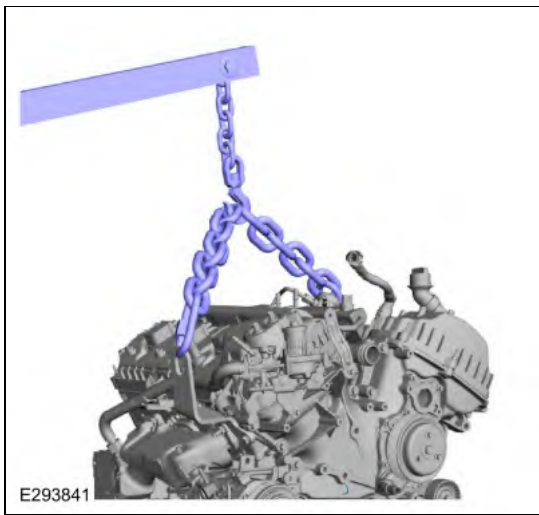
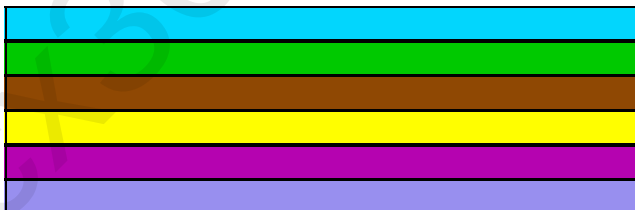
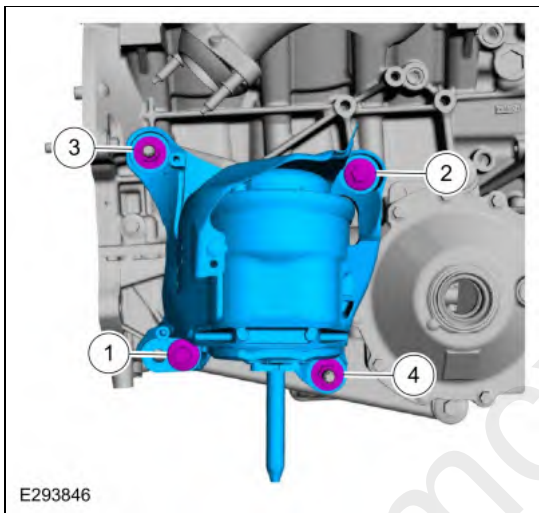




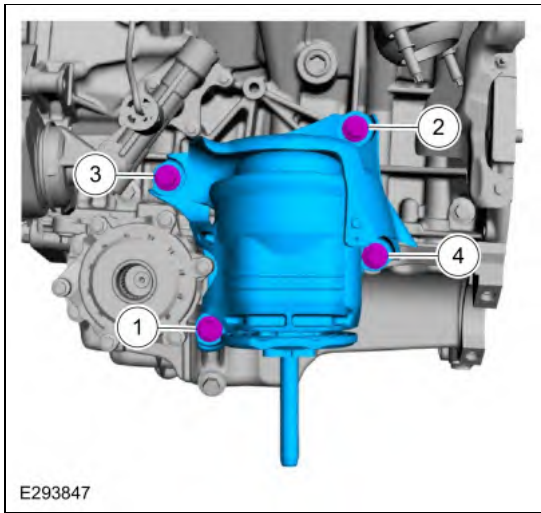
5. Remove the floor crane and the chains.
Use the General Equipment: Floor Crane



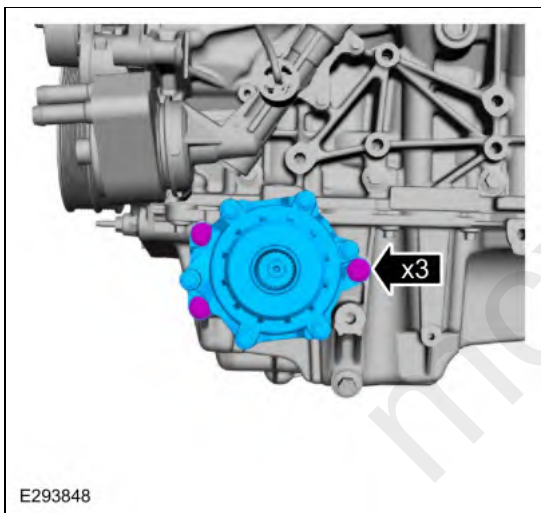
6. Remove the nuts, bolts and the RH engine mount.



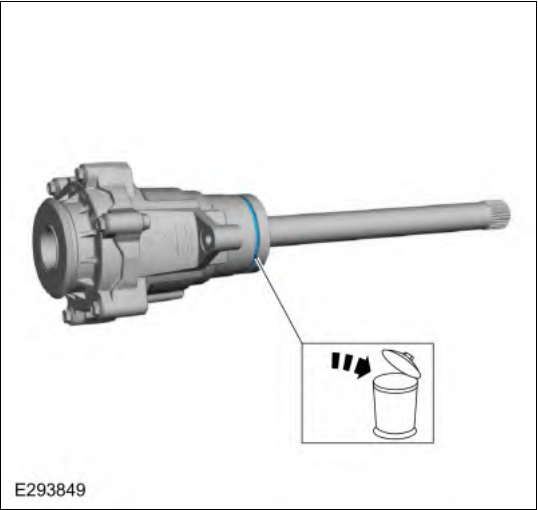
7. Remove the bolts and the LH engine mount.



8. Remove the bolts and the LH axle connector.

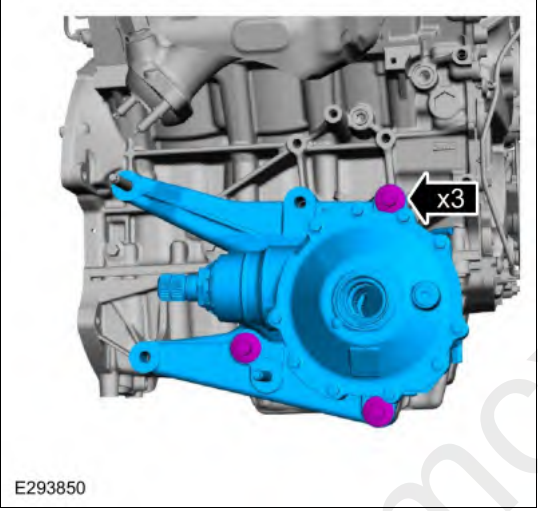


9. Remove and discard the axle connector seal.



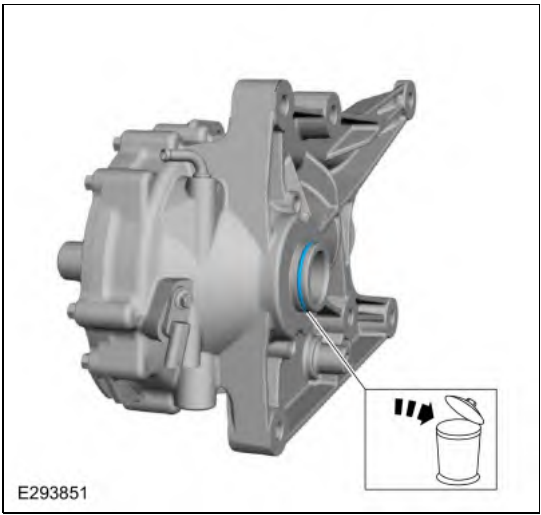
E293849

10. Remove the bolts and the front axle assembly.

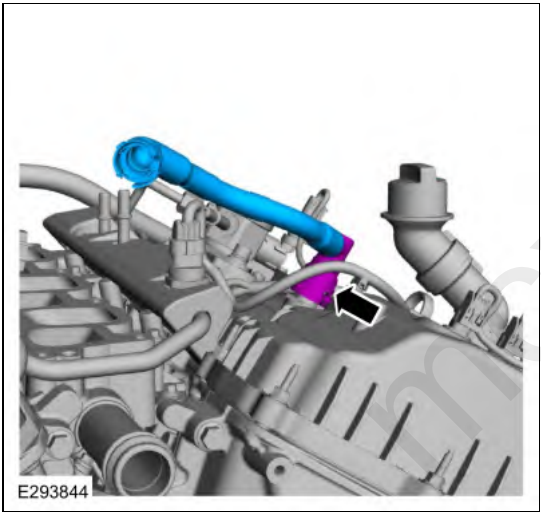


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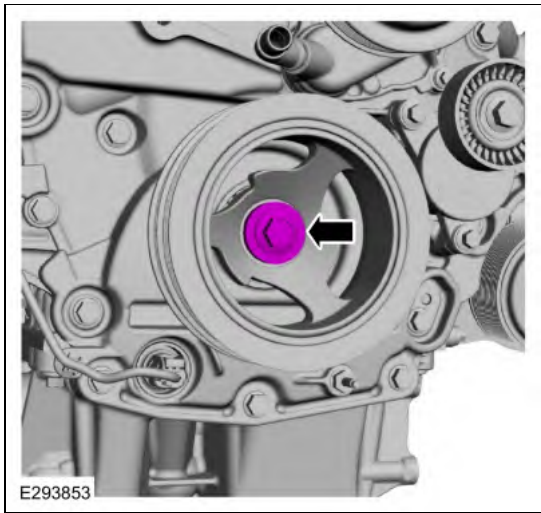
11. Remove and discard the front axle assembly seal.



12. Remove the crankcase vent tube.

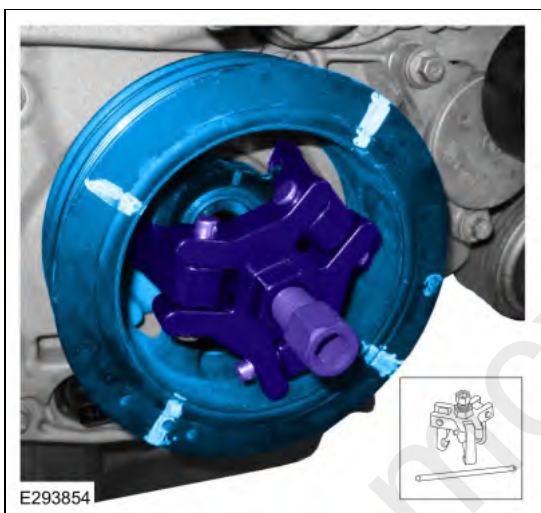


13. Remove the crankshaft pulley bolt and washer.

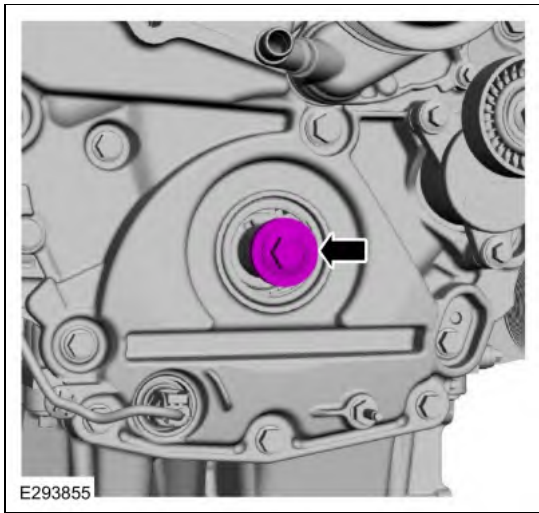


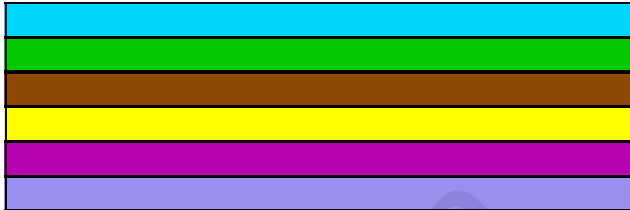
14. **NOTE:** Use a universal puller (such as an OTC 6667, or equivalent).

Using a universal puller, remove the crankshaft pulley.

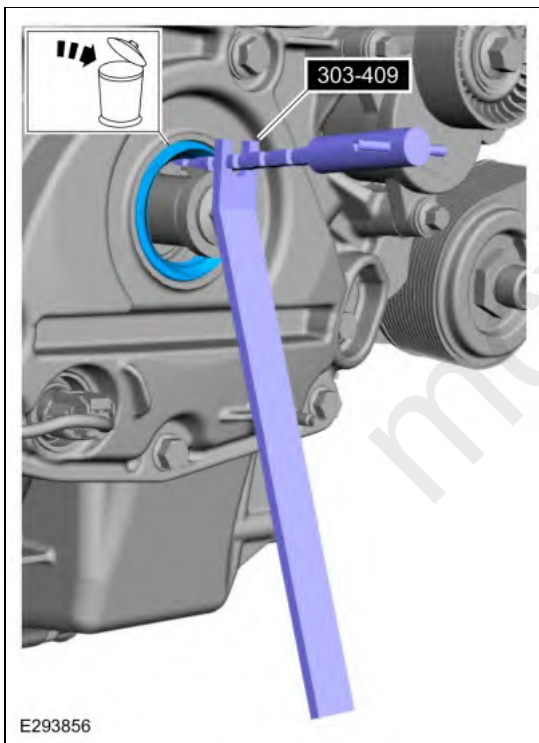


15. Install the original crankshaft pulley bolt and washer.



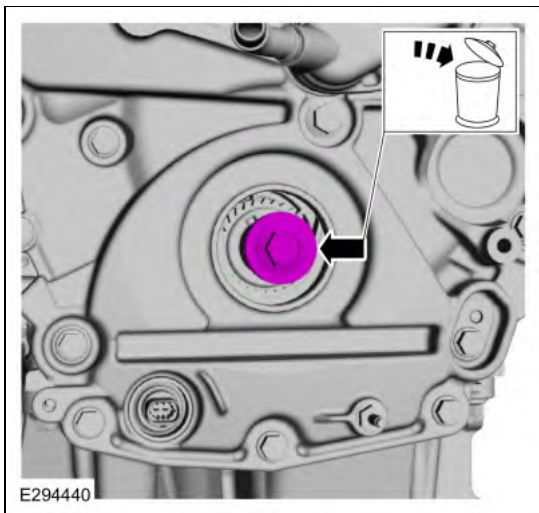


16. Using the special tool, remove and discard the crankshaft front seal.
Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.

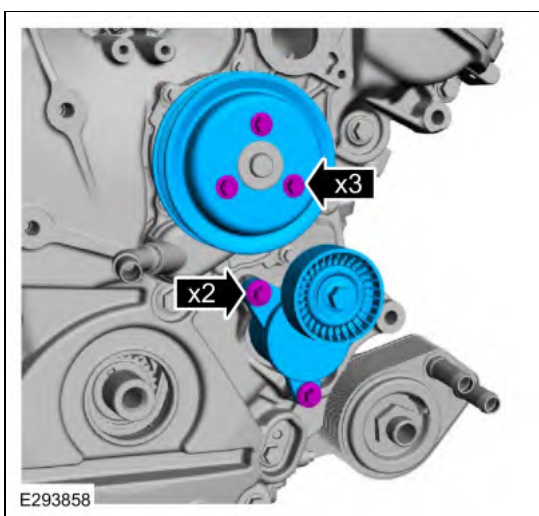




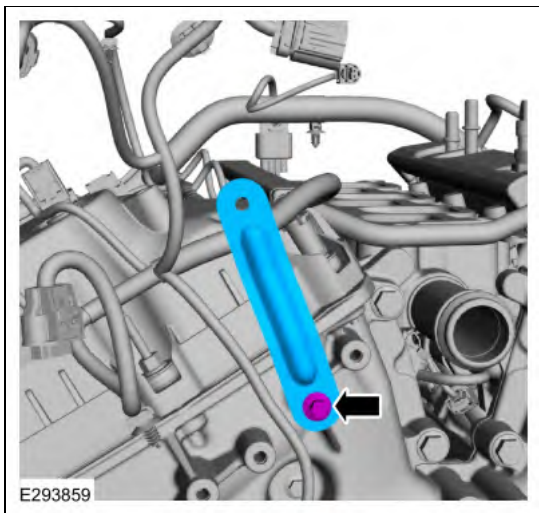
- 17.
- Remove the crankshaft pulley bolt and washer.
 - Discard the bolt.



- 18.
- Remove the bolts and the coolant pump pulley.
 - Remove the bolts and the accessory drive belt tensioner.

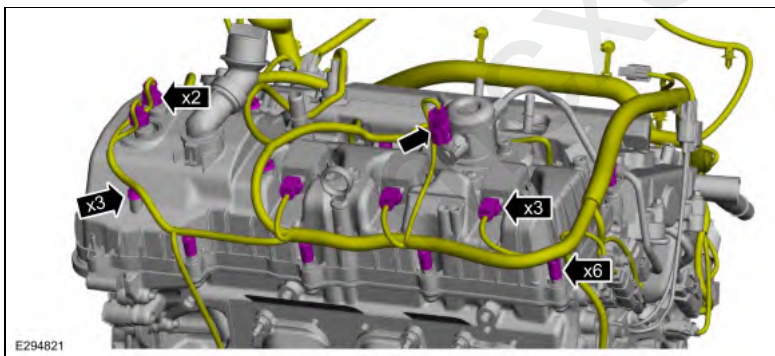


19. Remove the bolt and the upper intake manifold support bracket.



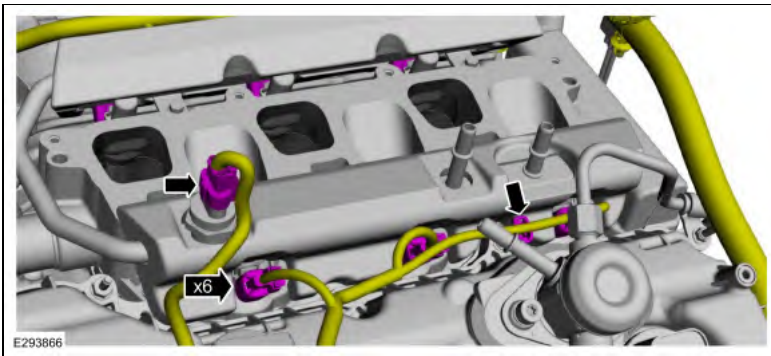
20.

- Disconnect the high-pressure fuel pump electrical connector.
- Disconnect the VCT oil control solenoids electrical connectors.
- Disconnect the ignition coil-on-plug electrical connectors.
- Detach the wiring harness retainers.

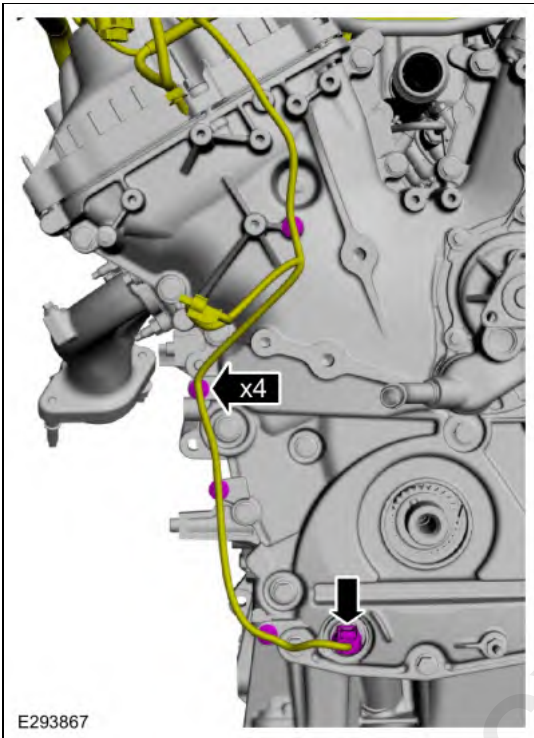


21.

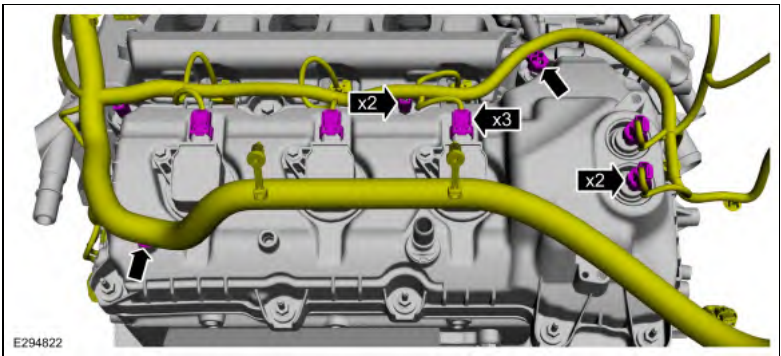
- Disconnect the FRP temperature sensor electrical connector.
- Detach the wiring harness retainer.
- Disconnect the port injector fuel rail electrical connectors.



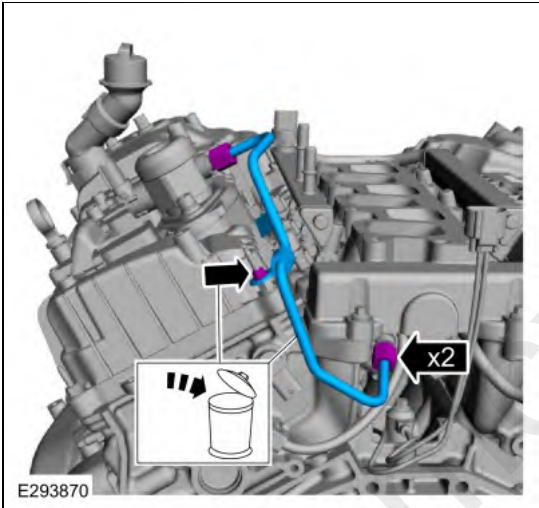
22. Disconnect the oil pressure control solenoid valve electrical connector and detach the wiring harness retainers.



- 23.
- Disconnect the VCT oil control solenoids electrical connectors.
 - Disconnect the ignition coil-on-plug electrical connectors.
 - Detach the wiring harness retainers and position the engine wiring harness aside.

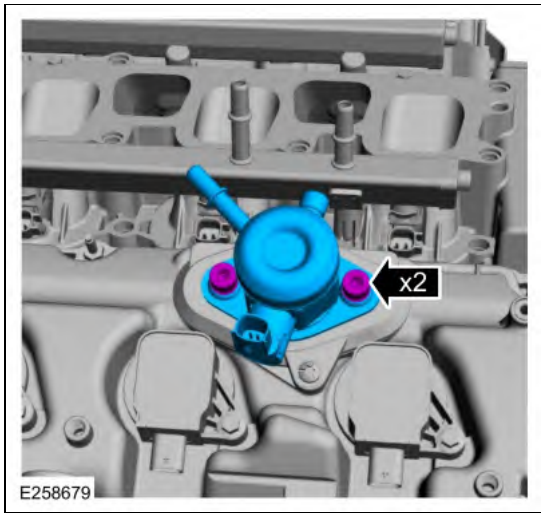


- 24.
- Remove and discard the high-pressure fuel pump to direct injection fuel rail tube nut.
 - Loosen the high-pressure fuel pump to direct injection fuel rail tube flare nuts.
 - Remove and discard the high-pressure fuel pump to direct injection fuel rail tube.

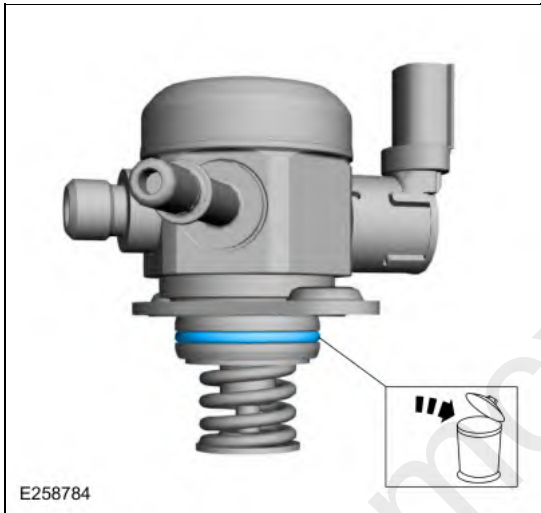


25. **NOTE:** Alternately loosen the high-pressure fuel pump bolts one complete revolution at a time.

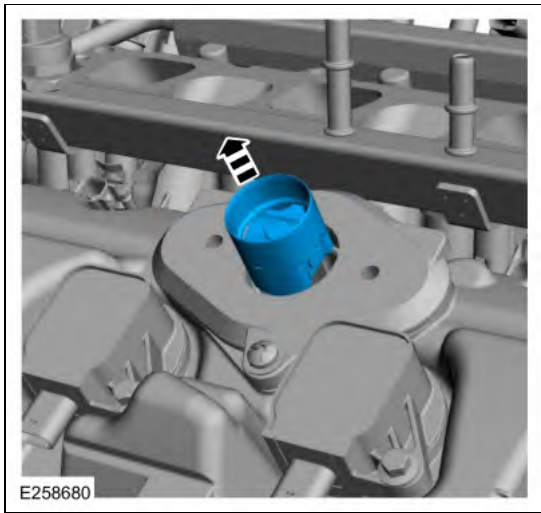
Remove the bolts and the high-pressure fuel pump.



26. Remove and discard the high-pressure fuel pump O-ring seal.



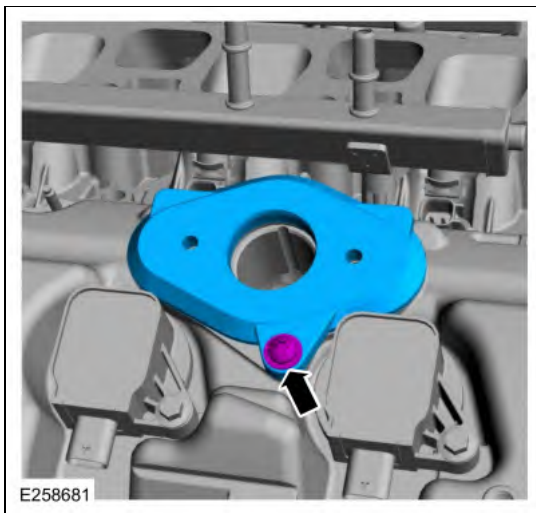
27. Remove the high-pressure fuel pump roller tappet.



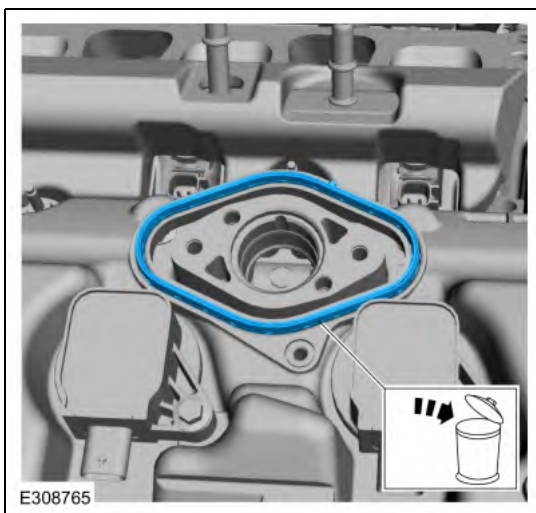
28. Inspect the high-pressure fuel pump roller tappet. If any flat spots or scoring are found, especially in the indicated areas, then inspect the high-pressure fuel pump and the high-pressure fuel pump roller tappet drive lobe. Install new components as needed.



29. Loosen the high-pressure fuel pump mounting plate bolt and remove the mounting plate.



30. Remove and discard the high-pressure fuel pump mounting plate seal.



31. Remove and discard the high-pressure fuel pump mounting plate O-ring seals.



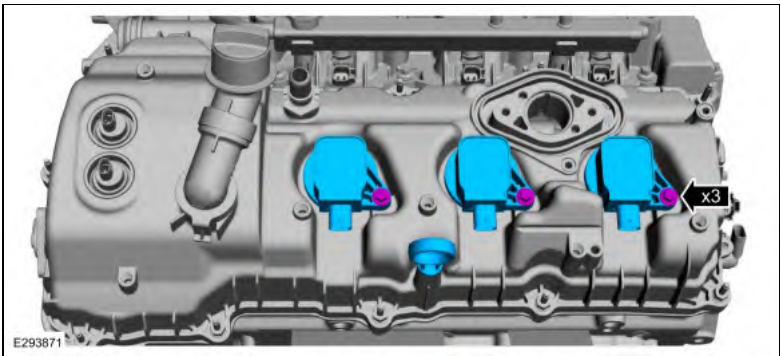
32.

- **NOTE:** Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.

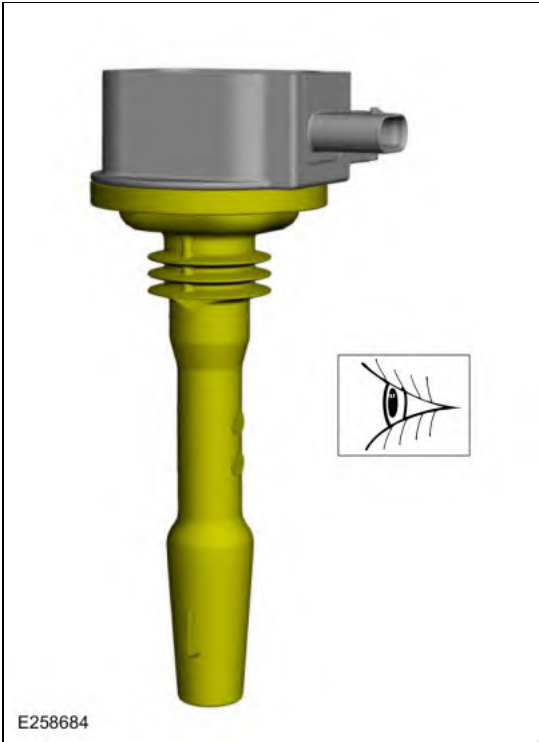
NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

Remove the bolts and the ignition coil-on-plugs.

- Remove the oil level indicator.



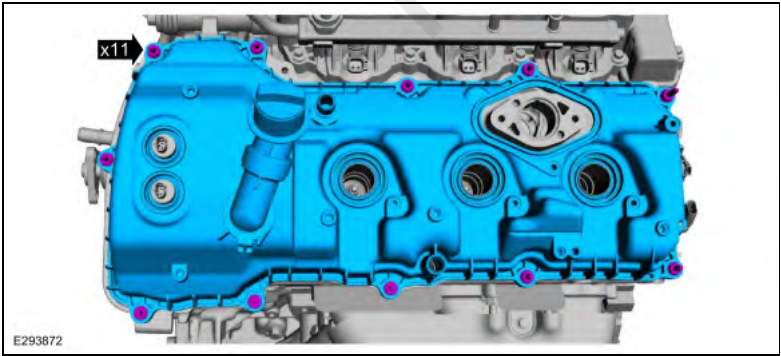
33. Inspect the coil seals for rips, nicks or tears and replace if necessary.



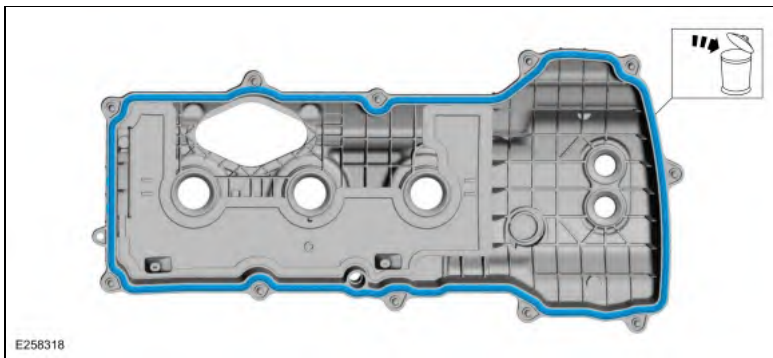
34. **NOTICE:** While removing the valve cover do not apply excessive force to the VCT oil control solenoid or damage may occur.

NOTICE: If the VCT oil control solenoid sticks to the VCT seal, carefully wiggle the valve cover until the bond breaks free or damage to the VCT seal and VCT oil control solenoid may occur.

Loosen the bolts, stud bolts and the LH valve cover.



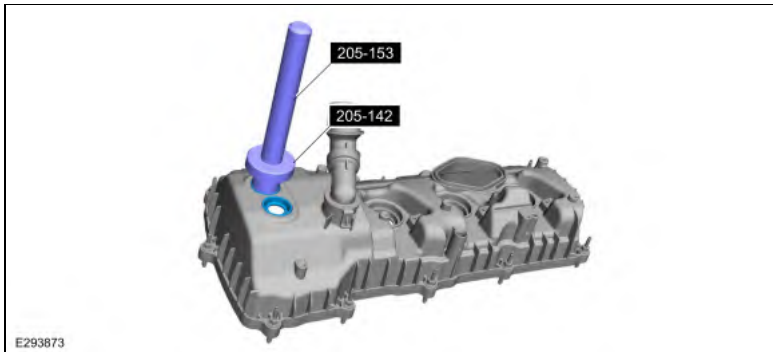
35. Discard the valve cover gasket.



36. **NOTE:** *Inspect the VCT solenoid seals. Remove any damaged seals.*

Using the special tools, remove and discard the seal(s).

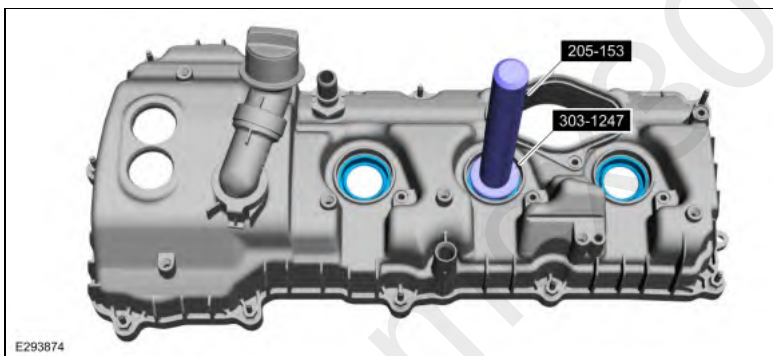
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone. , 205-153 (T80T-4000-W) Handle.



37. **NOTE:** *Inspect the spark plug tube seals. Remove any damaged seals.*

Using the special tools, remove and discard the seal(s).

Use Special Service Tool: 205-153 (T80T-4000-W) Handle. , 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



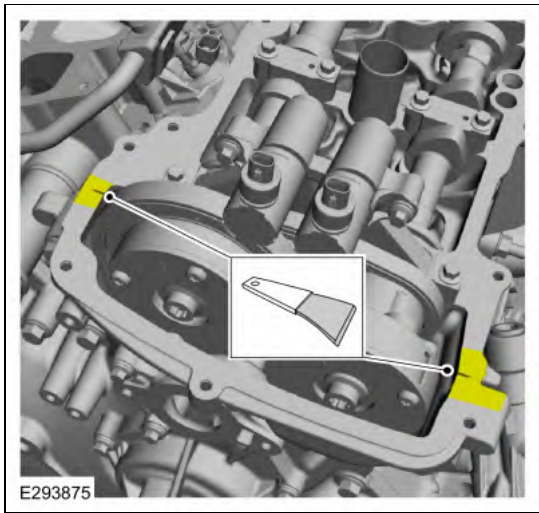
38. Make sure that the mating faces are clean and free of foreign material.

Use the General Equipment: Plastic Scraper

Material: Motorcraft® Silicone Gasket Remover / ZC-30-A

Material: Motorcraft® Metal Brake Parts Cleaner / PM-4-A, PM-4-B

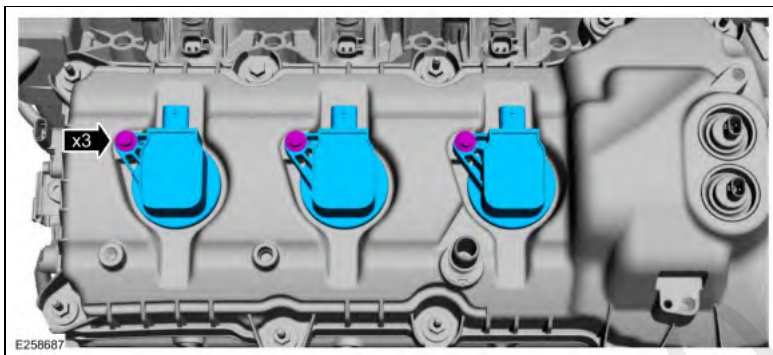
Material: Motorcraft® Metal Surface Prep Wipes / ZC-31-B



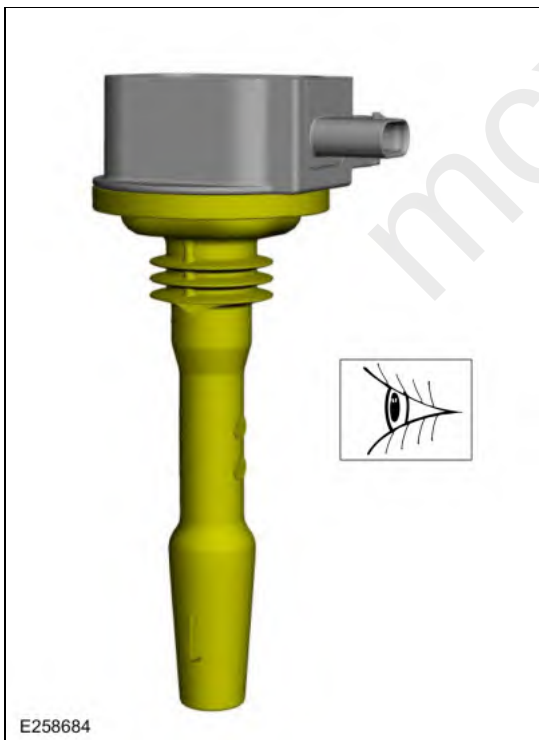
39. **NOTE:** Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.

NOTE: When removing the ignition coil-on-plugs, a slight twisting motion will break the seal and ease removal.

Remove the bolts and the ignition coil-on-plugs.



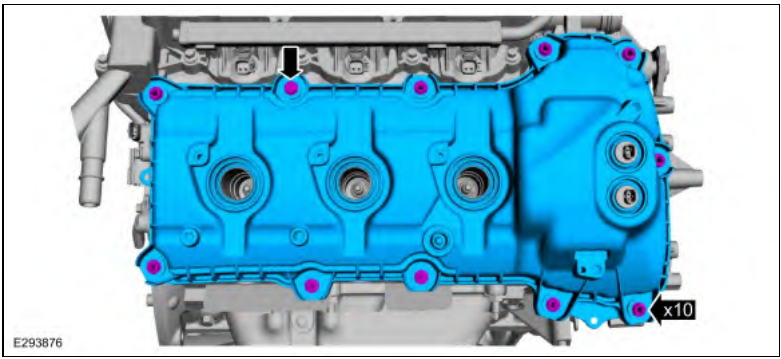
40. Inspect the coil seals for rips, nicks or tears and replace if necessary.



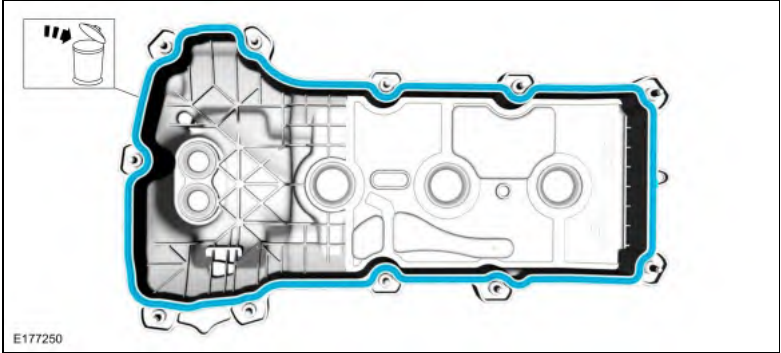
41. **NOTICE:** While removing the valve cover do not apply excessive force to the VCT oil control solenoid or damage may occur.

NOTICE: If the VCT oil control solenoid sticks to the VCT seal, carefully wiggle the valve cover until the bond breaks free or damage to the VCT seal and VCT oil control solenoid may occur.

Loosen the bolts and remove the RH valve cover.

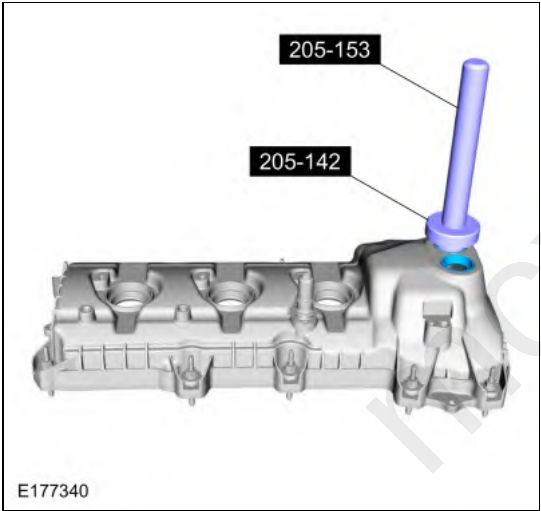


42. Discard the valve cover gasket.



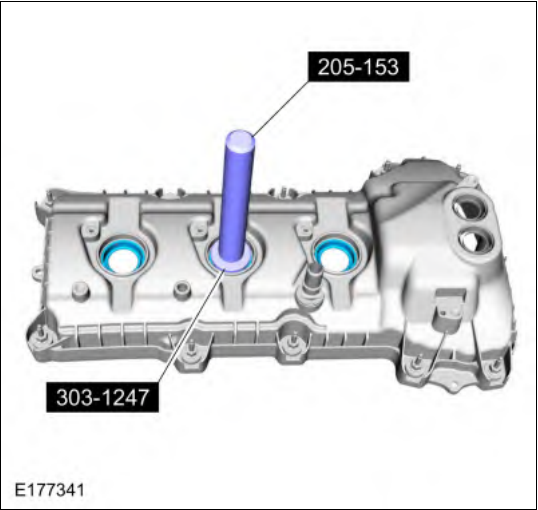
43. **NOTE:** *Inspect the VCT solenoid seals. Remove any damaged seals.*

Using the special tools, remove and discard the seal(s).
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone. , 205-153 (T80T-4000-W) Handle.

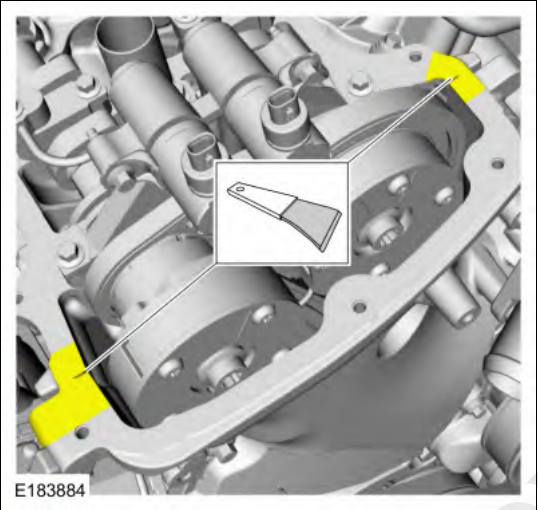


44. **NOTE:** *Inspect the spark plug tube seals. Remove any damaged seals.*

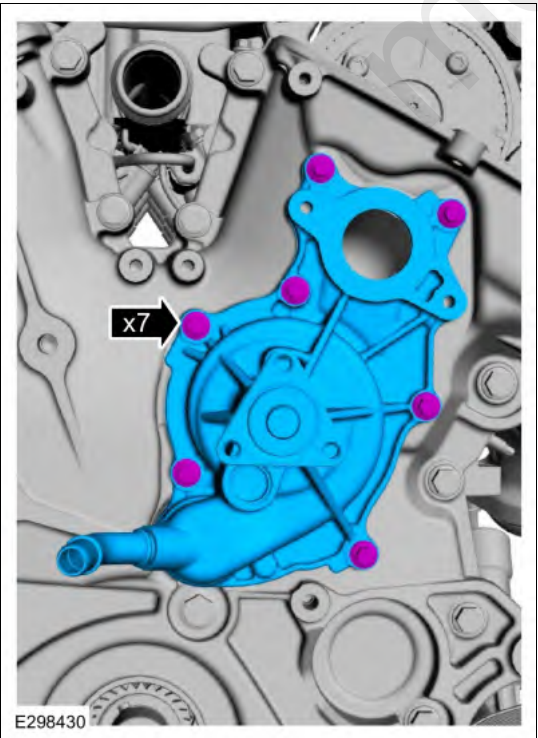
Using the special tools, remove and discard the seal(s).
Use Special Service Tool: 205-153 (T80T-4000-W) Handle. , 303-1247 VCT Spark Plug Tube Seal Remover and Installer.



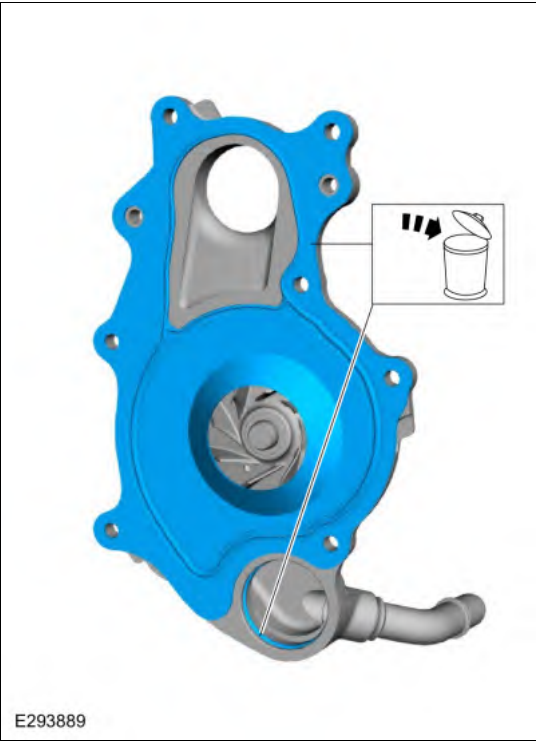
45. Make sure that the mating faces are clean and free of foreign material.
Use the General Equipment: Plastic Scraper
Material: Motorcraft® Silicone Gasket Remover / ZC-30-A
Material: Motorcraft® Metal Brake Parts Cleaner / PM-4-A, PM-4-B
Material: Motorcraft® Metal Surface Prep Wipes / ZC-31-B



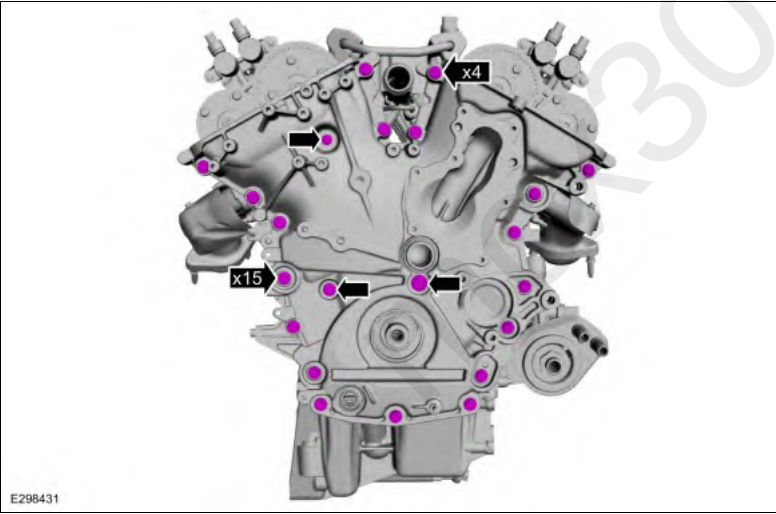
46. Remove the bolts and the coolant pump.



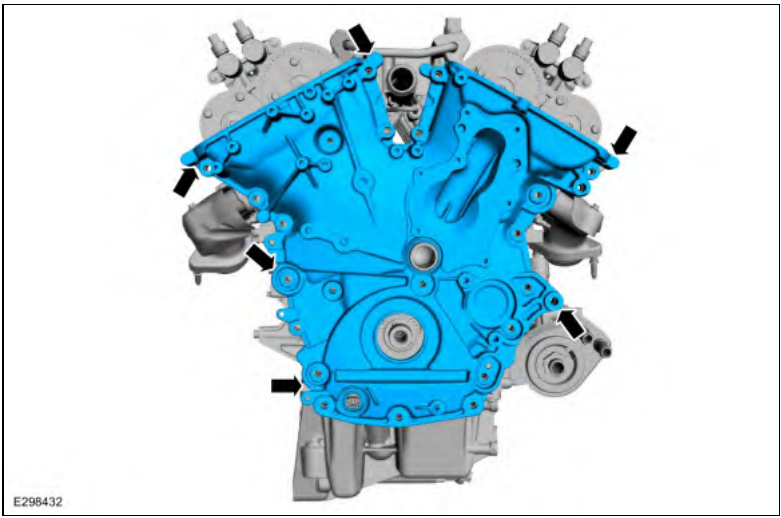
47. Remove and discard the coolant pump gasket and O-ring seal.



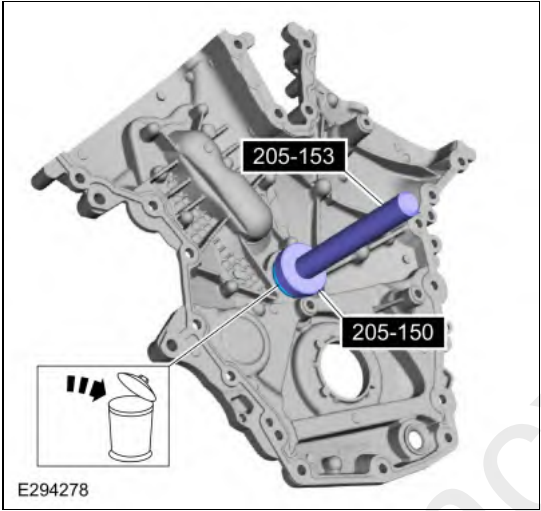
48. Remove the engine front cover bolts.



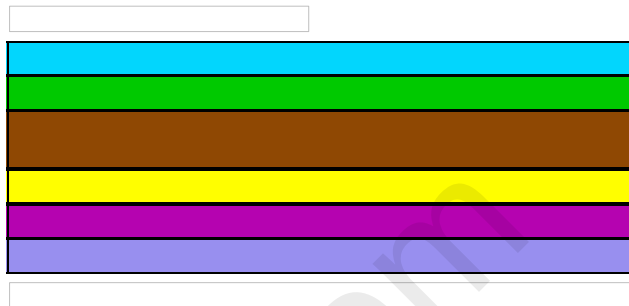
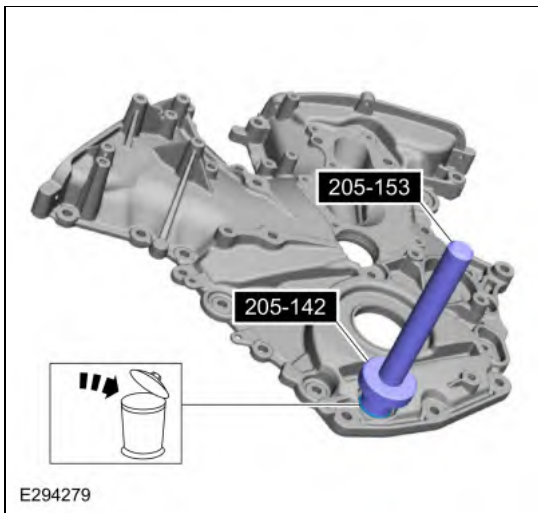
49. Using a pry tool, locate the pry pads shown and pry the engine front cover loose and remove.



50. Using the special tools, remove the engine front cover to coolant pipe seal.
Use Special Service Tool: 205-150 (T80T-4000-S) Installer, Spindle Bearing , 205-153 (T80T-4000-W) Handle.

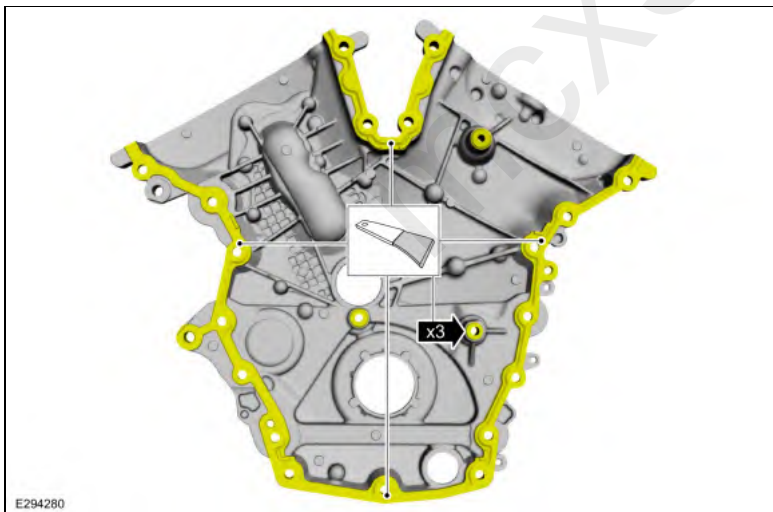


51. Using the special tools, remove and discard the oil pump electrical connector seal.
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone. , 205-153 (T80T-4000-W) Handle.



52. **NOTICE:** Only use a 3M[®] Roloc[®] Bristle Disk (2-in white, part number 07528) in a suitable tool turning at the recommended speed of 15,000 rpm, to clean the engine front cover. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean front cover.

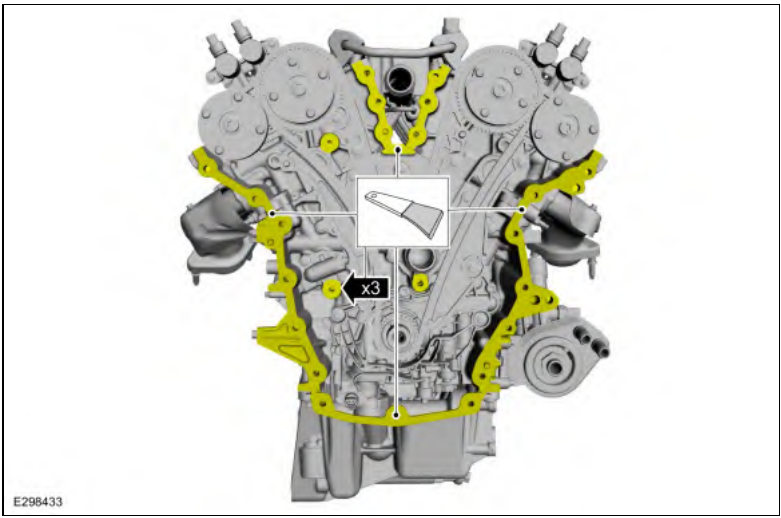
- Make sure that the mating faces of the front cover are clean and free of foreign material.
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).
Material: Motorcraft[®] Silicone Gasket Remover / ZC-30-A
Material: Motorcraft[®] Metal Brake Parts Cleaner / PM-4-A, PM-4-B
Material: Motorcraft[®] Metal Surface Prep Wipes / ZC-31-B
- Thoroughly wash the engine front cover to remove any foreign material, including any abrasive particles created during the cleaning process.



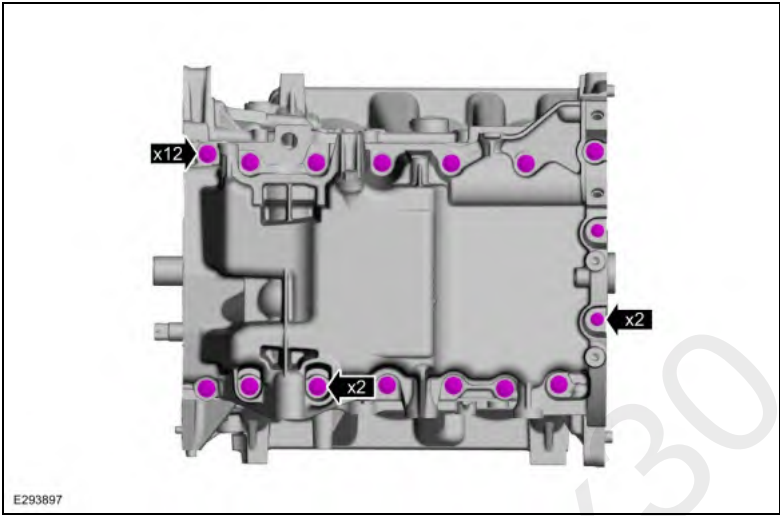
53. **NOTICE:** Place clean, lint-free shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Any foreign material (including any material created while cleaning gasket surfaces) that enters the oil passages or the oil pan, may cause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

NOTICE: Do not use wire brushes, power abrasive discs or 3M[®] Roloc[®] Bristle Disk (2-in white part number 07528) to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. They also cause contamination that will cause premature engine failure. Remove all traces of the gasket.

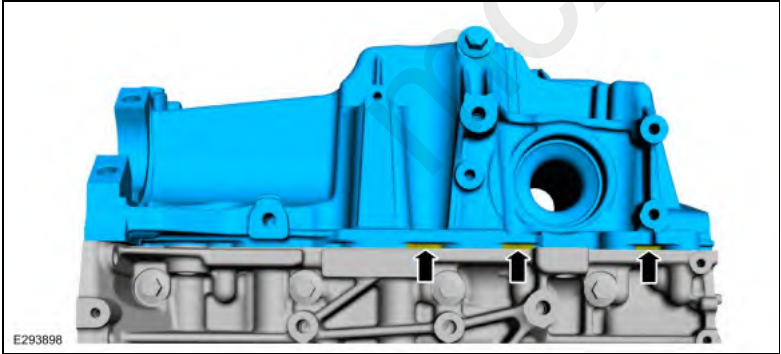
Make sure that the mating faces of the engine block and oil pan are clean and free of foreign material.
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).
Use the General Equipment: Plastic Scraper
Material: Motorcraft[®] Silicone Gasket Remover / ZC-30-A
Material: Motorcraft[®] Metal Brake Parts Cleaner / PM-4-A, PM-4-B
Material: Motorcraft[®] Metal Surface Prep Wipes / ZC-31-B



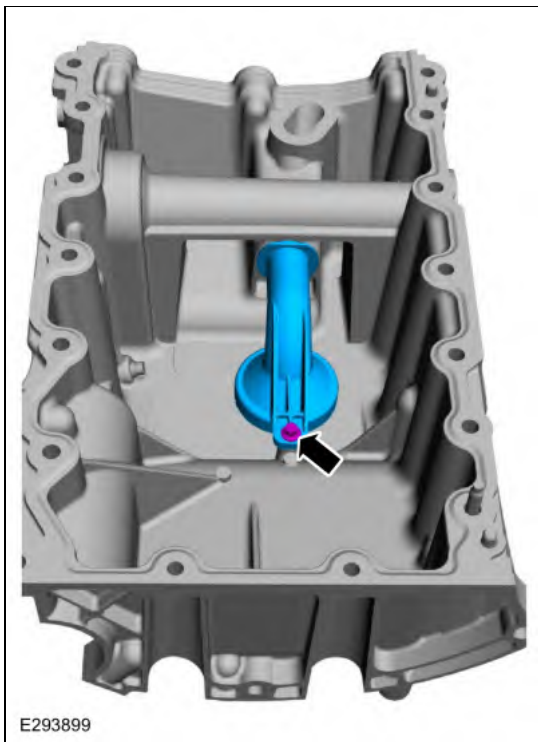
- 54.
- Rotate the engine so the oil pan is facing upwards.
 - Remove the oil pan bolts.



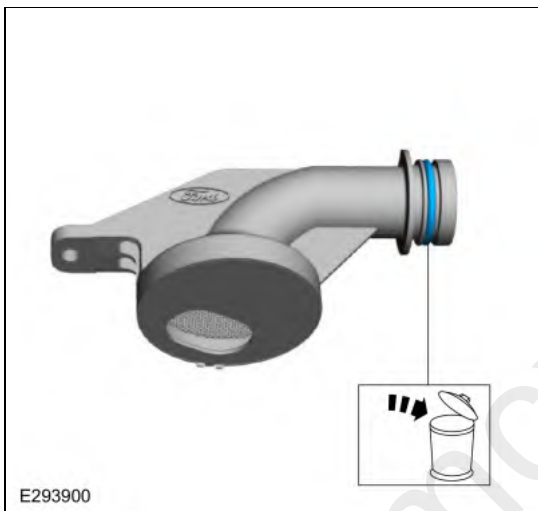
55. Using a pry tool, locate the pry pads at the side of the oil pan and pry the oil pan loose and remove.



56. Remove the bolt and the oil pump screen and pickup tube.

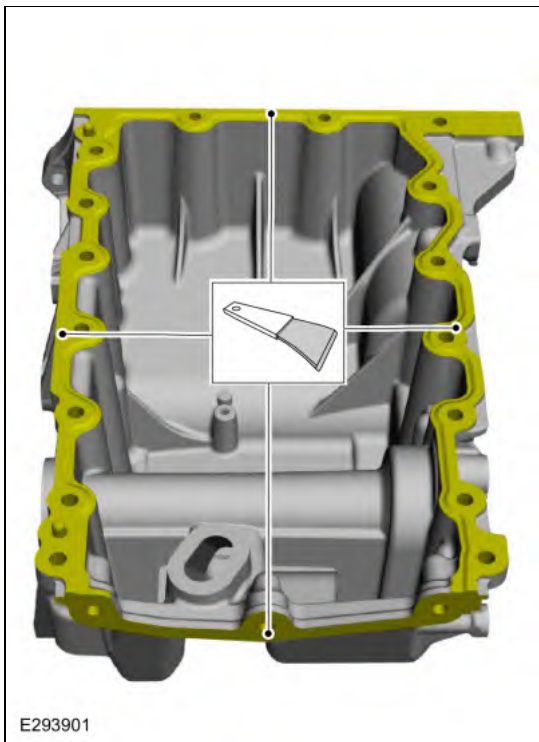


57. Remove and discard the oil pump screen and pickup tube O-ring seal.

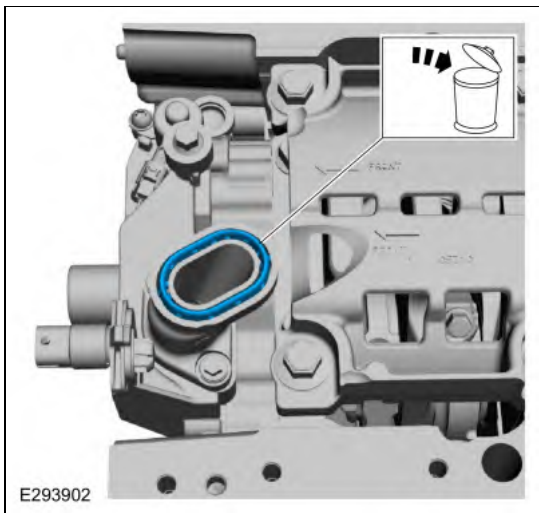


58. **NOTICE:** Only use a 3M[®] Roloc[®] Bristle Disk (2-in white, part number 07528) in a suitable tool turning at the recommended speed of 15,000 rpm, to clean the oil pan. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean. These tools cause scratches and gouges that make leak paths.

- Make sure that the mating faces of the oil pan are clean and free of foreign material.
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).
Material: Motorcraft[®] Silicone Gasket Remover / ZC-30-A
Material: Motorcraft[®] Metal Brake Parts Cleaner / PM-4-A, PM-4-B
Material: Motorcraft[®] Metal Surface Prep Wipes / ZC-31-B
- Thoroughly wash the oil pan to remove any foreign material, including any abrasive particles created during the cleaning process.



59. Remove and discard the oil pan-to-oil pump seal.



60. **NOTICE:** Do not use wire brushes, power abrasive discs or 3M[®] Roloc[®] Bristle Disk (2-in white, part number 07528) to clean the sealing surfaces of the engine block. These tools cause scratches and gouges that make leak paths. They also cause contamination that causes premature engine failure. Remove all traces of the gasket.

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

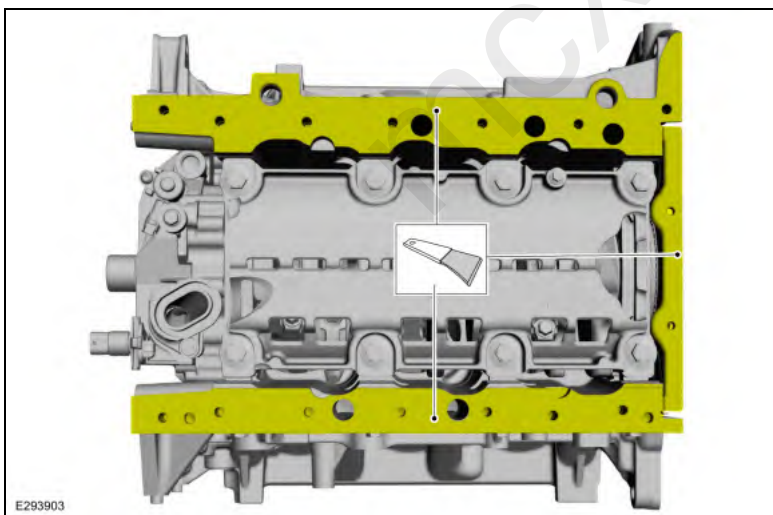
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).

Use the General Equipment: Plastic Scraper

Material: Motorcraft[®] Silicone Gasket Remover / ZC-30-A

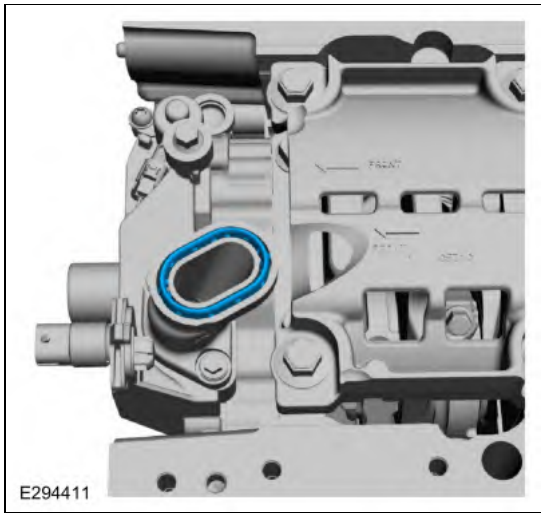
Material: Motorcraft[®] Metal Brake Parts Cleaner / PM-4-A, PM-4-B

Material: Motorcraft[®] Metal Surface Prep Wipes / ZC-31-B

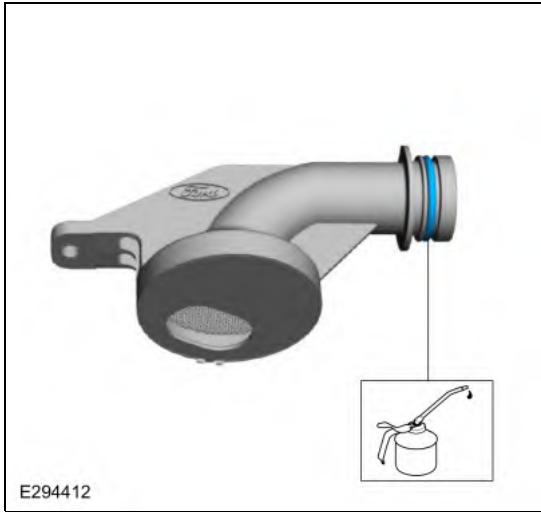


Installation

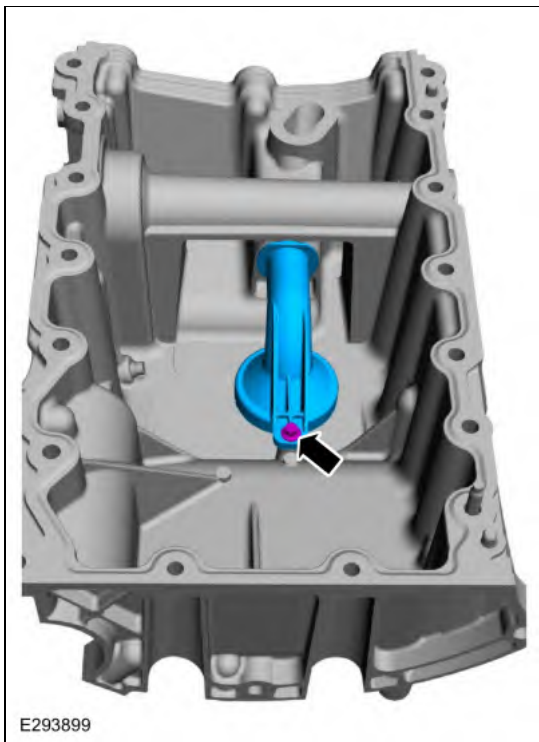
1. Install a new oil pan-to-oil pump seal.



2. Install a new oil pump screen and pickup tube O-ring seal and lubricate with clean engine oil.

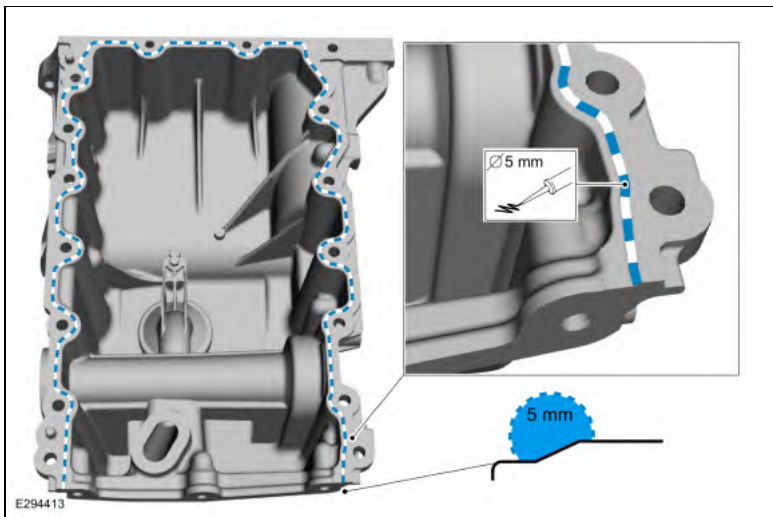


3. Install the oil pump screen and pickup tube and the bolt.
Torque: 89 lb.in (10 Nm)



4. **NOTICE:** Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

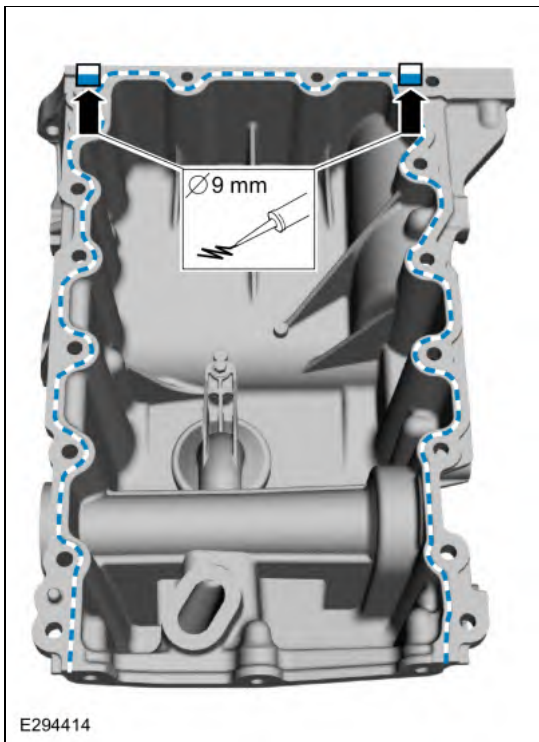
Apply a 5 mm (0.2 in) bead of Motorcraft® High Performance Engine RTV Silicone on the chamfer, as shown.
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



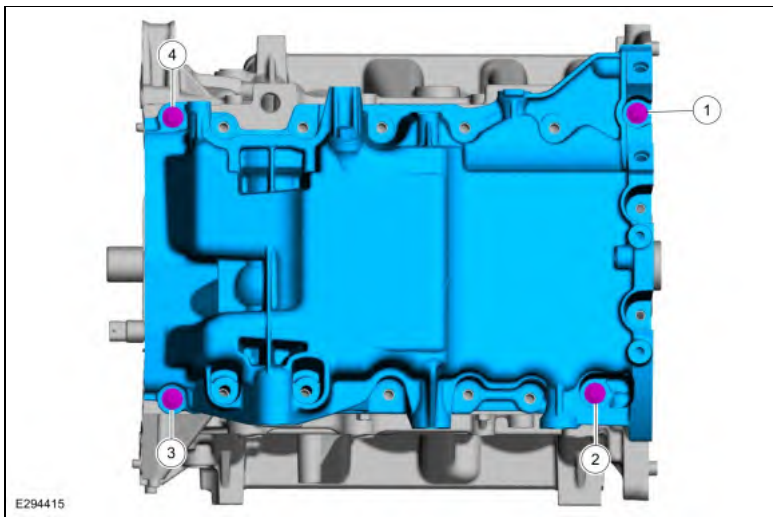
5. **NOTICE:** Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

Apply a 9 mm (0.35 in) bead of Motorcraft® High Performance Engine RTV Silicone to the 2 crankshaft seal retainer plate-to-cylinder block joint areas on the sealing surface of the oil pan.

Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



6. Install the oil pan and bolts finger tight.



7. **NOTE:** The oil pan bolts must be installed and tightened within 10 minutes of the initial sealant application.

- Install the remaining oil pan bolts. Tighten in the sequence shown.

Torque:

Stage 1: Tighten bolts 1-9 and 11-14 to: 177 lb.in (20 Nm)

Stage 2: Tighten bolts 1-9 and 11-14 an additional: 45°

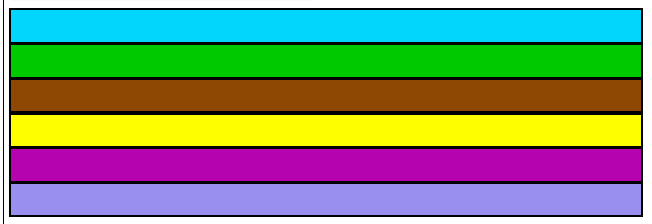
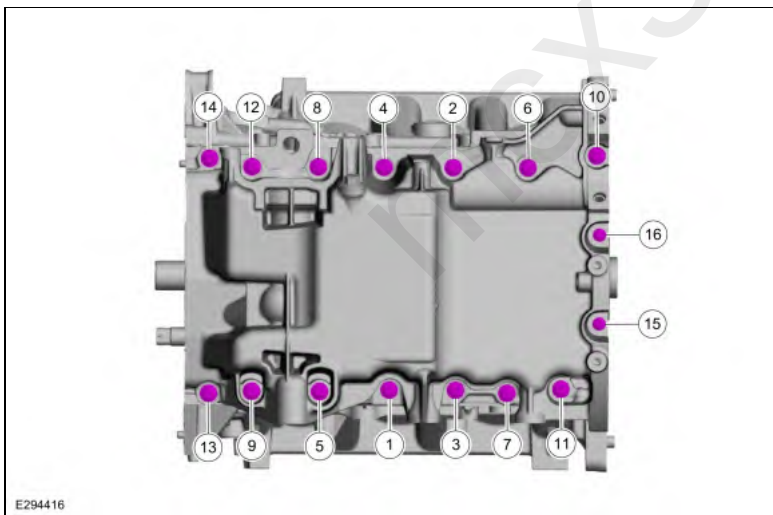
Stage 3: Tighten bolt 10 to: 177 lb.in (20 Nm)

Stage 4: Tighten bolt 10 an additional: 90°

Stage 5: Tighten bolts 15 and 16 to: 89 lb.in (10 Nm)

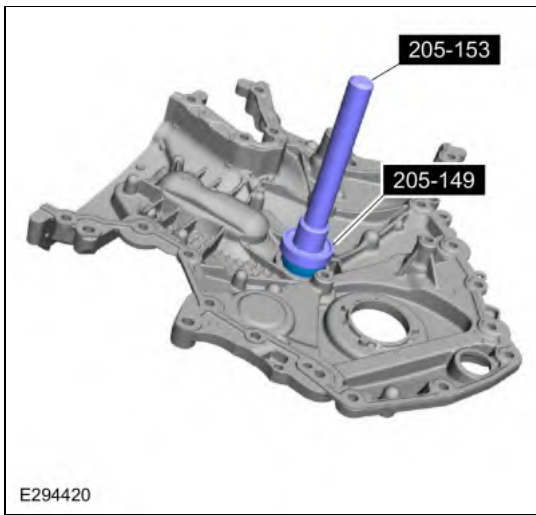
Stage 6: Tighten bolts 15 and 16 an additional: 45°

- Rotate the engine so the oil pan is facing downwards.

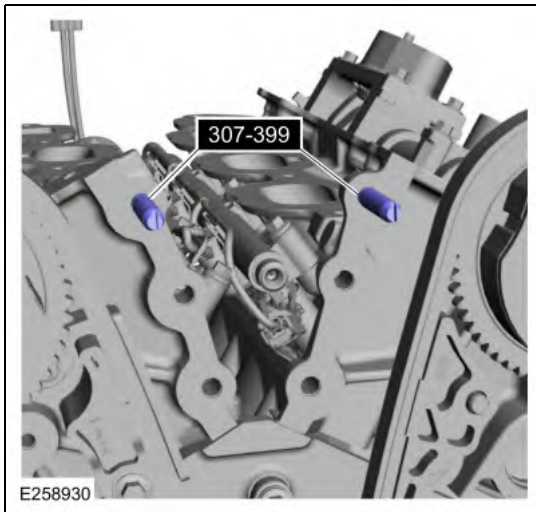


8. Using the special tools, install the front cover to coolant pipe seal.

Use Special Service Tool: 205-149 (T80T-4000-R) Installer, Spindle Bearing , 205-153 (T80T-4000-W) Handle.



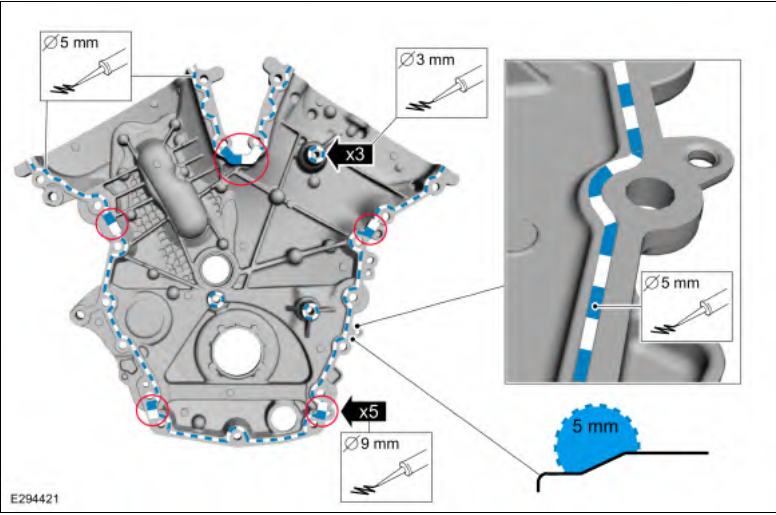
9. Install Special Service Tool: 307-399 Alignment Pins, Transmission Fluid Pump.



10. **NOTICE:** Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

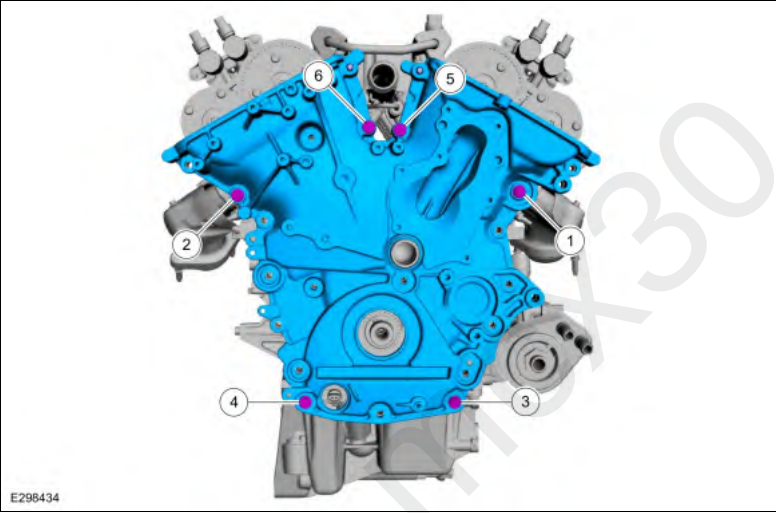
NOTE: The engine front cover and the 6 bolts must be installed within 4 minutes of the initial sealant application. The remainder of the engine front cover bolts must be installed and tightened within 10 minutes of the initial sealant application. If the time limits are exceeded, the sealant must be removed, the sealing area cleaned and sealant reapplied. Failure to follow this procedure can cause future oil leakage.

- Apply a 3 mm (0.12 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover inner bolt bosses.
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)
- Apply a 5 mm (0.19 in) bead of Motorcraft® High Performance Engine RTV Silicone on the chamfer, as shown.
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)
- Apply a 9 mm (0.35 in) bead of Motorcraft® High Performance Engine RTV Silicone to the oil pan-to-cylinder block joint and the cylinder head-to-cylinder block joint areas of the engine front cover in places as indicated.
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

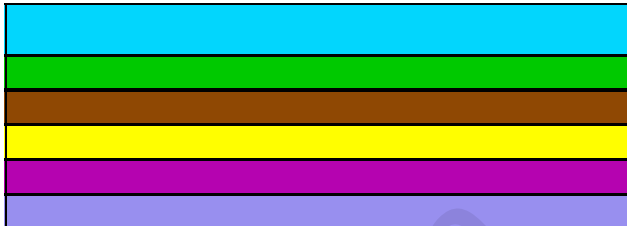
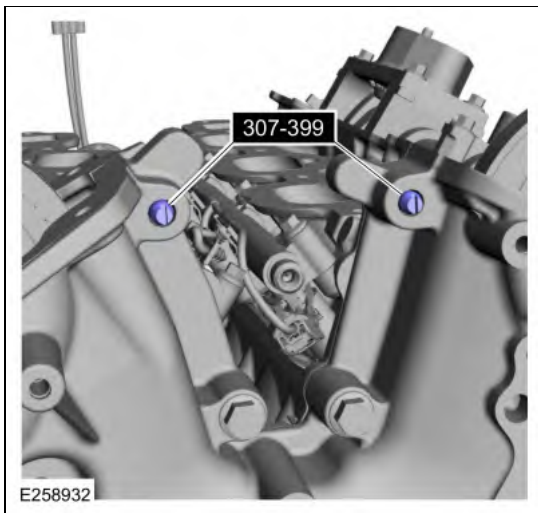


11. **NOTE:** Make sure the locating dowel pins are seated correctly in the cylinder block.

Install the engine front cover and the bolts.
Torque: 27 lb.in (3 Nm)



12. Remove Special Service Tool: 307-399 Alignment Pins, Transmission Fluid Pump.

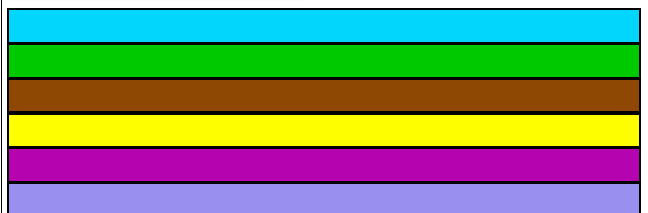
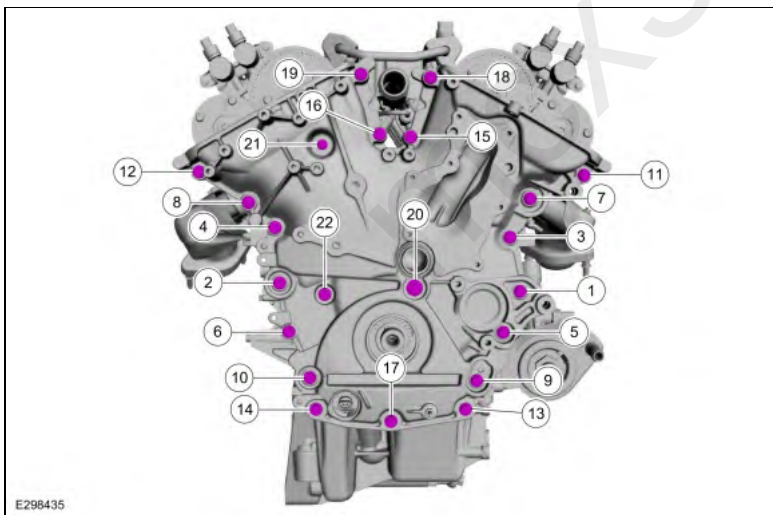


13. **NOTE:** The engine front cover bolts must be installed and tightened within 10 minutes of the initial sealant application.

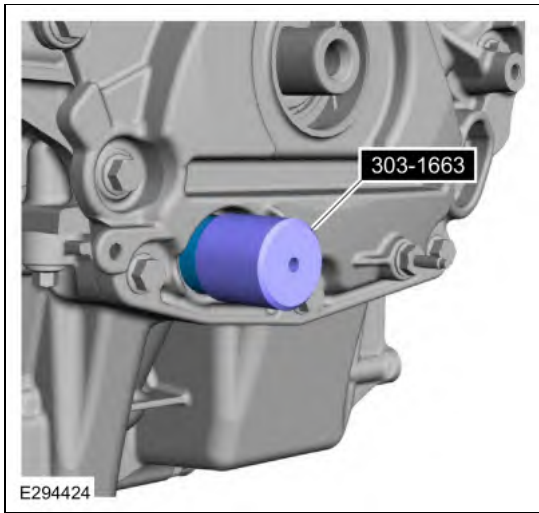
Install the remaining engine front cover bolts.

Torque:

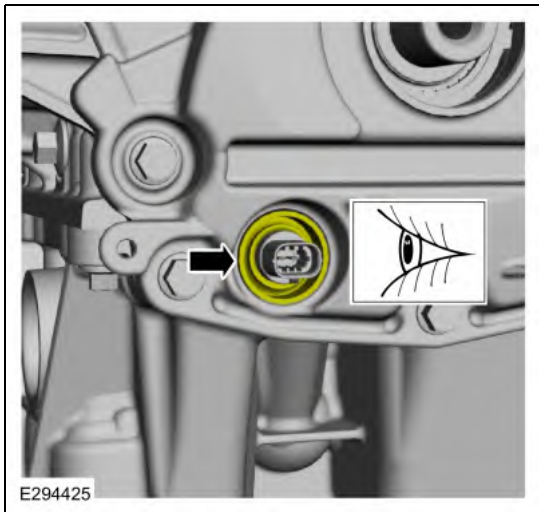
- Stage 1: Tighten bolts 1 through 20 to: 89 lb.in (10 Nm)
- Stage 2: Tighten bolts 1 through 19 and 22 to: 177 lb.in (20 Nm)
- Stage 3: Tighten bolts 1 through 19 and 22 an additional: 45°
- Stage 4: Tighten bolt 20 to: 177 lb.in (20 Nm)
- Stage 5: Tighten bolt 20 an additional: 90°
- Stage 6: Tighten bolt 21 to: 89 lb.in (10 Nm)
- Stage 7: Tighten bolt 21 an additional: 45°



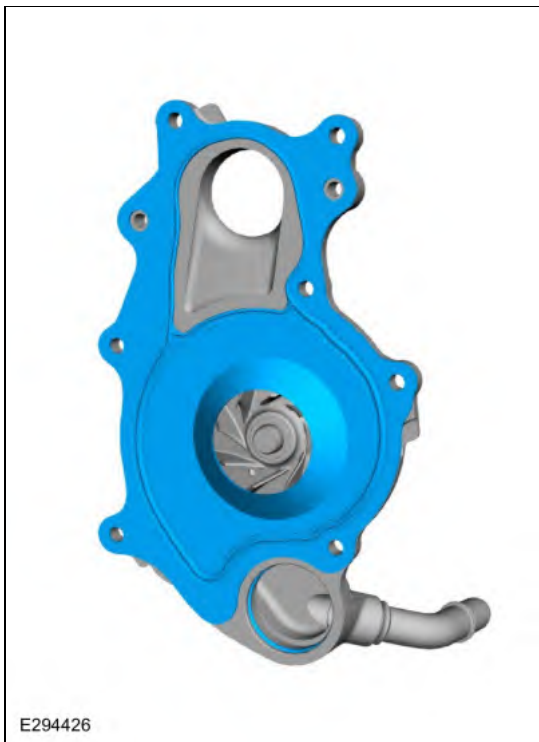
14. Using the special tool and a hammer, install the oil pump electrical connector seal.
Use Special Service Tool: 303-1663 Installer, VDOP Seal.



15. Make sure the oil pump electrical connector seal is below the top of the oil pump electrical connector or the oil pump electrical connector seal may leak oil.



16. Install a new coolant pump gasket and O-ring seal.

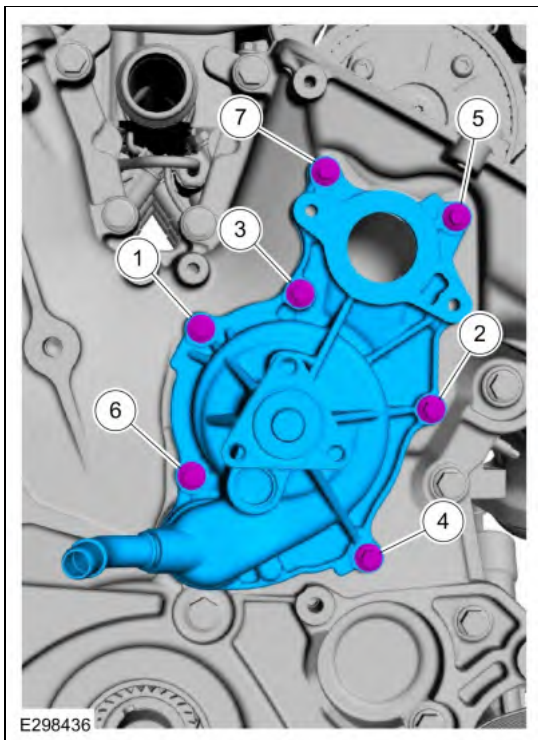


17. Install the coolant pump and the bolts.

Torque:

Stage 1: 89 lb.in (10 Nm)

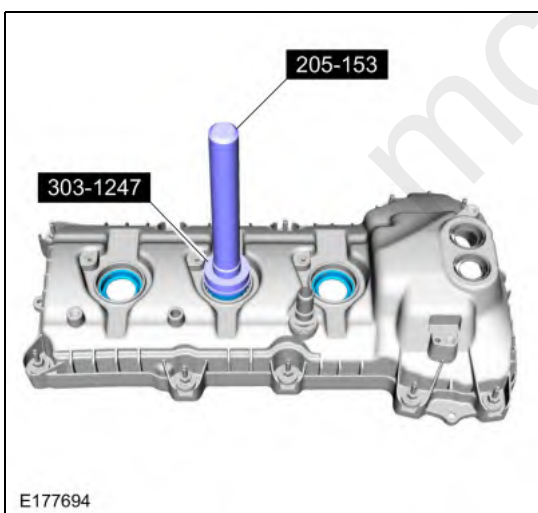
Stage 2: 45°



18. **NOTE:** *Installation of new seals is only required if damaged seals were removed.*

If removed, using the special tools, install the spark plug tube seals.

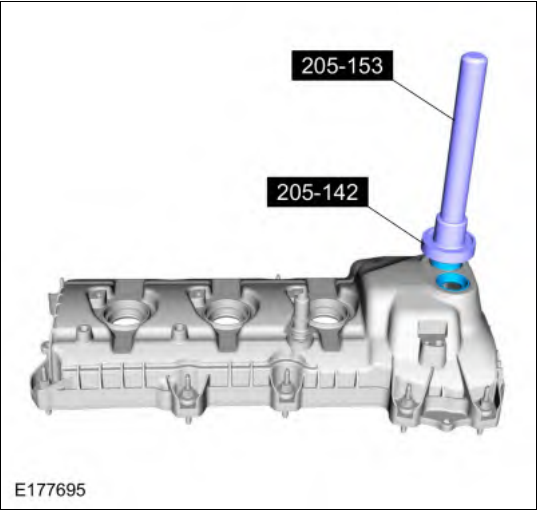
Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer. , 205-153 (T80T-4000-W) Handle.



19. **NOTE:** *Installation of new seals is only required if damaged seals were removed.*

If removed, using the special tools, install the VCToil control solenoid seals.

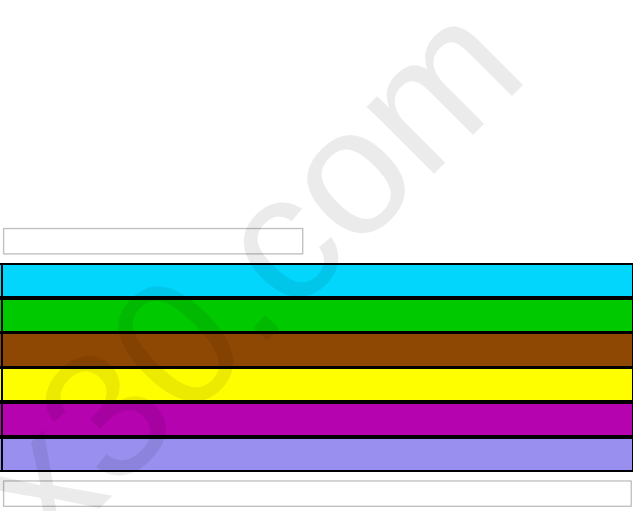
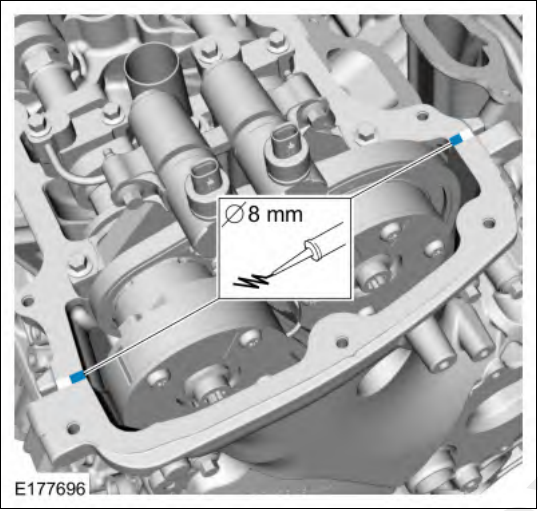
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone. , 205-153 (T80T-4000-W) Handle.



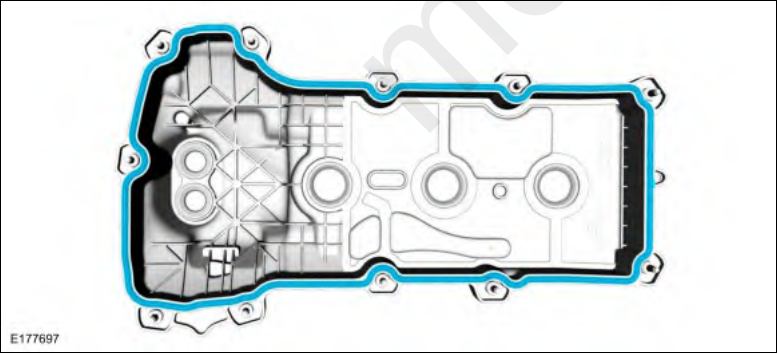
20. **NOTE:** If the valve cover is not installed and the fasteners tightened within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Failure to follow this procedure can cause future oil leakage.

Apply an 8 mm (0.31 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover-to-cylinder head joints.

Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

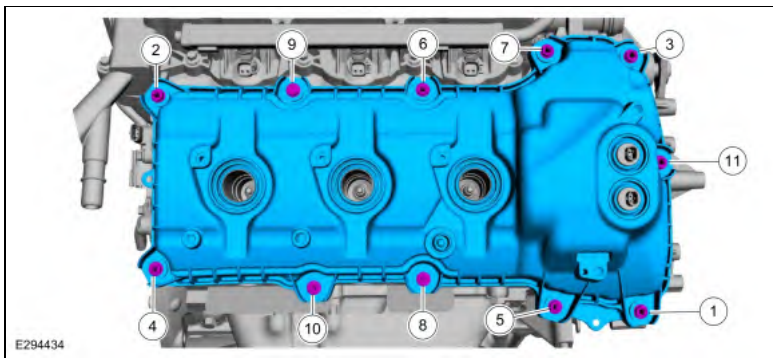


21. Install a new valve cover gasket.

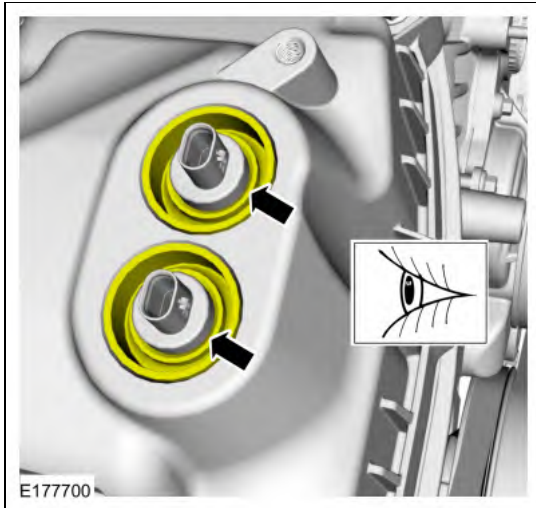


22. Install the valve cover and tighten the bolts.

Torque: 89 lb.in (10 Nm)



23. Make sure the VCT seals in the valve cover are below the top of the VCT oil control solenoid electrical connector or the VCT seal may leak oil.

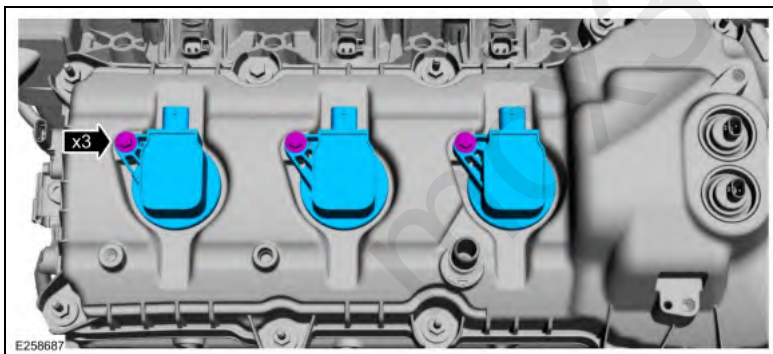


24. Install the RH coil-on-plugs and the bolts.

Torque:

Stage 1: 62 lb.in (7 Nm)

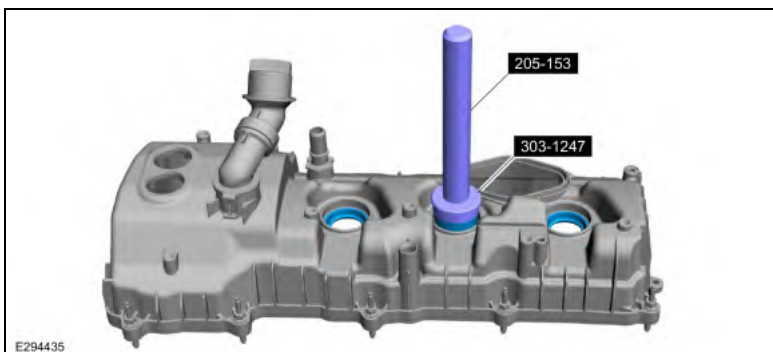
Stage 2: 50Å°



25. **NOTE:** Installation of new seals is only required if damaged seals were removed.

If removed, using the special tools, install the spark plug tube seals.

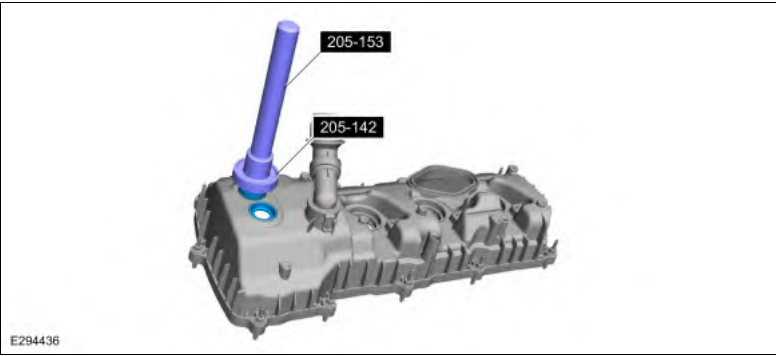
Use Special Service Tool: 303-1247 VCT Spark Plug Tube Seal Remover and Installer. , 205-153 (T80T-4000-W) Handle.



26. **NOTE:** Installation of new seals is only required if damaged seals were removed.

If removed, using the special tools, install the VCToil control solenoid seals.

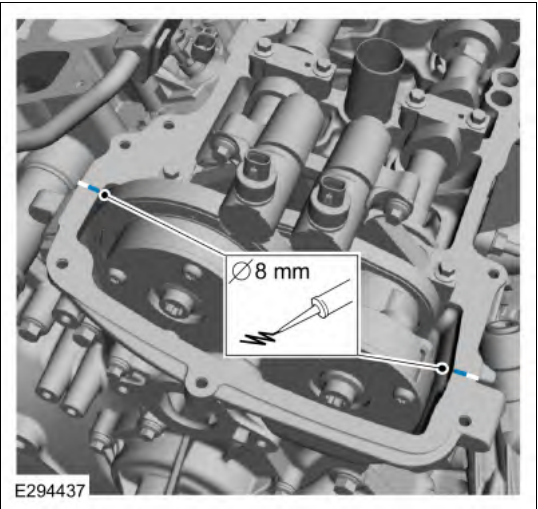
Use Special Service Tool: 205-142 (T80T-4000-J) Installer, Differential Bearing Cone. , 205-153 (T80T-4000-W) Handle.



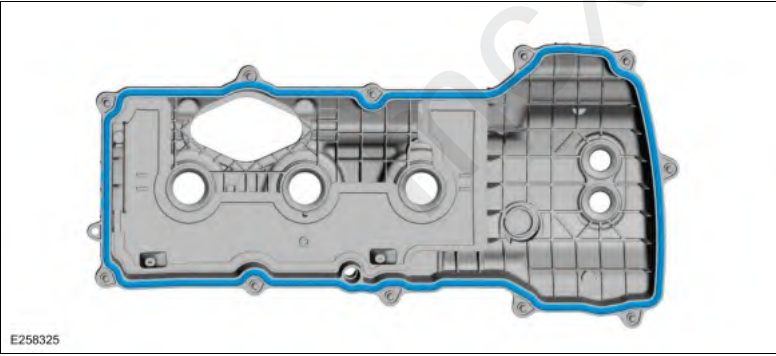
27. **NOTE:** If the valve cover is not installed and the fasteners tightened within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Failure to follow this procedure can cause future oil leakage.

Apply an 8 mm (0.31 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover-to-cylinder head joints.

Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

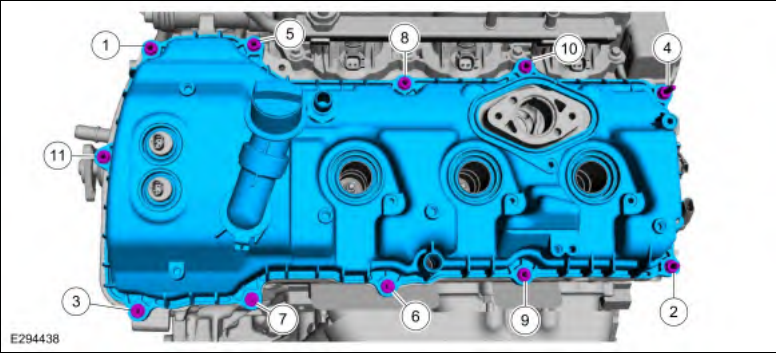


28. Install a new valve cover gasket.

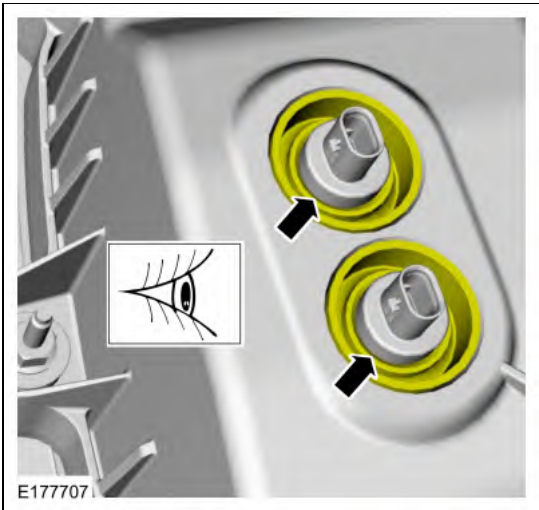


29. Install the valve cover and tighten the bolts.

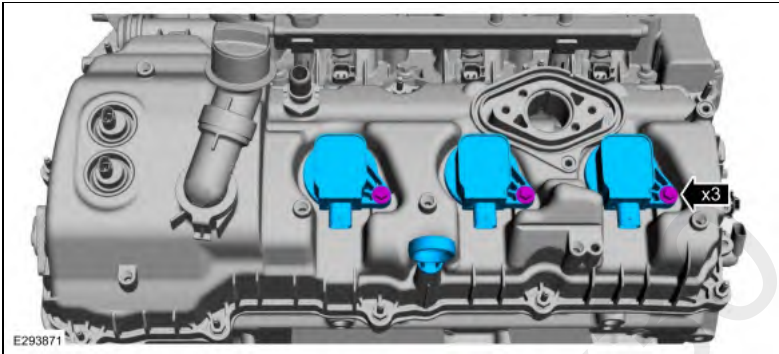
Torque: 89 lb.in (10 Nm)



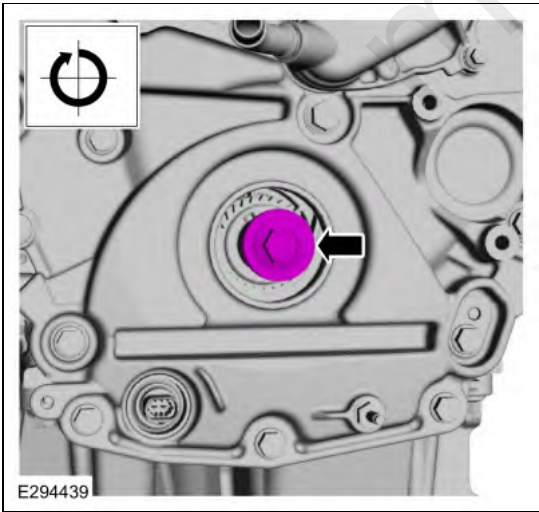
30. Make sure the VCT seals in the valve cover are below the top of the VCT oil control solenoid electrical connector or the VCT seal may leak oil.



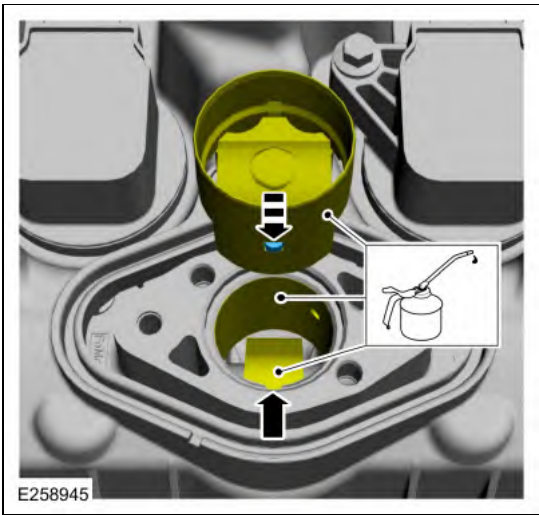
- 31.
- Install the LH coil-on-plugs and the bolts.
Torque:
Stage 1: 62 lb.in (7 Nm)
Stage 2: 50Å°
 - Install the oil level indicator.



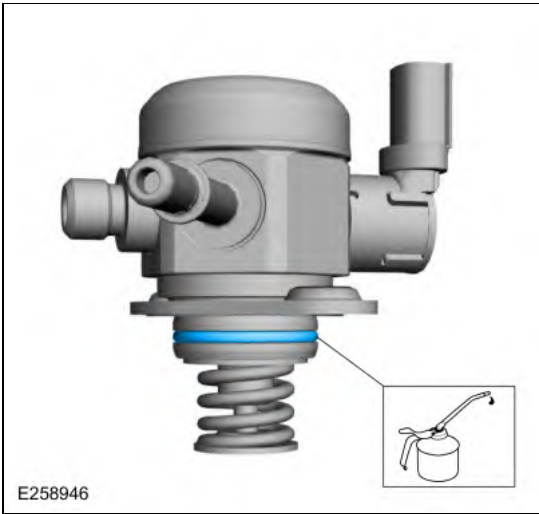
32. **NOTICE: Only rotate the crankshaft clockwise or damage to the engine may occur.**
- NOTICE: The drive lobe for the high-pressure fuel pump must be at BDC for the high-pressure fuel pump installation.**
- Using the crankshaft pulley bolt, turn the crankshaft until the high-pressure fuel pump drive lobe is at BDC.



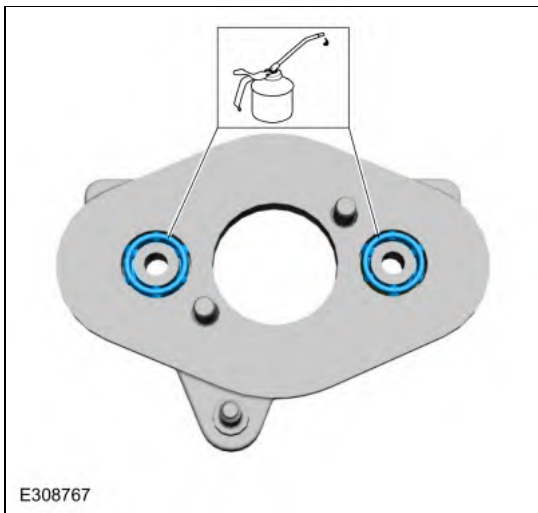
33. Apply clean engine oil to the high-pressure fuel pump mounting pedestal bore, the drive lobe and the roller tappet and install the high-pressure fuel pump roller tappet.



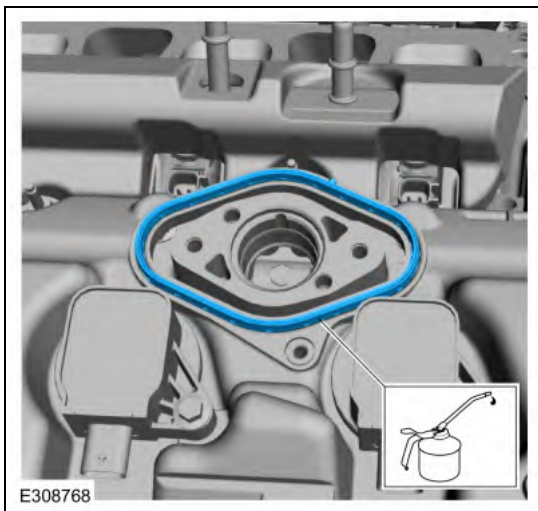
- 34.
- Install a new high-pressure fuel pump O-ring seal.
 - Lubricate with clean engine oil.



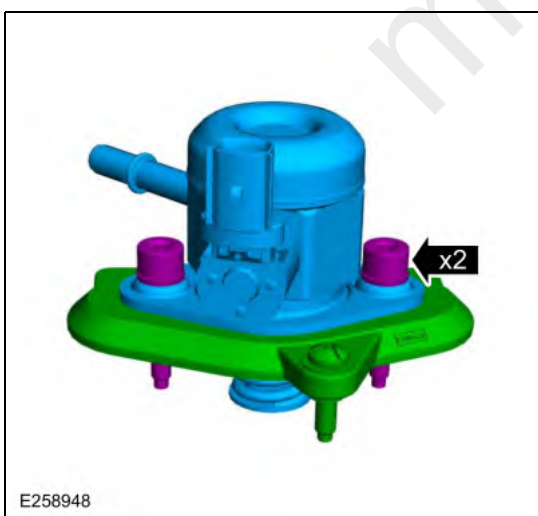
35. Lubricate the high-pressure fuel pump mounting plate O-ring seals with clean engine oil and install.



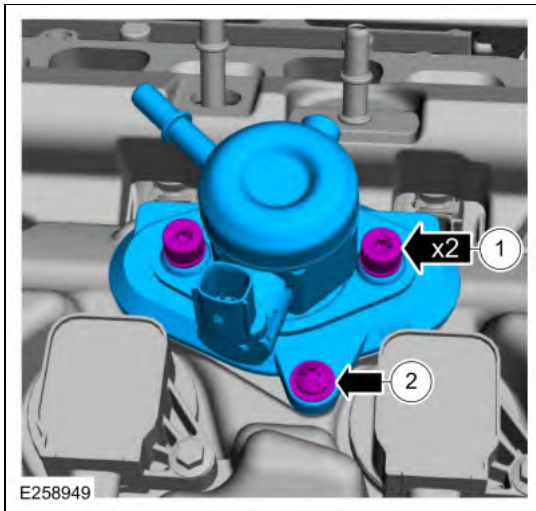
36. Lubricate the high-pressure fuel pump mounting plate seal with clean engine oil and install.



37. Install the high-pressure fuel pump mounting plate on to the high-pressure fuel pump and install the high-pressure fuel pump bolts.



- 38.
1. Install the high-pressure fuel pump with the mounting plate, and finger tighten the high-pressure fuel pump bolts. Finger tighten the mounting plate bolt. Alternately tighten each high-pressure fuel pump bolt one complete revolution until seated. Tighten the fuel high-pressure fuel pump bolts in the following 2 stages.
Torque:
Stage 1: 89 lb.in (10 Nm)
Stage 2: 45Å°
 2. Tighten the high-pressure fuel pump mounting plate bolt.
Torque: 89 lb.in (10 Nm)



39.

- Install the new fuel rail high-pressure fuel tube and finger tight the flare nuts.
- Install the new high-pressure fuel pump to direct injection fuel rail tube nut finger tight.
- Tighten the fuel rail high-pressure fuel tube flare nuts.

Torque:

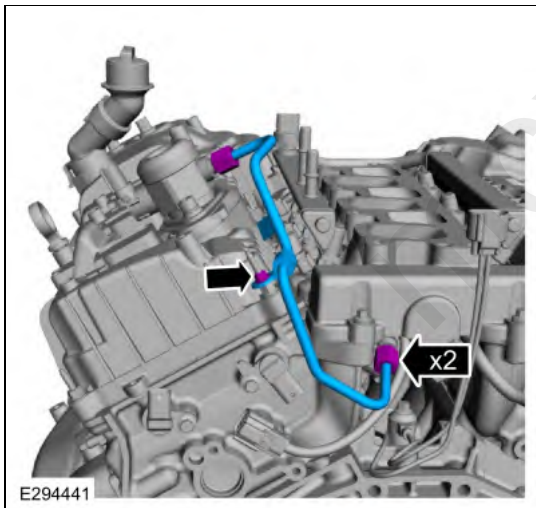
Stage 1: 71 lb.in (8 Nm)

Stage 2: 89 lb.in (10 Nm)

Stage 3: If the torque required to tighten any flare nut on the new high-pressure fuel tube reaches or exceeds 75 Nm (55 lb-ft), then that high pressure fuel tube must be discarded and replaced with another new high-pressure fuel tube.: 30°

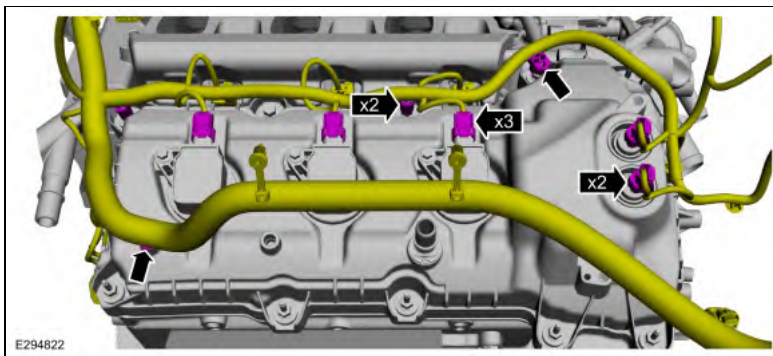
- Tighten the high-pressure fuel pump to direct injection fuel rail tube nut.

Torque: 62 lb.in (7 Nm)

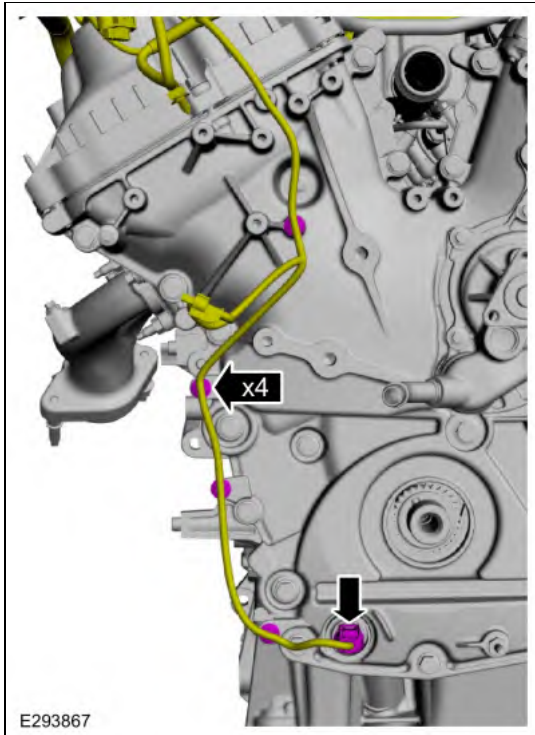


40.

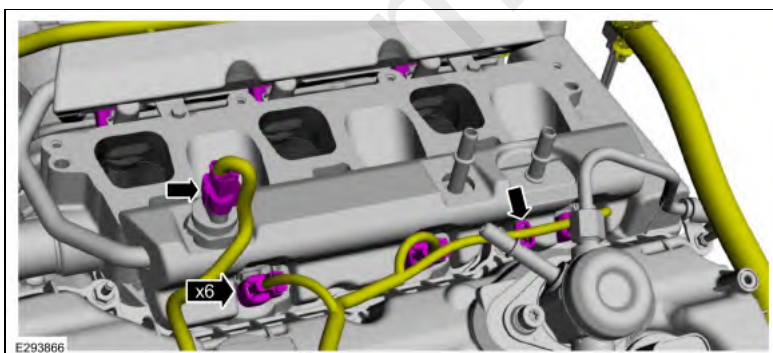
- Attach the wiring harness retainer.
- Connect the ignition coil-on-plug electrical connectors.
- Connect the VCT oil control solenoids electrical connectors.



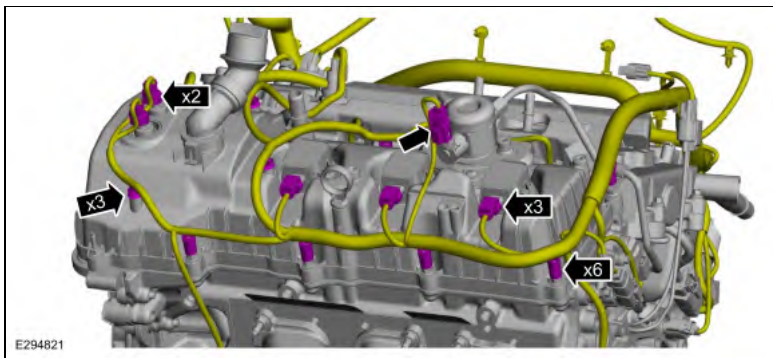
41. Connect the oil pressure control solenoid valve electrical connector and attach the wiring harness retainers.



- 42.
- Connect the port injector fuel rail electrical connectors.
 - Attach the wiring harness retainer.
 - Connect the FRP temperature sensor electrical connector.

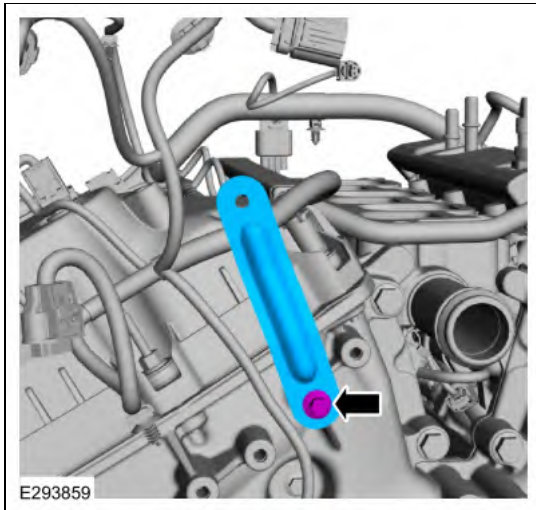


- 43.
- Attach the wiring harness retainers.
 - Connect the ignition coil-on-plug electrical connectors.
 - Connect the VCT oil control solenoids electrical connectors.
 - Connect the high-pressure fuel pump electrical connector.



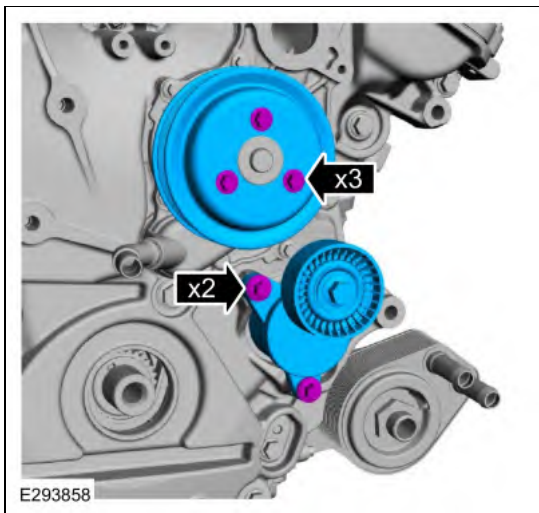
44. **NOTE:** The bolt will be tighten after the installation of the upper intake manifold.

Install the upper intake manifold support bracket and bolt finger tight.

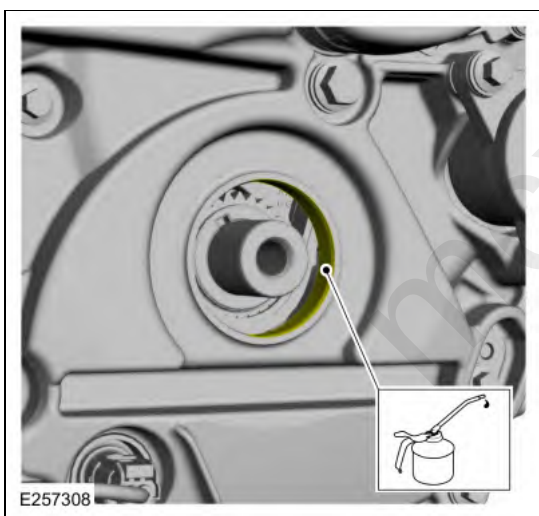


45.

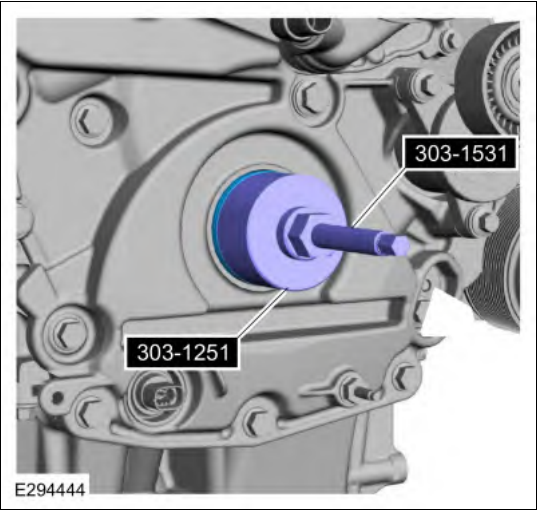
- Install the coolant pump pulley and the bolts.
Torque: 18 lb.ft (24 Nm)
- Install the accessory drive belt tensioner and the bolts.
Torque: 18 lb.ft (25 Nm)



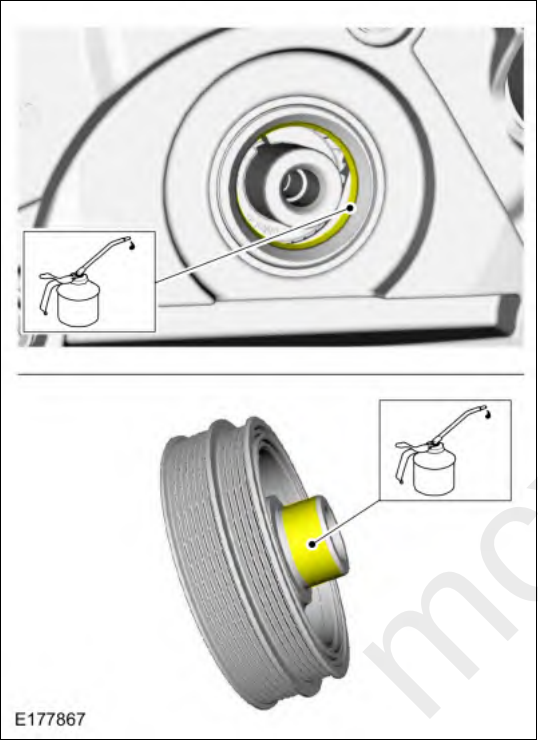
46. Lubricate the crankshaft front seal bore with clean engine oil.



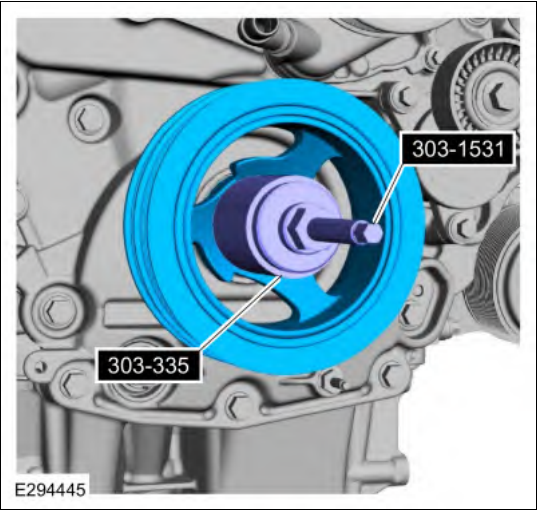
47. Using the special tools, install the crankshaft front seal.
Use Special Service Tool: 303-102 Installer, Crankshaft Pulley. , 303-1251 Installer, Front Seal.



48. Lubricate the crankshaft front seal and the crankshaft pulley with clean engine oil.



49. Using the special tools, install the crankshaft pulley.
Use Special Service Tool: 303-102 Installer, Crankshaft Pulley. , 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal.

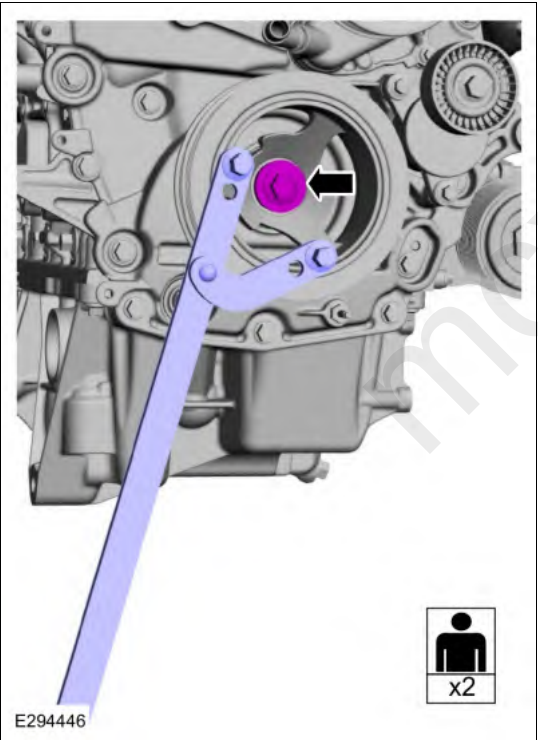


50. **NOTE:** Use a universal pulley holder (such as an OTC 4754, or equivalent).

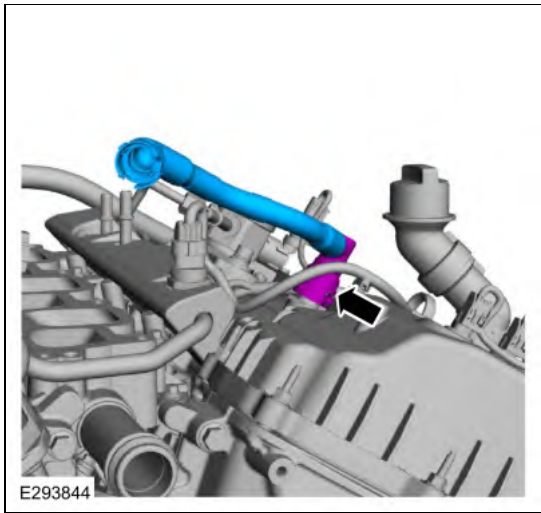
With the aid of an assistant, using a universal pulley holder, install and tighten a new crankshaft pulley bolt and the washer and tighten in 3 stages.

Torque:

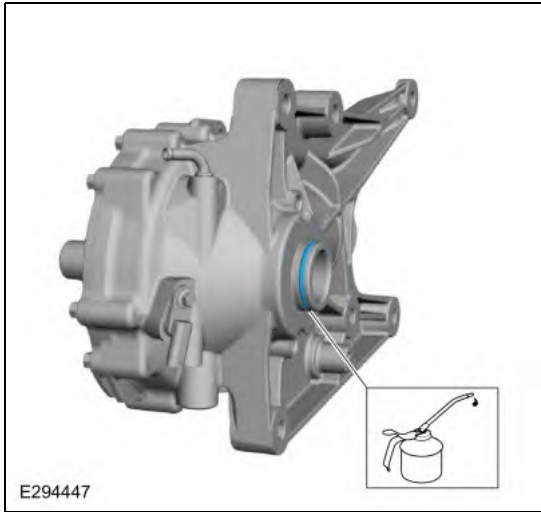
- Stage 1: 37 lb.ft (50 Nm)
- Stage 2: 90°
- Stage 3: 60°



51. Install the crankcase vent tube.

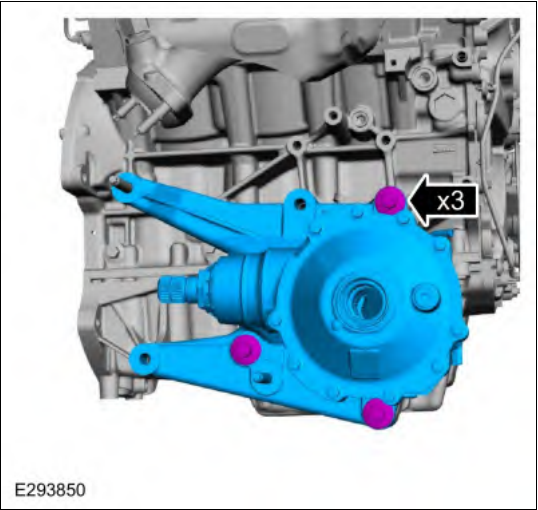


52. Install a new front axle assembly seal and lubricate.

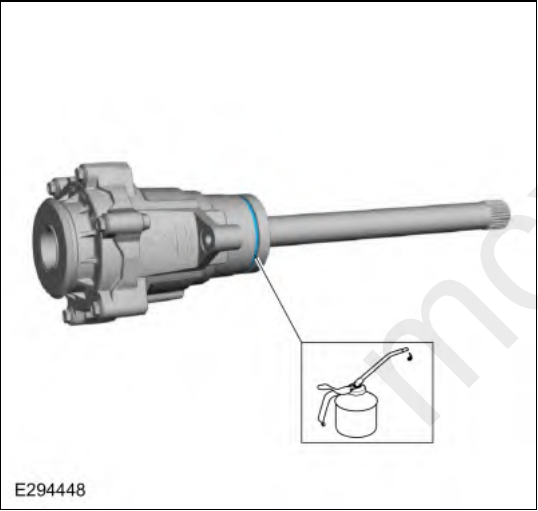


53. **NOTE:** Clean the front axle assembly-to-cylinder block mating surfaces of any dirt or foreign material prior to installation.

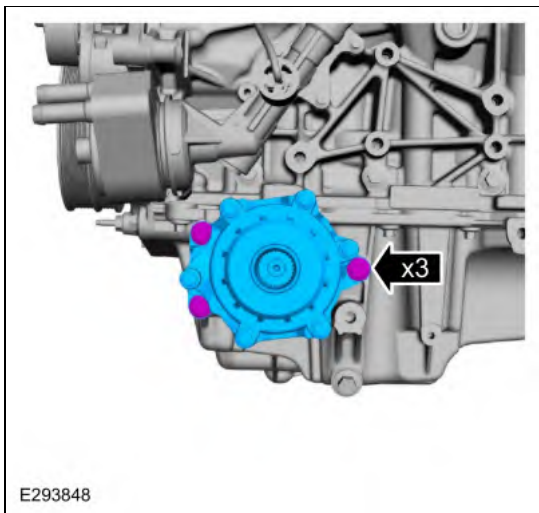
Install the front axle assembly and the bolts.
Torque:
Stage 1: 66 lb.ft (90 Nm)
Stage 2: 90°



54. Install a new axle connector seal and lubricate.

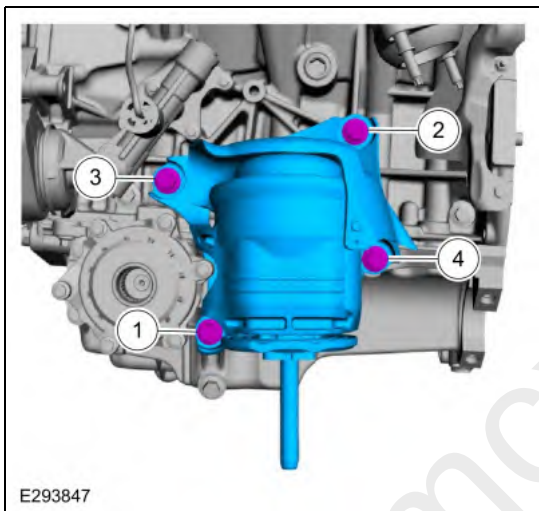


55. Install the LH axle connector and the bolts.
Torque: 26 lb.ft (35 Nm)



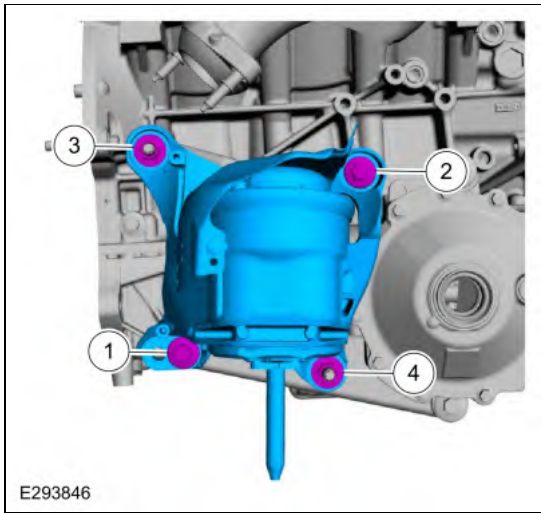
56. **NOTE:** Clean the engine mount-to-cylinder block mating surfaces of any dirt or foreign material prior to installation.

Install the LH engine mount and the bolts.
Torque: 46 lb.ft (63 Nm)

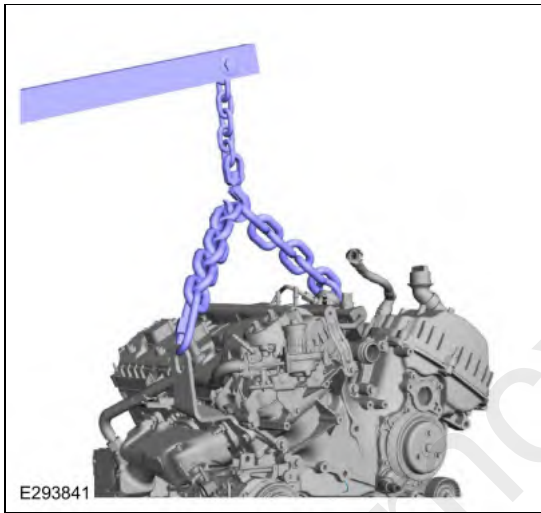


57. **NOTE:** Clean the engine mount-to-cylinder block mating surfaces of any dirt or foreign material prior to installation.

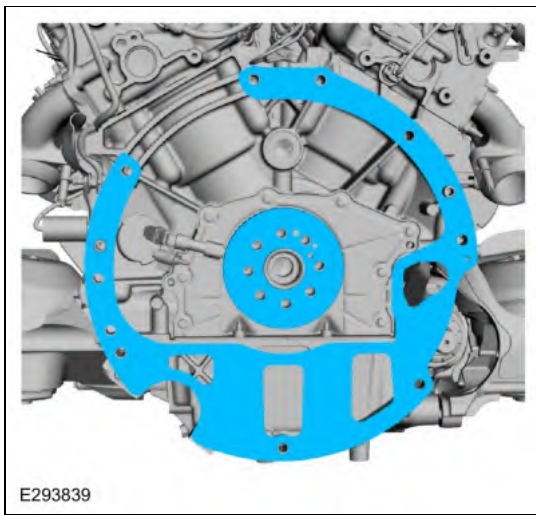
Install the RH engine mount and the nuts and bolts.
Torque:
Stage 1: 66 lb.ft (90 Nm)
Stage 2: 90°



58. Install the floor crane and chains.
Use the General Equipment: Floor Crane

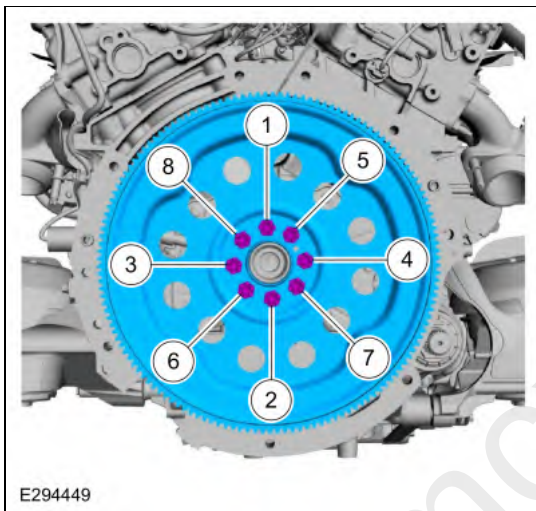


59. Remove the engine from the mounting stand.
Use the General Equipment: Mounting Stand



62. **NOTE:** One of the 8 flexplate holes are offset so the flexplate can only be installed in one position.

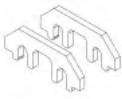
- Install the flexplate aligning it with the offset hole and hand start bolts 5, 6, 7 and 8.
- Tighten the bolts 5, 6, 7 and 8 in sequence one turn at a time until the flexplate is snug against the rear face of the crankshaft.
- Torque the bolts 5, 6, 7 and 8 in sequence.
Torque: 59 lb.ft (80 Nm)
- Install the bolts 1, 2, 3 and 4 finger tight.
- Torque the bolts 1, 2, 3 and 4 in sequence.
Torque: 59 lb.ft (80 Nm)



63. Install the engine.
Refer to: Engine (303-01C Engine - 3.3L Duratec-V6, Removal).

Oil Pump

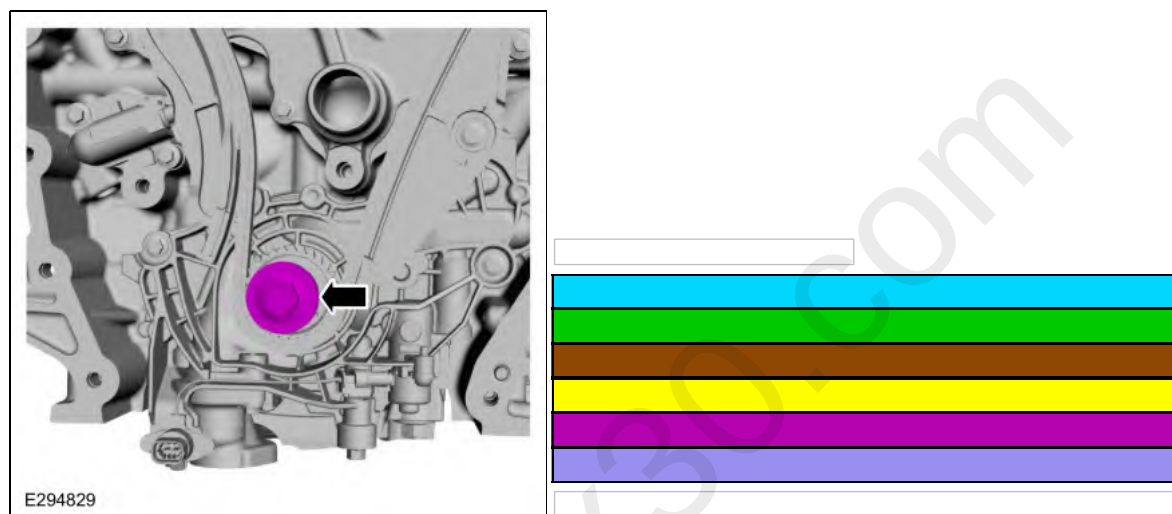
Special Tool(s) / General Equipment

 E216421	303-1248 Camshaft holding tools TKIT-2006UF-FLM TKIT-2006UF-ROW
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Removal

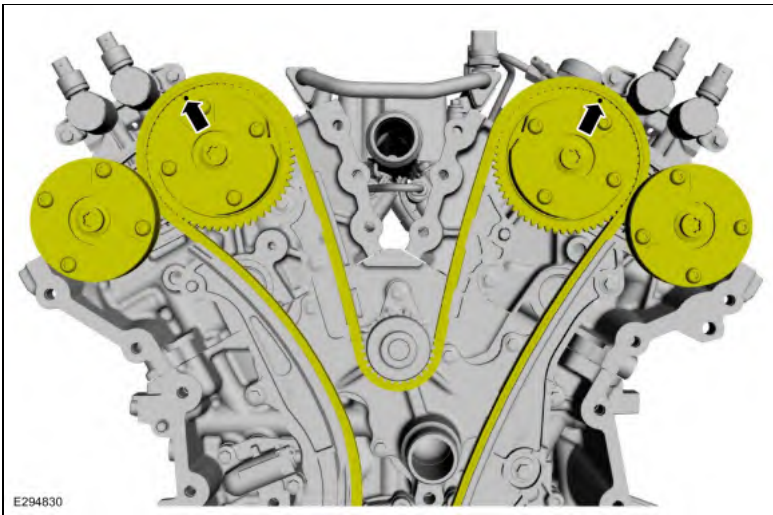
NOTICE: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan may cause engine failure.

1. Remove the oil pan.
Refer to: Oil Pan (303-01C Engine - 3.3L Duratec-V6, Removal and Installation).
2. Install the original crankshaft pulley bolt and washer.

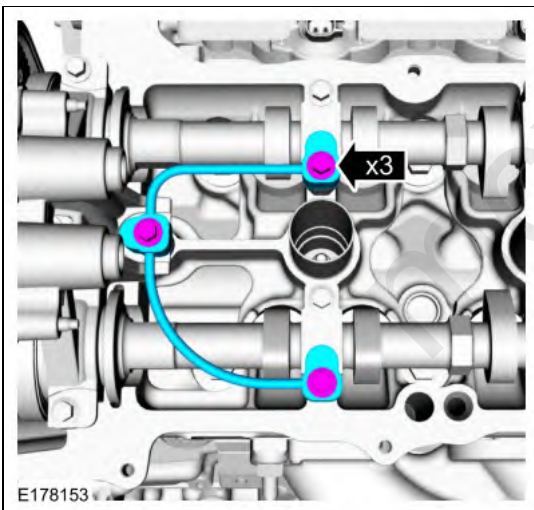


3. **NOTE:** Rotate the crankshaft in a clockwise direction only.

Using the crankshaft bolt, rotate the crankshaft in a clockwise direction to align the timing marks.



4. Remove the bolts and the LH oil tube.



5. **NOTE:** The Camshaft Holding Tool will hold the camshafts in the TDC position.

Install Special Service Tool: 303-1248 Camshaft holding tools.