

Rear Drive Axle/Differential -**Lubrication**

Description	Lubricant	Capacity (liters/pints/US quarts)
Haldex controlled coupling	Statoil SL01-301. Land Rover Part No LR003136	0.65/1.1/0.69
Rear drive axle/differential	Castrol Axle EPX 80W-90. Land Rover Part No LR003156	0.7/1.2/0.74

General Specification

Item	Specification
Differential type	Low offset hypoid spiral bevel design
Ratio	2.58:1
Electronic torque managed (ETM) range	Up to 1500 Nm (1106 lbf.ft)

Torque Specifications

Description	Nm	lb-ft
Active on-demand coupling module	6	4
Active on-demand coupling to differential	24	18
Active on-demand oil pump	6	4
Driveshaft to the rear flange*	40	30
Rear differential front bush retaining bolts*	175	129
Rear differential insulator to the rear differential	25	18
Rear differential rear bush retaining bolts*	110	81
Rear differential support bracket	25	18
Rear drive axle/differential pinion flange nut*	130	96
Rear drive axle/differential fluid drain plug	35	26
Rear drive axle/differential fluid filler plug	35	26

* **New nuts/bolts must be fitted**

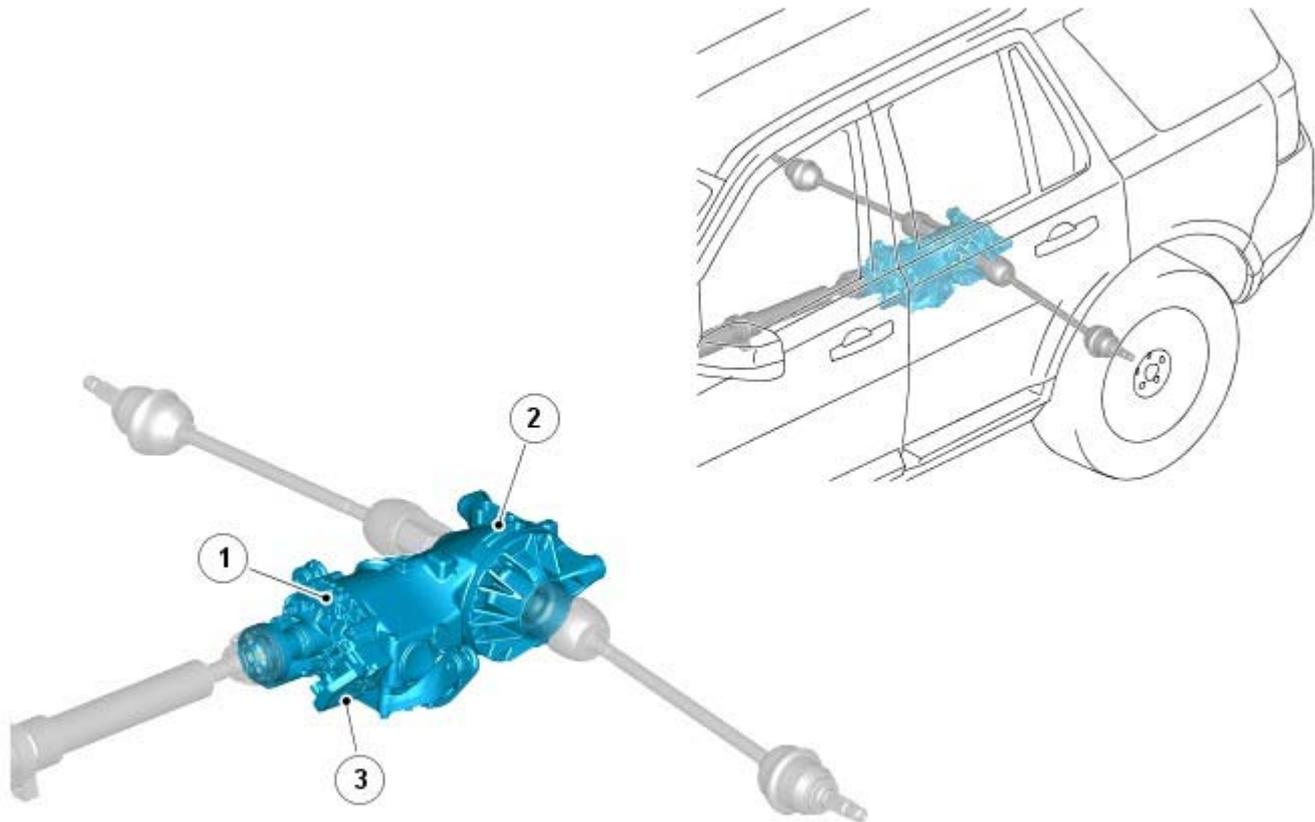
Part Number

Published: 11-May-2011

Rear Drive Axle/Differential - Rear Drive Axle and Differential

Description and Operation

COMPONENT LOCATION



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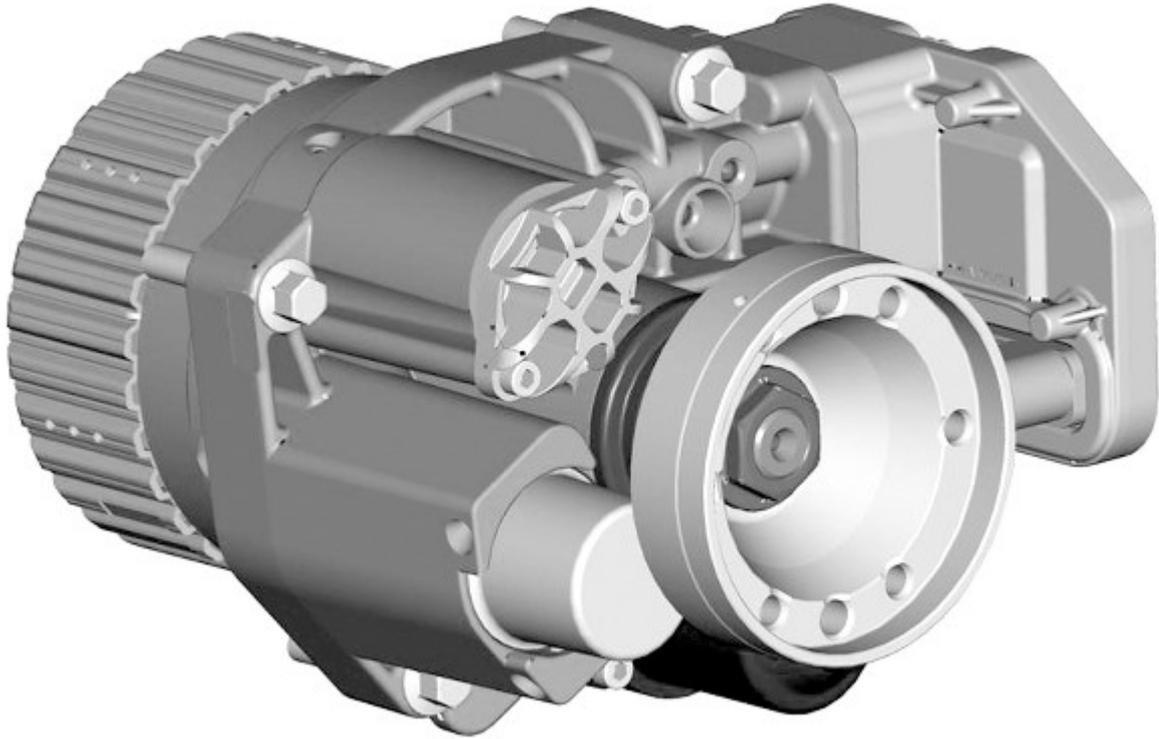
Item	Part Number	Description
1	-	Active on-demand coupling
2	-	Differential
3	-	Active on-demand coupling module

OVERVIEW

The differential operates in conjunction with the active on-demand coupling to provide drive to the rear axle.

Vehicles from 2009MY

Generation 4 Active On-Demand Coupling from 2009MY



E103421

Vehicles from 2009MY are fitted with a modified design of the active on-demand coupling, known as the generation 4 unit. The new active on-demand coupling has design improvement changes over the previous generation 3 coupling which give the following advantages:

- Reduced base torque at high differential speed
- Torque activation independent of differential speed
- Accurate torque limiter
- Energy stored in accumulator
- Lower max current consumption
- Faster response.

DIFFERENTIAL

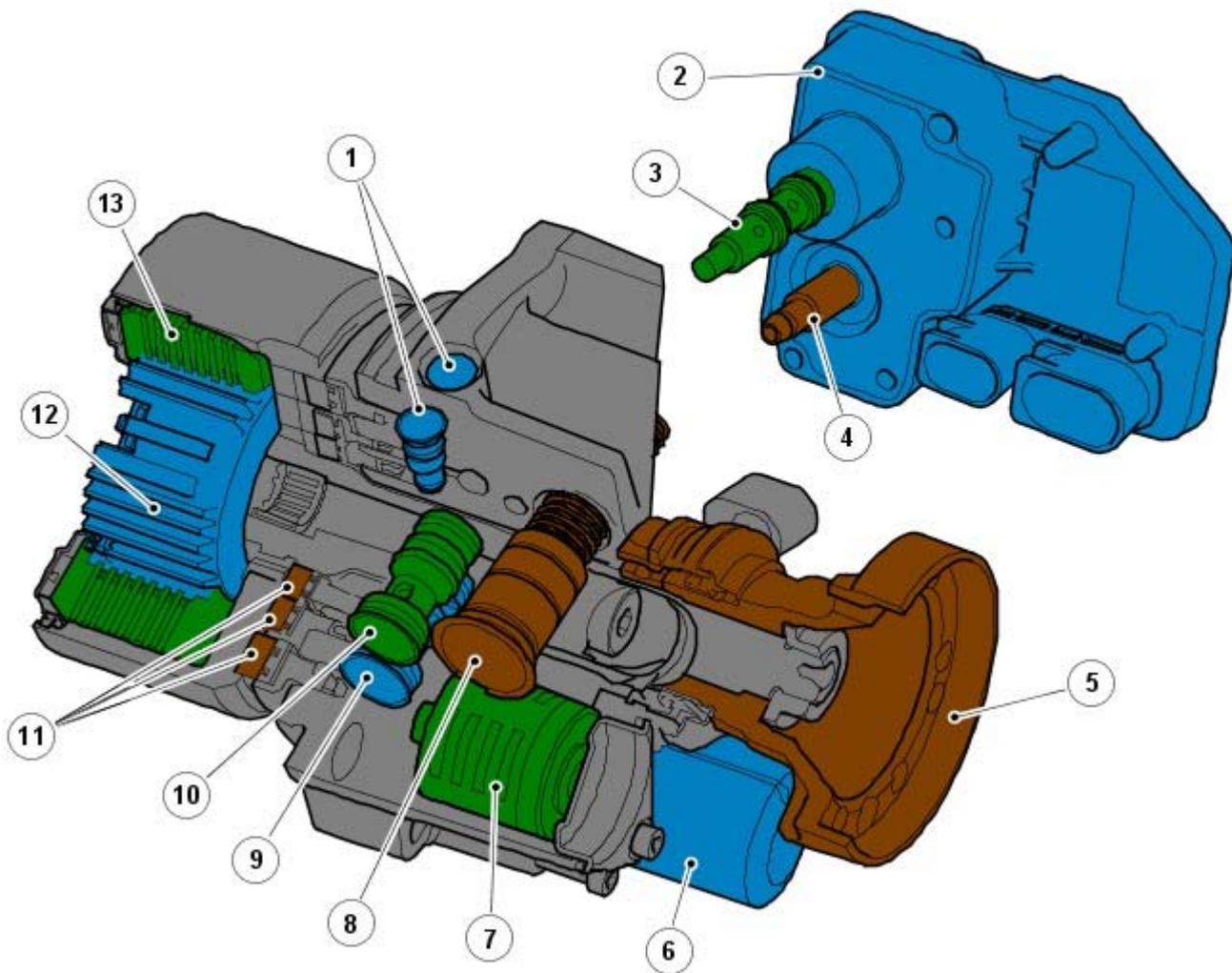
The differential unit is a low-offset-hypoid spiral-bevel design, based on a 167mm crown wheel geared to deliver a ratio of 2.58:1. The design of the differential gears and the 4 mountings that control the torque reaction of the unit within the rear subframe, provide a differential unit of excellent efficiency and refinement.

The torque delivered to the differential is controlled by the active on-demand coupling, mounted into the void at the front of the differential's cast-aluminum casing, which also provides the oil reservoir for the coupling.

ACTIVE ON-DEMAND COUPLING

Active On-demand Coupling

NOTE: [Generation 3 coupling shown.](#)



E79431

Item	Description
1	Check valves - exhaust side
2	Active on-demand coupling module
3	Control valve / axial solenoid
4	Oil pressure and temperature sensor
5	Input shaft
6	Electric hydraulic pump
7	Oil filter
8	Accumulator
9	Check valve - intake side
10	Combined check and by-pass valve
11	Ring shaped annular piston
12	Inner connection hub with splines for outer hub.
13	Inner and outer wet clutch plates

The active on-demand coupling provides the benefits of a permanent 4x4 system with the efficiency and economical benefits of a part-time system. Located between the differential and driveshaft, the coupling is a self-contained unit combining mechanical, hydraulic and electronic functions to distribute drive between the front and rear axles with transparent automatic control.

The active on-demand coupling provides the following functions:

- Electronic management of torque transfer.
- Rapid engagement in response to traction demands.
- Rapid disengagement to ensure its operation cannot corrupt wheel speed signals and compromise stability control system operation; this is especially important on very low friction surfaces.
- Pre-engagement from rest to minimize the risk of wheel-spin.
- No opposing forces when maneuvering or parking the vehicle.
- Not sensitive to brake testing on a chassis dynamometer.

Generation 4 Active On-Demand Coupling - Vehicles from 2009MY

- The generation 4 coupling does not have the differential speed driven pump used on the previous generation 3 coupling, but is fitted with a bigger capacity electrically operated axial pump and a high pressure accumulator.
- The proportional throttle valve and pressure sensor on the generation 3 coupling is replaced with a proportional pressure reducing valve.
- The torque limiter pressure reducing valve on the generation 3 coupling is replaced by an electronic control valve and controlling software.

The generation 4 active on-demand coupling gives the following improvements over the previous generation 3 coupling:

- Reduced base torque at high differential speeds
- Torque activation is now independent of differential speed
- Accurate torque limiter control
- Energy stored in high pressure accumulator giving a low maximum current consumption of the electric pump and faster response.

Control Module - Generation 3 and 4 Couplings

The control module, attached to the casing of the active on-demand coupling, forms a single unit with the control valve/axial solenoid. By analyzing information from other vehicle modules and sensors the control module regulates the axial solenoid to control the hydraulic fluid pressure supplied to the clutch plates. Some of the modules and sensors the control module communicates with are listed below:

- Hardwired:
- Control valve / axial solenoid
- Electric hydraulic pump
- Oil pressure and temperature sensor
- High speed CAN (controller area network):
- Engine control module
- Anti-lock brake system / traction control module
- Traction response switch
- Yaw rate sensor
- Steering wheel rotation sensor

The axial solenoid constantly adjusts the control valve output using a Pulse Width Modulation (PWM) signal. The fluid pressure delivered to the clutch plates determines the amount of torque that is delivered to the rear axle.

The active on-demand coupling has integrated oil pressure and temperature sensors to enable the control module to accurately manage the torque transfer under all environmental and operating conditions. Using these signals the control module will use strategies to protect the coupling from overheating; in extreme cases to protect the coupling from damage the coupling will disengage if the temperature of the hydraulic fluid exceeds 105°C. The coupling will return to normal functionality when the temperature falls below 101°C.

The control module has an integrated diagnostics system, which constantly monitors the active on-demand coupling system as well as its input and output signals. If the control module detects a fault a Diagnostic Trouble Code (DTC) is stored. The DTC is accessed using the Land Rover approved diagnostic system.

Electric Hydraulic Pump

When negotiating very low friction surfaces such as wet grass, snow or ice; initial wheel-spin can cut into the surface and reduce grip. With a re-active on-demand coupling, almost 60 degrees of wheel rotation would occur before torque could be transmitted through the coupling.

On Generation 3 couplings, to counteract this Land Rover developed a unique high-pressure pre-charge facility which energizes the hydraulic circuit as soon as the engine is started. Essentially an electrically operated hydraulic pump was designed to maintain a potential of 500 Nm (369 lb ft) of torque pressure within the coupling. (This pre-charge torque capacity has been increased to 1500Nm (1106 lb ft) for the Generation 4 coupling.)

Vehicles fitted with Terrain Response also add further benefits by varying the level of pre-charge to deliver optimum traction over a range of different terrain surfaces. The level of pre-charge is varied depending on the particular terrain response mode, for example:

- Terrain response in 'Special Programs Off' mode as common with vehicles without terrain response, the coupling is programmed to transmit 500 Nm 369 lb ft of torque on Generation 3 couplings and 1500 Nm (1106 lb ft) of torque on Generation 4 couplings to the rear axle when the vehicle moves from rest in a straight line. This strategy minimizes

traction loss from a standing-start regardless of the terrain. When the vehicle accelerates the pressure in the coupling is decreased to improve fuel economy.

- The ability to sense the steering angle allows the coupling to be programmed to provide no torque transfer through the coupling. This prevents the coupling locking when the vehicle is maneuvering at low speeds and acute steering angles.
- In 'Grass / Gravel / Snow' mode the coupling is programmed to maintain its pre-charge state until much higher speeds are obtained. The same applies even if the vehicle is traveling at low speeds and acute steering angles, as traction takes precedence over coupling lock-up on low-friction surfaces.

For additional information, refer to: Ride and Handling Optimization (204-06 Ride and Handling Optimization, Description and Operation).

Mechanical Hydraulic Pump - Generation 3 Couplings - Vehicles up to 2009MY

The driveshaft is attached to the coupling's front clutch plate assembly (input), with the rear clutch plate assembly connected to the differential pinion (output). A swash-plate with 6 hydraulic rollers is also attached to the differential pinion. When there is no speed difference between the coupling's input and output, the rollers do not function.

However, when the front and rear axles start to rotate at different speeds, the swash-plate rotates relative to the rollers which generates the hydraulic pressure. This pressure is used to force the opposing clutch plates together, increasing the transmission of torque to the rear axle. As the difference in axle speed increases the hydraulic pressure pushes the clutch plates further together to increase the torque to the rear axle.

A control valve/axial solenoid controls the amount of pressure applied to the clutch plates, and hence the amount of torque transmitted to the rear wheels. Close manufacturing tolerances and exceptionally low component wear ensure torque control remains accurate throughout the vehicle's life.

Mechanical Hydraulic Pump - Generation 4 Couplings - Vehicles from 2009MY

The Generation 4 coupling does not use the swash plate to mechanically raise hydraulic pressure; instead, a new hydraulic pump is used to generate hydraulic pressure and force the clutch plates together. The removal of the swash plate allows a larger overall clutch plate surface area, which in turn reduces the hydraulic pressure requirement. The pressure required to achieve 1500Nm (1106 lb ft) has been reduced from 100 Bar for Generation 3 couplings to 40 Bar for Generation 4 couplings.

The positioning of the Generation 4 coupling's input and output remains the same as the Generation 3 coupling, as described above.

By-pass Valve

On very low friction surfaces, driveline drag torque can occur, for example:

- reverse torque from engine braking, or
- forced movement of the driveshaft by the front wheels.

This can influence rear wheel speed, making it impossible to determine the true friction capability of the rear wheels, by distorting the wheel speed signal. To prevent this, the active on-demand coupling is designed to open immediately in response to a stability control event. This is achieved by a by-pass valve instantly reducing system pressure to nominal.

To balance the 4 bar base pressure (see below for details), the Generation 3 coupling uses a large Belleville spring to force the clutch plates clear of each other to prevent torque transmission through the coupling. Even at 0°C, torque transmission is reduced from 300 Nm to Zero within 10 ms. The Generation 4 coupling however, does not require a Belleville spring to separate the plates as the coupling does not have a significant base pressure pushing the plates together.

Accumulator

The further the clutch plates have to move in order to contact each other, the longer it takes to displace the hydraulic fluid necessary to build pressure and transmit torque. To counter this, the Generation 3 coupling incorporates an accumulator. This retains a nominal 4 bar pressure within the hydraulic circuit. Although this is not enough pressure to cause significant torque transmission through the coupling, it forces the plates very close together so that very little fluid displacement is required to achieve full engagement and maximum torque transfer. Full torque transmission can be achieved in 150 ms.

On Generation 4 couplings, the 150ms activation time is achieved through the use of a Belleville spring that acts to push the plates together (without causing significant torque transmission through the coupling). As the pump is not continuously used to create this base pressure (as it was with Generation 3 coupling), improvements in fuel economy have been achieved.

Wet Clutch Pack

The clutch pack is made up of 7 pairs of plates; the inner discs are produced from hardened steel with the outer discs manufactured from steel with a sintered face. The clutch plates operate in transmission fluid.

Torque transmission across the clutch pack is limited to 1500 Nm (1106 lb ft). This ensures the lower gears retain an element of front-wheel-drive for traction stability. Within the higher gears the coupling is theoretically capable of transmitting all the drive to the rear axle; although conditions would have to be extreme for this to occur.

PRINCIPLES OF OPERATION

Generation 3 Couplings - up to 2009MY

An internal electronically-controlled pump provides hydraulic pre-charge pressure within the coupling. The pre-charge pressure supplies the required operating pressure to the clutch plates to eliminate initial wheel-spin as the vehicle accelerates from standstill.

In conjunction with the pre-charge pressure a mechanical hydraulic pump operates within the clutch plates to supply the coupling's main hydraulic operating pressure. The mechanical pump is functioned by the 'input' and 'output' of the coupling:

- input - driveshaft connection from the front axle,
- output - differential connection to the rear axle.

Any speed difference between the front and rear axles will start the operation of the mechanical hydraulic pump. The amount of hydraulic pressure applied to the clutch pack by the pump determines the gap between the clutch plates. For example, the greater the hydraulic pressure, the smaller the gap between the plates and subsequently the greater the torque transmitted through the coupling from the front axle to the rear axle.

This main hydraulic pressure is designed to transmit the torque for traction demands of off-road driving, and to provide lock-up as required.

Generation 4 Couplings - from 2009MY

The Generation 4 coupling still uses an electrically-controlled pump to provide hydraulic pre-charge to eliminate wheel-spin from standstill; however, the same pump is also used to provide the coupling's main hydraulic operating pressure.

The principles of transmitting torque through the clutch plates remains the same, as described above for the Generation 3 coupling.

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Rear Drive Axle/Differential - Rear Drive Axle and Differential

Diagnosis and Testing

For additional information.

REFER to: [Driveline System](#) (205-00 Driveline System - General Information, Diagnosis and Testing).

Rear Drive Axle/Differential - Differential Draining and Filling

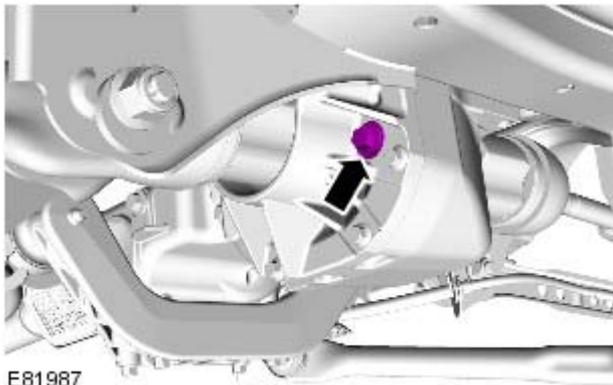
General Procedures

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



- CAUTION:** Make sure the vehicle is on a flat level surface.

Raise and support the vehicle.



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2. No provision is made to fully drain the rear differential. During repair procedures, fluid will be lost. A container should be positioned to collect any spillage.

3. Make sure the vehicle is level. Remove the rear differential filler plug and discard the sealing washer.
4. Fill the rear differential, until a thin thread of fluid runs from the filler hole.

Refer to: [Specifications](#) (205-02 Rear Drive Axle/Differential, Specifications).

5. Using a new washer, install the drain plug.

Torque: 35 Nm

6. Lower the vehicle.

Rear Drive Axle/Differential - Active On-Demand Coupling Filling

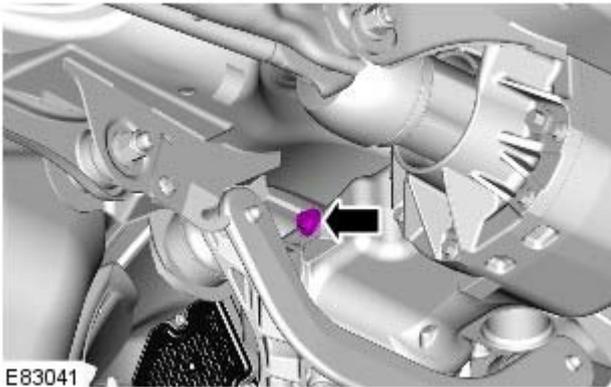
General Procedures

NOTE: If installing a new active on-demand coupling, fill with 650 ml of fluid. It is not possible to completely drain the active on-demand coupling fluid during service. The procedure below **MUST** be followed for both filling and topping up.

1.  **CAUTION:** Make sure the vehicle is on a flat level surface.

Raise and support the vehicle.

2. No provision is made to fully drain the active on-demand coupling. During repair procedures, fluid will be lost. A container should be positioned to collect any spillage.



3.  **CAUTION:** This is a filler plug only and must not be used as a fluid level indicator.

Make sure the vehicle is level. Remove the filler plug and discard the sealing washer.

4. Fill the active on-demand coupling, until a thin thread of fluid runs from the filler hole.

Refer to: [Specifications](#) (205-02 Rear Drive Axle/Differential, Specifications).

5. Install the active on-demand fluid filler plug.
6. Turn the ignition on for 5 minutes.
7. Turn the ignition off and remove the remote handset.
8. Fill the active on-demand coupling, until a thin thread of fluid runs from the filler hole.

9.  **CAUTION:** This is a filler plug only and must not be used as a fluid level indicator.

Using a syringe, remove exactly 70 ml of fluid.

10.  **CAUTION:** Replace the washer.

Install and tighten the filler plug.

Torque: 35 Nm

Rear Drive Axle/Differential - Active On-Demand Coupling

Removal and Installation

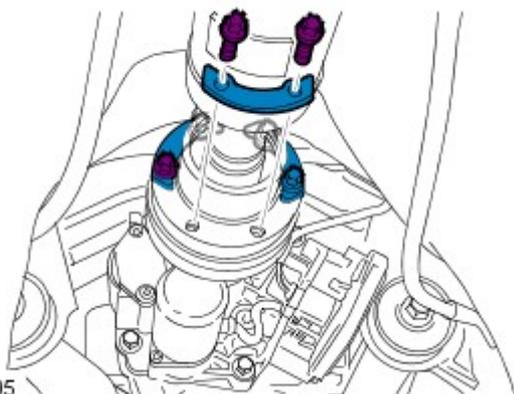
Removal

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

Raise the vehicle on a lift.

2. Remove the exhaust system.

Refer to: [Exhaust System](#) (309-00B Exhaust System - TD4 2.2L Diesel, Removal and Installation).



3.  **WARNING:** Do not lever the driveshaft joints to release from the power transfer unit or the rear differential flanges.

CAUTIONS:

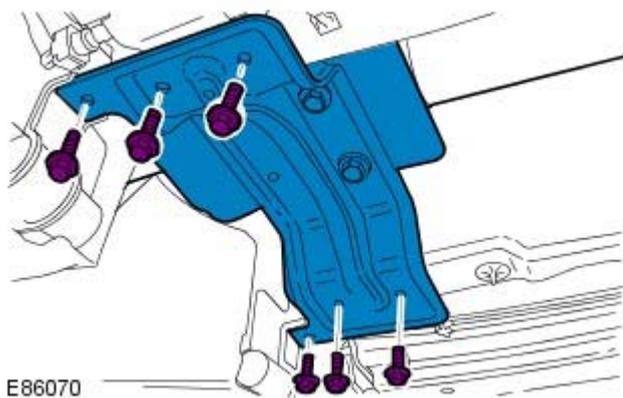


Mark the components to aid installation.

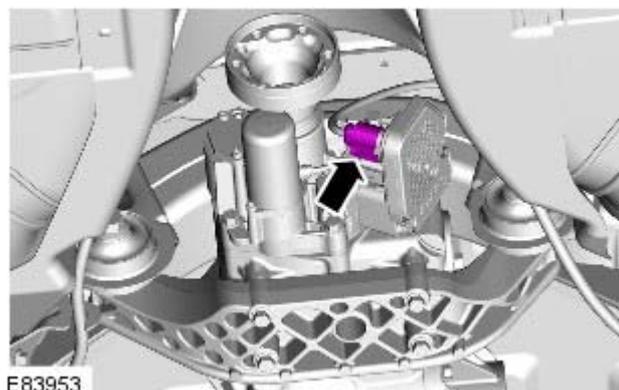


Make sure that the driveshaft is supported with suitable retaining straps.

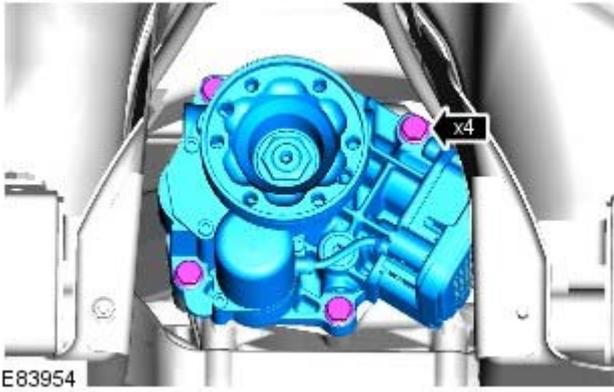
- Discard the bolts.



- 4.



- 5.



6.
 - Position a container to collect the oil spillage.
 - Discard the O-ring seal.

Installation

1. Lubricate and install a new O-ring seal.

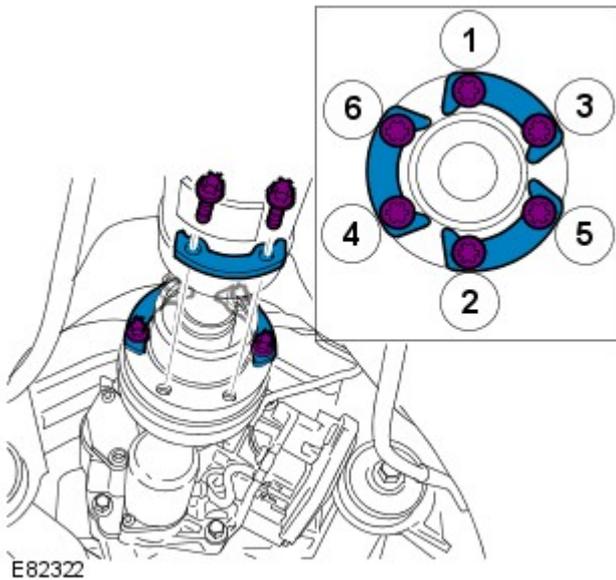
Refer to: [Specifications](#) (205-02 Rear Drive Axle/Differential, Specifications).

2.  **CAUTION:** Make sure that the area around the component is clean and free of foreign material.

Install the active on-demand coupling.

Torque: 24 Nm

3. Connect the electrical connector.



4.  **CAUTION:** Make sure that new bolts are installed.

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

Install the driveshaft to the active on-demand coupling.

Torque: 40 Nm

5. Install the driveshaft rear support bracket.

Torque: 35 Nm

6. Check and top up the active on-demand coupling fluid level.

Refer to: [Active On-Demand Coupling Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).
 Refer to: [Exhaust System](#) (309-00B Exhaust System - PD4 2.2L Diesel, Removal and Installation).

Rear Drive Axle/Differential - Active On-Demand Coupling Module

Removal and Installation

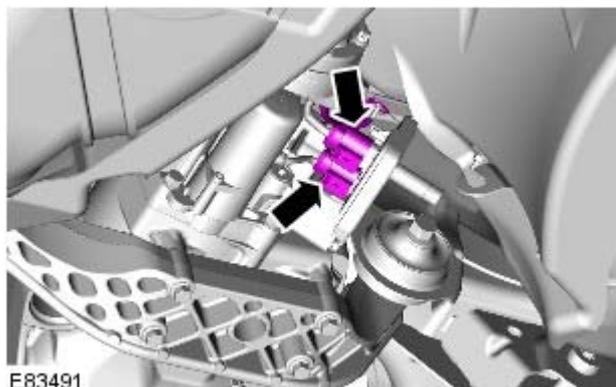
Removal

NOTE: If installing a new active on-demand coupling module the sensor and throttle valve must also be installed.

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

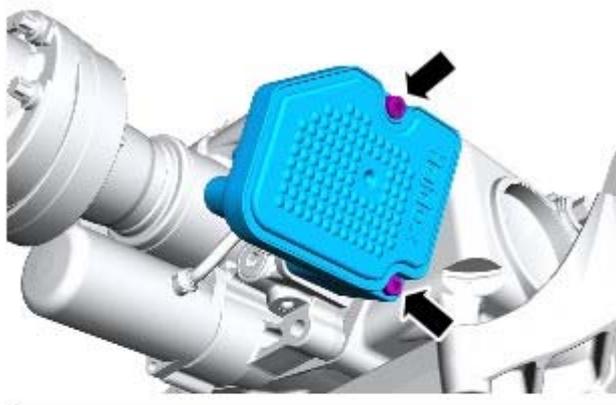
Raise the vehicle on a lift.

2. Disconnect the electrical connectors.



3.  **CAUTION:** Make sure that the area around the component is clean and free of foreign material.

- Position a container to collect the fluid spillage.
- Remove and discard the gasket.





4.
 - Using a suitable tool, remove the throttle valve.



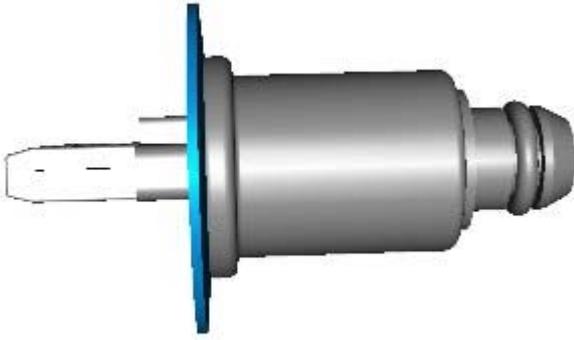
5.
 - Using a suitable tool, remove the active on demand coupling sensor.

Installation

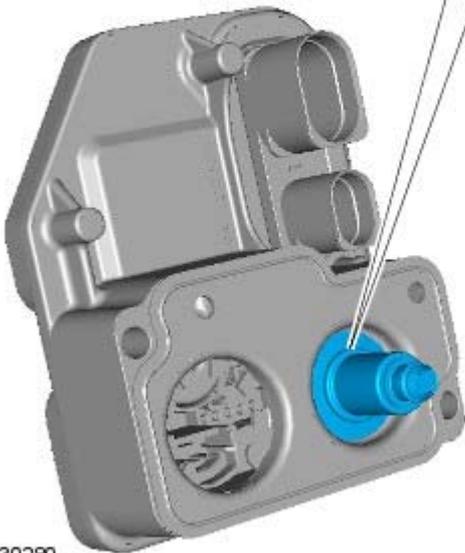
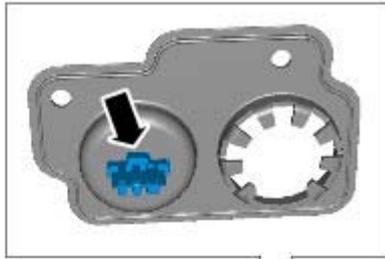


1. Install the new gasket.

2. Install the cupped washer to the sensor with the convex side against the sensor.



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E130280

3. CAUTIONS:

 The throttle valve and sensor must be installed to the active on-demand coupling module before the assembly is installed to the active on-demand coupling. Failure to follow this instruction may result in damage to the vehicle.

 Make sure the component is aligned as shown.

Install the sensor and washer assembly.

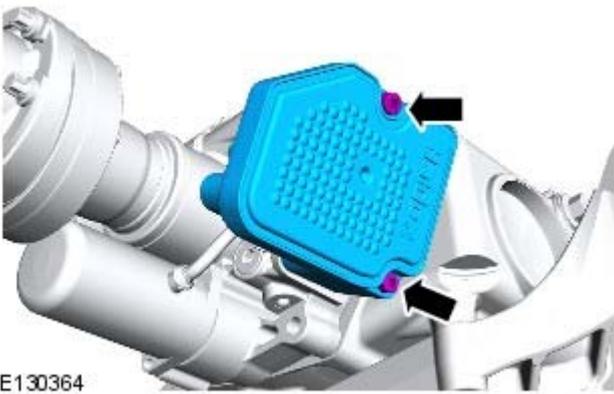
4. Install the new throttle valve.



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5. **NOTE:** Lubricate the O-ring seal.
Install the active on-demand coupling module.

Torque: 6 Nm



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6. Connect the electrical connectors.

Rear Drive Axle/Differential - Active On-Demand Coupling Oil Pump

Removal and Installation

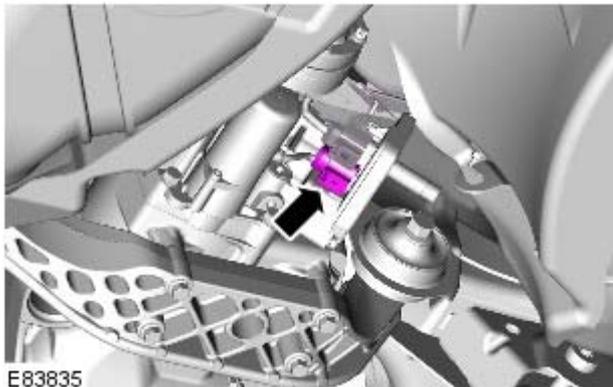
Removal

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

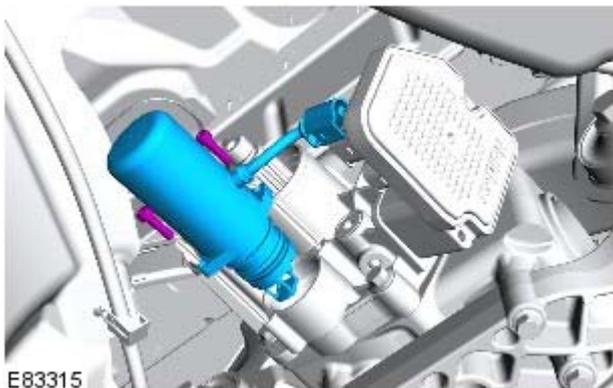
Raise the vehicle on the lift.

2. Remove the drive pinion flange.

Refer to: [Drive Pinion Flange](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).



3.



4. **CAUTIONS:**

 Be prepared to collect escaping oil.

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

- Discard the O-ring seals.

Installation

1.  **CAUTION:** Only use the specified material to lubricate the seals.

Lubricate the O-ring seals.

Refer to: [Specifications](#) (205-02 Rear Drive Axle/Differential, Specifications).

2. Install the new O-ring seals.

3.  **CAUTION:** Make sure that the area around the component is clean and free of foreign material.

Install the oil pump.

Torque: 6 Nm

4. Connect the electrical connector.

5. Install the drive flange.

Refer to: [Drive Pinion Flange](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

6. Check and top-up the active on-demand coupling fluid level.

Refer to: [Active On-Demand Coupling Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).

Rear Drive Axle/Differential - Active On-Demand Coupling Drive Pinion Seal

Removal and Installation

Special Tool(s)

 <p>100-012</p> <p>E54135</p>	<p>100-012 Slide Hammer</p>
 <p>205-862-1</p> <p>E85136</p>	<p>205-862-1 Installer, Active On-demand Pinion Seal</p>
 <p>308-529</p> <p>E85137</p>	<p>308-529 Remover, Seals</p>

Removal

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

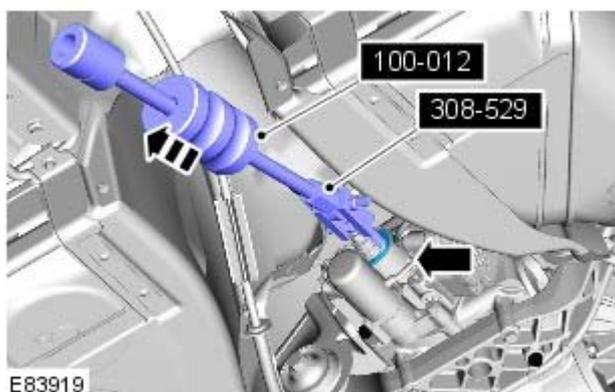
Raise the vehicle on the lift.

2. Remove the differential drive flange.

Refer to: [Drive Pinion Flange](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

3. Carefully remove and discard the pinion oil seal.

Special Tool(s): [308-529](#), [100-012](#)

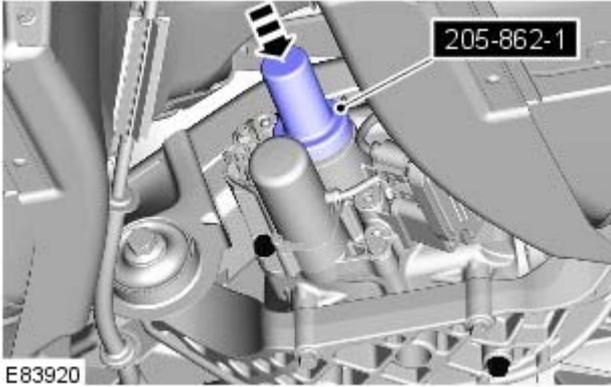


Installation

1.  CAUTION: Only use the specified material to lubricate the seals.

Lubricate the oil seal.

Refer to: [Specifications](#) (205-02 Rear Drive Axle/Differential, Specifications).



2.
 - Using the special tool, install a new oil seal.
 - *Special Tool(s):* [205-862-1](#)
 - Tap in the seal until the head of the drift is against the active on-demand coupling housing.

3. Install the differential drive flange.

Refer to: [Drive Pinion Flange](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

4. Install the exhaust system.

Refer to: [Exhaust System](#) (309-00B Exhaust System - TD4 2.2L Diesel, Removal and Installation).

Rear Drive Axle/Differential - Differential Case

Removal and Installation

Removal

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

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

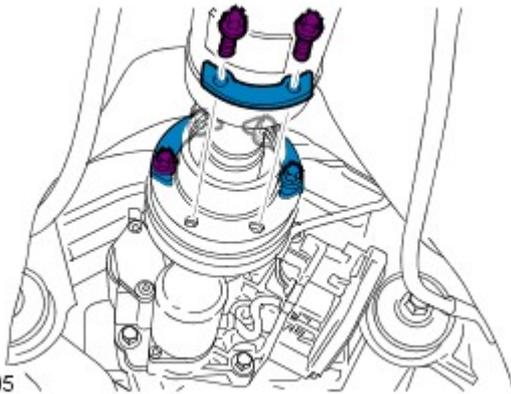
Raise and support the vehicle.

2. Remove the LH rear wheel and tire.

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

3. With assistance, remove the rear muffler.

Refer to: [Exhaust System](#) (309-00A Exhaust System - I6 3.2L Petrol, Removal and Installation).



4.  **WARNING:** Do not lever the driveshaft joints to release from the power transfer unit or the rear differential flanges.

CAUTIONS:



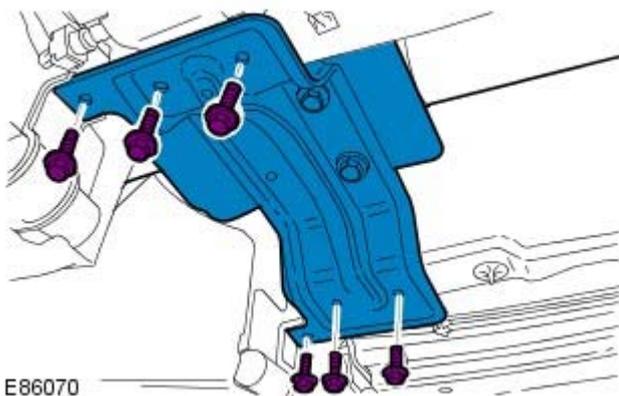
Mark the components to aid installation.

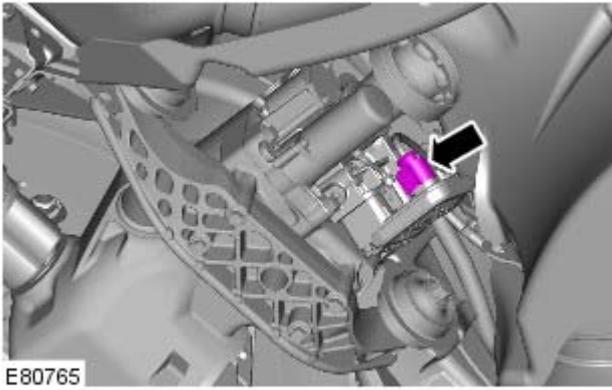


Make sure that the driveshaft is supported with suitable retaining straps.

- Discard the bolts.

- 5.



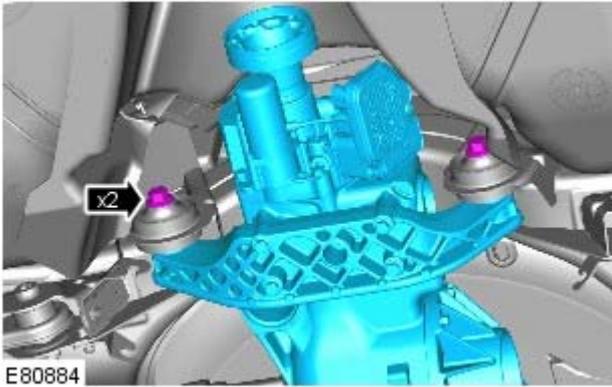


6.

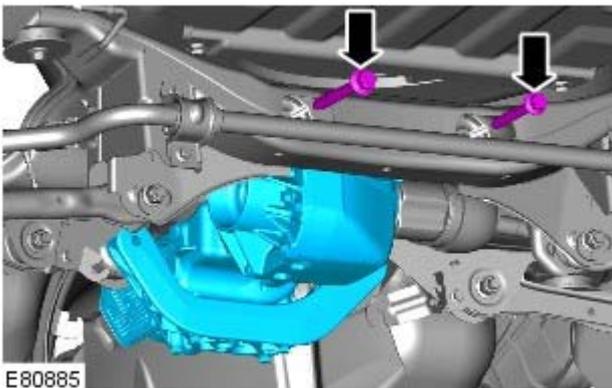
7. Remove the LH rear halfshaft.

Refer to: [Rear Halfshaft LH](#) (205-05 Rear Drive Halfshafts, Removal and Installation).

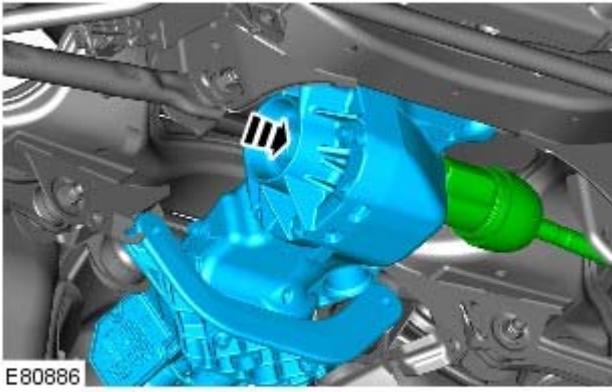
8. Using a transmission jack, support the differential case.



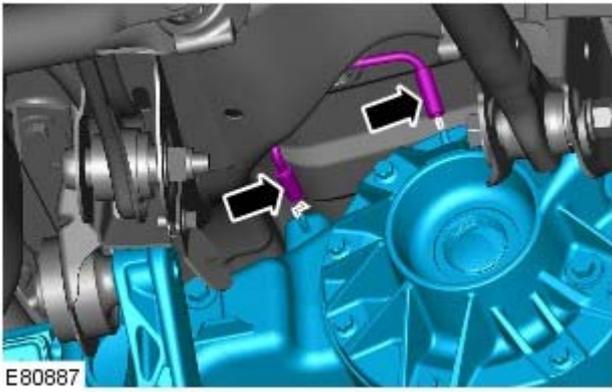
9.  **CAUTION:** Mark the components to aid installation.
- Discard the bolts.



10.  **CAUTION:** Mark the components to aid installation.
- Discard the bolts.



11. Carefully release the RH inboard halfshaft joint from the differential and tie aside.



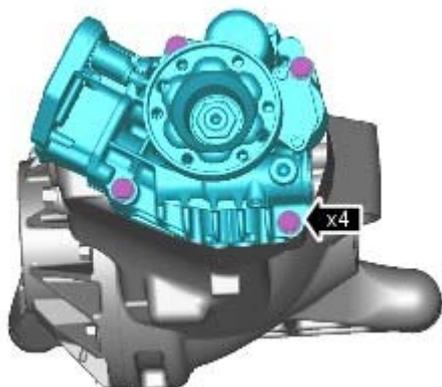
12.

13. Carefully lower and remove the differential case.



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

15.



E80889

Installation

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

Install a new O-ring seal to the active on-demand coupling.

2. CAUTIONS:



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



Make sure that new bolts are installed.

Align the active on-demand coupling to the differential and tighten the bolts.

Torque: 24 Nm

3. Install the rear differential support bracket.

Torque: 35 Nm

4. Using a transmission jack, carefully raise the assembly.

5. Connect the differential breather lines.

6. Secure the RH inner halfshaft joint to the differential.

7. CAUTIONS:



Make sure that the installation marks are aligned.



Make sure that new bolts are installed.

Install the rear differential front bush retaining bolts.

Torque: 175 Nm

8. CAUTIONS:



Make sure that the installation marks are aligned.

 Make sure that new bolts are installed.

Install the rear differential rear bush retaining bolts.

Torque: 110 Nm

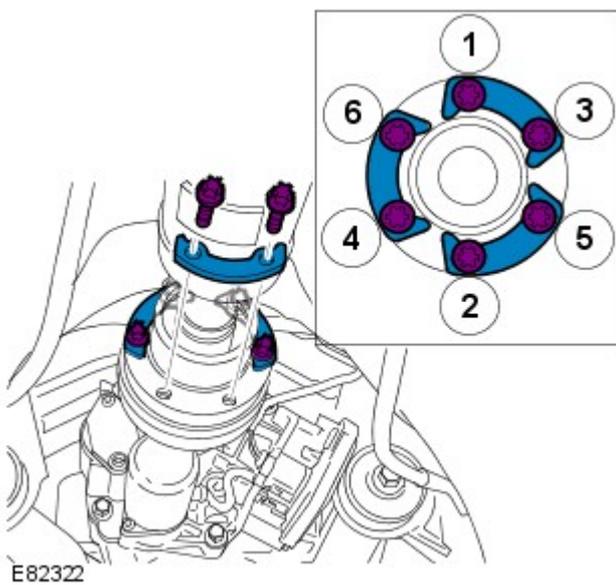
9. Install the LH halfshaft.

Refer to: [Rear Halfshaft LH](#) (205-05 Rear Drive Halfshafts, Removal and Installation).

10. Connect the Active On-demand Coupling module electrical connector.

11. Install the driveshaft rear support bracket.

Torque: 35 Nm



12.  CAUTION: Make sure that new bolts are installed.

Connect the driveshaft to the rear flange.

Torque: 40 Nm

13. Install the rear muffler.

Refer to: [Exhaust System](#) (309-00A Exhaust System - 16 3.2L Petrol, Removal and Installation).

14. Install the LH rear wheel and tire.

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

15. Check and top-up the active on-demand coupling fluid level.

Refer to: [Active On-Demand Coupling Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).

16. Fill the differential case with fluid.

Refer to: [Differential Draining and Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).

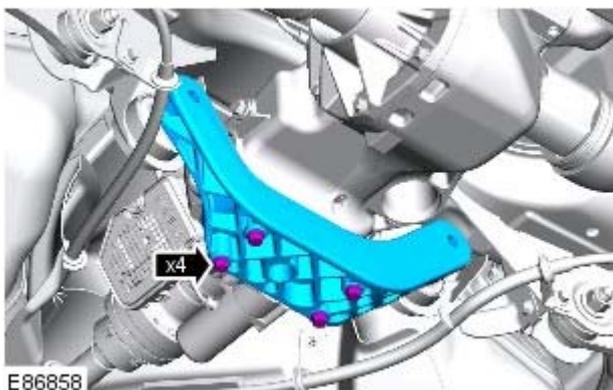
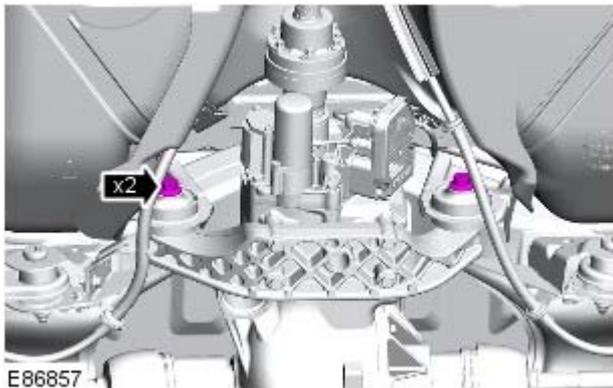
Rear Drive Axle/Differential - Differential Support Insulator

Removal and Installation

Removal

-  **WARNING:** Make sure to support the vehicle with axle stands.
 Raise and support the vehicle.
- Remove the exhaust system.

 Refer to: [Exhaust System](#) (309-00A Exhaust System - I6 3.2L Petrol, Removal and Installation).
-  **WARNING:** Make sure to support the vehicle with axle stands.
 Support the rear differential using a transmission jack.
-  **CAUTION:** Mark the components to aid installation.
 - Discard the bolts.



5.

Installation

- Install the rear differential insulator to the rear differential.

Torque: 35 Nm

- CAUTIONS:**



Make sure that new bolts are installed.



Make sure that the installation marks are aligned.

Install the rear differential front bush retaining bolts.

Torque: 175 Nm

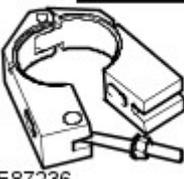
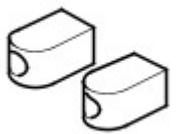
3. Install the exhaust system.

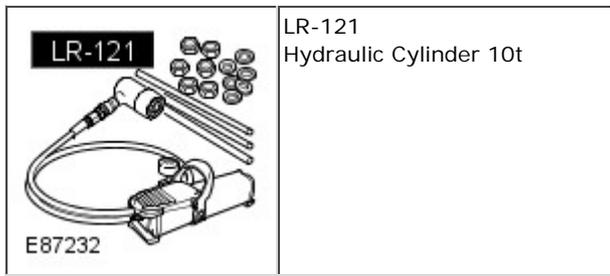
Refer to: [Exhaust System](#) (309-00A Exhaust System - I6 3.2L Petrol, Removal and Installation).

Rear Drive Axle/Differential - Differential Front Bushing

Removal and Installation

Special Tool(s)

 <p>205-860-01 E87233</p>	<p>205-860-01 Remover, Differential Bushing</p>
 <p>205-860-02 E87234</p>	<p>205-860-02 Remover, Differential Bushing</p>
 <p>205-860-03 E87235</p>	<p>205-860-03 Installer, Differential Bushing</p>
 <p>205-860-04 E87236</p>	<p>205-860-04 Installer, Differential Bushing</p>
 <p>205-860-09 E87237</p>	<p>205-860-09 Installer, Differential Bushing</p>
 <p>205-860-10 E87238</p>	<p>205-860-10 Spacer, Differential Bushing</p>

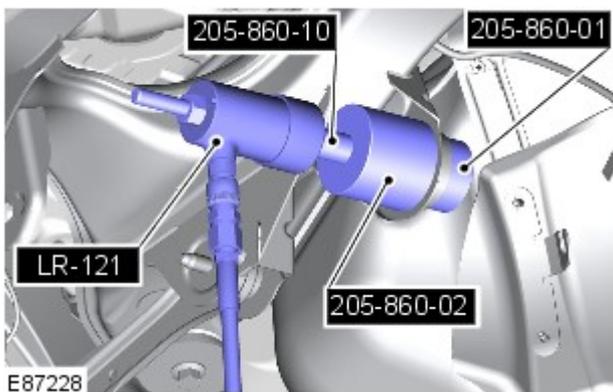


Removal

1.  **WARNING:** Make sure to support the vehicle with axle stands.
Raise and support the vehicle.
2. Remove both rear wheels and tires.

Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).
3. Remove the rear differential.

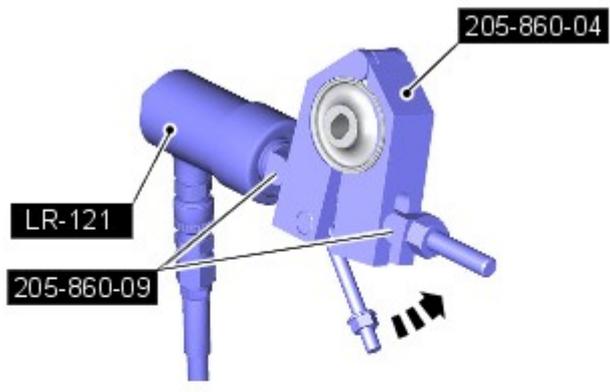
Refer to: [Differential Case](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).



4. **CAUTIONS:**
 -  Mark the components to aid installation.
 -  Note the fitted position of the component prior to removal.Using the special tools, remove the bushing.

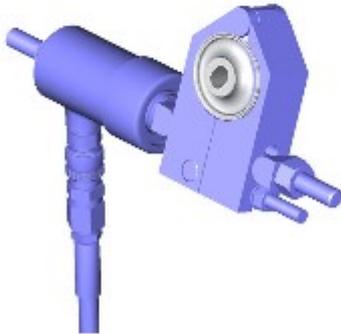
Special Tool(s): [205-860-01](#), [205-860-02](#), [205-860-10](#), [LR-121](#)

Installation

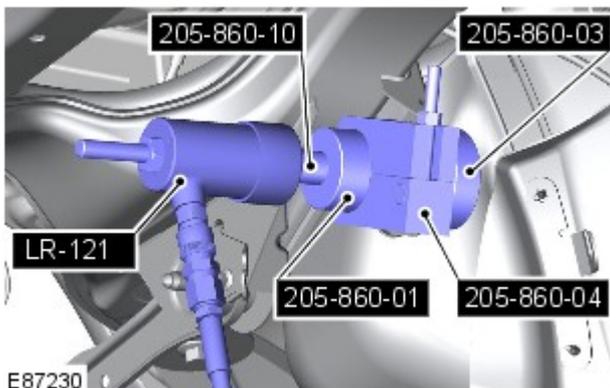


1. Using the special tool, compress the bushing.

Special Tool(s): [205-860-09](#), [205-860-04](#), [LR-121](#)



E87229



2.  **CAUTION:** Make sure the correct special tool is used to install the bushings to the correct depth.

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

Using the special tool, install the bushing.

Special Tool(s): [205-860-10](#), [205-860-01](#), [205-860-04](#), [205-860-03](#), [LR-121](#)

E87230

3. Install the rear differential.

Refer to: [Differential Case](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

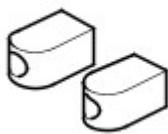
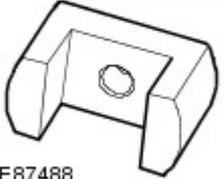
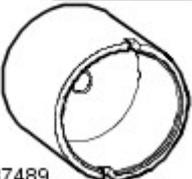
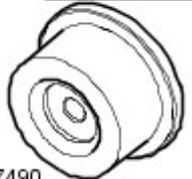
4. Install the rear wheels and tires.

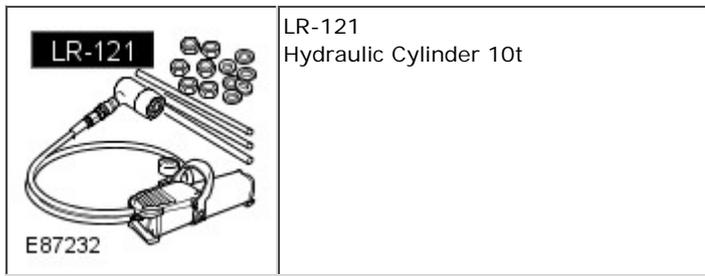
Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).

Rear Drive Axle/Differential - Differential Rear Bushing

Removal and Installation

Special Tool(s)

 <p>205-860-09</p> <p>E87237</p>	<p>205-860-09 Installer, Differential Bushing</p>
 <p>205-861-01</p> <p>E87488</p>	<p>205-861-01 Remover, Differential Bushing</p>
 <p>205-861-02</p> <p>E87489</p>	<p>205-861-02 Remover/Installer, Differential Bushing</p>
 <p>205-861-03</p> <p>E87490</p>	<p>205-861-03 Installer, Differential Bushing</p>
 <p>205-861-04</p> <p>E87491</p>	<p>205-861-04 Installer, Differential Bushing</p>
 <p>205-861-05</p> <p>E87492</p>	<p>205-861-05 Installer, Differential Bushing</p>

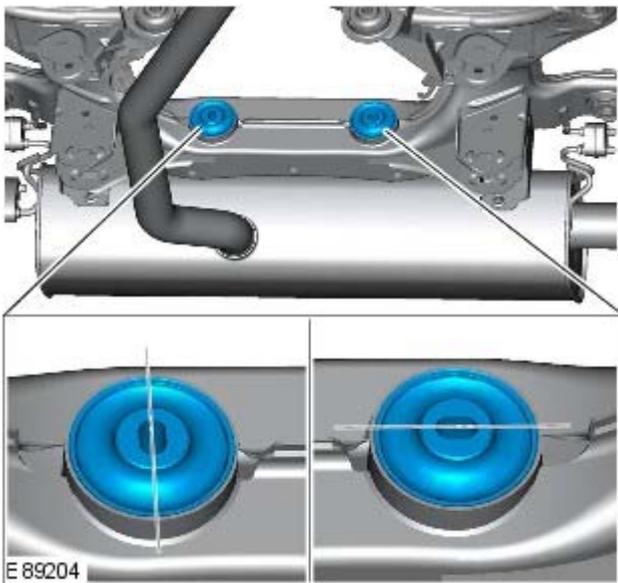


Removal

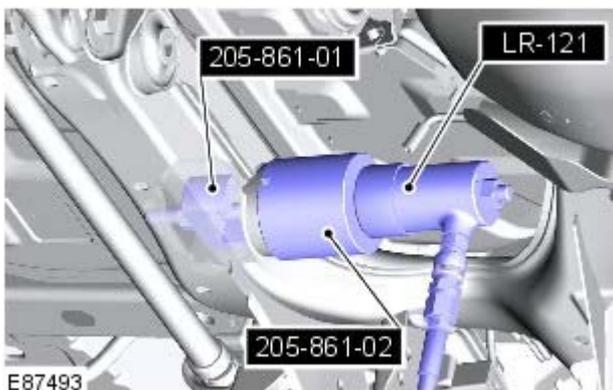
1. **WARNING:** Make sure to support the vehicle with axle stands.
Raise and support the vehicle.
2. Remove both rear wheels and tires.

Refer to: [Wheel and Tire](#) (204-04 Wheels and Tires, Removal and Installation).
3. Remove the rear differential.

Refer to: [Differential Case](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).



4. Take note of the fitted position of the rear bushings. The RH bushing slot is positioned vertically and the LH bushing slot is positioned horizontally.

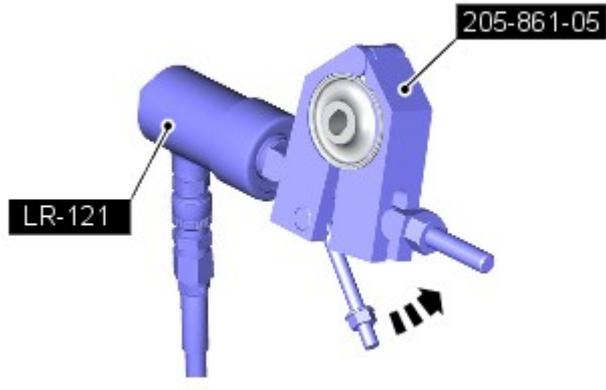


5. **CAUTION:** Note the fitted position of the component prior to removal.

Using the special tool, remove the bushing.

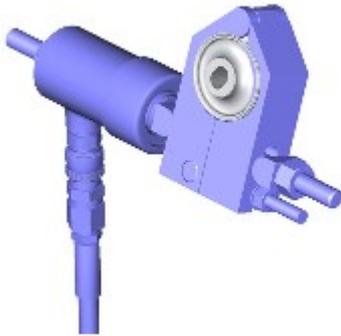
Special Tool(s): [205-861-01](#), [205-861-02](#), [LR-121](#)

Installation

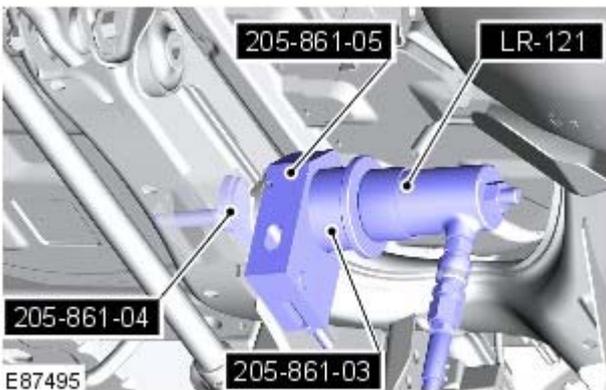


1.  **CAUTION:** Only use the specified special tool.
Using the special tool, compress the bushing.

Special Tool(s): [205-860-09](#), [205-861-05](#), [LR-121](#)



E87660



2.  **CAUTION:** Make sure the correct special tool is used to install the bushings to the correct depth.

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

Using the special tool, install the bushing, making sure the slot on the RH bushing is positioned vertically and the slot on the LH bushing is positioned horizontally.

Special Tool(s): [LR-121](#), [205-861-04](#), [205-861-03](#), [205-861-05](#)

3. Install the rear differential.

Refer to: [Differential Case](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

4. Install the rear wheels and tires.

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

Rear Drive Axle/Differential - Drive Pinion Flange

Removal and Installation

Special Tool(s)

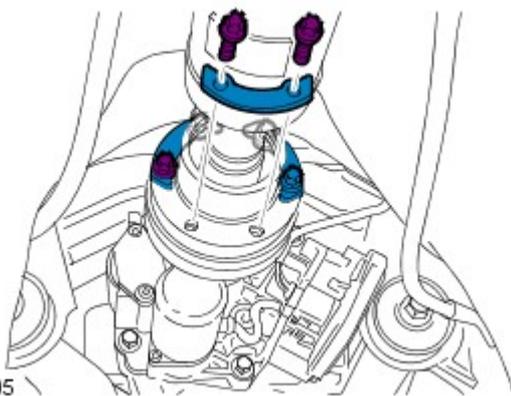
 <p>205-053 Retainer, Drive Flange</p> <p>E54574</p>	<p>205-053 Retainer, Drive Flange</p>
---	---

Removal

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

2. Remove the exhaust system.

Refer to: [Exhaust System](#) (309-00A Exhaust System - I6 3.2L Petrol, Removal and Installation).

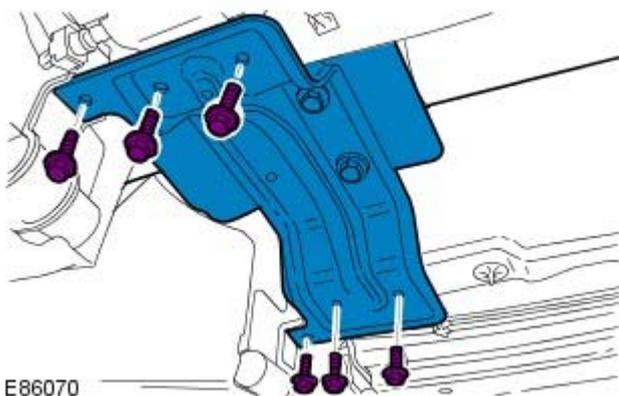


3.  **WARNING:** Do not lever the driveshaft joints to release from the power transfer unit or the rear differential flanges.

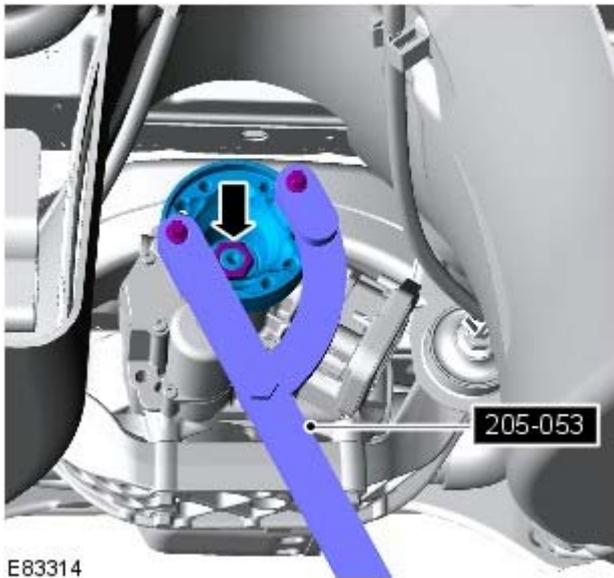


CAUTION: Mark the components to aid installation.

- Discard the bolts.



4.  **CAUTION:** Make sure that the driveshaft is supported with suitable retaining straps.



5.
 - Position a container to collect the oil spillage.
 - Using the special tool, remove the drive flange.

Special Tool(s): [205-053](#)

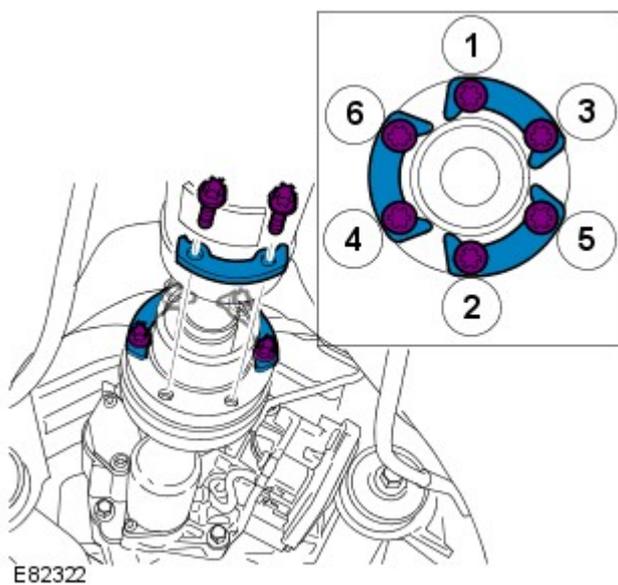
 - Discard the nut.

Installation

1.  **WARNING:** Make sure that a new nut is installed.

Using the special tool, install the drive flange.

Special Tool(s): [205-053](#)
Torque: [130 Nm](#)



2.  **CAUTION:** Make sure that new bolts are installed.

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

Install the driveshaft to the active on-demand coupling.

Torque: [40 Nm](#)

3. Install the driveshaft rear support bracket.

Torque: [35 Nm](#)

4. Check and top-up the active on-demand coupling fluid level.

Refer to: [Active On-Demand Coupling Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).

5. Install the exhaust system.

Refer to: [Exhaust System](#) (309-00A Exhaust System - I6 3.2L Petrol, Removal and Installation).

Rear Drive Axle/Differential - Drive Pinion Front Bearing

Removal and Installation

Removal

1. Raise and support the vehicle.

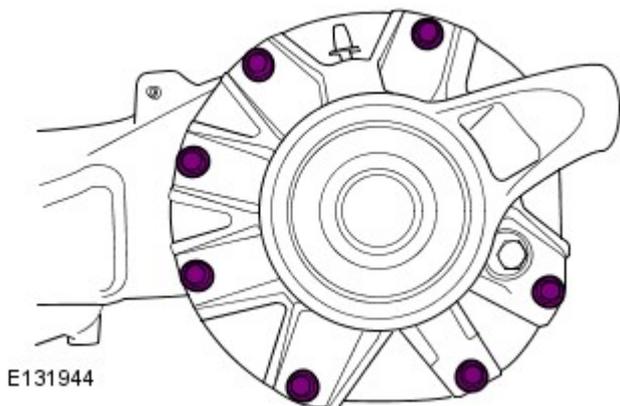
2. Drain the differential fluid.

Refer to: [Differential Draining and Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).

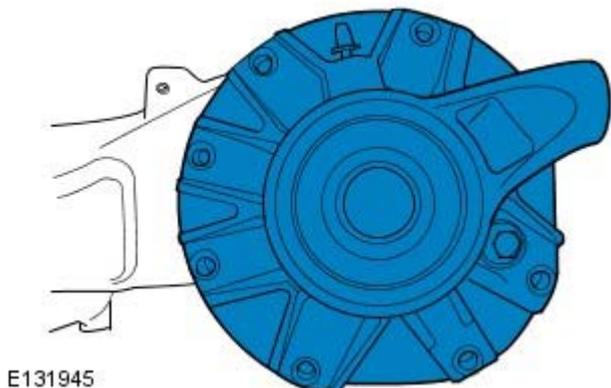
3. Remove the rear differential.

Refer to: [Differential Case](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

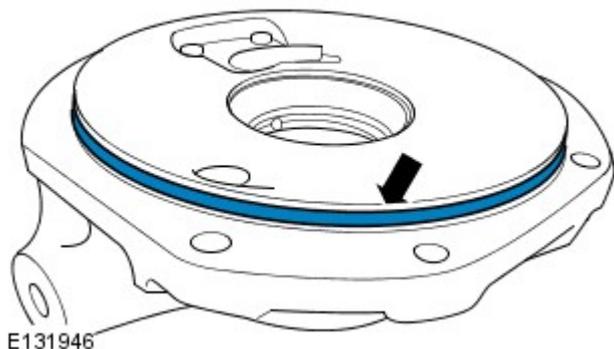
4. Remove the differential casing bolts.



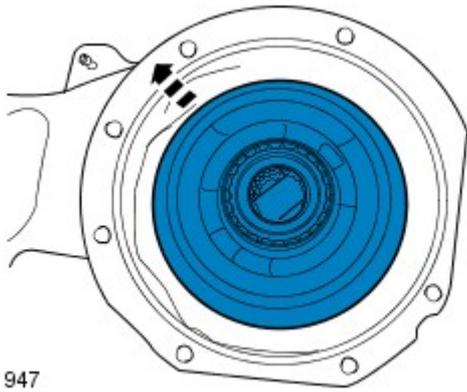
5. Remove the differential case.



6. Remove and discard the differential case seal.

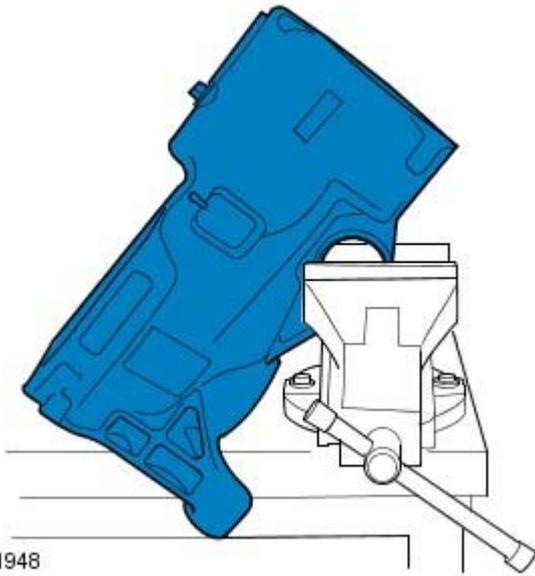


7. Remove the crown wheel assembly.



E131947

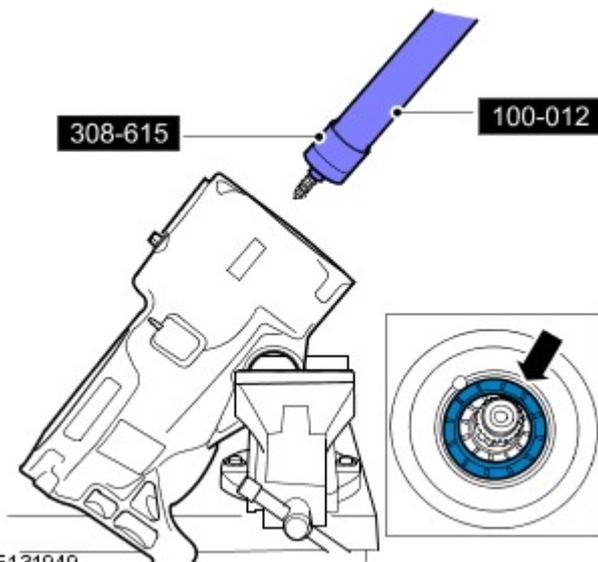
8. Position the differential assembly in a suitable vice as shown.



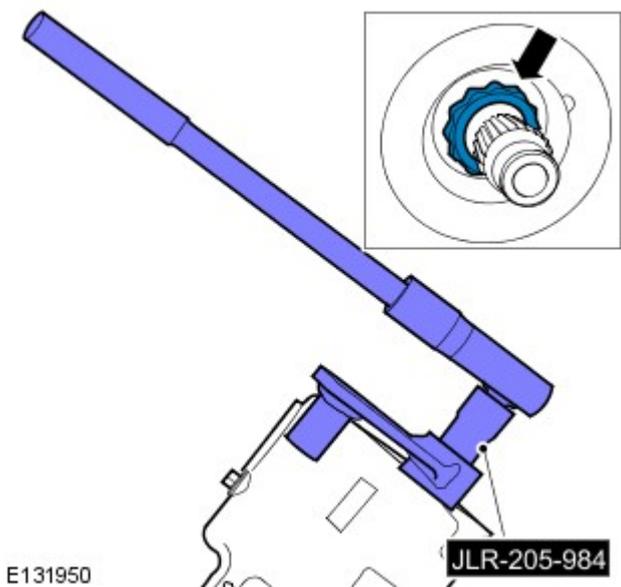
E131948

9.  **CAUTION:** Make sure the pinion seal recess is not damaged as the seal is removed.

Using the special tool remove the pinion shaft oil seal.



E131949

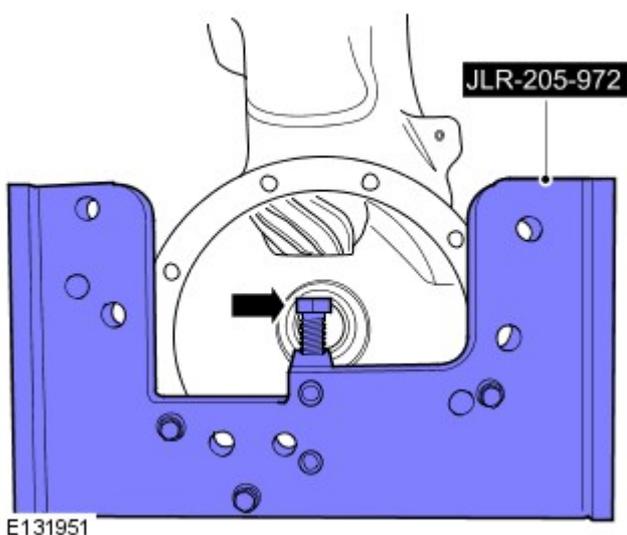


10.  **WARNING:** High torque application.

 **CAUTION:** Do not use air tools or heat to remove the nut (as this could contaminate the head bearing). Failure to follow this instruction may result in damage to the component.

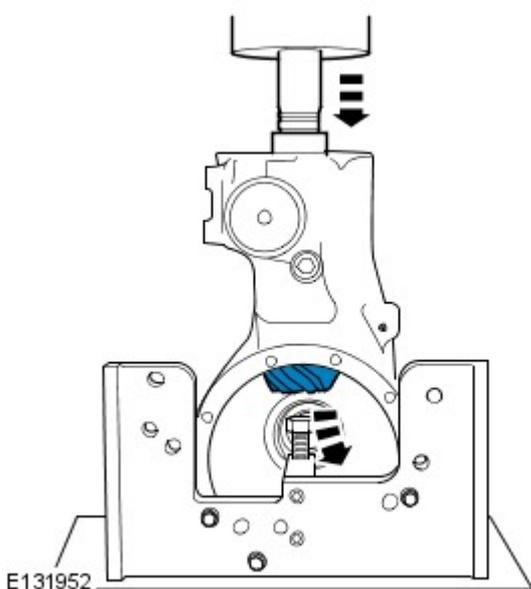
NOTE: The special tool should be turned clockwise to remove the pinion shaft nut.

Using the special tools remove the pinion shaft nut.



11.

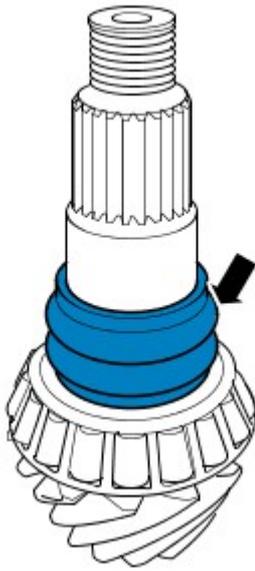
- Secure the differential casing to the special tool.
- Position the support bolt to its lowest setting.



12.  **CAUTION:** Twisting or damage to the casing may occur if the base plates to support the jig on the press are not used.

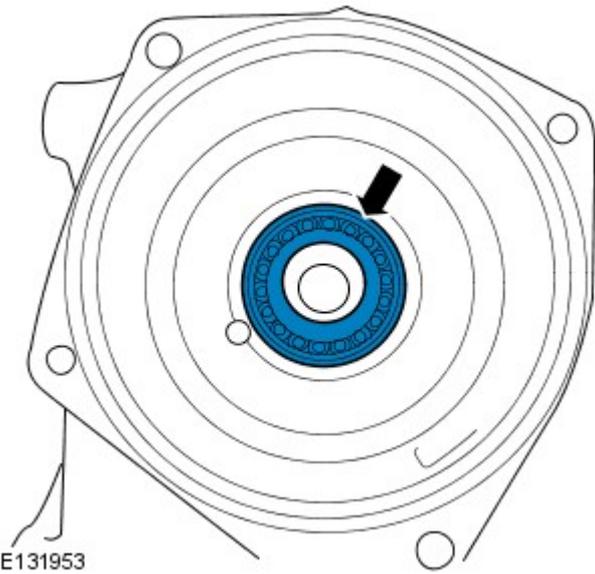
Using a suitable press remove the differential pinion shaft.

- 13. Remove and discard the pinion shaft collapsible spacer.



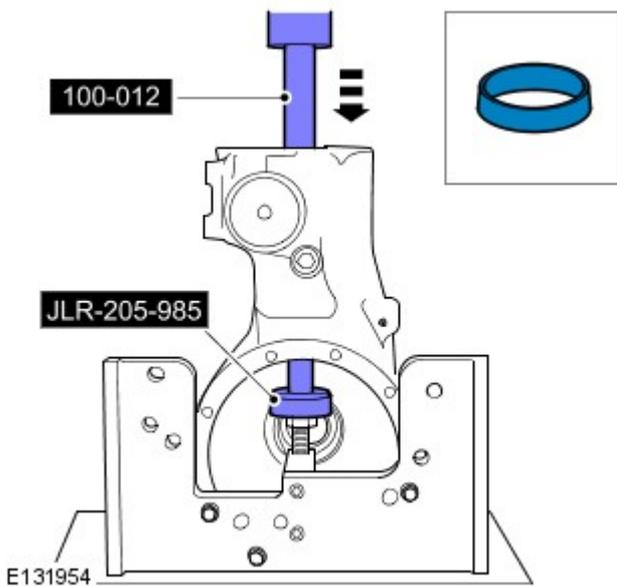
E131656

- 14. Remove the tail bearing inner race.



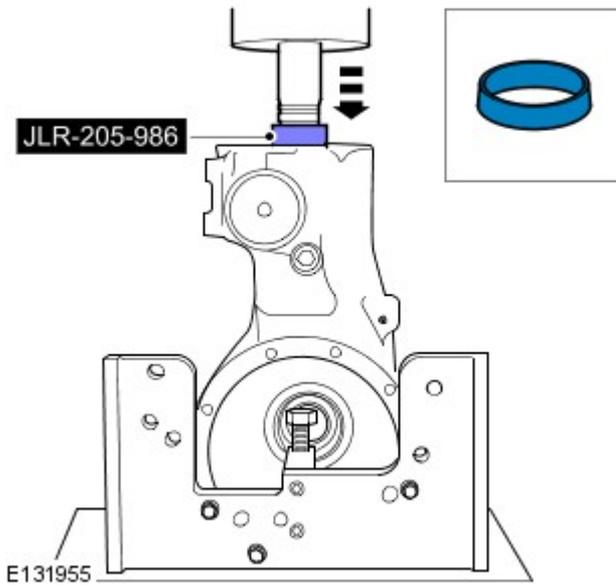
E131953

- 15. Using the special tools remove the pinion shaft tail bearing outer race.



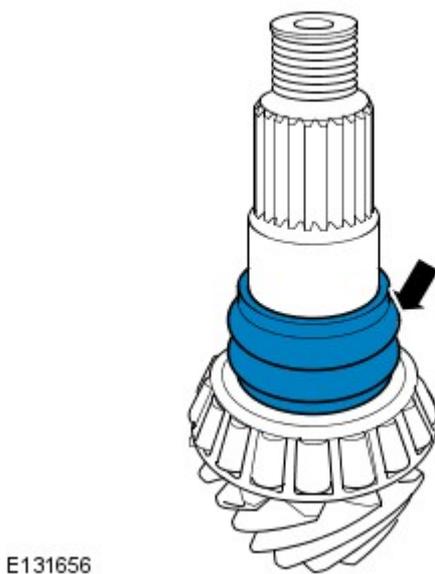
16.  CAUTION: It is essential that absolute cleanliness is observed when working on the rear differential. Always cover any open orifices using lint free non-flocking material to prevent the ingress of foreign matter. Failure to follow this instruction may result damage to the components.
- Remove the differential from the supporting tool.
 - Thoroughly clean the pinion shaft paying particular attention to the thread.
 - Using a suitable cleaning fluid thoroughly clean the differential casings.

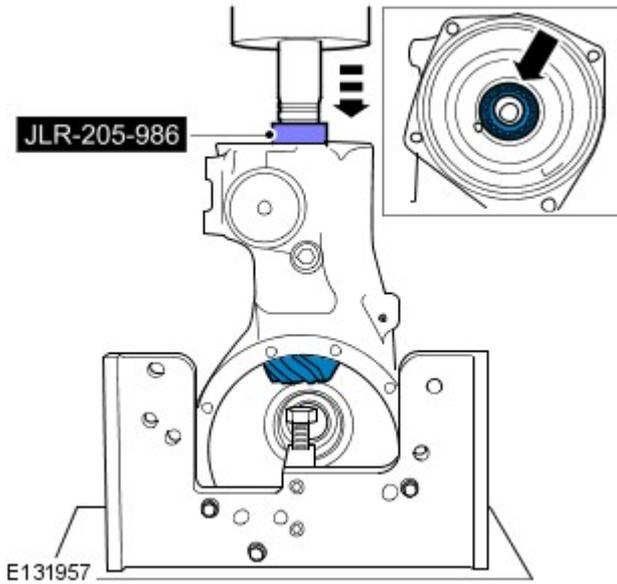
Installation



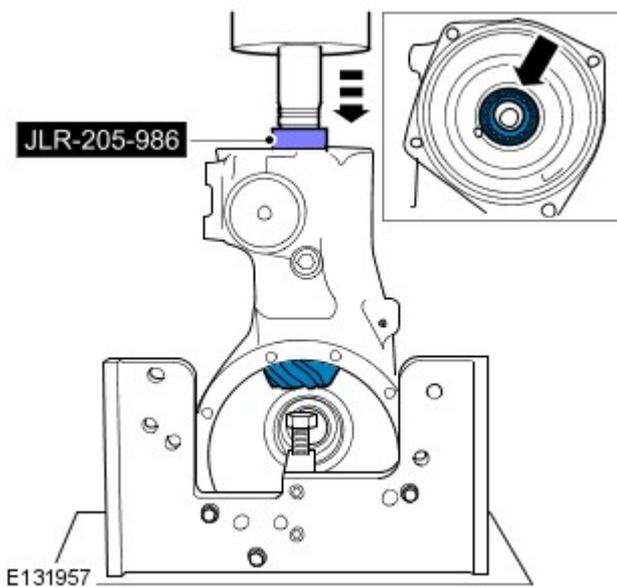
1.  CAUTION: Do not clean or lubricate the new pinion shaft tail bearing, as it is supplied coated with a low friction oil. Failure to follow this instruction will require the pinion shaft tail bearing to be replaced before the differential can be successfully assembled.
- Secure the differential casing to the special tool.
 - Using a suitable press and the special tool install the pinion shaft tail bearing outer race.

2. Install the new pinion shaft spacer.



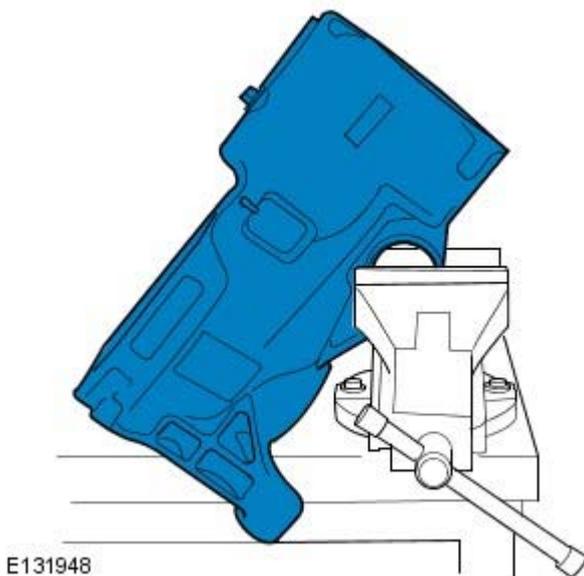


3.
 - Install the pinion shaft to the differential case.
 - Lubricate the pinion head bearing with differential oil.
 - Position the support bolt to its highest setting.

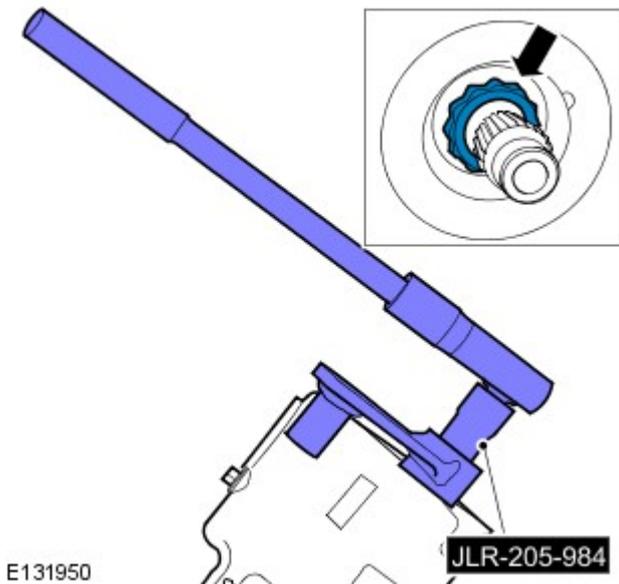


4.  **CAUTION:** Do not clean or lubricate the new pinion shaft tail bearing, as it is supplied coated with a low friction oil. Failure to follow this instruction will require the pinion shaft tail bearing to be replaced before the differential can be successfully assembled.

Using a suitable press and the special tool install the pinion shaft tail bearing inner race.



5.
 - Position the differential assembly in a suitable vice as shown.
 - Remove the differential from the supporting tool.



6.  **WARNING:** High torque application.

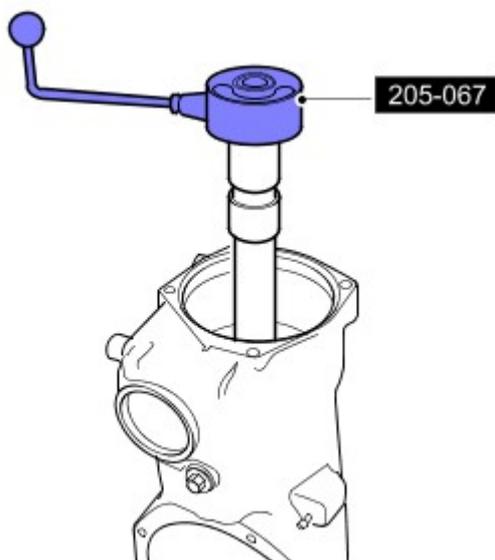
CAUTIONS:

 The special tool should be turned counter clockwise to install the pinion shaft nut.

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

NOTE: 250 Nm (184 lb.ft) is the minimum torque requirement to begin collapsing the pinion shaft spacer.

- Using the special tools install the new pinion nut.
- Tighten to 250 Nm (184 lb. ft).



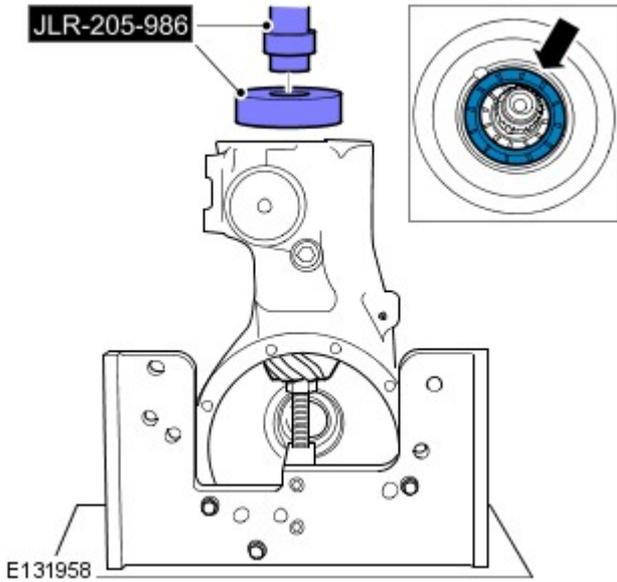
7. **CAUTIONS:**

 Make sure the specified torque to rotate the pinion shaft is not exceeded. If excess preload is applied to the joint the pinion shaft should be removed and a new collapsible spacer, pinion shaft tail bearing, pinion shaft tail bearing cup and pinion nut must be installed.

 The special tool should be rotated at 60 rpm (1x revolution per second) to produce a consistent reading.

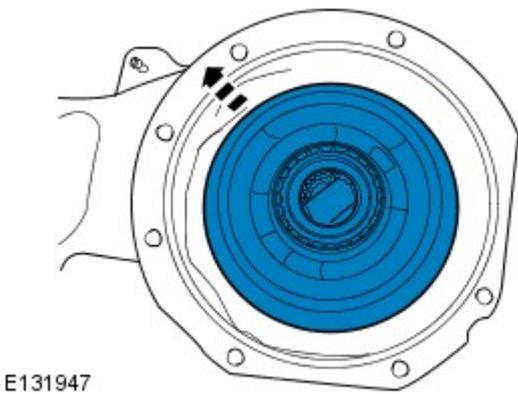
 The pinion shaft should be rotated through two full revolutions by hand before the torque measurement is performed.

- Using the special tool, check the torque required to rotate the pinion shaft. The specified torque is 1.1 Nm +/- 0.2 Nm
- If the specified torque to rotate the pinion shaft is not reached, using the special tools, tighten the pinion flange nut in one degree increments and check the rotational torque after each until the specified torque of 1.1 Nm +/-0.2 Nm is achieved.

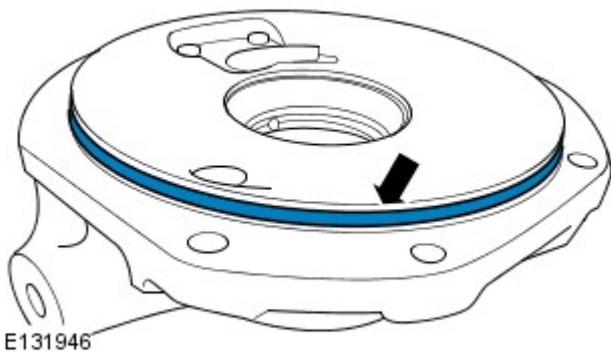


8.  **CAUTION:** Do not lubricate the pinion oil seal.

Using a suitable press, the special tool and adapter install the pinion bearing oil seal.



9. Install the crown wheel assembly.

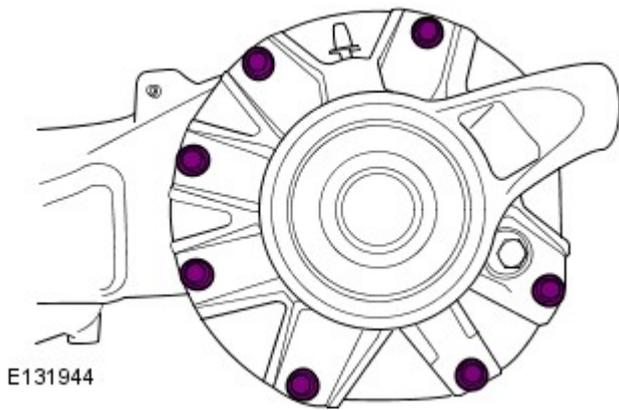


10. **CAUTIONS:**

 Make sure the mating faces are clean, failure to follow this instruction may result in damage to the differential.

 Make sure the new seal is not twisted when fitting, failure to follow this instruction may result in damage to the differential.

- Install the differential case seal.
- Apply a thin amount of clean differential oil to the new differential casing seal.



11.

- Install the differential casing bolts.
- Tighten the 7 bolts to 29 Nm.

12. Install the rear differential.

Refer to: [Differential Case](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

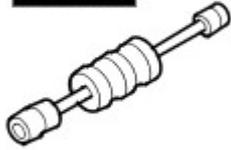
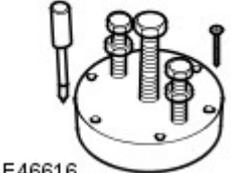
13. Fill the differential case with fluid.

Refer to: [Differential Draining and Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).

Rear Drive Axle/Differential - Drive Pinion Seal

Removal and Installation

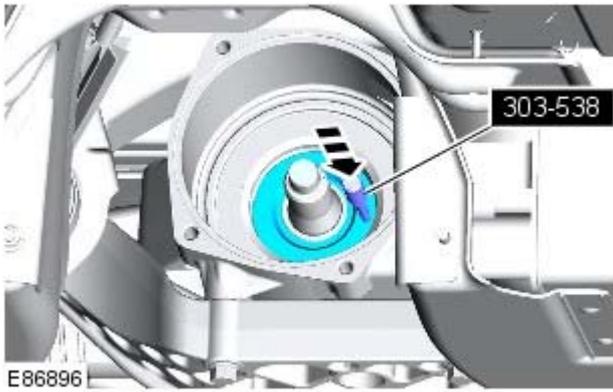
Special Tool(s)

 <p>100-012</p> <p>E54135</p>	<p>100-012 Slide Hammer</p>
 <p>205-865</p> <p>E86899</p>	<p>205-865 Installer, Differential Pinion Seal</p>
 <p>303-538</p> <p>E46616</p>	<p>303-538 Remover/Installer, Crankshaft Oil Seal</p>
 <p>308-615</p> <p>E86871</p>	<p>308-615 Remover, Seals</p>

Removal

-  **WARNING:** Make sure to support the vehicle with axle stands.
Raise and support the vehicle.
- Remove the active on-demand coupling.

Refer to: [Active On-Demand Coupling](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).



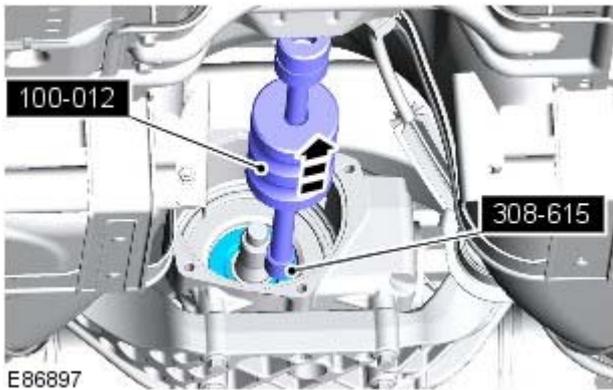
3. CAUTIONS:

 Take extra care not to damage the edges of the component.

 Take extra care not to damage the mating faces.

Using the special tool, punch a hole in the oil seals outer edge.

Special Tool(s): [303-538](#)



4. CAUTIONS:

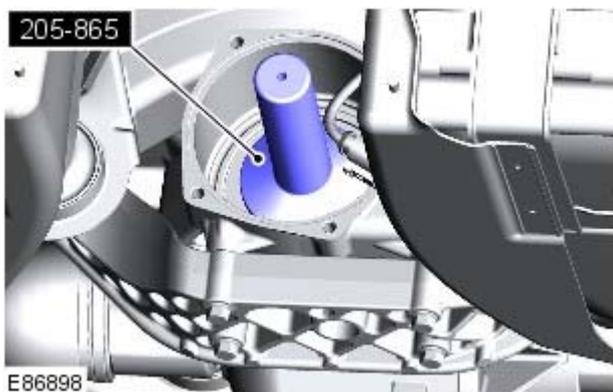
 Take extra care not to damage the mating faces.

 Be prepared to collect escaping oil.

Using the special tools and a self tapping screw, remove the oil seal.

Special Tool(s): [308-615](#), [100-012](#)

Installation



1. CAUTIONS:

 Take extra care not to damage the seal.

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

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

Special Tool(s): [205-865](#)

2. Install the active on-demand coupling.

Refer to: [Active On-Demand Coupling](#) (205-02 Rear Drive Axle/Differential, Removal and Installation).

3. Check and top-up the differential case.

Refer to: [Differential Draining and Filling](#) (205-02 Rear Drive Axle/Differential, General Procedures).

Rear Drive Axle/Differential - Rear Halfshaft Seal

Removal and Installation

Special Tool(s)

 <p>205-863 E82970</p>	<p>205-863 Installer, Halfshaft Seal</p>
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Removal

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

2. Remove the wheel and tire.

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

3. Remove the halfshaft.

Refer to: [Rear Halfshaft LH](#) (205-05 Rear Drive Halfshafts, Removal and Installation).

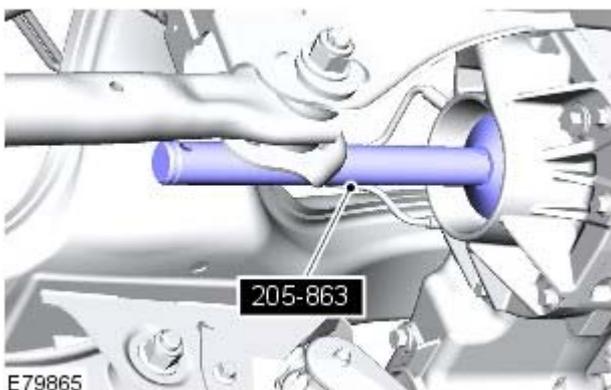


4. **CAUTIONS:**

 Take extra care not to damage the mating faces.

 Take extra care not to damage the edges of the component.

Installation



1. **CAUTIONS:**

 Make sure that the seal is correctly located.

 Take extra care not to damage the seal.

Using the special tool, install a new rear halfshaft oil seal.

Special Tool(s): [205-863](#)

2. Install the halfshaft.

Refer to: [Rear Halfshaft LH](#) (205-05 Rear Drive Halfshafts, Removal and Installation).

3. Install the wheel and tire.

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