect the brake fluid reservoir electrical connector.
- Remove the brake fluid reservoir cap.
- Fill the brake fluid reservoir to the MAX mark.

5. Install the bleed tube to the brake caliper bleed screw and immerse the free end of the bleed tube in a bleed jar containing a small quantity of approved brake fluid.
   - Hold the bleed container at least 300 mm above the Caliper that is being bled.

6. **WARNING:**

   High performance front brake calipers have two bleed points. The inner bleed point must be bled before the outer bleed point. Braking efficiency may be seriously impaired if an

incorrect bleed sequence is used.

- If access is restricted to the front caliper outer bleed screws, rotate the road wheels to gain access.
- Loosen the bleed screw by one-half to three-quarters of a turn.

7. **CAUTION:**

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

   With assistance, depress the brake pedal steadily through to 2/3 of its full stroke.

8. With the brake pedal held down, close bleed screw and then return the brake pedal to 1/3 of its full stroke and hold.

9. Repeat steps 7 and 8, 28 times for the rear brake and 10 times for the front brake.

10. At the end of the bleed process, depress and hold the brake pedal down.

11. **CAUTION:**

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

    With the brake pedal fully depressed, tighten the bleed screw.

    - Tighten the front caliper bleed screws to 19 Nm (14 lb.ft).
    - Tighten the rear caliper bleed screws to 10 Nm (7 lb.ft).

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

13. Apply the brakes and check for leaks.

14. Install the brake fluid reservoir cap.
    - Connect the brake fluid reservoir electrical connector.

15. On completion, road test the vehicle and check the brake pedal operation. The pedal travel should be short with a firm feel.