

Engine

Special Tool(s) / General Equipment

 E129694	100-001 (T50T-100-A) Slide Hammer
	303-050 (T70P-6000) Lifting Bracket, Engine
 E318522	303-050-01 7.3L Bracket, Engine (P558)
 E318529	303-1661-03 7.3L OVC Bolt
 E318528	303-1702 7.3L VCT Locking Tools
 E134603	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH
 E274085	303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal TKIT-1995-FH/FLMH TKIT-1995-LMH/MH
Floor Crane	
Three Leg Puller	
Mounting Stand	
1/2 Inch Square Drive Breaker Bar	

NOTICE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTICE: Remove the cylinder heads before removing the crankshaft. Failure to do so can result in engine damage.

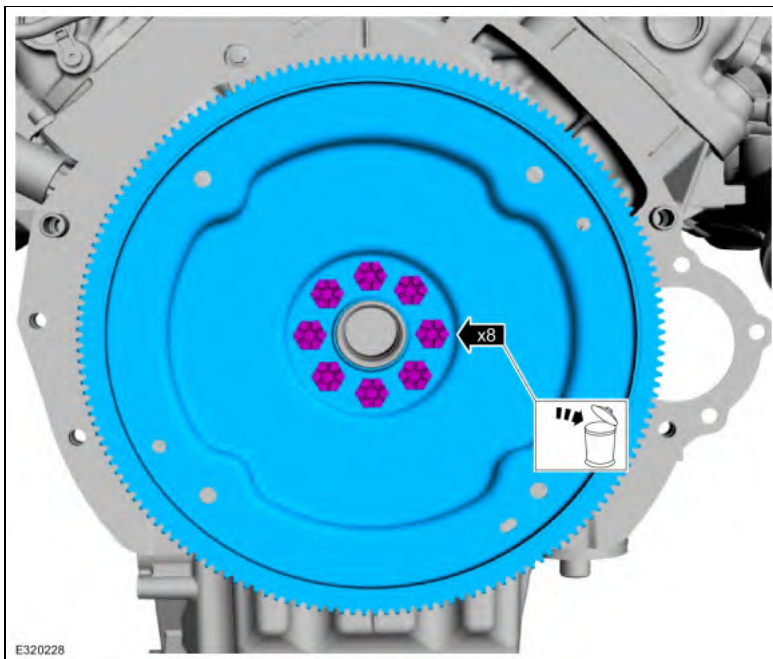
NOTE: If the components are to be reinstalled, they must be installed in their original location. Mark the components for installation into their original location.

NOTE: Refer to the exploded view under the Engine Component View in the Description and Operation.

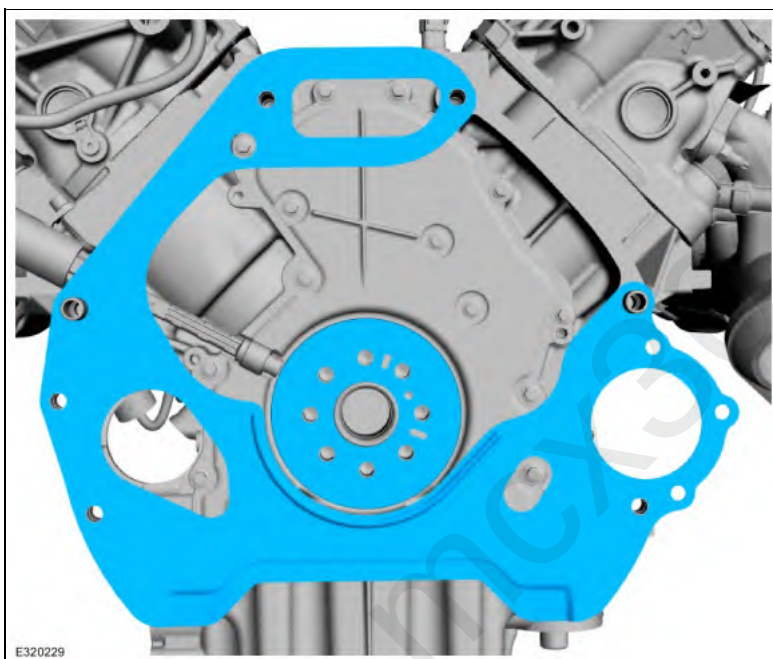
- NOTE:** The flywheel bolts are torque-to-yield design and are not reusable.

Remove and discard the flywheel bolts.

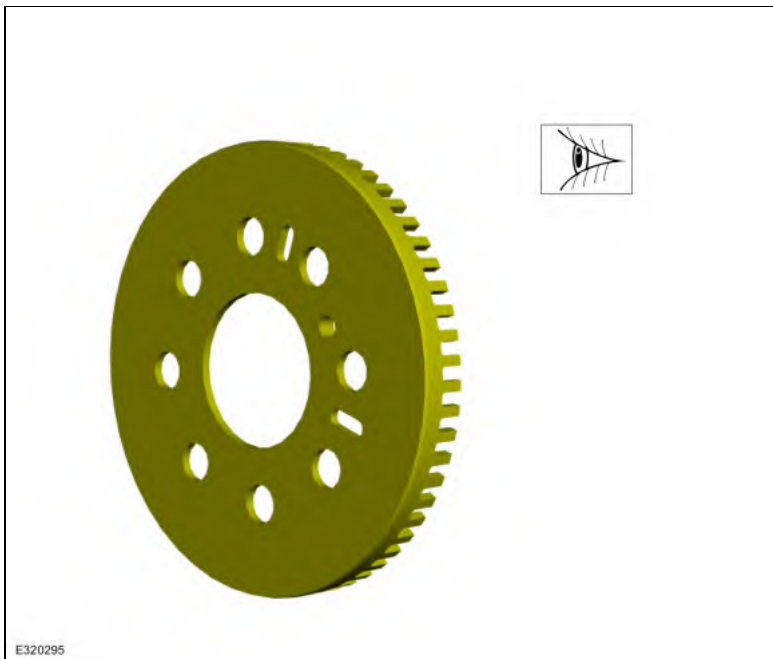
- Remove the flywheel.



2. Remove the crankshaft sensor ring and the engine-to-transmission spacer plate.

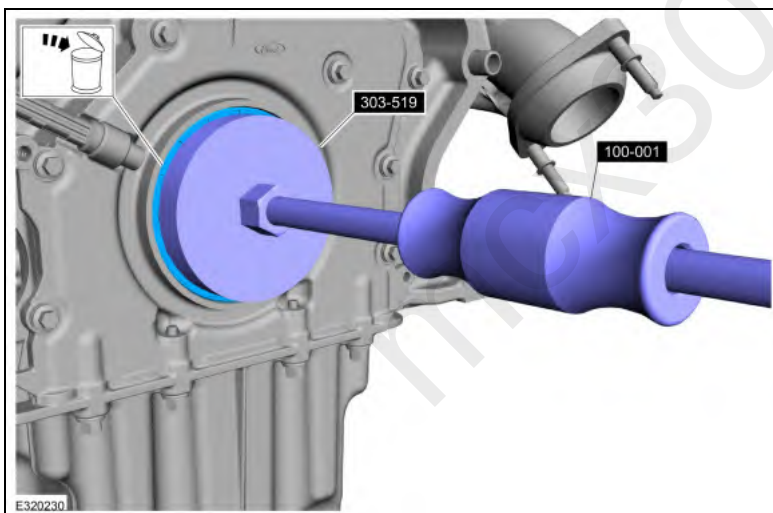


3. Inspect the crankshaft sensor ring for damage. If the crankshaft sensor ring has been dropped or has any visual damage, it must be discarded.



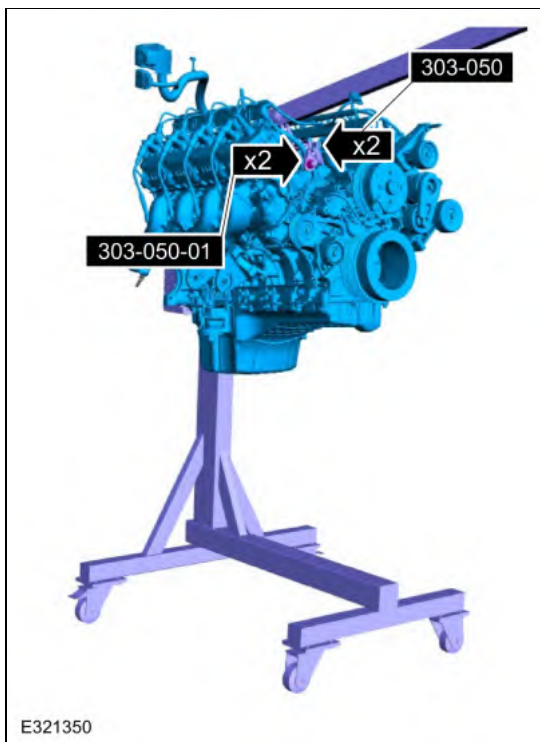


4. Using the special tools, remove and discard the crankshaft rear seal.
Use Special Service Tool: 303-519 (T95P-6701-EH) Remover, Crankshaft Rear Oil Seal , 100-001 (T50T-100-A) Slide Hammer.





5. Using a floor crane, install the engine on a mounting stand and remove the special tools.
Remove Special Service Tool: 303-050 (T70P-6000) Lifting Bracket, Engine. , 303-050-01 7.3L Bracket, Engine (P558).
Use the General Equipment: Floor Crane
Use the General Equipment: Mounting Stand

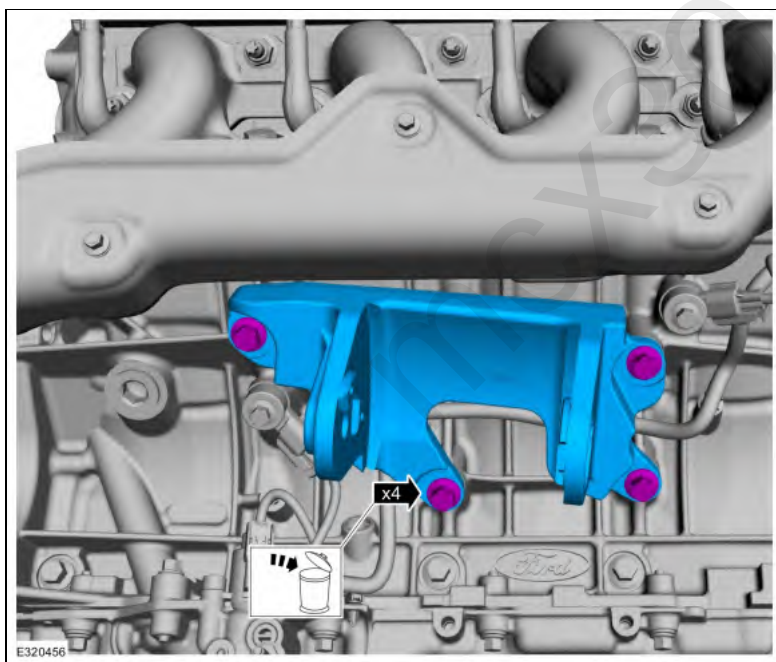


E321350



6. **NOTICE:** The engine support insulator bracket bolts must be discarded and new bolts installed or damage to the vehicle may occur. They are a tighten-to-yield design and cannot be reused.

- Remove the bolts and the RH engine support insulator bracket.
- Discard the bolts.

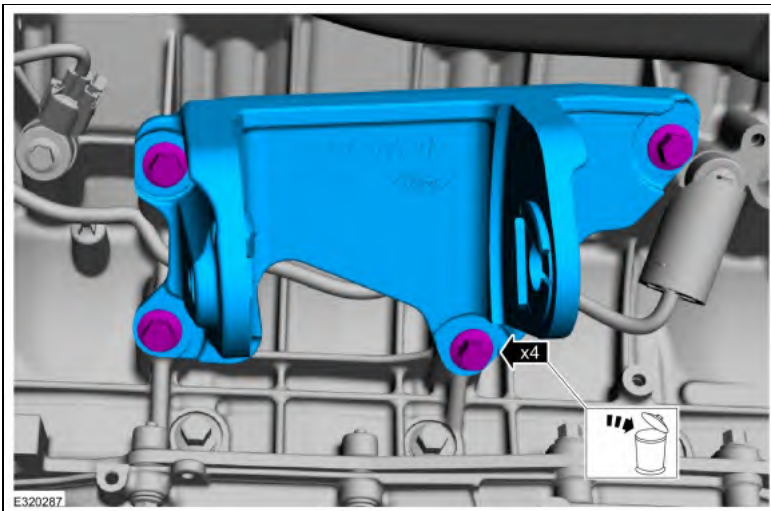


E320456

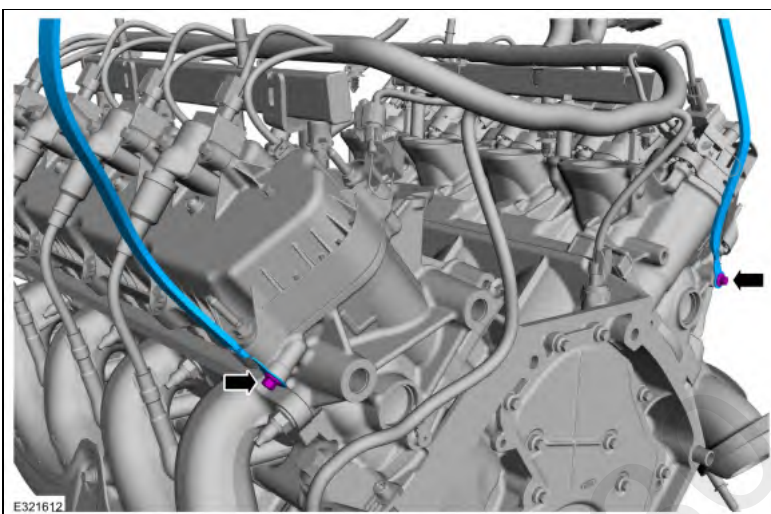


7. **NOTICE:** The engine support insulator bracket bolts must be discarded and new bolts installed or damage to the vehicle may occur. They are a tighten-to-yield design and cannot be reused.

- Remove the bolts and the LH engine support insulator bracket.
- Discard the bolts.

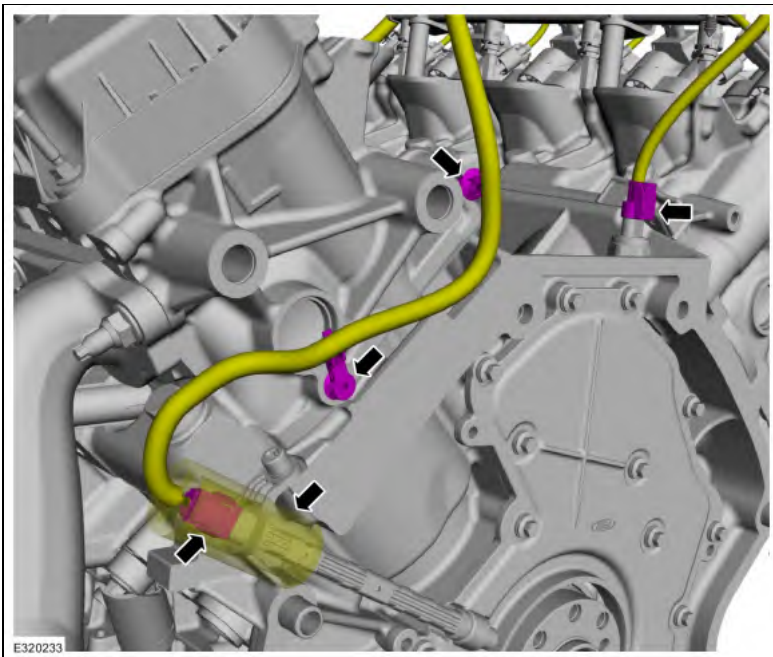


8. Remove the bolts and the ground straps.

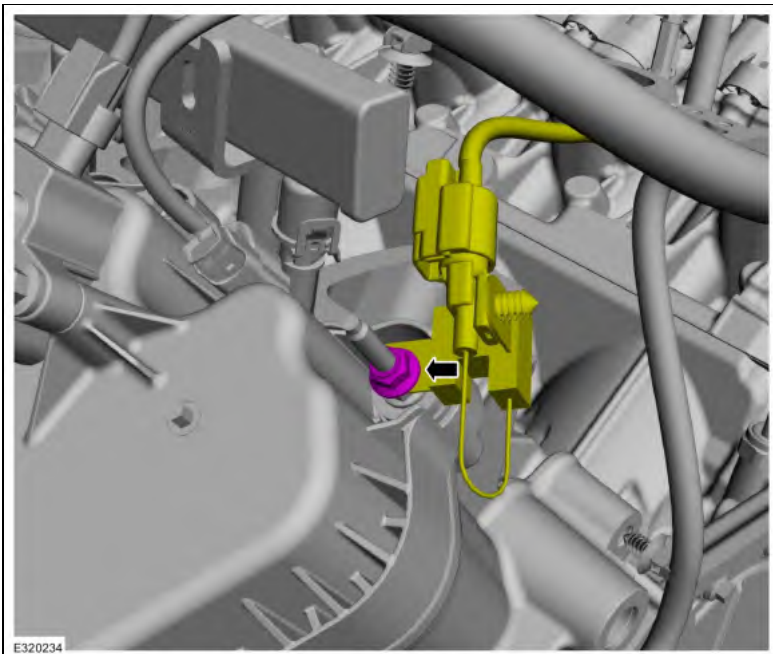


- 9.
- Reposition the wiring harness electrical connector insulator.
 - Disconnect the engine wiring harness electrical connectors.
 - Detach the engine wiring harness retainers and position the harness aside.

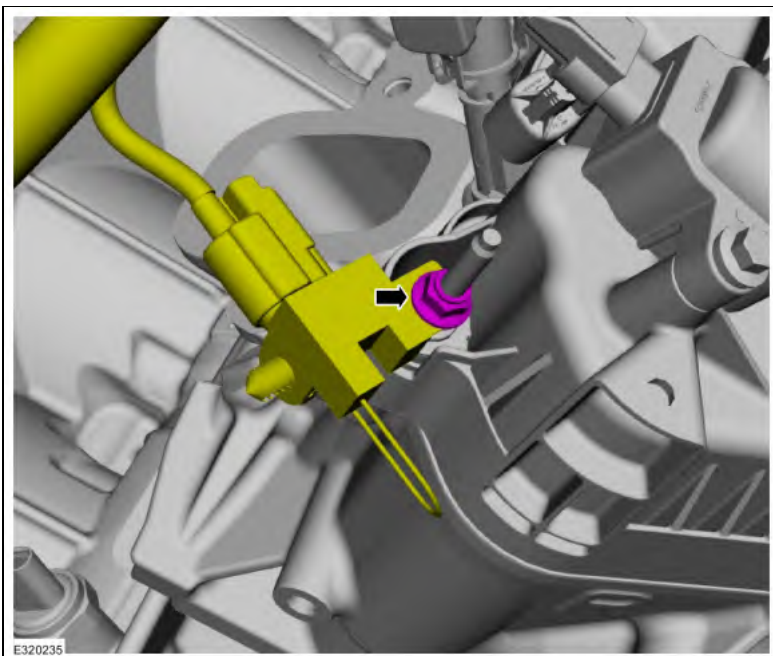




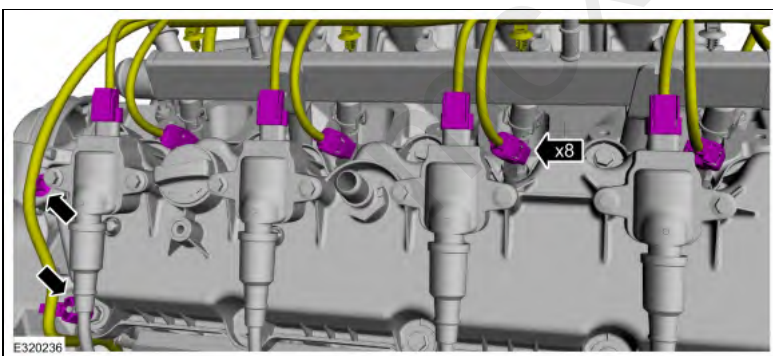
10. Remove the nut and the position the RFI capacitor aside.



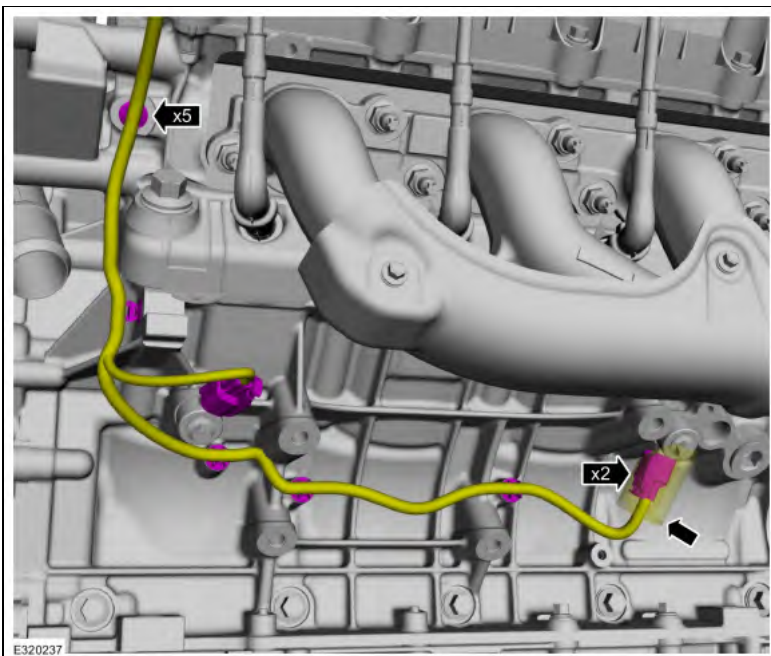
11. Remove the nut and the position the RFI capacitor aside.



- 12.
- Disconnect the engine wiring harness electrical connectors.
 - Detach the engine wiring harness retainers and position the harness aside.

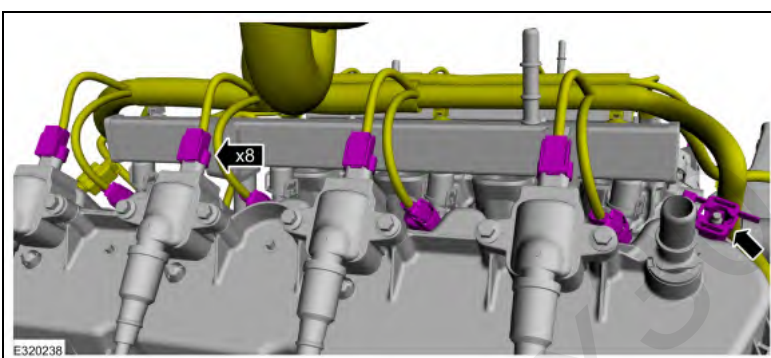


- 13.
- Reposition the wiring harness electrical connector insulator.
 - Disconnect the engine wiring harness electrical connectors.
 - Detach the engine wiring harness retainers and position the harness aside.



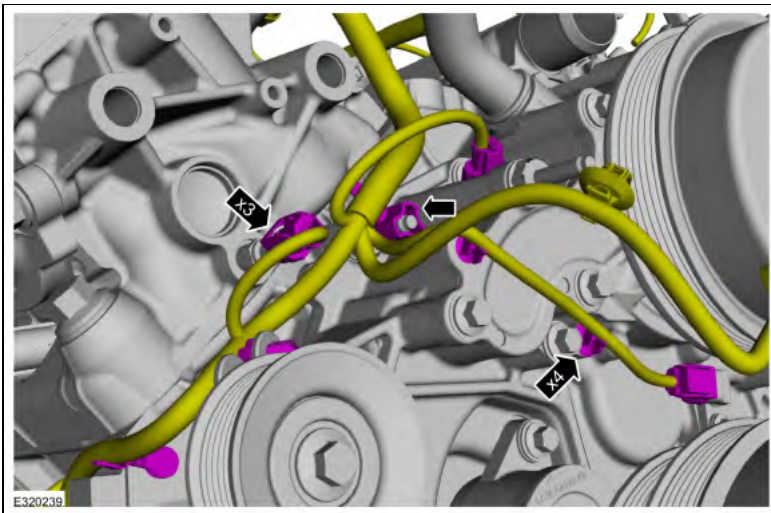
14.

- Disconnect the engine wiring harness electrical connectors.
- Detach the engine wiring harness retainer and position the harness aside.

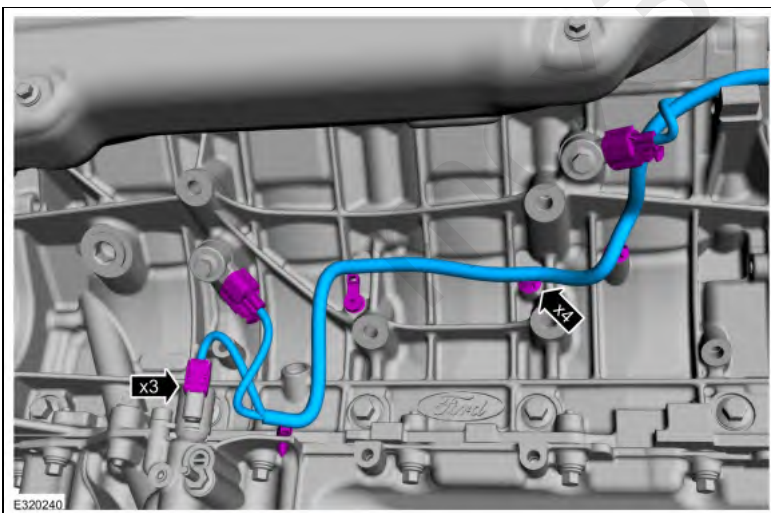


15.

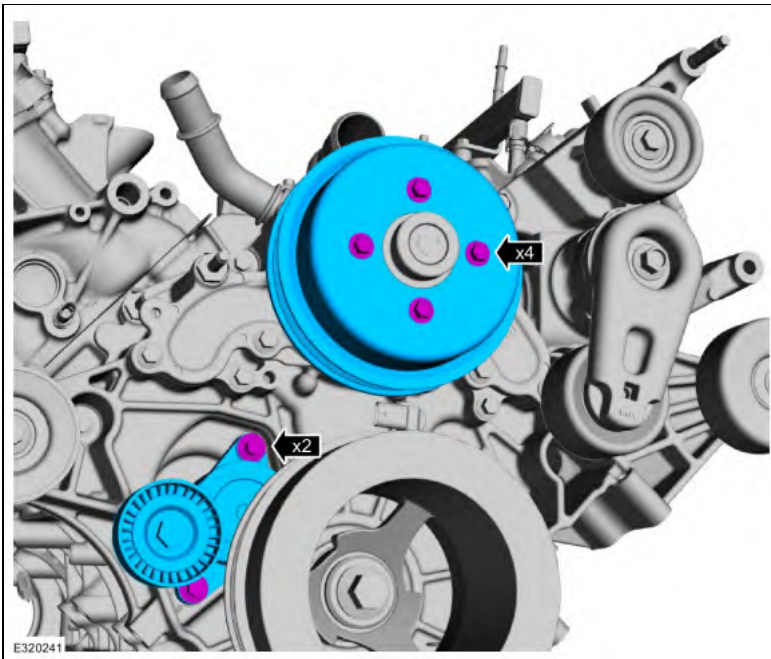
- Disconnect the engine wiring harness electrical connectors.
- Detach the engine wiring harness retainers and position the harness aside.



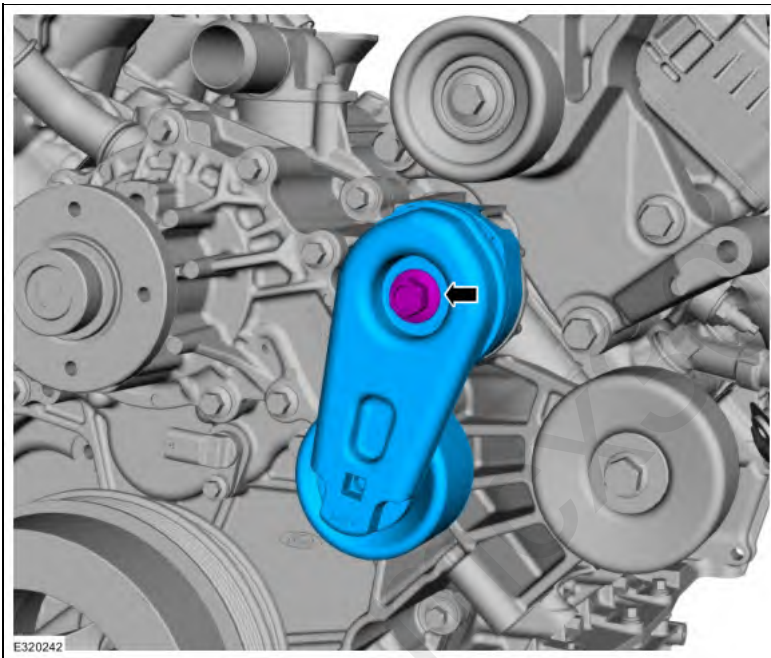
- 16.
- Disconnect the engine wiring harness electrical connectors.
 - Detach the engine wiring harness retainers.
 - Remove the wiring harness from the engine.



- 17.
- Remove the bolts and the coolant pump pulley.
 - Remove the bolts and the belt tensioner.

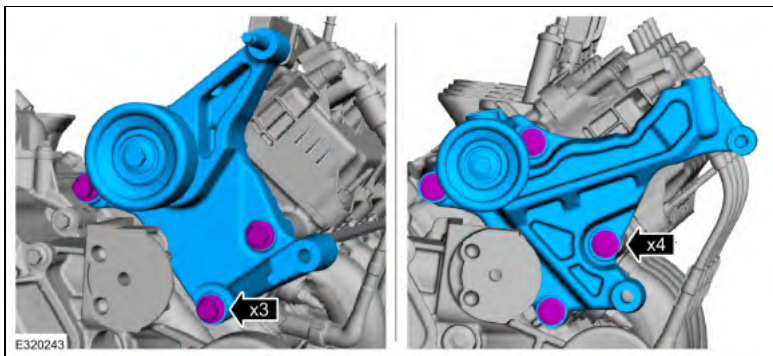


18. Remove the bolt and the belt tensioner.



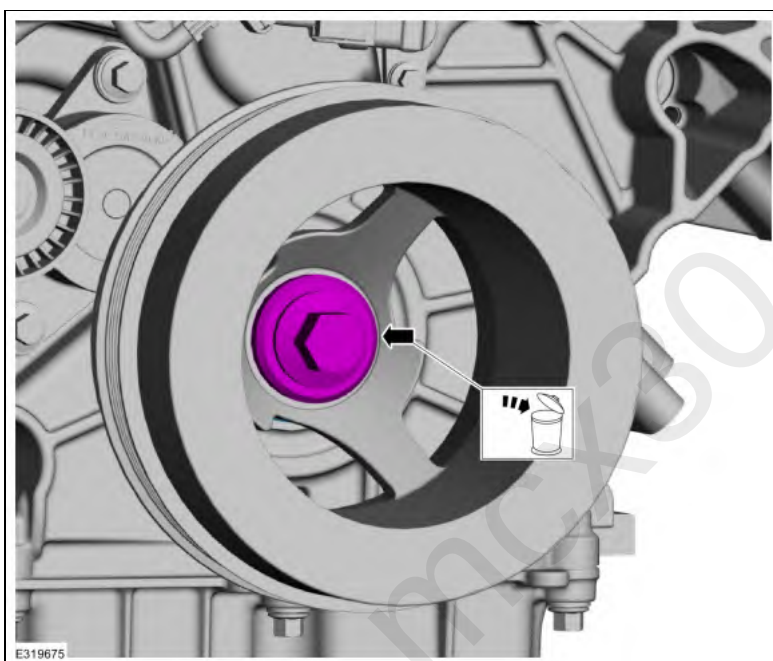
19. **NOTE:** The dual generator bracket has an additional bolt.

Remove the bolts and the generator bracket.

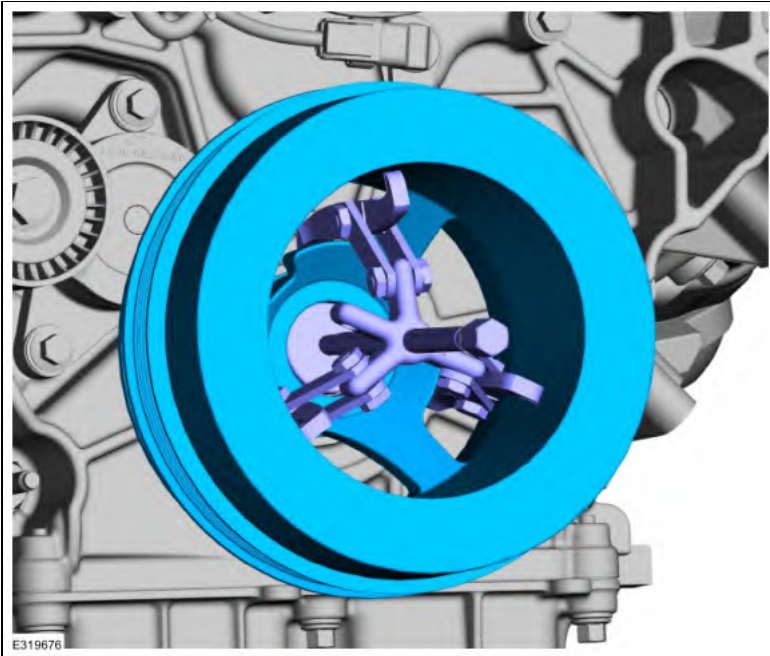


20. **NOTE:** If further disassembly of the engine will be performed, retain the original crankshaft pulley bolt for removing the crankshaft front seal, and if necessary, turning the crankshaft while the pulley is removed.

Remove and discard the crankshaft pulley bolt.



21. Remove the crankshaft pulley using a 3-jaw puller and a step plate.
Use the General Equipment: Three Leg Puller





22.

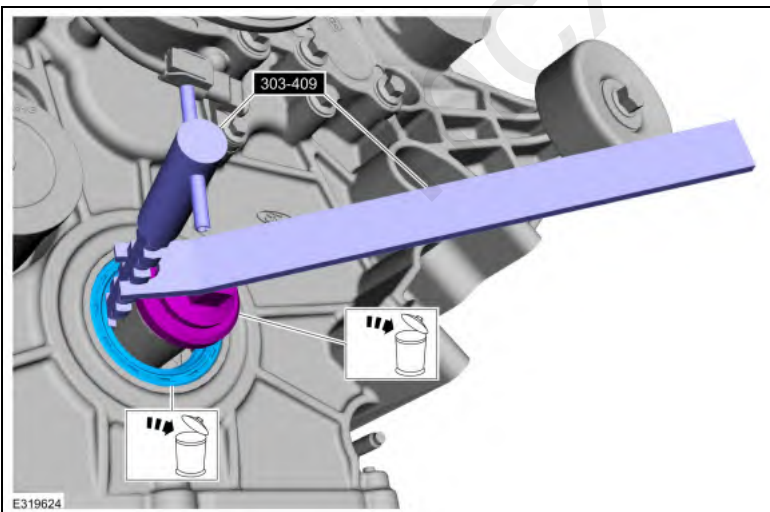
- **NOTICE:** Use care not to damage the engine front cover or the crankshaft when removing the seal.

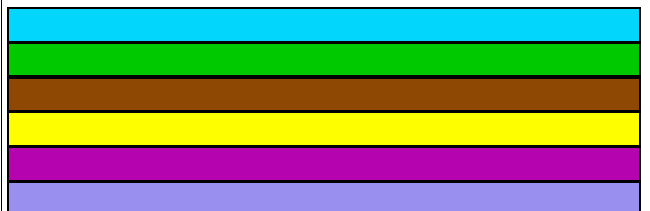
NOTE: If further disassembly of the engine will be performed, retain the original crankshaft pulley bolt for turning the crankshaft while the pulley is removed.

Using the special tool and the original crankshaft bolt, remove and discard the crankshaft front oil seal.

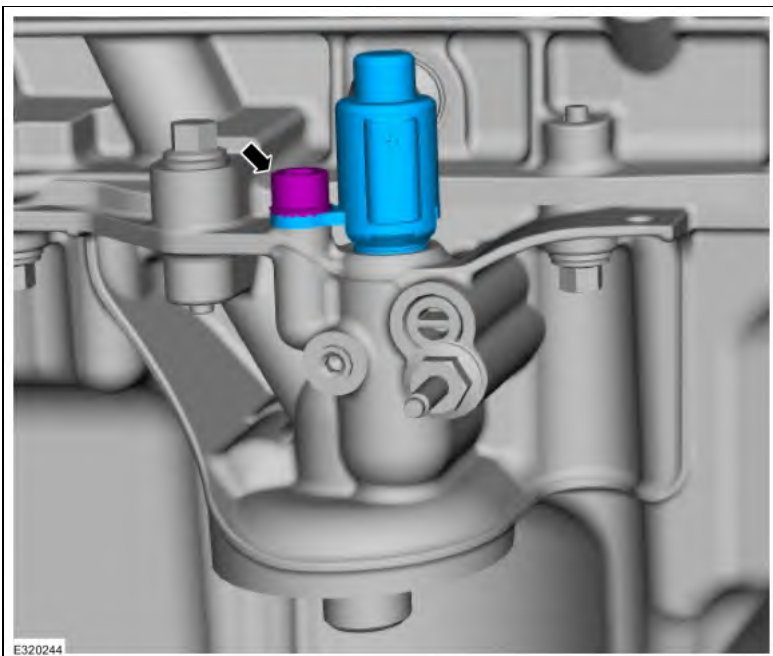
Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.

- Discard the crankshaft pulley bolt.

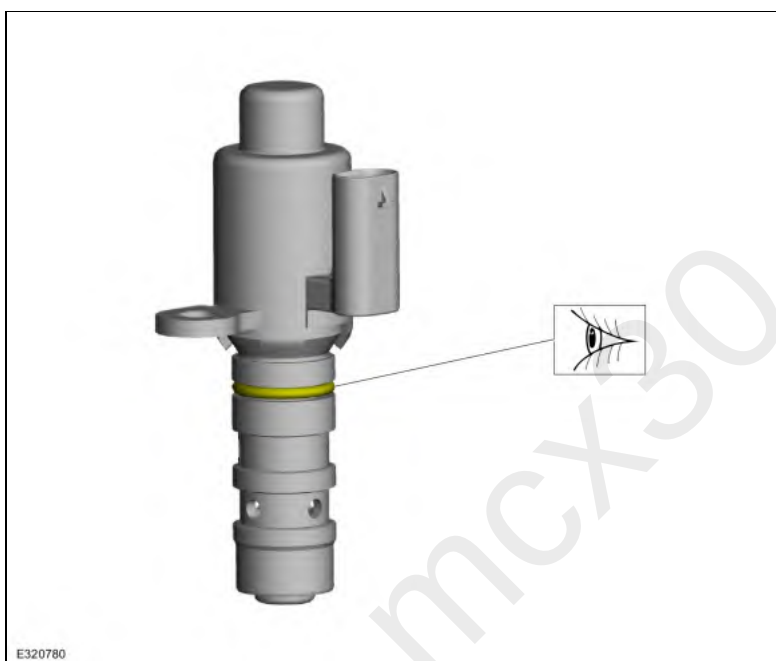




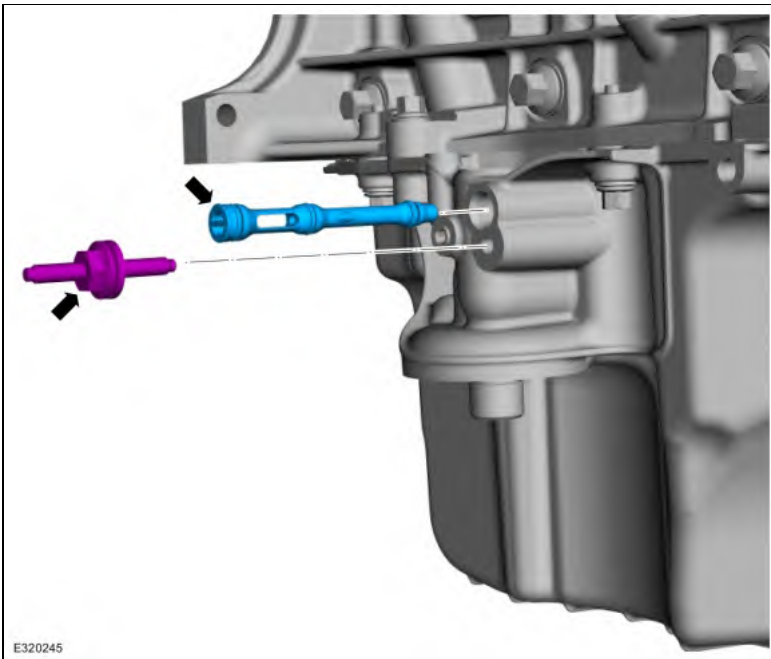
23. Remove the bolt and the oil control solenoid.



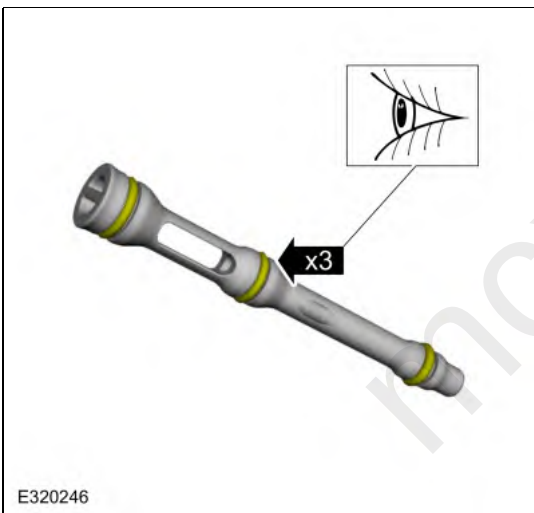
24. Inspect the O-ring seal and replace as necessary.



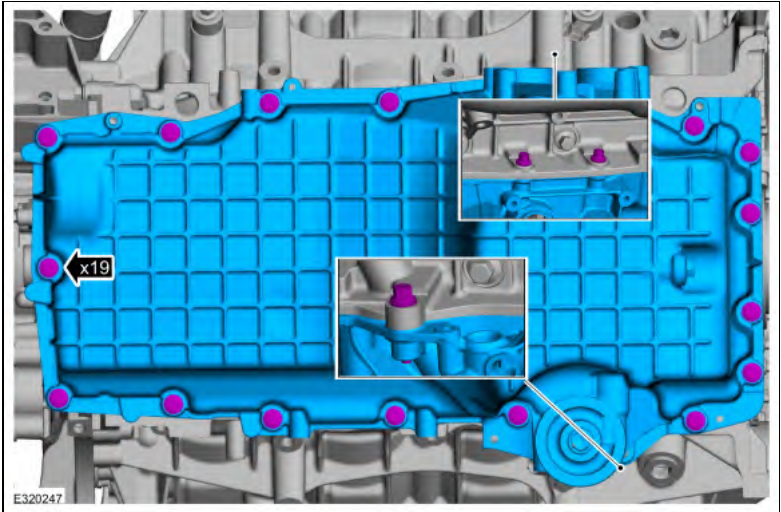
25. Remove the stud bolt and the oil return tube.



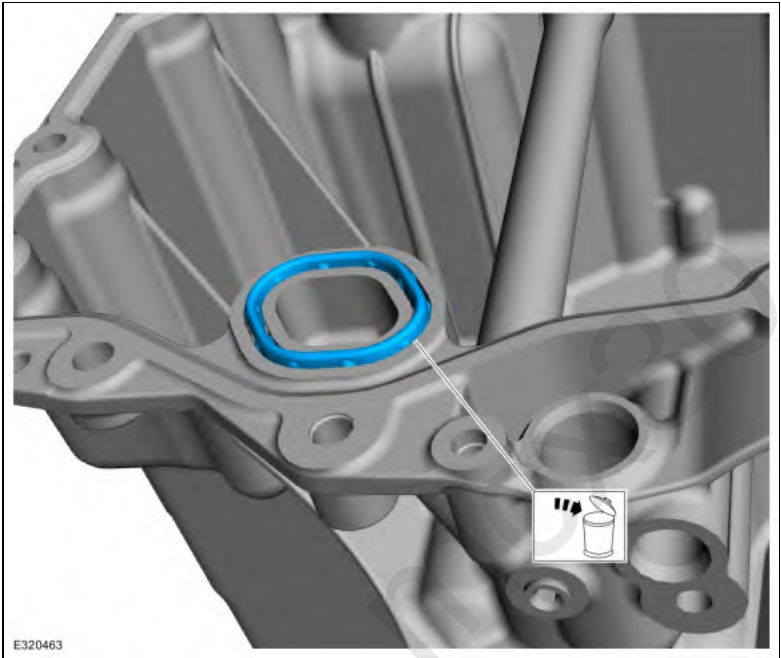
26. Inspect the O-ring seals for damage. Replace as necessary.



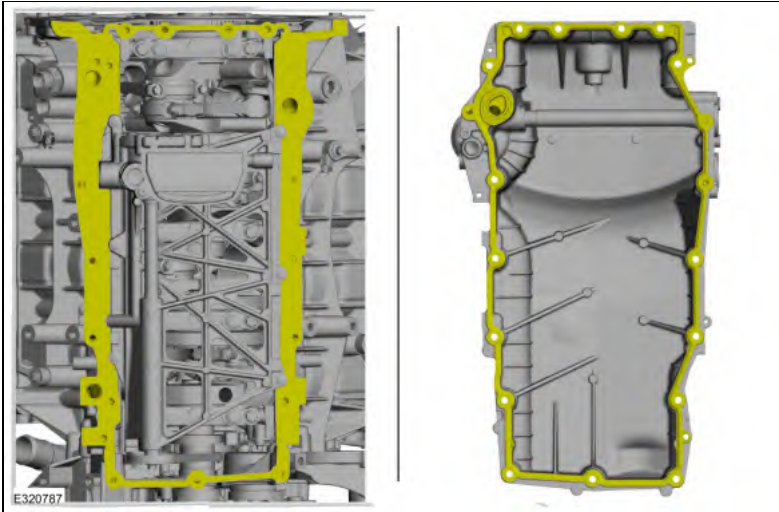
27. Remove the oil pan bolts.
- Carefully pry the oil pan from the cylinder block to release the sealant and remove the oil pan.



28. Remove and discard the gasket.

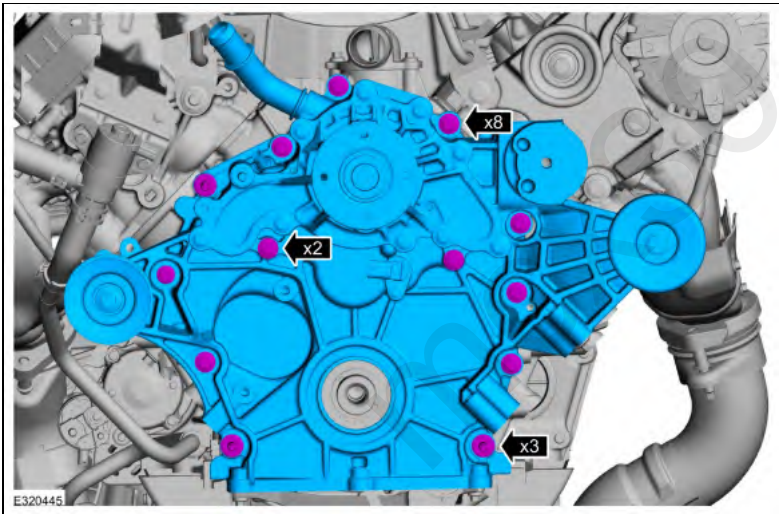


29. Clean and prepare the RTV sealing surfaces.
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).

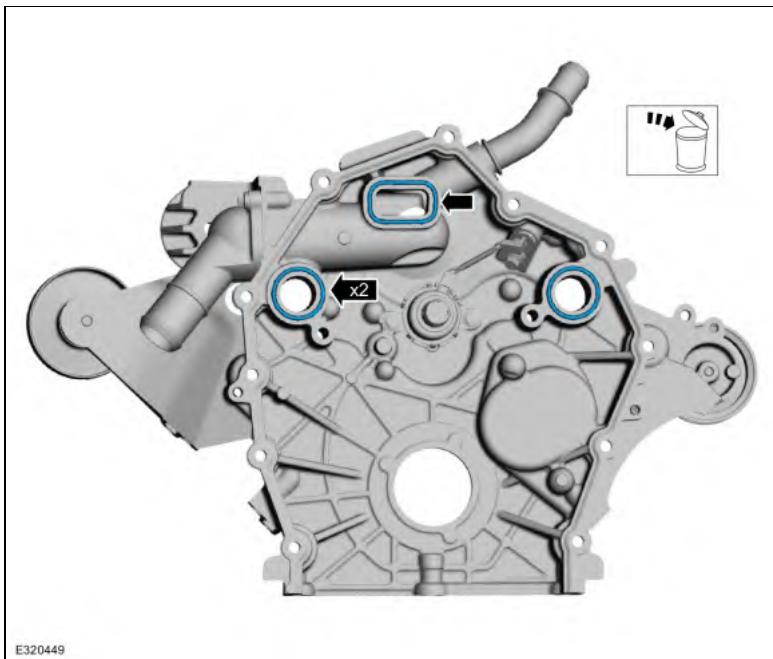


30. **NOTE:** The fasteners differ in size, note the location of each fastener during removal.

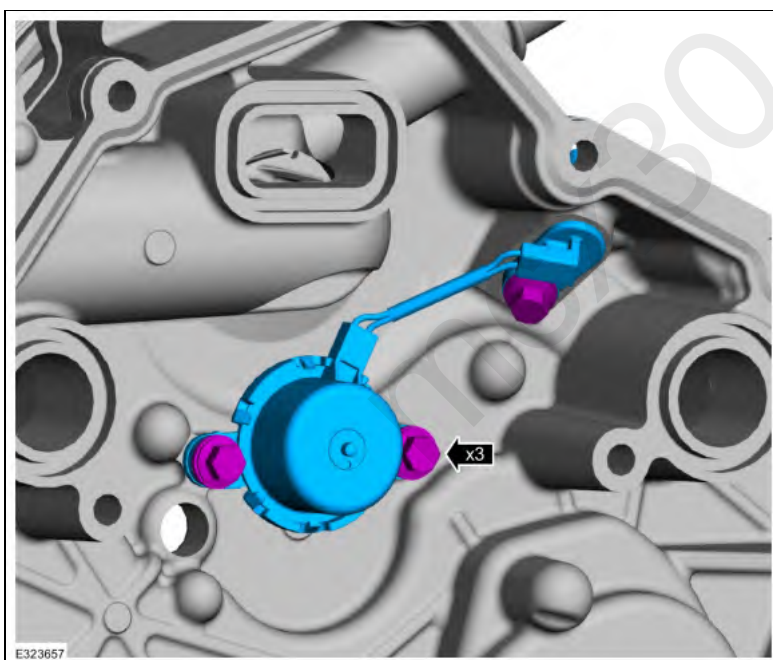
- Remove the engine front cover bolts and stud bolts.
- Carefully pry the engine front cover from the cylinder block to release the sealant.



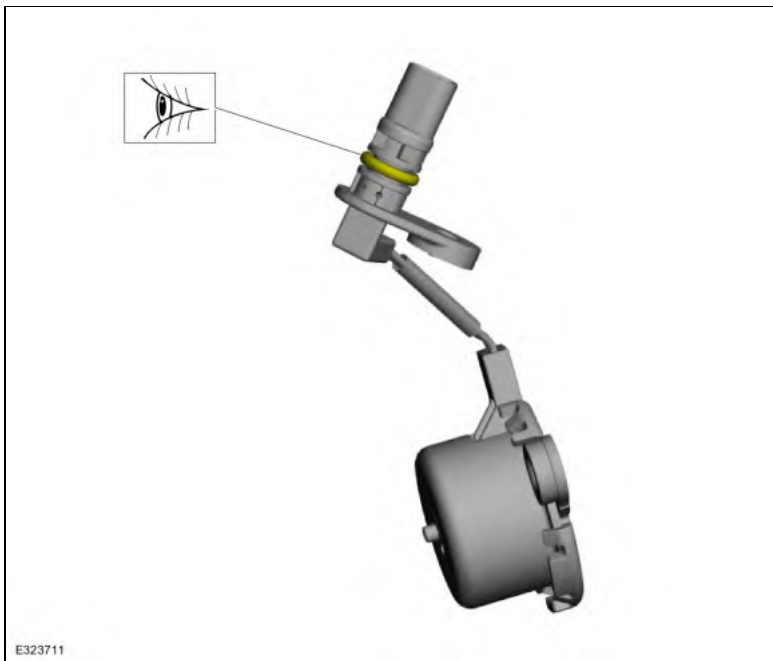
31. Remove and discard the gaskets.



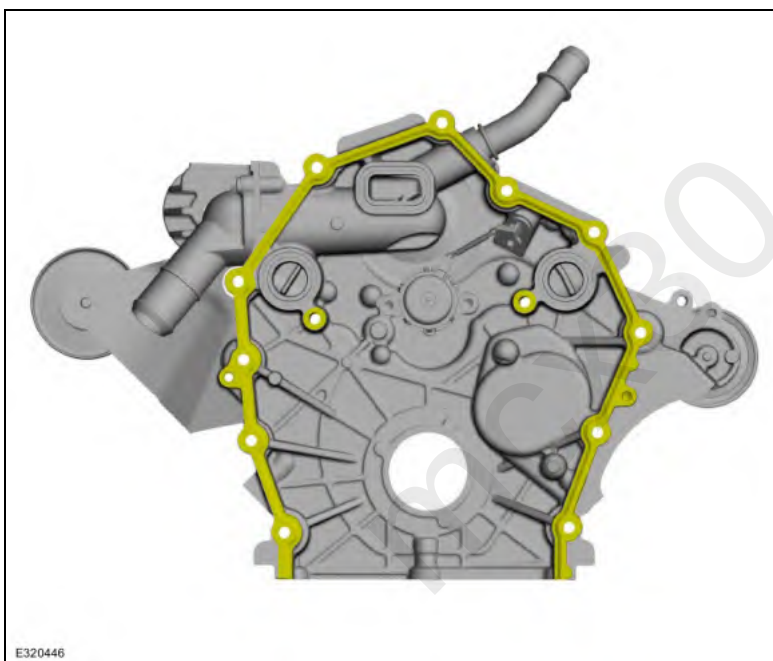
32. If necessary, remove the bolts and the VCT solenoid assembly.



33. If removed, inspect the VCT solenoid O-ring seal. If damaged, discard the VCT solenoid assembly and install a new one.

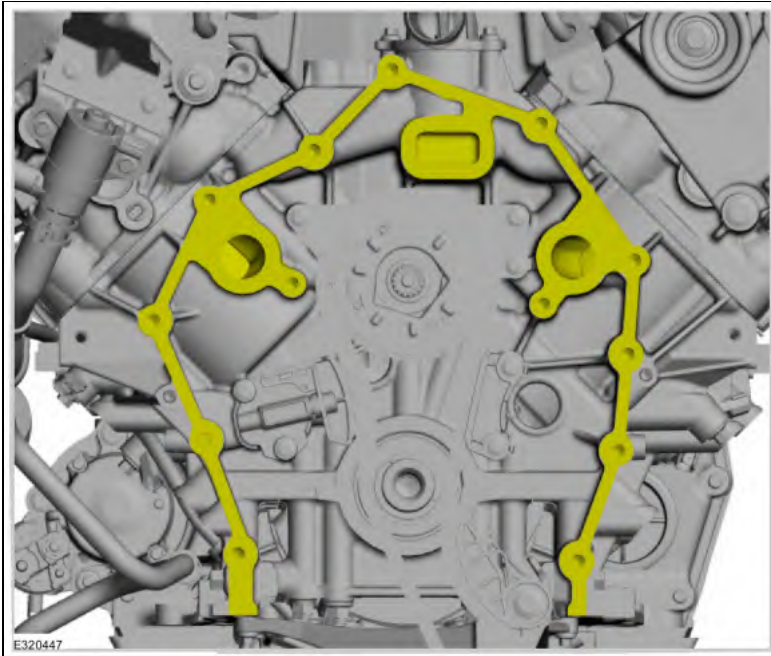


34. Clean and prepare the RTV sealing surfaces.
 Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).

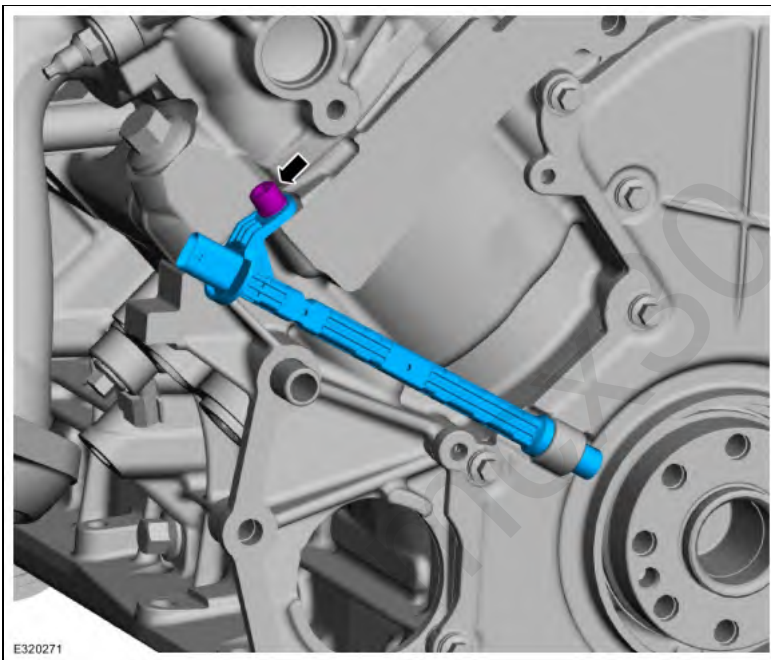


35. **NOTICE:** Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages may cause engine failure.

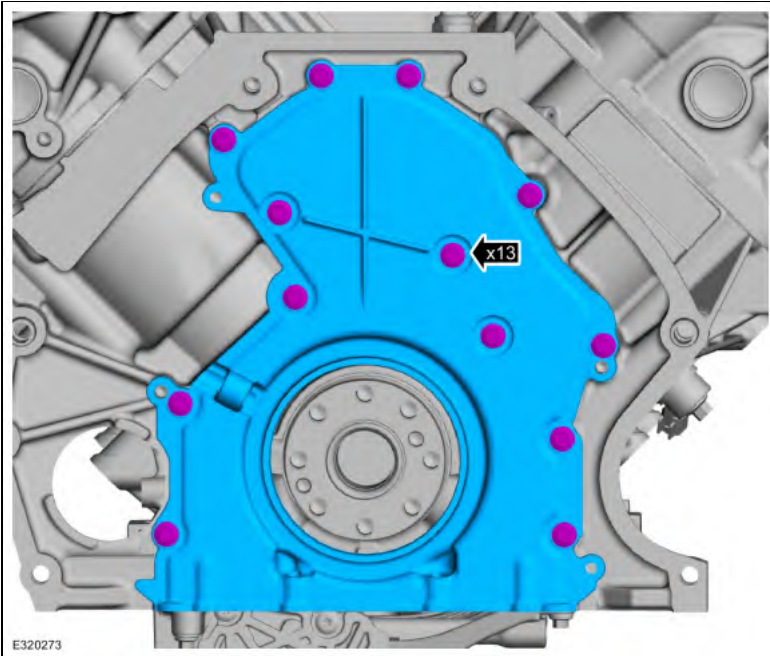
Clean and prepare the RTV sealing surfaces.
 Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).



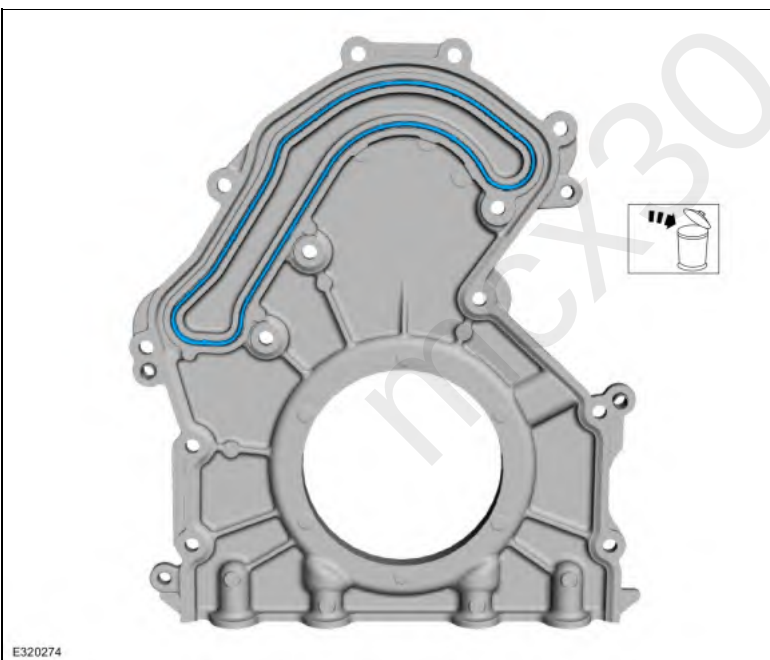
36. Remove the bolt and the CKP sensor.



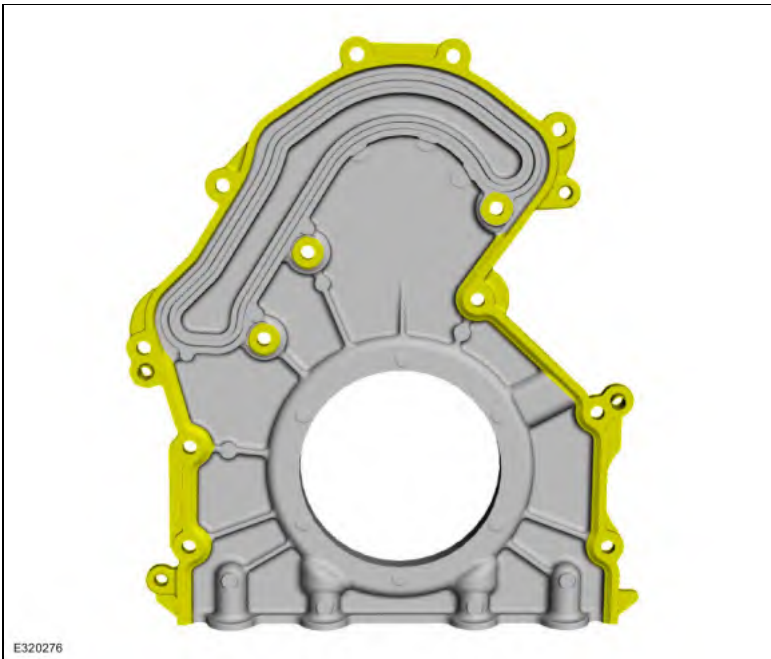
37. Remove the bolts and the rear crankshaft seal retainer plate.



38. Remove and discard the gasket.



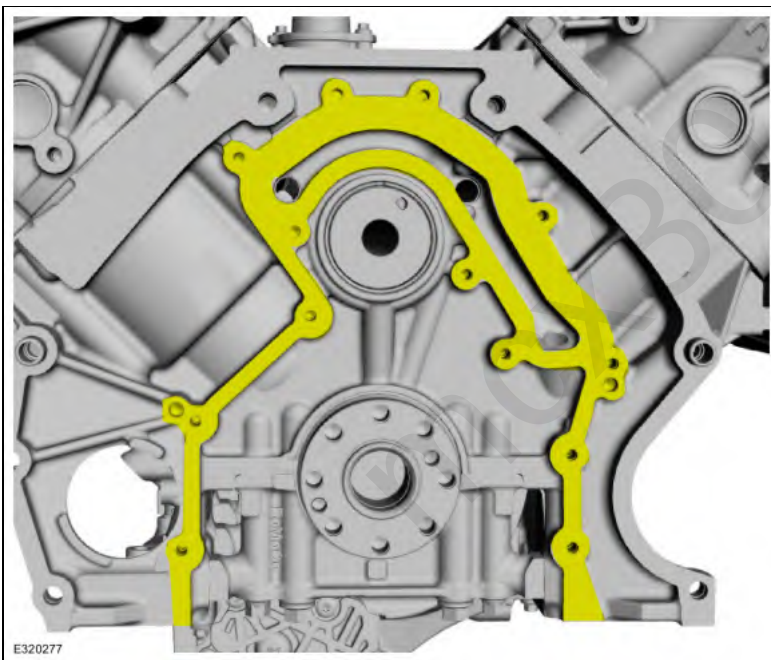
39. Clean and prepare the RTV sealing surfaces
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).



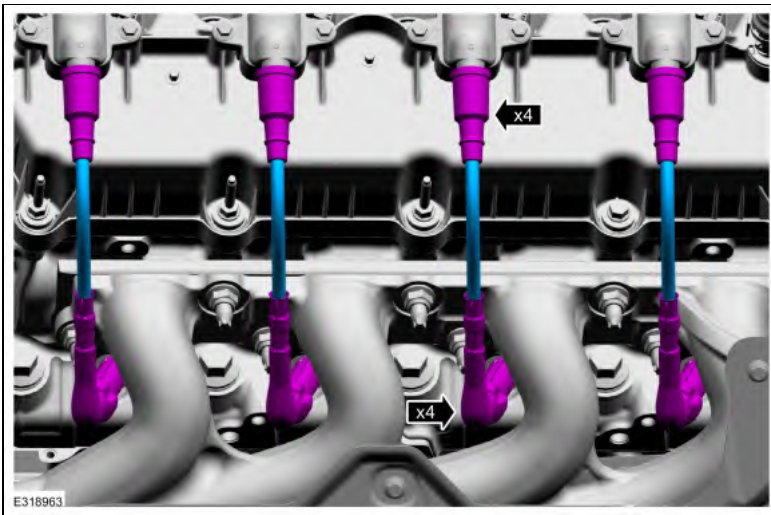
40. **NOTICE:** Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages may cause engine failure.

Clean and prepare the RTV sealing surfaces

Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).

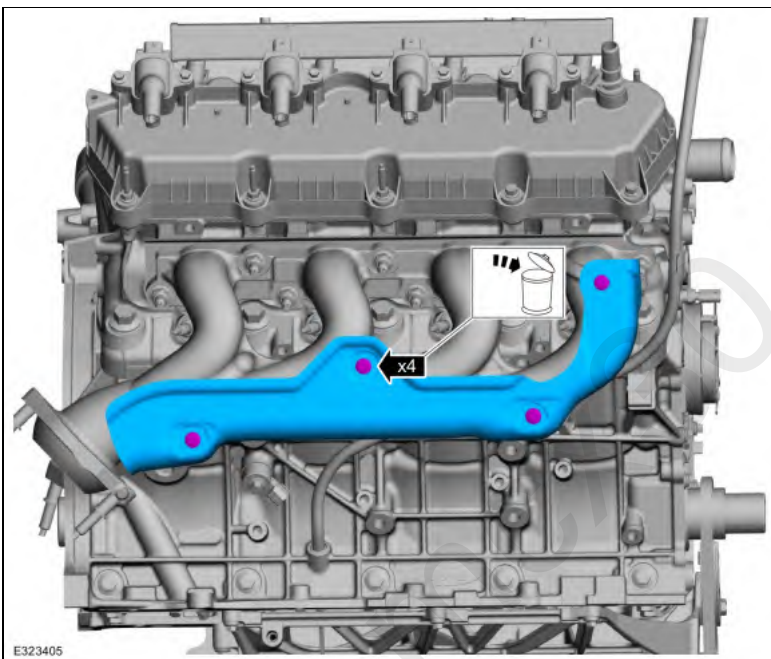


- 41.
1. Disconnect the spark plug wires from the ignition coils.
 2. Disconnect the spark plug wires from the spark plugs and remove the wires.



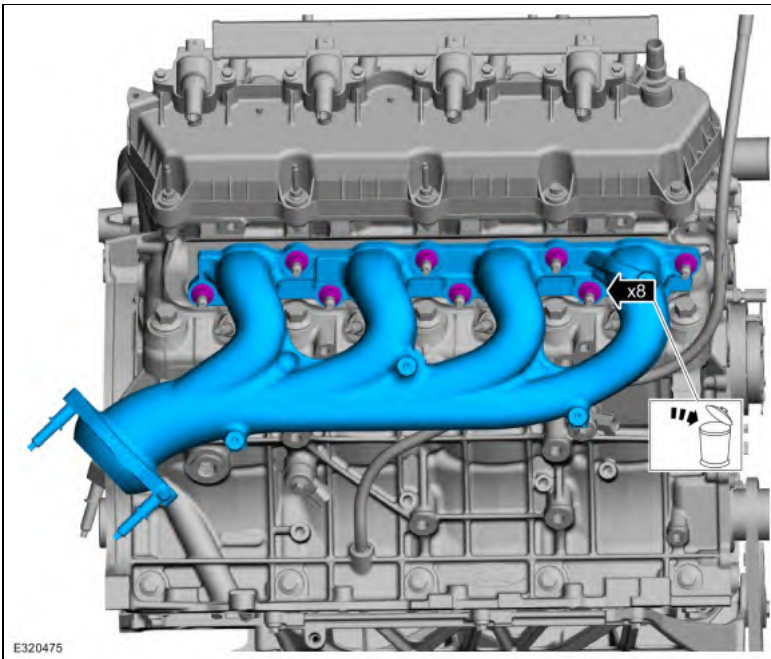
42. **NOTE:** The heat shield must be removed to access the upper front exhaust manifold nut.

- Remove the bolts and the heat shield.
- Discard the bolts.

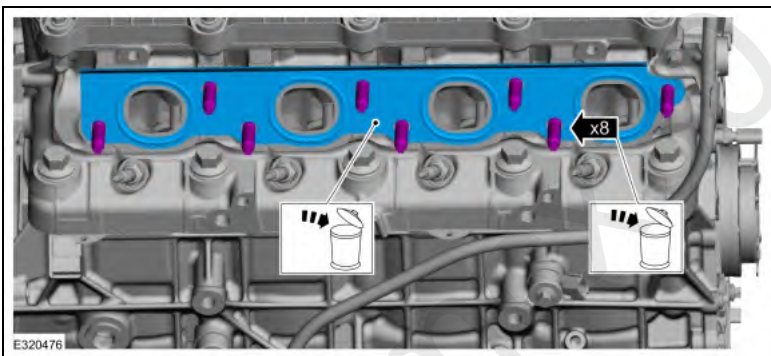


43.

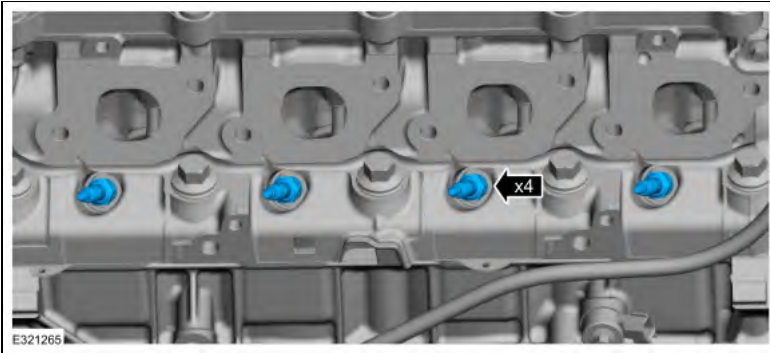
1. Remove the nuts and the RH exhaust manifold.
 2. Discard the nuts.
- Clean and inspect the exhaust manifold.
Refer to: Exhaust Manifold Cleaning and Inspection (303-00 Engine System - General Information, General Procedures).



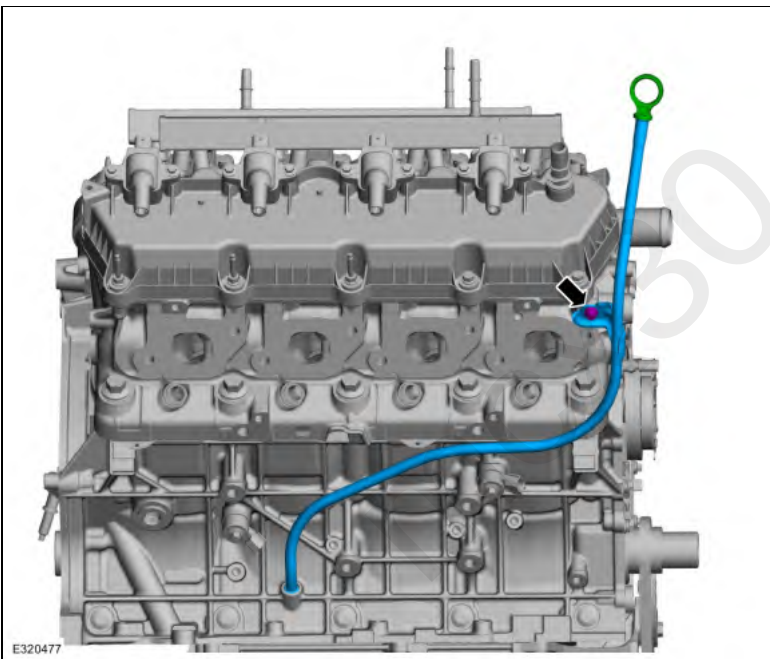
- 44.
1. Remove and discard the gasket.
 2. Remove and discard the studs.



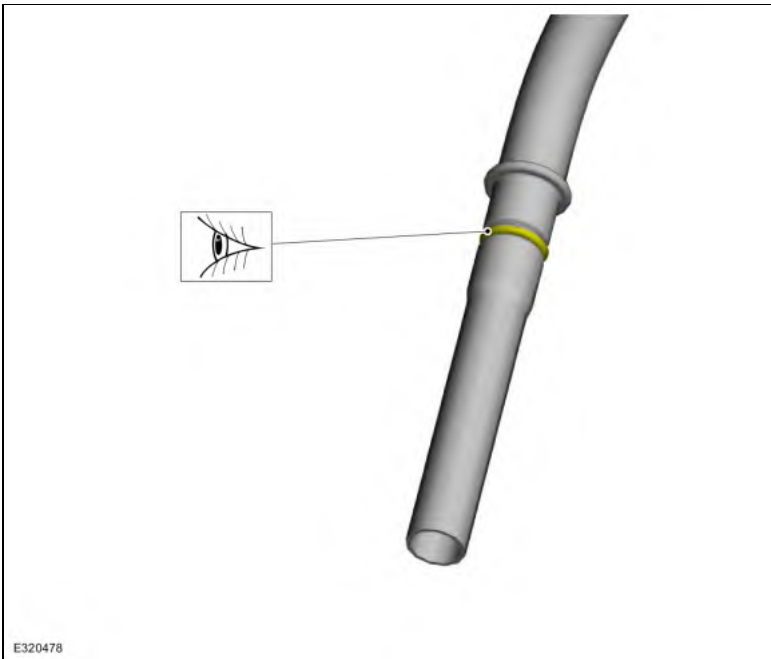
45. Remove the spark plugs.



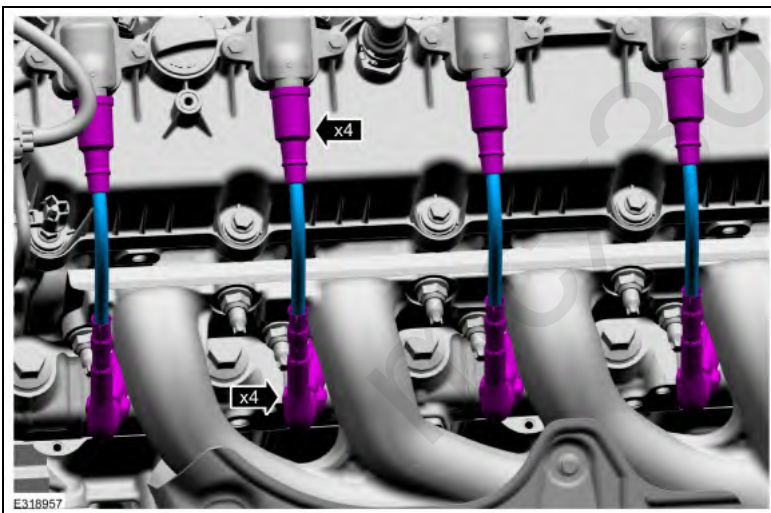
- 46.
1. Remove the oil level indicator.
 2. Remove the bolt and the oil level indicator tube.



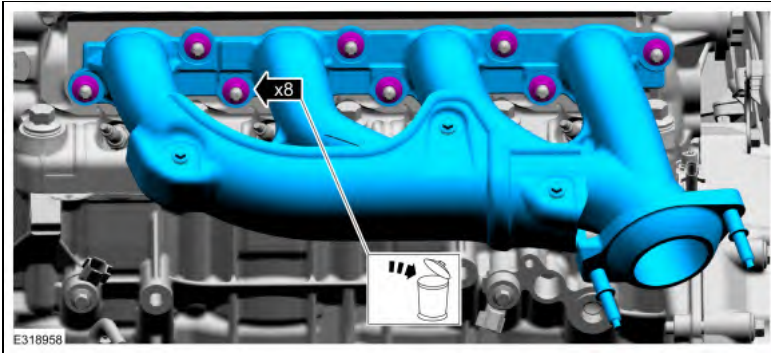
47. Inspect the O-ring seal and replace as necessary.



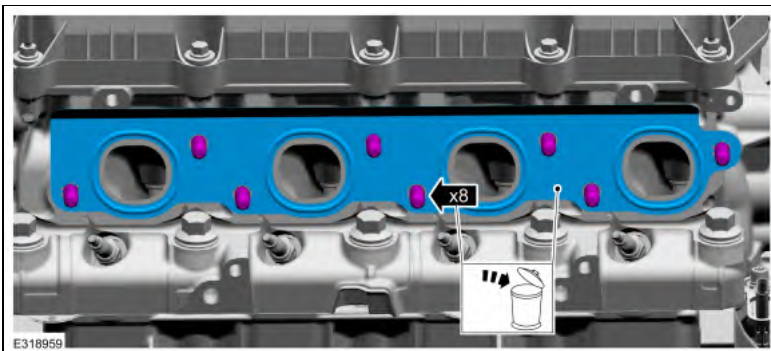
- 48.
1. Disconnect the spark plug wires from the ignition coils.
 2. Disconnect the spark plug wires from the spark plugs and remove the wires.



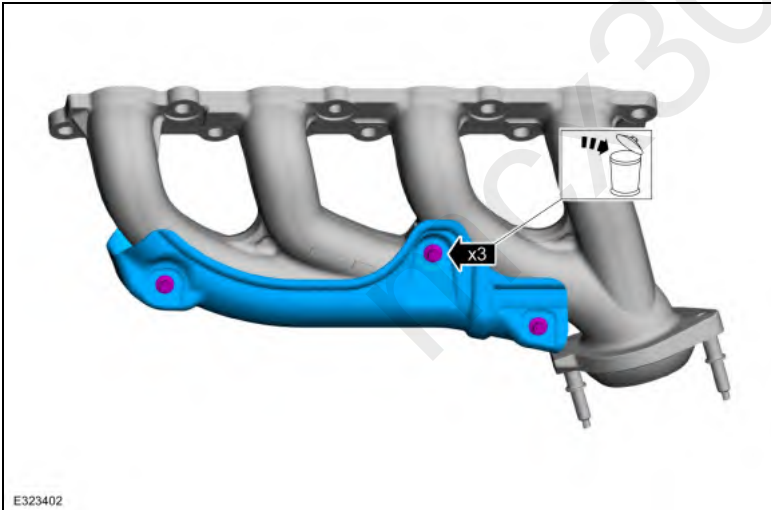
- 49.
1. Remove the nuts and the LH exhaust manifold.
 2. Discard the nuts.
 - Clean and inspect the exhaust manifold.
- Refer to: Exhaust Manifold Cleaning and Inspection (303-00 Engine System - General Information, General Procedures).



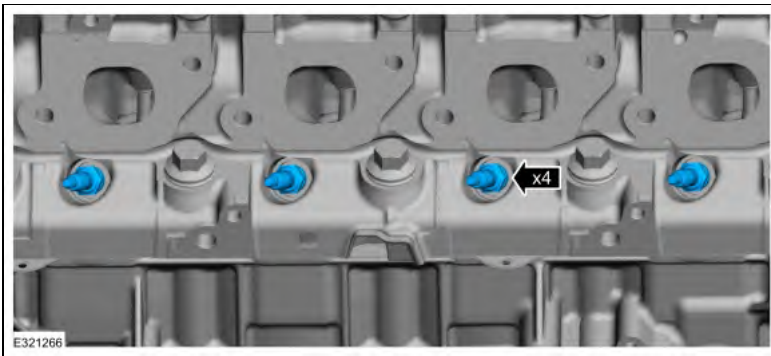
- 50.
1. Remove and discard the gasket.
 2. Remove and discard the studs.



- 51.
1. If necessary, remove the bolts and the heat shield.
 2. Discard the bolts.

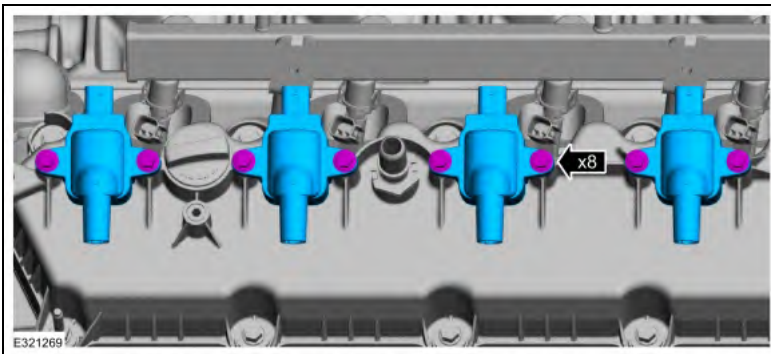


52. Remove the spark plugs.



53. **NOTE:** LH shown, RH similar.

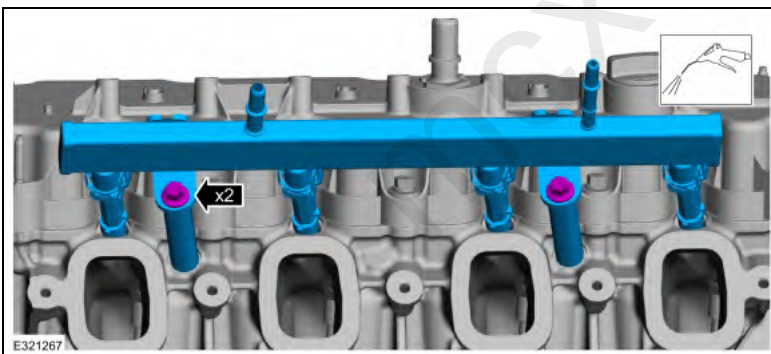
Remove the bolts and the ignition coils.



54. **NOTE:** LH shown, RH similar.

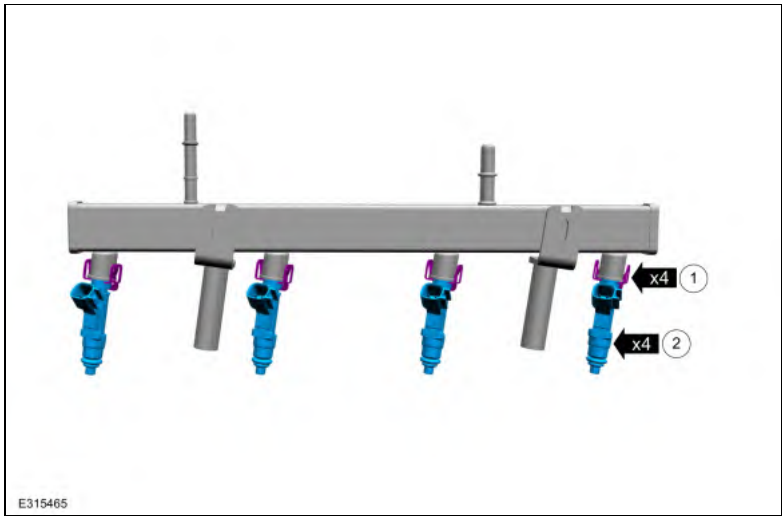
Remove the fuel rails and the injectors.

1. Use compressed air to remove any dirt or foreign material from the cylinder head, the engine block and the general surrounding area of the fuel rail and the injectors.
2. Remove the bolts and the LH and RH fuel rails.

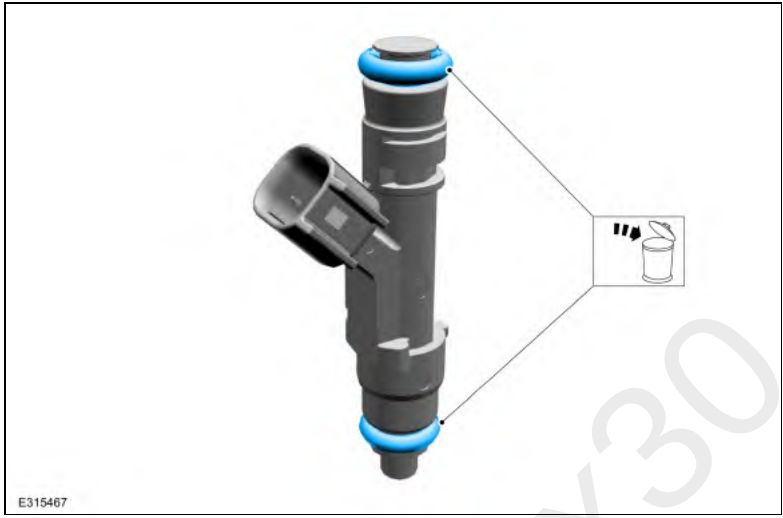


55. **NOTE:** LH shown, RH similar.

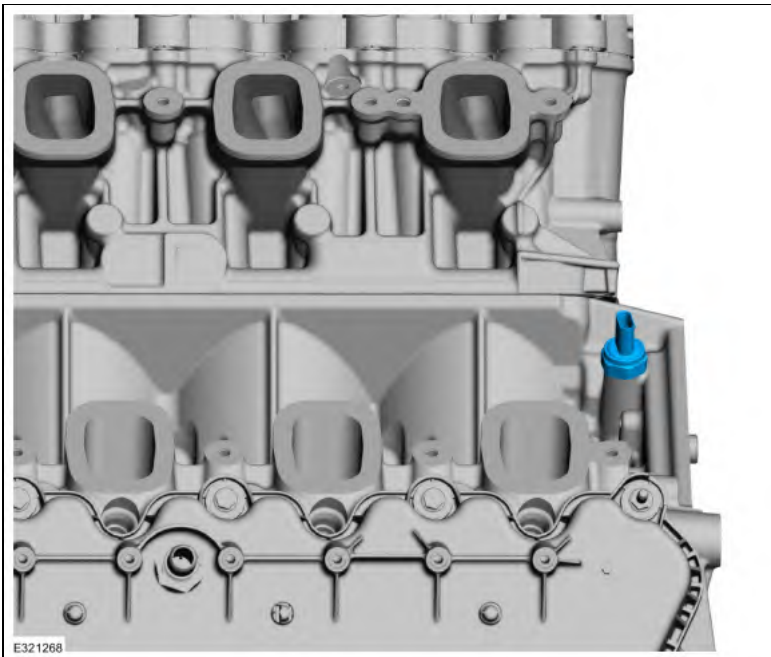
1. Remove the fuel injector retaining clips.
2. Remove the fuel injectors from the fuel rail.



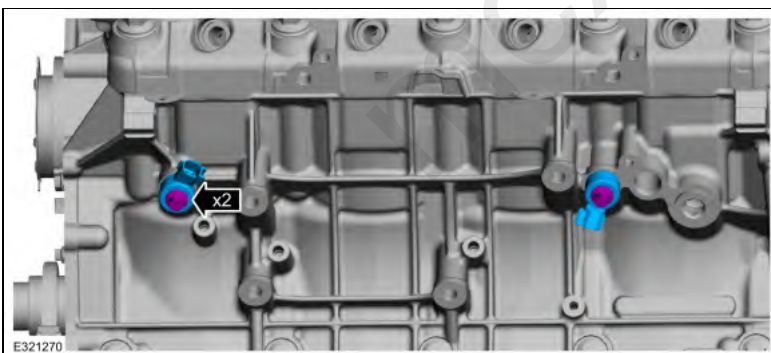
56. Remove and discard all of the fuel injector O-ring seals.



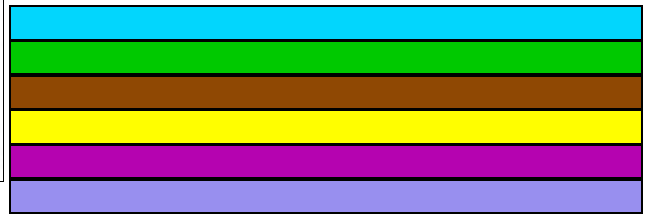
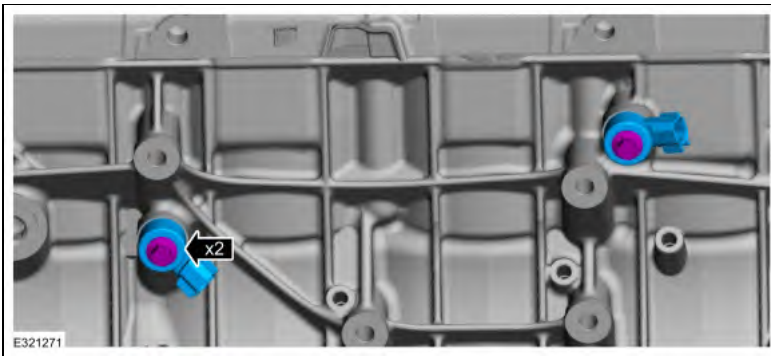
57. Remove the EOP sensor.



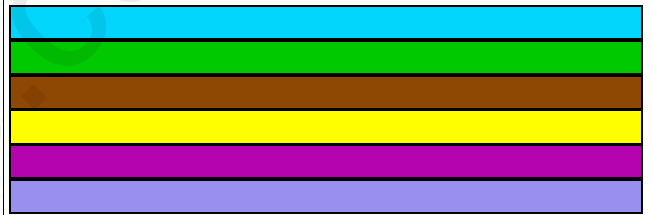
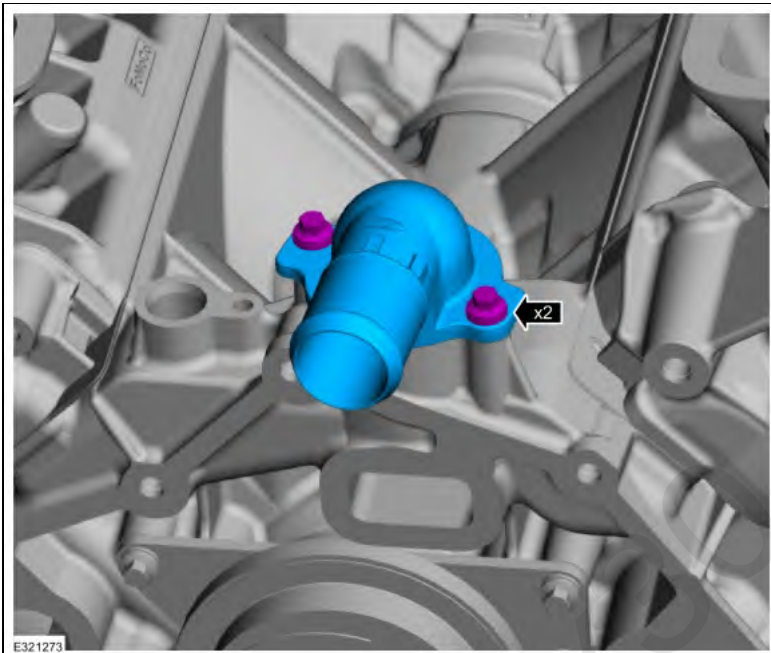
58. Remove the KSs on the LH side of the engine block.



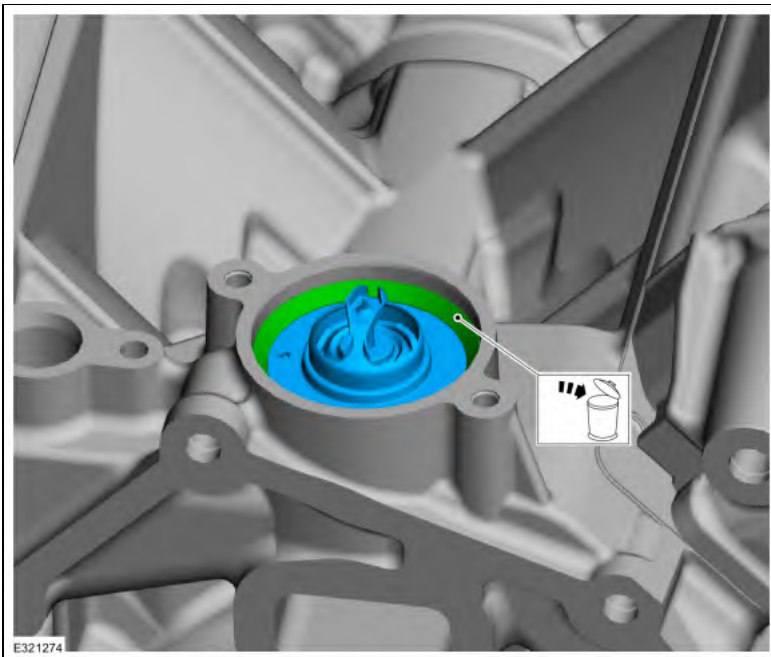
59. Remove the KSs on the RH side of the engine block.



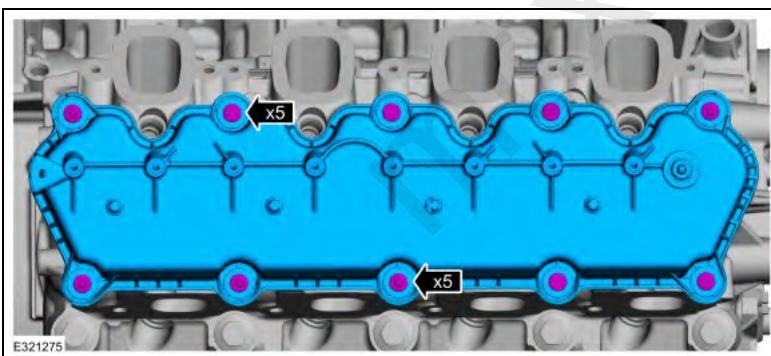
60. Remove the bolts and the thermostat housing.



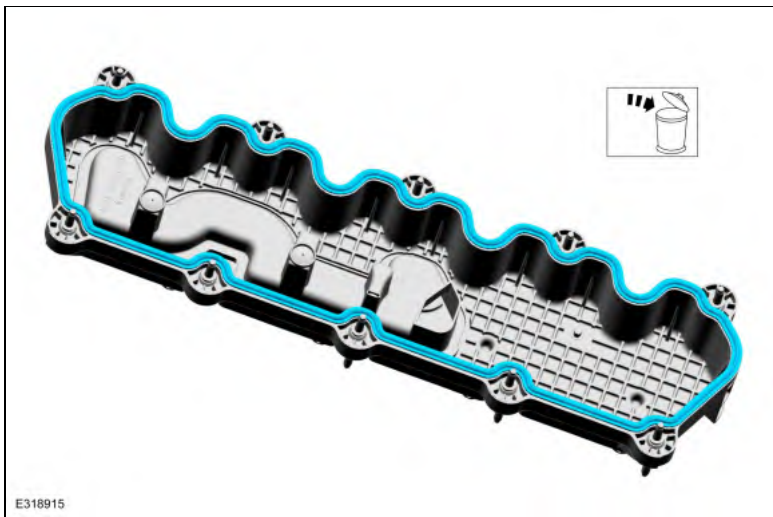
- 61.
1. Remove and discard the O-ring seal.
 2. Remove the thermostat.



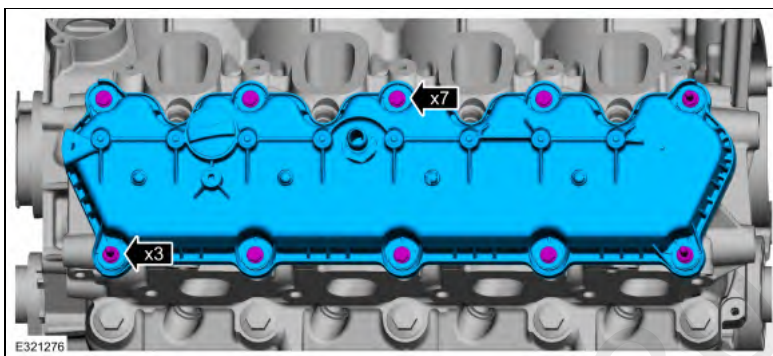
62. Loosen the bolts and remove the RH valve cover.



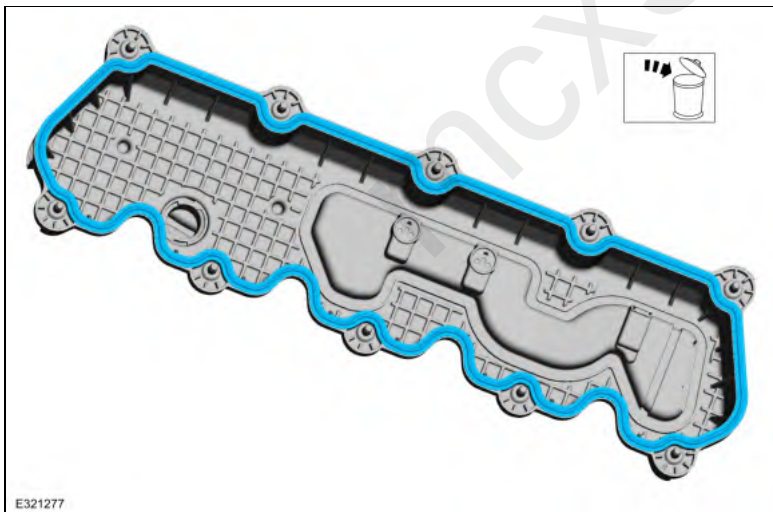
63. Remove and discard the gasket.



64. Loosen the bolts and remove the LH valve cover.



65. Remove and discard the gasket.

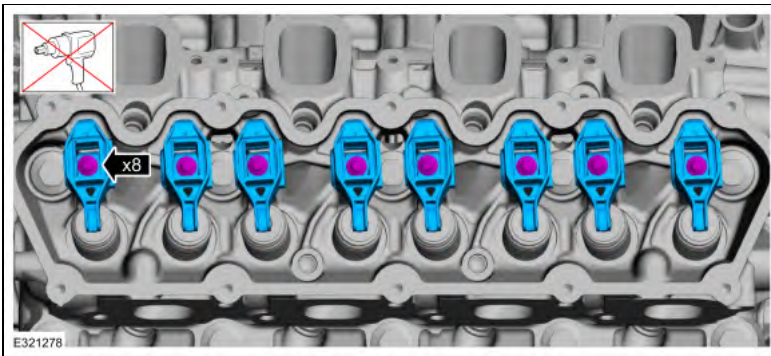


66. **NOTICE: Do not use power tools to remove the bolts.**

NOTE: If the components are to be reinstalled, they must be installed in the same positions or engine damage may occur. Mark the components for installation into their original locations.

NOTE: RH shown, LH similar.

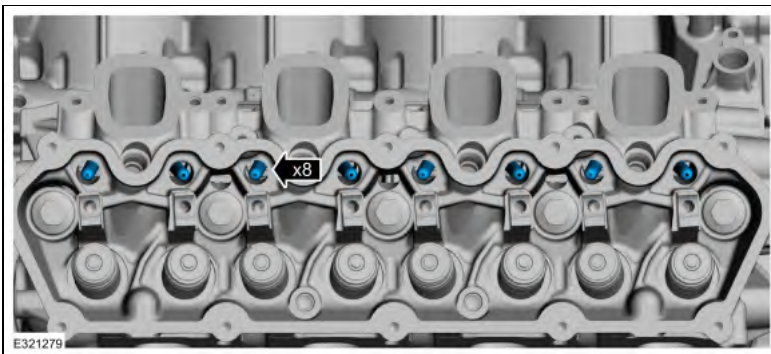
Remove the bolts and the RH and LH rocker arms.



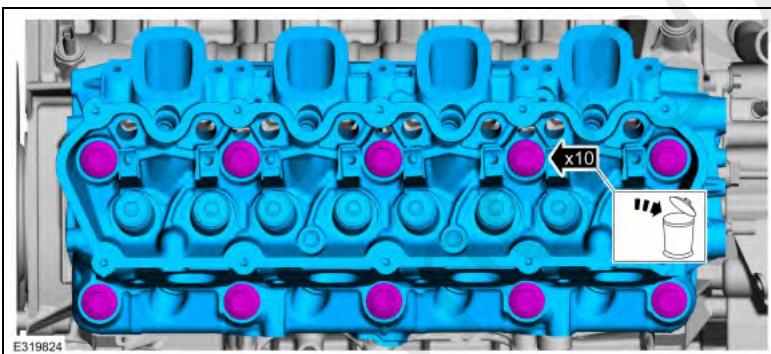
67. **NOTE:** If the components are to be reinstalled, they must be installed in the same positions or engine damage may occur. Mark the components for installation into their original locations.

NOTE: RH shown, LH similar.

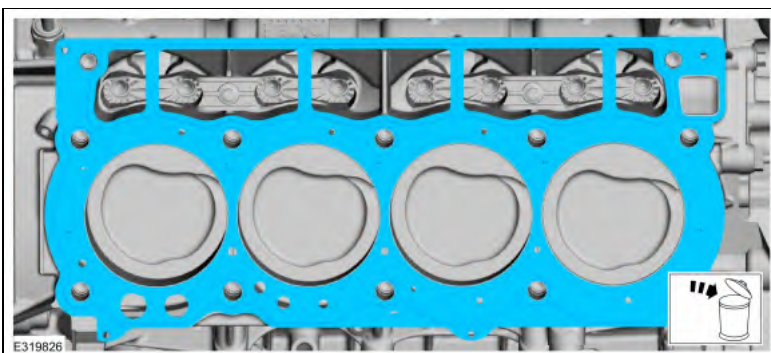
Remove the RH and LH push rods.



- 68.
- Remove and discard the bolts.
 - Remove the RH cylinder head.



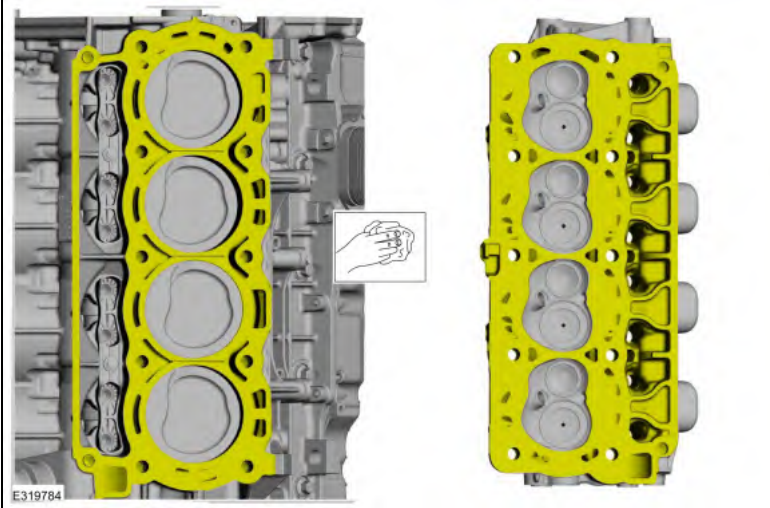
69. Remove and discard the cylinder head gasket.



70. **NOTICE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

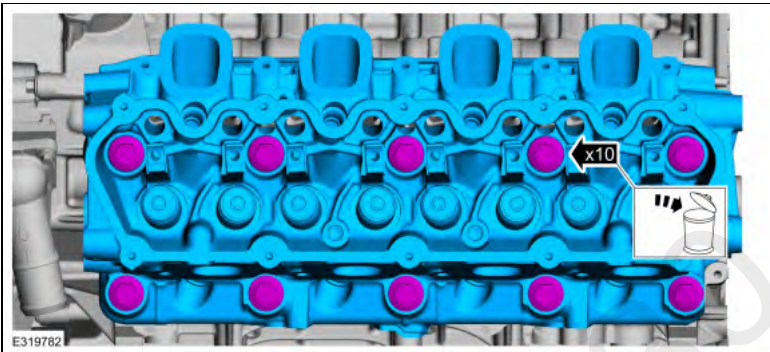
NOTE: Clean the cylinder head bolt holes in the cylinder block using compressed air. Make sure all coolant, oil or other foreign material is removed.

- Clean and inspect the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block
- Refer to: Cylinder Head Distortion (303-00 Engine System - General Information, General Procedures).
- Refer to: Cylinder Block Distortion (303-00 Engine System - General Information, General Procedures).

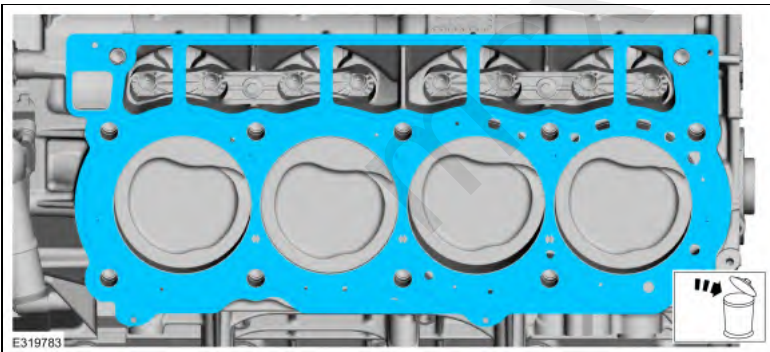


71.

- Remove and discard the bolts.
- Remove the LH cylinder head.



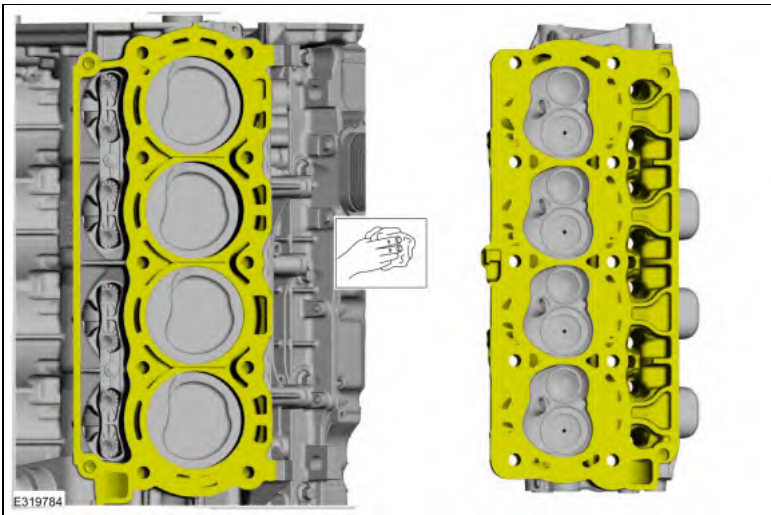
72. Remove and discard the cylinder head gasket.



73. **NOTICE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

NOTE: Clean the cylinder head bolt holes in the cylinder block using compressed air. Make sure all coolant, oil or other foreign material is removed.

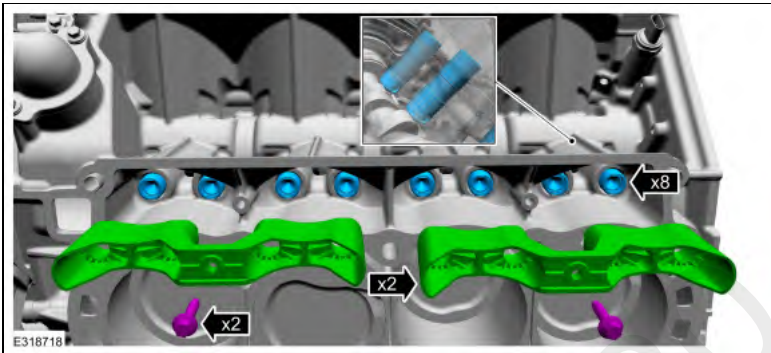
- Clean and inspect the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block
- Refer to: Cylinder Head Distortion (303-00 Engine System - General Information, General Procedures).
- Refer to: Cylinder Block Distortion (303-00 Engine System - General Information, General Procedures).



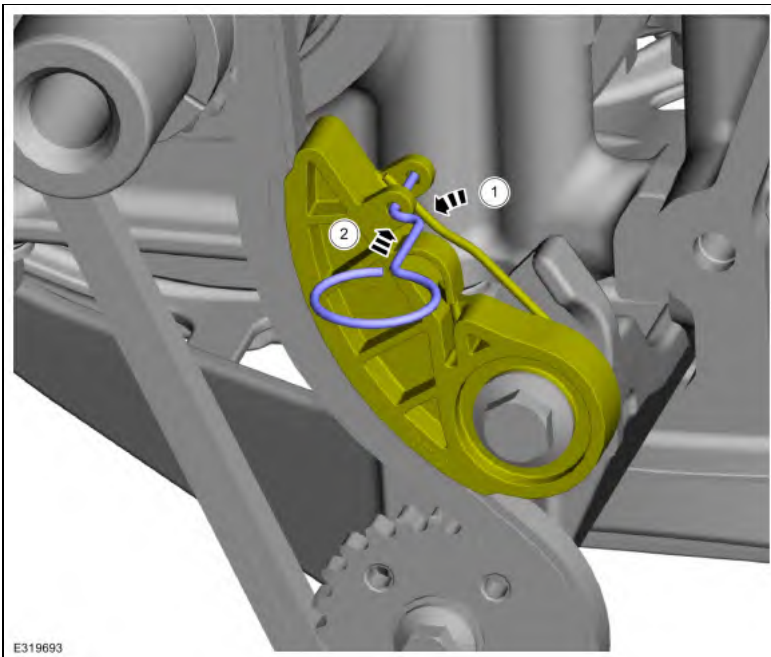
74. **NOTE:** If the components are to be reinstalled, they must be installed in the same positions or engine damage may occur. Mark the components for installation into their original locations.

NOTE: LH shown, RH similar.

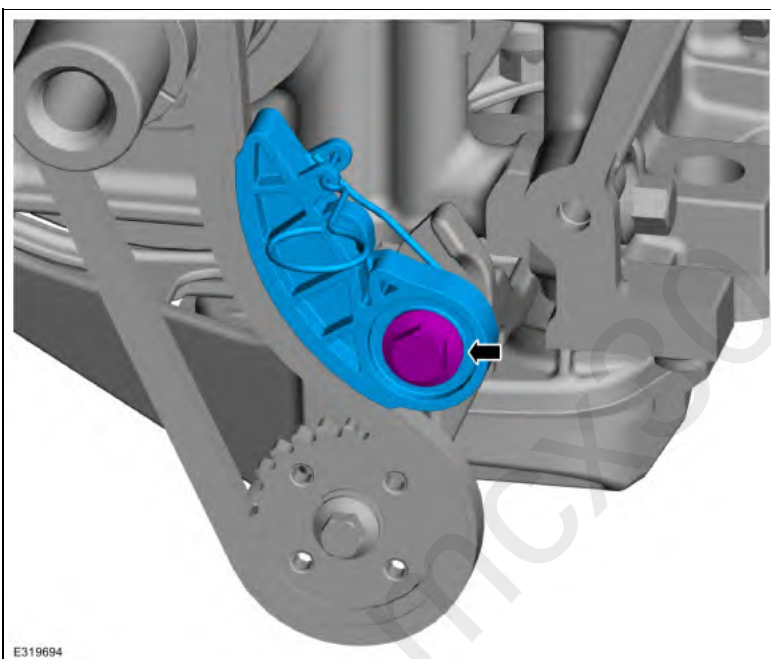
Remove the bolts, the guide plates and the valve tappets.



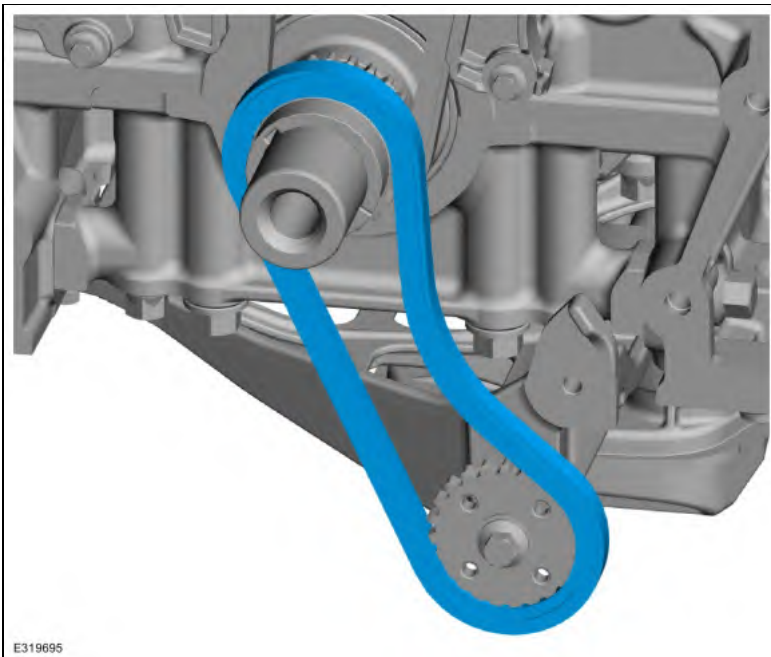
- 75.
1. Position the spring.
 2. Insert a locking pin to secure the spring to the oil pump drive chain tensioner.



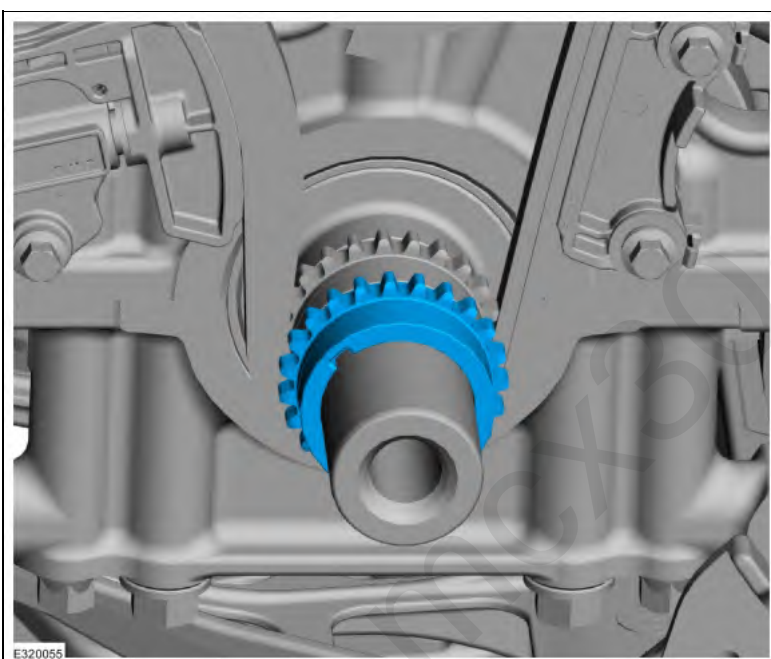
76. Remove the bolt and the oil pump drive chain tensioner.



77. Remove the oil pump drive chain.

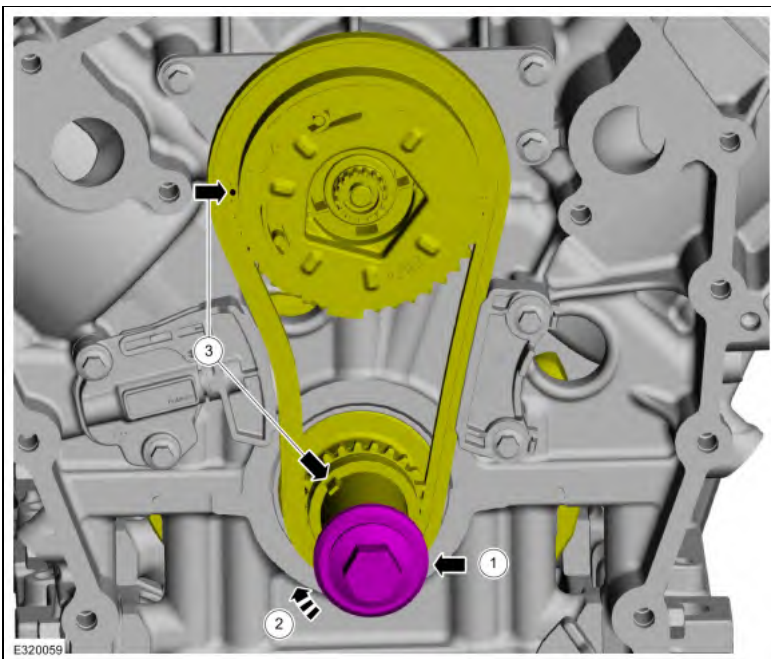


78. Remove the oil pump drive chain sprocket.



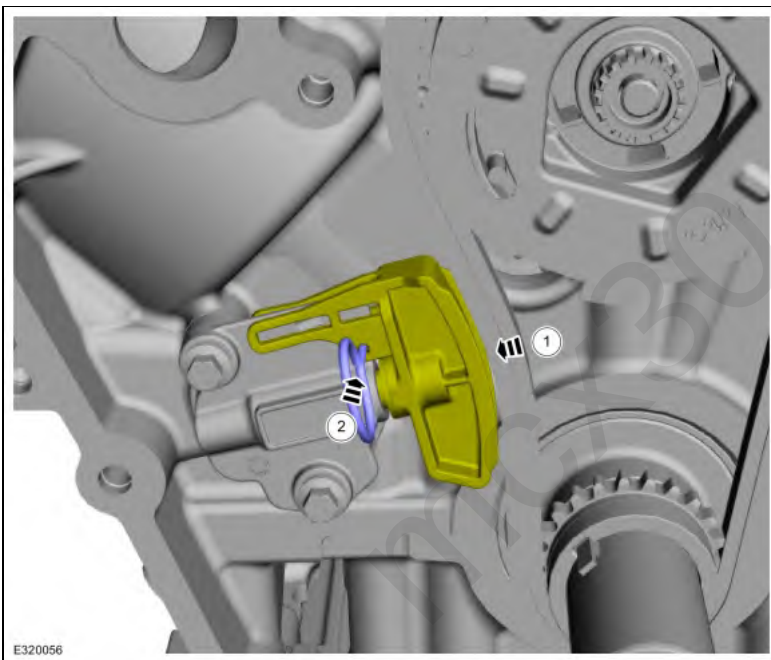
79.

1. Install the original crankshaft pulley bolt.
2. Rotate the crankshaft clockwise until the keyway (3) and the VCT unit timing mark (3) are aligned as shown.
 - Remove the original crankshaft pulley bolt.



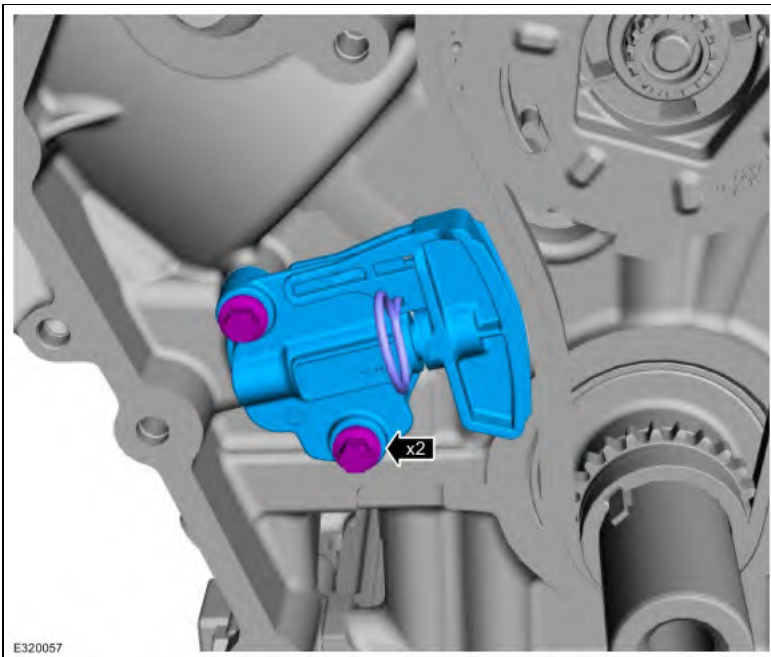
80.

1. Depress the timing chain tensioner plunger.
2. Insert a locking pin to secure the timing chain tensioner plunger in the retracted position.

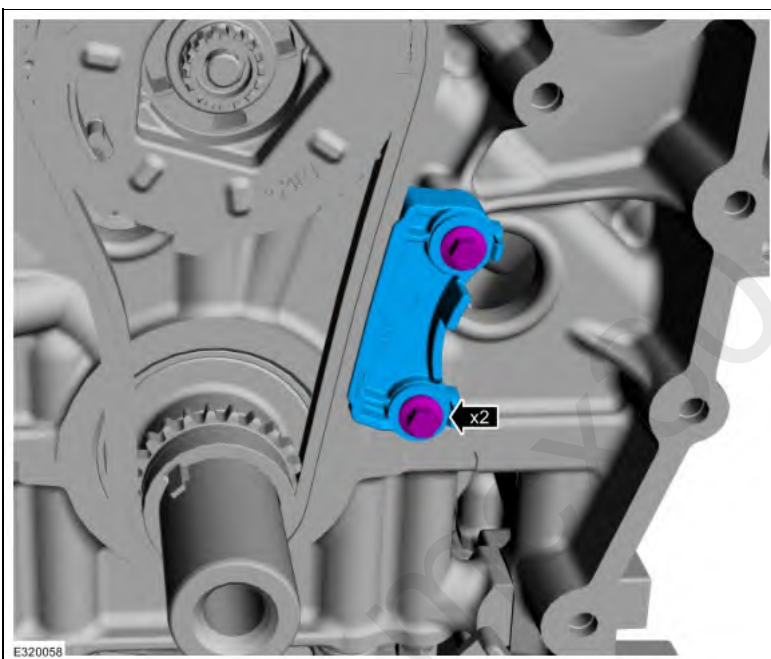


A horizontal bar chart with six bars of equal length, stacked vertically. The bars are colored cyan, green, brown, yellow, purple, and light blue from top to bottom.

81. Remove the bolts and the timing chain tensioner.

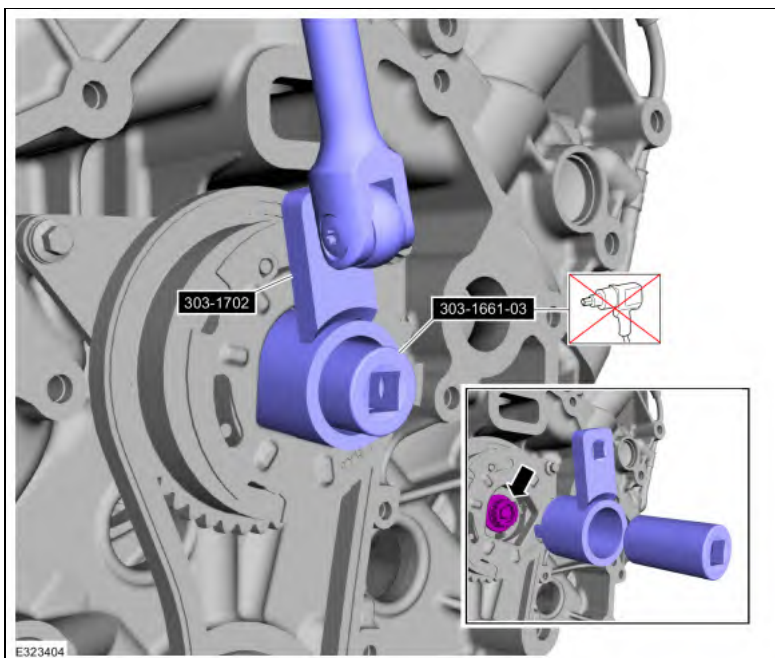


82. Remove the bolts and the timing chain guide.

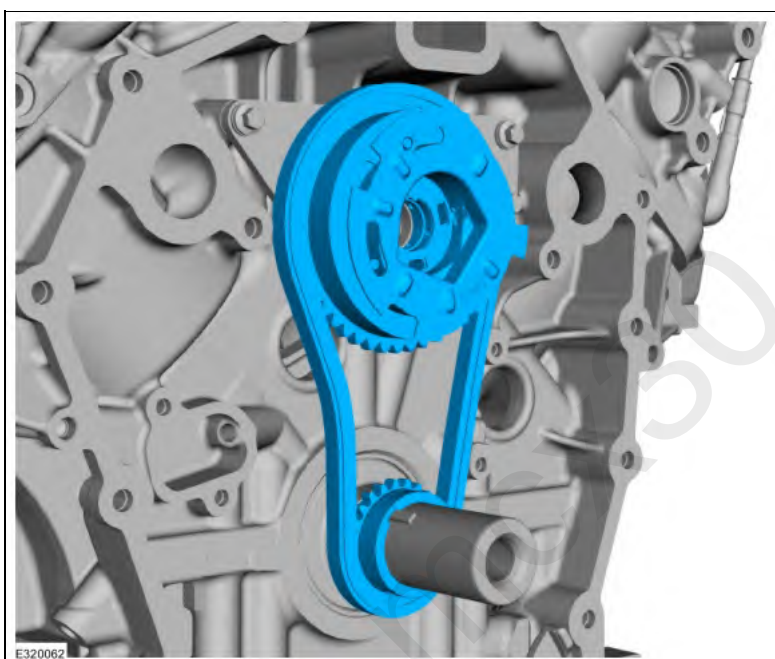


83. **NOTICE: Do not use power tools to remove the VCT valve.**

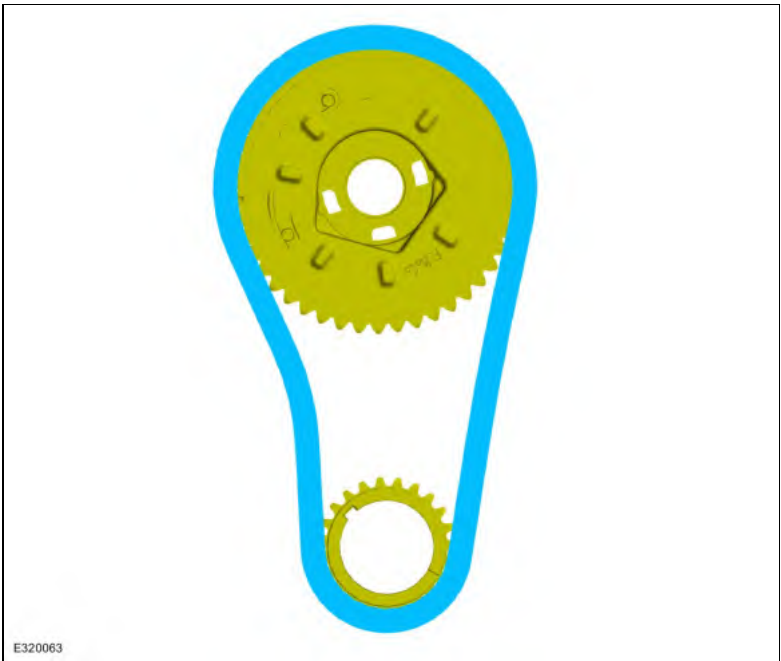
Using the special tools, remove the VCT valve.
 Use Special Service Tool: 303-1702 7.3L VCT Locking Tools. , 303-1661-03 7.3L OVC Bolt.
 Use the General Equipment: 1/2 Inch Square Drive Breaker Bar



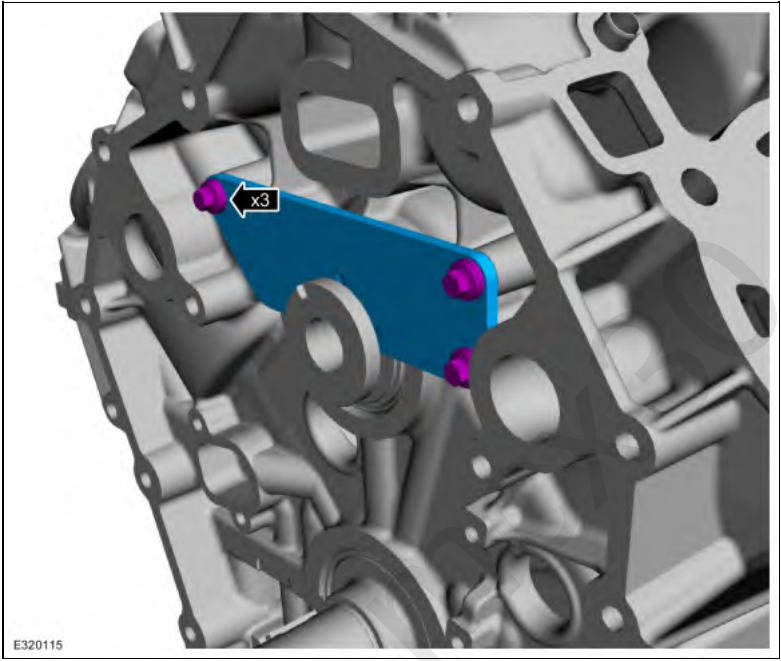
84. Remove the VCT unit, the timing chain and crankshaft sprocket together.



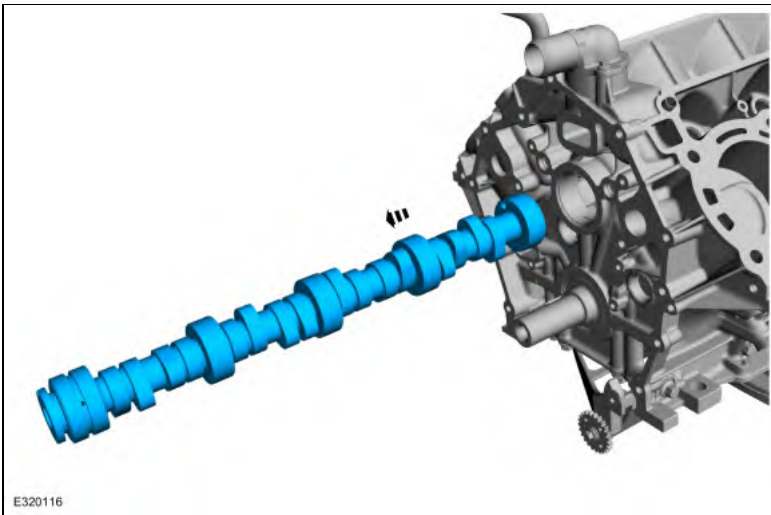
85. Separate the timing chain from the VCT unit and the crankshaft sprocket.



86. Remove the bolts and the camshaft thrust plate.

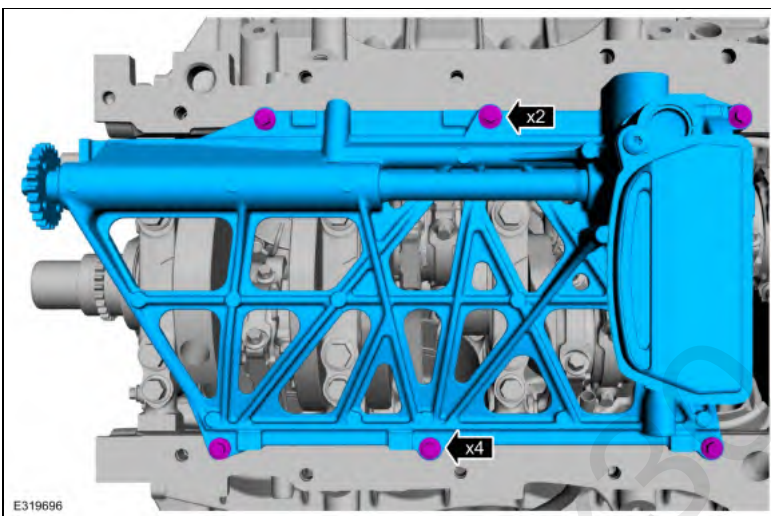


87. Remove the camshaft.



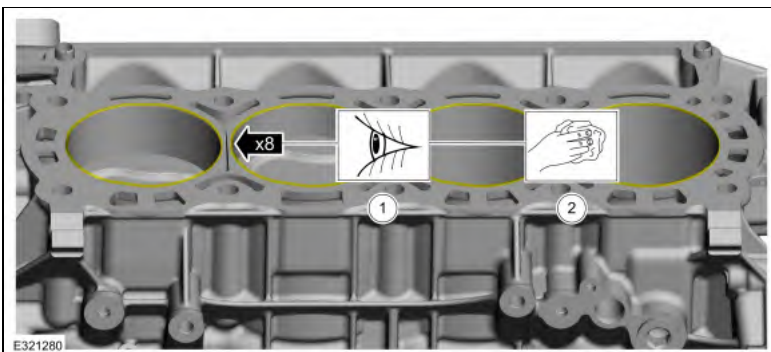
88. **NOTE:** The oil pump bolts vary in length, note position of bolts for assembly.

Remove the bolts and the oil pump.



89.

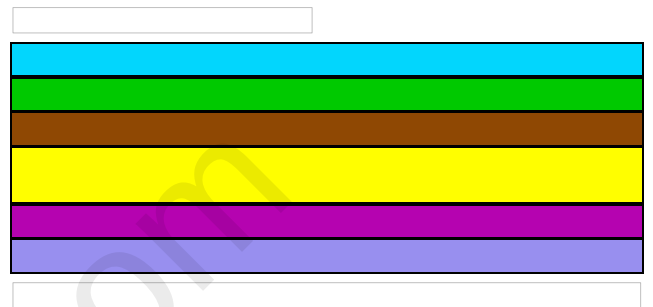
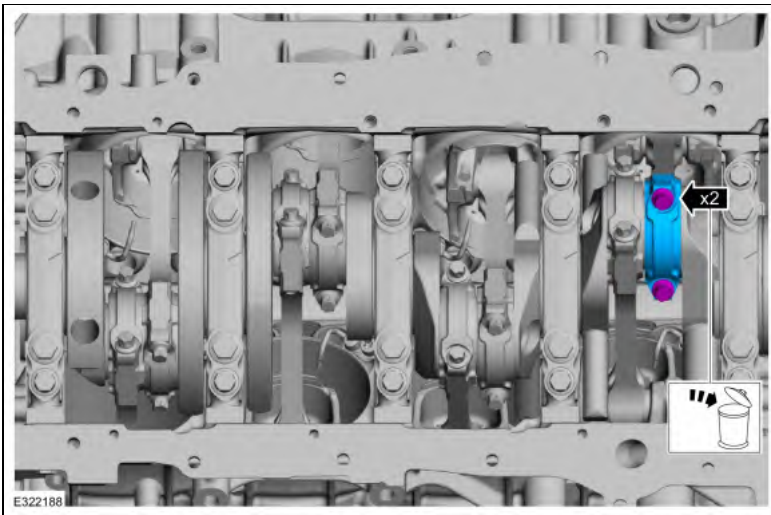
- Before removing the pistons, inspect the top of the cylinder bores.
- If necessary, remove the ridge or carbon deposits from each cylinder using an abrasive pad.



90. **NOTICE:** Verify that the connecting rod and rod cap have orientation numbers cast into them. If not, number the connecting rod and rod cap for correct orientation. Failure to do so can result in engine damage.

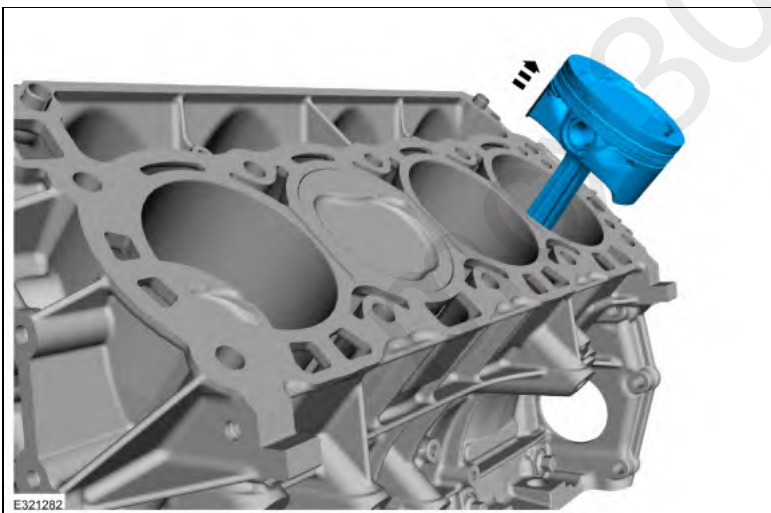
Remove the bolts and the connecting rod cap.

- Discard the bolts.



91. **NOTICE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod or engine damage may occur.**

Remove the piston through the top of the cylinder block.



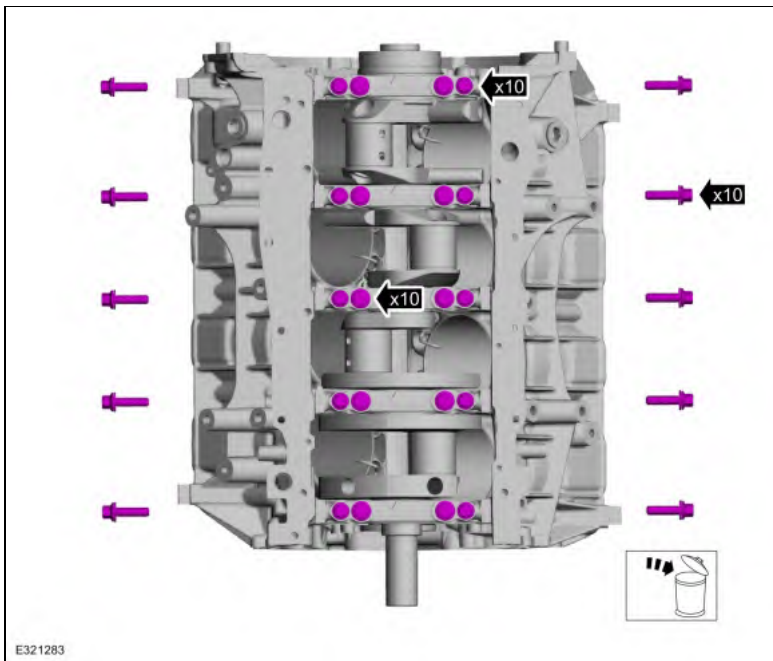
92. Repeat the previous 2 steps for each of the remaining pistons.

93. Disassemble the 8 pistons.

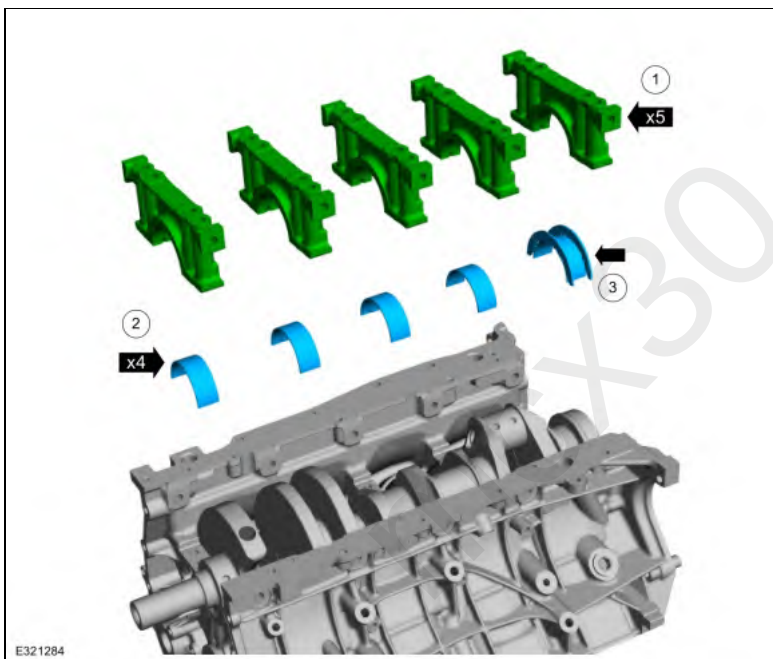
Refer to: Piston (303-01C Engine - 7.3L 2V DEVCT V8 (239kW/320PS) (J0), Disassembly and Assembly of Subassemblies).

94.

1. Remove and discard the cross-mounted main cap bolts.
2. Remove and discard the main bearing cap bolts and stud bolt.



- 95.
1. Remove the main bearing caps.
 2. Remove the lower crankshaft main bearings.
 3. Remove the lower thrust bearing.



- 96.
1. Remove the crankshaft.
 2. Remove the upper crankshaft main bearings.
 3. Remove the upper thrust washer.

