

PUBLISHED: 17-FEB-2020  
2020.0 DEFENDER (LE), 303-01C

ENGINE – INGENIUM I6 3.0L PETROL

# CAMSHAFT CARRIER (G2340715)

REMOVAL AND INSTALLATION

|          |                                     |                                |      |              |  |
|----------|-------------------------------------|--------------------------------|------|--------------|--|
| 12.29.43 | CAMSHAFT<br>COVER – LEFT<br>– RENEW | 2000 CC,<br>INGENIUM<br>DIESEL | 6.10 | USED WITHINS |  |
|----------|-------------------------------------|--------------------------------|------|--------------|--|

## SPECIAL TOOL(S)



E115261

303-1444-01

Guide Pins - Threaded



E115262

303-1444-02

Guide Pins - Unthreaded



E206101

## JLR-303-1639

CVVL brake unit reset tool



E206102

## JLR-303-1647

CVVL Locating Pins

### PART(S)

| STEP                 | PART NAME                                             | QUANTITY |
|----------------------|-------------------------------------------------------|----------|
| Installation Step 1  | Camshaft bearing cap nuts                             | 28       |
| Installation Step 2  | Camshaft carrier gasket                               | 1        |
| Installation Step 12 | Engine vent oil separator to valve cover gasket       | 1        |
| Installation Step 14 | Continuous Variable Valve Lift (CVVL) Assembly Gasket | 1        |
| Installation Step 22 | Camshaft position sensor O-ring seal                  | 2        |

## REMOVAL

### CAUTION:

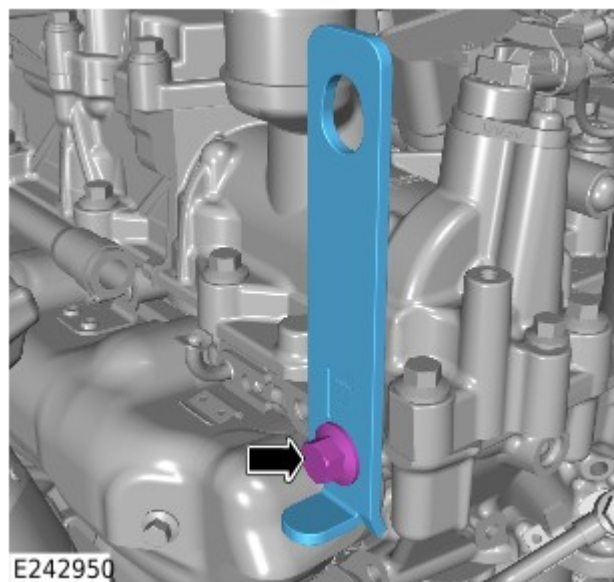
Before disconnecting any components, make sure the area is clean and free from foreign material. When disconnected all components must be sealed.

### NOTE:

- This procedure contains some variation in the illustrations depending on the vehicle specification, but the essential information is always correct.
- This procedure contains illustrations showing certain components removed to provide extra clarity.

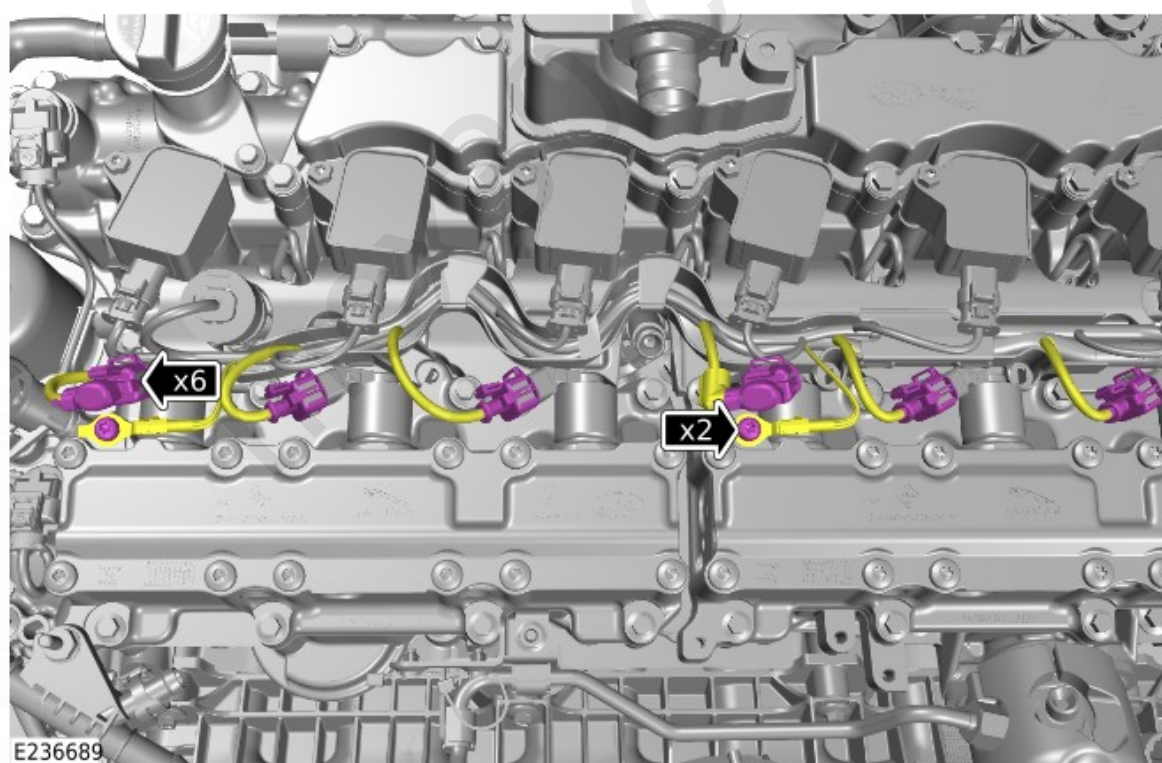
1. Raise and support the vehicle on a suitable 2 post lift.  
Refer to: [Jacking and Lifting](#) (100-02 Jacking and Lifting, Description and Operation).
2. Disconnect the startup battery ground cable.  
Refer to: [Startup Battery Disconnect and Connect](#) (414-00 Battery and Charging System - General Information, General Procedures).
3. Remove the upper timing chain.  
Refer to: [Upper Timing Chain](#) (303-01C Engine - INGENIUM I6 3.0L Petrol, Removal and Installation).
4. Remove the fuel injectors.  
Refer to: [Fuel Injectors](#) (303-04E Fuel Charging and Controls - INGENIUM I6 3.0L Petrol, Removal and Installation).
5. Remove the High Pressure (HP) fuel pump.  
Refer to: [High Pressure Fuel Pump](#) (303-04E Fuel Charging and Controls - INGENIUM I6 3.0L Petrol, Removal and Installation).
6. Remove the electric supercharger.  
Refer to: [Electric Supercharger](#) (303-12C Intake Air Distribution and Filtering - INGENIUM I6 3.0L Petrol, Removal and Installation).

7.



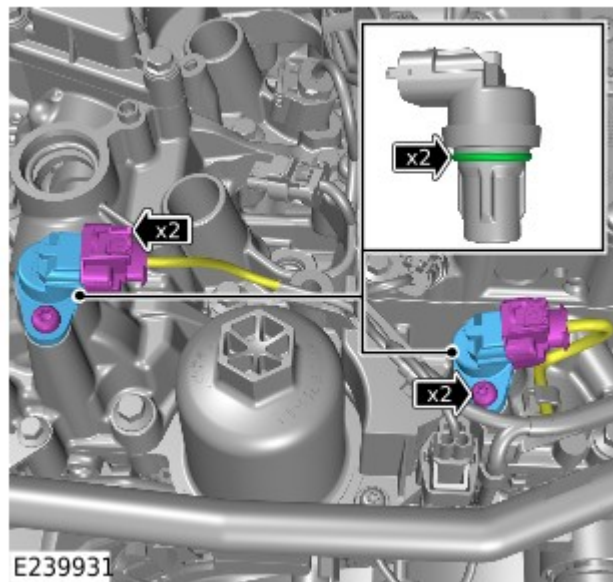
- Remove the bolt.
- Remove the powertrain support bracket.

8.



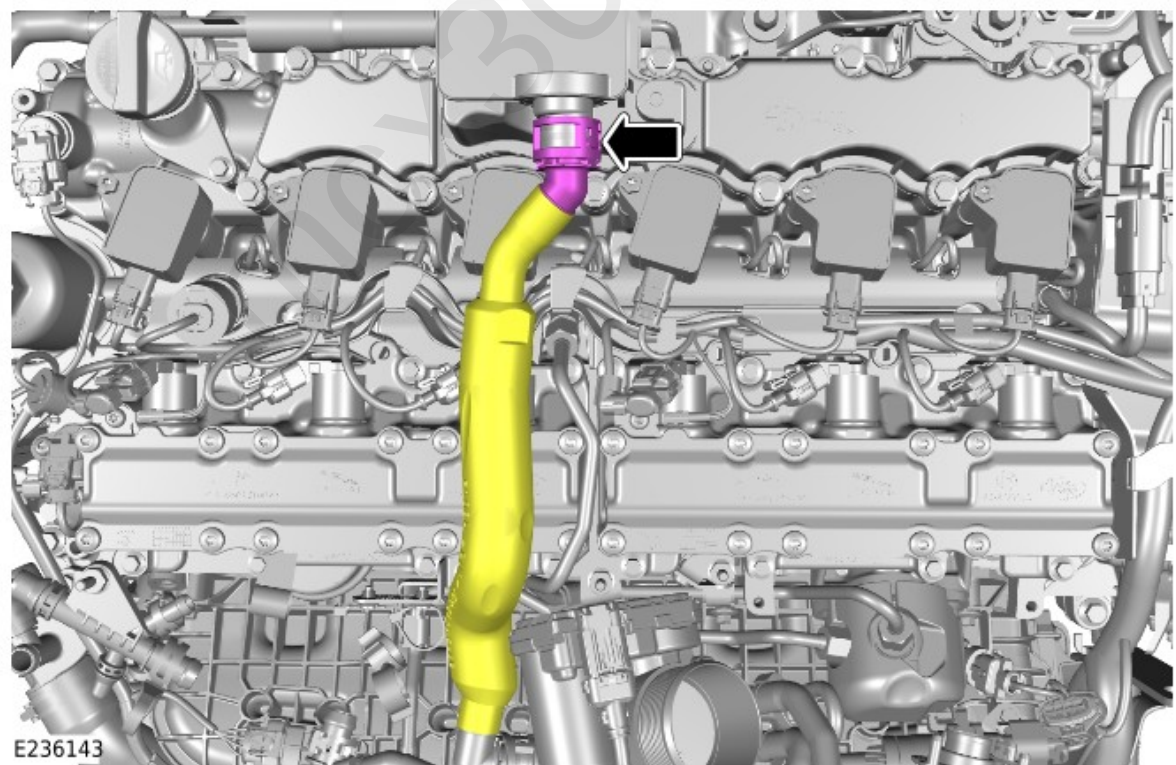
- Disconnect the 6 electrical connectors.
- Remove the 2 bolts.
- Reposition the wiring harness away from the camshaft carrier.

9.



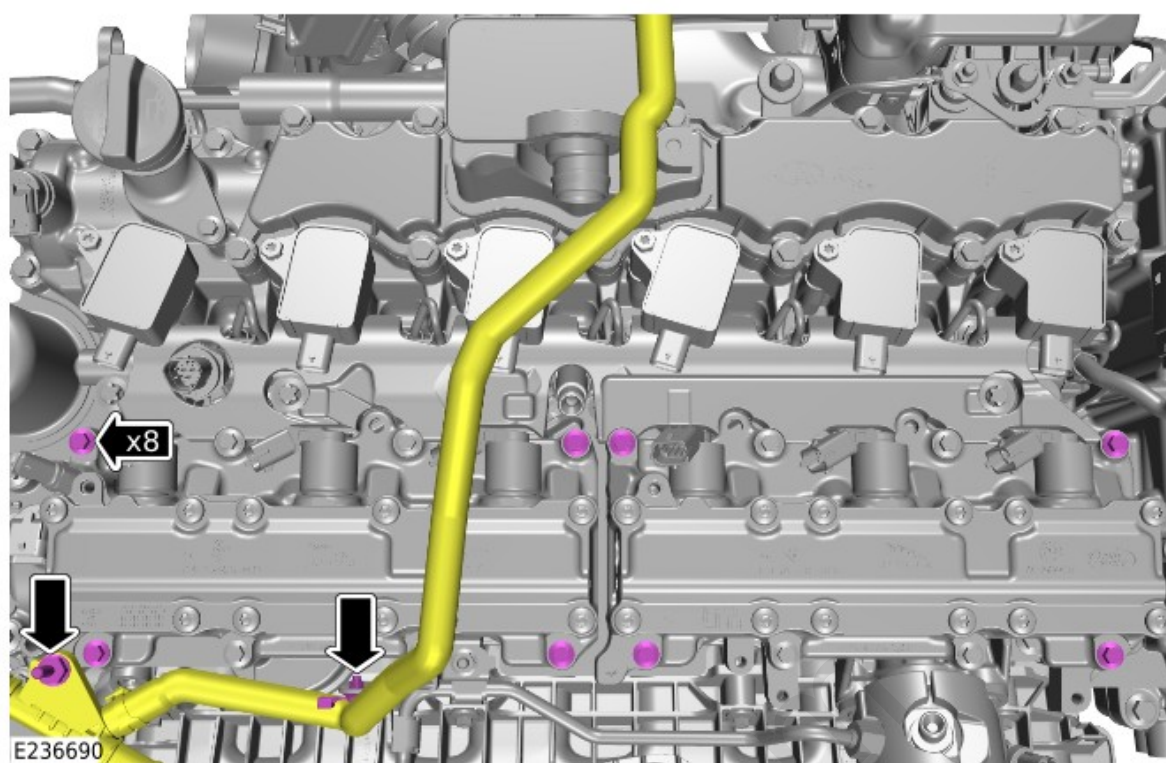
- Disconnect the 2 electrical connectors.
- Remove the 2 bolts.
- Remove the 2 Camshaft Position Sensor (CMP) sensors.
- Remove and discard the 2 O-ring seals.

10.



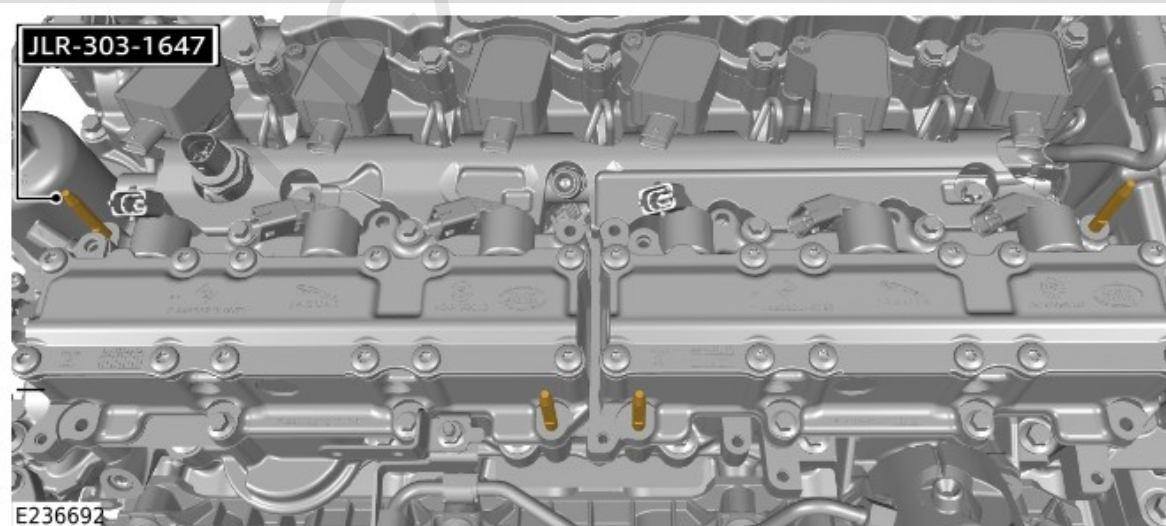
Disconnect the breather hose.

11.



- Remove the bolt.
- Release the clip.
- Reposition the coolant hose away from the camshaft carrier.
- Remove the 8 bolts from the Continuous Variable Valve Lift (CVVL) assembly.

12.



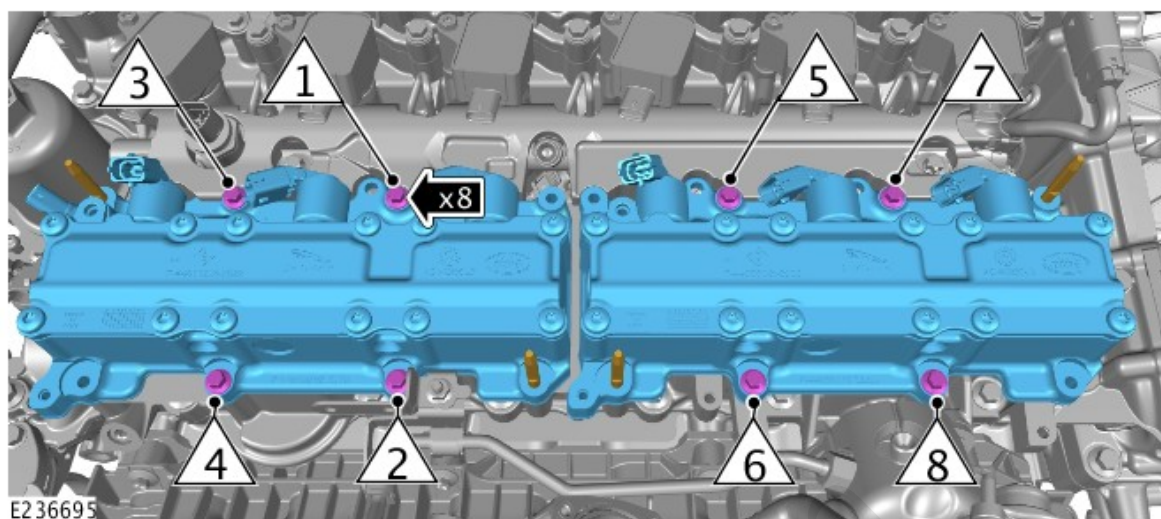
Install the special tools.

Special Tool(s): [JLR-303-1647](#)

13.

**⚠ CAUTION:**

Make sure the CVVL assembly is not inverted.



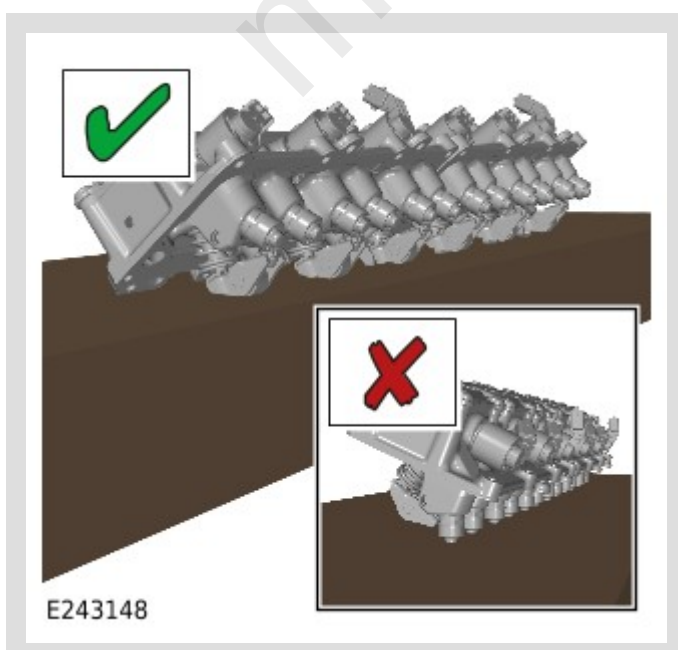
- Remove the 8 bolts in the illustrated sequence.
- Remove the 2 CVVL assemblies.
- Remove the special tools.

*Special Tool(s):* [JLR-303-1647](#)

14.

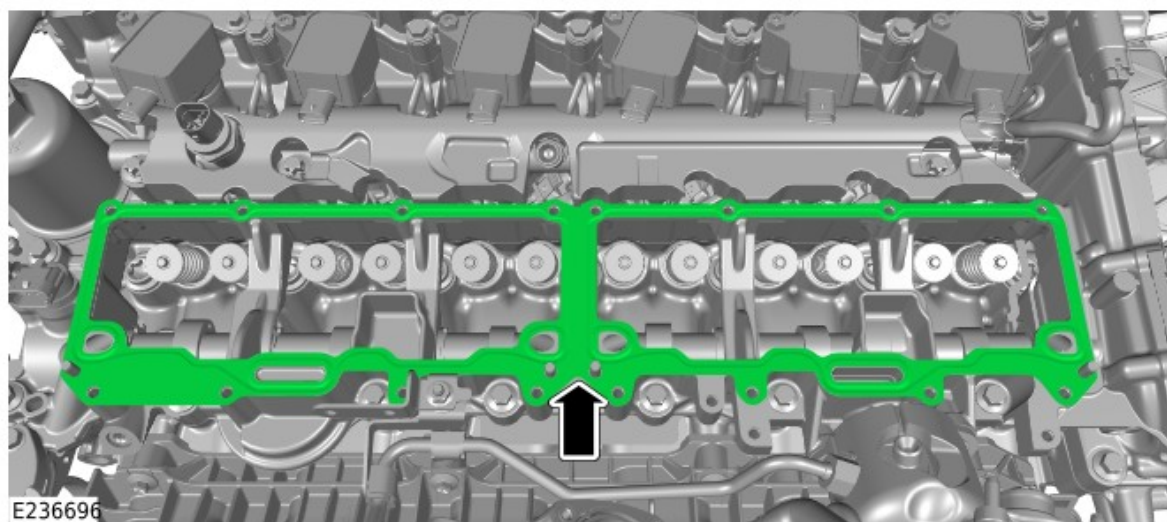
**⚠ CAUTION:**

Failure to follow this instruction will result in damage to the Continuous Variable Valve Lift (CVVL) assembly.



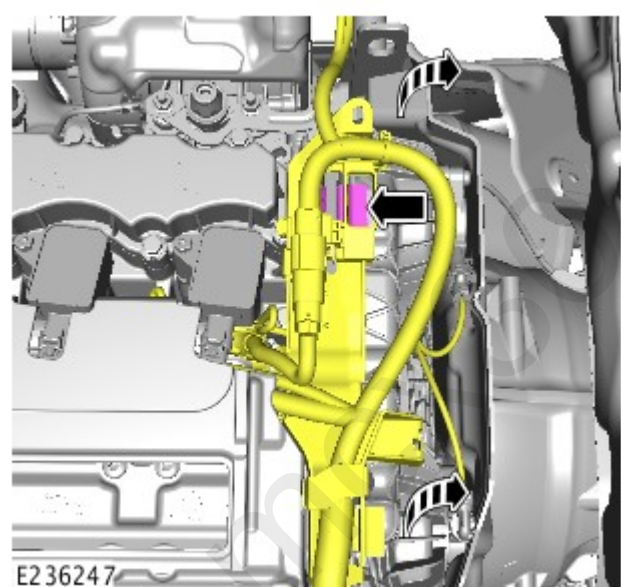
Do not allow the CVVL assembly to be rested on the brake units.

15.



Remove and discard the CVVL gasket.

16.

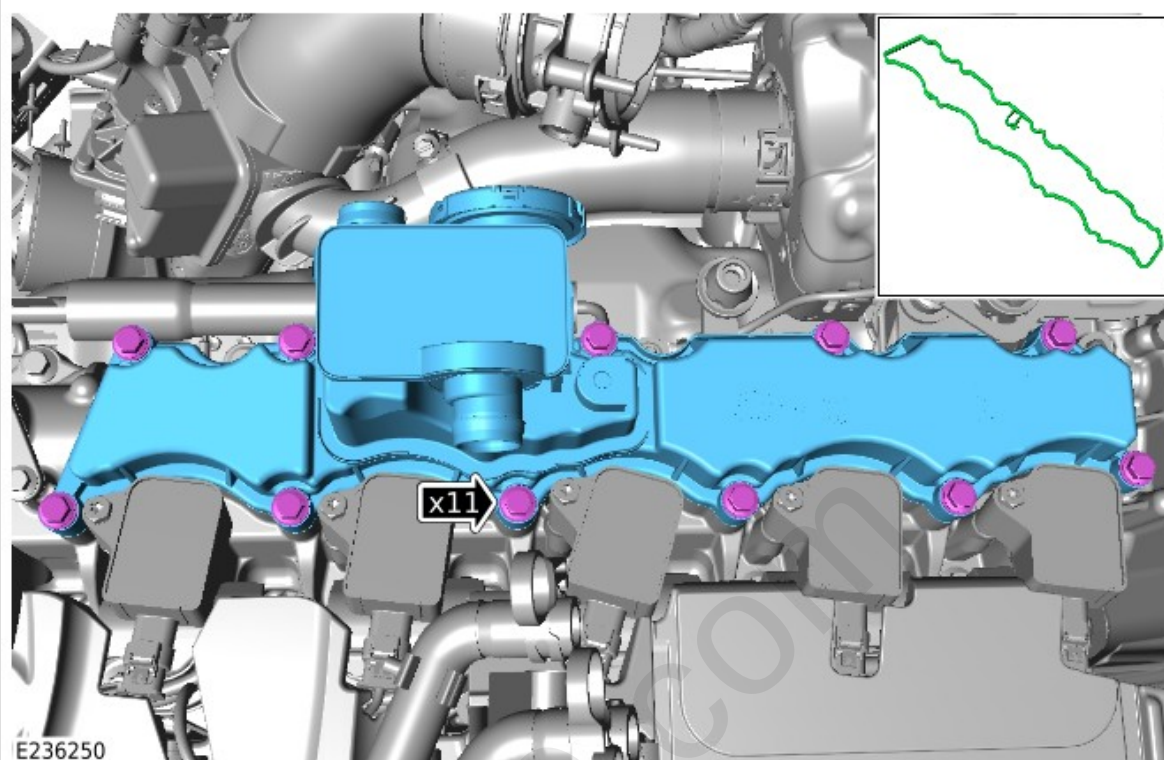


- Release the clip.
- Reposition the wiring harness away from the engine vent oil separator.

17.

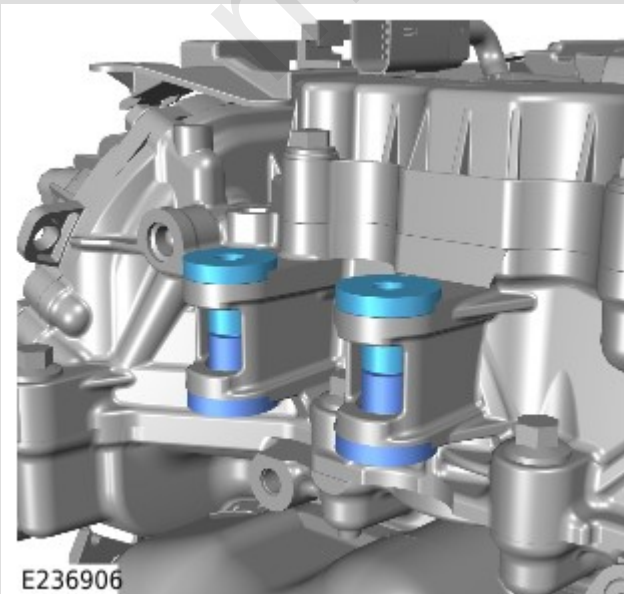
 **NOTE:**

The bolts are captive.



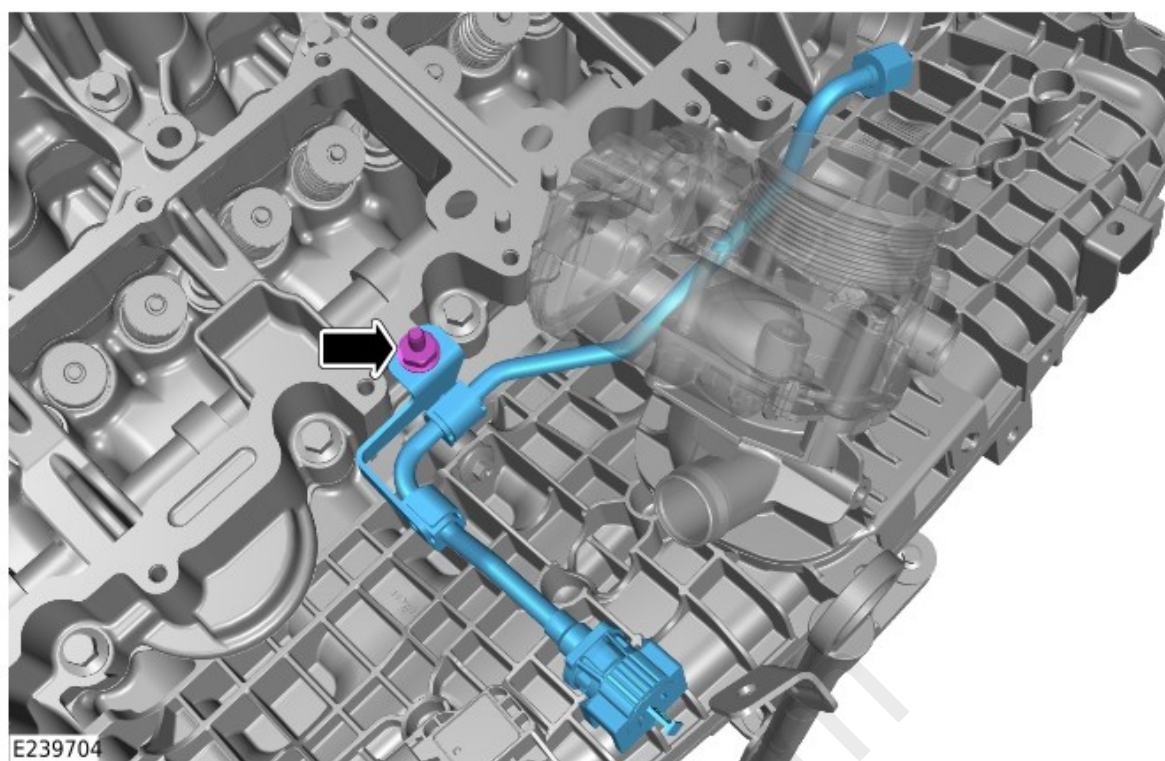
- Loosen but do not remove the 11 bolts.
- Remove the engine vent oil separator.
- Remove and discard the gasket.

18.



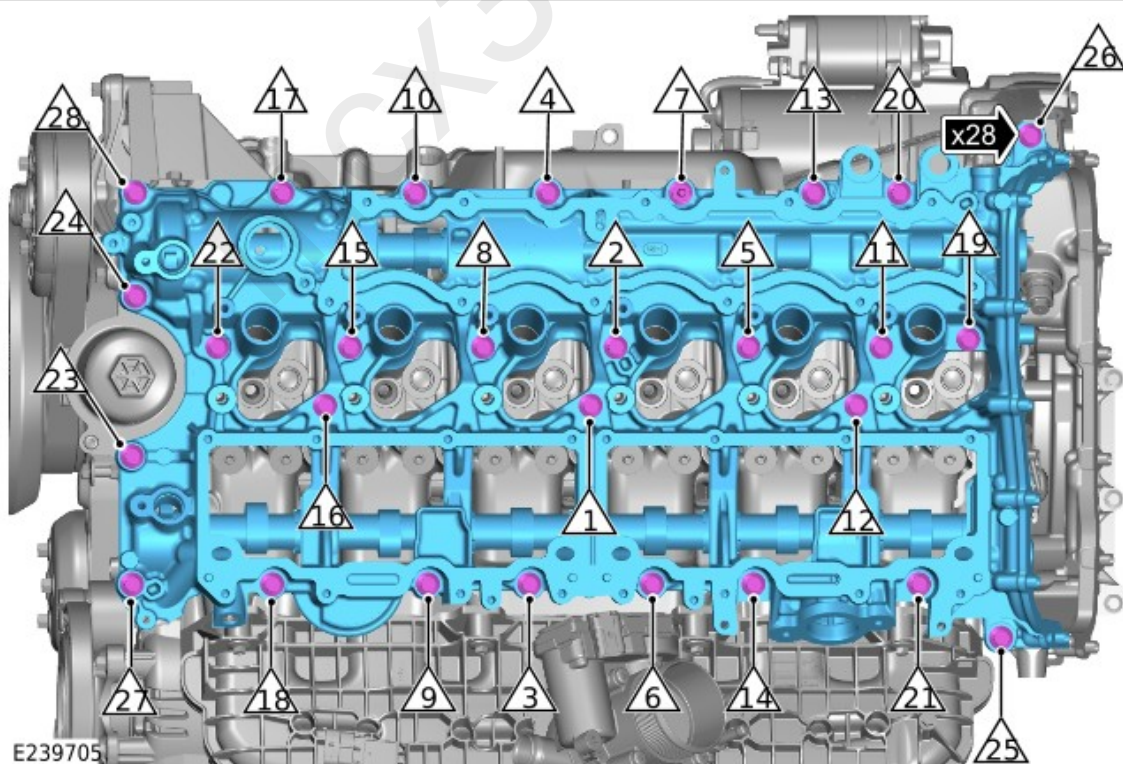
Remove the 4 electric supercharger mounting rubbers.

19.

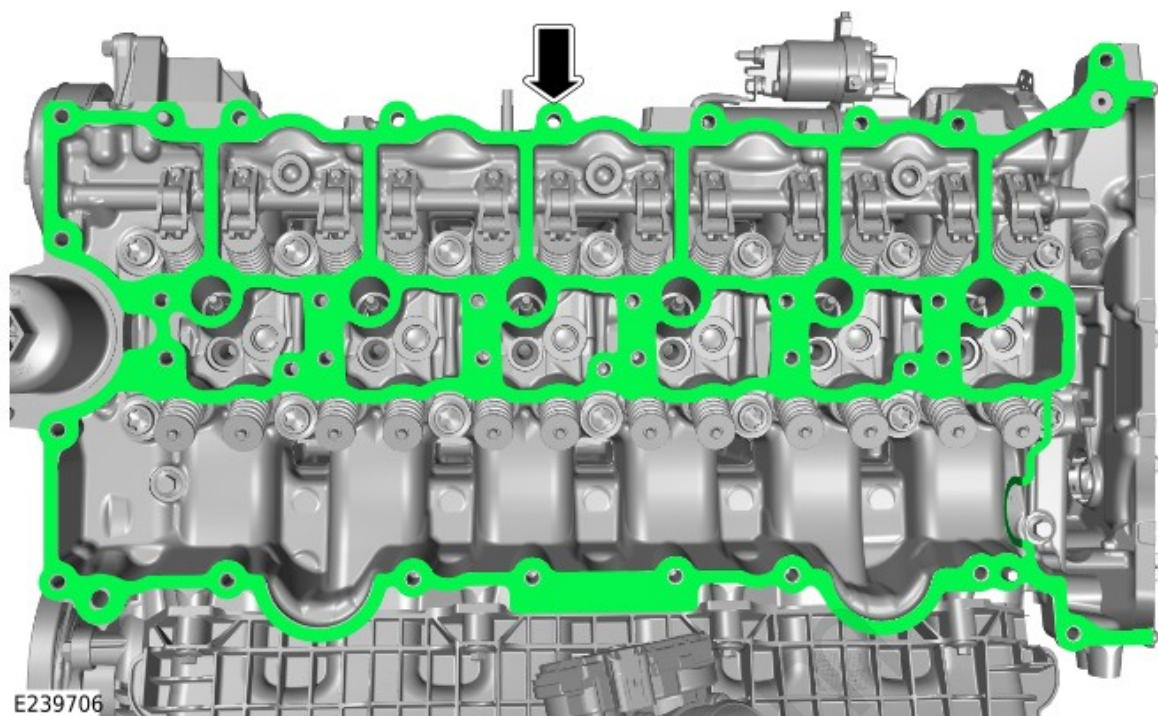


- Remove the bolt.
- Remove the fuel line.

20.



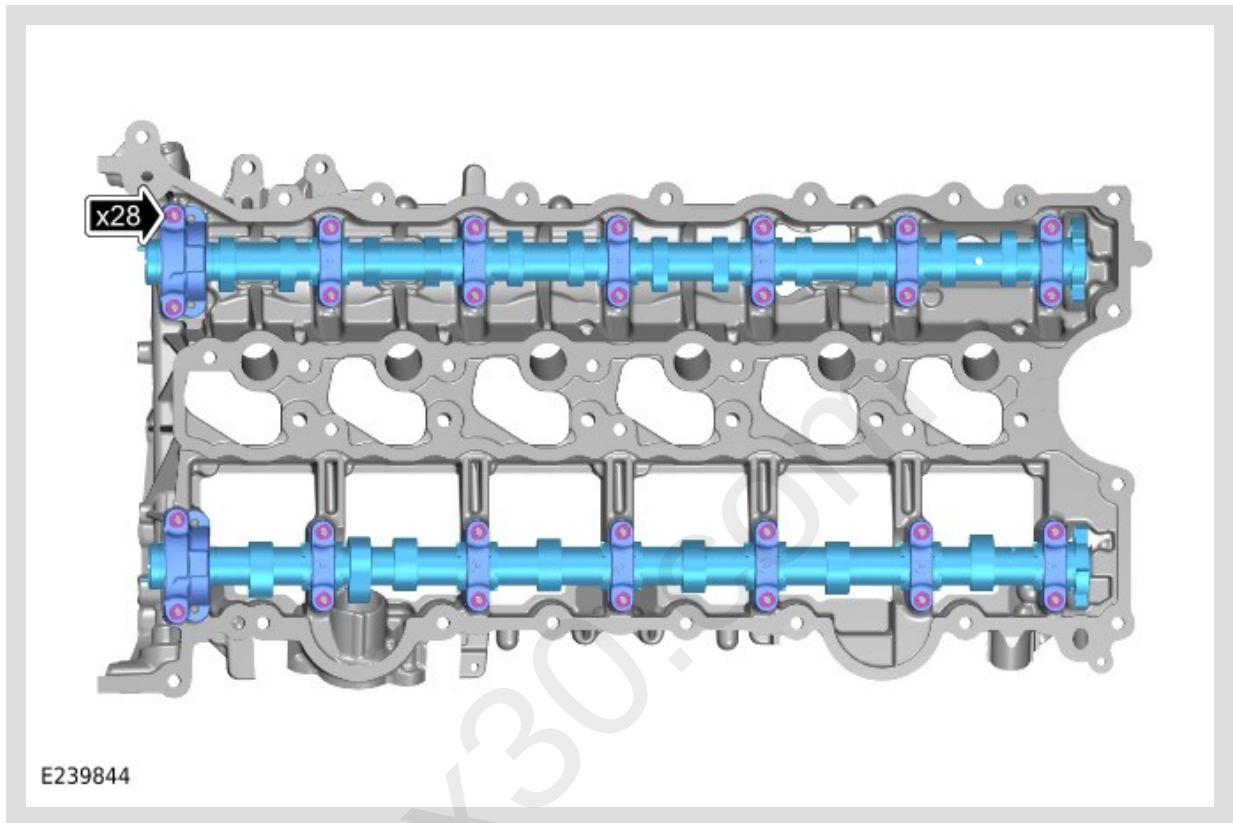
- Remove the 28 bolts in the illustrated sequence.
- Remove the camshaft carrier assembly.



Remove and discard the camshaft carrier gasket.

 **NOTES:**

- Do not disassemble further if the component is removed for access only.
- Note the camshaft bearing caps position, orientation and markings. Each is marked with its position (number) and an orientation (arrow).
- Note the installed position of the 2 camshafts.



- Remove and discard the 28 nuts.
- Remove the 14 camshaft bearing caps.
- Remove the 2 camshafts.

## INSTALLATION

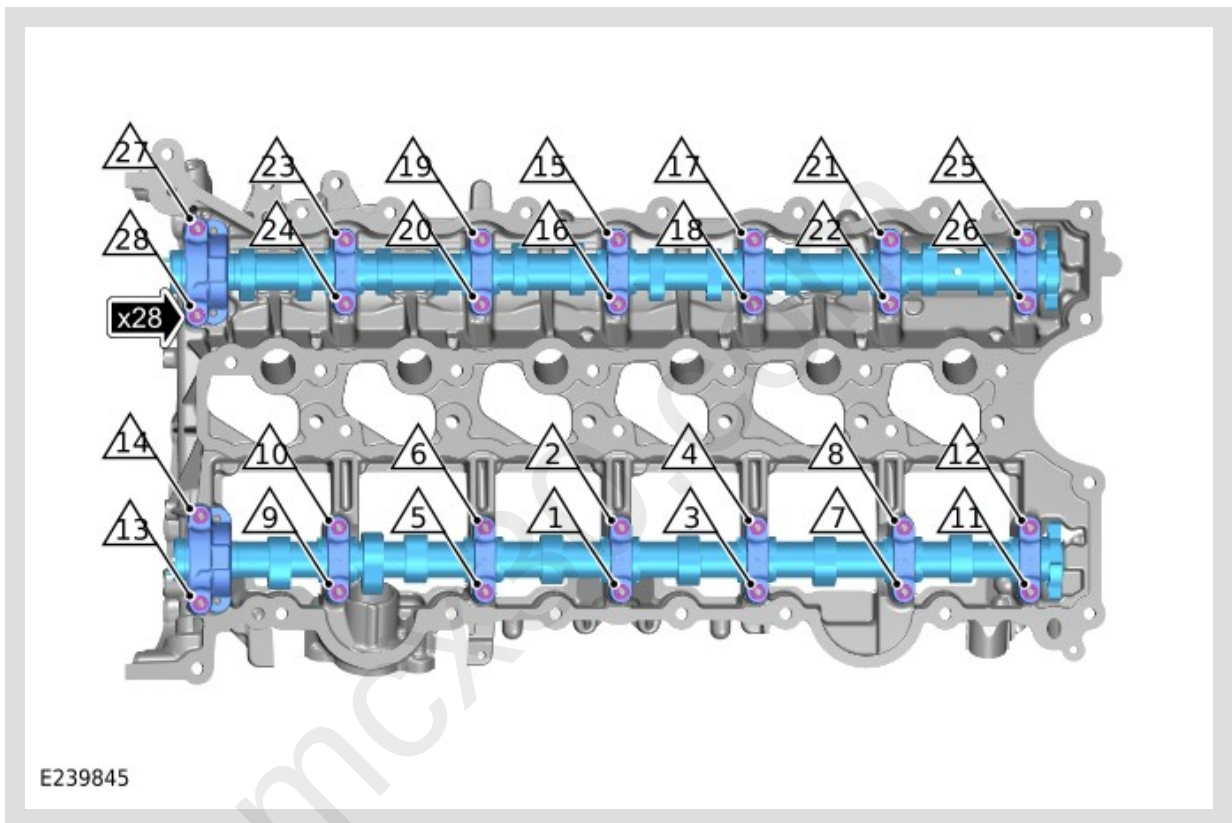
1.

### ⚠ CAUTION:

Make sure that the mating surfaces are clean and free from debris and foreign material.

### △ NOTE:

This step is not required if the component is removed for access only.



- Lubricate the components with clean engine oil.  
Refer to: [Specifications](#) (303-01C Engine - INGENIUM I6 3.0L Petrol, Specifications).
- Install the 2 camshafts to their noted removal position.
- Install the 14 camshaft bearing caps to their noted removal position.
- Install and tighten 28 new nuts in the sequence illustrated.  
*Renew Part: [Camshaft bearing cap nuts](#) Quantity: 28.*  
*Torque: 11Nm*

2.

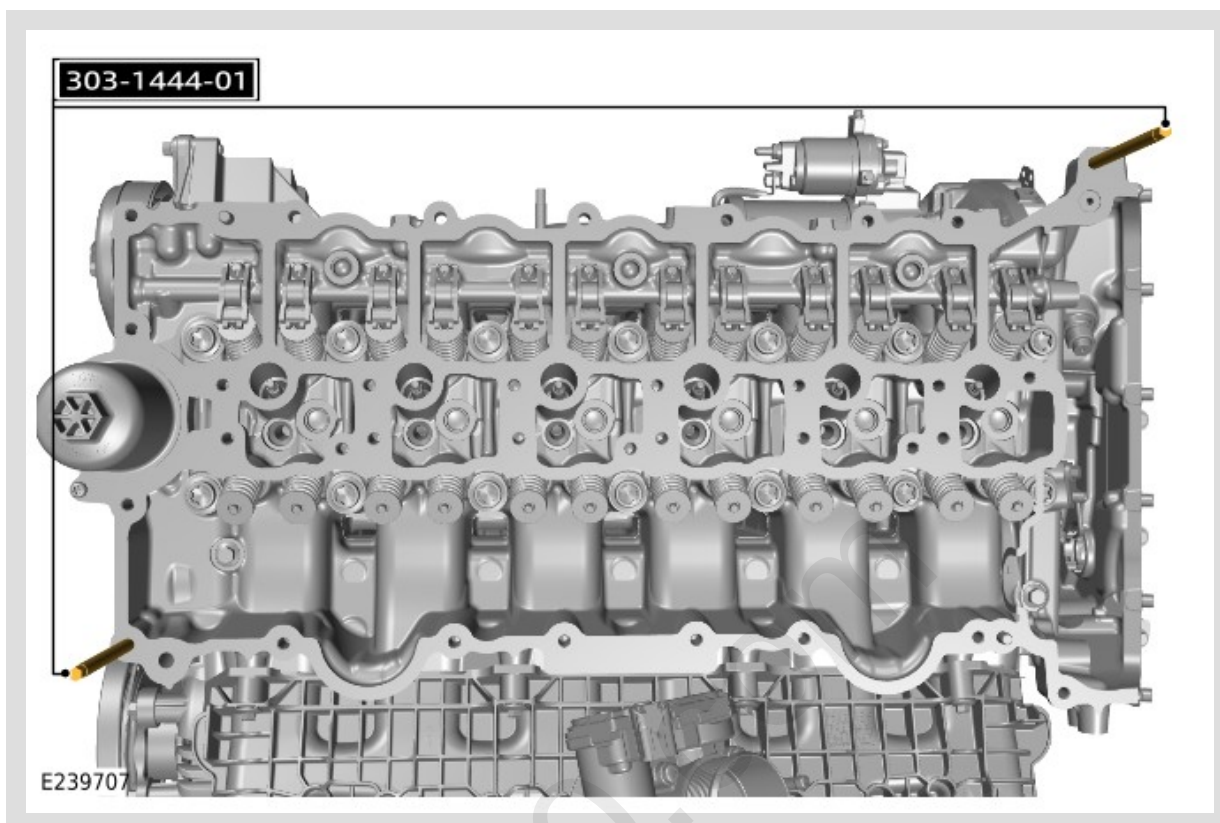
Install a new camshaft carrier gasket.

*Renew Part: [Camshaft carrier gasket](#) Quantity: 1.*

3.

 NOTE:

If the original cylinder head is installed use the threaded guide pins 303-1444-01.



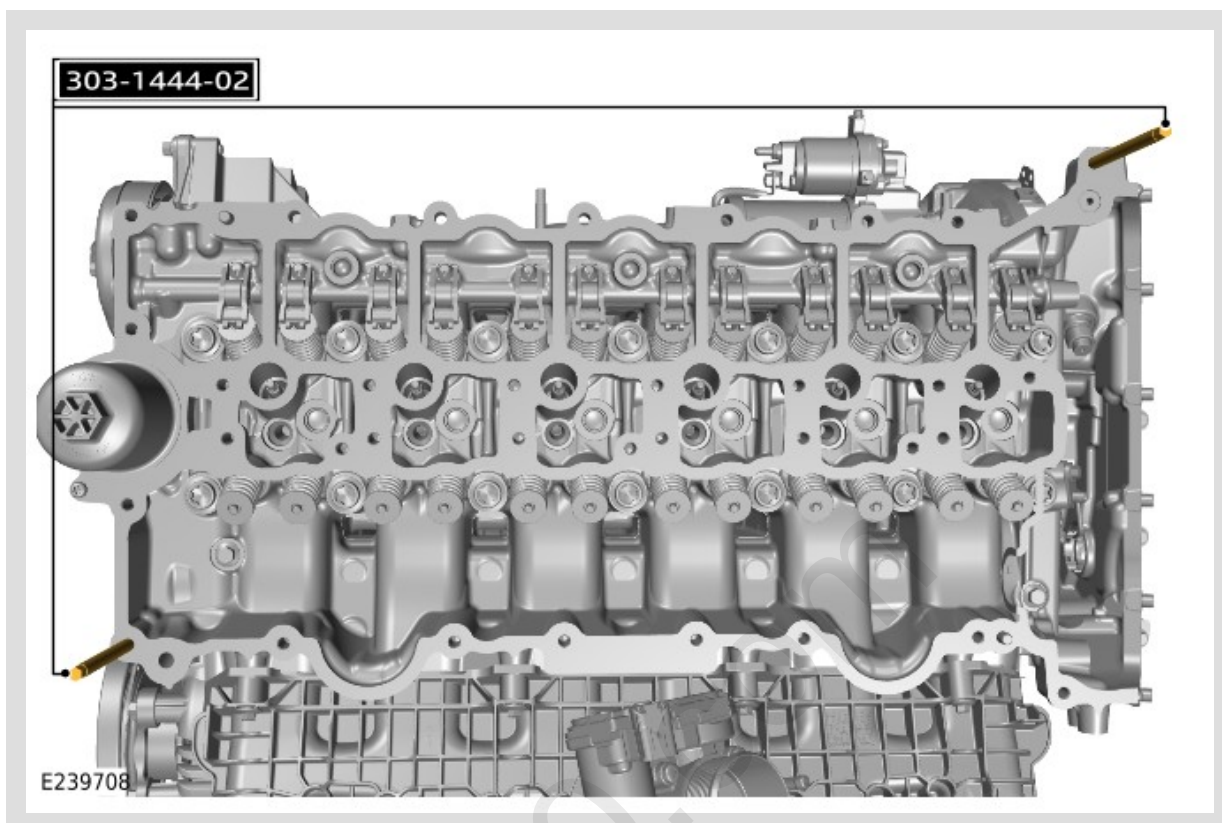
Install the special tools.

Special Tool(s): [303-1444-01](#)

4.

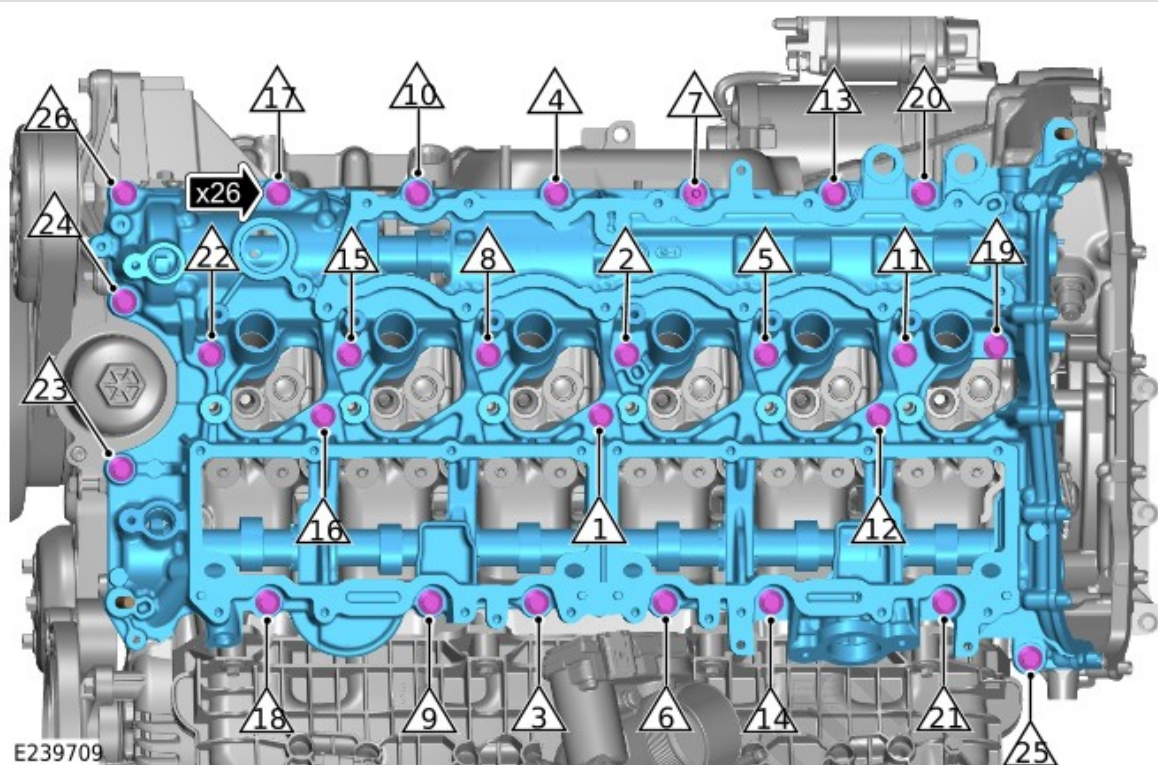
 NOTE:

If a new cylinder head is installed use the unthreaded guide pins 303-1444-02.



Install the special tools.

Special Tool(s): [303-1444-02](#)



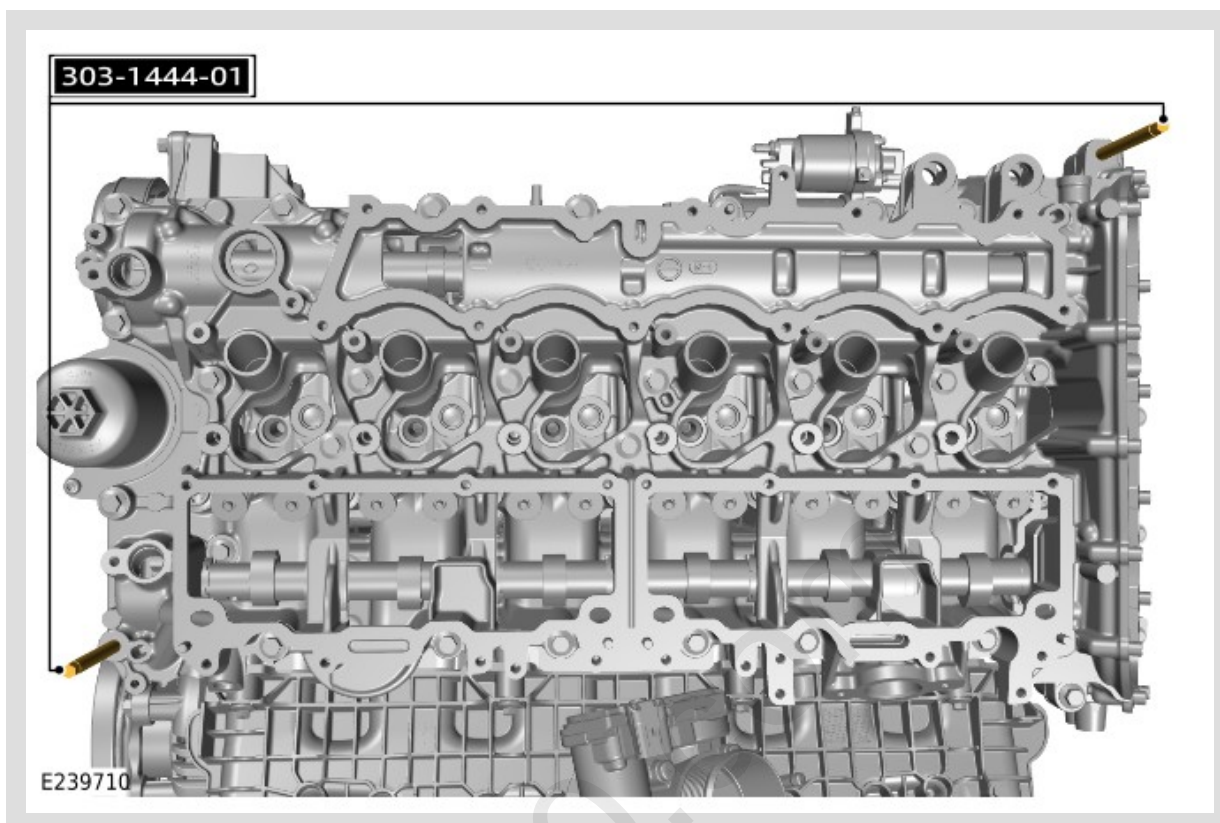
- Install the camshaft carrier.
- Install and tighten the 26 bolts in the illustrated sequence.

*Torque: 10Nm*

6.

 **NOTE:**

This step is only required if previously installed.



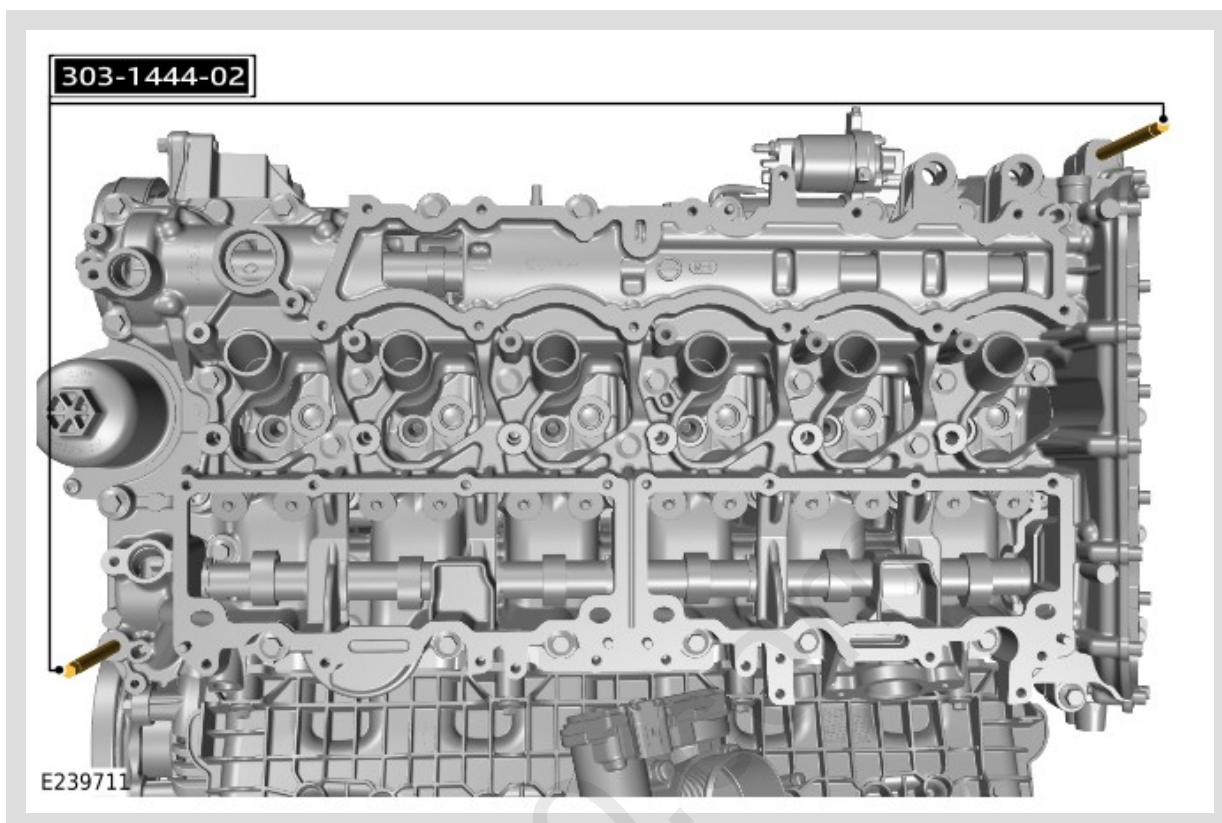
Remove the special tools.

*Special Tool(s):* [303-1444-01](#)

7.

 NOTE:

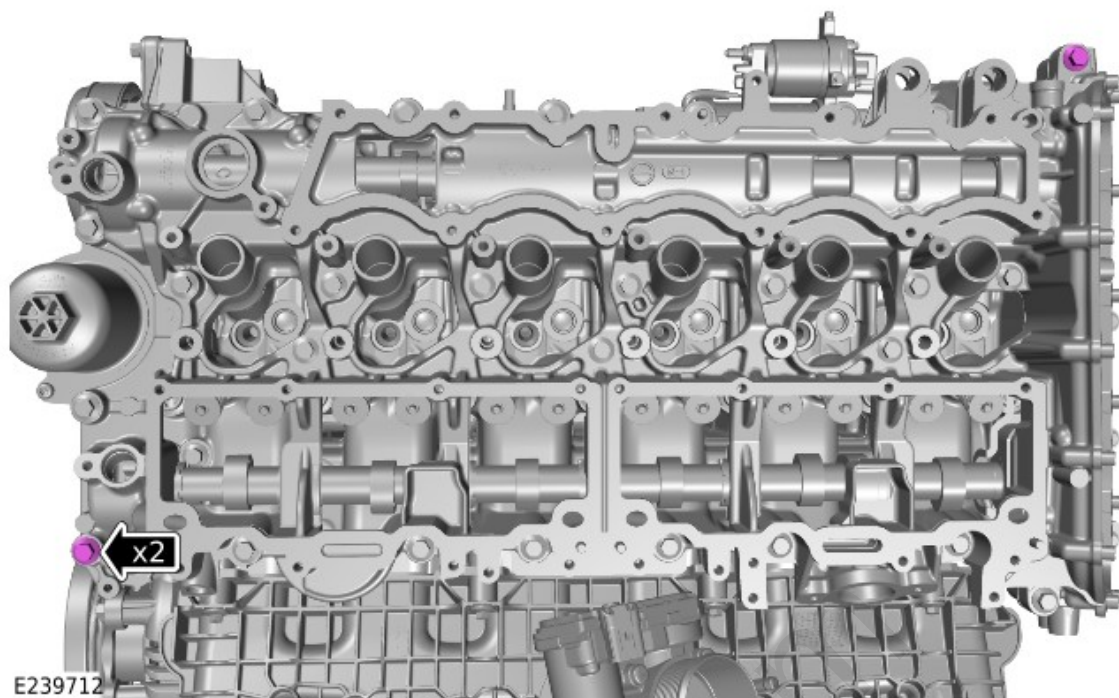
This step is only required if previously installed.



Remove the special tools.

Special Tool(s): [303-1444-02](#)

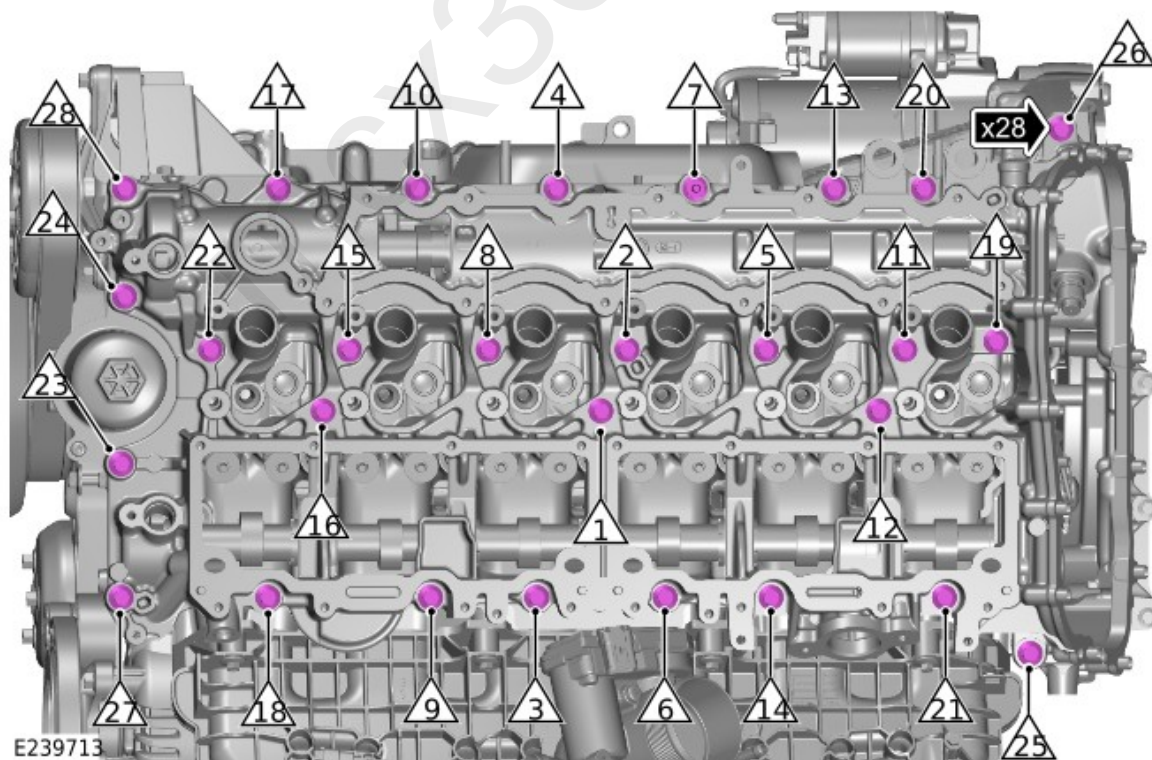
8.



Install and tighten the 2 bolts.

*Torque: 10Nm*

9.



Tighten the 28 bolts in the illustrated sequence.

*Torque: 28Nm*

10.

- Install the fuel line.
- Install and tighten the bolt.

*Torque: 11Nm*

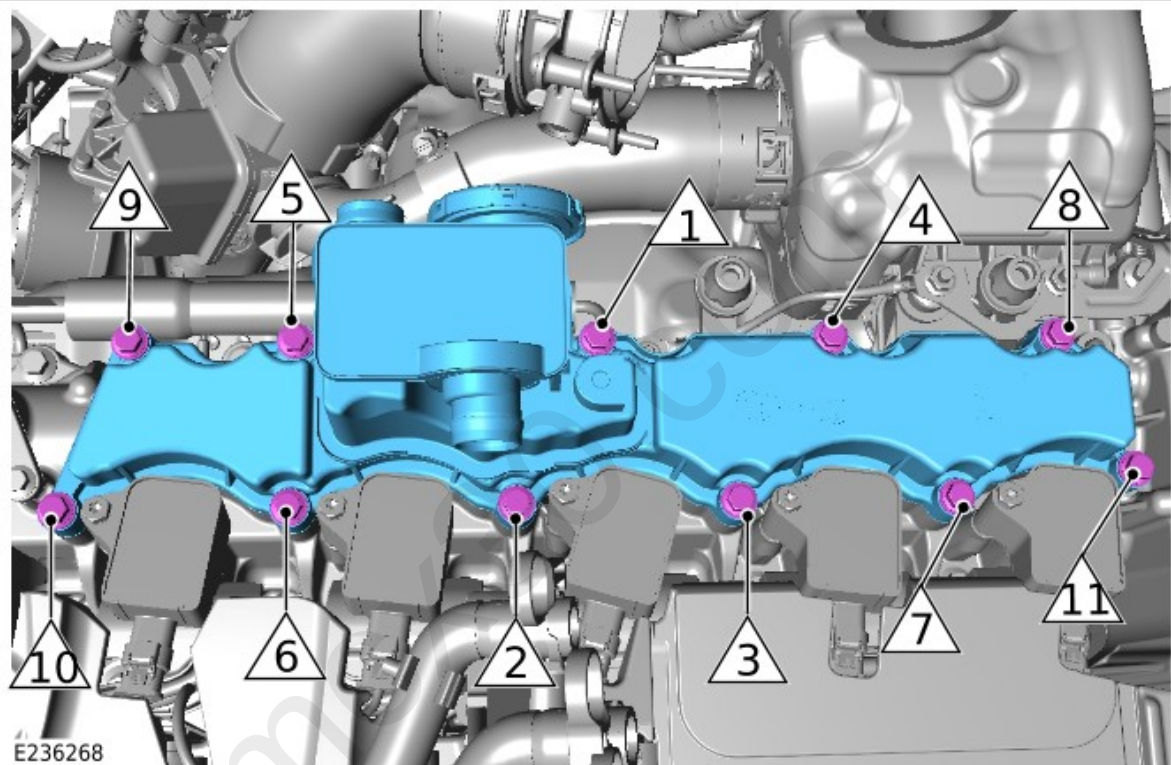
11.

Install the 4 electric supercharger mounting rubbers.

12.

**NOTE:**

The bolts are captive.



- Install a new gasket.  
*Renew Part: [Engine vent oil separator to valve cover gasket](#) Quantity: 1.*
- Install the engine vent oil separator.
- Tighten the 11 bolts in the illustrated sequence.  
*Torque: 11Nm*

13.

- Reposition the engine wiring harness in the correct location.
- Install the clip.

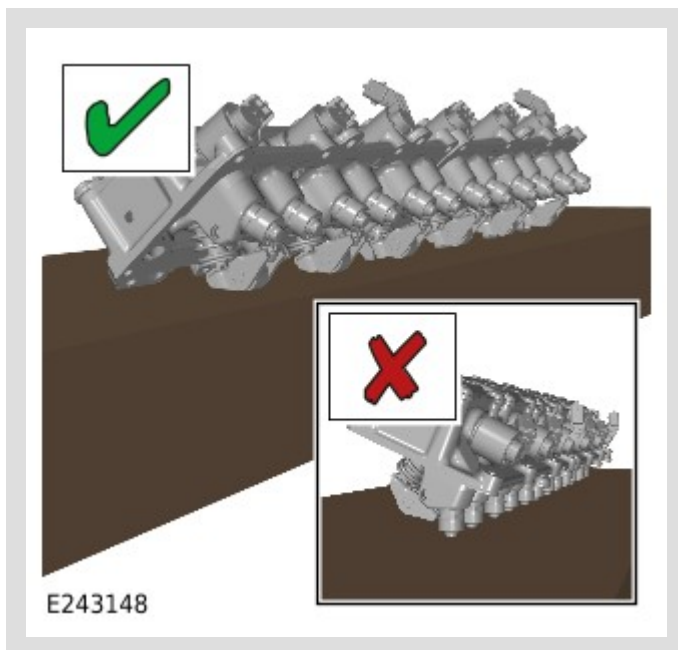
14.

Install a new Continuous Variable Valve Lift (CVVL) gasket.

*Renew Part: [Continuous Variable Valve Lift \(CVVL\) Assembly Gasket](#) Quantity: 1.*

**ⓘ CAUTION:**

Failure to follow this instruction will result in damage to the Continuous Variable Valve Lift (CVVL) assembly.



Do not allow the CVVL assembly to be rested on the brake units.

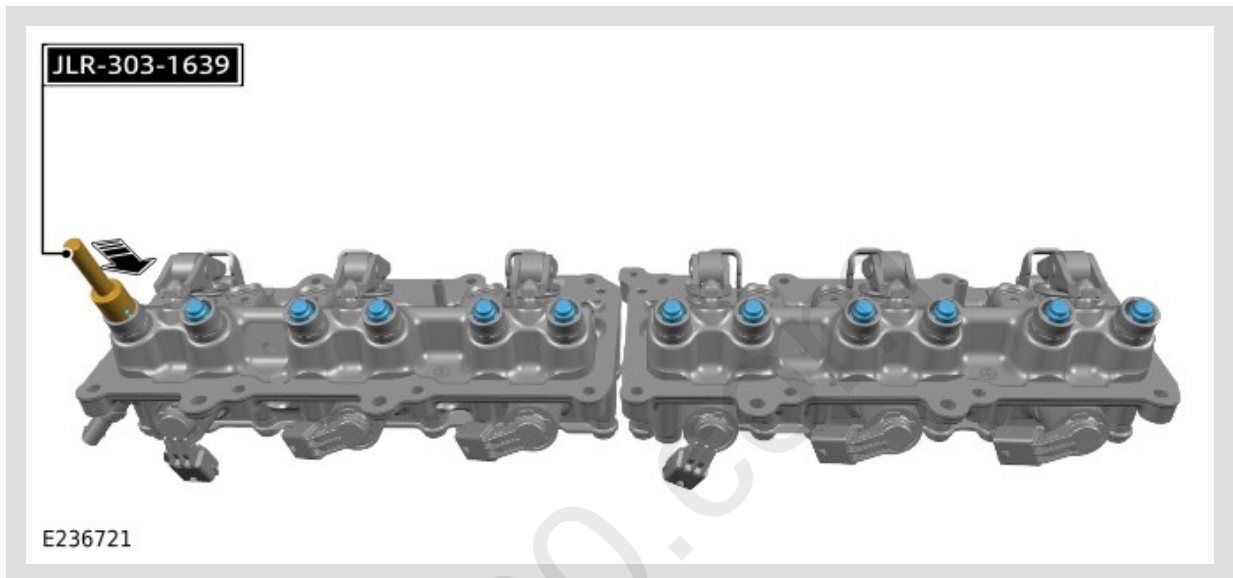
16.

**⚠ CAUTIONS:**

- Make sure the mating surfaces are clean and free of foreign material.
- CVVL assembly shown inverted to provide extra clarity. Make sure the CVVL assembly is not inverted.

**⚠ NOTE:**

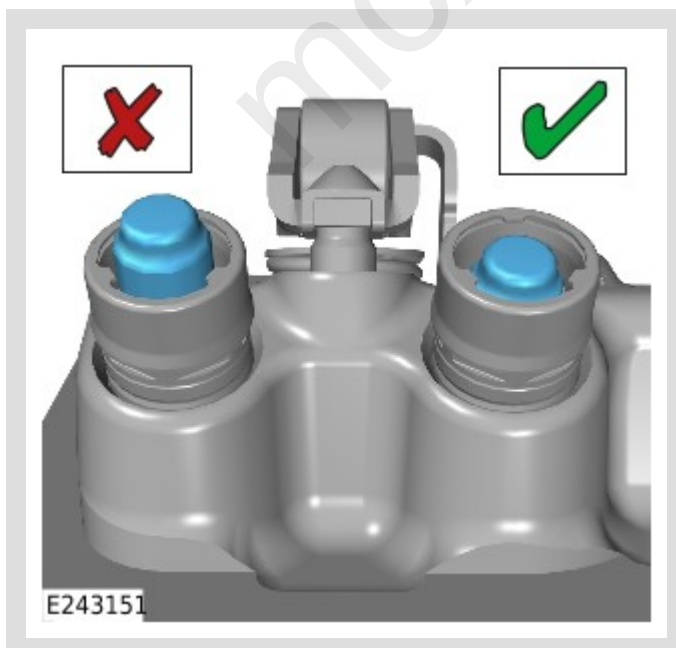
This step is not required if a new CVVL assembly is installed.



Use the special tool to reset the 12 CVVL brake units.

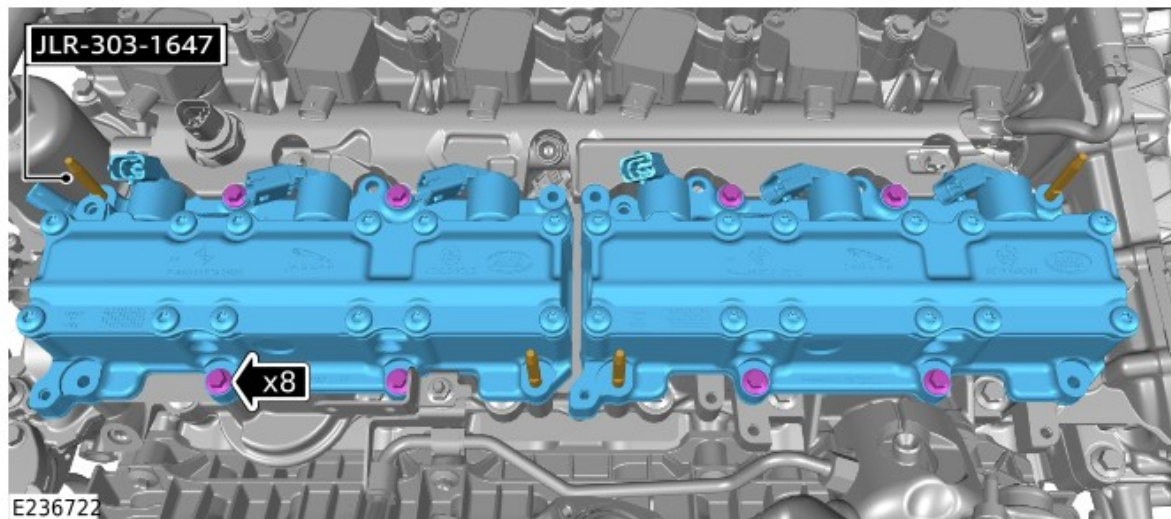
Special Tool(s): [JLR-303-1639](#)

17.



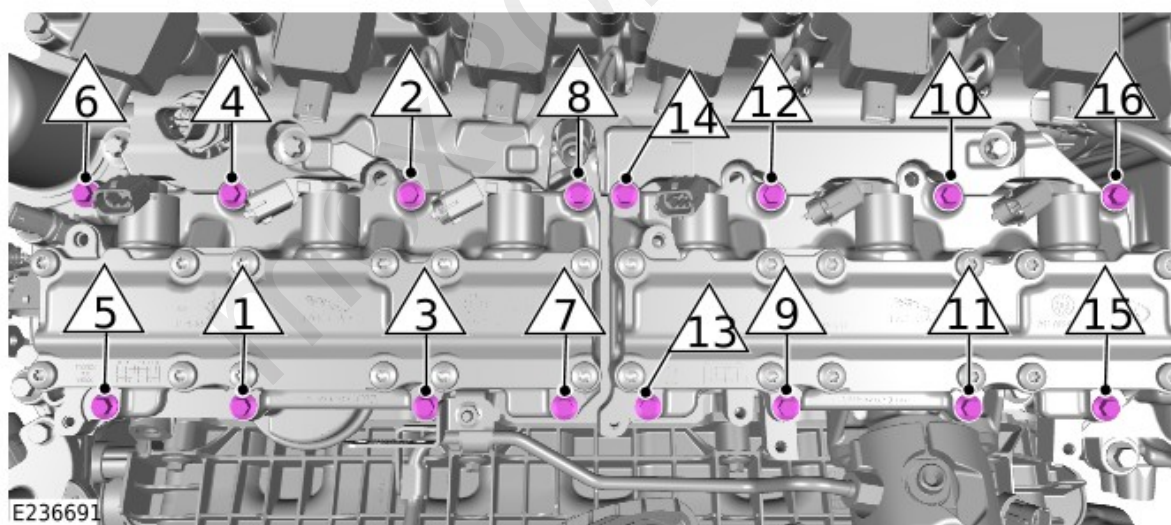
Make sure the CVVL brake units are correctly reset.

18.



- Install the special tools.  
*Special Tool(s): JLR-303-1647*
- Install the 2 CVVL assemblies.
- Install, but do not fully tighten the 8 bolts.
- Remove the special tools.

19.



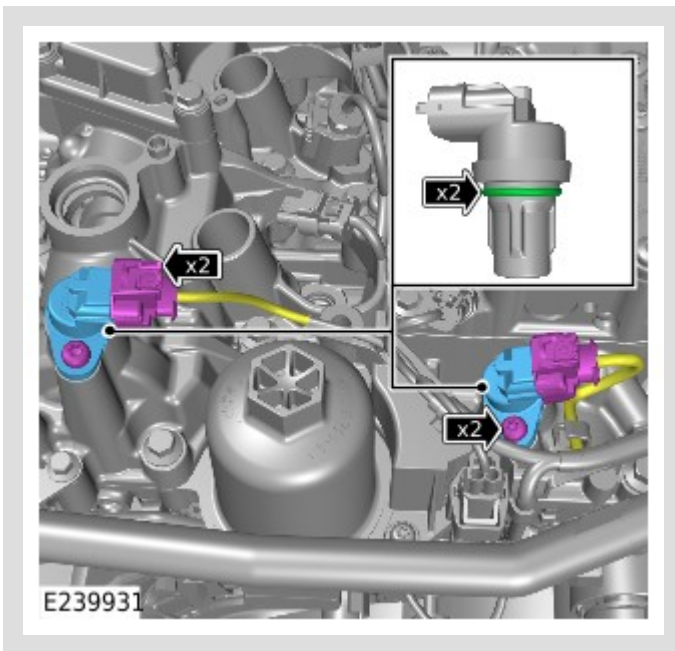
- Install, but do not fully tighten the 8 remaining bolts.
- Tighten the 16 bolts in the illustrated sequence.  
*Torque: 11.5Nm*

20.

- Reposition the coolant hose.
- Install the clip.
- Install and tighten the bolt.  
*Torque: 11Nm*

21. Connect the breather hose.

22.



- Install 2 new O-ring seals.  
*Renew Part: [Camshaft position sensor O-ring seal](#) Quantity: 2.*
- Install the 2 CMP sensors.
- Install and tighten the 2 bolts.  
*Torque: 8Nm*
- Connect the 2 electrical connectors.

23.

- Reposition the wiring harness in the correct location.
- Connect the 6 electrical connectors to the CVVL assembly.
- Install and tighten the 2 bolts.  
*Torque: 10Nm*

24.

- Install the powertrain support bracket.
- Install and tighten the bolt.  
*Torque: 47Nm*

25.

Install the electric supercharger.

Refer to: [Electric Supercharger](#) (303-12C Intake Air Distribution and Filtering - INGENIUM I6 3.0L Petrol, Removal and Installation).

26.

Install the HP fuel pump.

Refer to: [High Pressure Fuel Pump](#) (303-04E Fuel Charging and Controls - INGENIUM I6 3.0L Petrol, Removal and Installation).

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27. Install the fuel injectors.

Refer to: [Fuel Injectors](#) (303-04E Fuel Charging and Controls - INGENIUM I6 3.0L Petrol, Removal and Installation).

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28. Install the upper timing chain.

Refer to: [Upper Timing Chain](#) (303-01C Engine - INGENIUM I6 3.0L Petrol, Removal and Installation).

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29. Connect the startup battery ground cable.

Refer to: [Startup Battery Disconnect and Connect](#) (414-00 Battery and Charging System - General Information, General Procedures).

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