



## Camshafts LH (12.13.21)

### Special Service Tools

303-1145/1



E60399

Camshaft pulley holding tool  
303-1145/1

303-1145/2



E60429

Camshaft pulley bolt remover  
303-1145/2

303-1145/3



E60430

Camshaft pulley bolt socket  
303-1145/3

303-1119



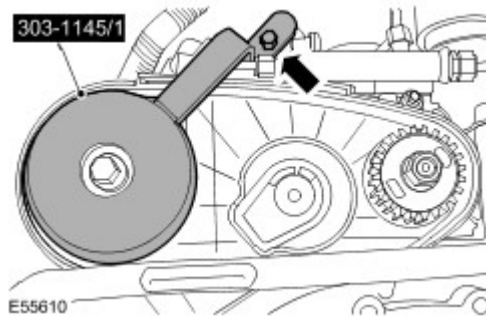
E54542

Installer - Camshaft Oil Seal  
303-1119

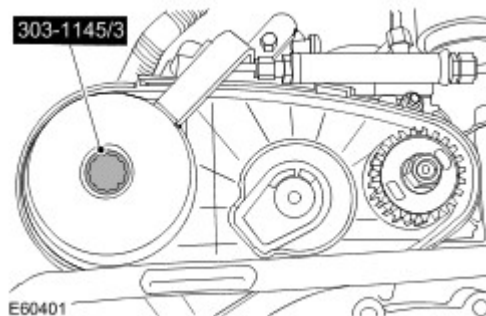
### Removal

- 1 . Disconnect the battery ground cable. For additional information, refer to [Specifications](#) (Section 414-00)
- 2 . Remove the camshaft front seal. For additional information, refer to [Camshaft Front Seal \(12.13.44\)](#) (Section 303-01)
- 3 . Remove the LH valve cover. For additional information, refer to [Valve Cover LH \(12.29.43\)](#) (Section 303-01)

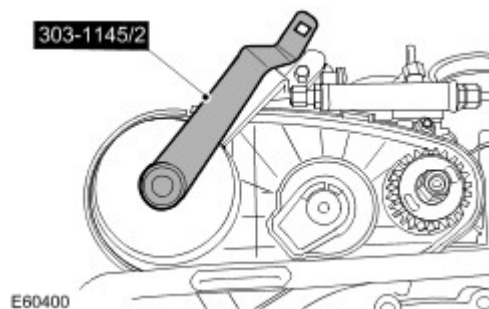
4. Remove the fuel injection pump belt. For additional information, refer to [Fuel Injection Pump Belt \(12.10.27\)](#) (Section 303-05)
5. Install the special tool to the camshaft rear pulley.
  - ▶ Rotate the crankshaft to align the special tool to the engine lifting bracket.
  - ▶ Install the special tool retaining bolt.



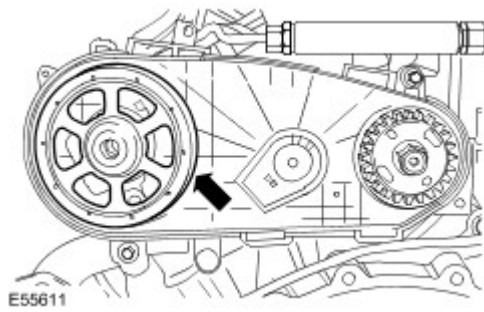
6. Install the special tool to the camshaft rear pulley retaining bolt.



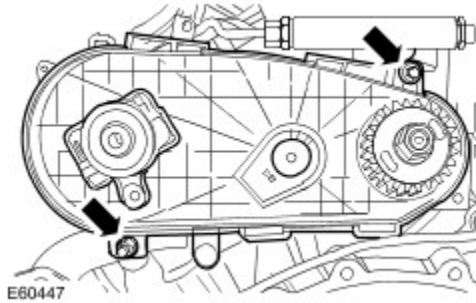
7. Using the special tools, remove and discard the camshaft rear pulley retaining bolt.
  - ▶ Rotate the crankshaft clockwise to retain the camshaft rear pulley.



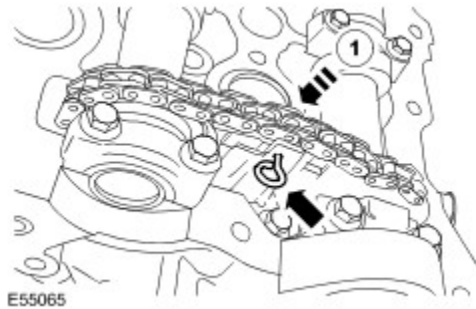
8. Remove the special tools.
9. Remove the camshaft rear pulley.



10. Remove the fuel injection pump belt rear cover.
- ▶ Remove the fuel injection pump belt rear cover retaining bolt.



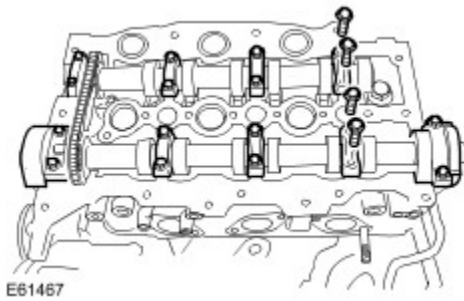
11. Retain the secondary timing chain tensioner piston.
- ▶ Reposition the secondary timing chain tensioner.
  - ▶ Install a 1.5 mm (0.060 in.) diameter pin into the secondary timing chain tensioner piston.



12.  **CAUTION: Evenly and progressively, release the camshaft bearing caps.**

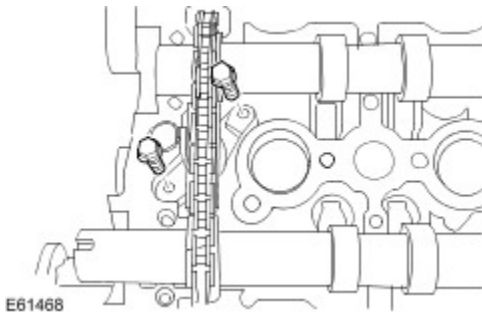
Remove the camshaft bearing caps.

- ▶ Remove the 18 retaining bolts.

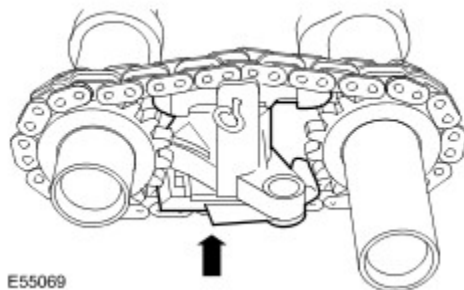


13. Remove the camshafts and secondary timing chain tensioner assembly.

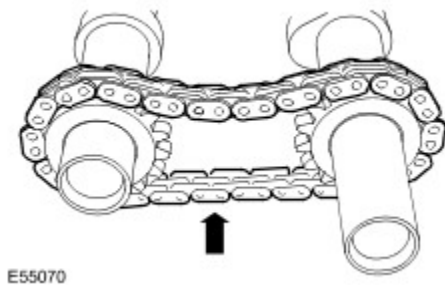
- ▶ Remove the two retaining bolts.
- ▶ Release the LH secondary timing chain tensioner.



14. Remove the secondary timing chain tensioner.



15. Remove the LH camshafts.
- ▶ Release the secondary timing chain from the LH camshafts.
  - ▶ Remove and discard the LH camshaft rear seal.



## Installation

1. Install the secondary timing chain onto the camshafts.

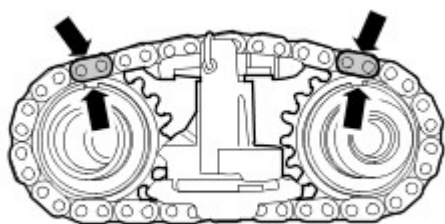
- 2.



**CAUTION:** Do not release the secondary timing chain tensioner locking pin until all of the camshaft bearing caps have been installed.

Install the secondary timing chain tensioner.

- ▶ Align the marks on the camshafts with the marks on the secondary timing chain.



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3. Install the camshafts and secondary timing chain tensioner assembly.

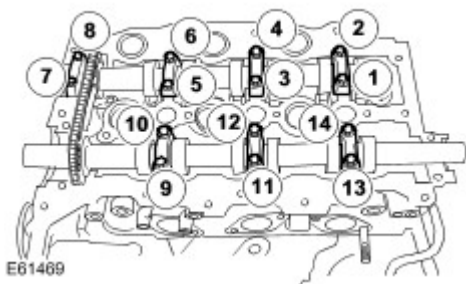
- ▶ Lubricate the journals and camshaft lobes.

4. Attach the LH secondary timing chain tensioner.

- ▶ Tighten the two retaining bolts to 10 Nm (7 lb.ft).

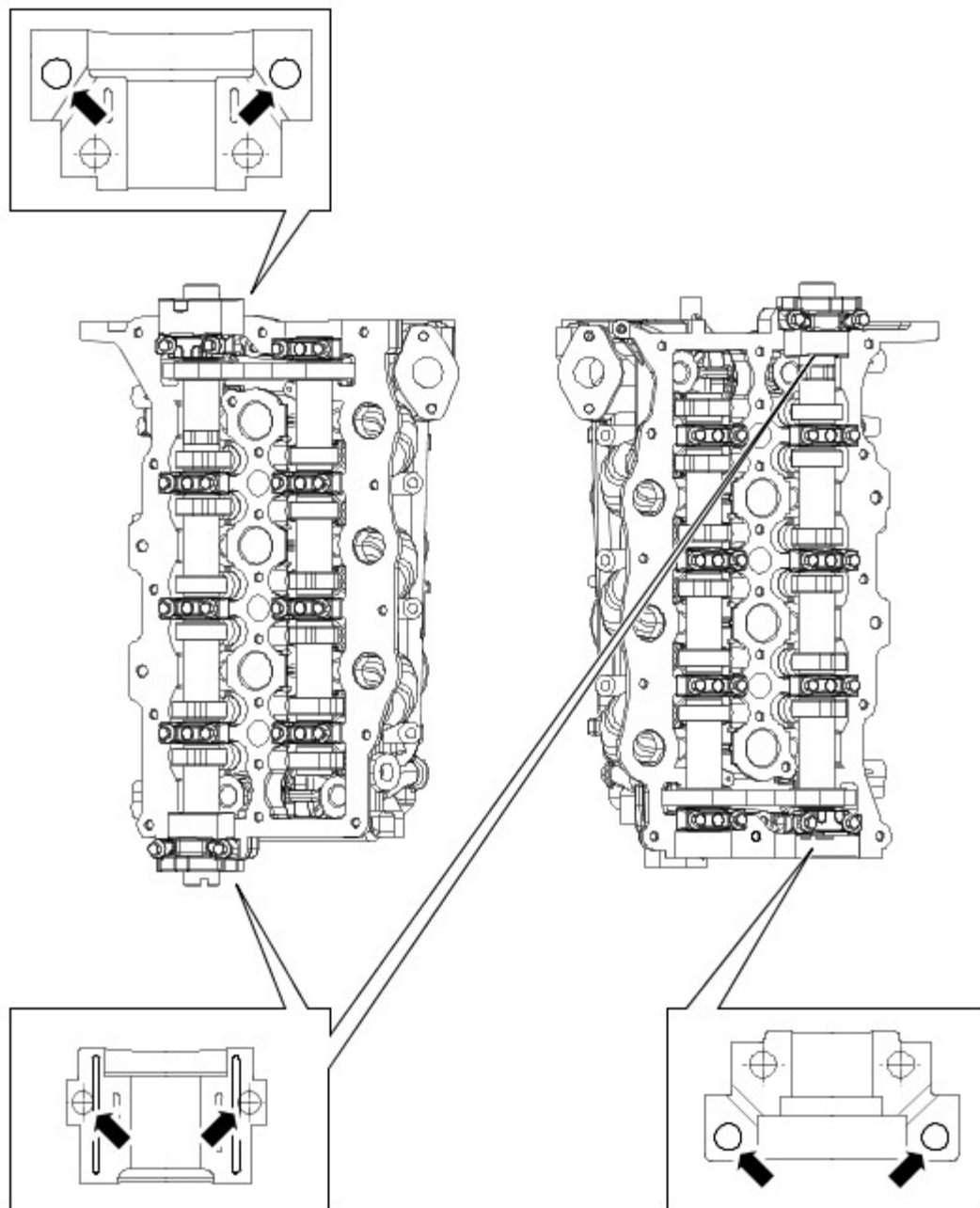
5. Install the camshaft bearing caps.

- ▶ Do not install the two exhaust camshaft end bearing caps at this stage.
- ▶ Tighten the bolts evenly in three stages in the sequence shown.
- ▶ Stage one: Tighten to 1 Nm (1 lb.ft).
- ▶ Stage two: Tighten to 5 Nm (4 lb.ft).
- ▶ Stage three: Tighten to 10 Nm (7 lb.ft).

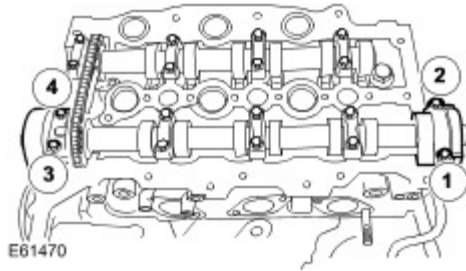


E61469

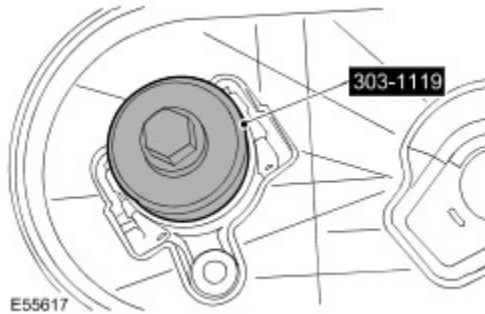
6. Apply sealant to the two exhaust camshaft end bearing caps at the positions shown. For additional information, refer to [Specifications](#) (Section 303-01)



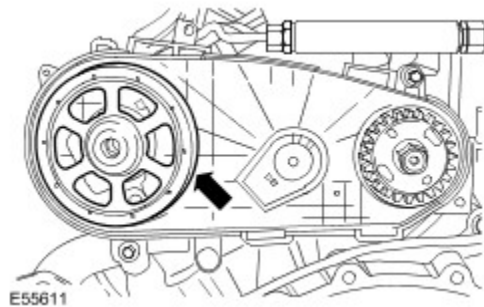
7. Install the exhaust camshaft end bearing caps.
- Tighten the bolts evenly in three stages in the sequence shown.
  - Stage one: Tighten to 1 Nm (1 lb.ft).
  - Stage two: Tighten to 5 Nm (4 lb.ft).
  - Stage three: Tighten to 10 Nm (7 lb.ft).



- 8 . Release the secondary timing chain tensioner piston.
  - Remove the locking pin.
- 9 . Install the fuel injection pump belt rear cover.
  - Install the fuel injection pump belt rear cover retaining bolt.
- 10 . Using the special tool, install the new camshaft rear seal.

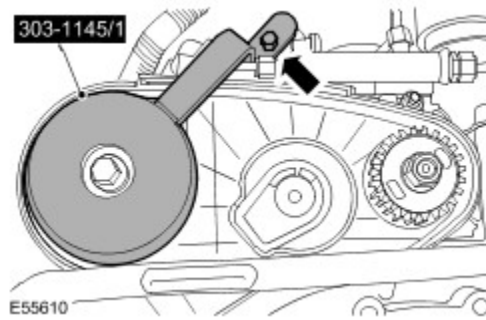


- 11 . Install the camshaft rear pulley.
  - Apply loctite 242 to the new camshaft pulley bolt.
  - Install a new camshaft pulley retaining bolt.

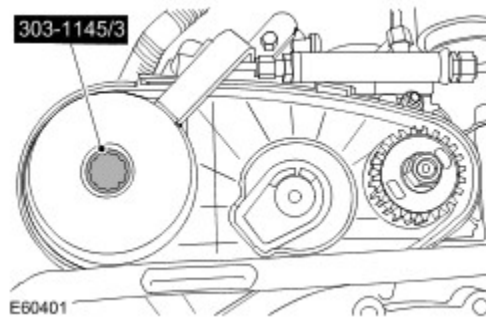



- 12 . Install the special tool to the camshaft rear pulley.
  - Install the special tool retaining bolt.





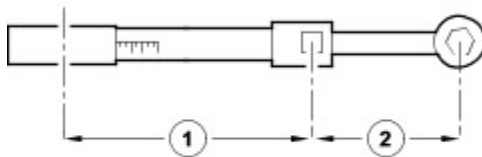
13. Install the special tool to the camshaft rear pulley retaining bolt.




14.  **CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.**

Calculate the setting for the torque wrench.

- Stage 1: Multiply the required torque by the effective length of the torque wrench (1).
- Stage 2: Add the effective length of the special tool (2) to the effective length of the torque wrench.
- Stage 3: Divide the total of stage 1 by the total of stage 2.
- Stage 4: Set the torque wrench to the figure arrived at in stage 3.

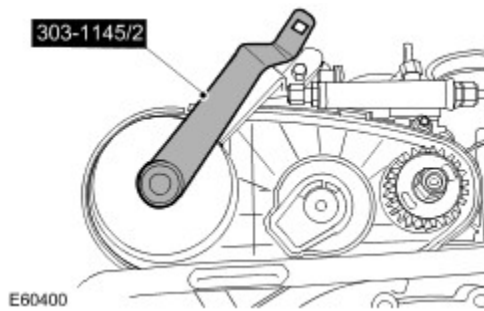


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15.  **CAUTION: Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.**

Using the special tools, tighten the camshaft rear pulley retaining bolt to 40 Nm (30 lb.ft).





16 .



**CAUTION:** Make sure the torque wrench setting procedure is followed correctly. Failure to follow this instruction may result in damage to the vehicle.

Using the special tools, tighten the camshaft rear pulley bolt a further 75 Nm (56 lb.ft).



Rotate the crankshaft counter-clockwise to retain the camshaft rear pulley.

17 .

Remove the special tools.

18 .

Install the fuel injection pump belt. For additional information, refer to [Fuel Injection Pump Belt \(12.10.27\)](#) (Section 303-05)

19 .

Install the LH valve cover. For additional information, refer to [Valve Cover LH \(12.29.43\)](#) (Section 303-01)

20 .

Install the camshaft front seal. For additional information, refer to [Camshaft Front Seal \(12.13.44\)](#) (Section 303-01)

21 .

Connect the battery ground cable. For additional information, refer to [Specifications](#) (Section 414-00)