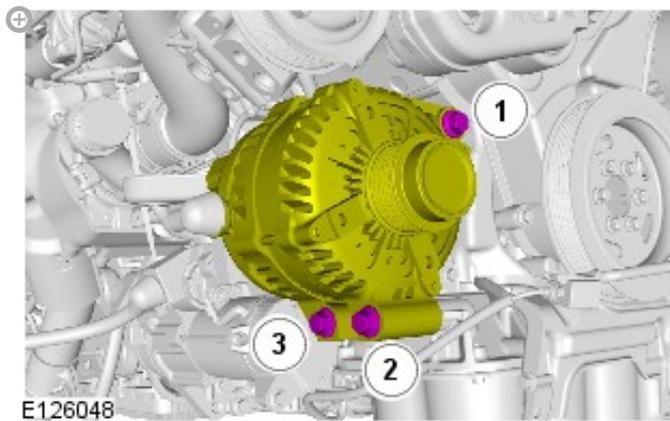


Torque: 10 Nm

15.

Tighten the bolts in the sequence shown.

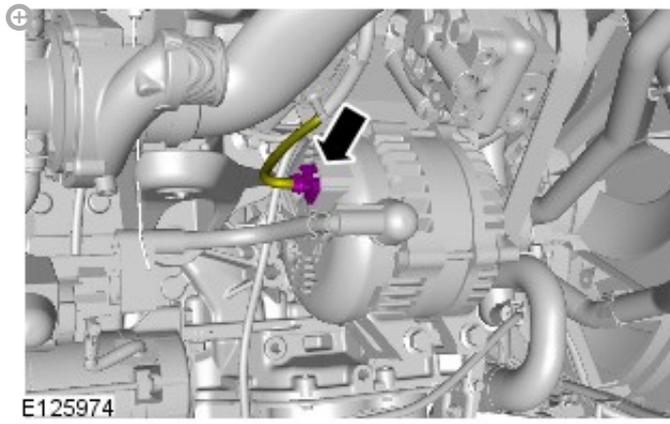
Engine shown removed for clarity.



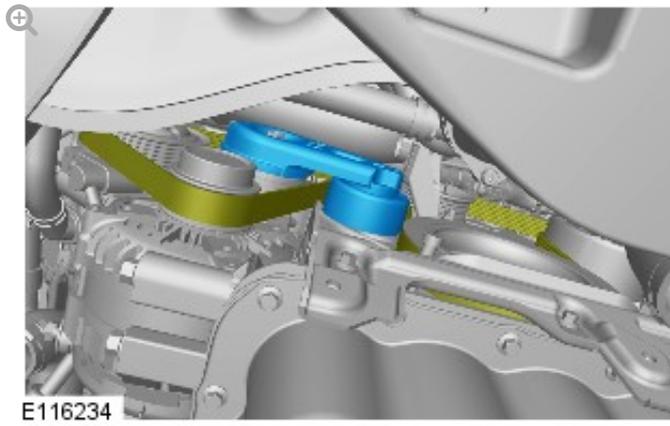
Torque: 47 Nm

16.

Engine shown removed for clarity.

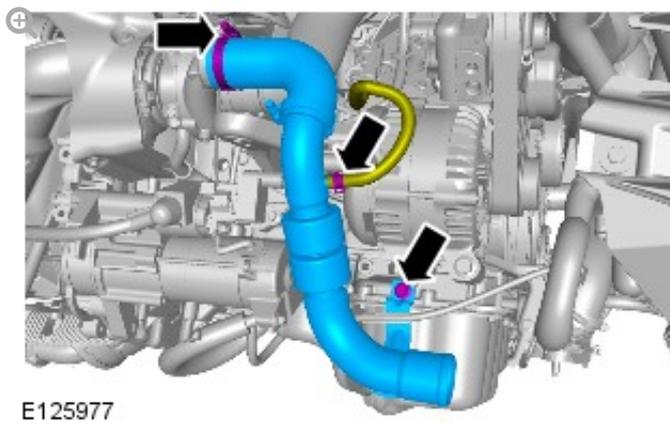


17.



18.

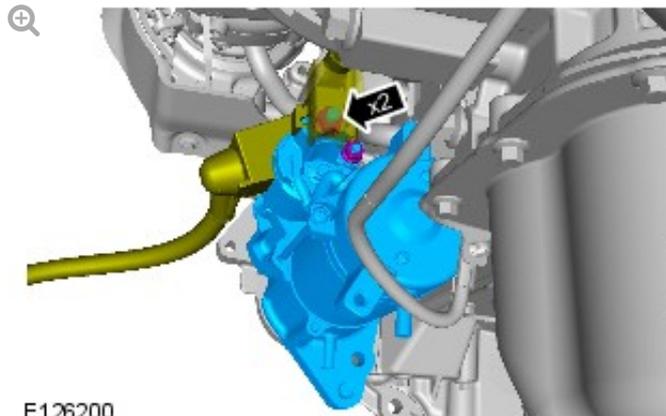
Engine shown removed for clarity.



Torque: 10 Nm

19.

- Some variation in the illustrations may occur, but the essential information is always correct.
- Engine shown removed for clarity.



Torque:

M8 10 Nm

M6 7 Nm

20. Refer to: [Oil Pan \(303-01A Engine - TDV6 3.0L Diesel, Removal and Installation\)](#).
21. Refer to: [Transmission - TDV6 3.0L Diesel \(307-01 Automatic Transmission/Transaxle, Installation\)](#).
22. Refer to: [Battery Disconnect and Connect \(414-01 Battery, Mounting and Cables, General Procedures\)](#).

ENGINE - TDV6 3.0L DIESEL

OIL PUMP [G1561164]

+

SPECIAL TOOL(S)



303-1120

Crankshaft Front Seal
Remover



303-1122

Crankshaft Front Seal
Sleeve



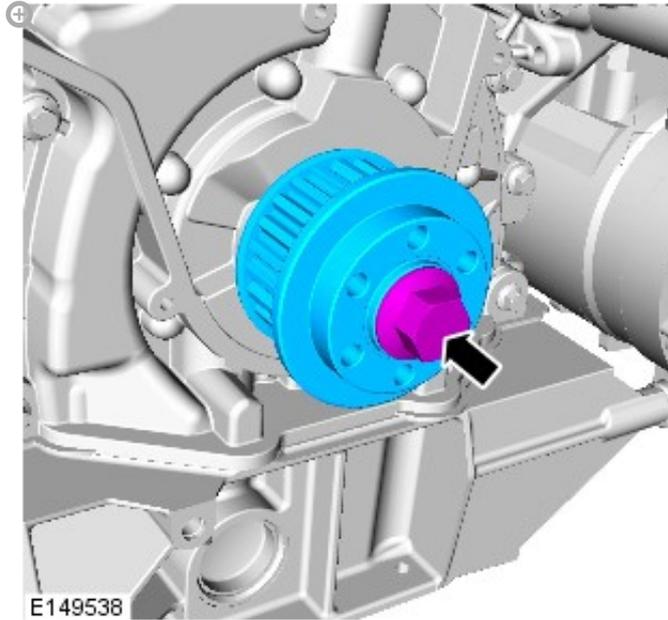
303-1121

Crankshaft Front Seal
Installer

REMOVAL

1. Disconnect the battery ground cable.
For additional information, refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).
 2. For additional information, refer to: [Generator](#) (414-02A Generator and Regulator - TDV6 3.0L Diesel, Removal and Installation).
 3. For additional information, refer to: [Timing Belt](#) (303-01 Engine - TDV6 3.0L Diesel, Removal and Installation).
-

4.



Remove the crankshaft pulley.

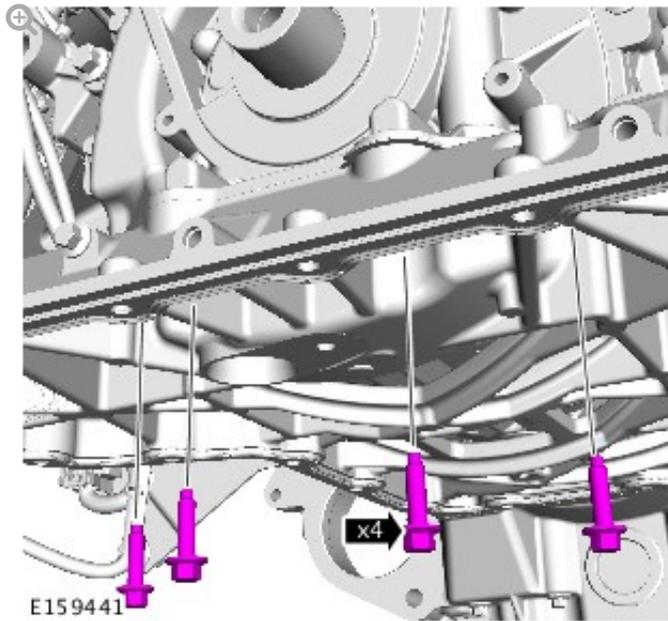
5.

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.

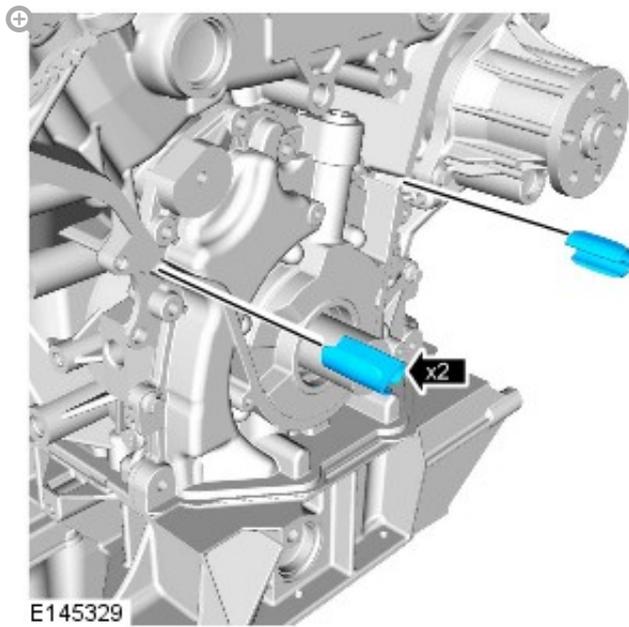
6. For additional information, refer to: Oil Pan (303-01A, Removal and Installation).

7.



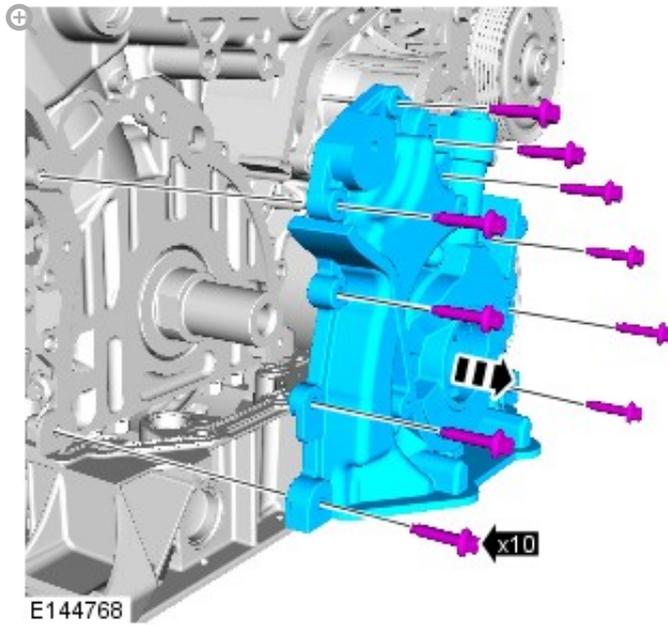
Remove the oil pump lower retaining bolts.

8.



Remove the timing belt cover sealing strips.

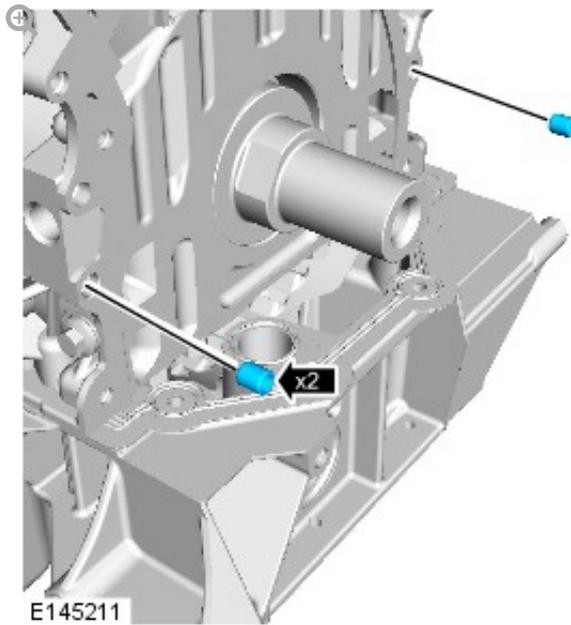
9.



Remove the oil pump.

- Remove the ten retaining bolts.

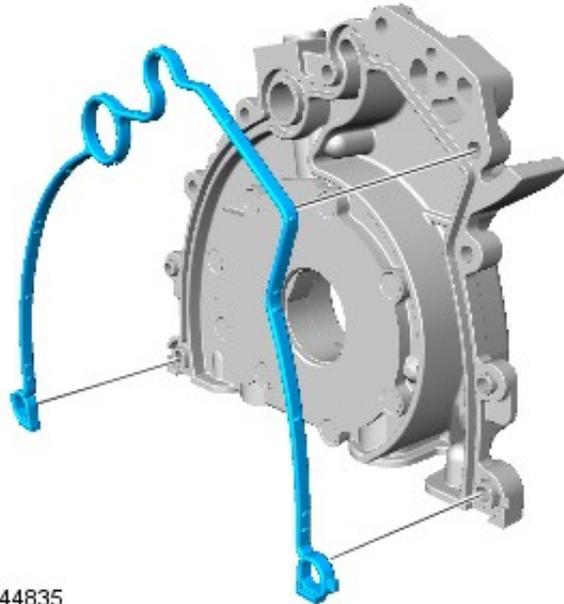
10.



Remove the alignment dowels (if equipped).

INSTALLATION

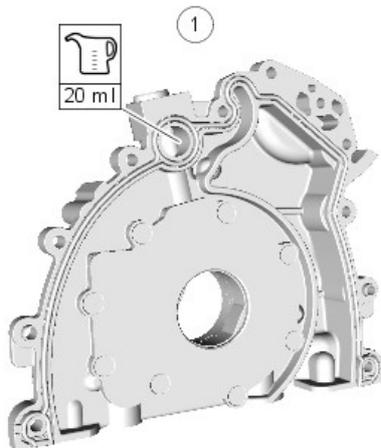
1.



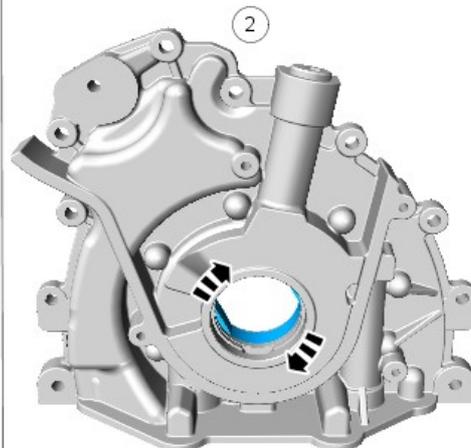
E144835

Install a new oil pump gasket.

2.



E144763

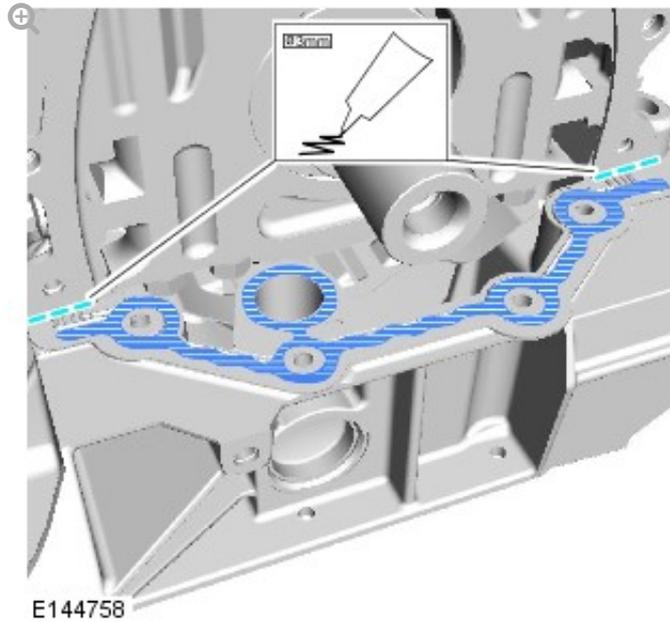


Prime the oil pump.

- Fill the orifice shown with 20 ml of engine oil.
- Rotate the oil pump drive 2 complete turns.

3.

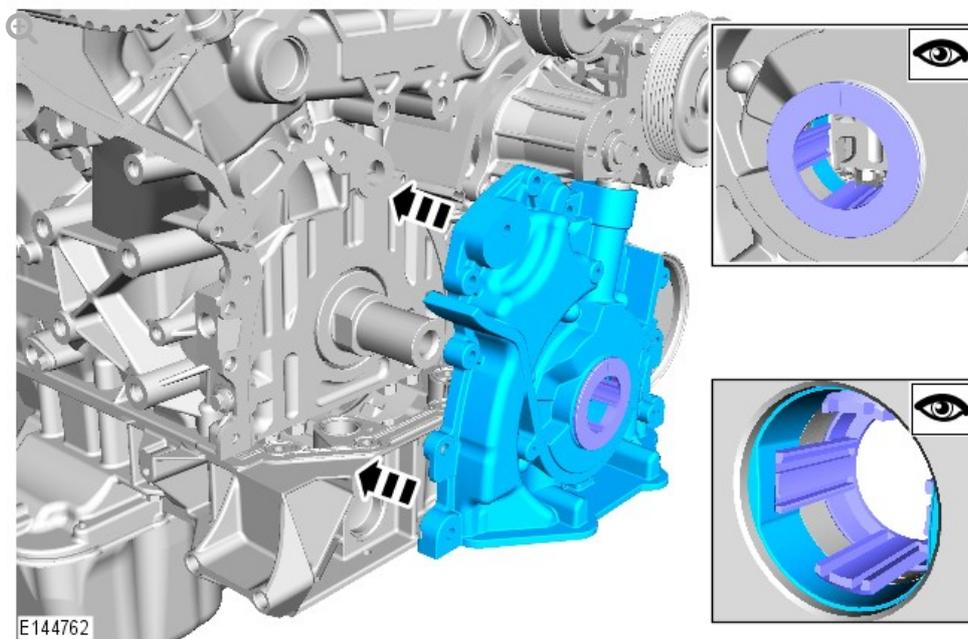
Make sure that the mating faces are clean and free of foreign material.



Apply a 3 mm diameter bead of sealant, to the area shown.

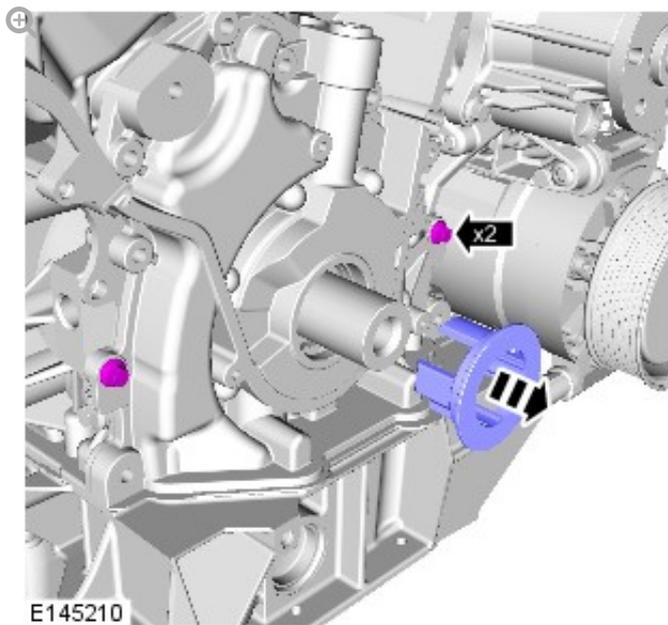
4.

- Make sure that the mating faces are clean and free of foreign material.
- Make sure the gasket is installed correctly.



Install the oil pump.

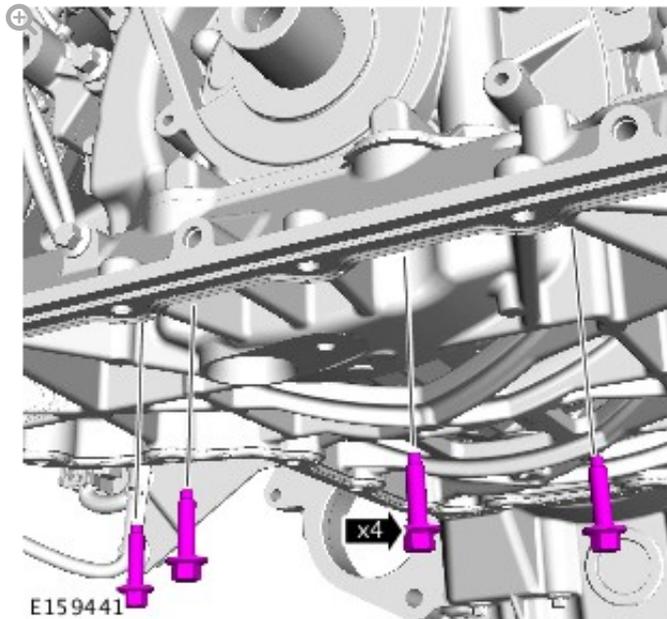
5.



Install two bolts to the oil pump, only finger tighten at this stage.

- Remove the oil pump locator.

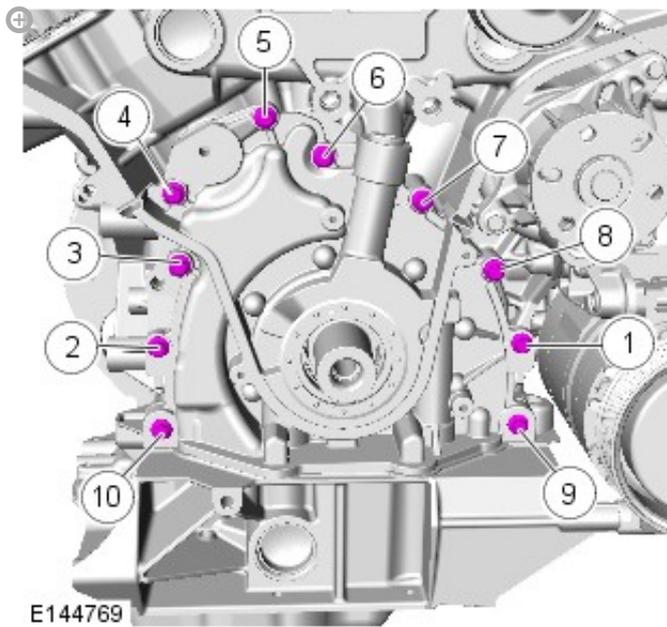
6.



Install the oil pump lower retaining bolts.

- Tighten the 4 bolts to 10 Nm.

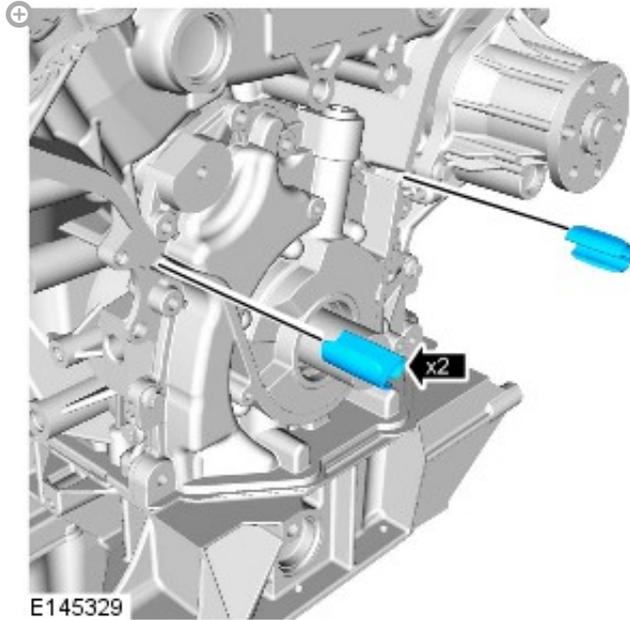
7.



Secure the oil pump.

- Tighten the bolts in the sequence shown to 10 Nm .

8.



Install the timing belt cover sealing strips.

9. For additional information, refer to: Oil Pan (303-01A, Removal and Installation).

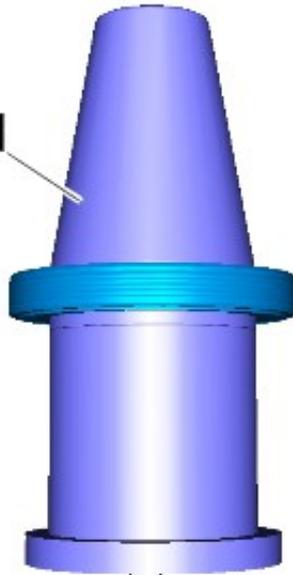
10.

Do not use any lubricant on the crankshaft front seal, special tools or the crankshaft. Failure to follow this instruction may result in damage to the vehicle.

Make sure all component mating faces are clean.



303-1122



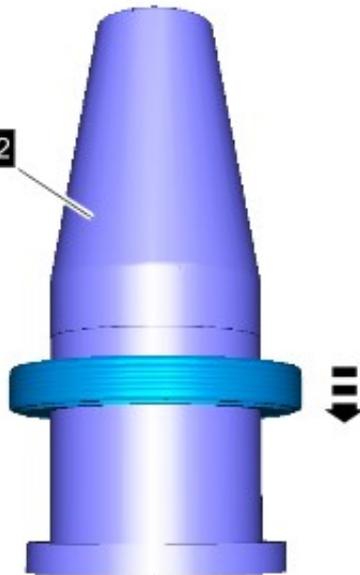
E116752

Install a new crankshaft front seal to the special tool.

11.



303-1122

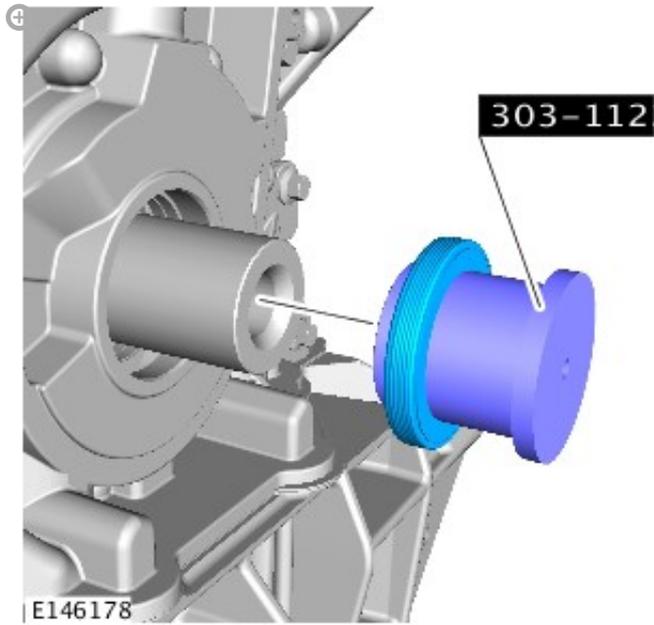


E116753

Reposition the crankshaft front seal along the special tool.

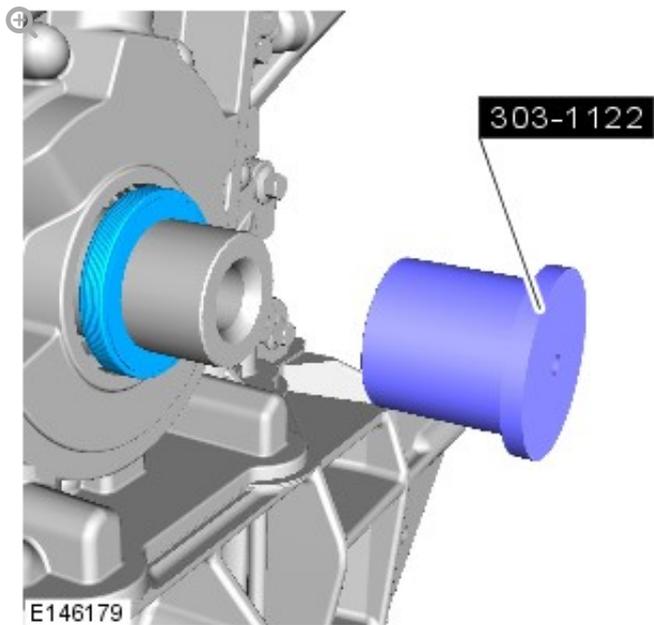
- Remove the sleeve from the special tool.

12.



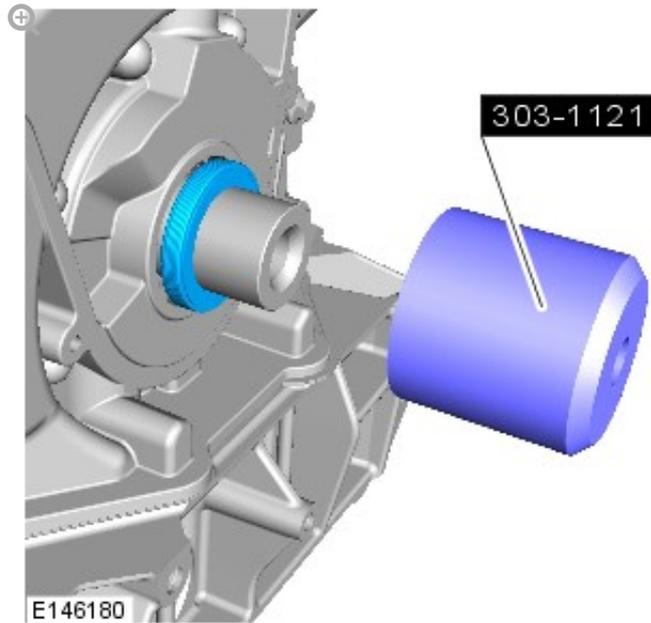
Install the special tool to the crankshaft.

13.



Remove the special tool from the crankshaft.

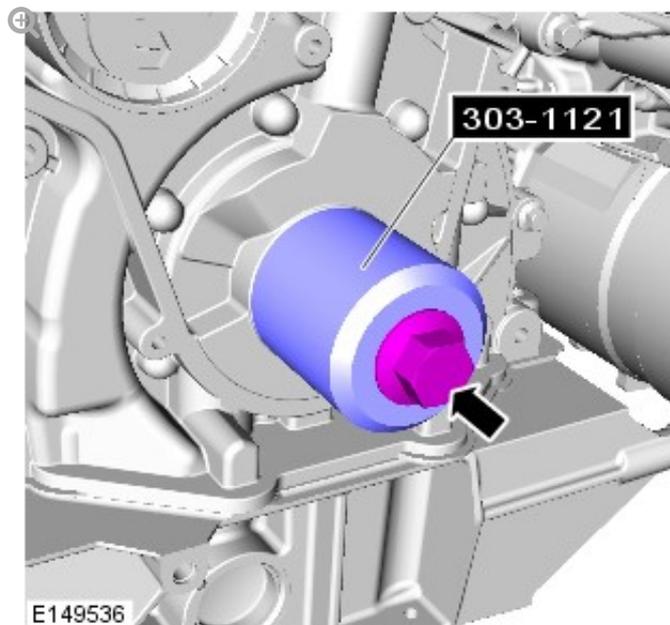
14.



Install the special tool to the crankshaft.

15.

Make sure the seal is installed correctly.



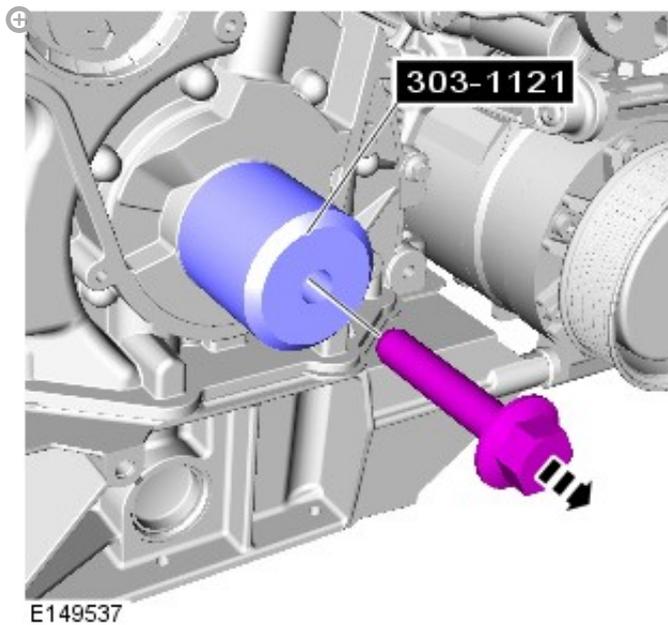
Using the special tool, install the crankshaft front seal.

- Use the crankshaft bolt with the service tool.

16.

Make sure the seal is installed correctly.

Wait 10 seconds before removing the crankshaft seal installation tool.



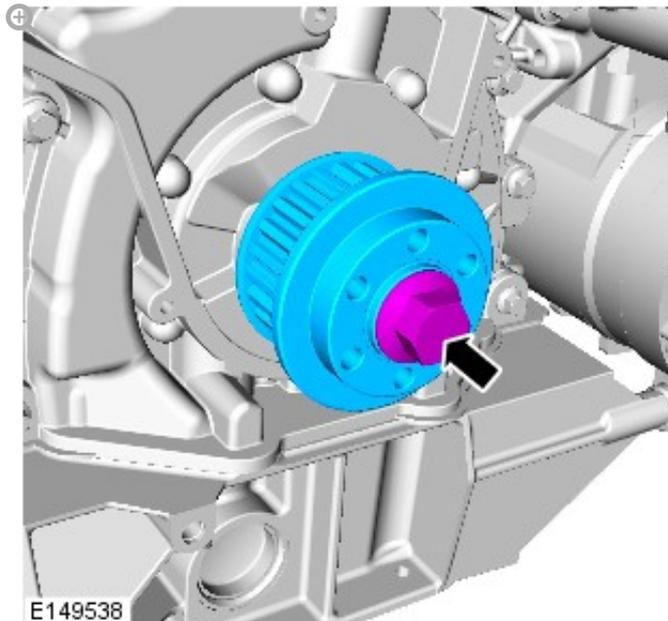
Remove the special tool.

- Remove and discard the crankshaft pulley retaining bolt.

17.

Make sure that a new crankshaft pulley bolt is installed.

Before installing the crankshaft pulley retaining bolt, note the thread size of the bolt (there are two different sized threads, M14 and M16). Failure to follow this instruction may result in damage to the vehicle.



Install the crankshaft pulley.

- **Tighten the M14 retaining bolt in two stages:**
 - Stage one: Tighten to 140 Nm.
 - Stage two: Tighten a further 90degrees.
- **Tighten the M16 retaining bolt in three stages:**
 - Stage one: Tighten to 150 Nm.
 - Stage two: Tighten to 300 Nm.
 - Stage three: Tighten a further 90 degrees.

18. Install the generator.

For additional information, refer to: [Generator](#) (414-02A Generator and Regulator - TDV6 3.0L Diesel, Removal and Installation).

19. Install the new timing belt kit.

For additional information, refer to: Timing Belt (303-01 Engine - TDV6 3.0L Diesel, Removal and Installation).

20. Connect the battery ground cable.

For additional information, refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).

ENGINE - TDV6 3.0L DIESEL

ENGINE - OVERVIEW [G1245354]

OVERVIEW

The 3.0 liter diesel engine is a V6 configuration unit with 2 banks of 3 cylinders arranged at 60 degrees to each other. There are 4 valves per cylinder, which are operated by 2 overhead camshafts per cylinder bank.

The cylinder block is cast in compacted graphite iron, which uses less material to produce compared to a conventional cast iron block. This provides reduced weight and length with superior structural capabilities. A separate aluminum ladder frame, bolted to the underside of the cylinder block, provides a lightweight, compact and very stiff bottom end of the engine.

The cylinder heads are cast aluminum with a moulded plastic camshaft cover with an integral air intake. The single-piece oil pan is formed from stamped steel. The exhaust manifolds are cast from an iron alloy. A moulded plastic acoustic cover is fitted over the upper engine to absorb engine-generated noise.

A low compression ratio of 16:1 contributes to improved emissions quality, quieter combustion and compatibility with the engine's unique forced induction system. For additional information refer to Intake Air distribution and Filtering.

The low compression ratio also means less heat build-up in the piston bowl

and more efficient fuel burn, resulting in the production of lower levels of pollutants. It also assists with cold starting allowing a faster cranking speed.

ENGINE - TDV6 3.0L DIESEL

RIGHT CAMSHAFT [C1672070]

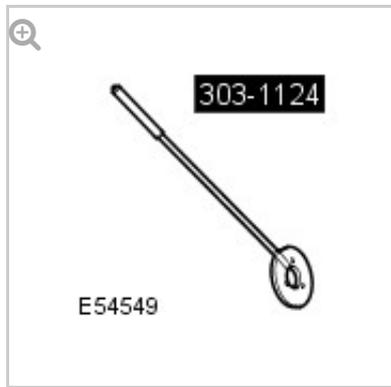
+

SPECIAL TOOL(S)



303-1117

Timing Peg,
Automatic
Transmission



303-1124

Holding Tool,
Camshaft Front
Pulley



303-1126

Timing Peg,
Camshaft Pulley

REMOVAL

1. Disconnect the battery ground cable.
Refer to: [Battery Disconnect and Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).

2.

Make sure to support the vehicle with axle stands.

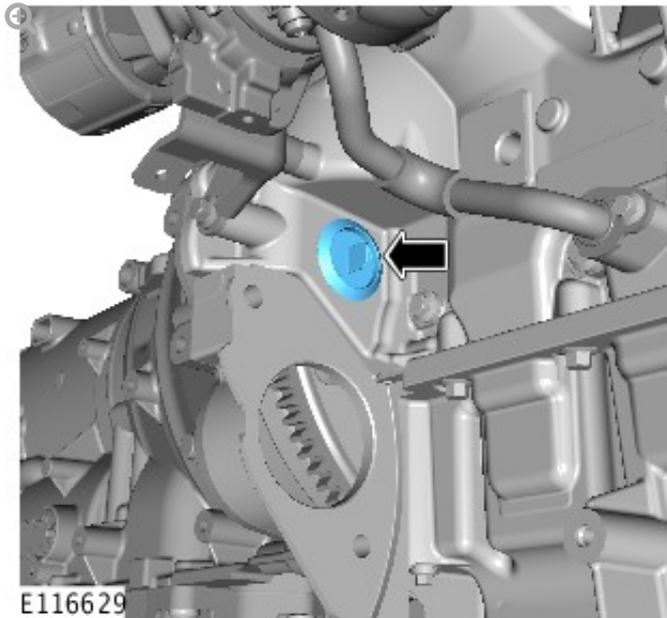
Raise and support the vehicle.

3. Refer to: [Starter Motor](#) (303-06A Starting System - TDV6 3.0L Diesel,

Removal and Installation).

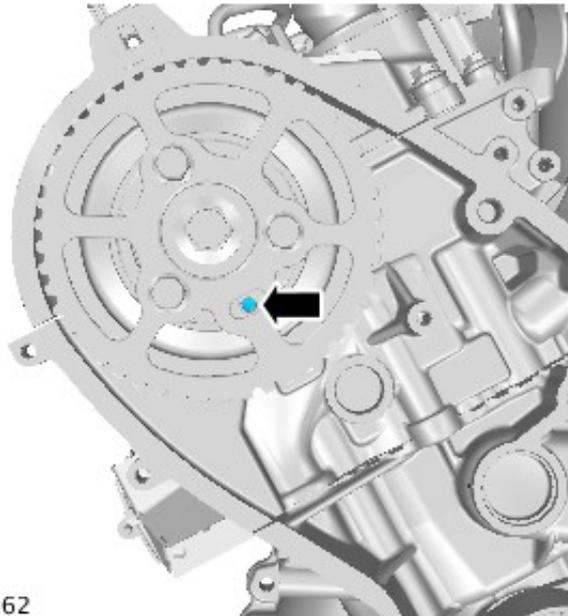
4. Refer to: [Brake Vacuum Pump - TDV6 3.0L Diesel](#) (206-07 Power Brake Actuation, Removal and Installation).
5. Refer to: [Right Valve Cover](#) (303-01A Engine - TDV6 3.0L Diesel, Removal and Installation).

6.



7. Rotate the crankshaft clockwise to align the crankshaft alignment hole in the flywheel or flexplate with the block aperture.

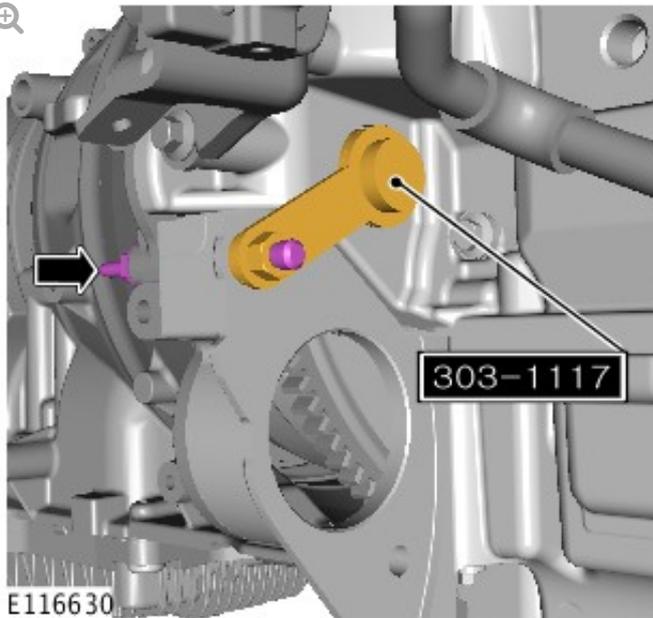
8.



E160262

Check the camshaft pulley alignment holes are correctly aligned. If the alignment holes are not aligned, rotate the crankshaft one full turn clockwise.

9.

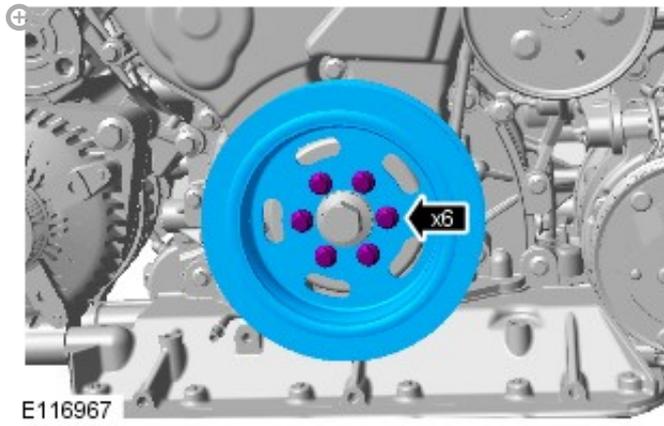


E116630

Install the special tool.

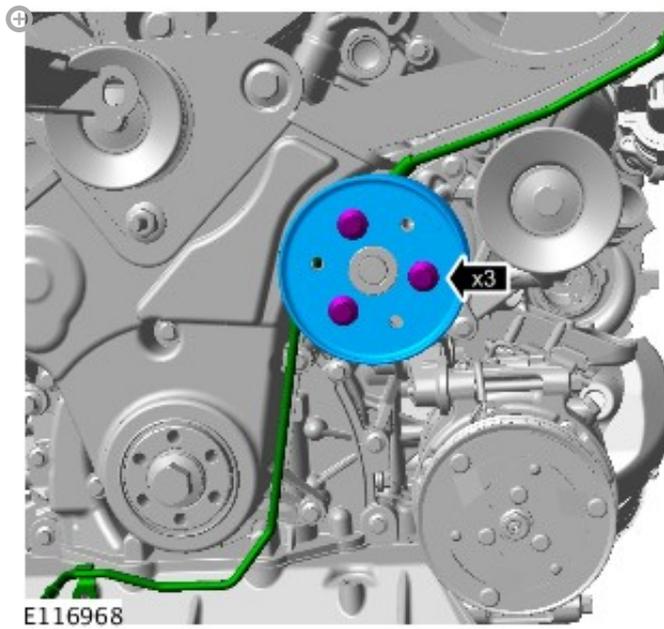
Special Tool(s): [303-1117](#)

10.



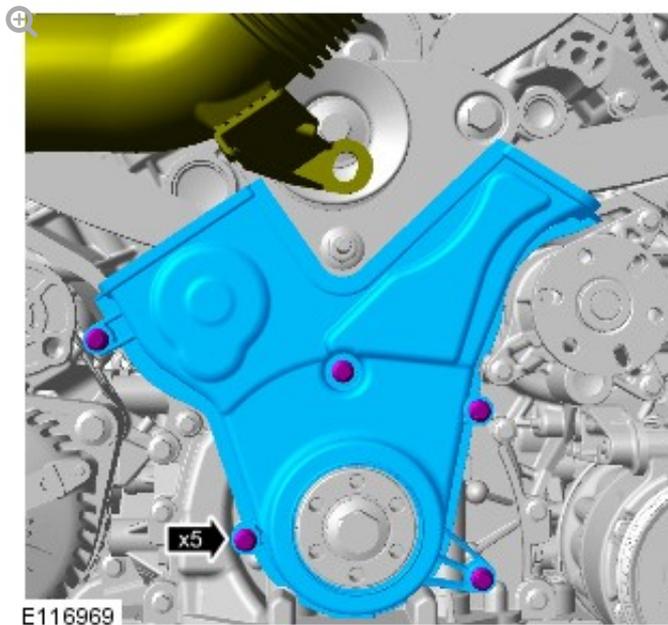
11.

Discard the bolts.



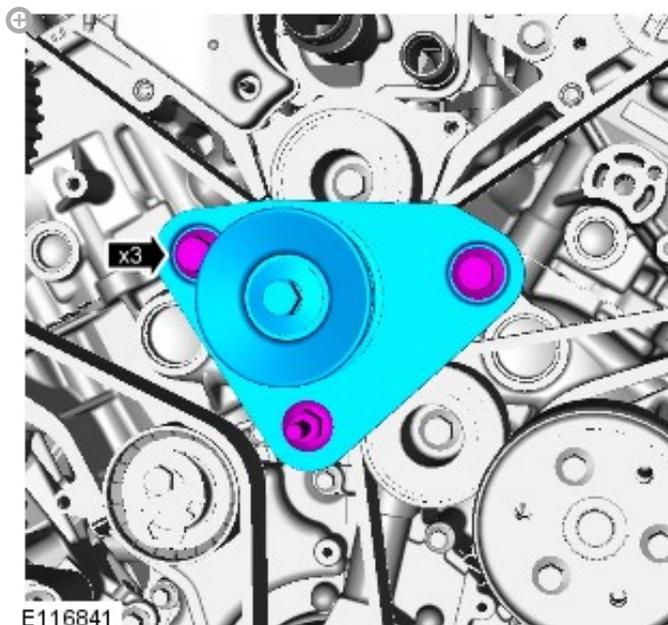
12.

Discard the gasket.



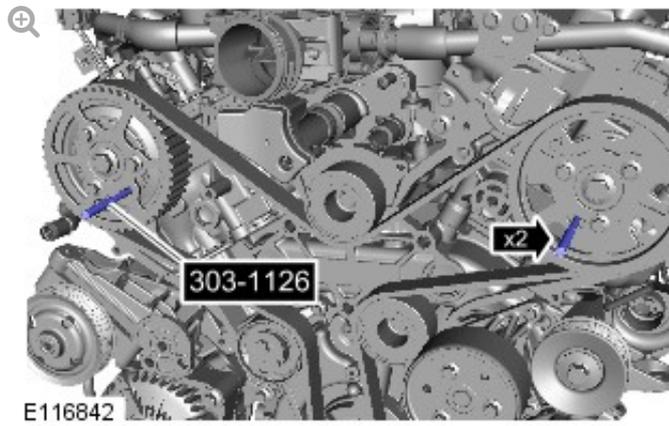
E116969

13.



E116841

14.

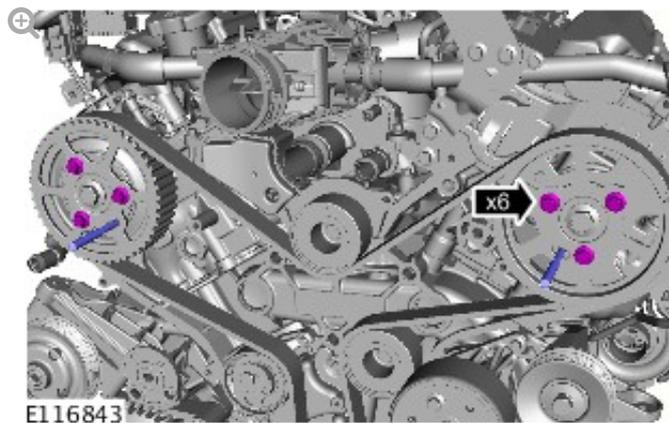


Special Tool(s): [303-1126](#)

15.

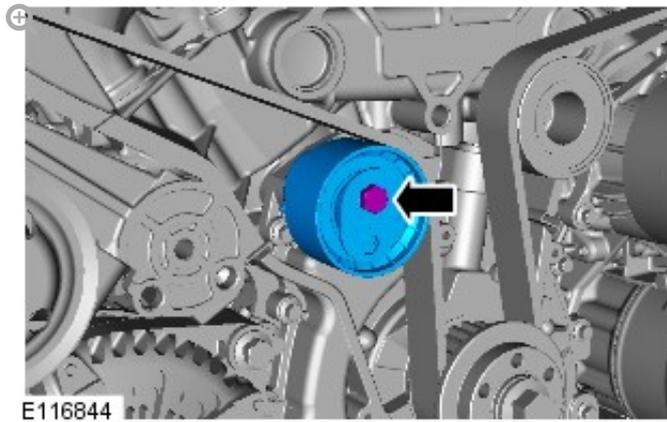
Do not use the special tools to lock the camshafts. Failure to follow this instruction may result in damage to the engine or the special tools.

Do not loosen the bolts more than 2 turns.



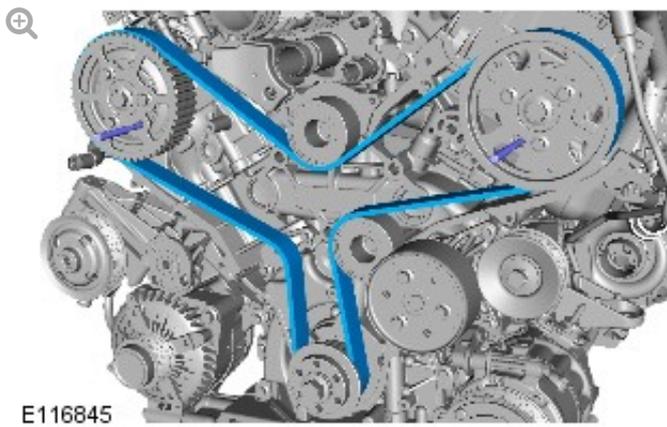
16.

- Discard the component.
- Discard the bolt.

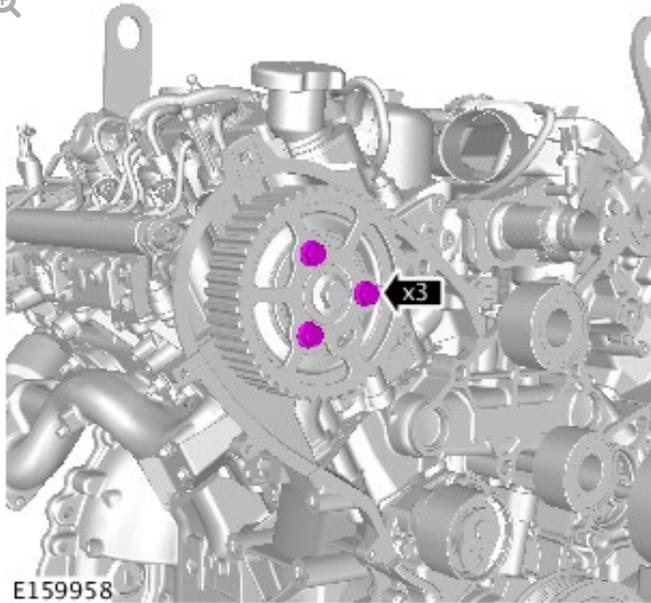


17.

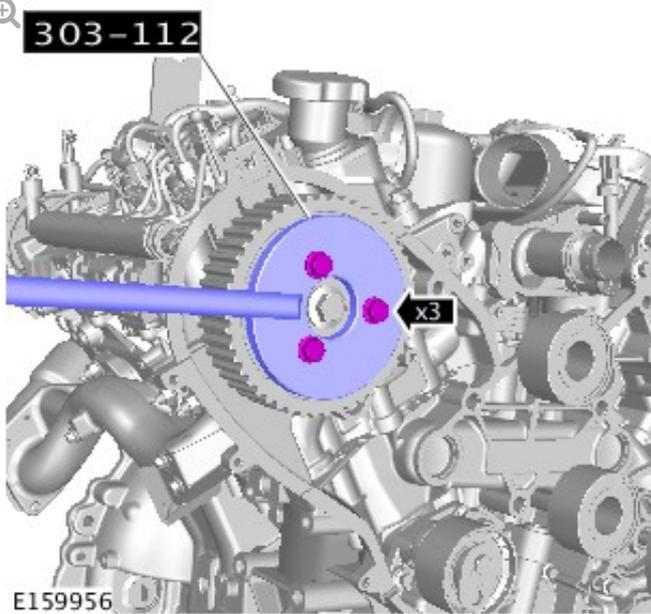
Discard the component.



18.



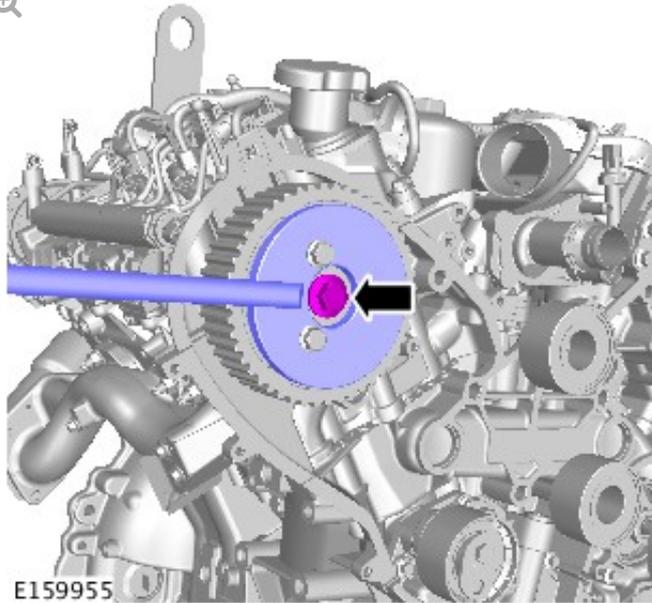
19.



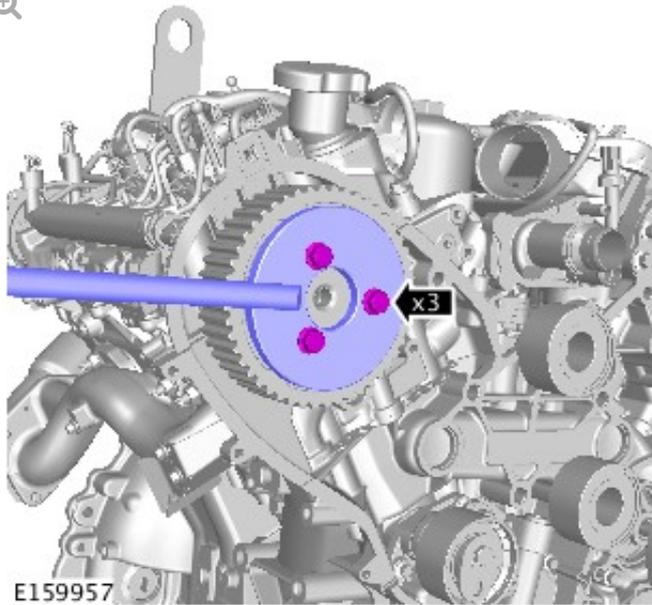
Install the special tool.

Special Tool(s): [303-1124](#)

20.



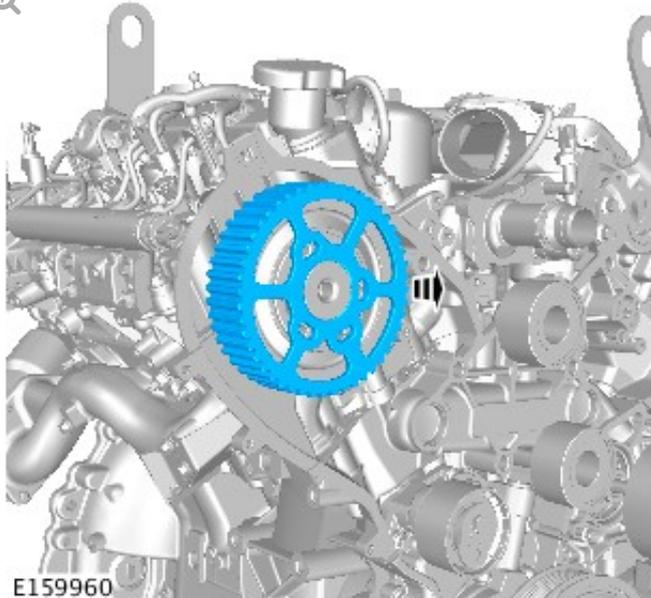
21.



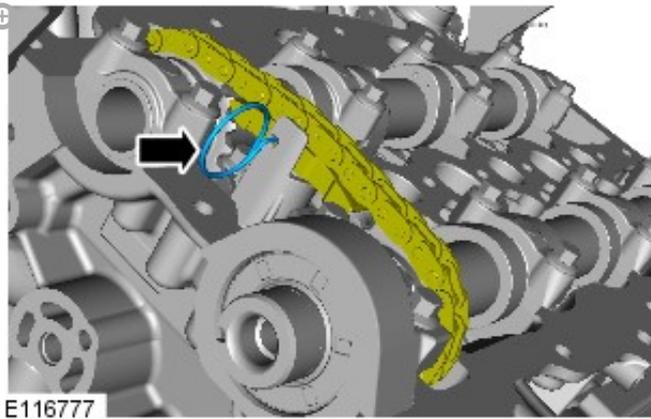
Remove the special tool.

Special Tool(s): [303-1124](#)

22.



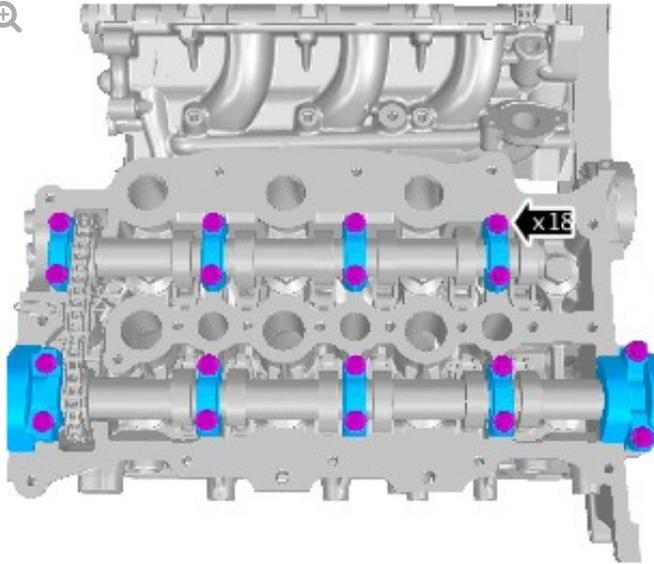
23.



Reposition the secondary timing chain tensioner.

Retain the secondary timing chain tensioner plunger.

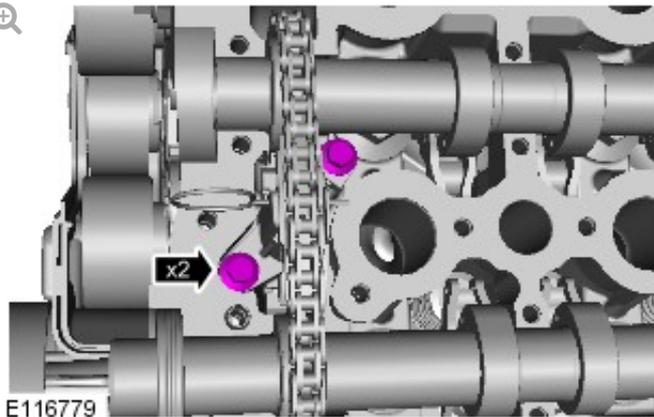
24.



E159959

Remove the camshaft bearing caps evenly.

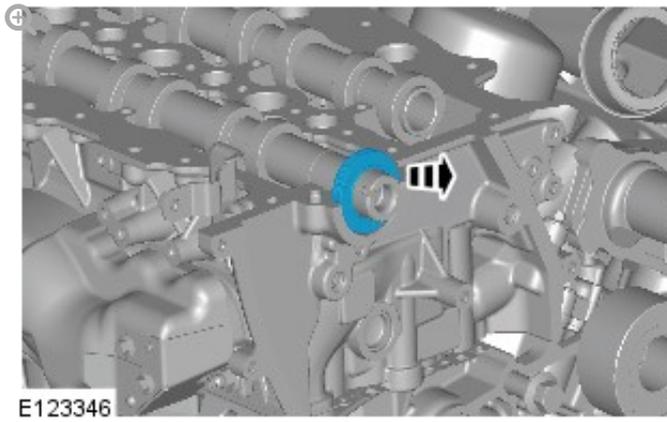
25.



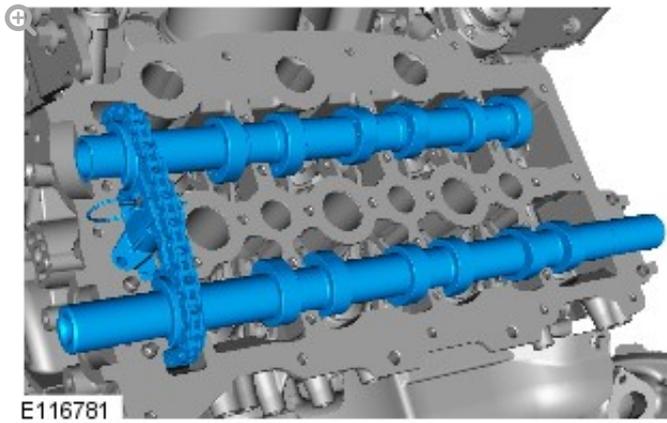
E116779

26.

Discard the seal.

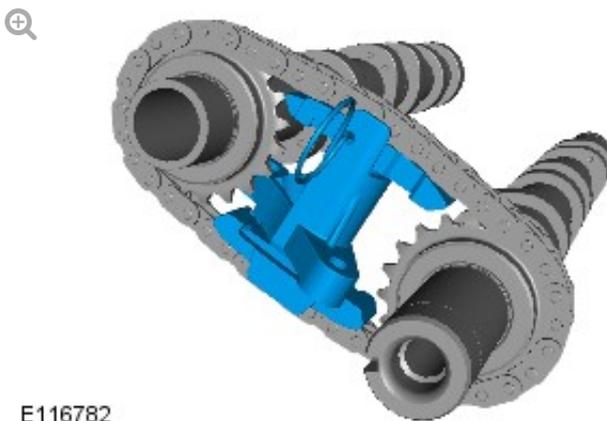


27.



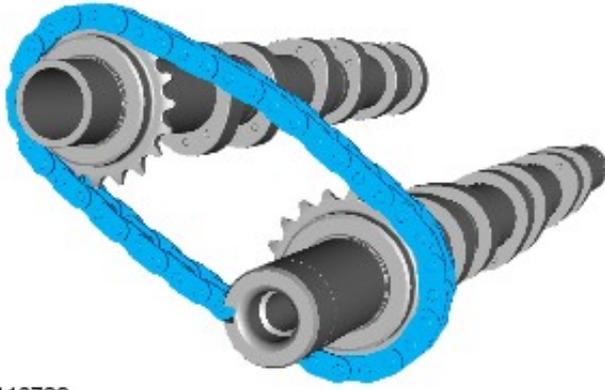
Remove the RH bank camshafts and secondary timing chain tensioner assembly.

28.



Remove the secondary timing chain tensioner assembly.

29.

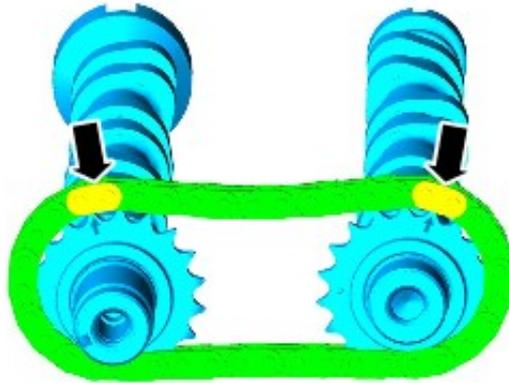


E116783

Remove the secondary timing chain from the camshafts.

INSTALLATION

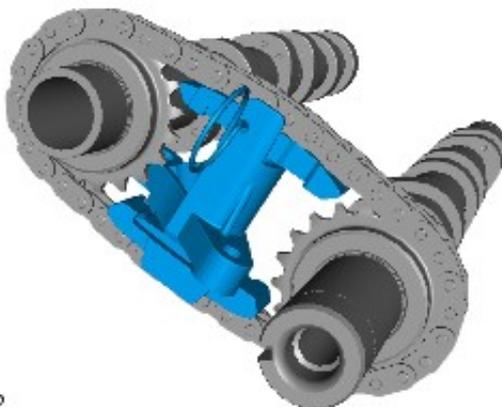
1.



E86461

Install the secondary timing chain onto the camshafts.

2.



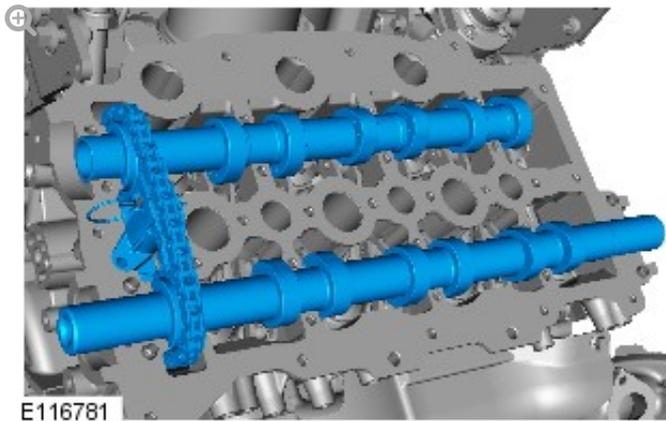
E116782

Install the secondary timing chain tensioner assembly.

3.

Make sure that the dots on the camshafts are aligned at the 12 o'clock position. Failure to follow this instruction may result in damage to the engine.

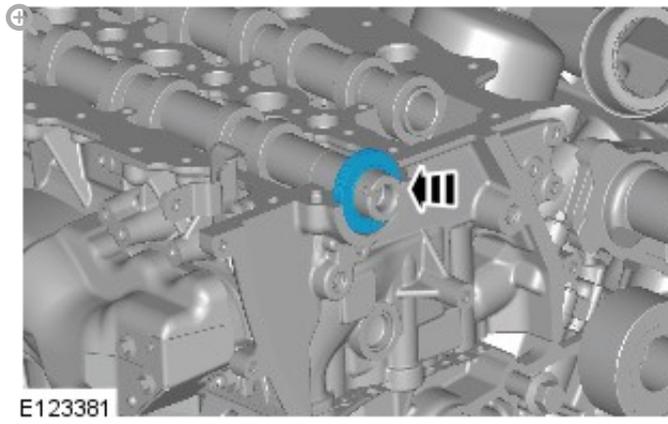
- Lubricate the camshafts and the camshaft bearing caps with oil meeting Jaguar specification prior to installation.
- Use hypoid oil to lubricate the camshafts.



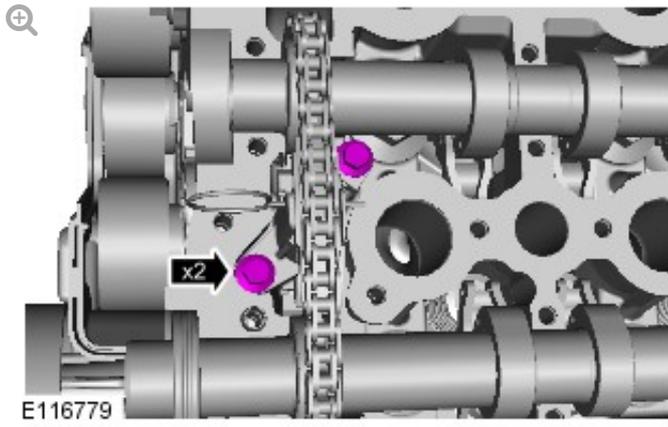
Install the camshafts.

4.

Install a new seal.

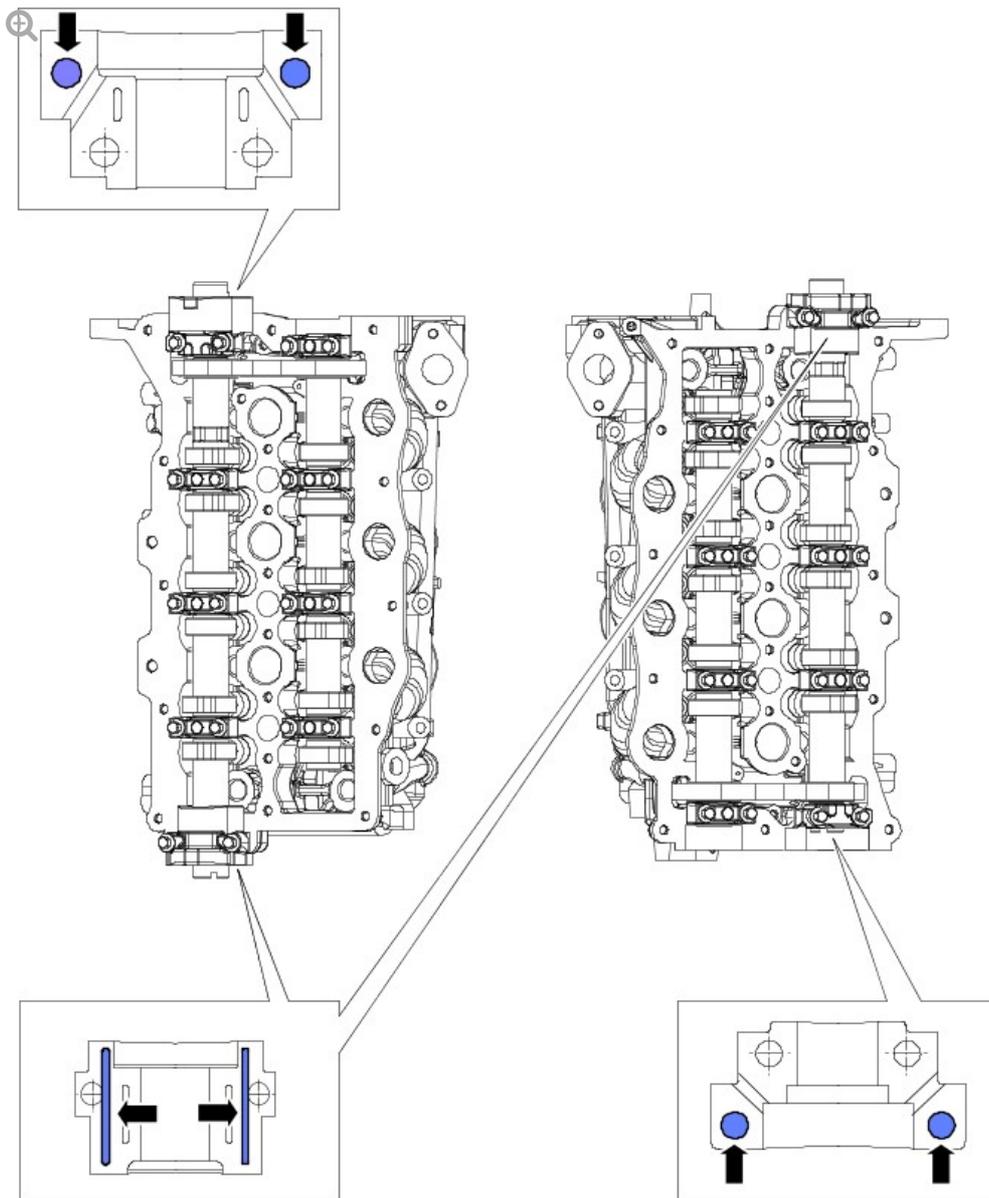


5.



Torque: 10 Nm

6.

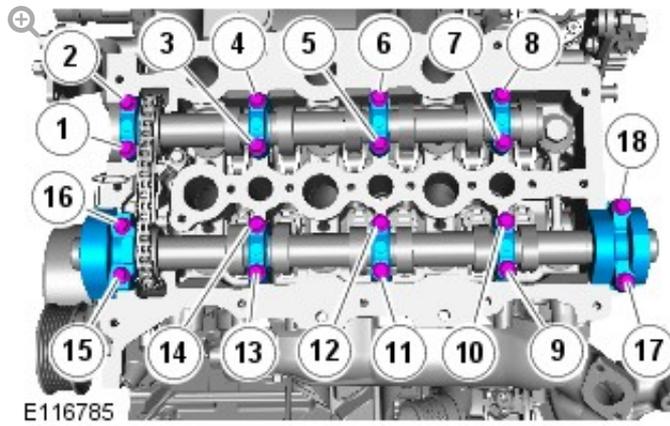


E116784

- Apply Loctite 518 sealant to the exhaust camshaft seal bearing caps.
- Apply Loctite 518 sealant, 2 mm wide, to the LH rear and RH front camshaft bearing caps.
- Apply Loctite 518 sealant, 7 mm diameter, to the LH front and RH rear camshaft bearing caps.

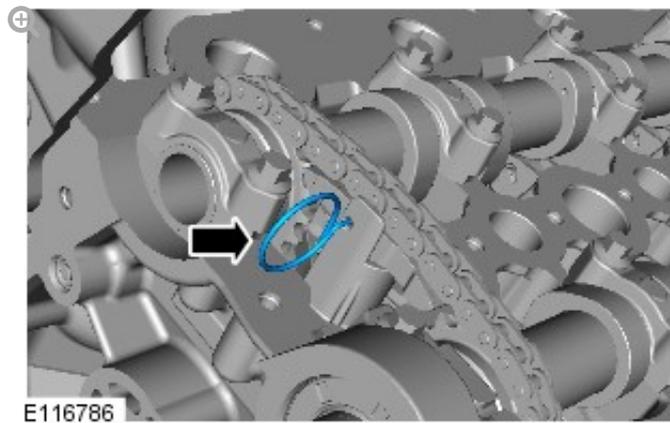
7.

Tighten the bolts in the indicated sequence.



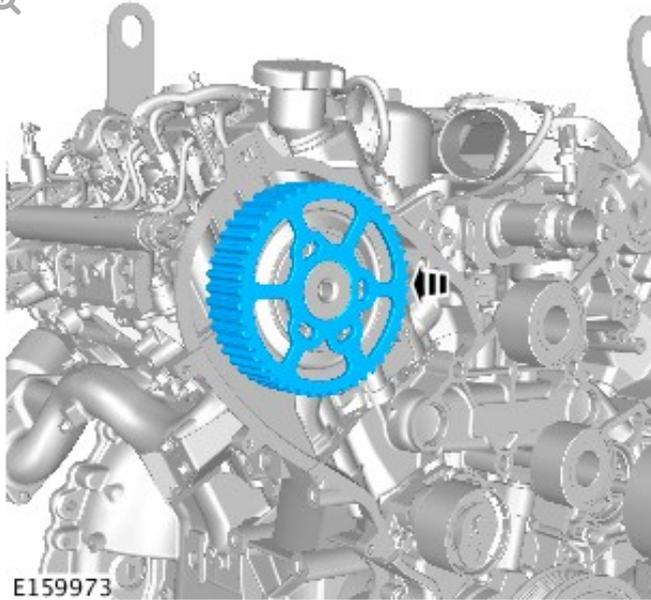
- Install the camshaft bearing caps in their original positions.
- Stage 1: Bolts 1 to 14, 1 Nm.
- Stage 2: Bolts 1 to 14, 5 Nm.
- Stage 3: Bolts 1 to 14, 10 Nm.
- Stage 4: Bolts 15 to 18, 1 Nm.
- Stage 5: Bolts 15 to 18, 5 Nm.
- Stage 6: Bolts 15 to 18, 10 Nm.

8.

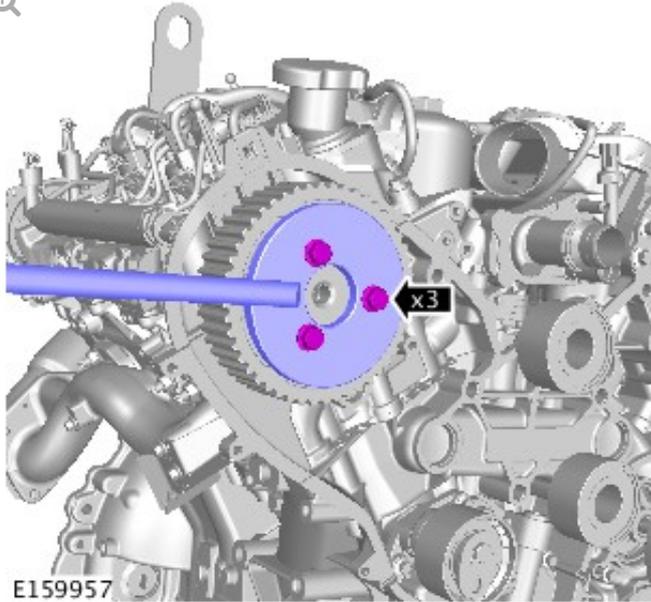


Remove the secondary timing chain tensioner retaining pin.

9.



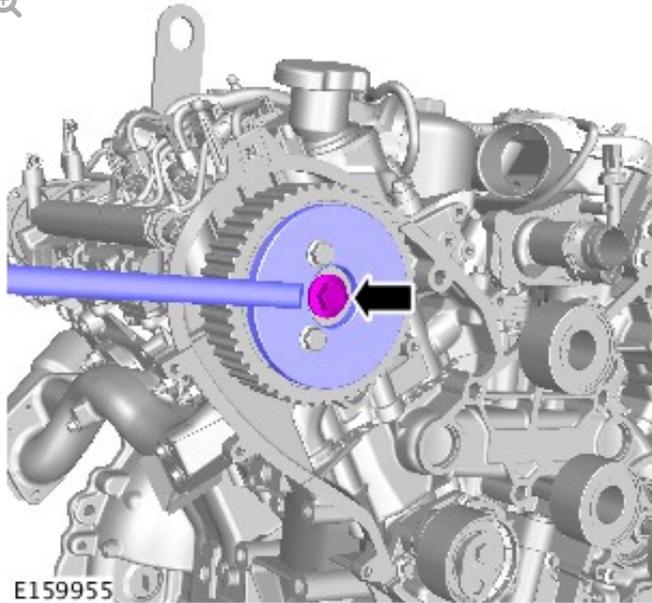
10.



Install the special tool.

Special Tool(s): [303-1124](#)

11.



Torque:

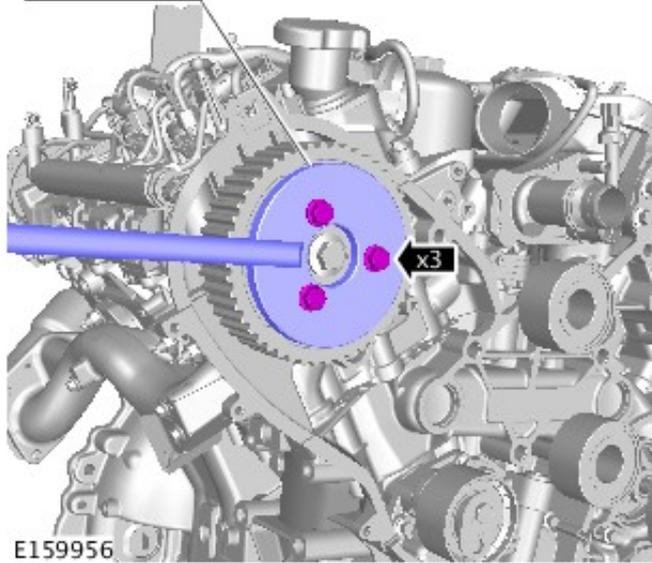
Stage 1: **80 Nm**

Stage 2: **80°**

12.



303-112

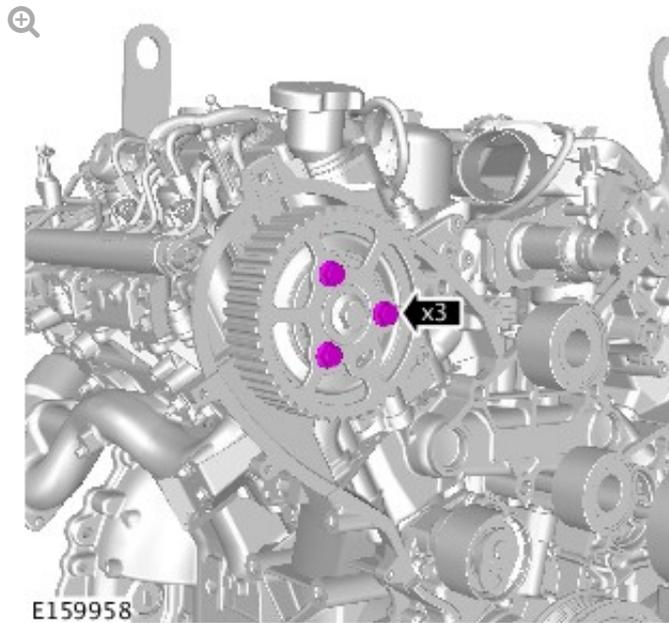


Remove the special tool.

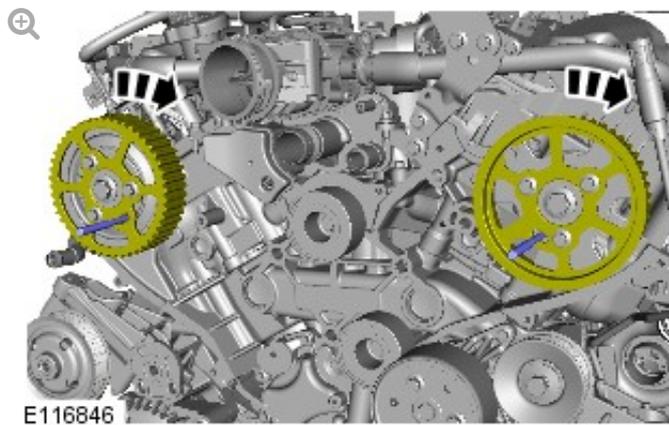
Special Tool(s): [303-1124](#)

13.

Only tighten the bolt finger-tight at this stage.

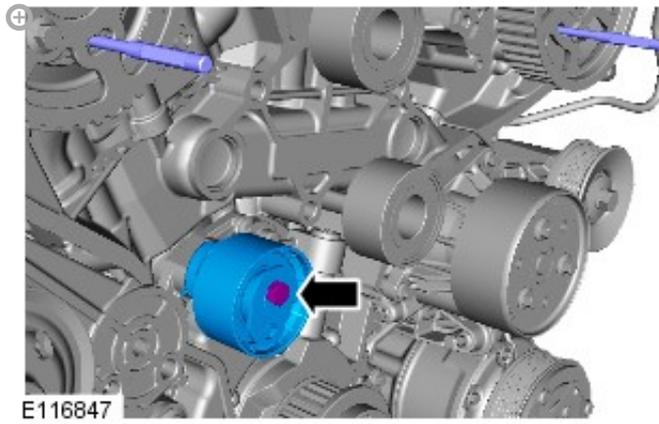


14.



15.

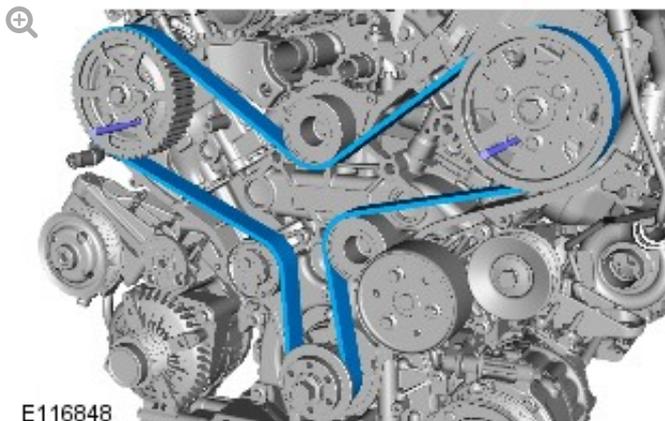
- Make sure that a new bolt is installed.
- Only tighten the bolts finger-tight at this stage.



E116847

16.

Make sure the camshaft pulleys remain in the clockwise position.



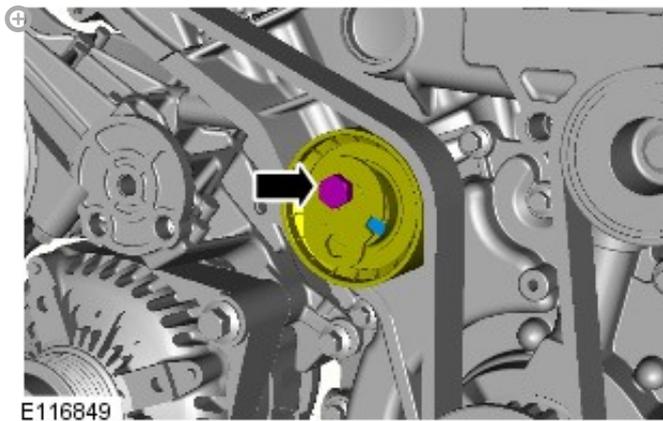
E116848

- Install the new timing belt.
- Starting at the crankshaft pulley, install the timing belt in a counter-clockwise direction, in the sequence shown.
- Stage one: Attach the timing belt to the crankshaft pulley.
- Stage two: Attach the timing belt to the idler pulley.
- Stage three: Attach the timing belt to the left-hand camshaft pulley.
- Stage four: Attach the timing belt to the idler pulley.

- Stage five: Attach the timing belt to the RH camshaft pulley.
- Stage six: Attach the timing belt to the timing belt tensioner.

17.

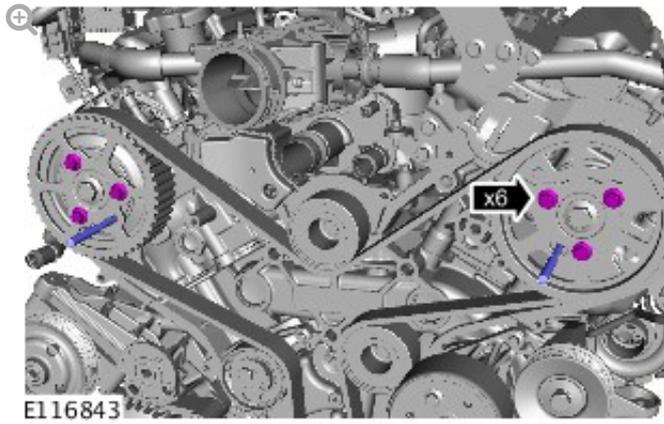
Make sure the timing belt tensioner window is aligned with the groove as illustrated.



- Tension the timing belt.
- Rotate the tensioner assembly counter-clockwise.
- *Torque: 26 Nm*

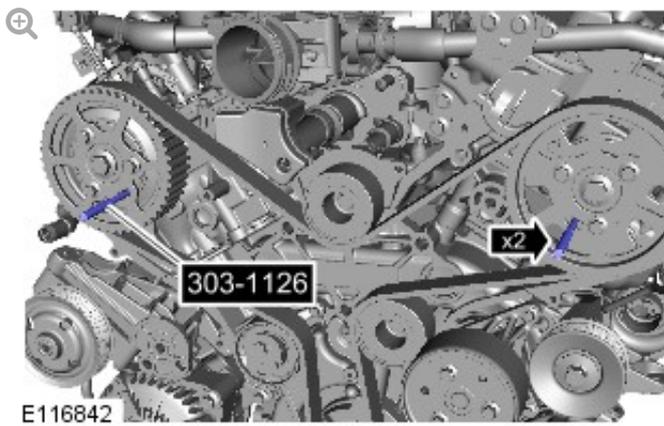
18.

Do not use the special tools to lock the camshafts. Failure to follow this instruction may result in damage to the engine or the special tools.



- Using a suitable tool, counterhold the camshaft pulley center retaining bolts.
- *Torque: 23 Nm*

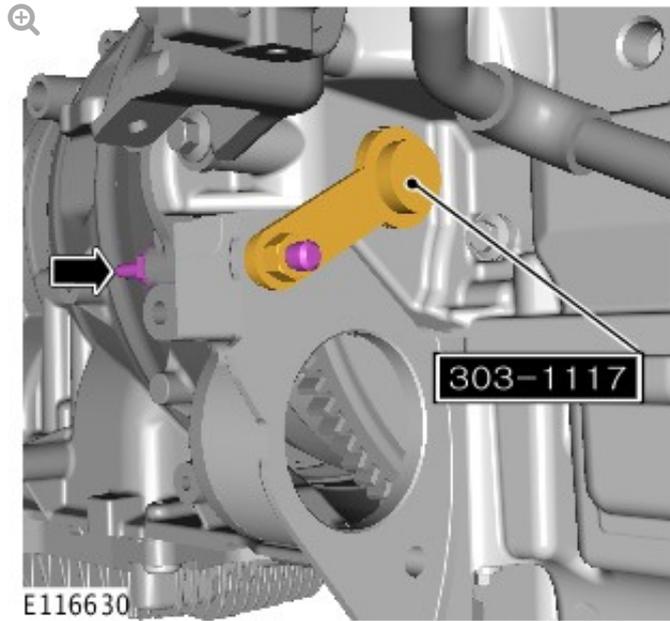
19.



Remove the special tool.

Special Tool(s): [303-1126](#)

20.



Remove the special tool.

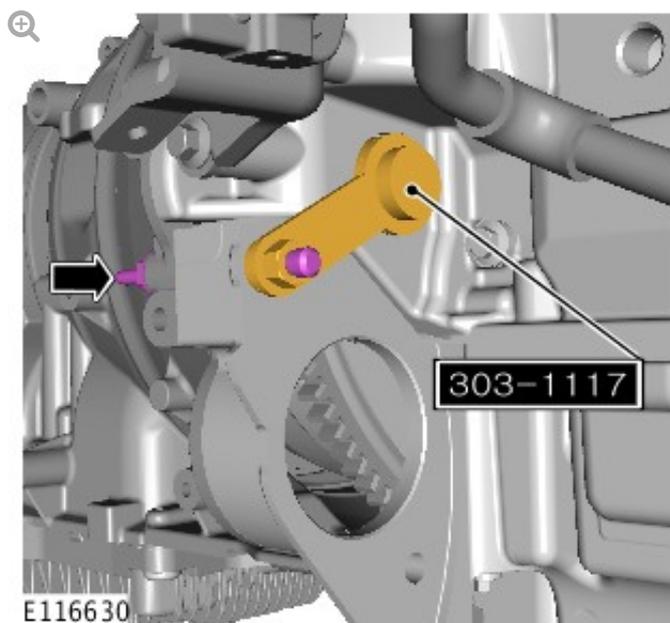
Special Tool(s): [303-1117](#)

21.

Only rotate the crankshaft clockwise.

Rotate the engine two complete turns clockwise.

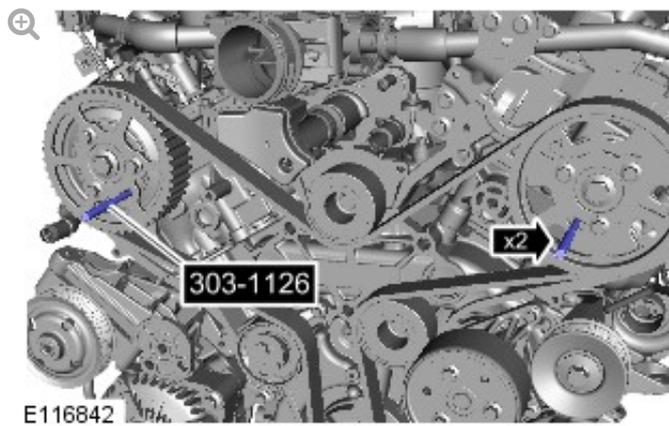
22.



Install with the special tool.

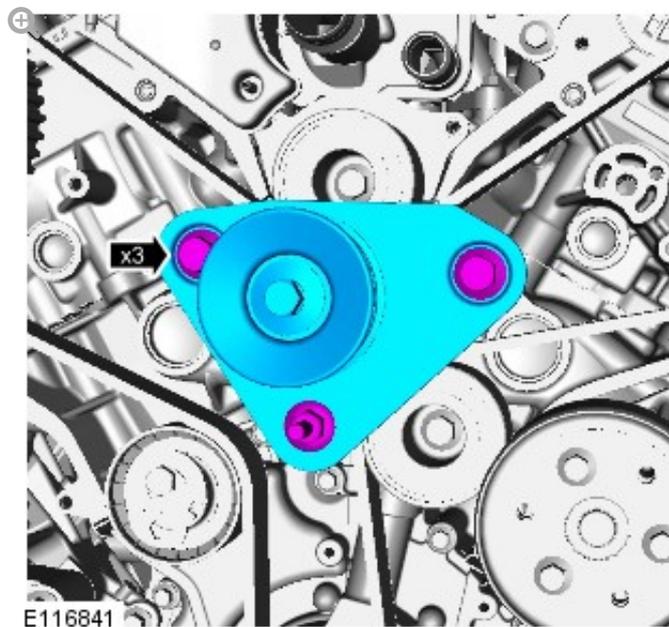
Special Tool(s): [303-1117](#)

23.



- Install the special tools to the exhaust camshaft pulleys.
Special Tool(s): [303-1126](#)
- If the special tool does not fit correctly, repeat the timing belt installation procedure.
- Remove the special tools from the camshaft pulleys.

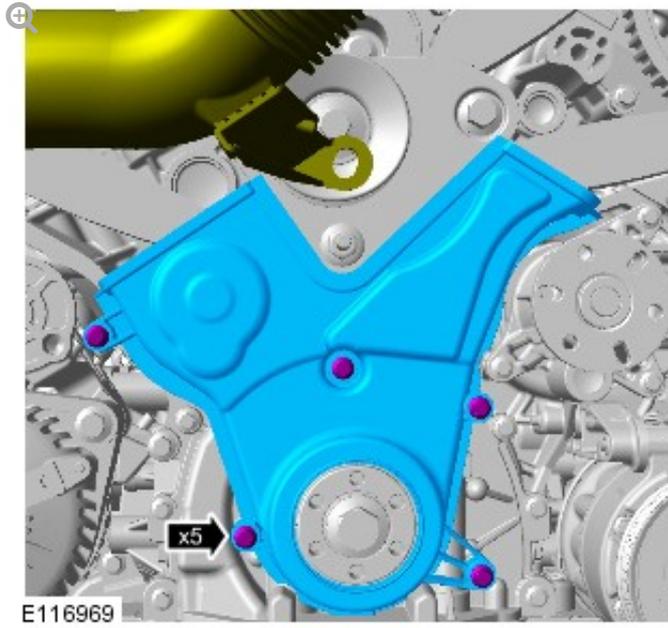
24.



Torque: **80 Nm**

25.

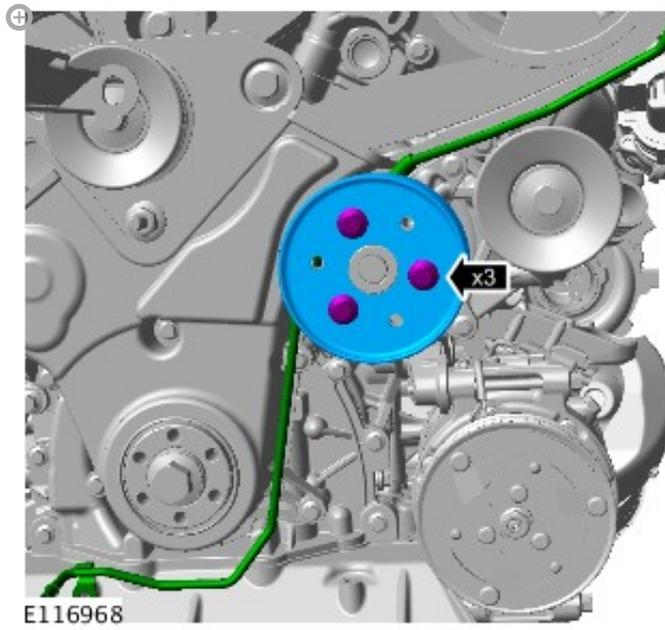
Install a new gasket.



Torque: 10 Nm

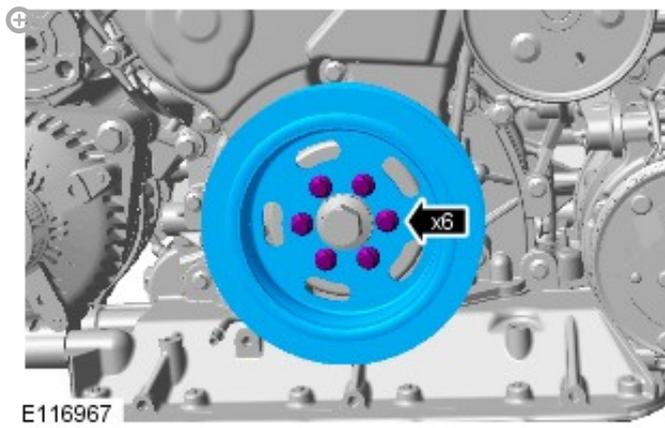
26.

Make sure that new bolts are installed.



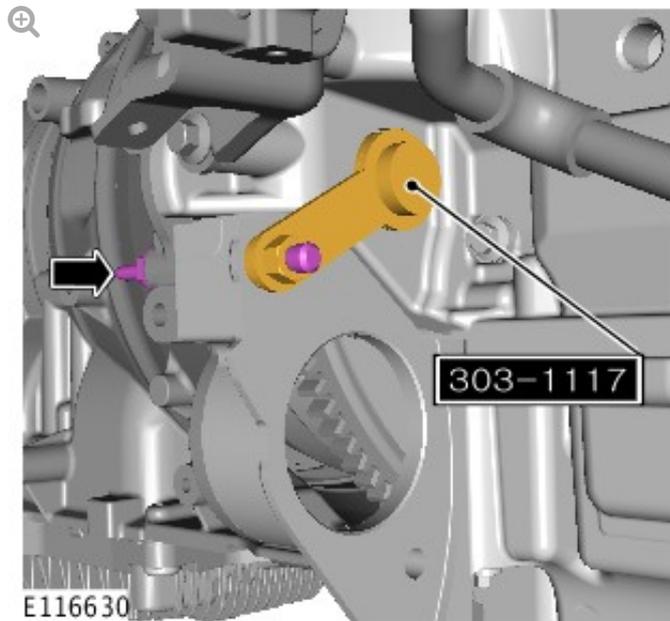
Torque: 24 Nm

27.



Torque: 25 Nm

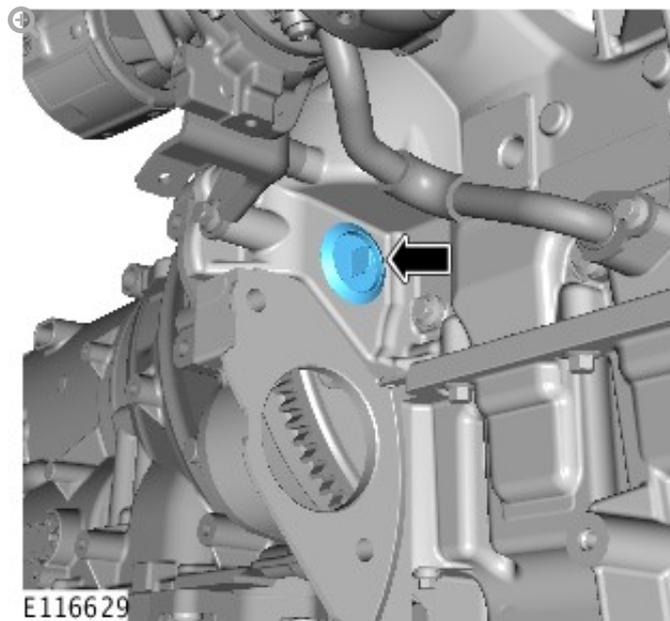
28.



Remove the special tool.

Special Tool(s): [303-1117](#)

29.



30. Refer to: [Right Valve Cover](#) (303-01A Engine - TDV6 3.0L Diesel, Removal and Installation).

31. Refer to: [Starter Motor](#) (303-06A Starting System - TDV6 3.0L Diesel, Removal and Installation).