

PUBLISHED: 04-MAR-2020
2020.0 DEFENDER (LE), 303-01C

ENGINE – INGENIUM I6 3.0L PETROL

ENGINE AND ANCILLARIES – LONG ENGINE (G2340958)

REMOVAL

12.41.02

STRIPPED
ENGINE –
REMOVE
ENGINE,
CHANGE
OVER
ANCILLARY
EQUIPMENT
AND REFIT

2000 CC,
INGENIUM
DIESEL

14.20

USED WITHINS

REMOVAL

SPECIAL TOOL(S)



100-012

Slide Hammer



100-012-01

Slide Hammer Adapter



E136268

JLR-303-1591

Lifting Bracket, Engine - Rear



E238887

JLR-303-1659

Locking Tool, Crankshaft Pulley



E241320

JLR-303-1667

Holding Tool, Cooling Fan Pulley



E218674

JLR-303-1673

Engine stand adaptor



E238238

JLR-303-1676

Engine lifting eyes

mcx30.com



E233668

JLR-308-1699

Accessory Drive Belt Tensioner Locking Tool



E200616

JLR-310-254

Injector Remover

GENERAL EQUIPMENT

EQUIPMENT NAME
Engine stand
Hydraulic jib crane
Oil drain equipment
Wooden Block



WARNING:

- Be prepared to collect escaping coolant.

- Be prepared to collect escaping oil.
- Be prepared to collect escaping fuel.

⚠ CAUTION:

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

△ NOTE:

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

1. Disconnect the startup battery ground cable.

Refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

2. Raise and support the vehicle on a suitable 2 post lift.

Refer to: [Jacking and Lifting](#) (100-02 Jacking and Lifting, Description and Operation).

3. Remove the engine assembly.

Refer to: [Engine Assembly Remove for Access](#) (303-01C Engine - INGENIUM I6 3.0L Petrol, Installation).

- 4.

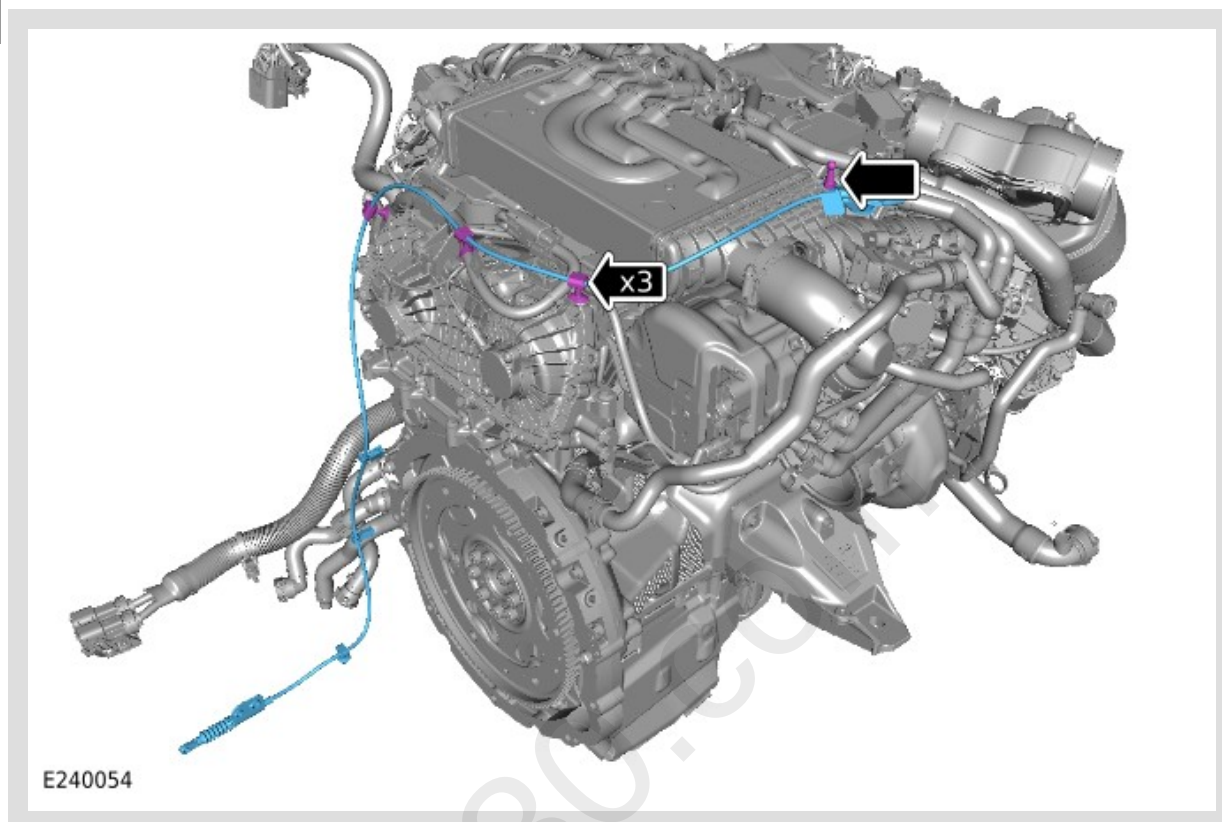


- Remove the oil pan drain plug.
- Drain the engine oil into a suitable container.

5. Install and tighten the oil pan drain plug.

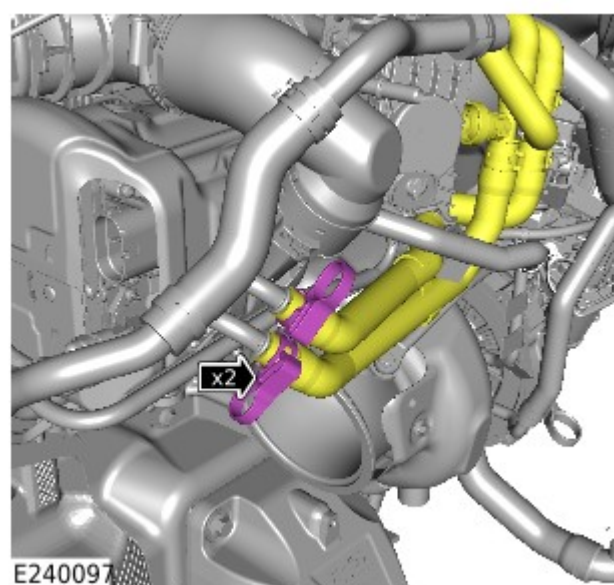
Torque: 23Nm

6.



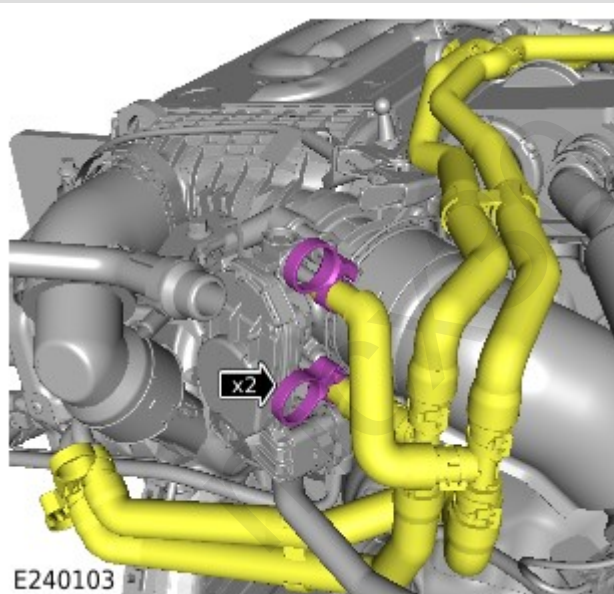
- Remove the bolt.
- Release the 3 clips.
- Remove the Emergency Park Release (EPR) cable.

7.



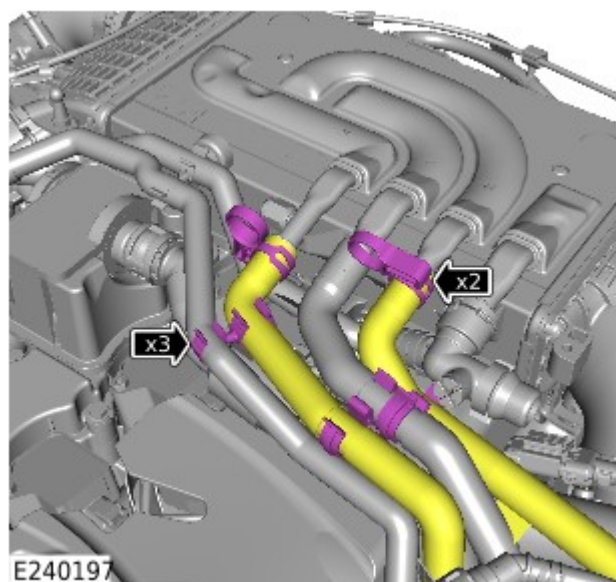
Disconnect the 2 coolant hoses.

8.



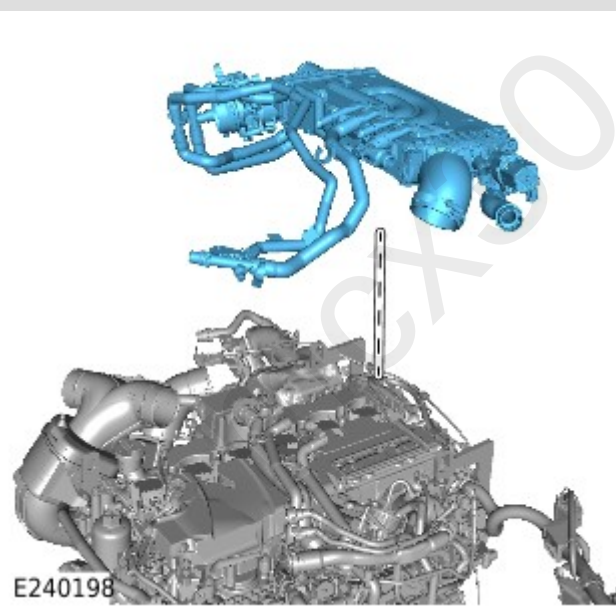
Disconnect the 2 coolant hoses.

9.



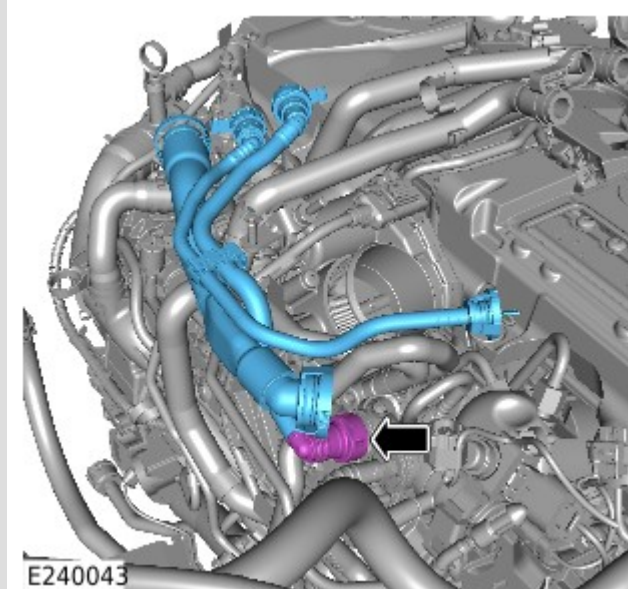
- Release the 3 clips.
- Disconnect the 2 coolant hoses.

10.



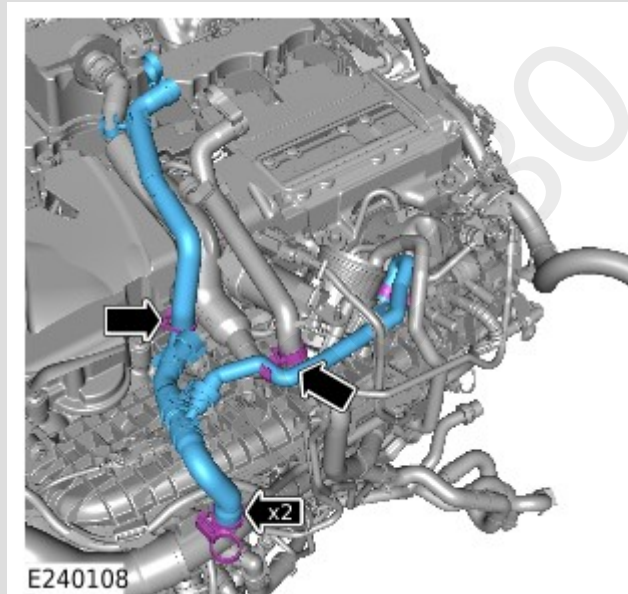
Remove the charge air cooler assembly.

11.



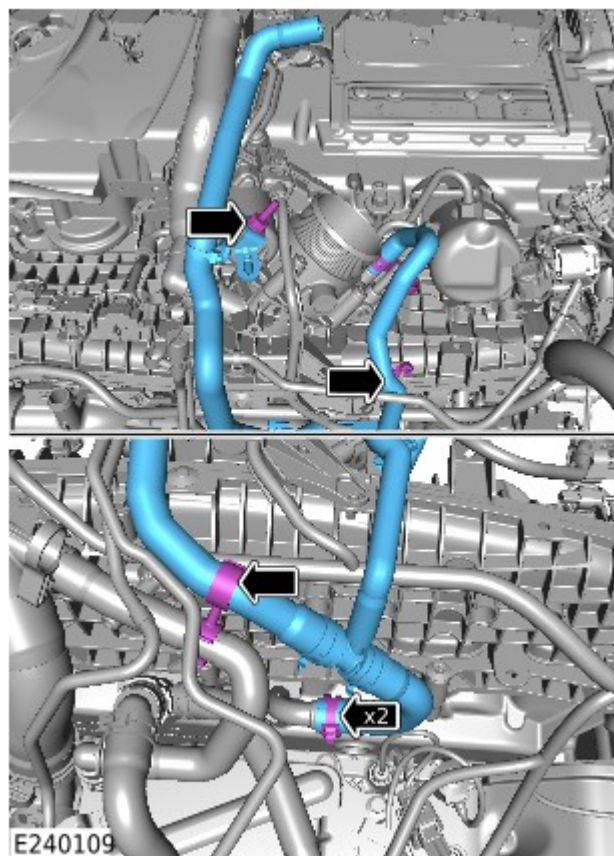
- Disconnect the breather pipe.
- Remove the breather pipe assembly.

12.



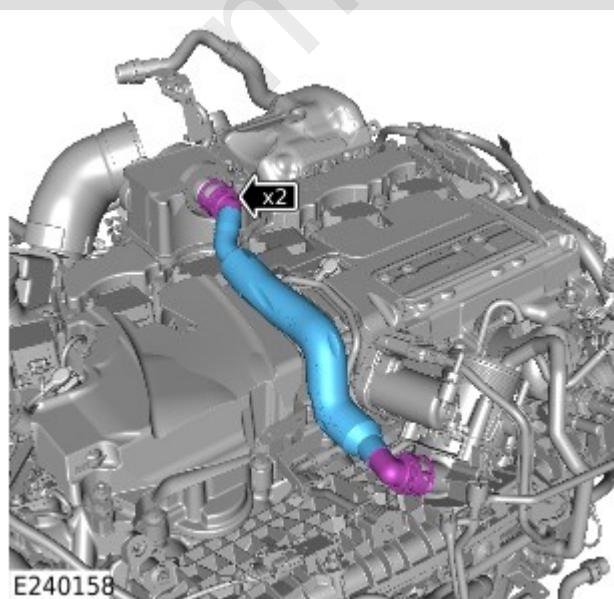
- Release the 2 coolant hose clips.
- Disconnect the 2 coolant hoses.
- Remove the coolant hose assembly.

13.



- Remove the bolt.
- Release the 2 clips.
- Disconnect the 2 coolant hoses.
- Remove the coolant hose assembly.

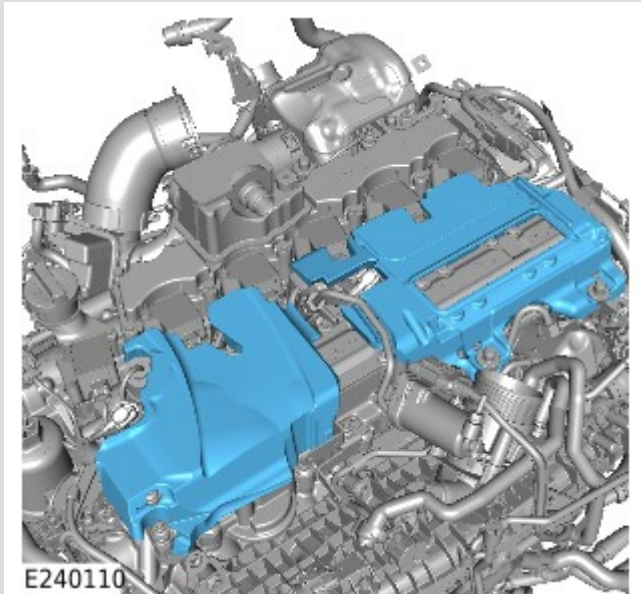
14.



- Disconnect the 2 breather pipe connectors.

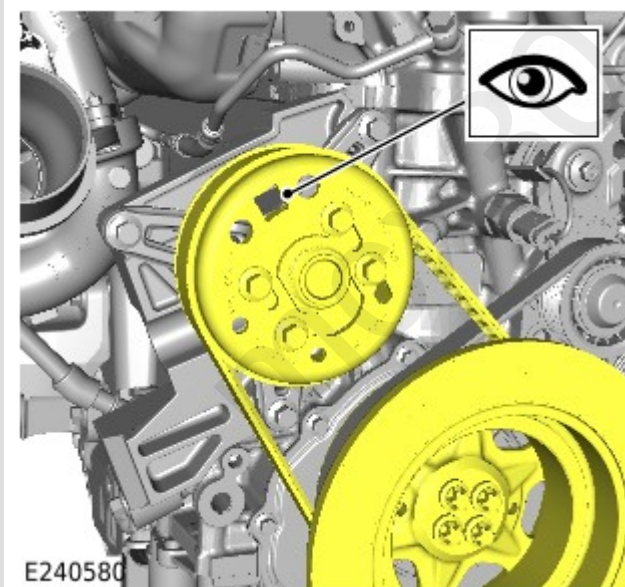
- Remove the breather pipe.

15.



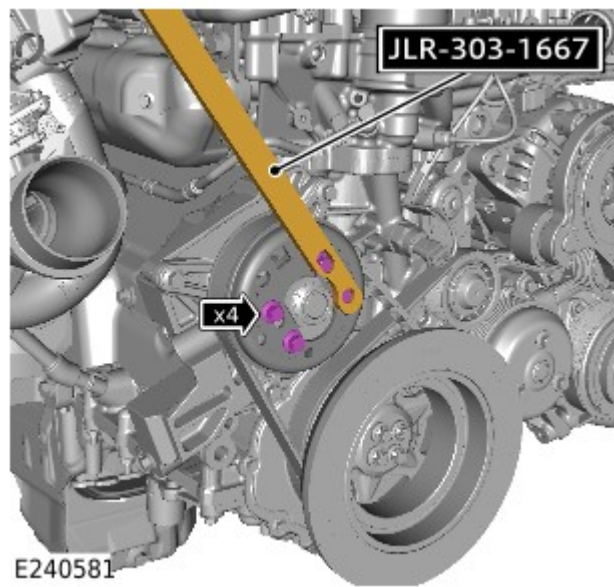
Remove the Noise, Vibration and Harshness (NVH) material.

16.



Rotate the crankshaft in a **clockwise** direction until the pulley reaches the position illustrated.

17.

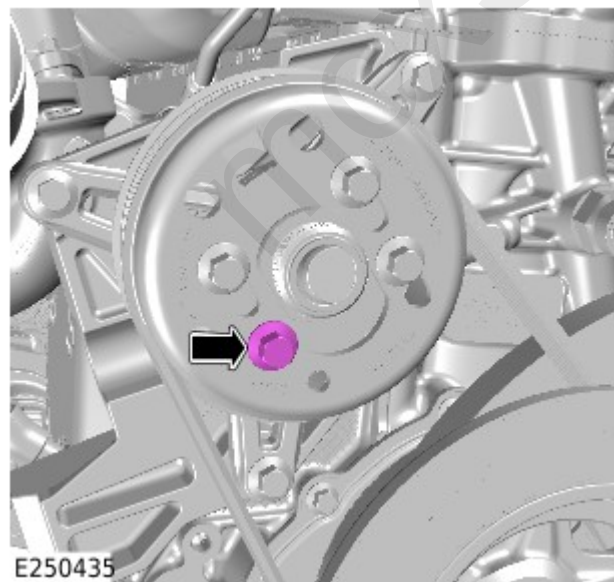


- Use the special tool to prevent the pulley from rotating when loosening the 4 bolts.
Special Tool(s): [JLR-303-1667](#)
- Loosen but do not fully remove the 4 bolts.

18.

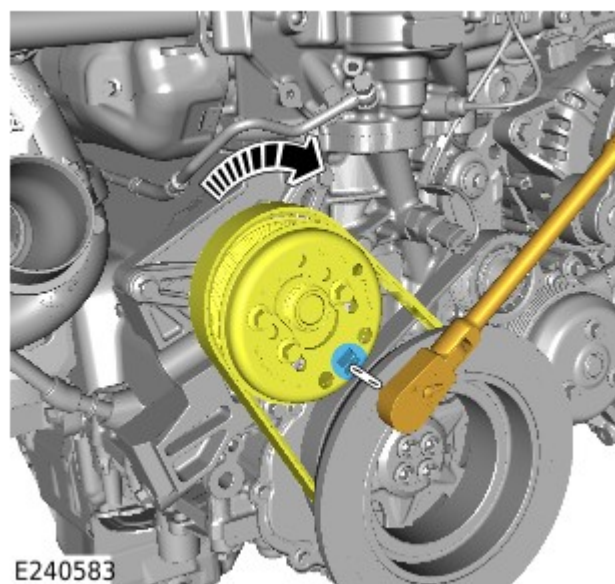
NOTE:

Do not remove the bolts from the slotted positions.



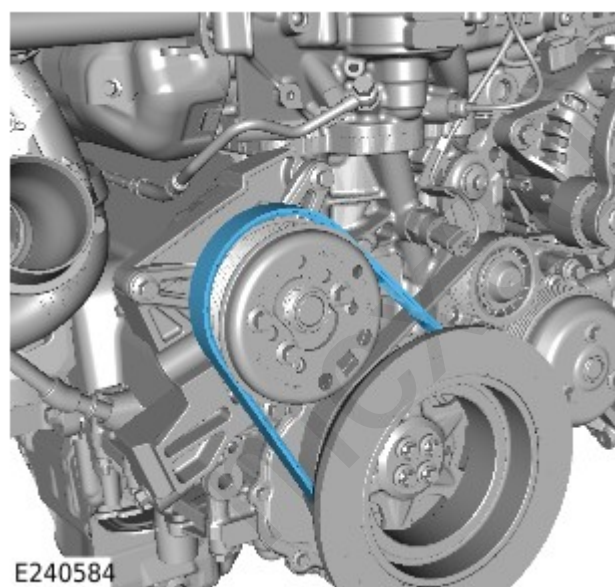
Fully remove the fixed positioned bolt as illustrated.

19.



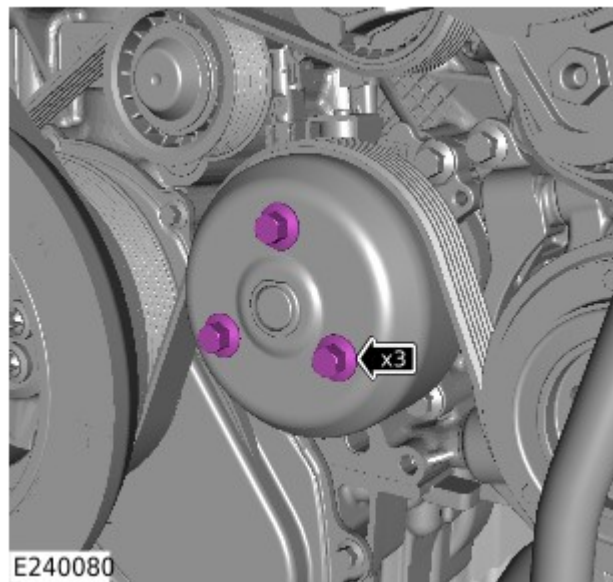
Use a suitable tool to rotate the pulley to the position illustrated.

20.



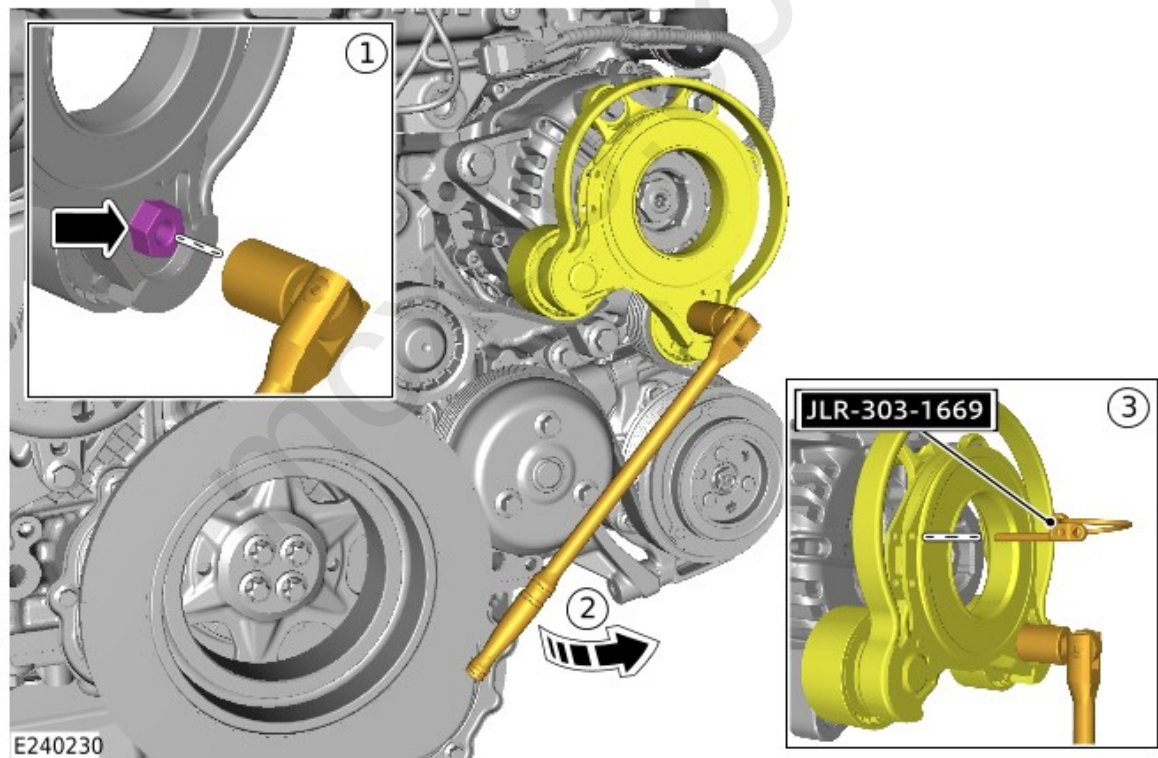
Remove the viscous cooling fan drive belt.

21.



Loosen, but do not fully remove the 3 bolts.

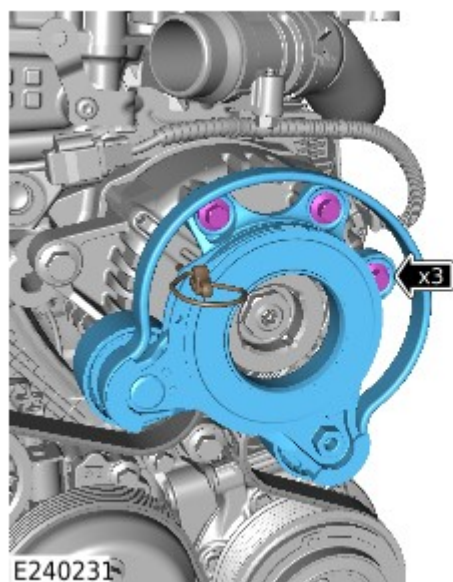
22.



- Use a suitable tool to release the accessory drive belt tension as illustrated.
- Use the special tool to lock the tensioner in the removal position.

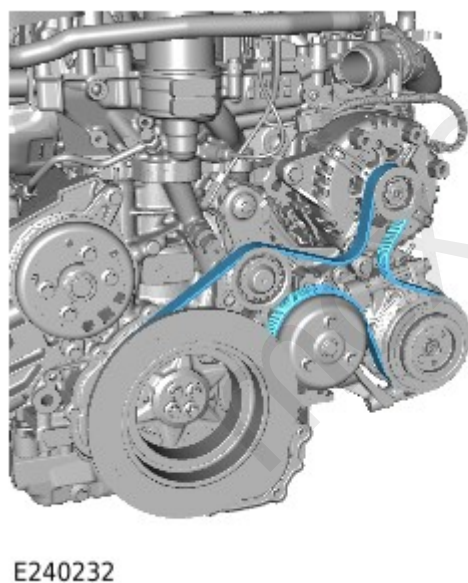
Special Tool(s): [JLR-308-1699](#)

23.



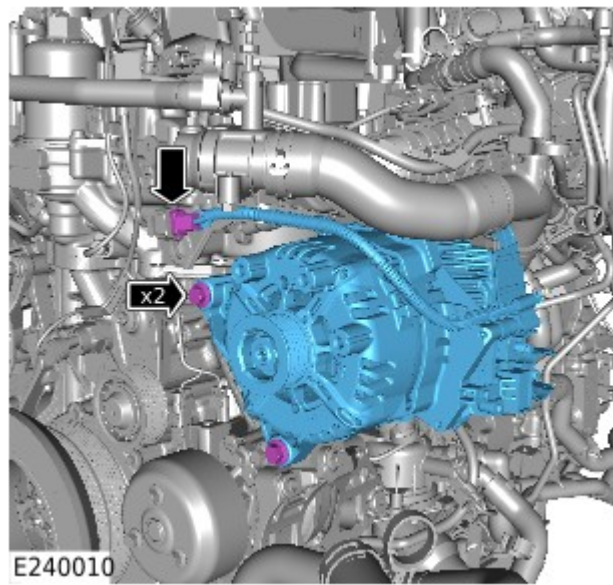
- Remove the 3 bolts.
- Remove the accessory drive belt tensioner.

24.



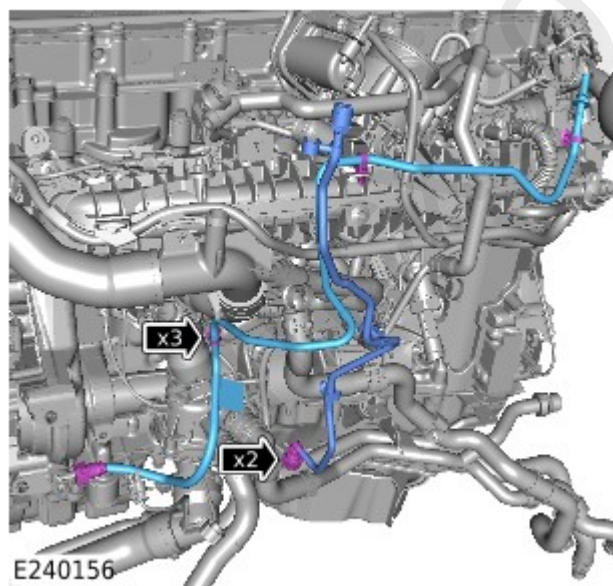
Remove the accessory drive belt.

25.



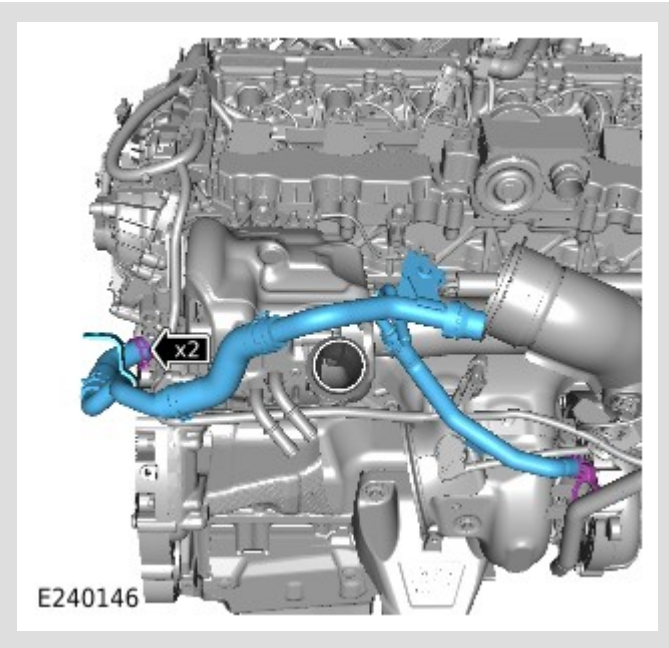
- Disconnect the electrical connector.
- Remove the 2 bolts.
- Remove the Belt Integrated Starter Generator (BISG).

26.



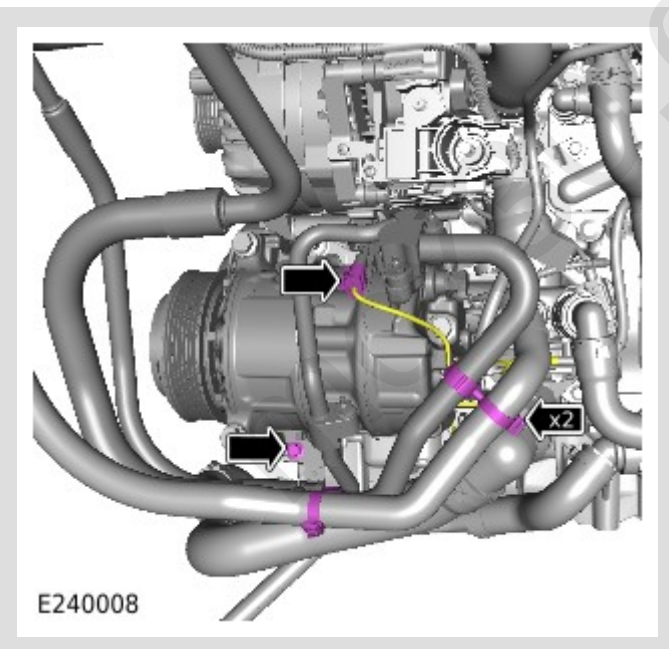
- Release the 3 clips.
- Disconnect the 2 pipes.
- Remove the vacuum pipe.
- Remove the coolant pipe.

27.



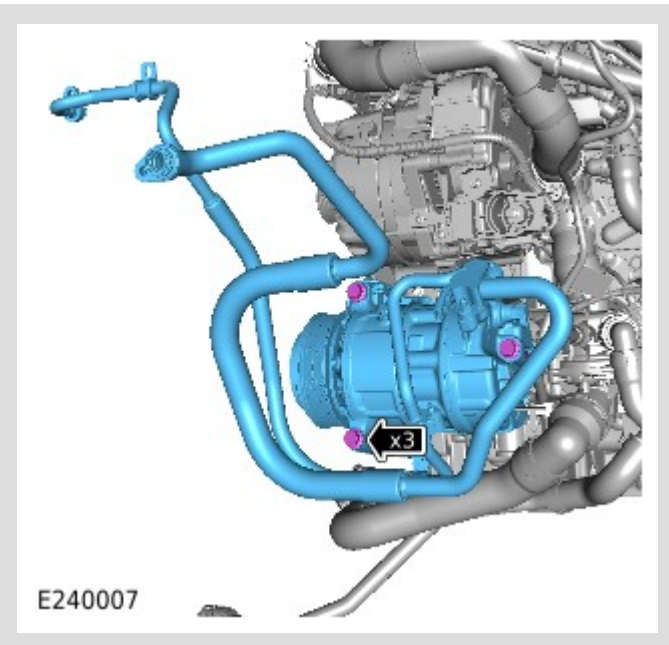
- Disconnect the 2 coolant hoses.
- Remove the coolant hose assembly.

28.



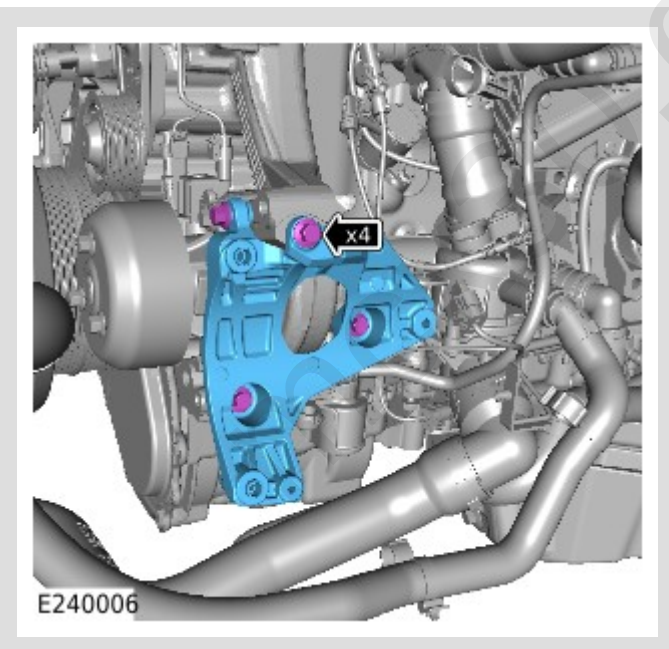
- Disconnect the electrical connector.
- Release the 2 clips.
- Remove the bolt.

29.



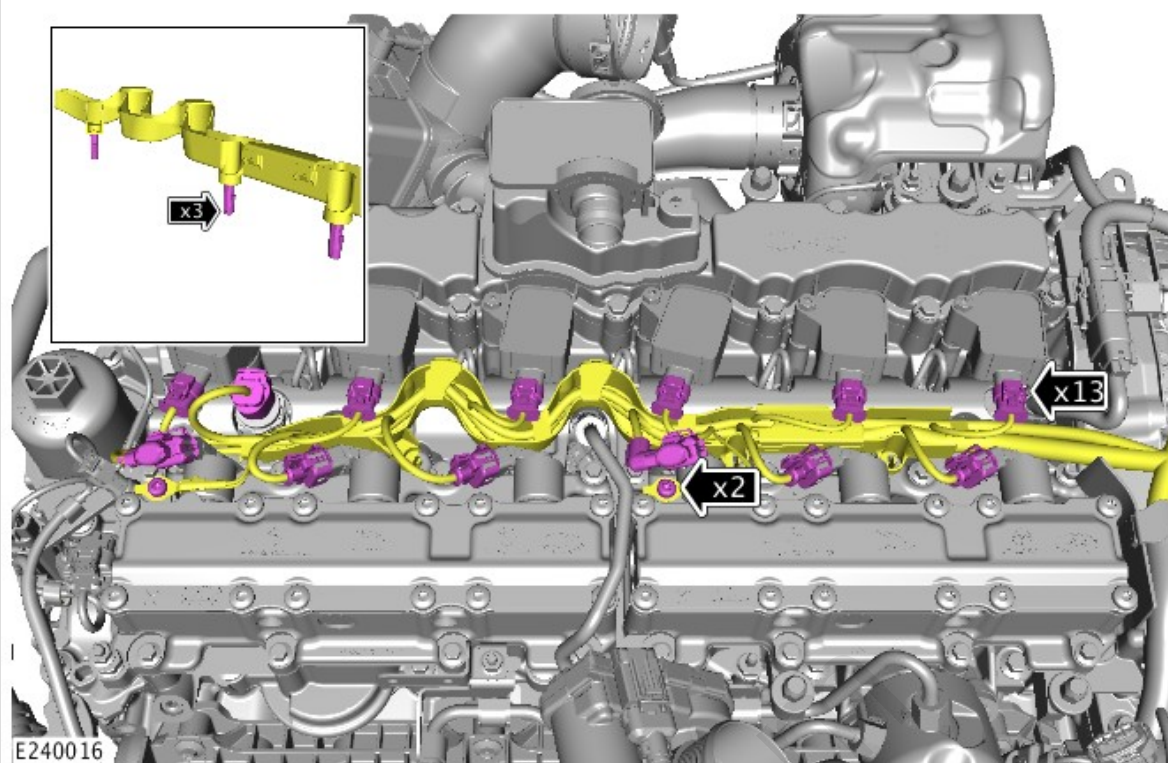
- Remove the 3 bolts.
- Remove the Air Conditioning (A/C) compressor.

30.



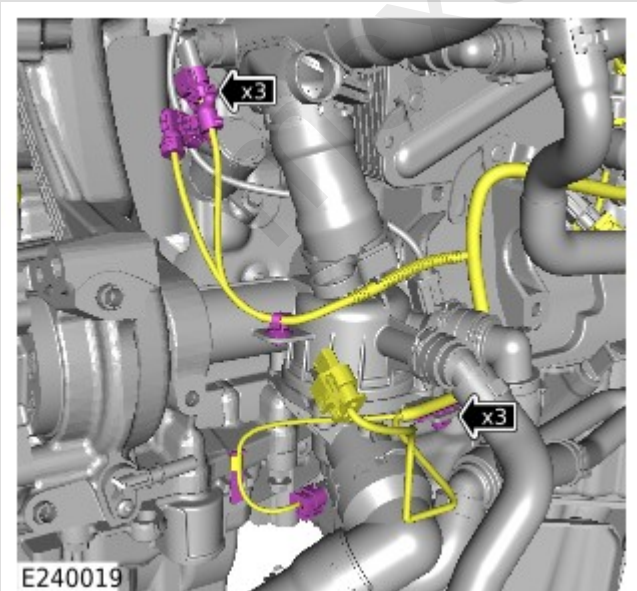
- Remove the 4 bolts.
- Remove the bracket.

31.



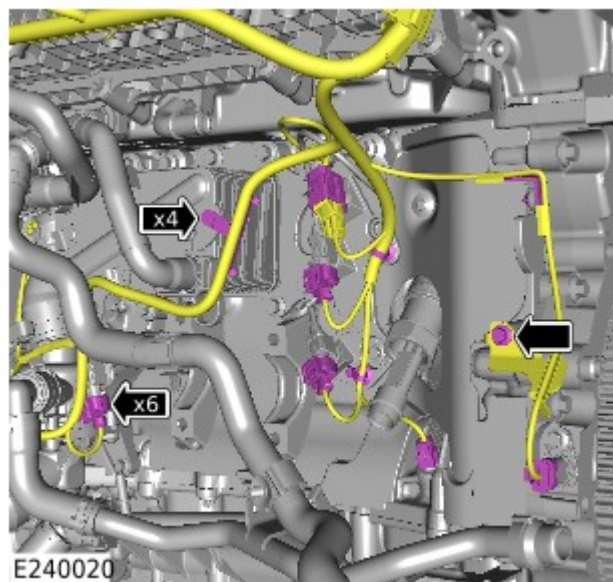
- Disconnect the 13 electrical connectors.
- Remove the 2 bolts.
- Release the wiring harness from the 3 clips.

32.



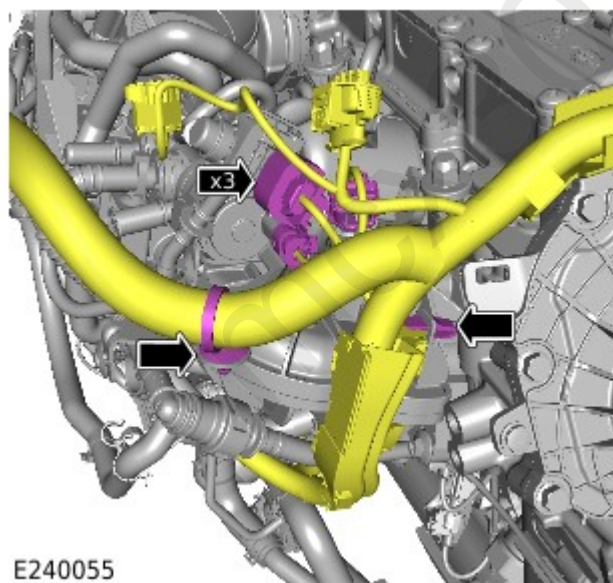
- Disconnect the 3 electrical connectors.
- Release the 3 clips.

33.



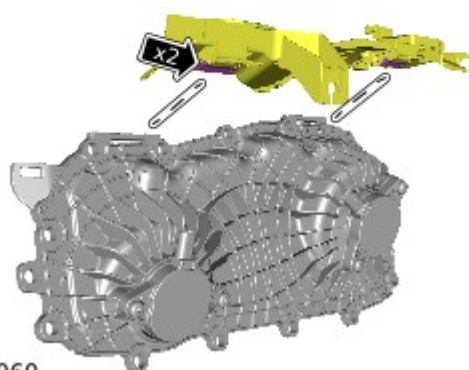
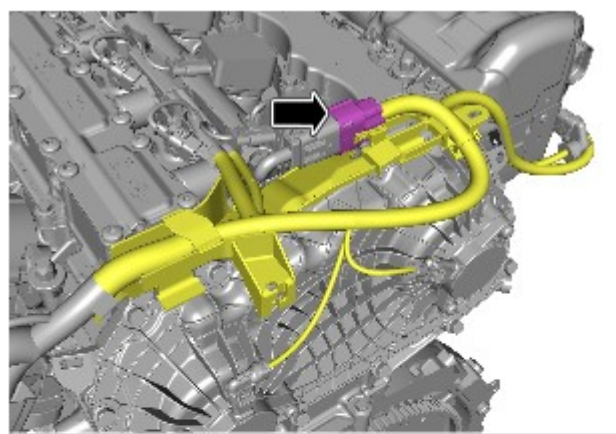
- Disconnect the 6 electrical connectors.
- Release the 4 clips.
- Remove the bolt.

34.



- Disconnect the 3 electrical connectors.
- Release the 2 clips.

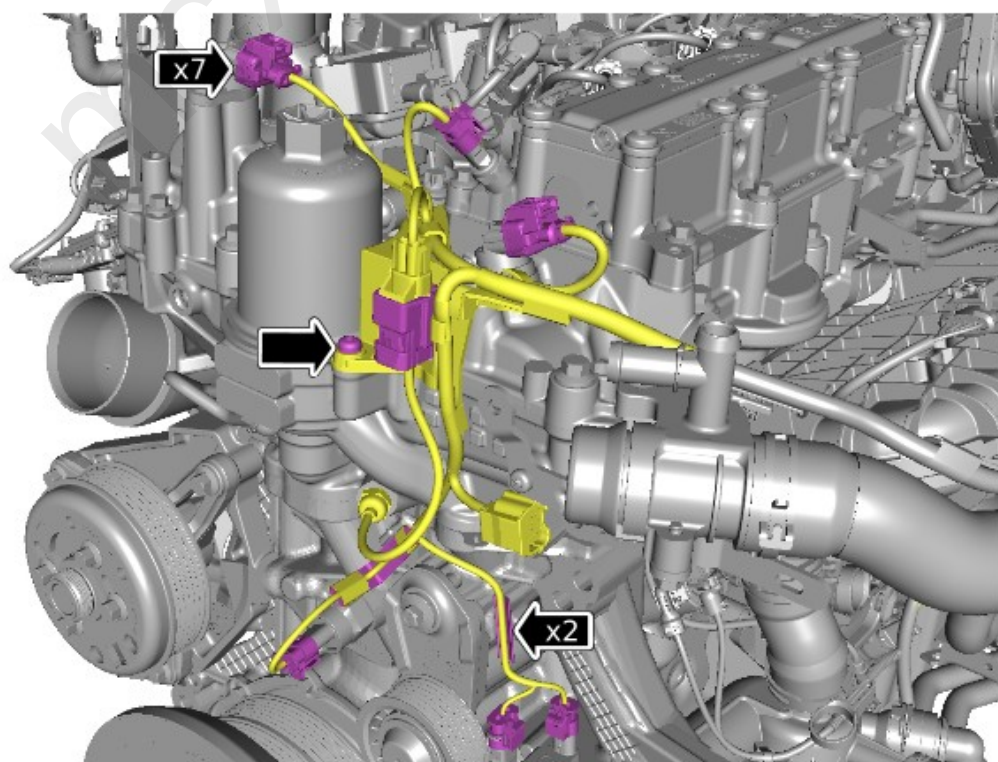
35.



E240060

- Disconnect the electrical connector.
- Release the 2 clips.

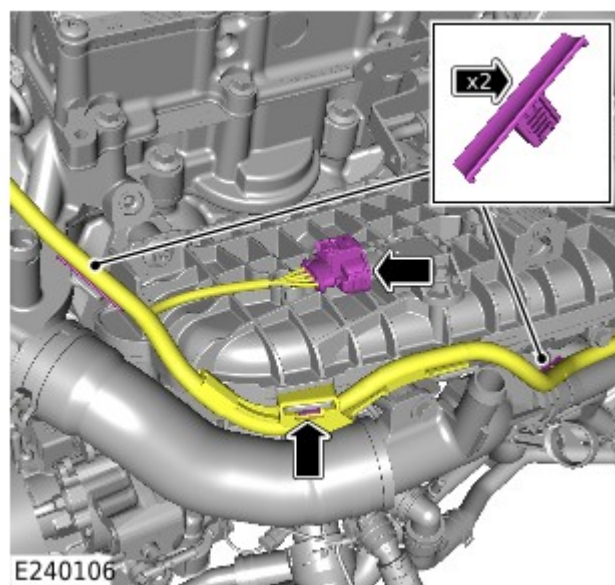
36.



E240057

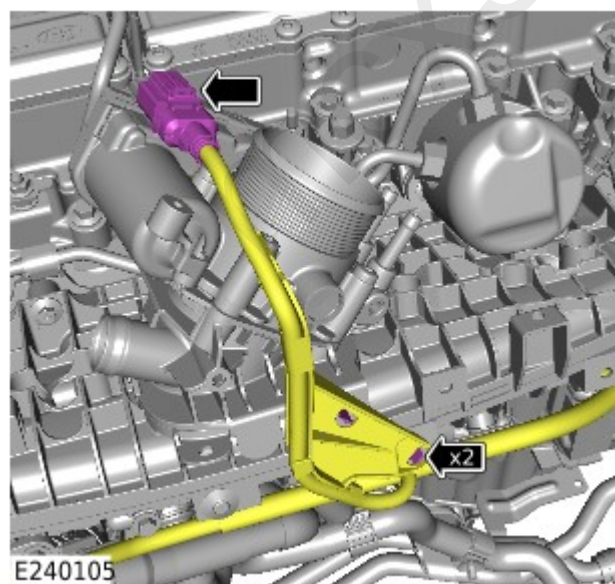
- Disconnect the 7 electrical connectors.
- Remove the bolt.
- Release the 2 clips.

37.



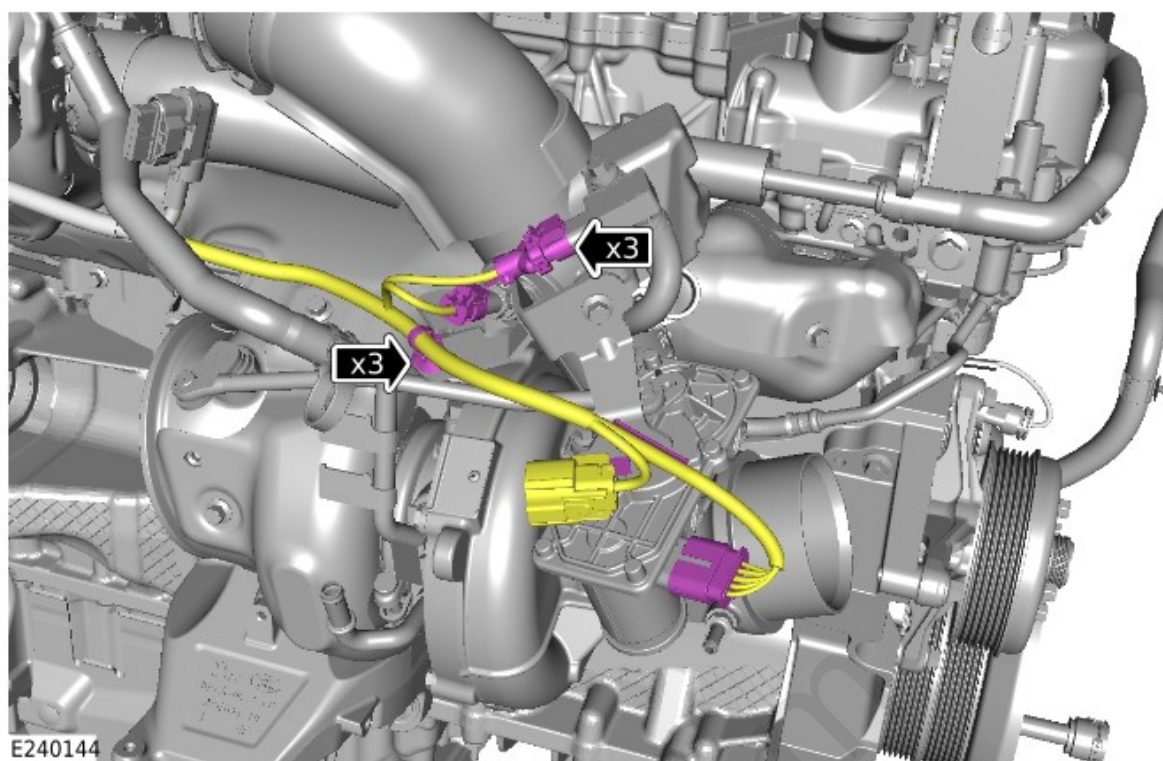
- Disconnect the electrical connector.
- Release the 3 clips.

38.



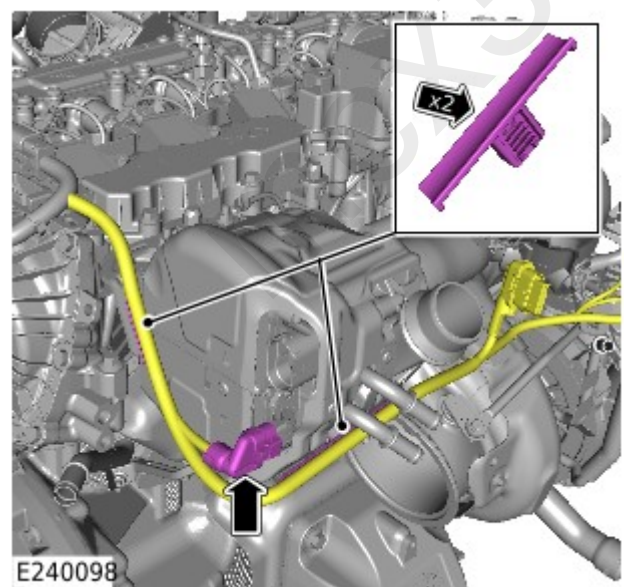
- Disconnect the electrical connector.
- Release the 2 clips.

39.



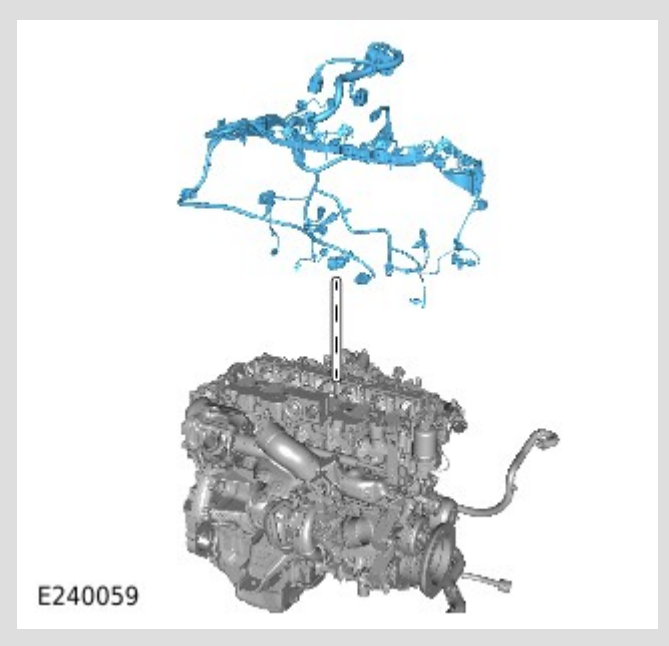
- Disconnect the 3 electrical connectors.
- Release the 3 clips.

40.



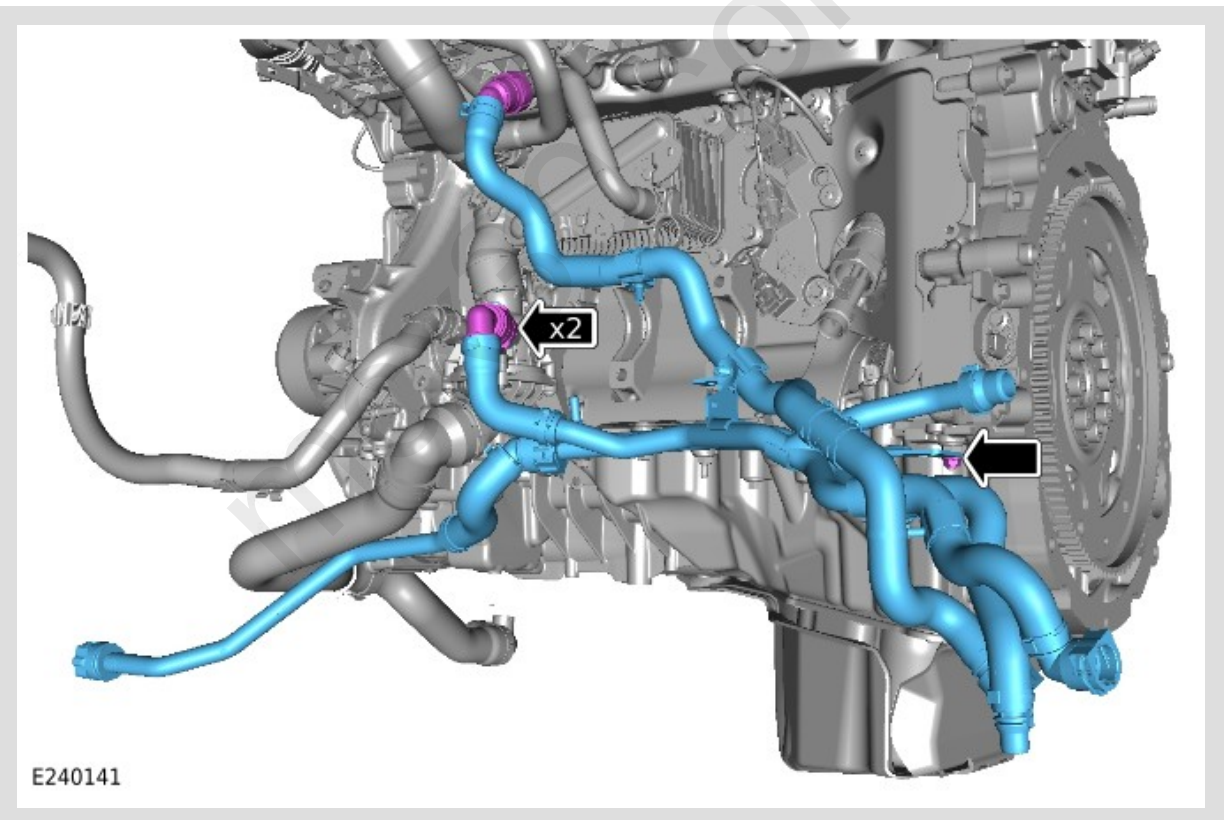
- Disconnect the electrical connector.
- Release the 2 clips.

41.



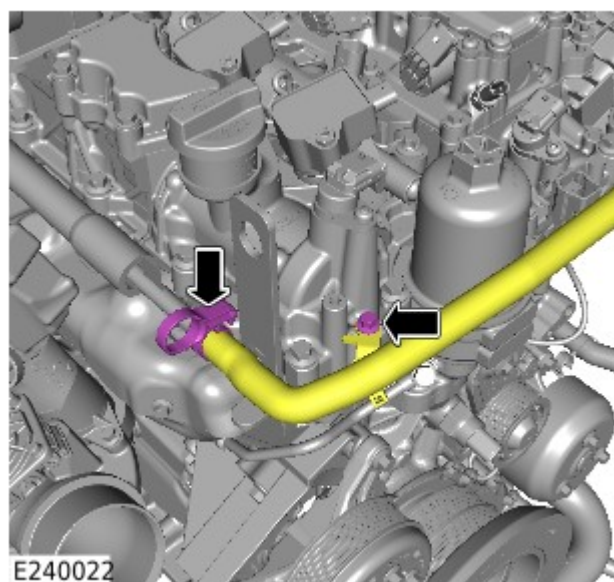
Carefully remove the engine wiring harness.

42.



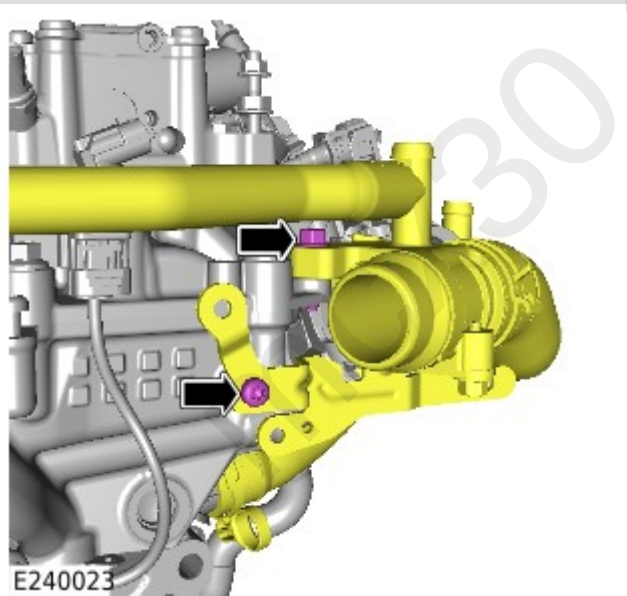
- Disconnect the 2 coolant hoses.
- Remove the nut.
- Remove the coolant hose assembly.

43.



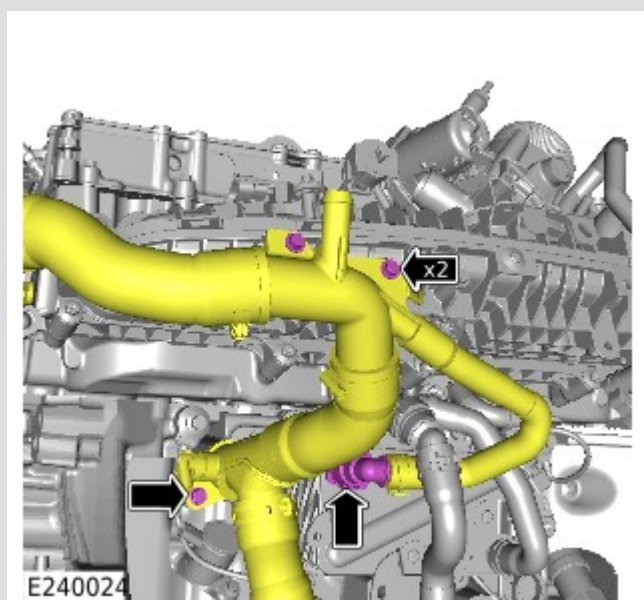
- Remove the bolt.
- Disconnect the coolant hose.

44.



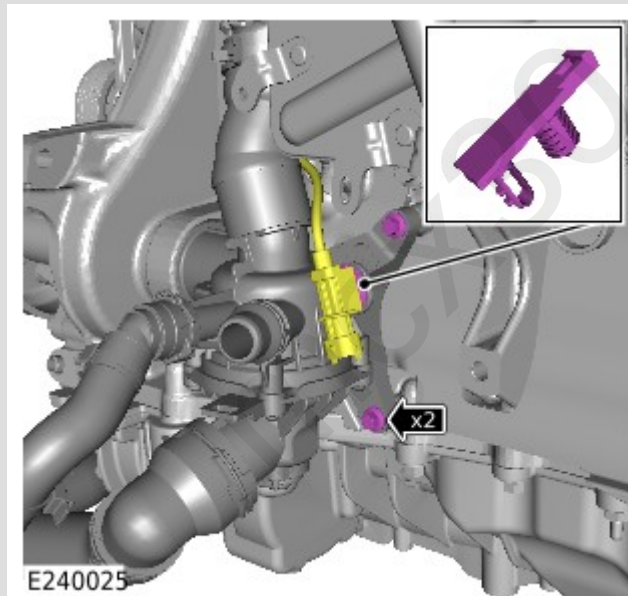
Remove the 2 bolts.

45.



- Disconnect the coolant hose.
- Remove the 3 bolts.

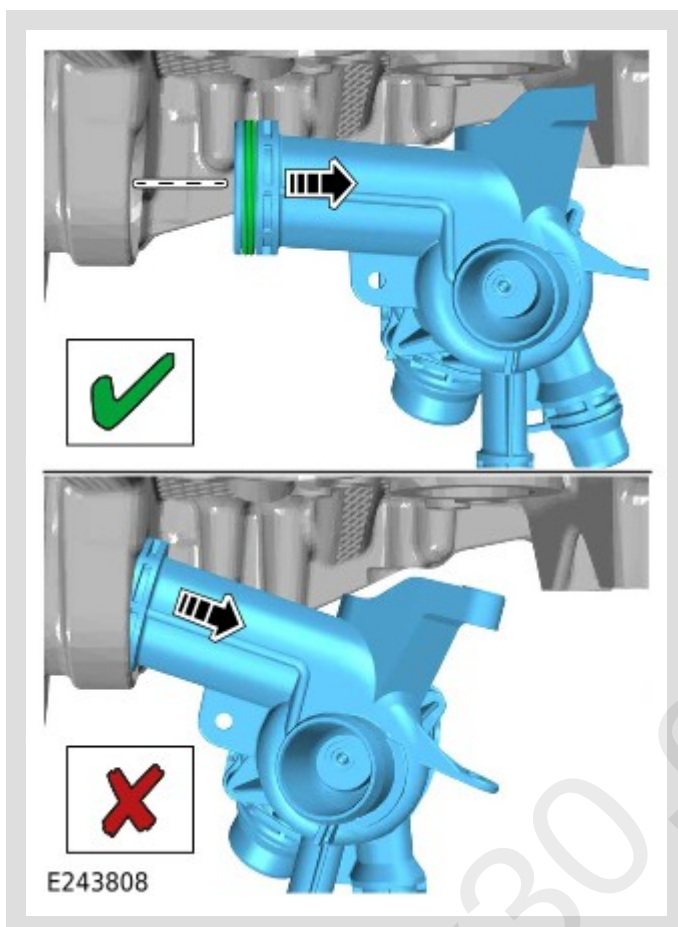
46.



- Release the clip.
- Remove the 2 bolts.

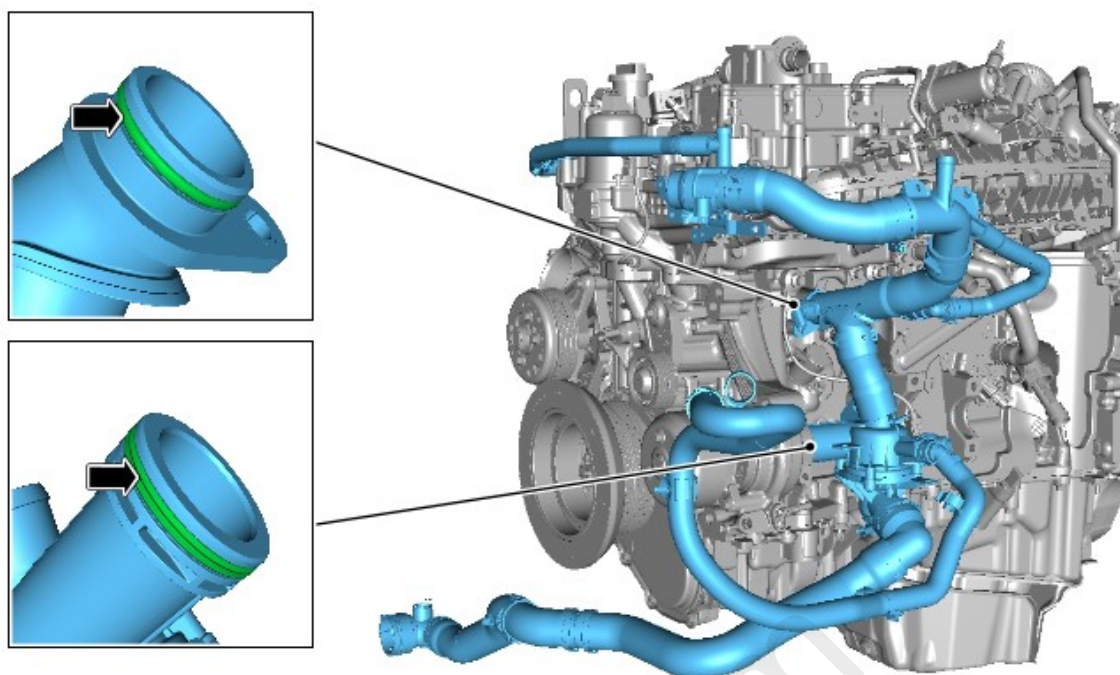
ⓘ CAUTION:

Failure to follow this instruction could cause damage to the thermostat housing.



Make sure the thermostat housing is removed correctly as illustrated.

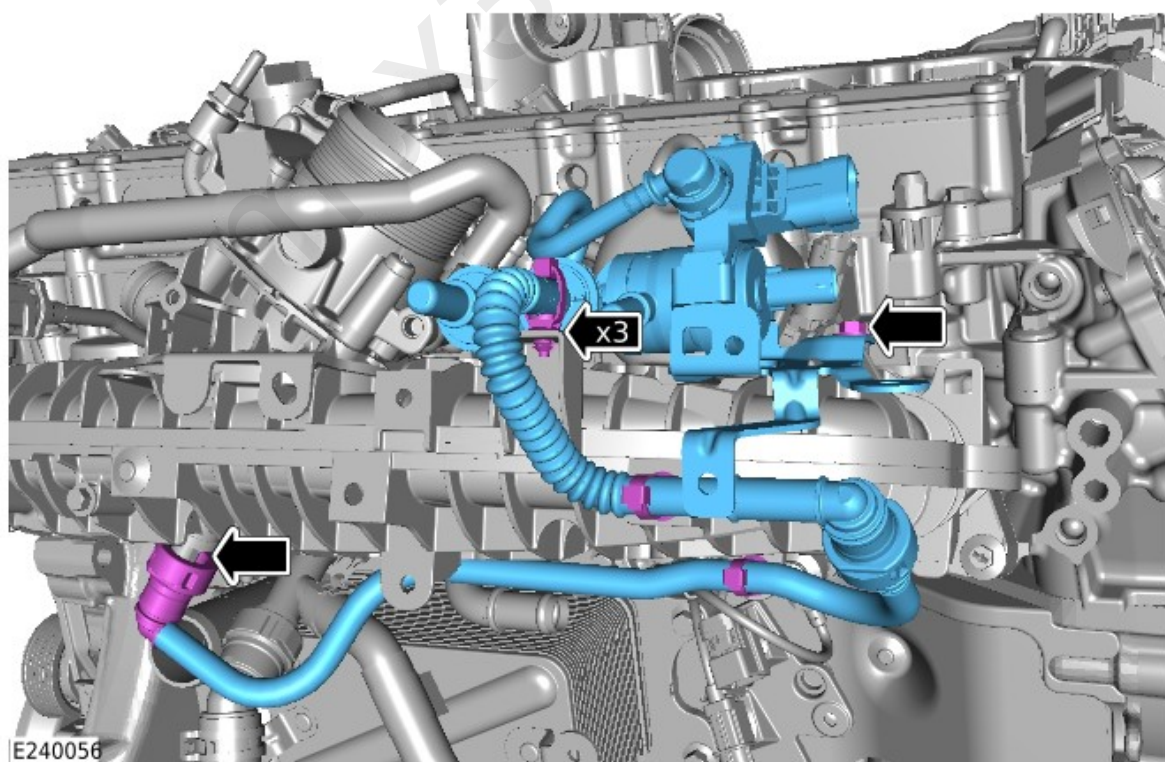
48.



E240044

- Remove the coolant hose assembly.
- Inspect the O-ring seals. Remove and discard the O-ring seals if damaged or worn.

49.

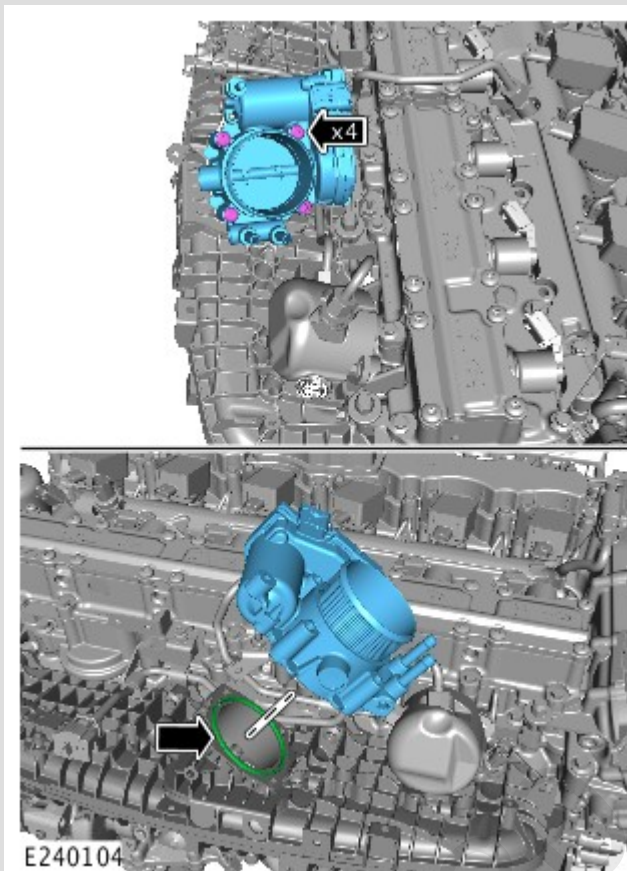


E240056

- Disconnect the breather pipe.
- Remove the bolt.

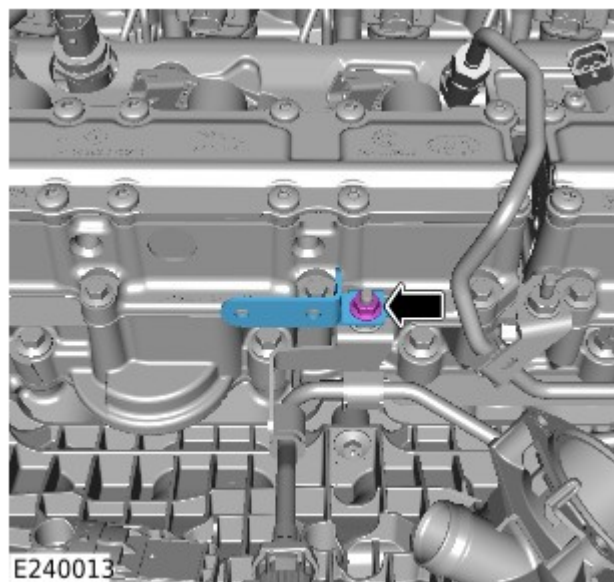
- Release the 3 clips.
- Remove the purge valve assembly.

50.



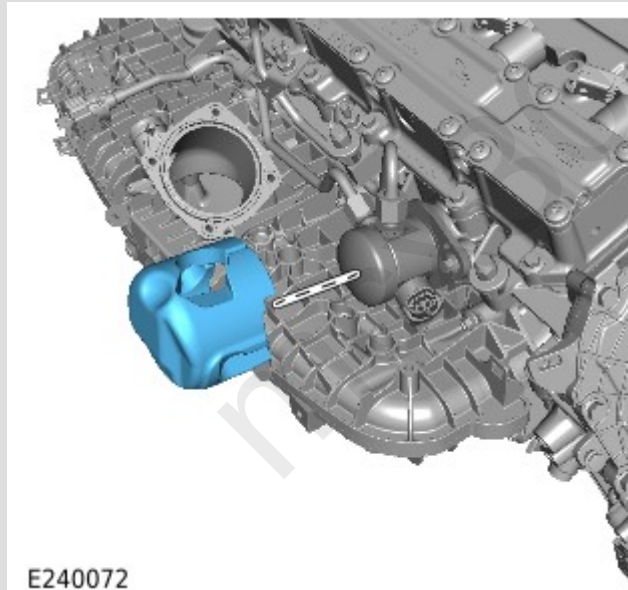
- Remove the 4 bolts.
- Remove the throttle body.
- Remove and discard the O-ring seal.

51.



- Remove the nut.
- Remove the bracket.

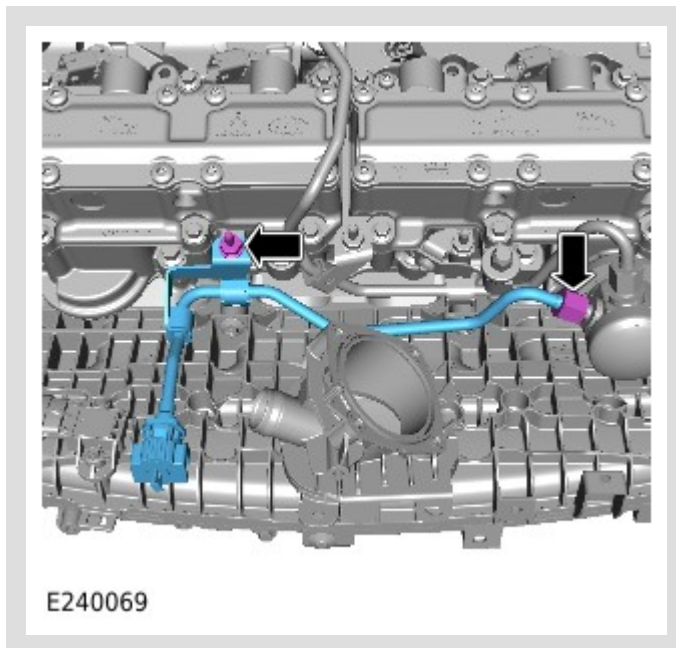
52.



Remove the NVH material.

ⓘ CAUTION:

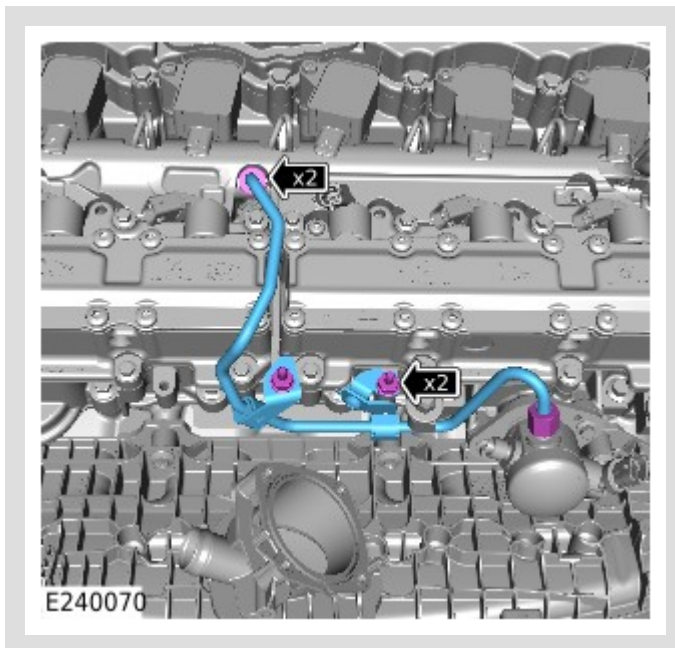
Fuel lines may only be reused one time. After final tightening, clean the fuel line and apply a paint mark to identify reuse. If the fuel line is already paint marked, a new fuel line must be installed.



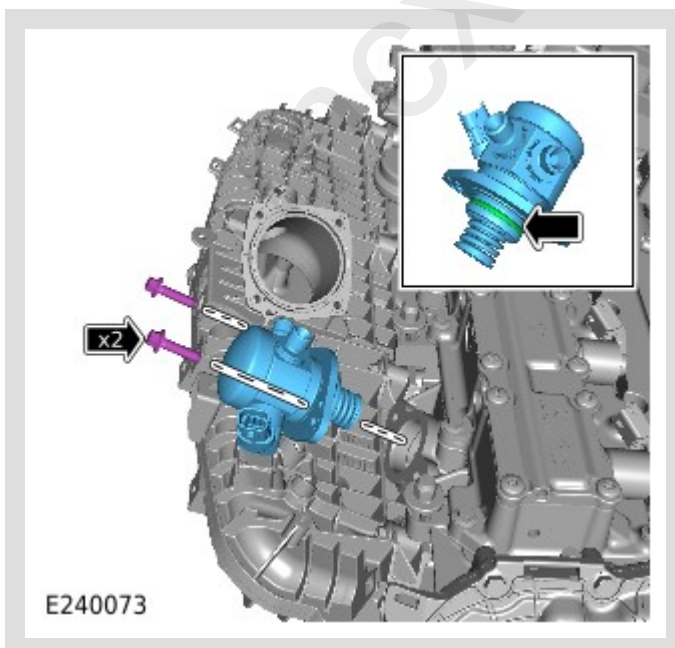
- Release the union.
- Remove the bolt.
- Remove the Low Pressure (LP) fuel line.

⚠ CAUTION:

Fuel lines may only be reused one time. After final tightening, clean the fuel line and apply a paint mark to identify reuse. If the fuel line is already paint marked, a new fuel line must be installed.



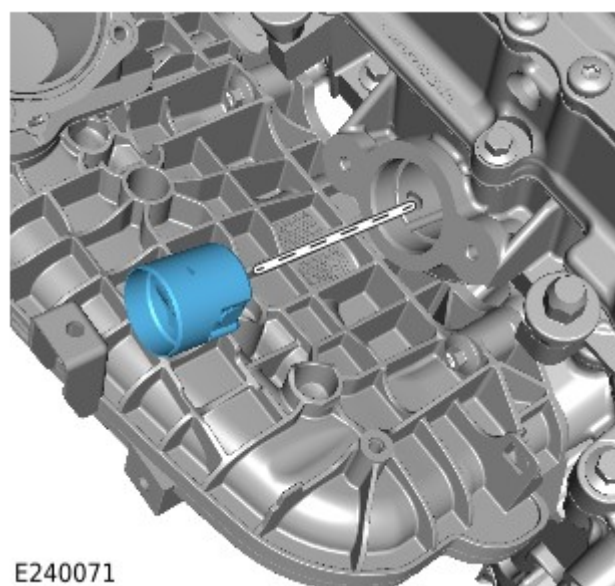
- Release the 2 unions.
- Remove the 2 bolts.
- Remove the High Pressure (HP) fuel line.



- Loosen the 2 bolts a half turn at a time until the spring tension is fully released.
- Discard the 2 bolts.
- Remove the HP fuel pump.

- Remove and discard the O-ring seal.

56.

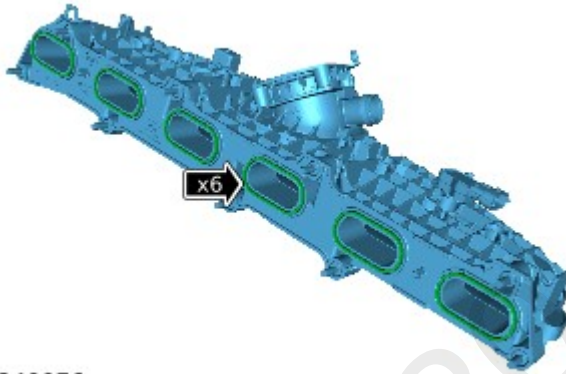
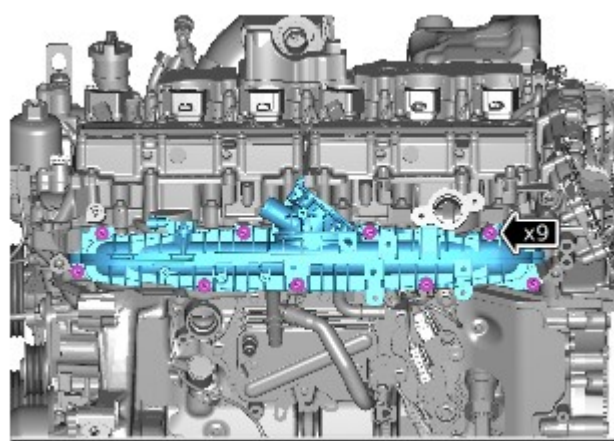


Remove the HP fuel pump cam follower.

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 NOTE:

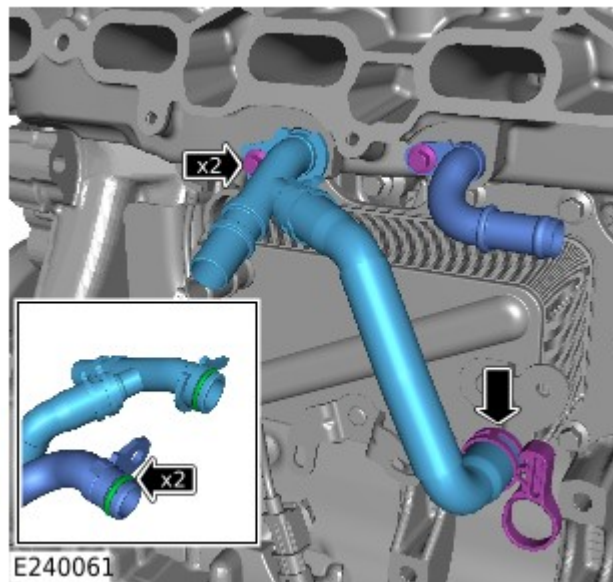
The bolts will remain captive.



E240076

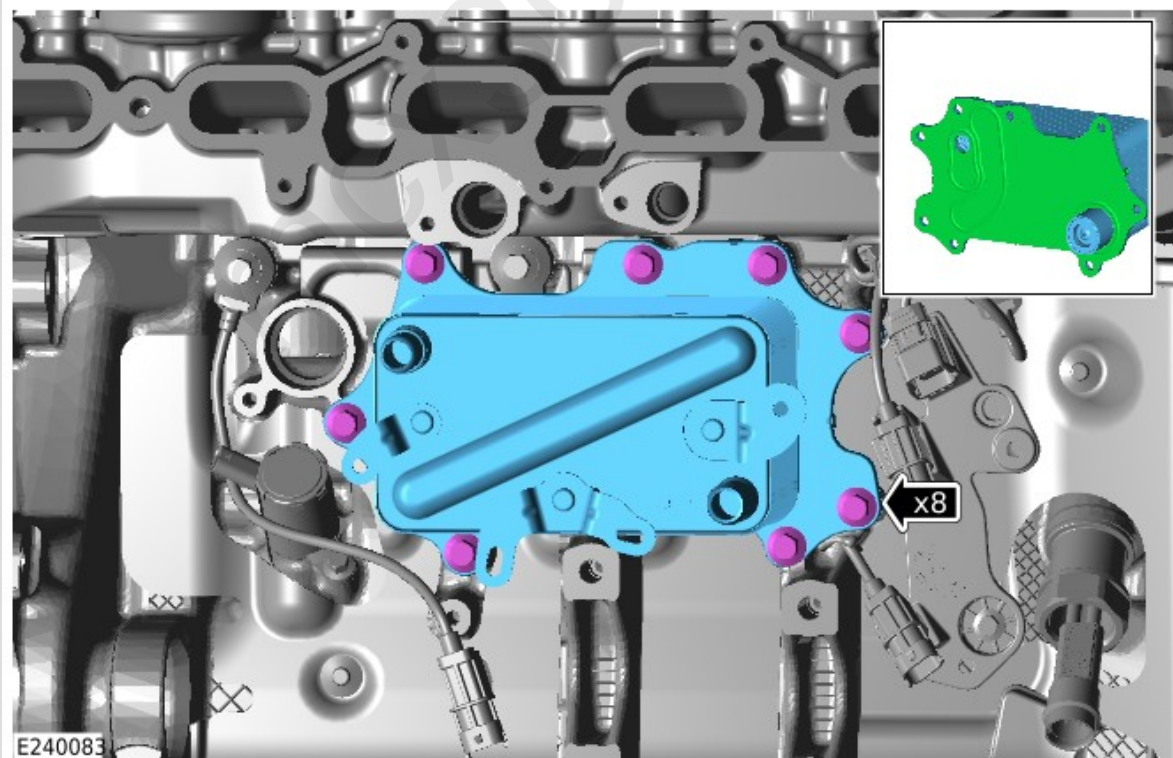
- Release the 9 bolts.
- Remove the intake manifold.
- Remove and discard the 6 O-ring seals.

58.



- Disconnect the coolant hose.
- Remove the 2 bolts.
- Remove the 2 coolant pipes.
- Inspect the 2 O-ring seals. Remove and discard the 2 O-ring seals if damaged or worn.

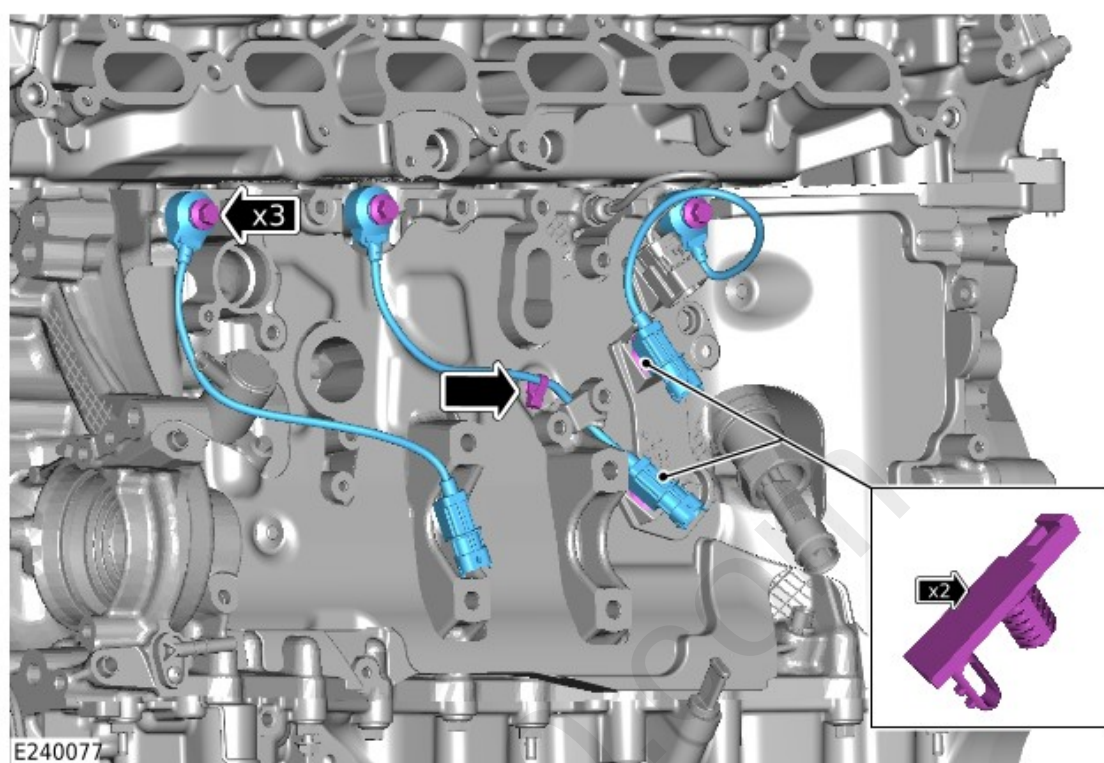
59.



- Remove the 8 bolts.
- Remove the oil cooler.
- Remove and discard the gasket.

⚠ CAUTION:

Note the installed position of the component(s) prior to removal.

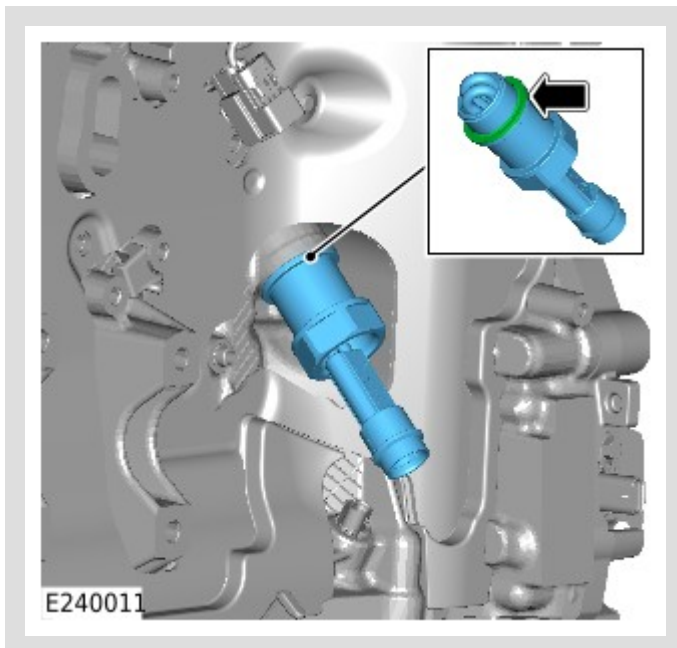


- Release the 3 clips.
- Remove the 3 bolts.
- Remove the 3 knock sensors.

61.

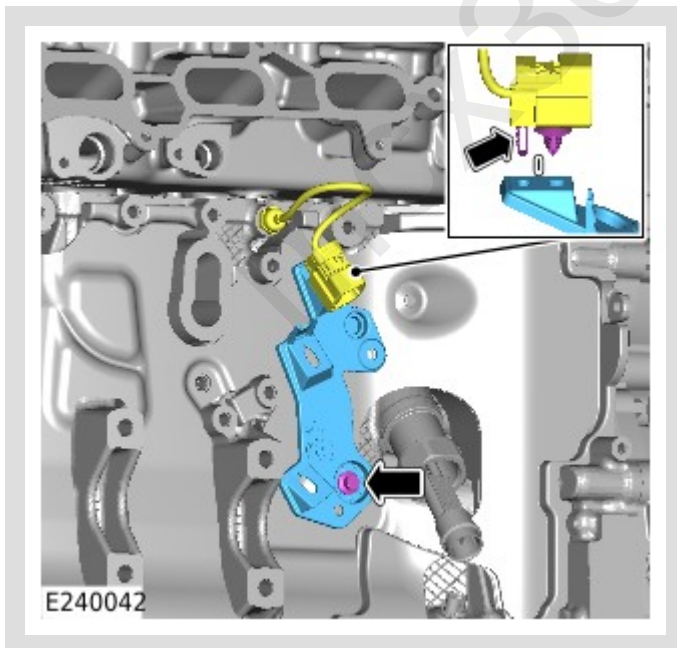
NOTE:

If equipped.



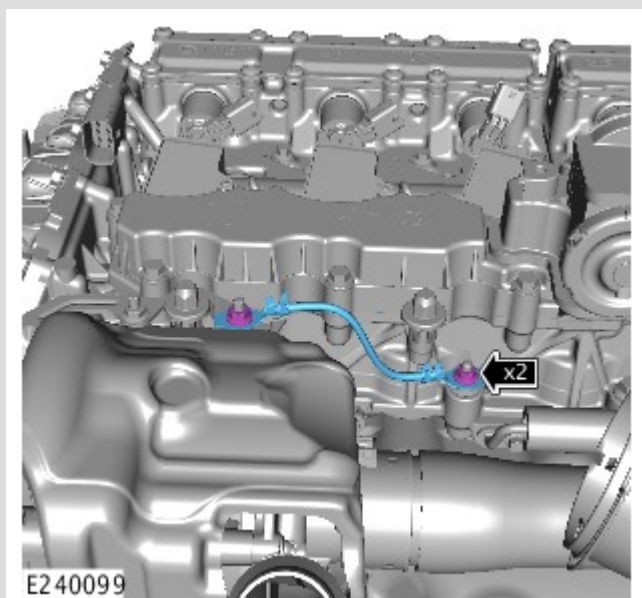
- Remove the block heater.
- Remove and discard the gasket.

62.



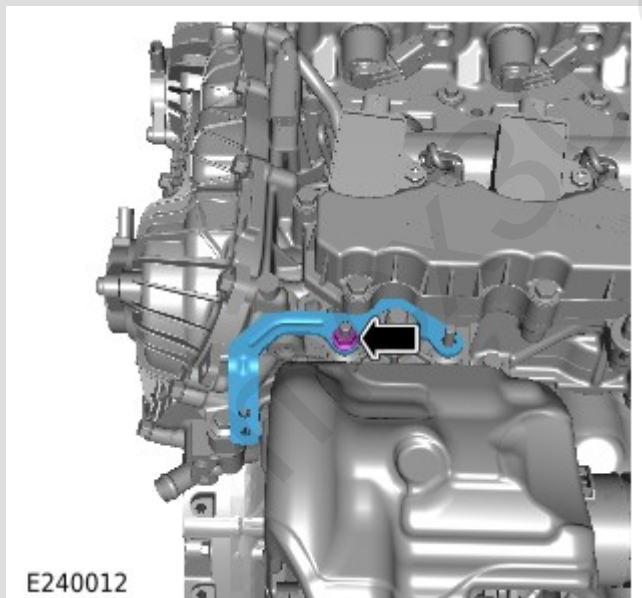
- Release the clip.
- Remove the bolt.
- Remove the bracket.

63.



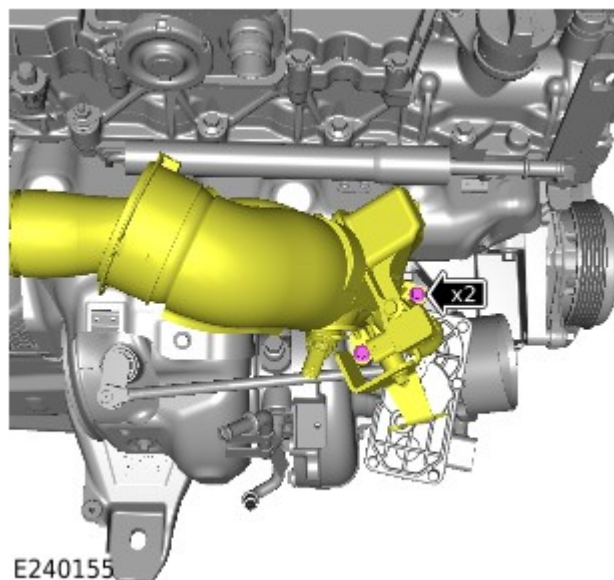
- Remove the 2 nuts.
- Remove the ground cable.

64.



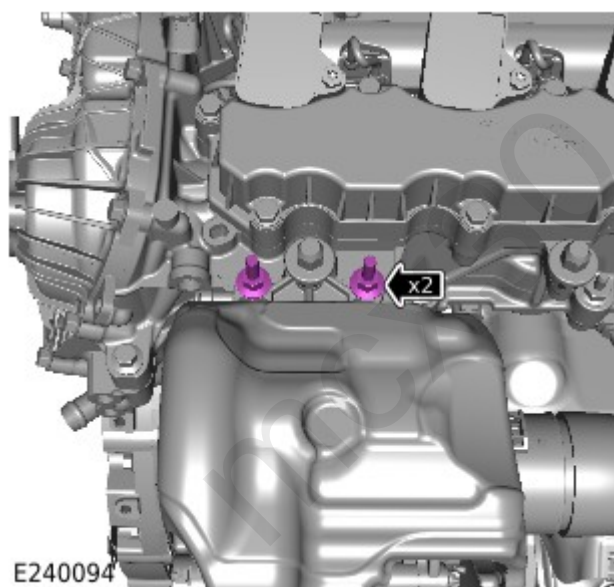
- Remove the nut.
- Remove the bracket.

65.



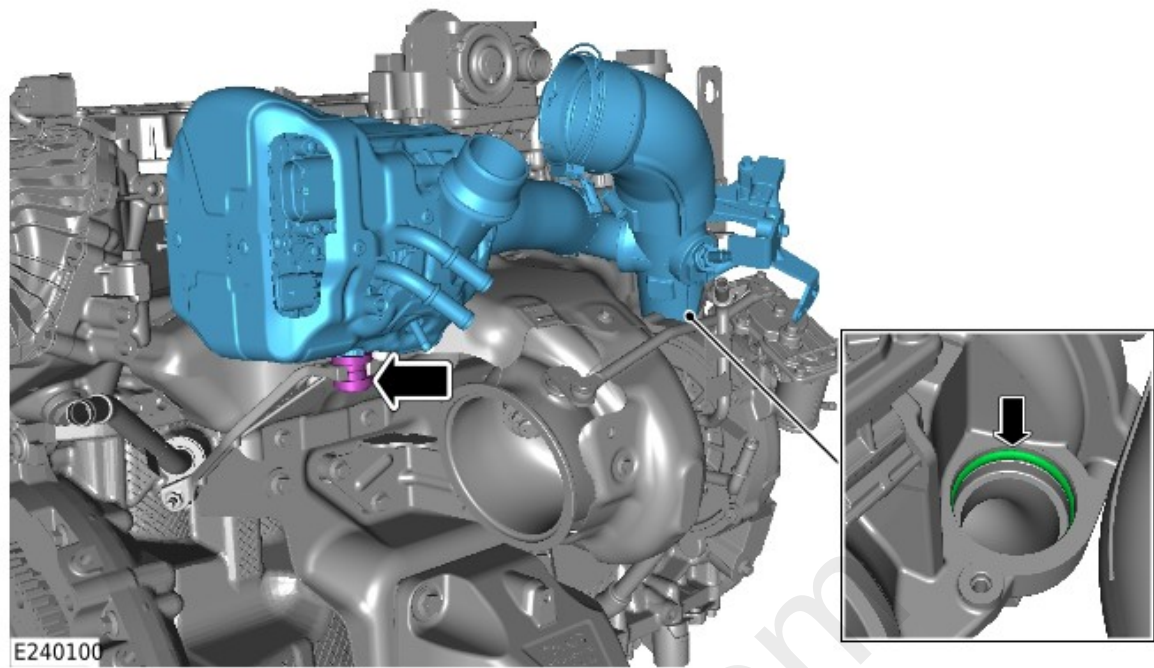
Remove the 2 bolts.

66.



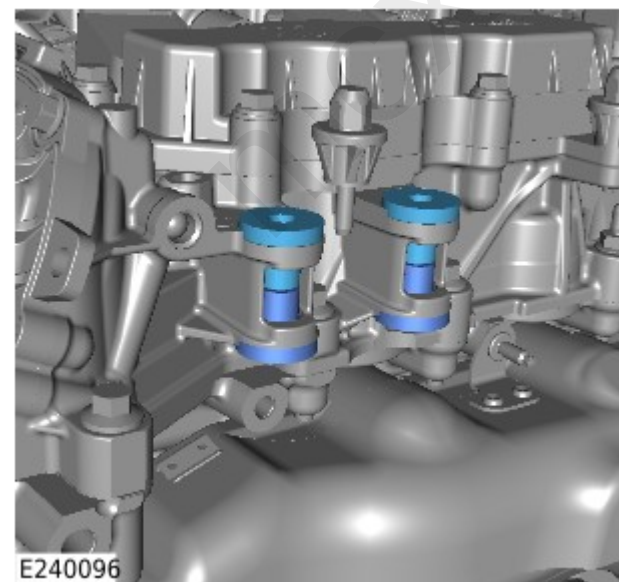
Remove the 2 bolts.

67.



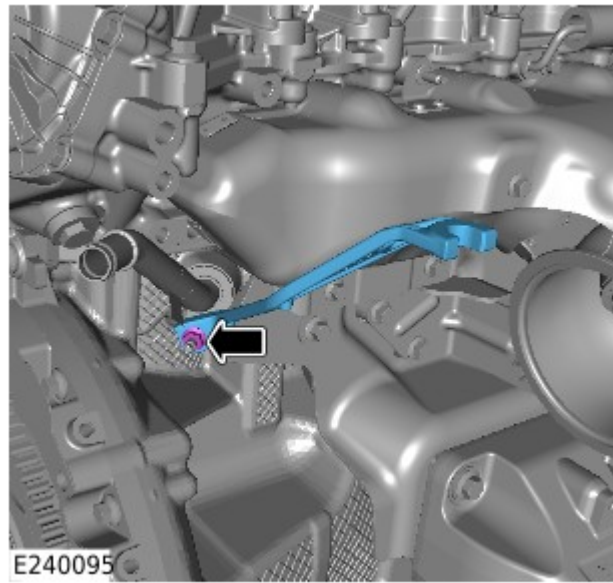
- Release the mounting rubber.
- Remove the supercharger assembly.
- Inspect the O-ring seal. Remove and discard the O-ring seal if damaged or worn.

68.



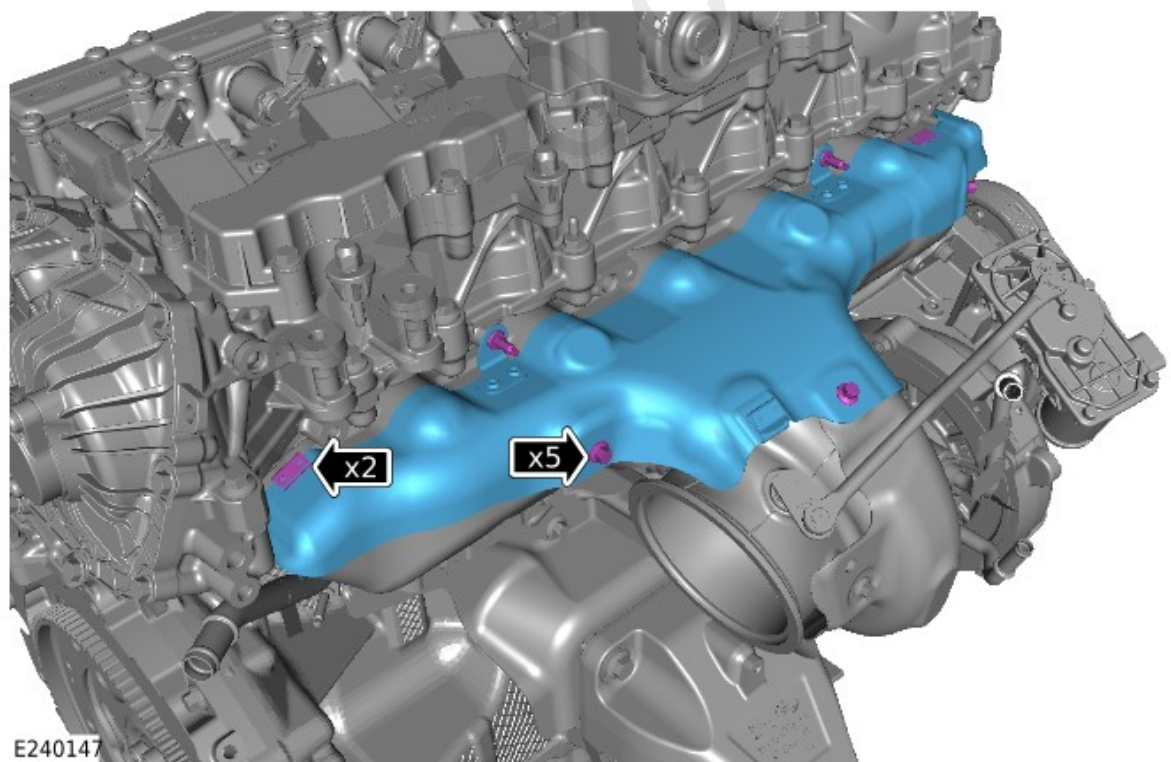
Remove the 4 supercharger mounting rubbers.

69.



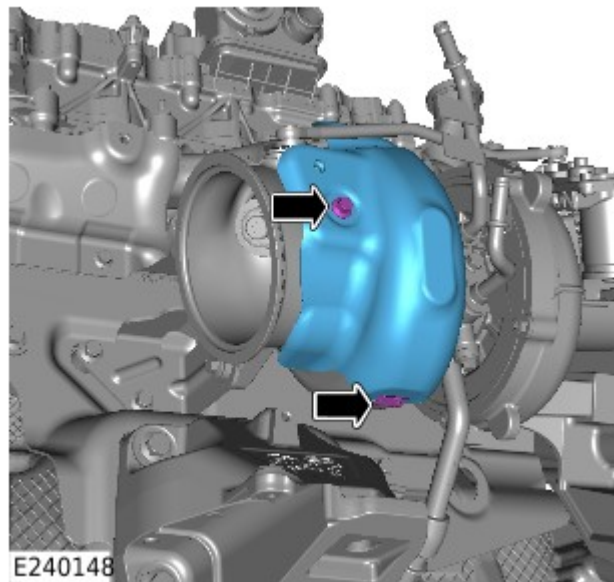
- Remove the nut.
- Remove the bracket.

70.



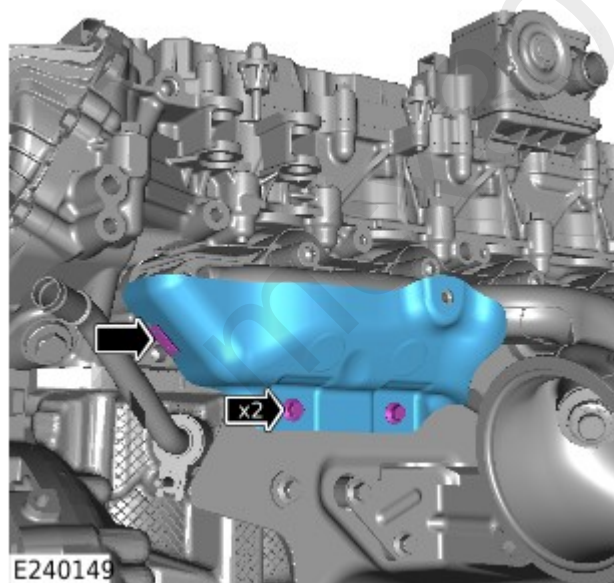
- Remove the 5 bolts.
- Release the heatshield from the 2 clips.
- Remove the heatshield.

71.



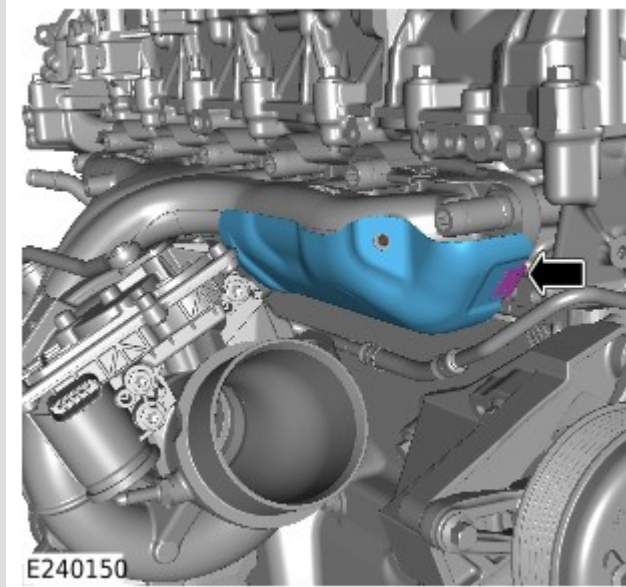
- Remove the bolt.
- Release the heatshield from the clip.
- Remove the heatshield.

72.



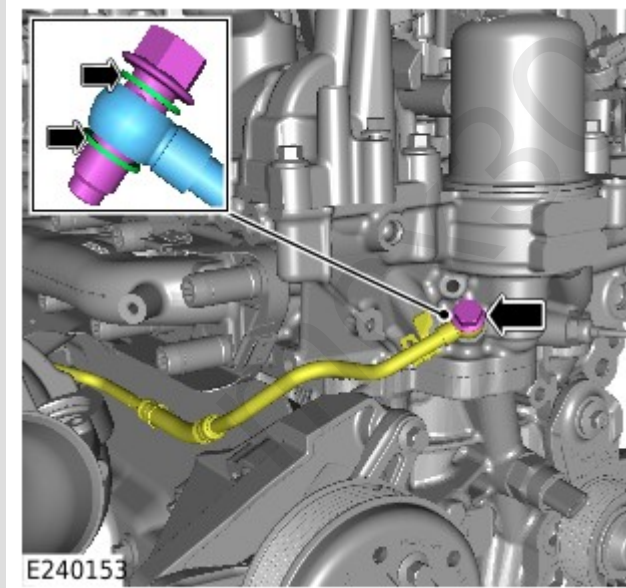
- Remove the 2 bolts.
- Release the heatshield from the clip.
- Remove the heatshield.

73.



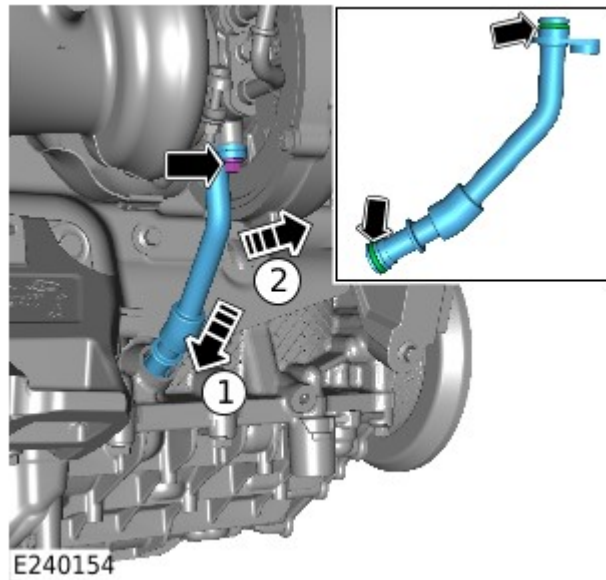
- Release the heatshield from the clip.
- Remove the heatshield.

74.



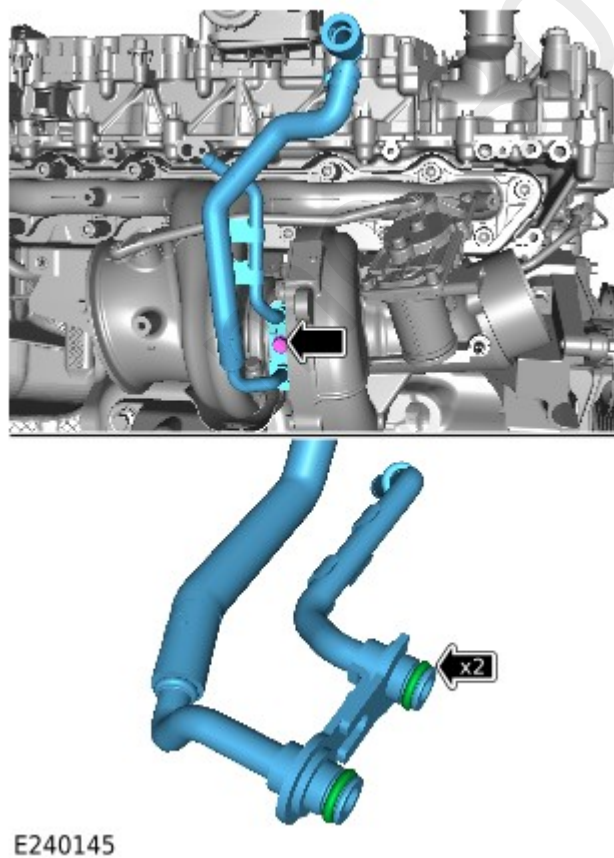
- Remove the banjo bolt.
- Remove and discard the 2 sealing washers.

75.



- Remove the bolt.
- Remove the pipe.
- Remove and discard the 2 O-ring seals.

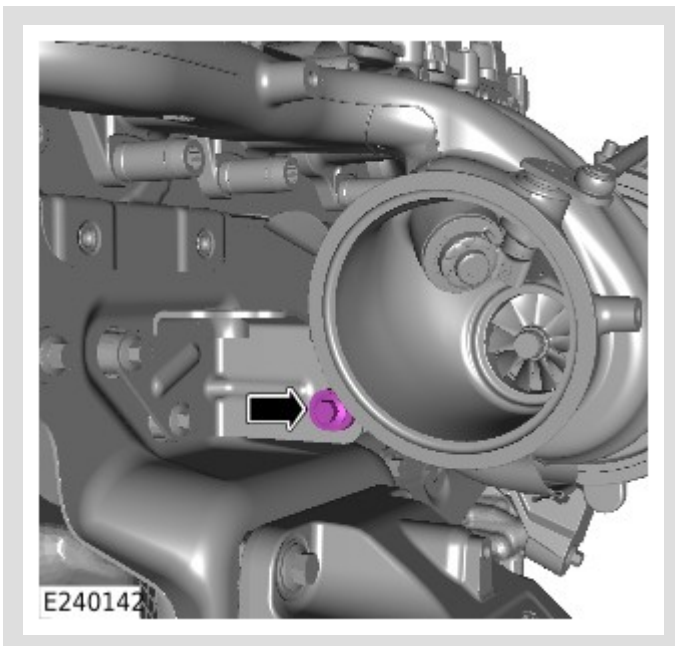
76.



- Remove the bolt.
- Remove the 2 coolant pipes.

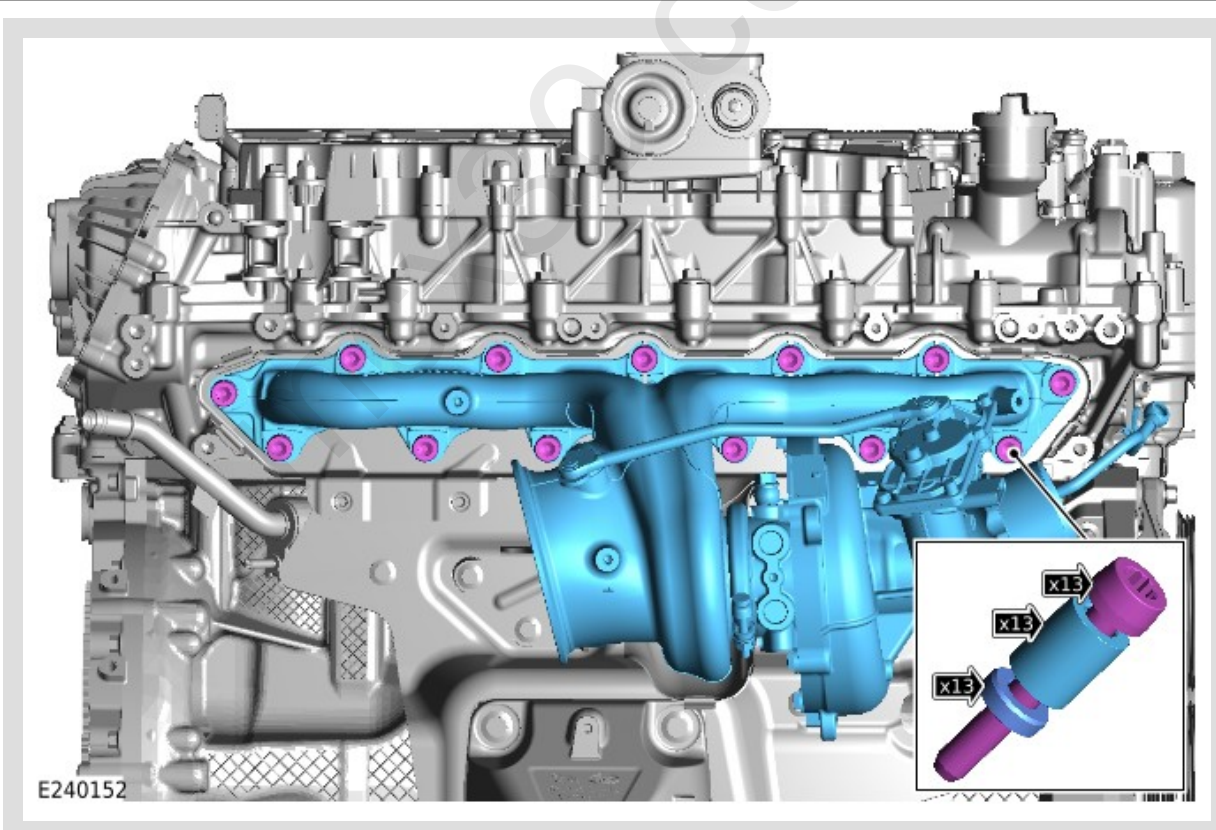
- Remove and discard the 2 O-ring seals.

77.



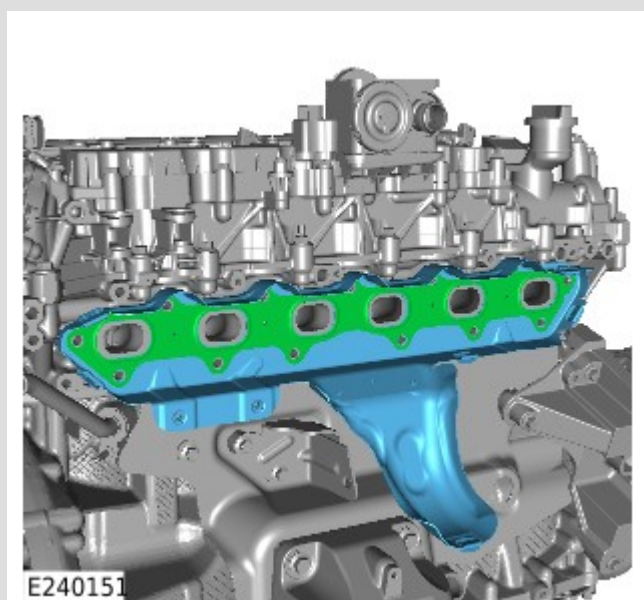
Remove the bolt.

78.



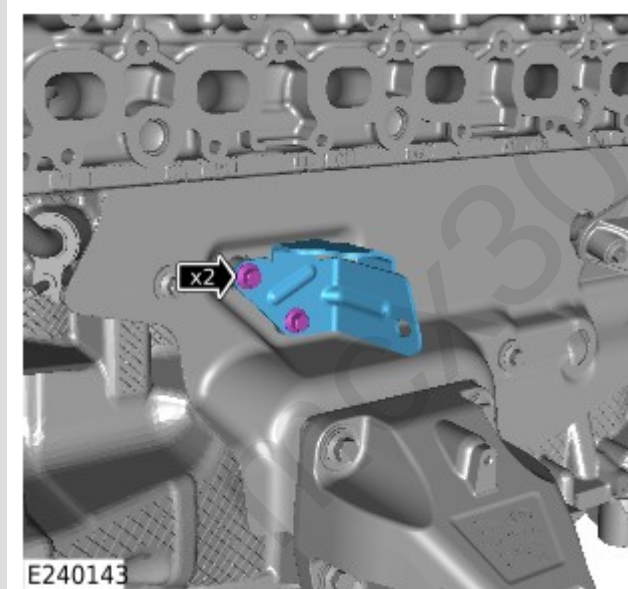
- Remove and discard the 13 bolts, spacers and washers.
- Remove the turbocharger.

79.



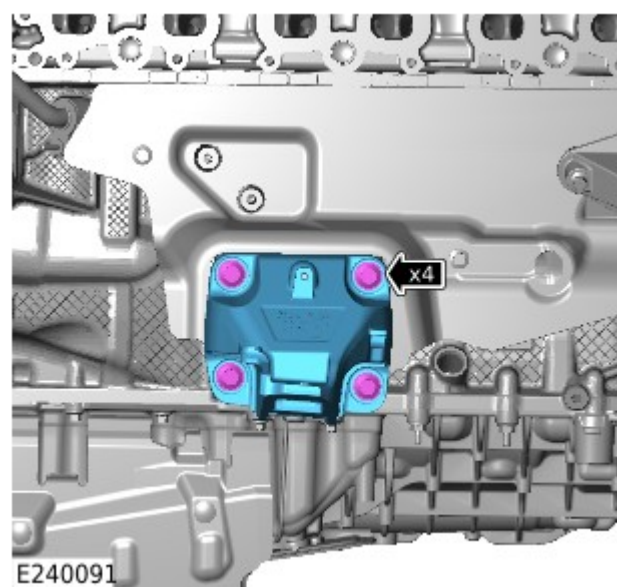
Remove and discard the gasket.

80.



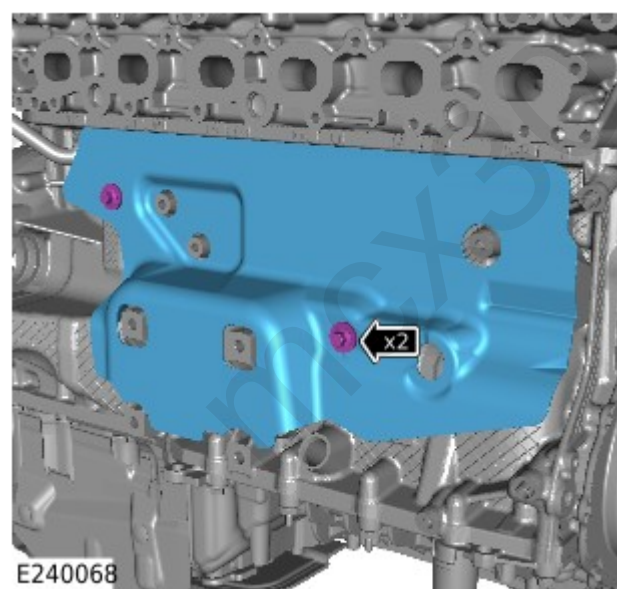
- Remove the 2 bolts.
- Remove the bracket.

81.



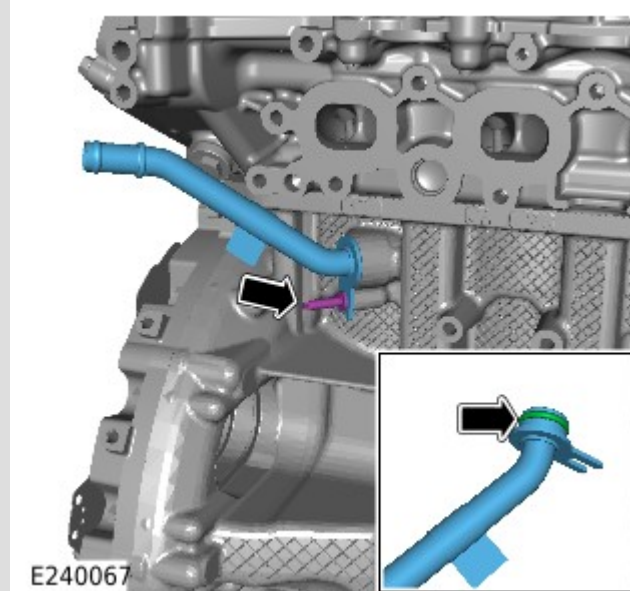
- Remove the 4 bolts.
- Remove the bracket.

82.



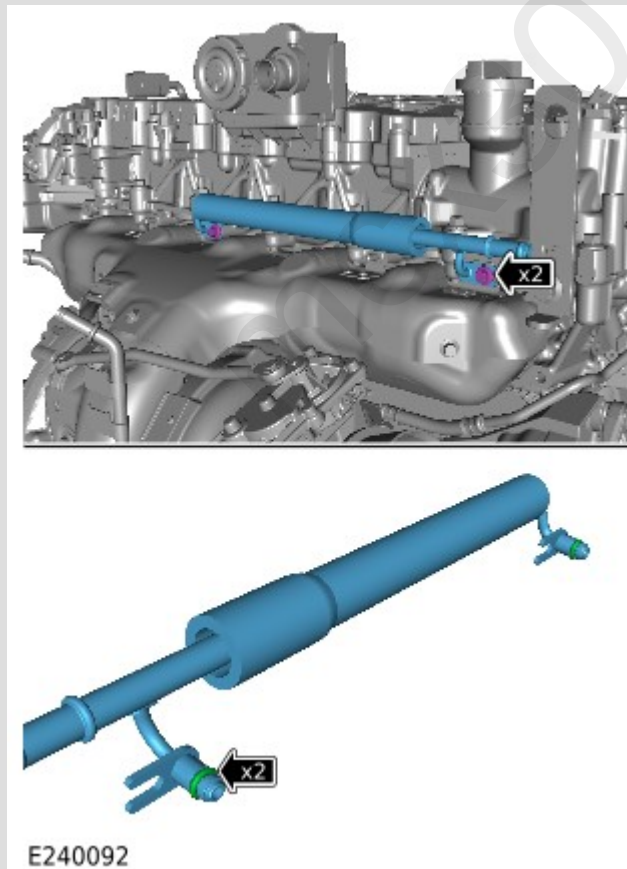
- Remove the 2 bolts.
- Remove the NVH material.

83.



- Remove the bolt.
- Remove the coolant pipe.
- Inspect the O-ring seal. Remove and discard the O-ring seal if damaged or worn.

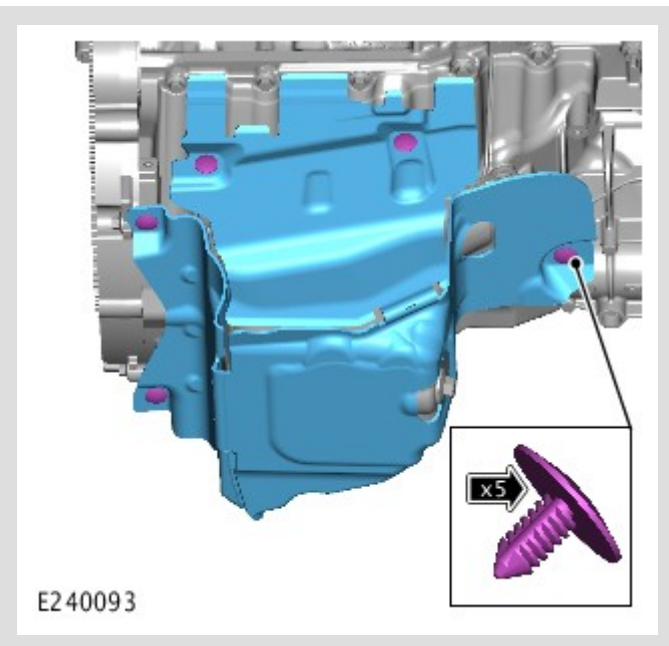
84.



- Remove the 2 bolts.
- Remove the coolant pipe.

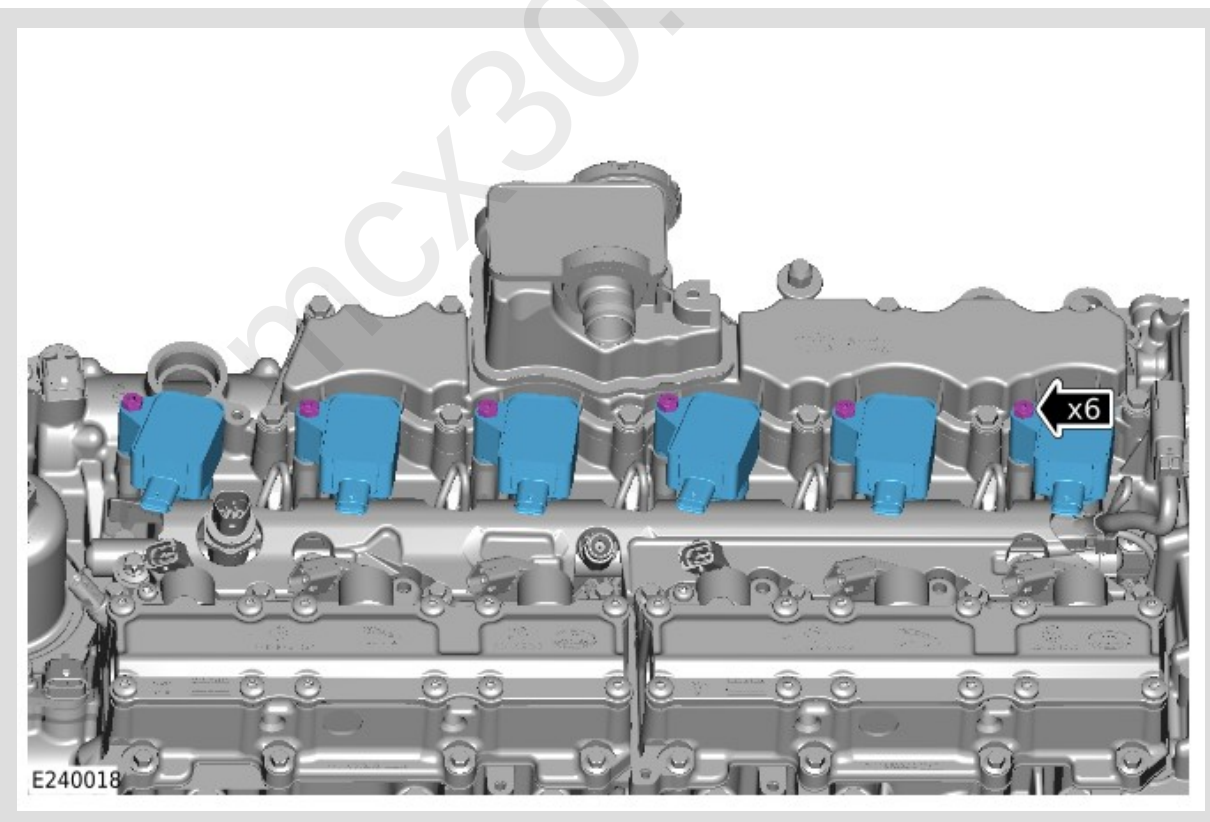
- Inspect the 2 O-ring seals. Remove and discard the 2 O-ring seals if damaged or worn.

85.



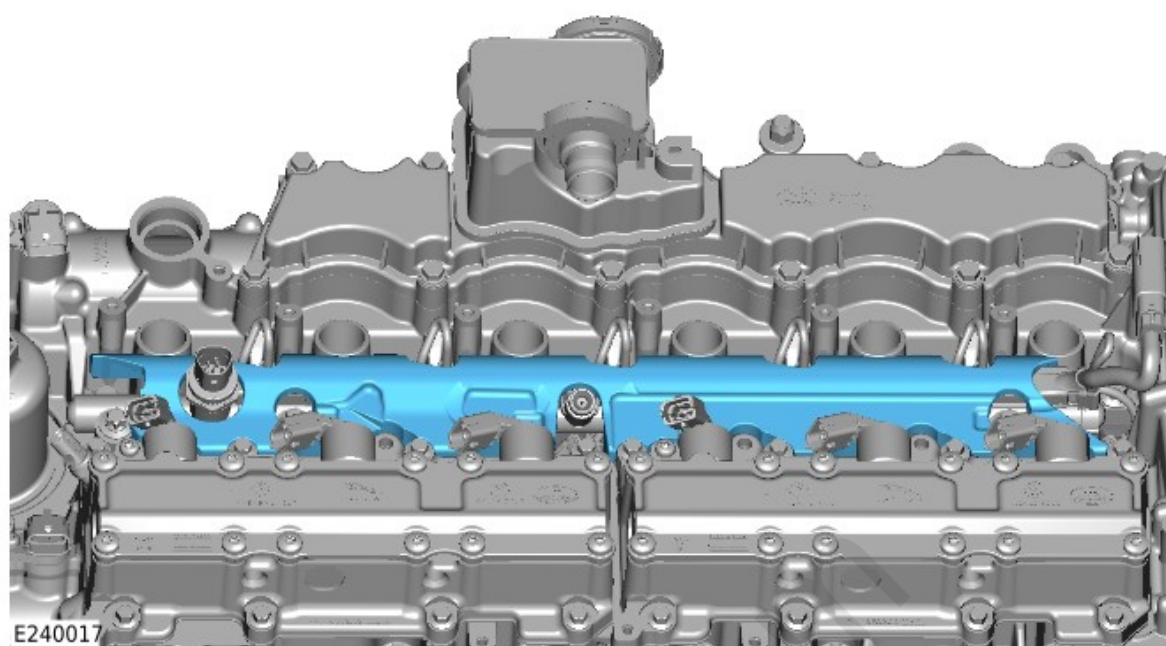
- Remove the 5 clips.
- Remove the NVH material.

86.



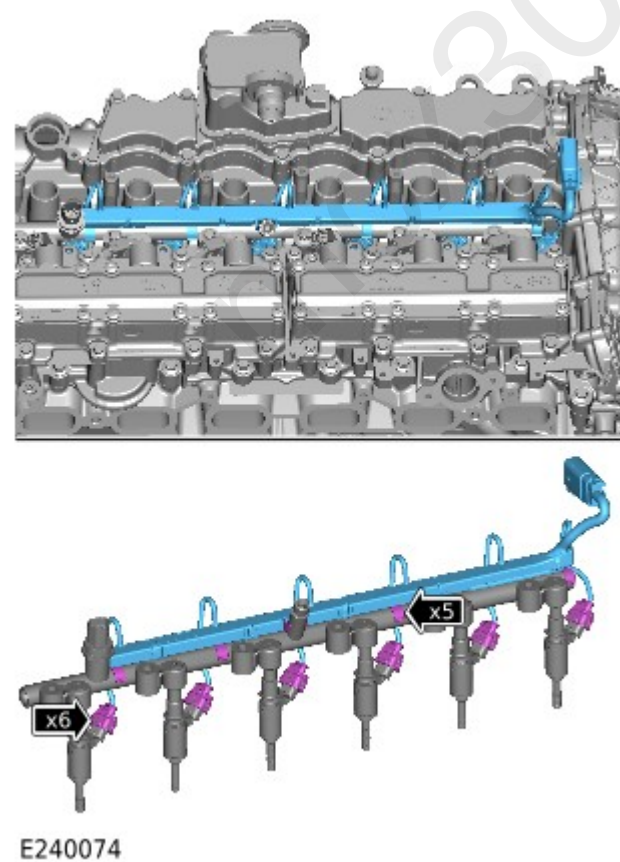
- Remove the 6 bolts.
- Remove the 6 ignition coils.

87.



Remove the NVH material.

88.



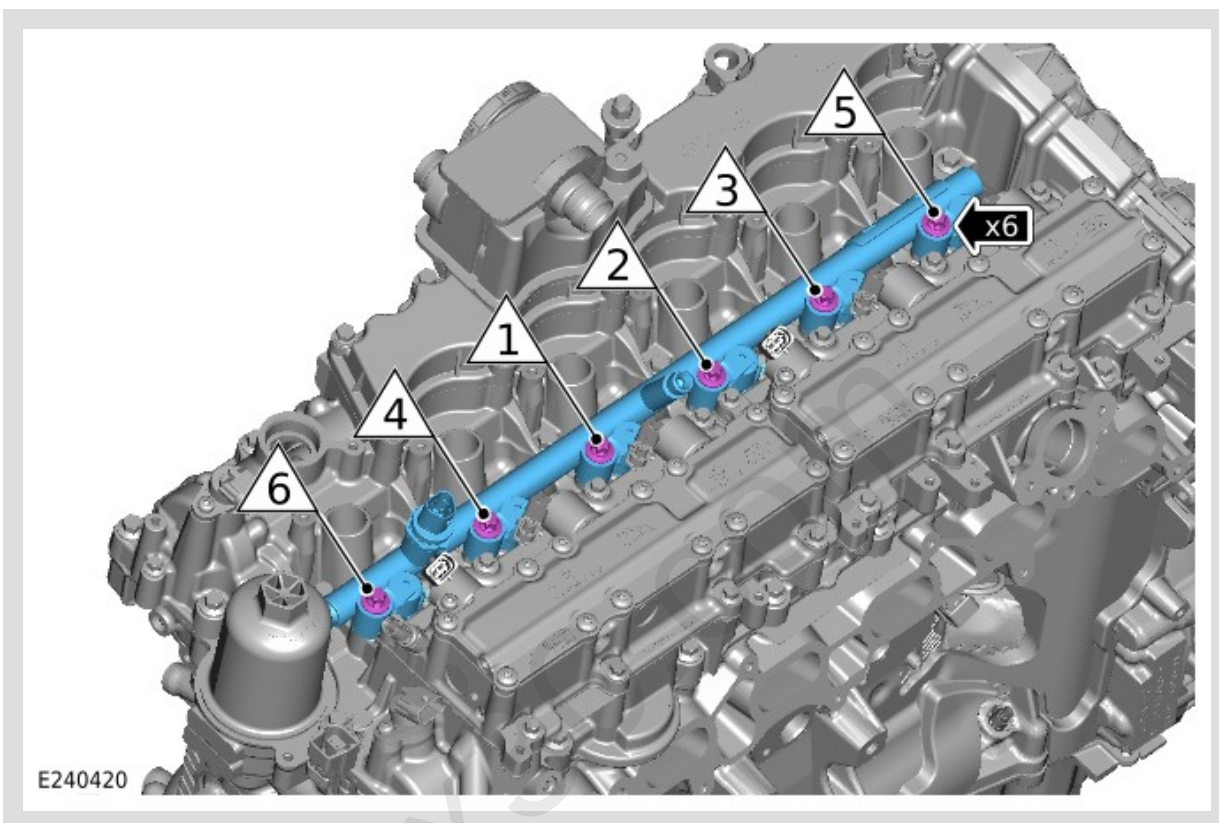
- Release the 5 wiring harness clips.

- Disconnect the 6 electrical connectors.
- Remove the wiring harness.

89.

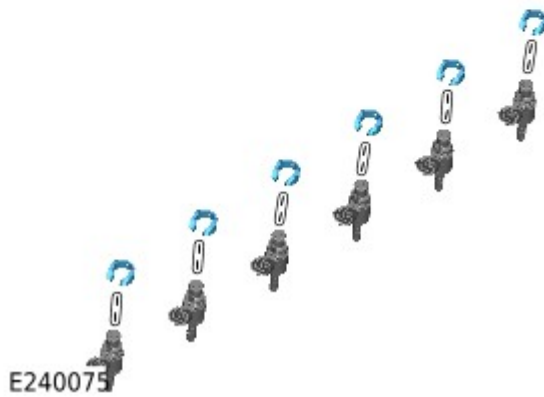
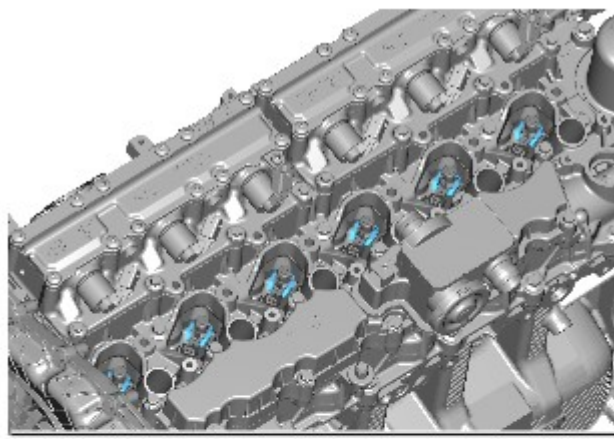
 NOTE:

Loosen each of the bolts 1 turn at a time until the spring tension is fully released.



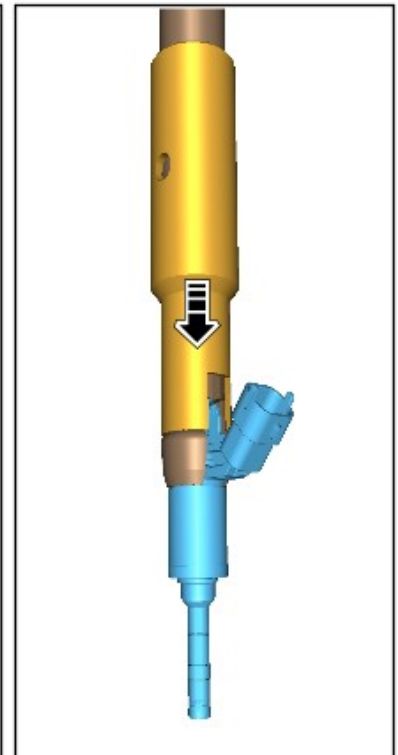
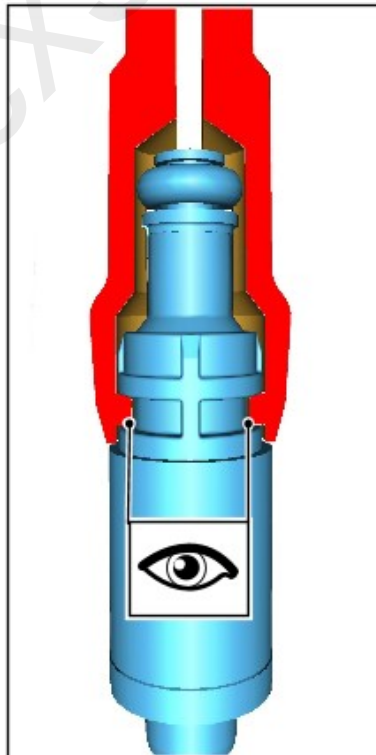
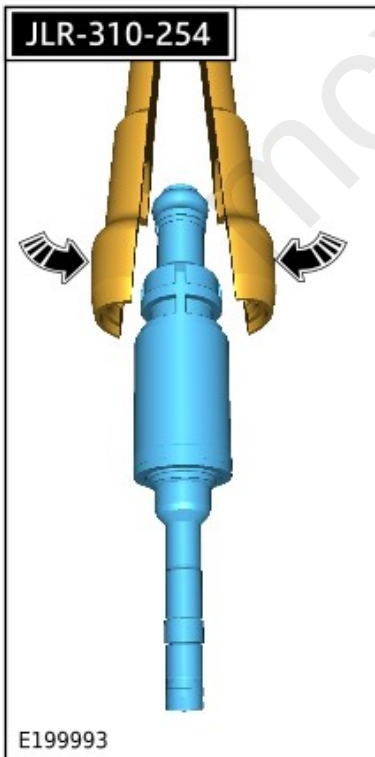
- Remove the 6 bolts in the illustrated sequence.
- Discard the 6 bolts.
- Remove the fuel rail.

90.



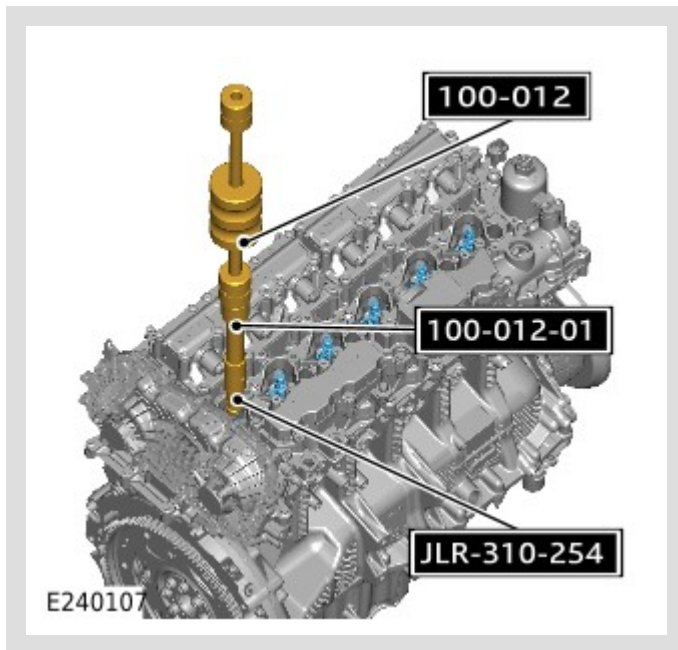
Remove and discard the 6 fuel injector spring clamps.

91.



Make sure the fuel injector remover special tool is correctly installed on the fuel injectors before attempting to remove them.

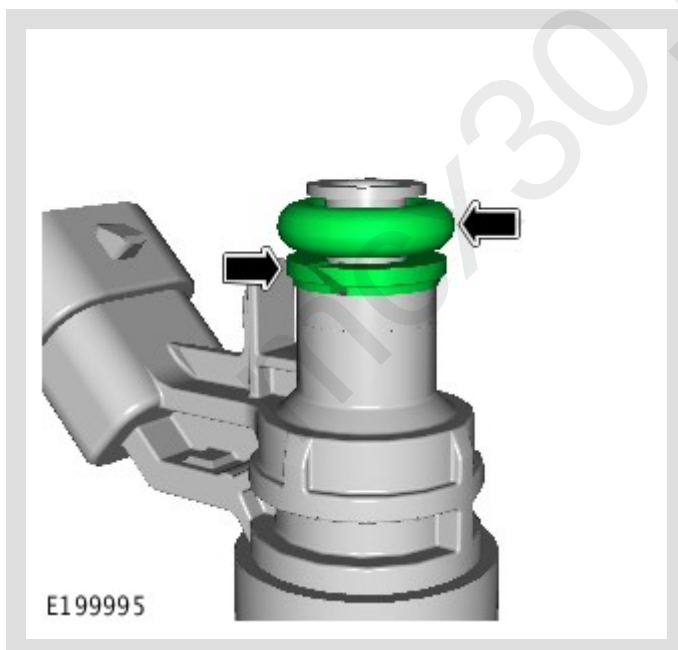
92.



Use the special tools to remove the 6 fuel injectors.

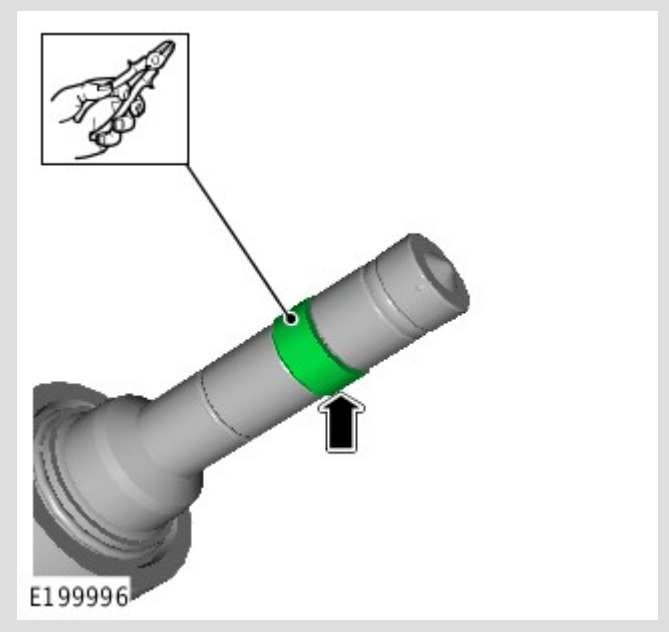
Special Tool(s): [100-012](#), [100-012-01](#)

93.



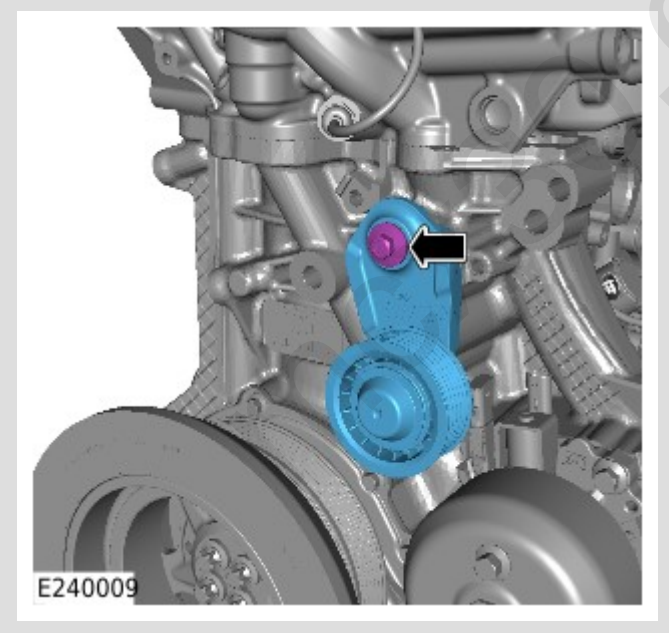
- Remove and discard the O-ring seal.
- Remove and discard the spacer washer.
- Repeat this step for the 5 remaining fuel injectors.

94.



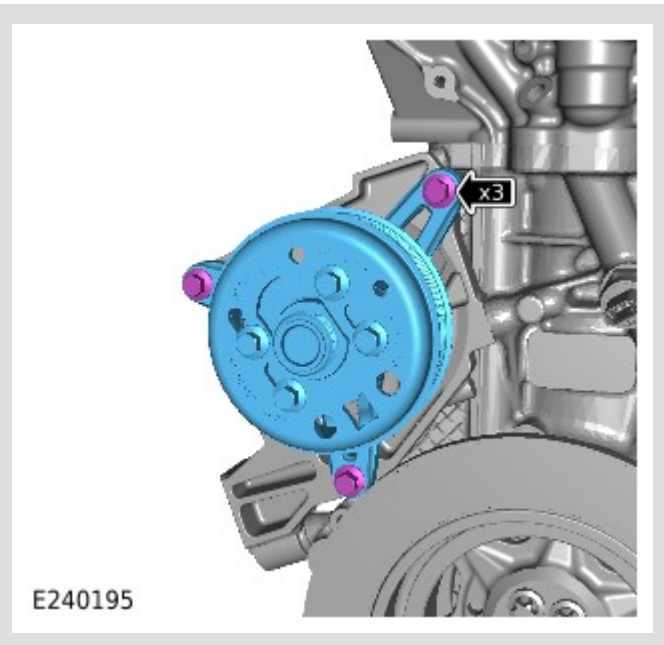
- Cut and remove the seal.
- Repeat this step for the 5 remaining fuel injectors.

95.



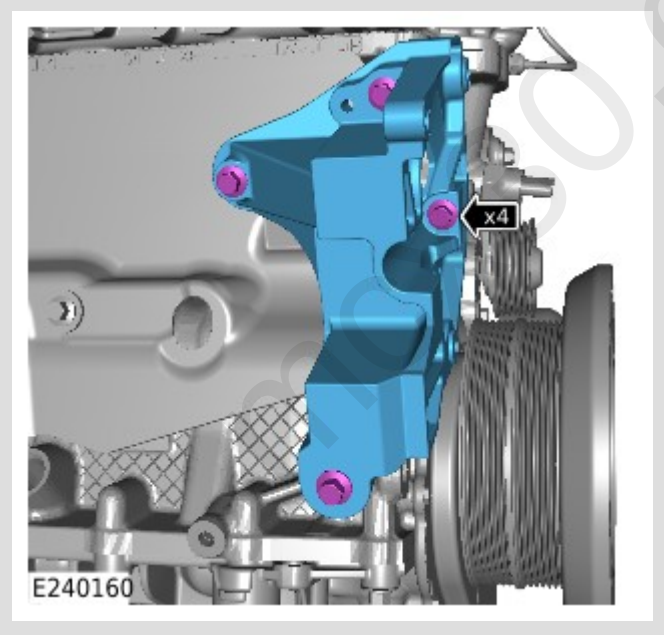
- Remove the bolt.
- Remove the idler pulley.

96.



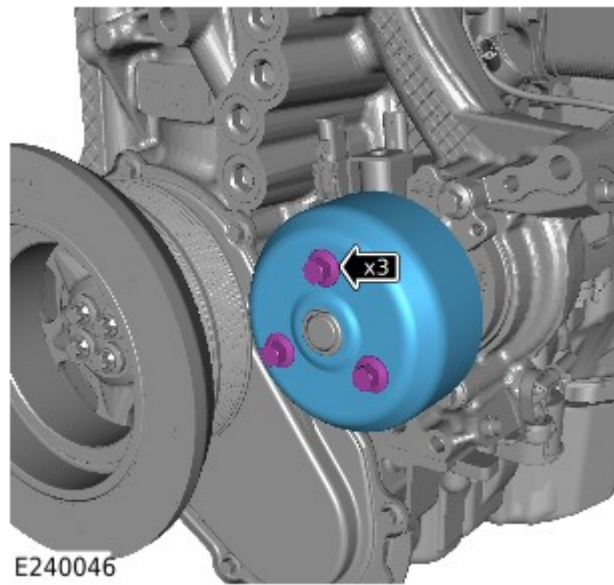
- Remove the 3 bolts.
- Remove the viscous cooling fan drive pulley.

97.



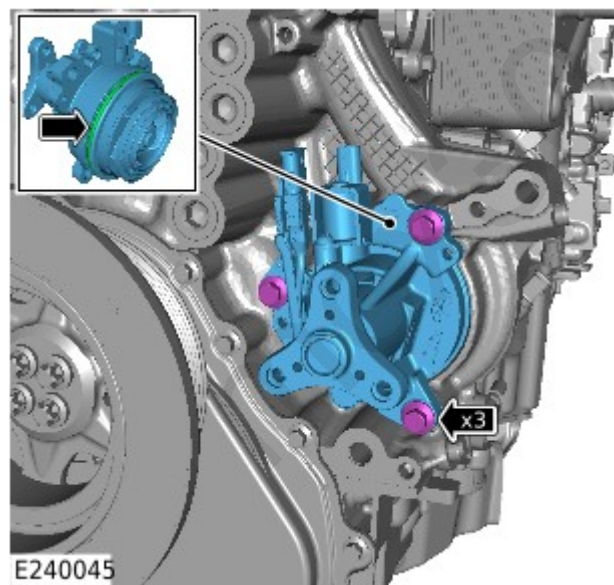
- Remove the 4 bolts.
- Remove the bracket.

98.



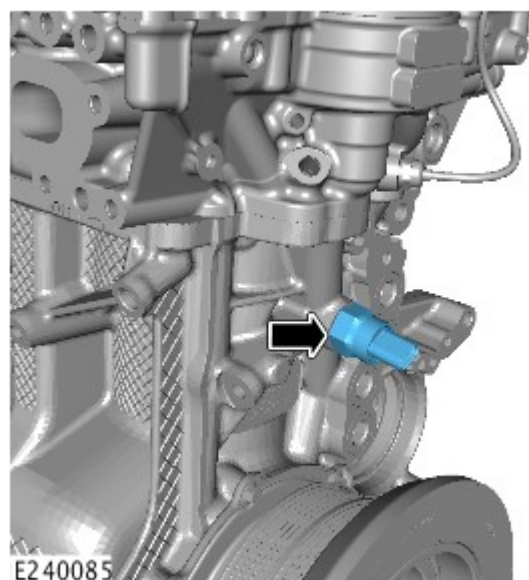
- Remove the 3 bolts.
- Remove the coolant pump pulley.

99.



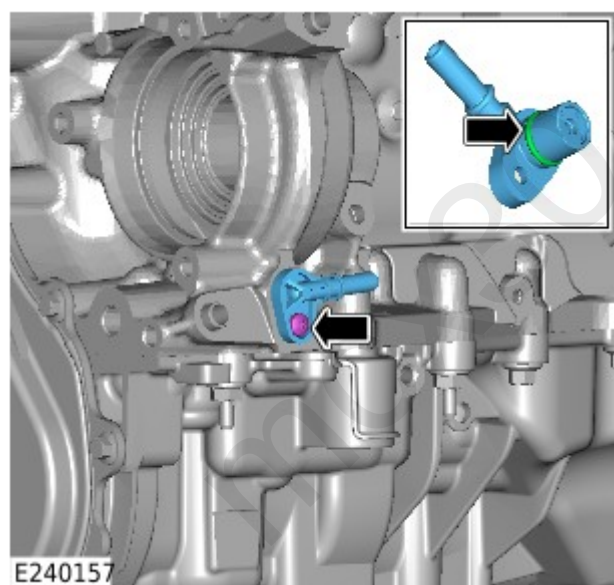
- Remove and discard the 3 bolts.
- Remove the coolant pump.
- Remove and discard the O-ring seal.

100.



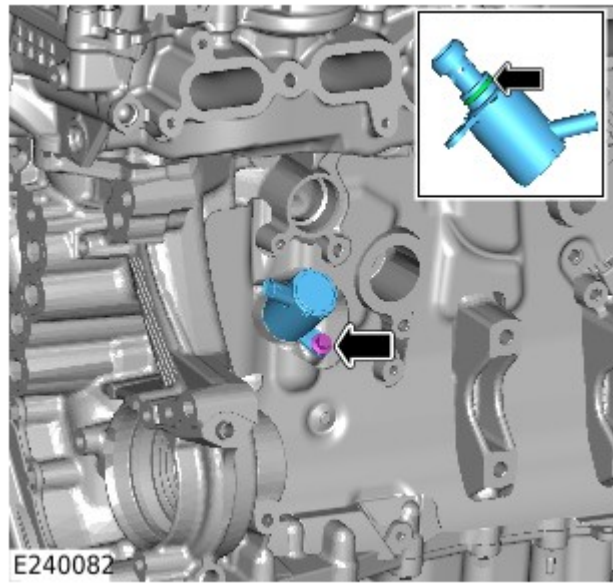
Remove the oil pressure and temperature sensor.

101.



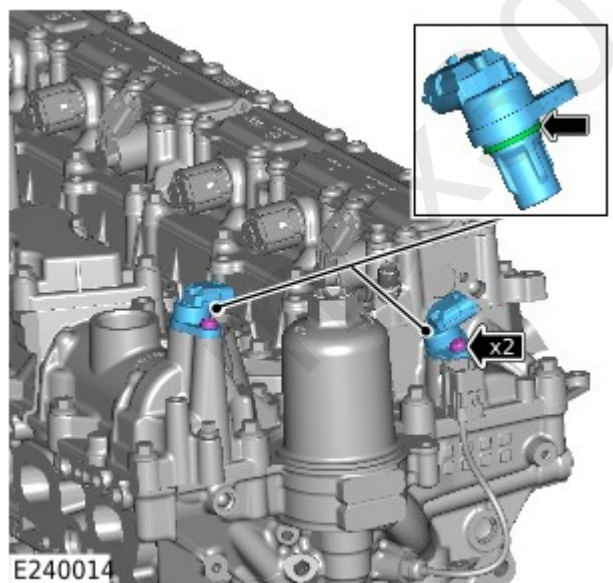
- Remove and discard the bolt.
- Remove the vacuum pipe connector.
- Inspect the O-ring seal. Remove and discard the O-ring seal if damaged or worn.

102.



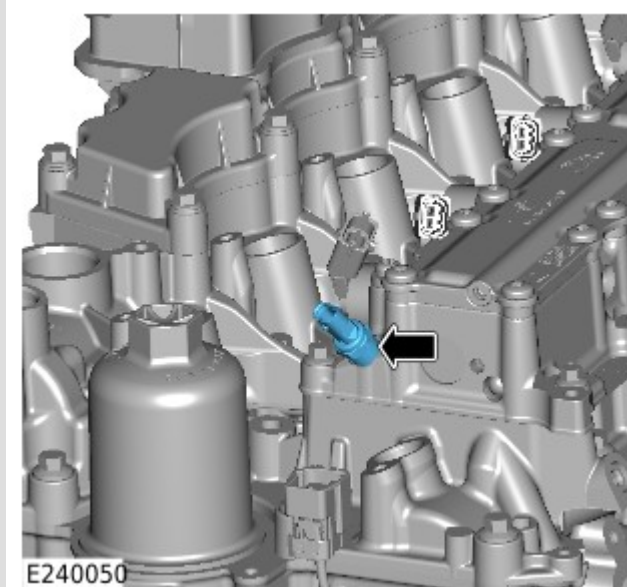
- Remove the bolt.
- Remove the piston cooling jet solenoid.
- Inspect the O-ring seal. Remove and discard the O-ring seal if damaged or worn.

103.



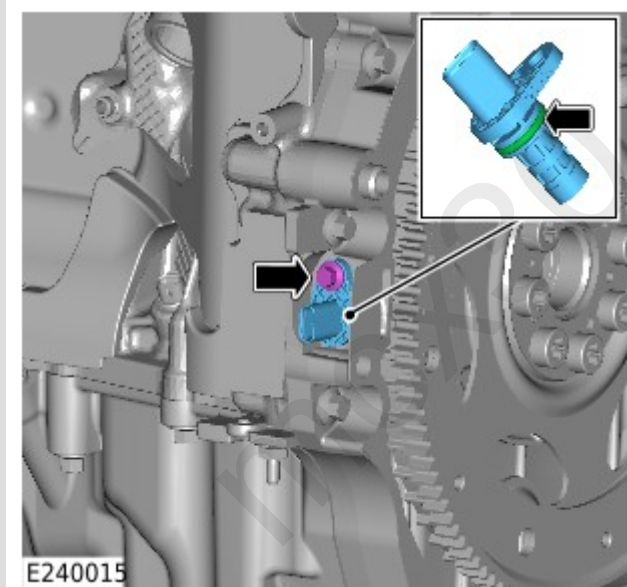
- Remove the 2 bolts.
- Remove the 2 Camshaft Position Sensor (CMP) sensors.
- Inspect the O-ring seals. Remove and discard the O-ring seals if damaged or worn.

104.



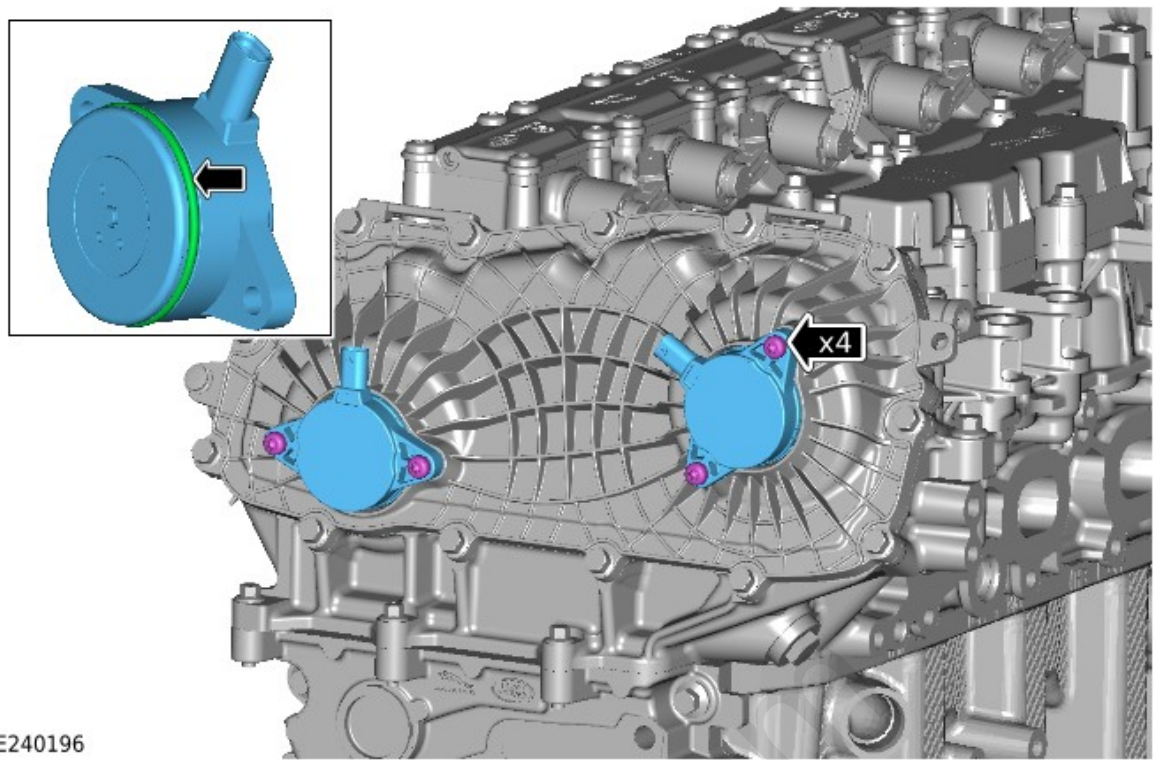
Remove the Continuous Variable Valve Lift (CVVL) oil temperature sensor.

105.



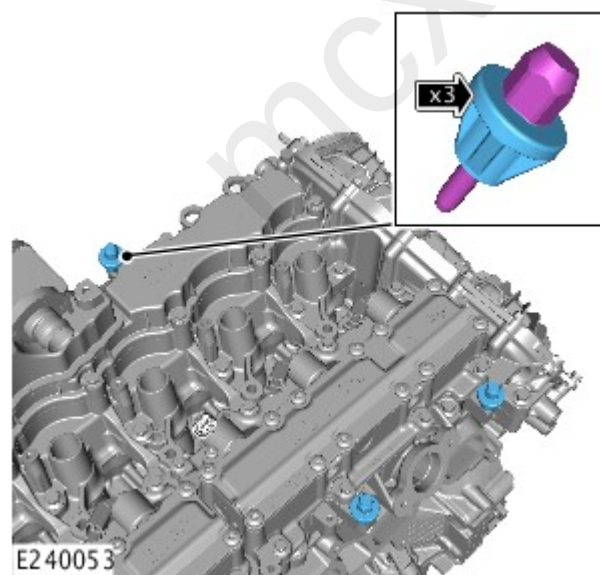
- Remove the bolt.
- Remove the Crankshaft Position Sensor (CKP) sensor.
- Inspect the O-ring seal. Remove and discard the O-ring seal if damaged or worn.

106.



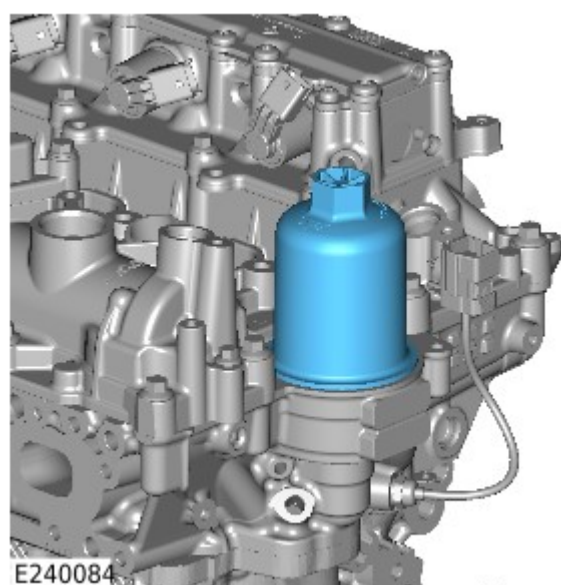
- Remove the 4 bolts.
- Remove the 2 Variable Valve Timing (VVT) solenoids.
- Inspect the O-ring seals. Remove and discard the O-ring seals if damaged or worn.

107.



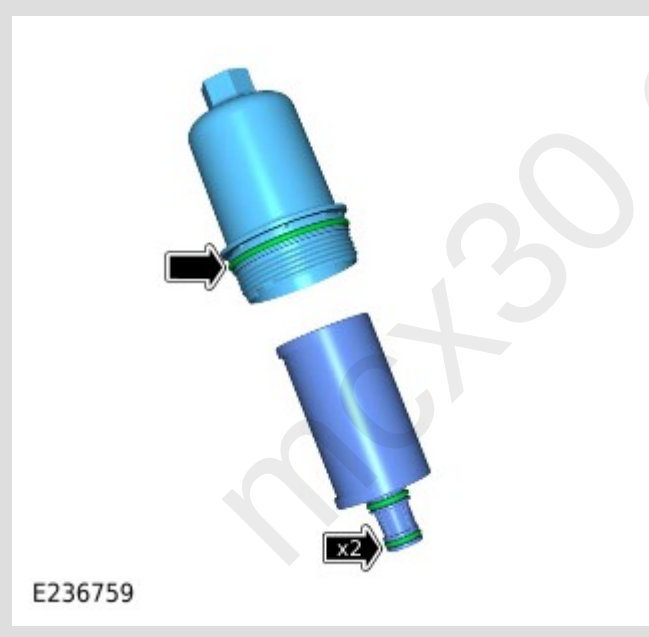
Remove the 3 studs.

108.



Remove the oil filter element assembly.

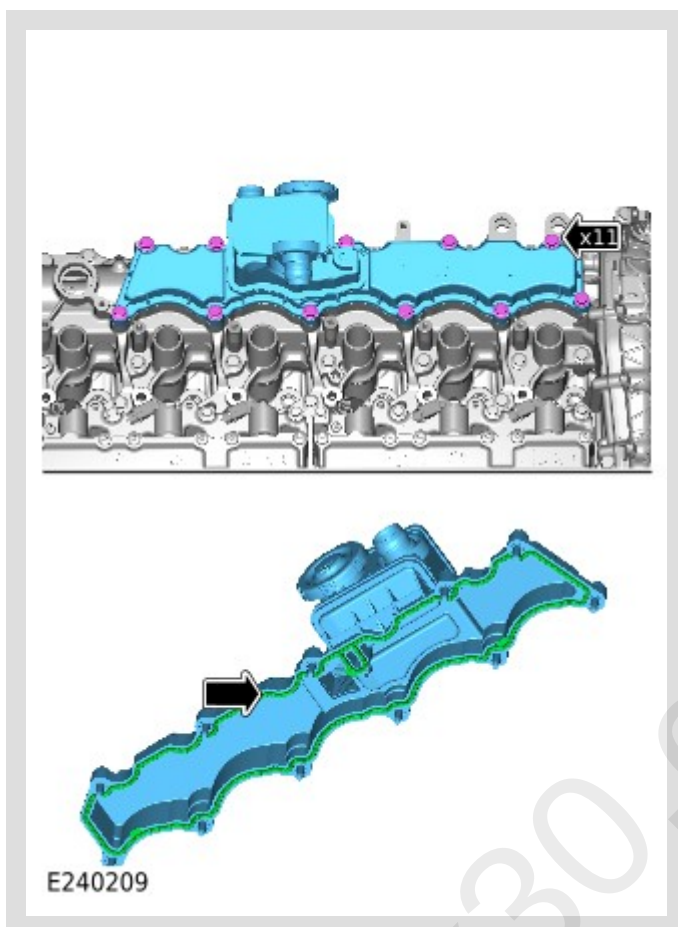
109.



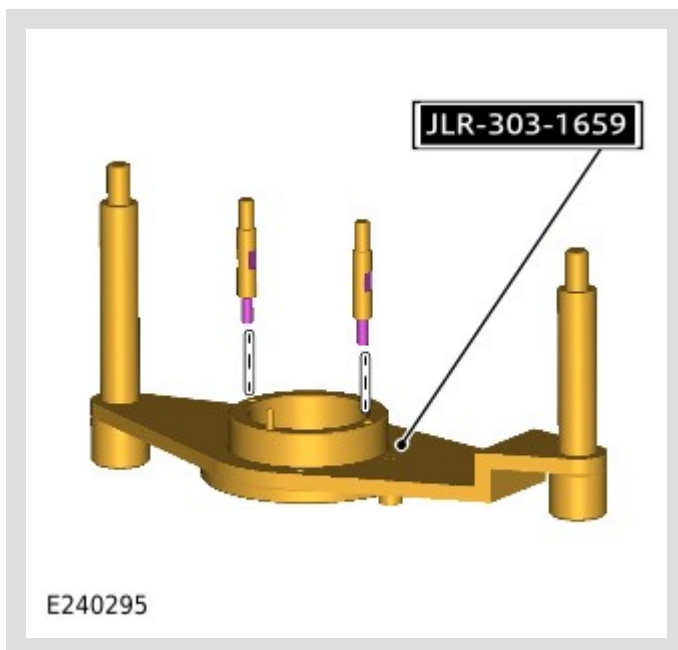
- Remove and discard the oil filter element.
- Remove and discard the 3 O-ring seals.

 NOTE:

The bolts will remain captive.



- Release the 11 bolts.
- Remove the engine vent oil separator.
- Remove and discard the gasket.



Install the special tool as illustrated.

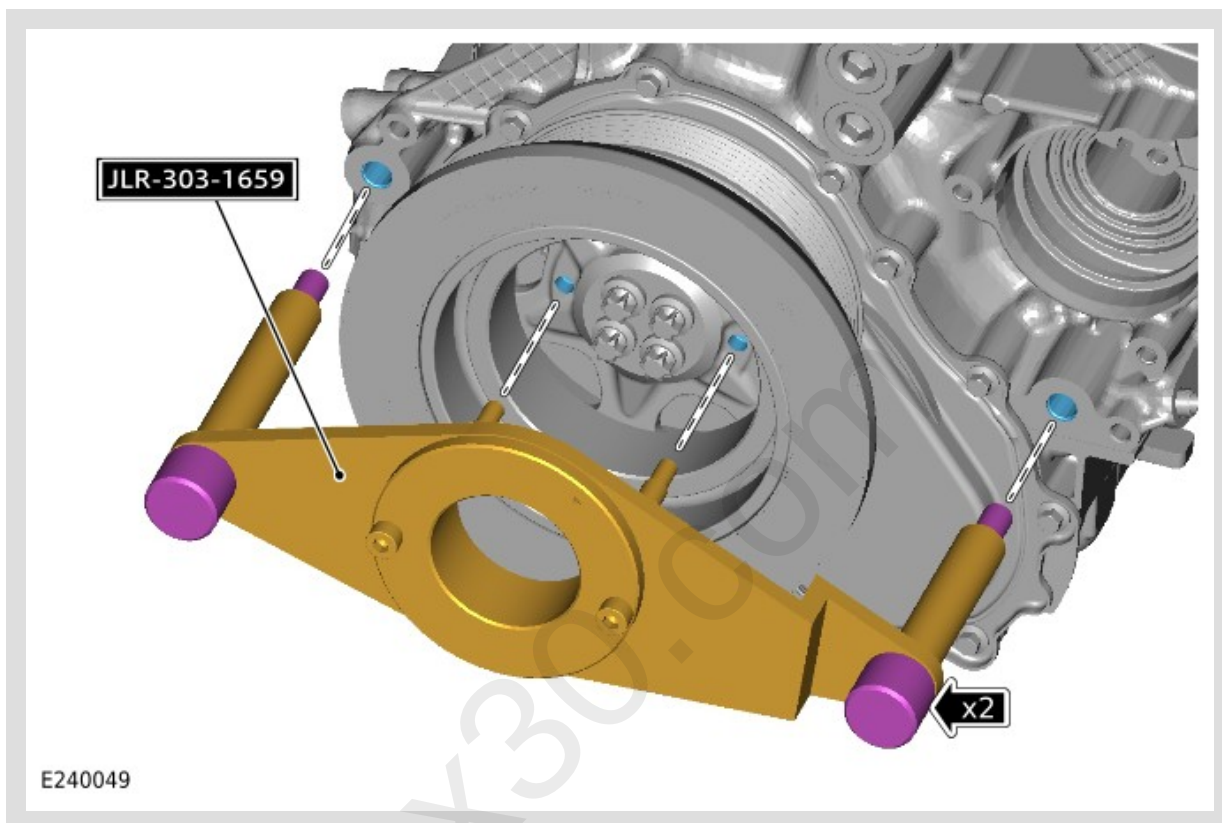
Special Tool(s): [JLR-303-1659](#)

⚠ CAUTION:

Only rotate the engine in the normal direction of rotation.

⚠ NOTE:

The crankshaft may require rotating to correctly position the special tool.



Install the special tool as illustrated.

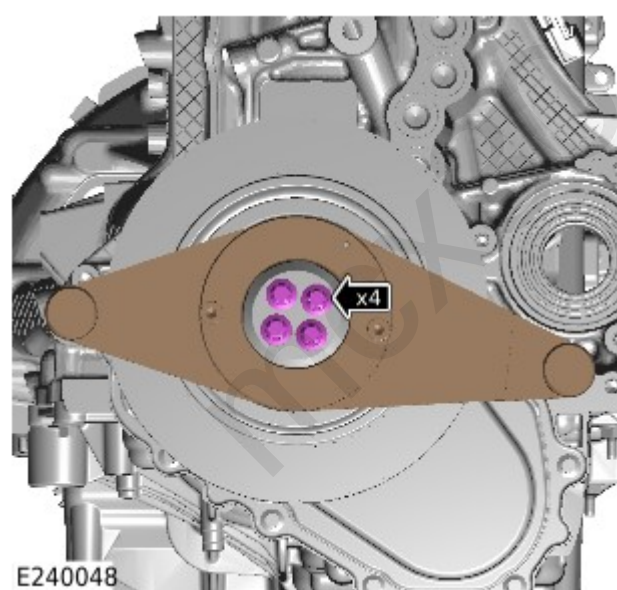
Special Tool(s): [JLR-303-1659](#)

113.



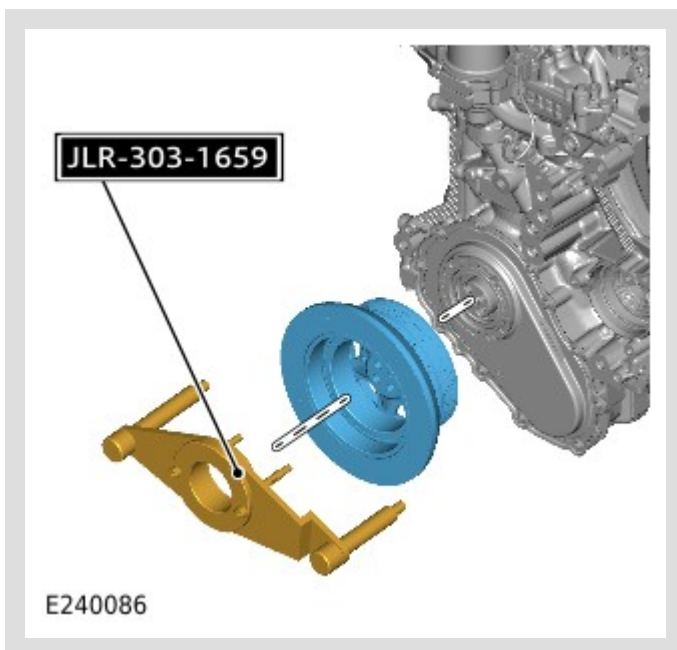
- Remove and discard the 8 bolts.
- Remove the drive plate.

114.



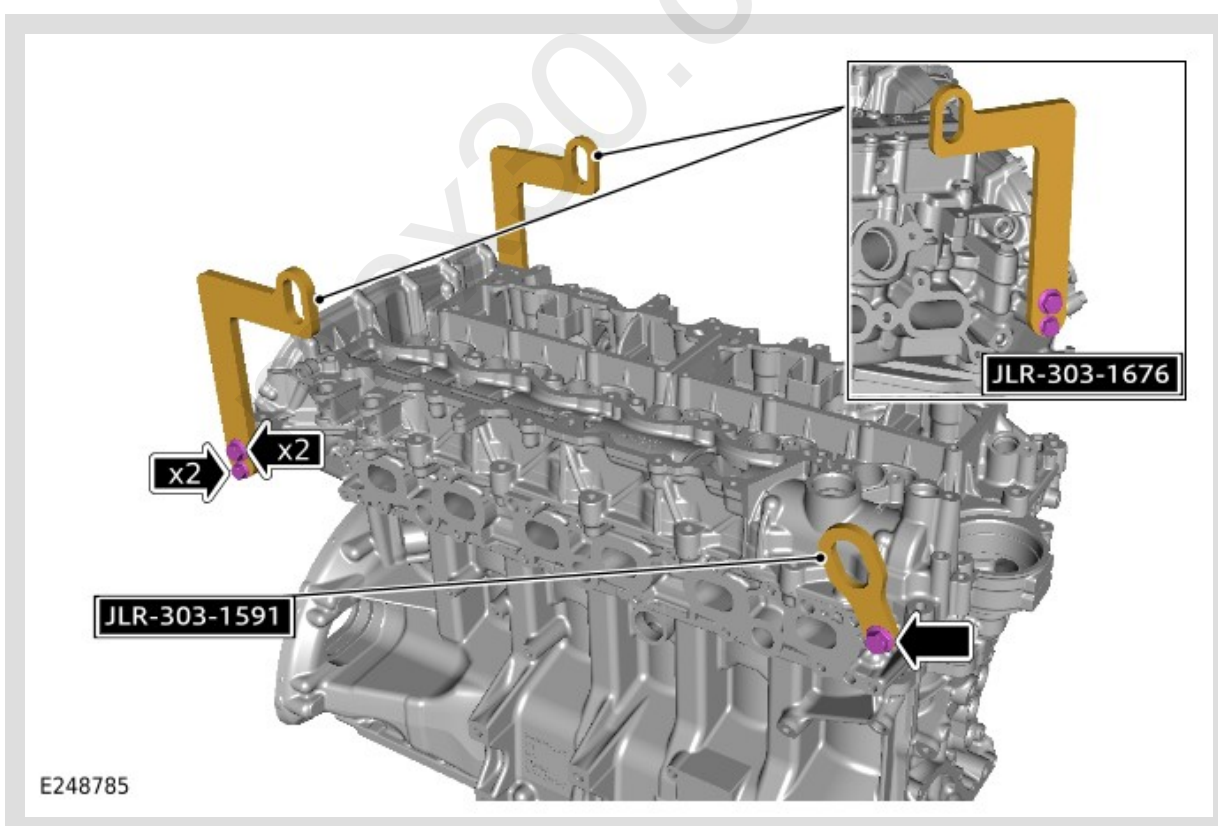
Remove and discard the 4 bolts.

115.



- Remove the special tool.
Special Tool(s): [JLR-303-1659](#)
- Remove the crankshaft damper pulley.

116.



- Install the special tools JLR-303-1676.
Special Tool(s): [JLR-303-1676](#)
- Install and tighten the 4 bolts.
Torque
M8: 24Nm

M10: 47Nm

- Install the special tool JLR-303-1591.

Special Tool(s): [JLR-303-1591](#)

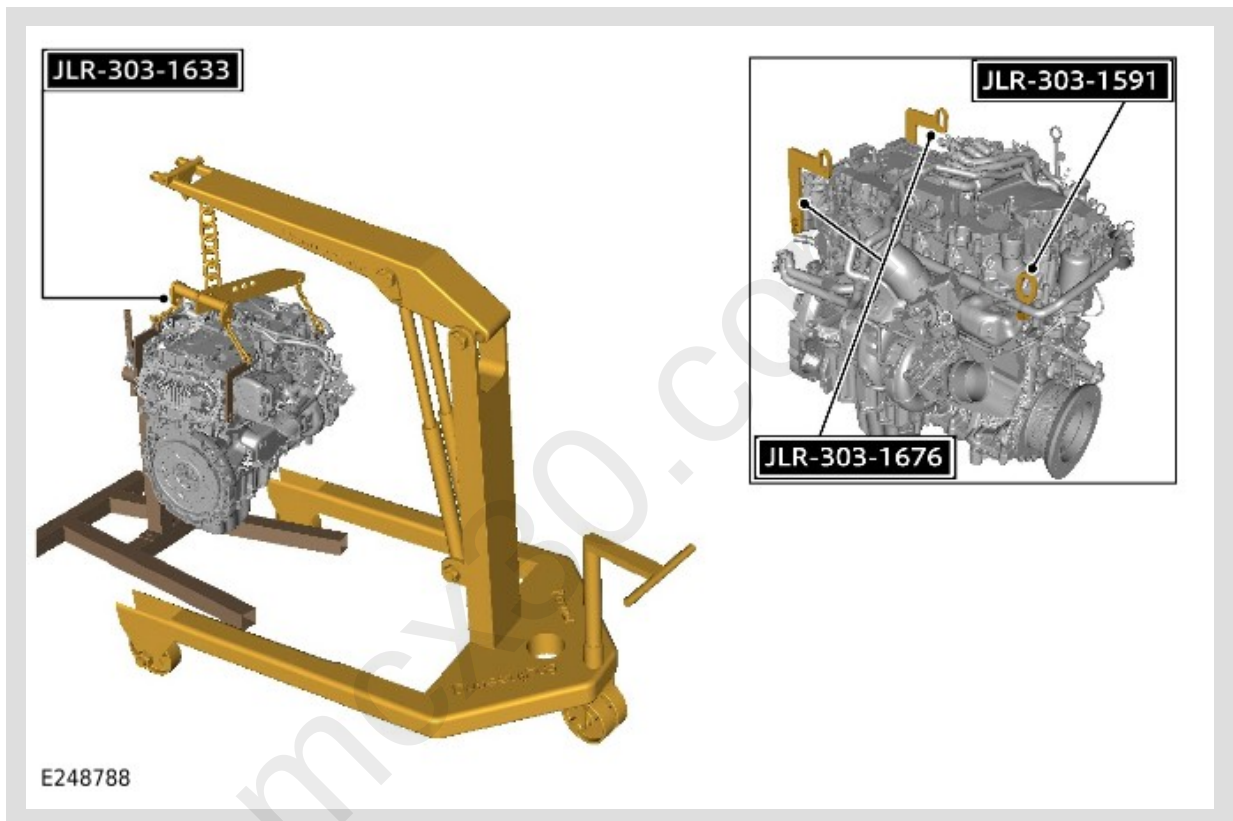
- Install and tighten the bolt.

Torque: 10Nm

117.

⚠ CAUTION:

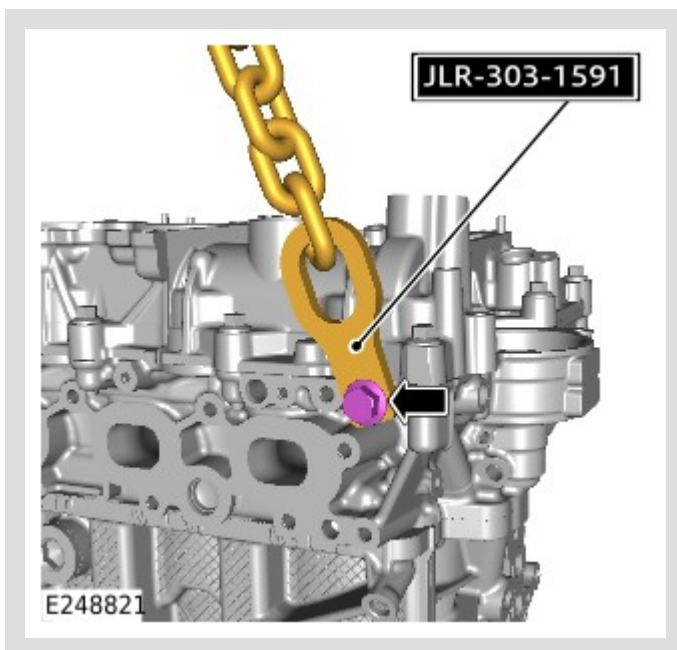
Only operate the crane enough to align special tool JLR-303-1591. Do not apply lifting force to the engine.



- Install a suitable hydraulic jib crane to the special tools and lifting bracket as illustrated.

General Equipment: [Hydraulic jib crane](#)

- Operate the crane to align the special tool JLR-303-1591.

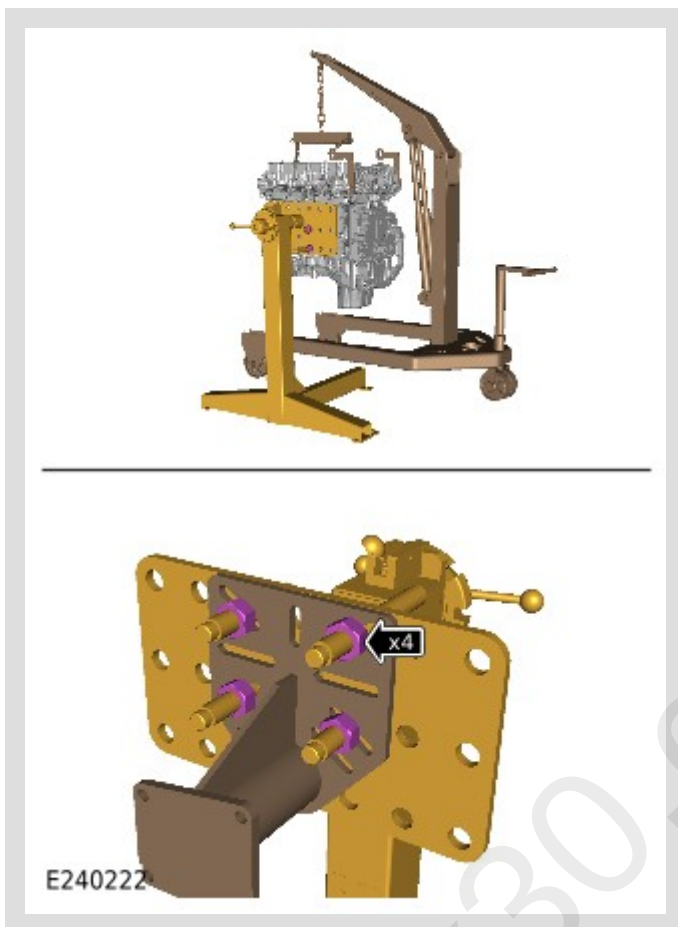


- Fully tighten the bolt.

Torque: 47Nm

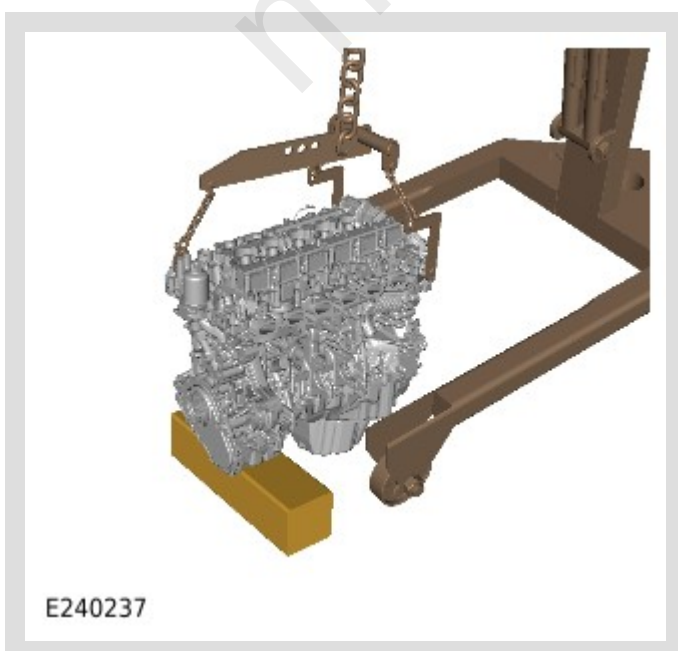
**WARNING:**

This step requires the aid of another technician.



With the aid of another technician, remove the engine assembly from the engine stand.

General Equipment: [Engine stand](#)

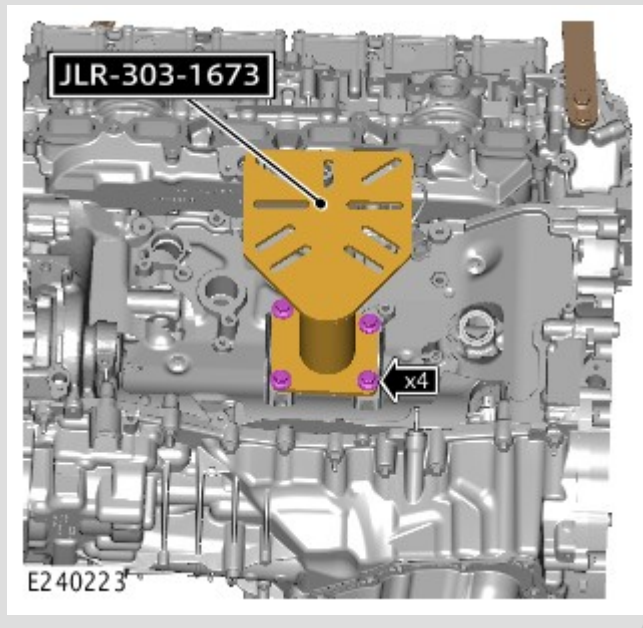


Use a suitable wooden block to support the engine.

121. Remove the hydraulic jib crane.

General Equipment: [Hydraulic jib crane](#)

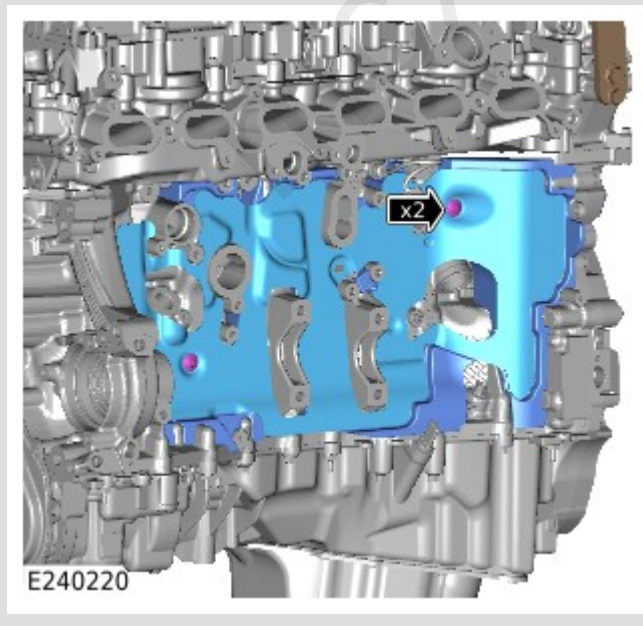
122.



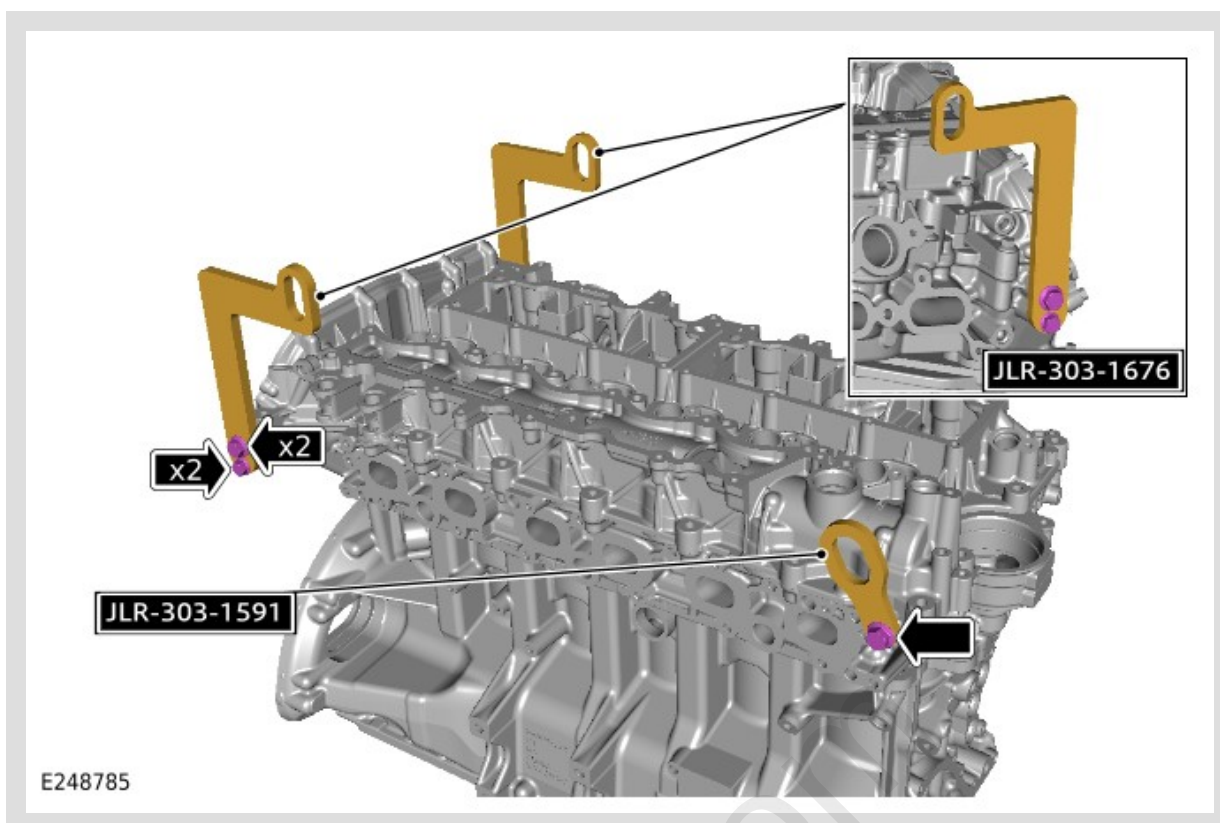
- Remove the 4 bolts.
- Remove the special tool.

Special Tool(s): [JLR-303-1673](#)

123.



- Remove the 2 clips.
- Remove the NVH material.



Remove the special tools.

Special Tool(s): [JLR-303-1676](#), [JLR-303-1591](#)