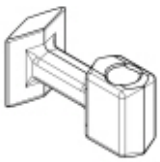
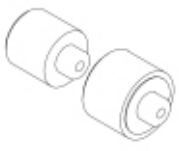
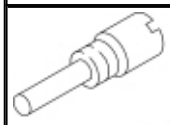
Oil Pan

Base Part Number: 6675

Special Tool(s) / General Equipment

 E133913	205-153 (T80T-4000-W) Handle
	303-096 (T74P-6150-A) Installer, Camshaft Front Oil Seal TKIT-2009TC-F
 E222983	303-103 (T74P-6375-A) Holding Tool, Flywheel T74P-77000-A TKIT-2009TC-F
 E121926	303-1521 Alignment Tool, Crankshaft Position Sensor TKIT-2010C-FLM
 E274102	303-1685 Alignment Tool, Camshaft
 E274104	303-1687 Installer, VCT Solenoid Seal
	303-1689 Holding Tool, Crank Damper

 E274106	
 E134603	303-409 (T92C-6700-CH) Remover, Crankshaft Seal TKIT-1992-FH/FMH/FLMH TKIT-1993-LMH/MH
 PZ21210	303-507 Timing Peg, Crankshaft TDC TKIT-2001N-FLM TKIT-2001N-ROW
Mounting Stand	
Plastic Scraper	

Materials

Name	Specification
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep Wipes ZC-31-B	-
Motorcraft® Metal Brake Parts Cleaner PM-4-A, PM-4-B	-

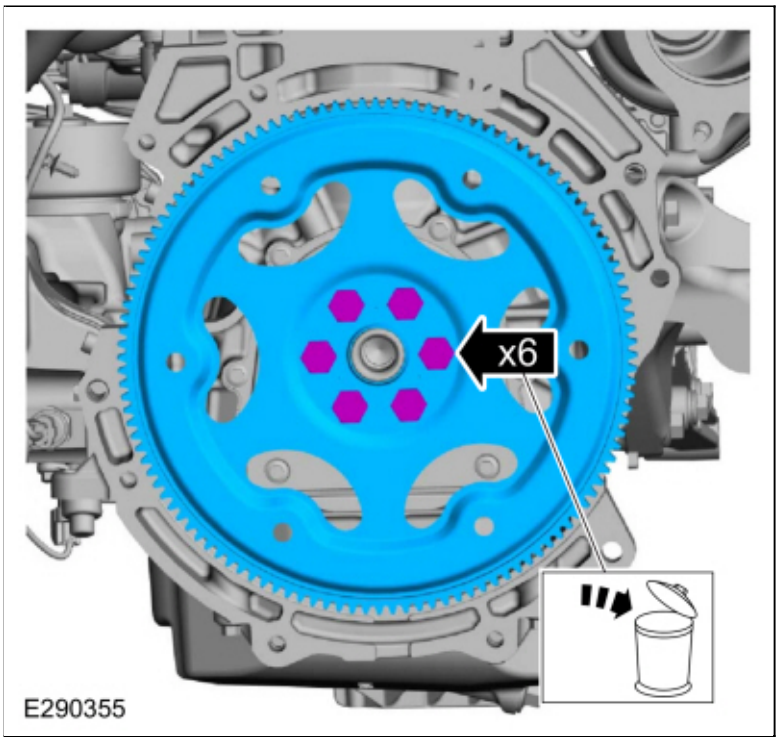
Removal

NOTICE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction. For that reason, the crankshaft sprocket is also unfastened if the pulley bolt is loosened. Before any repair requiring loosening or removal of the crankshaft pulley bolt, the crankshaft and camshafts must be locked in place by the special service tools, otherwise severe engine damage can occur.

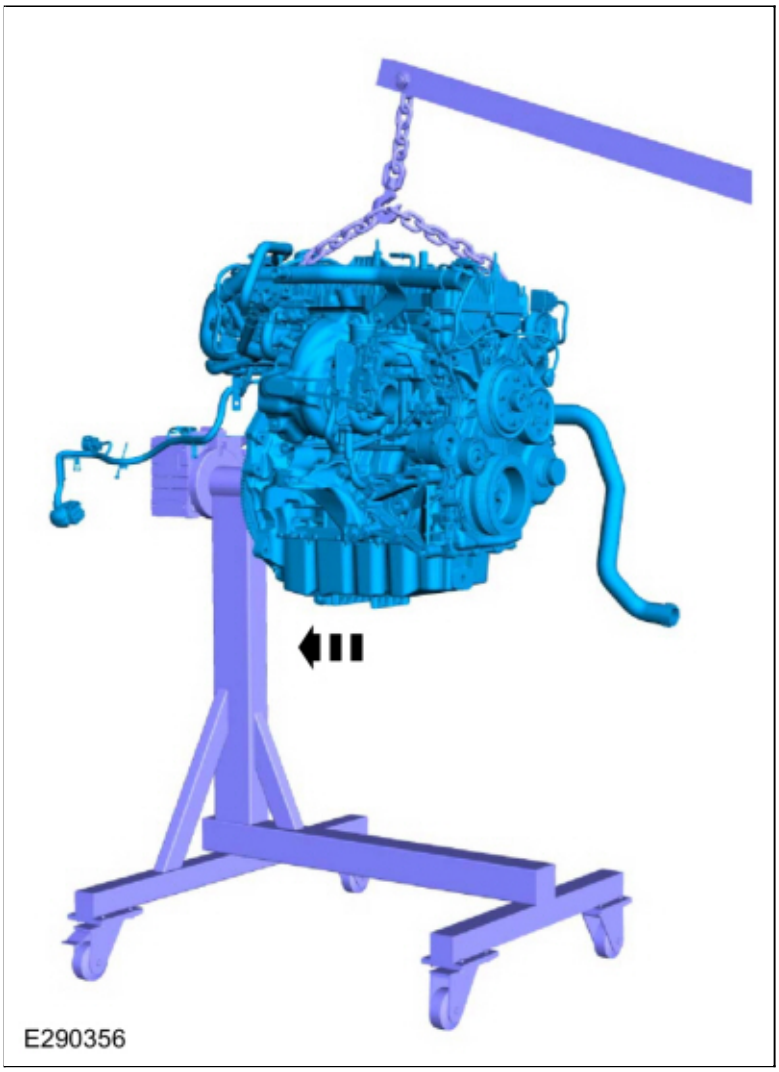
NOTICE: During engine repair procedures, cleanliness is extremely important. All parts must be thoroughly cleaned and any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1. Remove the engine.
   Refer to: Engine (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal).

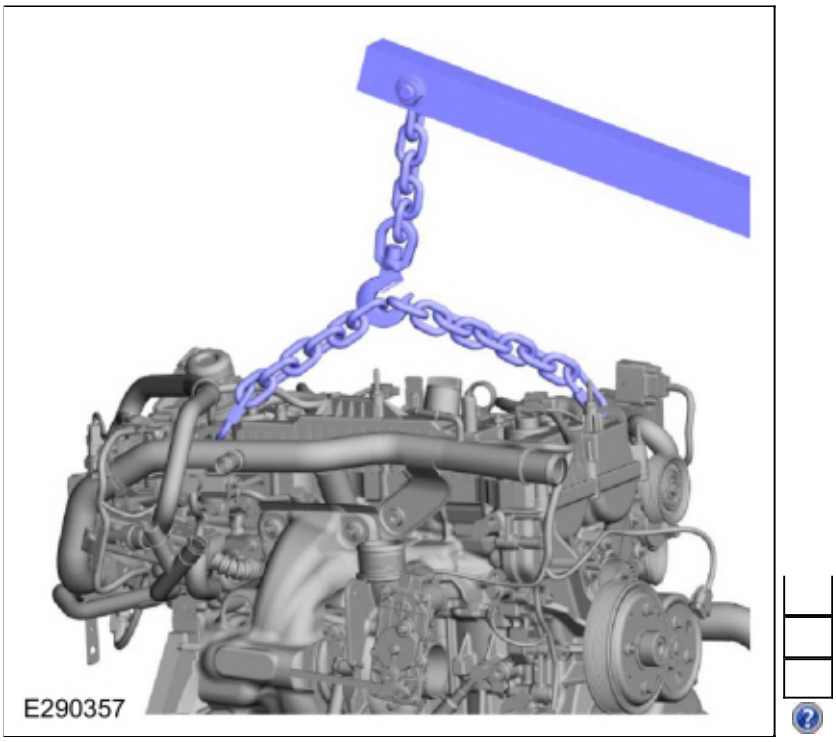
2.
   - Remove the bolts and the flexplate.
   - Discard the bolts.



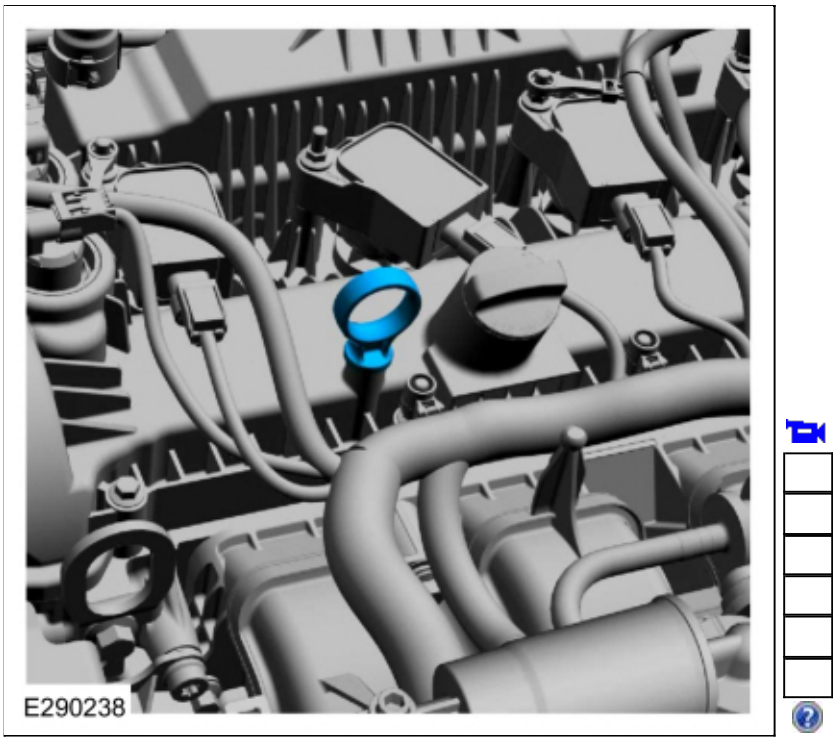
3. Using a floor crane, install the engine on a mounting stand.
   Use the General Equipment: Mounting Stand



4. Remove the engine lift equipment.

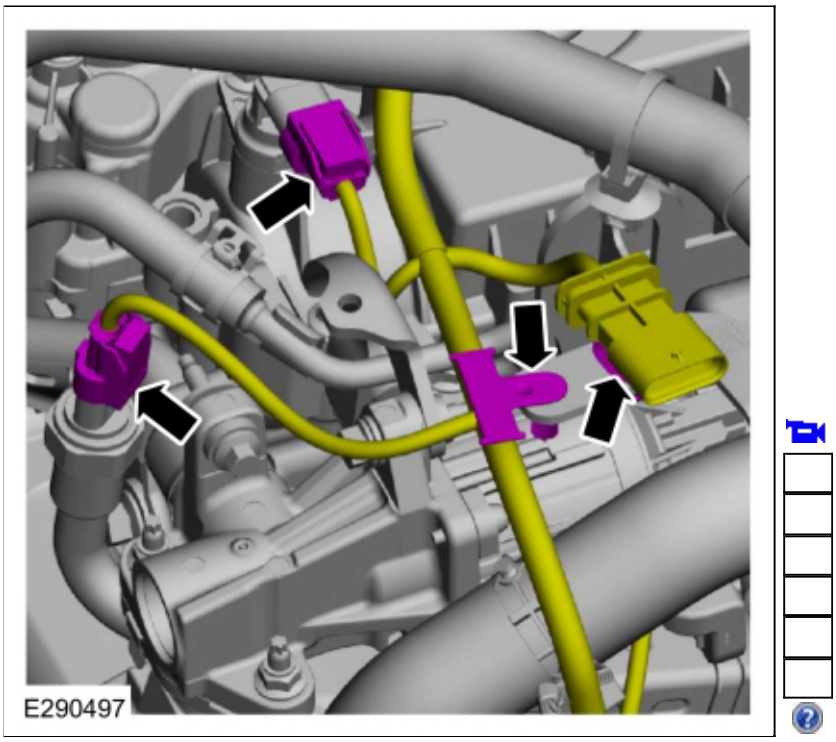


5. Remove the oil level indicator.



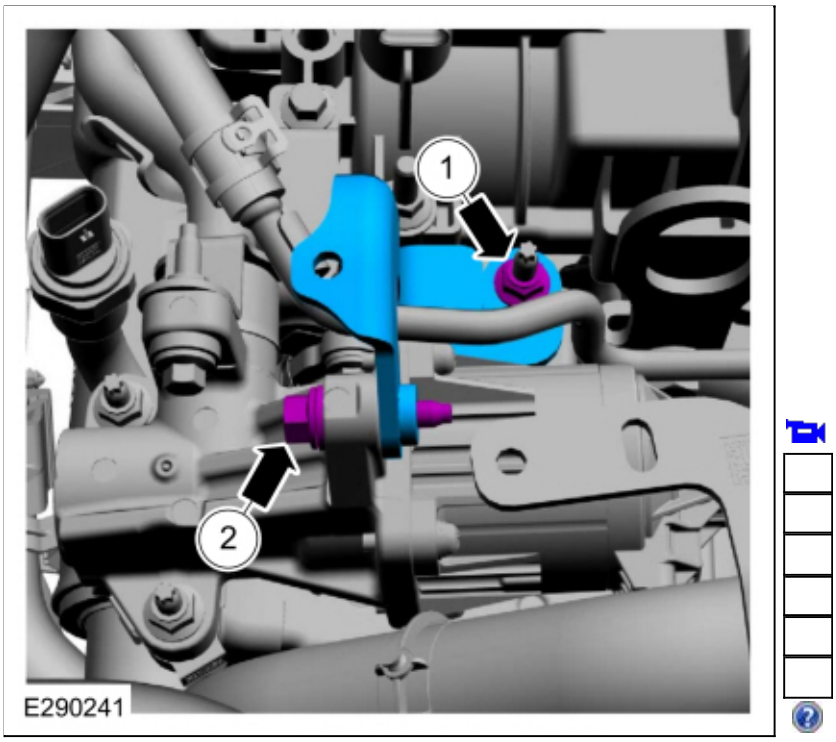
6.

- Disconnect the wiring harness electrical connectors and retainer.
- Detach the HO2S electrical connector from the bracket.

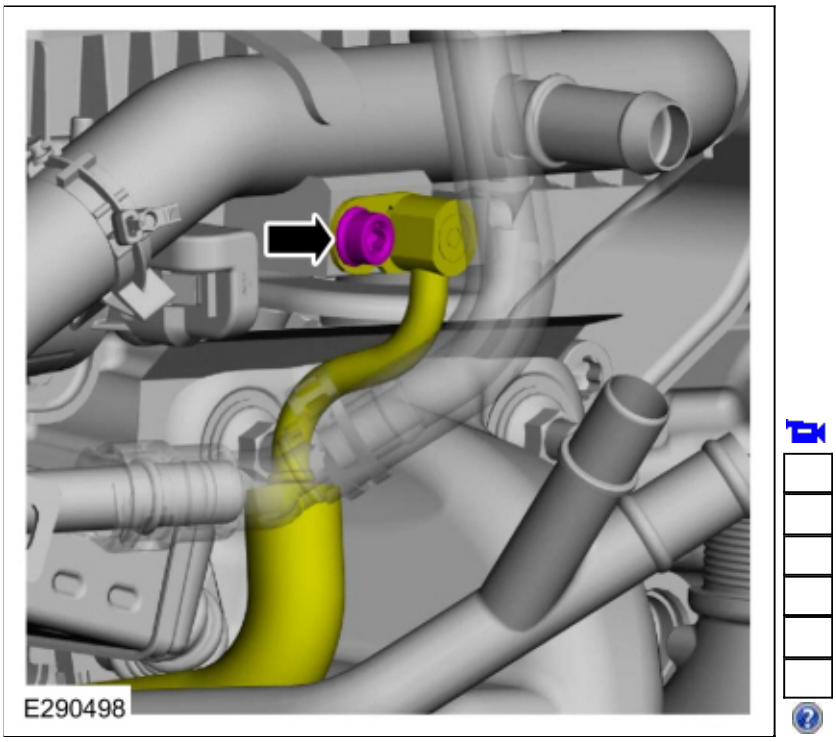


7.

1. Remove the EGR valve bracket nut.
2. Remove the bolt and the EGR valve bracket.

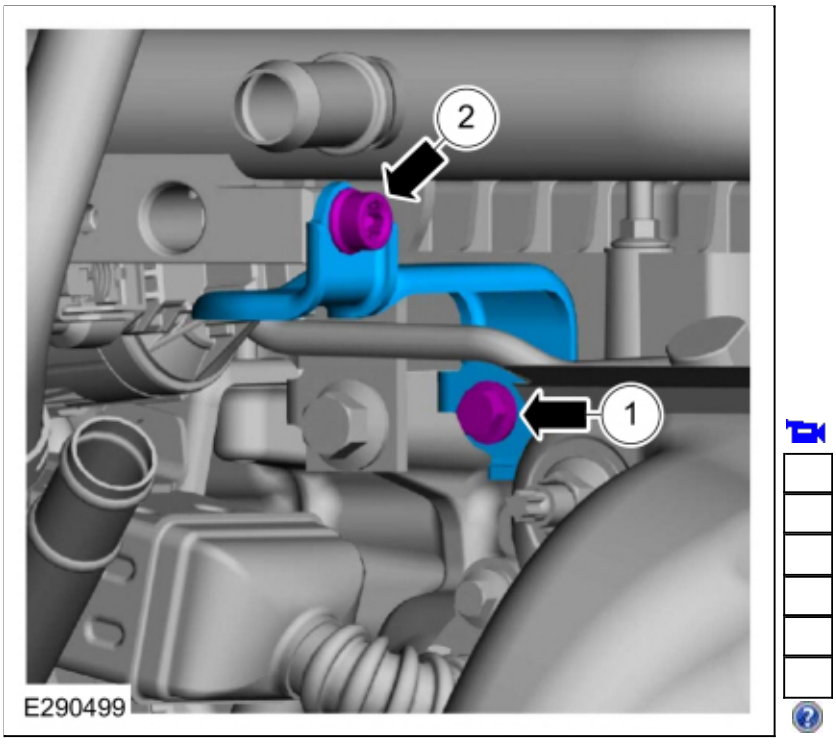


8. Remove the bolt and position the turbocharger coolant tube aside.

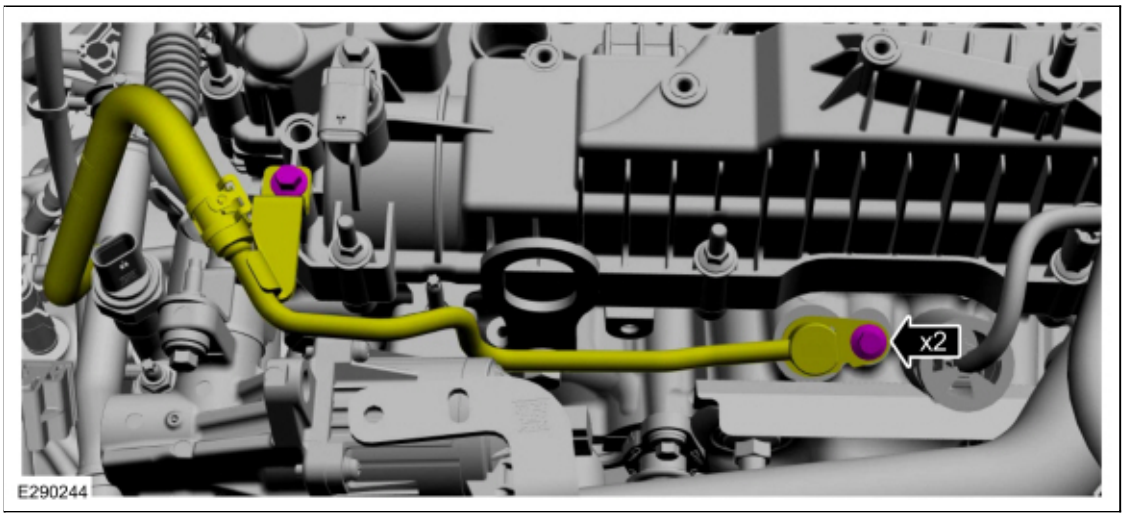


9.

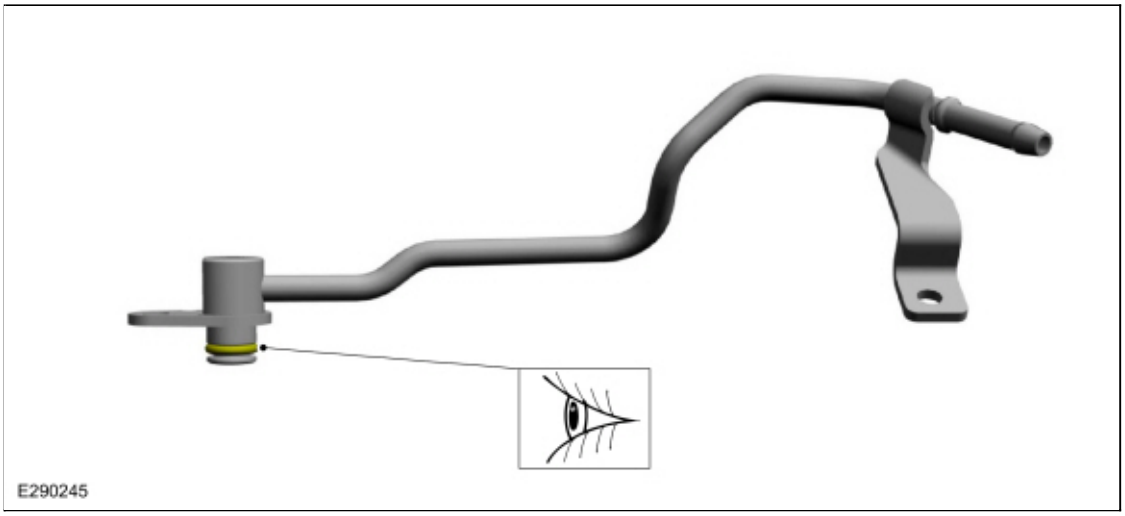
1. Remove the coolant tube support bracket bolt.
2. Remove the bolt and the coolant tube support bracket.



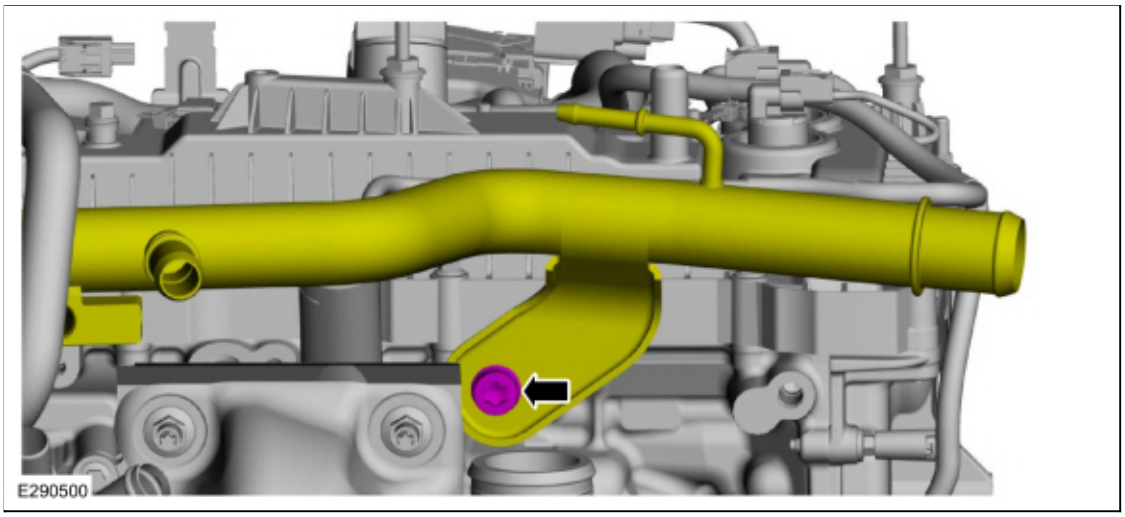
10. Remove the bolts and position the coolant tube aside.



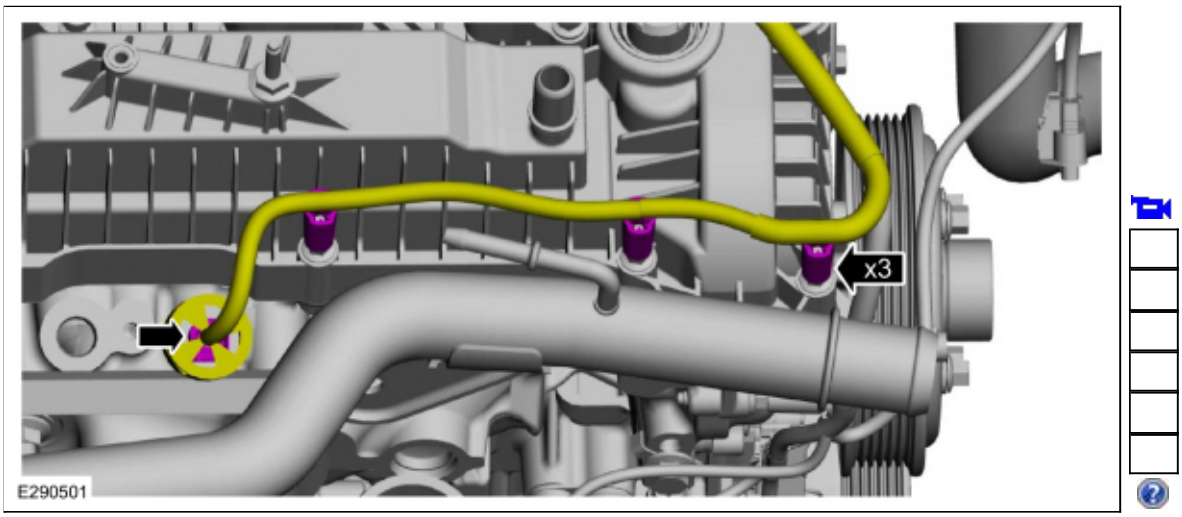
11. Inspect the coolant tube O-ring seal and replace if damaged.



12. Remove the bolt and position the coolant tube aside.

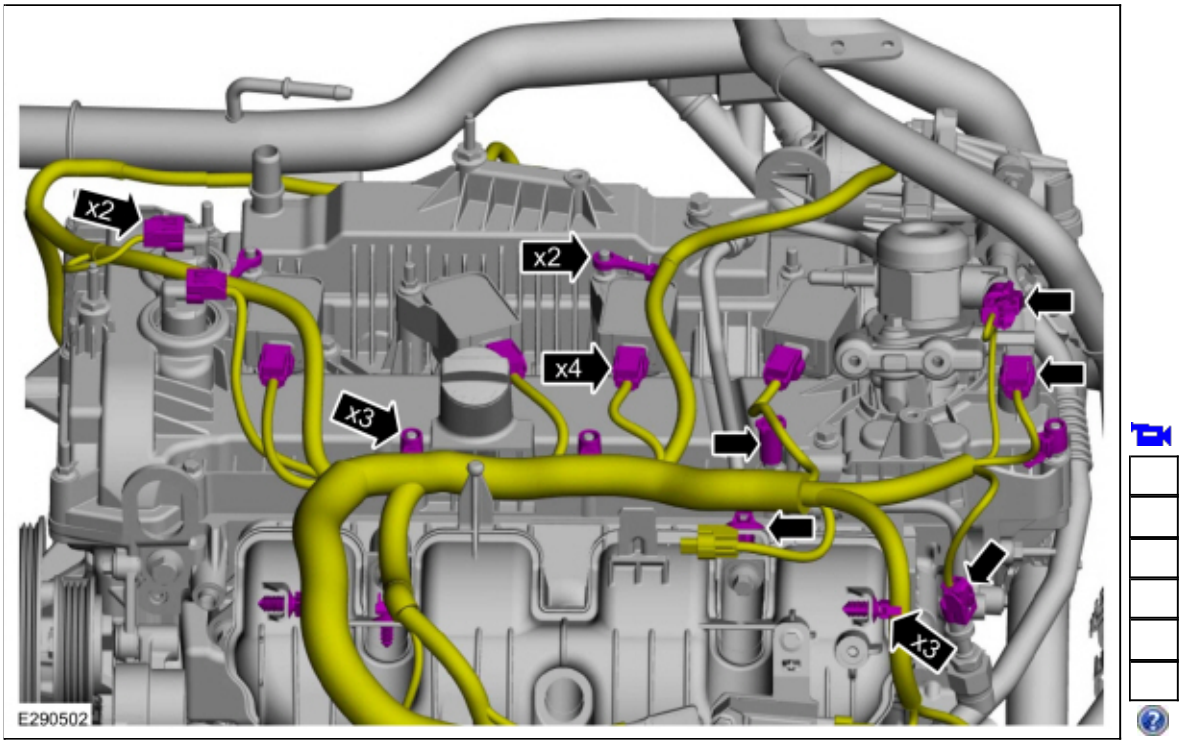


13. Disconnect the CHT sensor wiring harness electrical connector and detach the retainers.



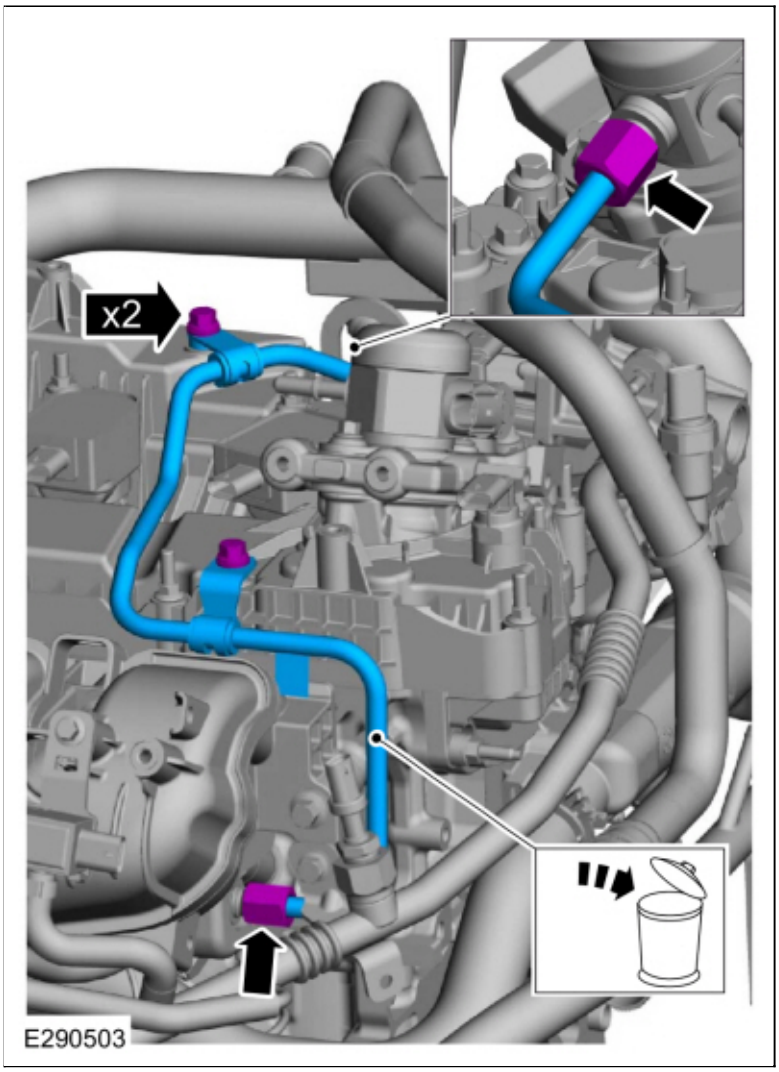
14.

- Disconnect the wiring harness electrical connectors.
- Detach the wiring harness retainers.
- Position the wiring harness aside.



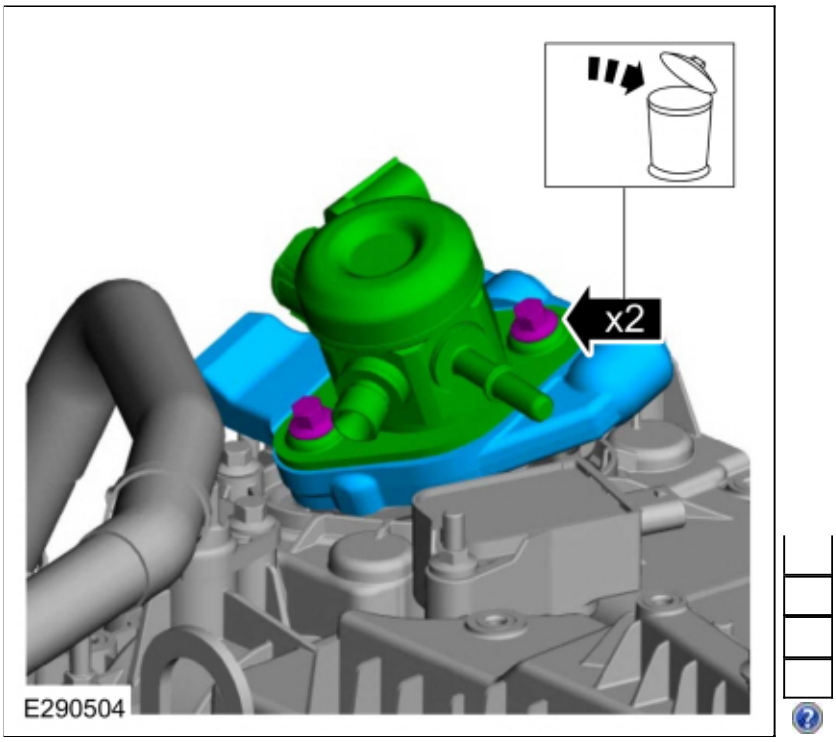
15.

- Remove the high-pressure fuel tube bolts.
- Loosen the flare nuts, remove and discard the high-pressure fuel tube.

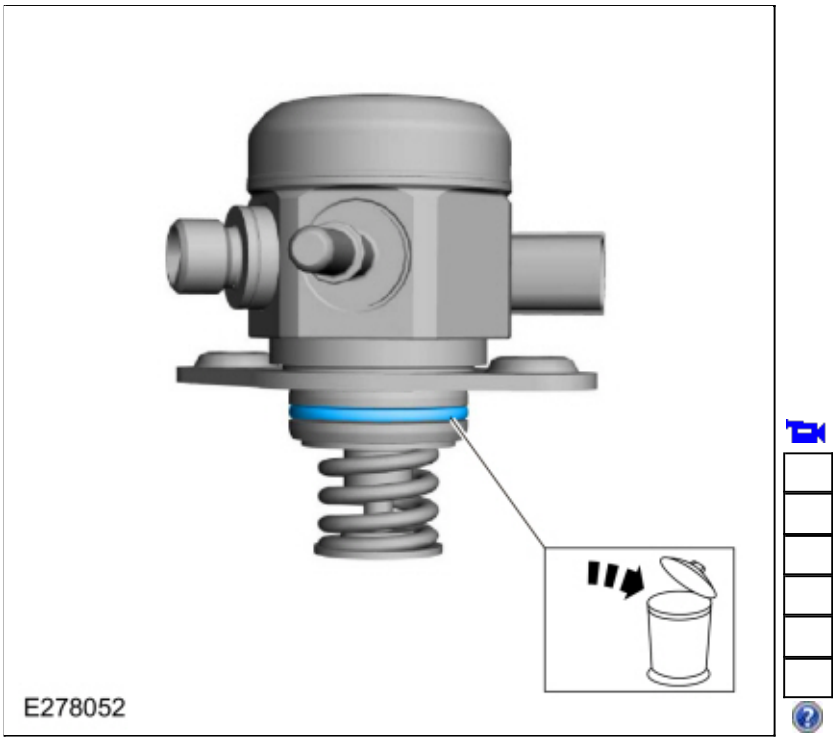


16.

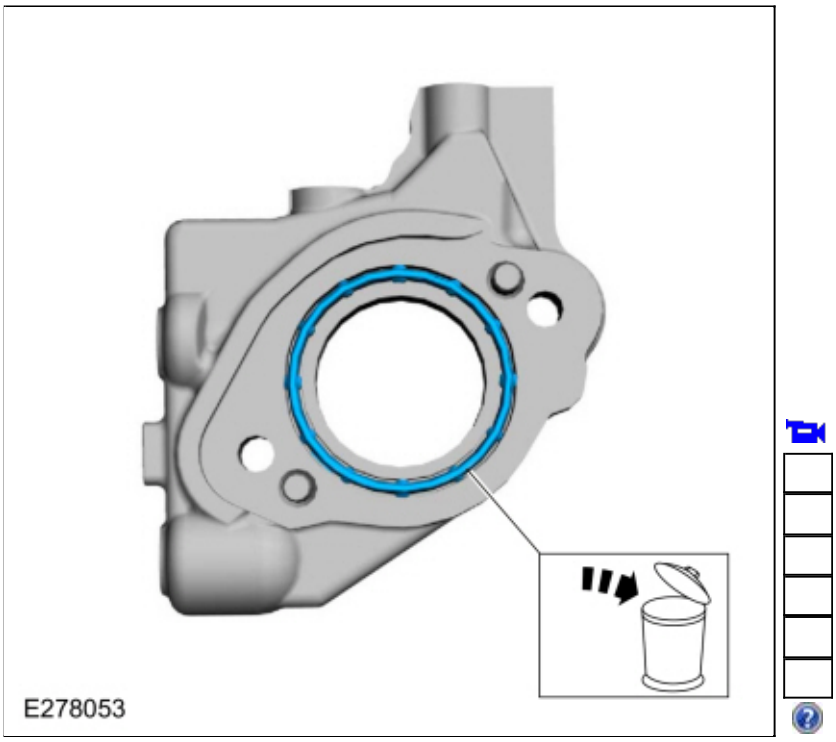
- Remove and discard the bolts.
- Remove the high-pressure fuel pump and mounting plate.



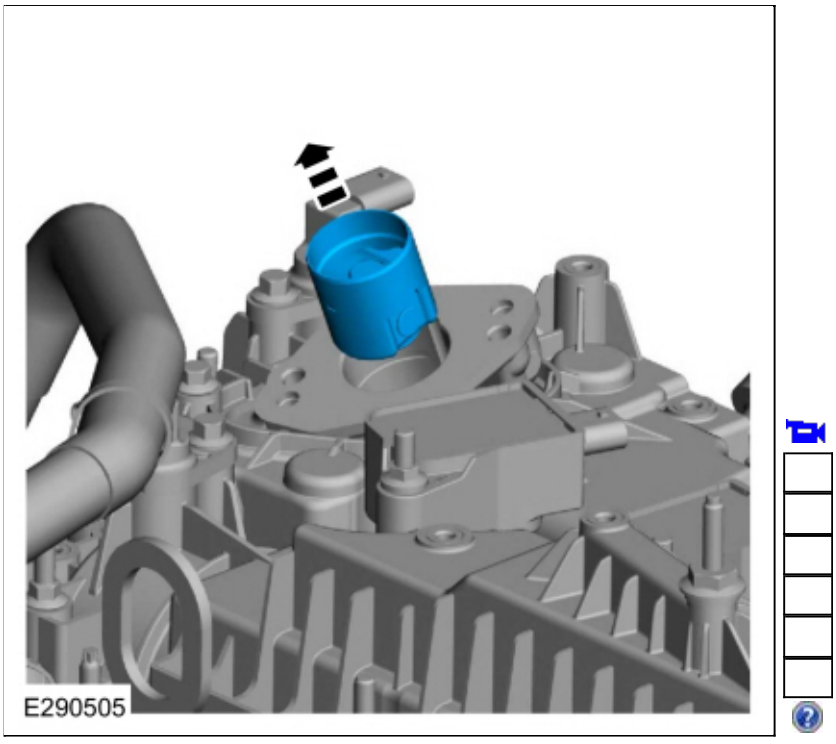
17. Remove and discard the high-pressure fuel pump O-ring seal.



18. Remove and discard the fuel pump mounting plate O-ring seal.



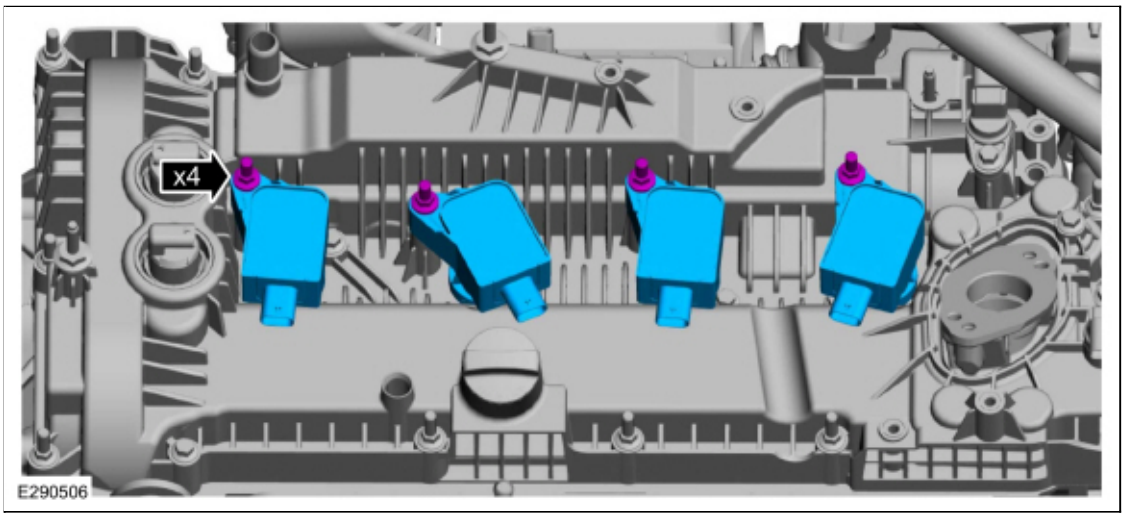
19. Remove the high-pressure fuel pump tappet.



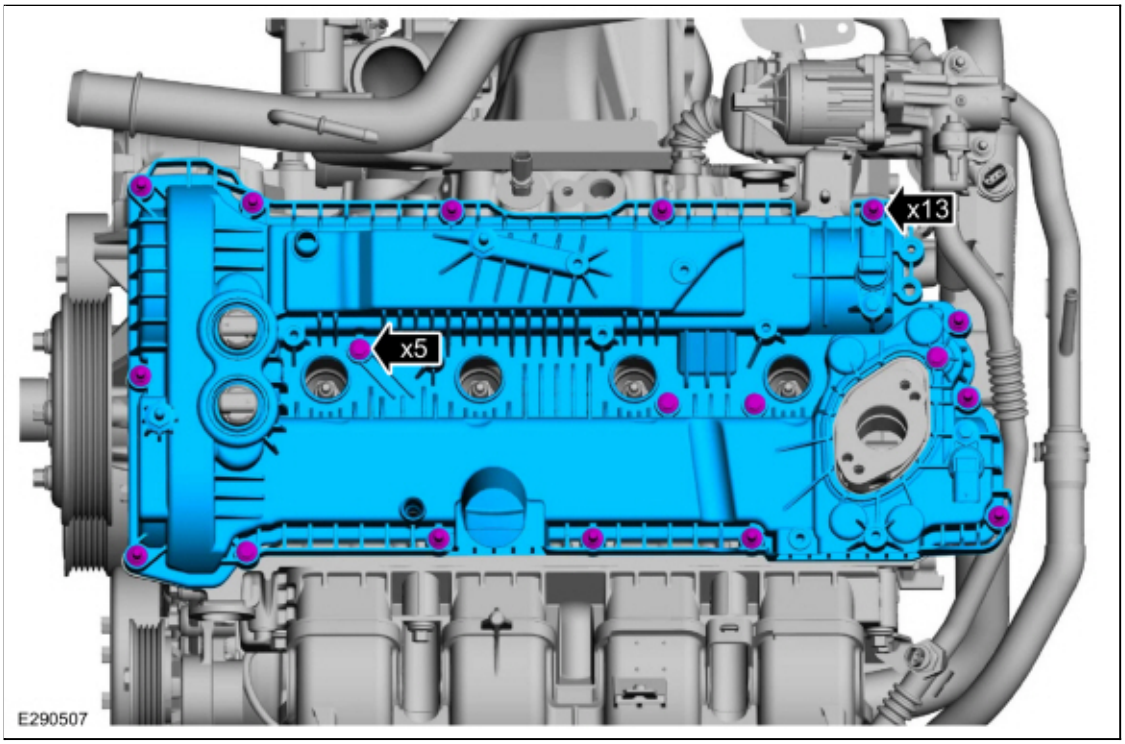
20. **NOTE:** *Use compressed air to remove any foreign material from the ignition coil-on-plugs and surrounding area before removing the ignition coil-on-plugs.*

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

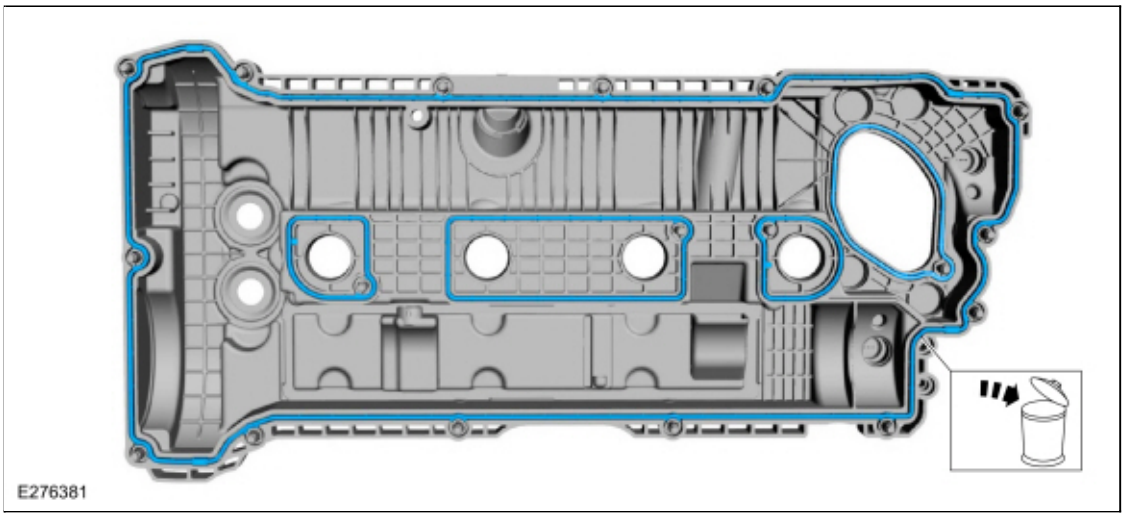
Remove the stud bolts and the ignition coil-on-plugs.



21. Loosen the fasteners and remove the valve cover.

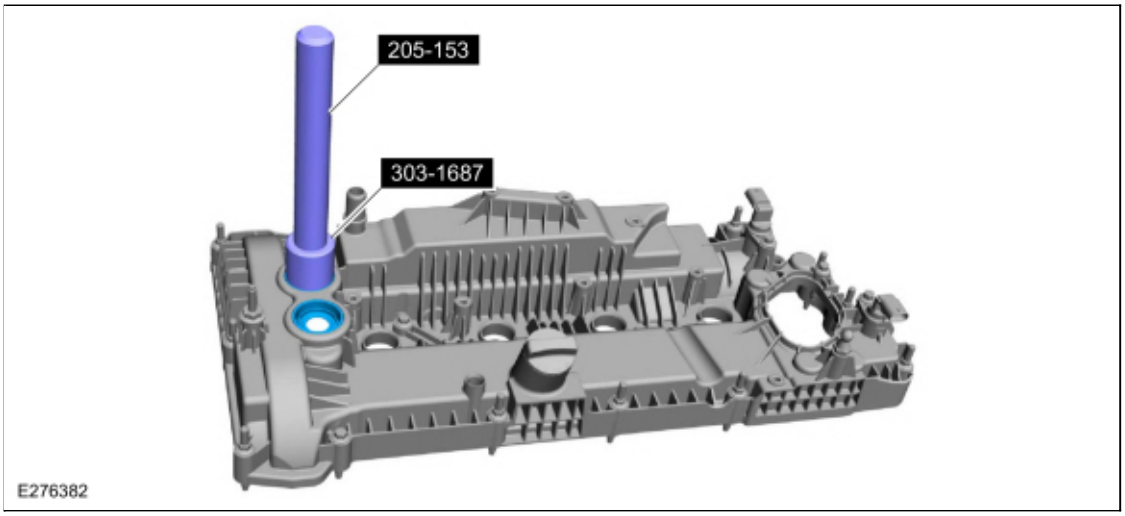


22. Remove and discard the valve cover gaskets.



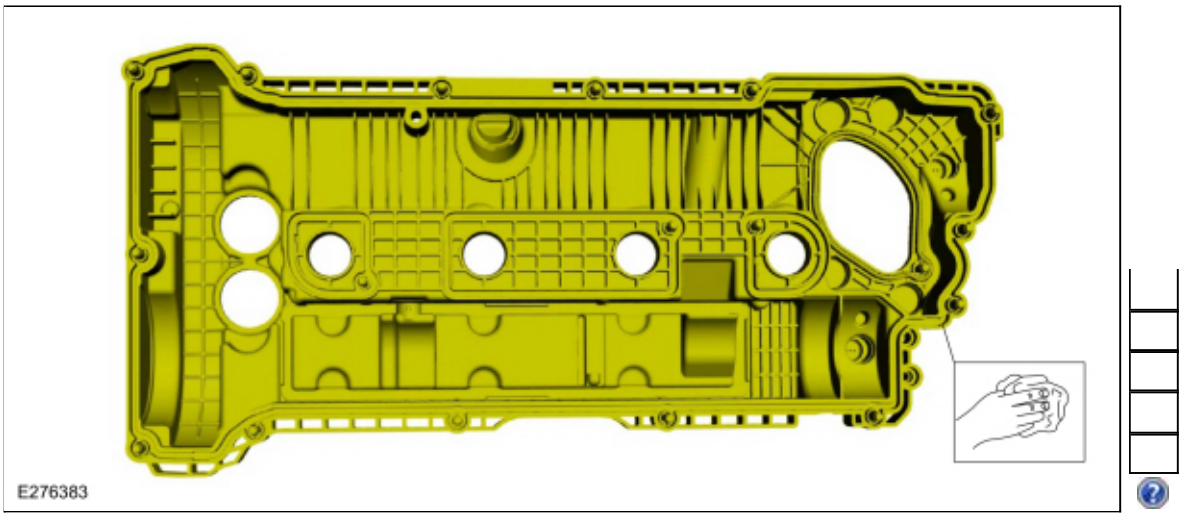
23. **NOTE:** *The VCT solenoid seals should only be replaced if they are damaged.*

- Inspect the VCT oil control solenoid seals for damage.
- If damaged, using the special tools, remove and discard the VCT oil control solenoid seals. Use Special Service Tool: 205-153 (T80T-4000-W) Handle. , 303-1687 Installer, VCT Solenoid Seal.



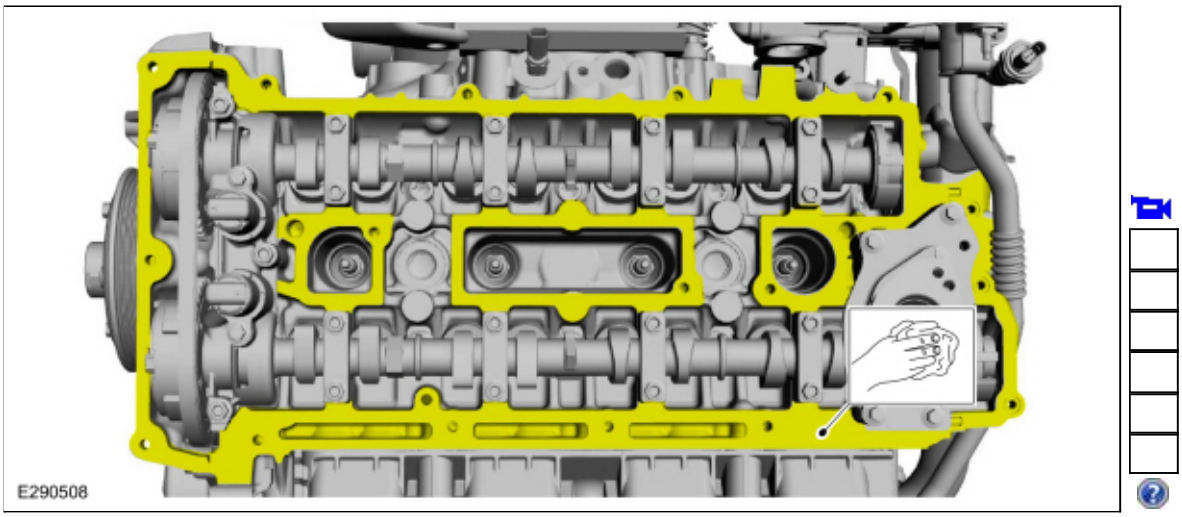
24. **NOTICE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.**

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

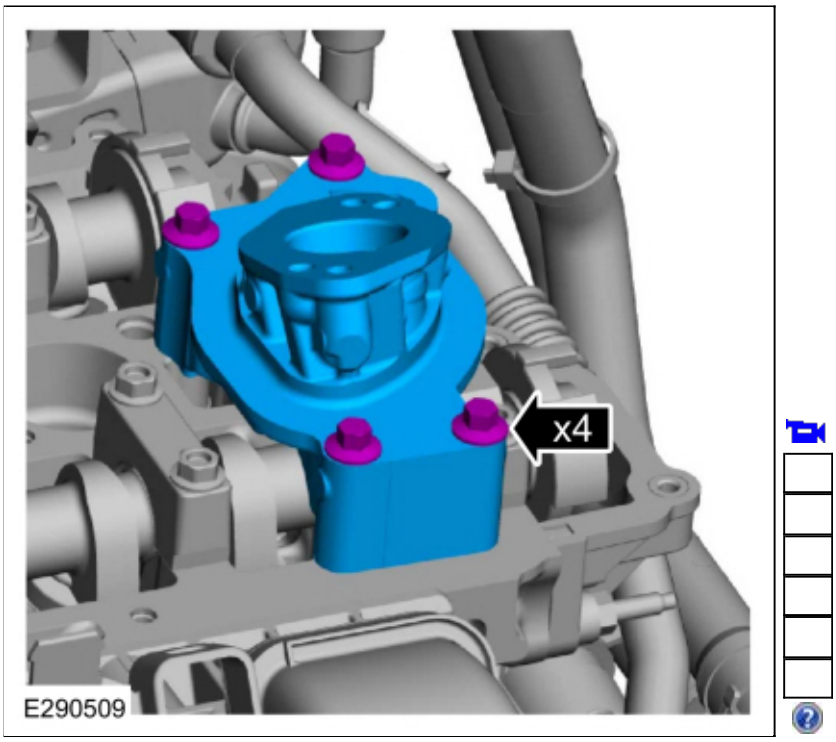


25. **NOTICE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.**

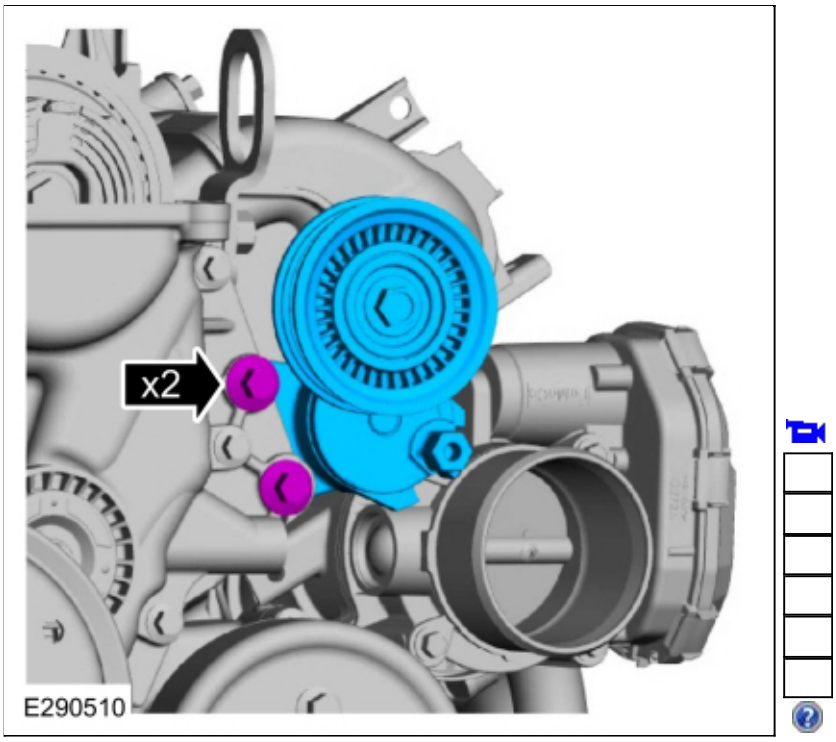
    Make sure that the mating faces are clean and free of foreign material.



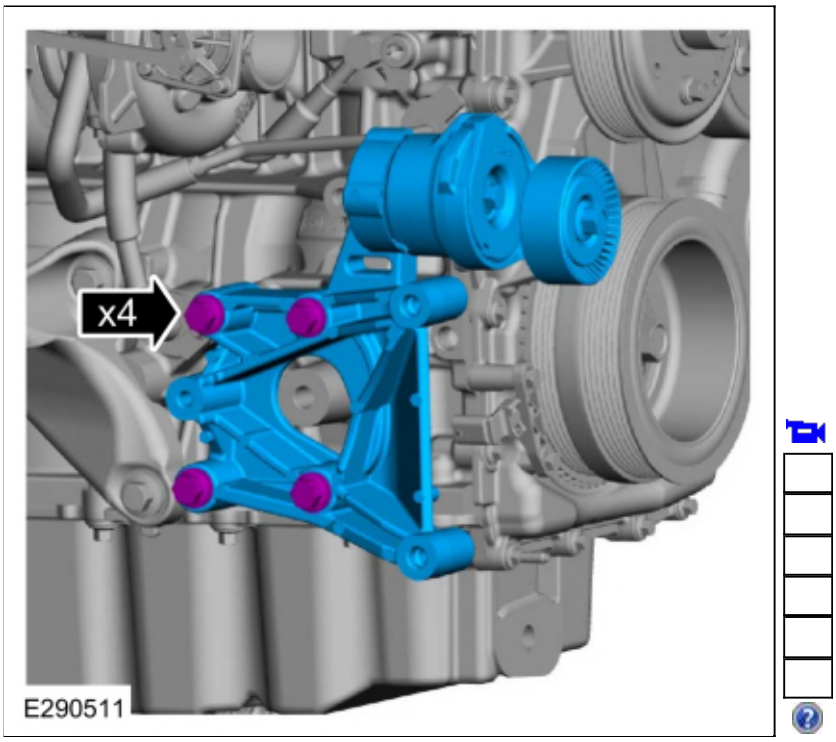
26. Remove the bolts and the high-pressure fuel pump drive unit.



27. Remove the bolts and the accessory drive belt tensioner.

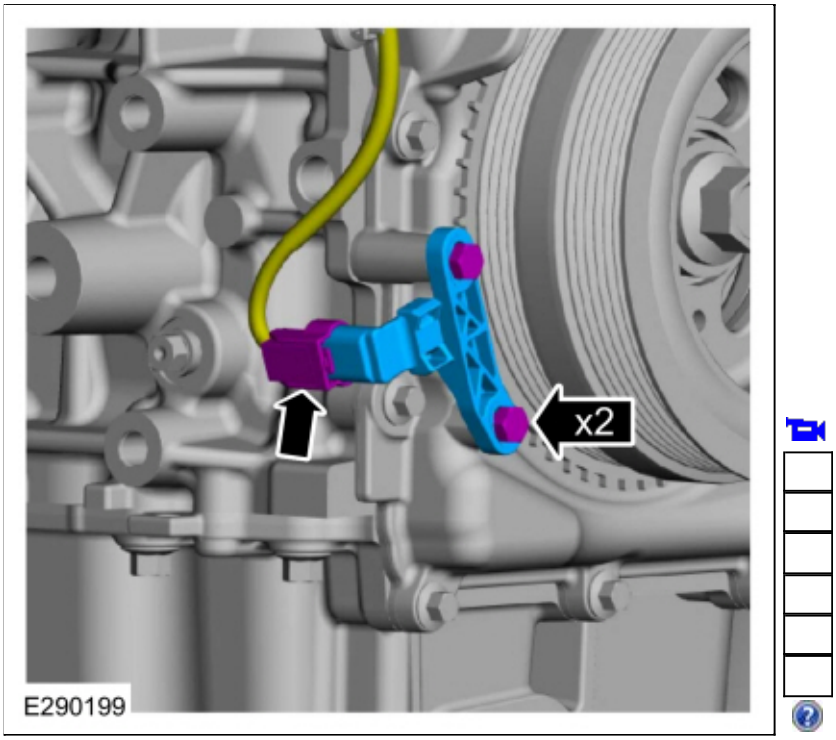


28. Remove the bolts and the A/C compressor bracket.

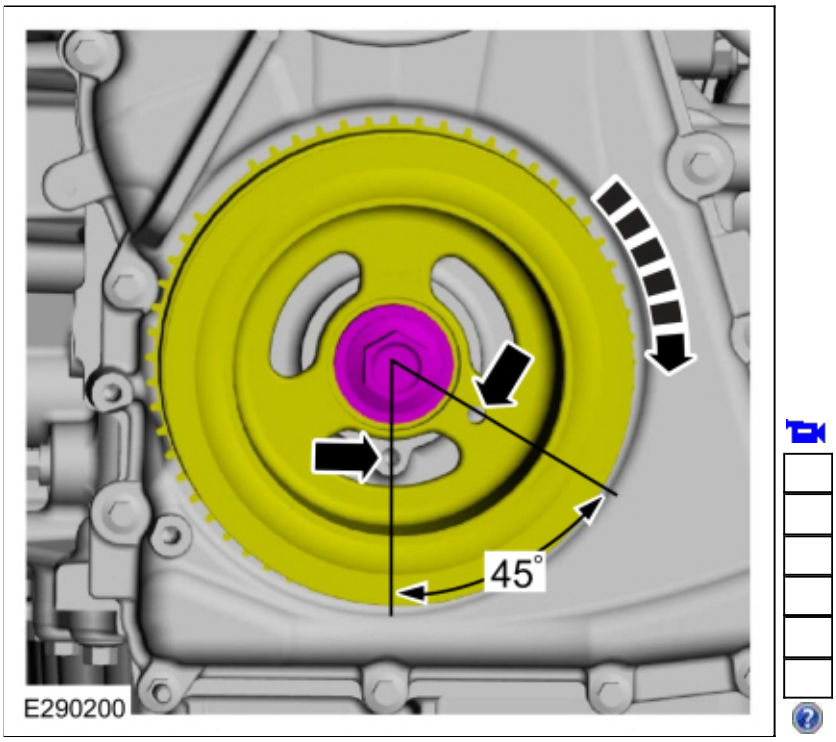


29.

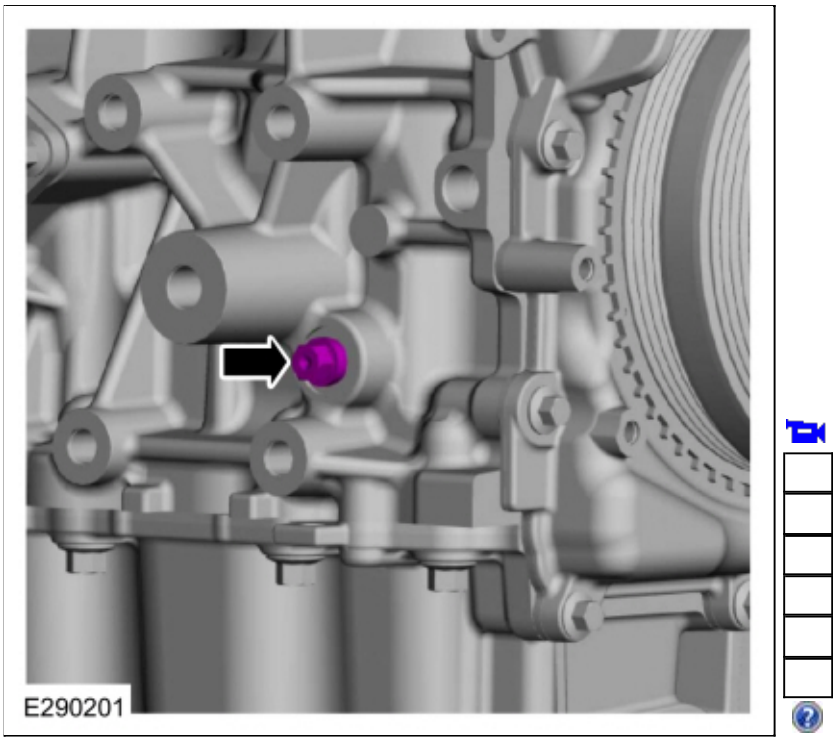
- Disconnect the CKP sensor electrical connector.
- Remove the bolts and the CKP sensor.



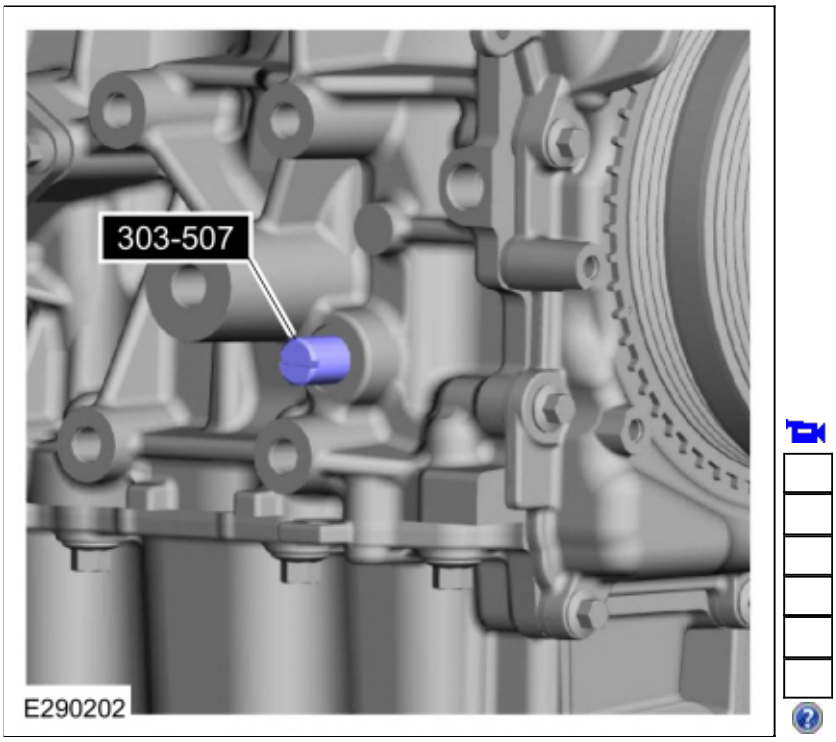
30. Turn the crankshaft clockwise until the No.1 piston is 45 degrees BTDC using the guide holes on the engine front cover and the crankshaft pulley.



31. Remove the engine plug bolt.



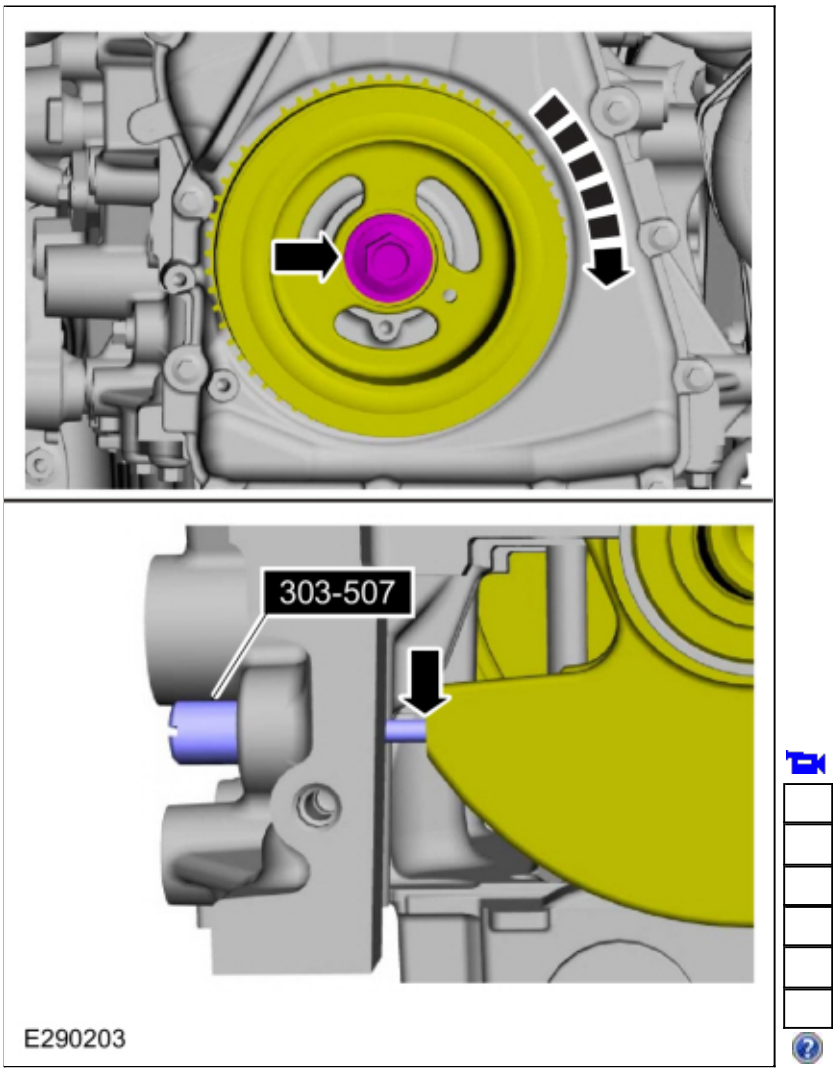
32. Install Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



33. **NOTE:** *The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC. However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the crankshaft pulley removal and installation.*

    NOTE: *The engine front cover is removed from graphic for clarity.*

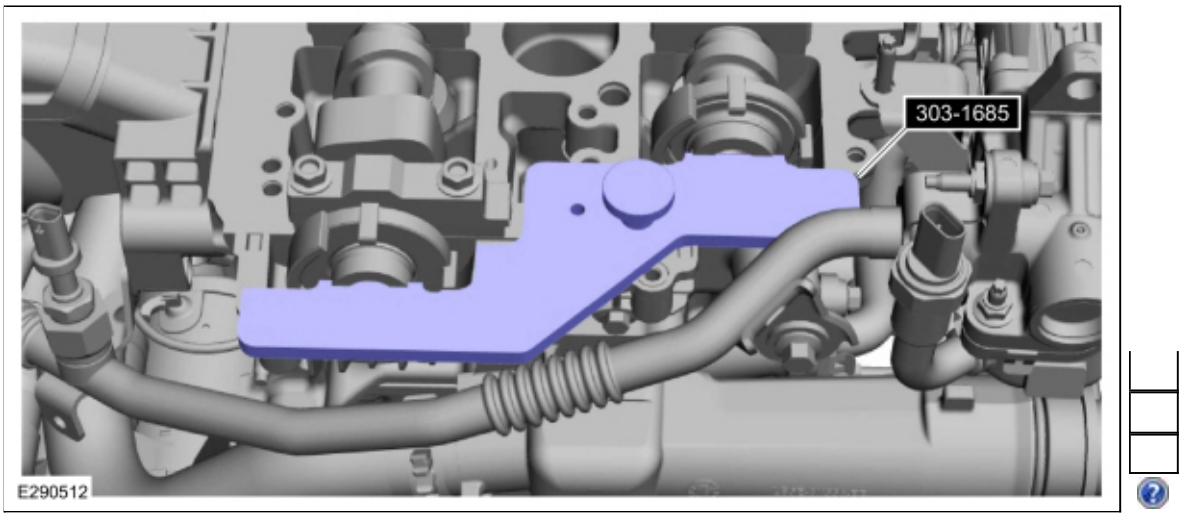
    Rotate the crankshaft clockwise until the contacts the special tool.
    Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



34. **NOTICE: The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.**

    NOTE: *The camshaft timing slots are offset. If the Camshaft Alignment Tool cannot be installed, remove the TDC Timing Peg and rotate the crankshaft three-fourths of a revolution clockwise and repeat the previous 2 steps of this procedure.*

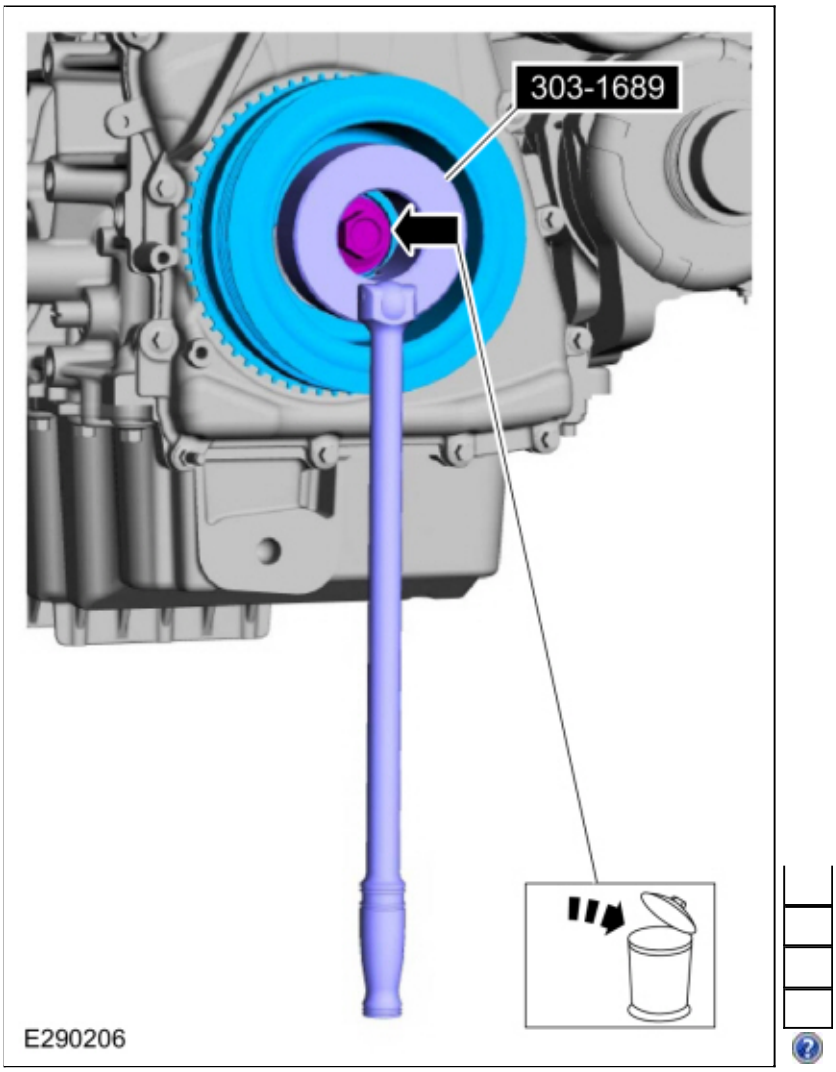
    Install Special Service Tool: 303-1685 Alignment Tool, Camshaft.



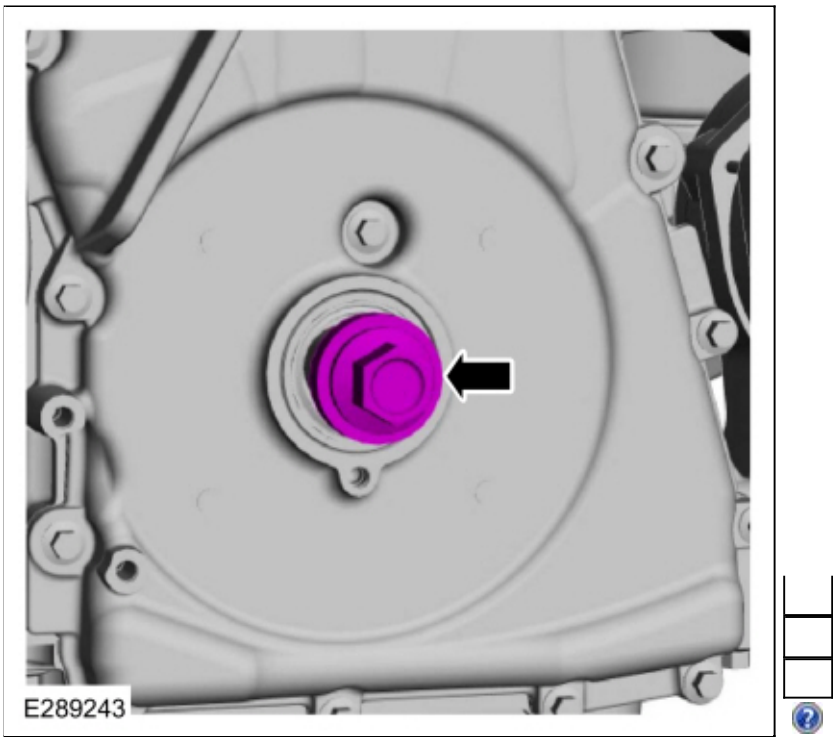
35. **NOTICE: The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Crank Damper Holding Tool and the bolt should be removed using an air impact wrench (1/2-in drive minimum).**

- Using the special tool, remove the bolt, washer and the crankshaft pulley.
  Use Special Service Tool: 303-1689 Holding Tool, Crank Damper.
- **NOTE:** *Retain the original crankshaft pulley bolt to use for the removal of the crankshaft front seal.*

  Discard the bolt.

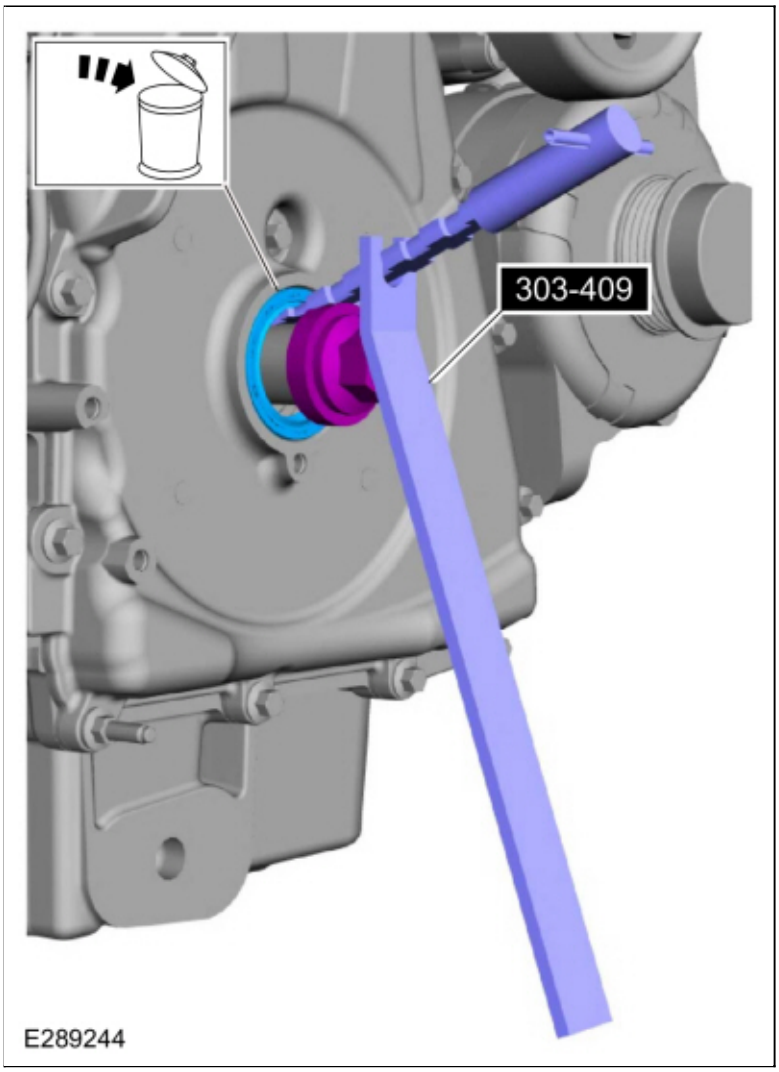


36. Install the old crankshaft pulley bolt.



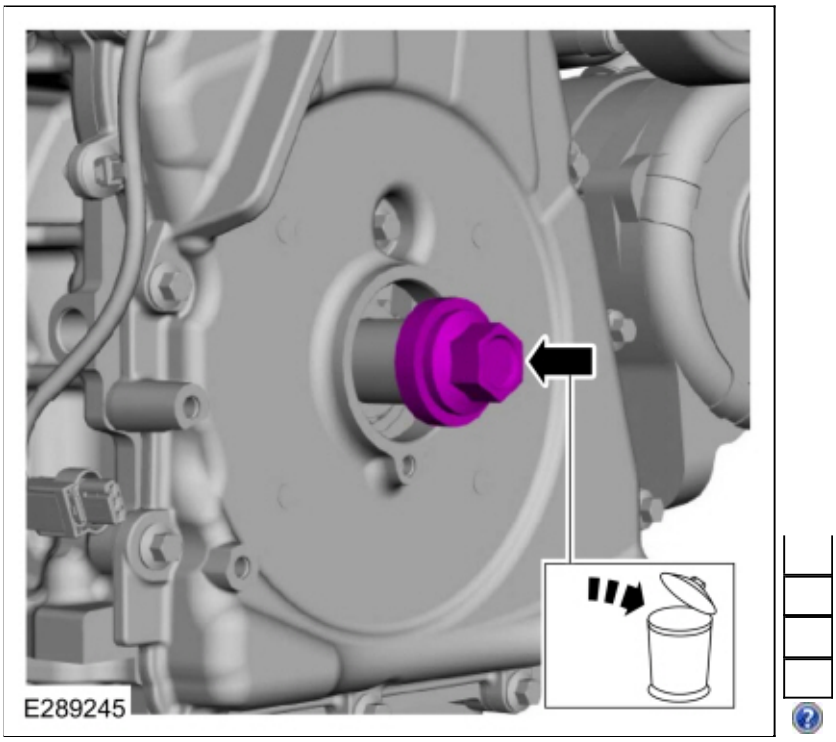
37. **NOTICE: Use care not to damage the engine front cover or the crankshaft when removing the seal.**

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

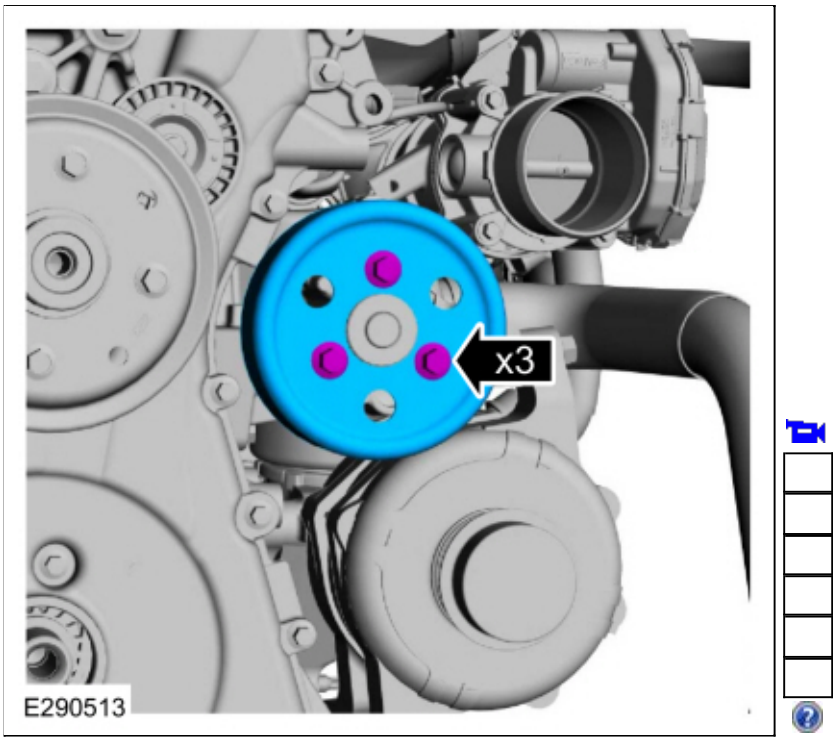


38. **NOTE:** *If necessary, retain the original crankshaft pulley bolt to use in other procedures.*

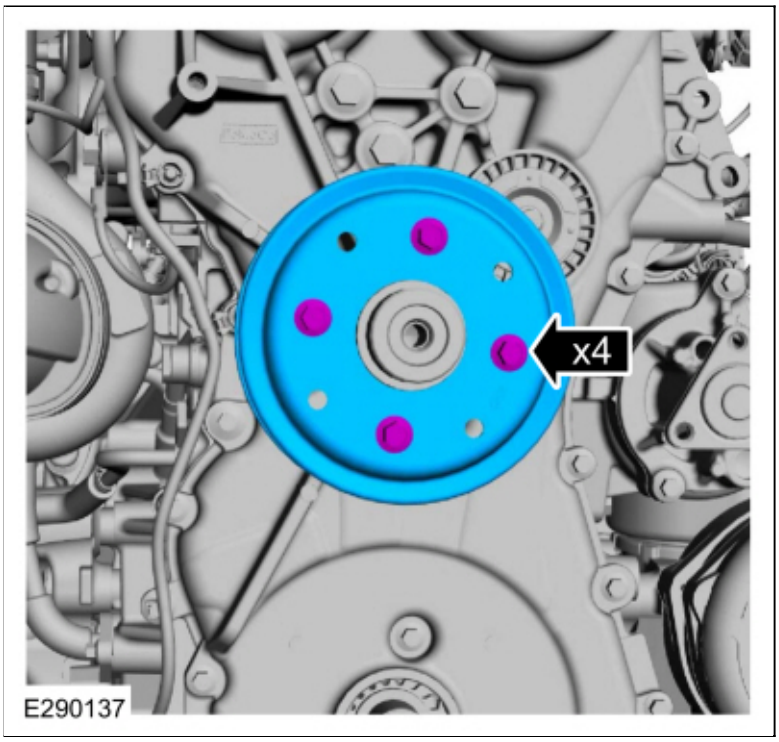
    Remove and discard the crankshaft pulley bolt.



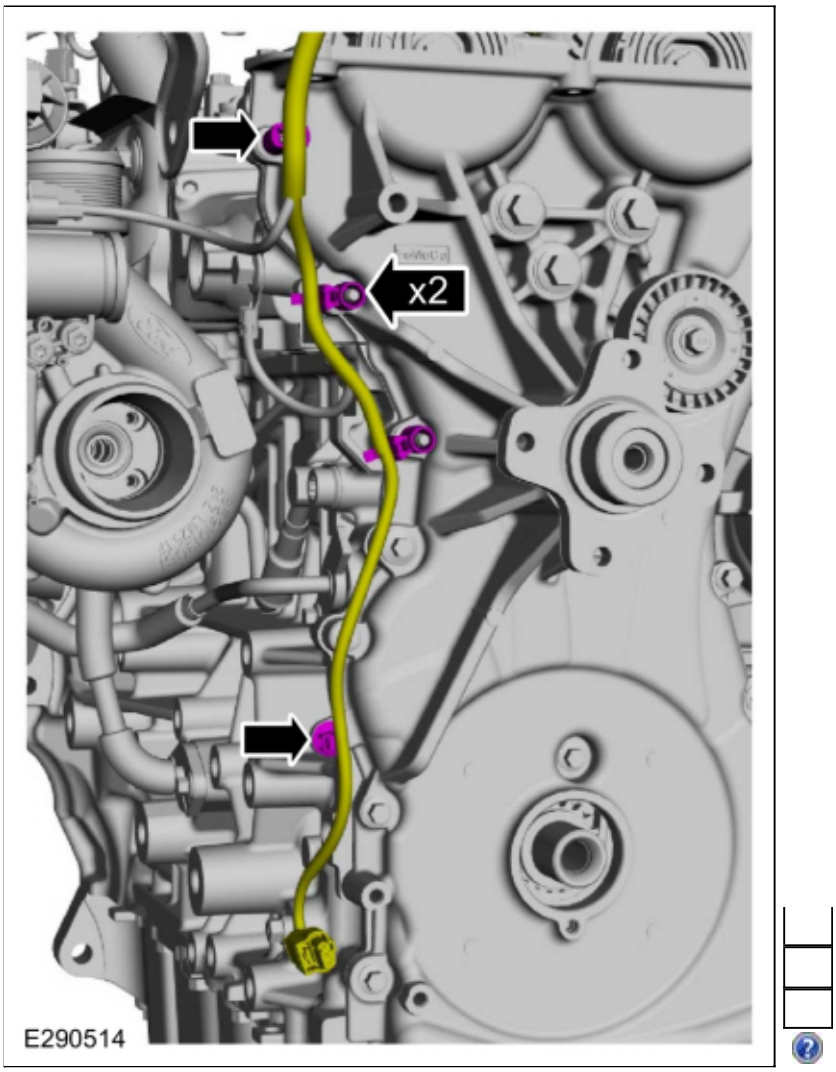
39. Remove the bolts and the coolant pump pulley.



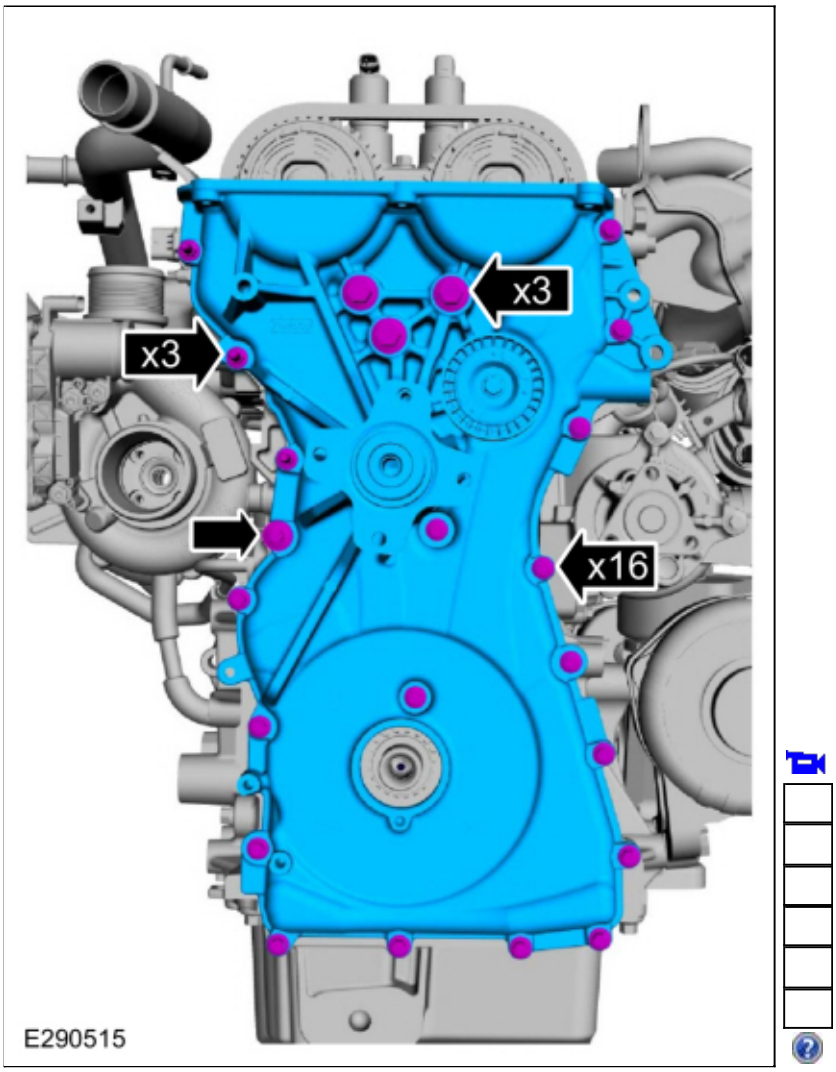
40. Remove the bolts and the accessory drive belt pulley.



41. Detach wiring harness retainers from the engine front cover and stud bolts.

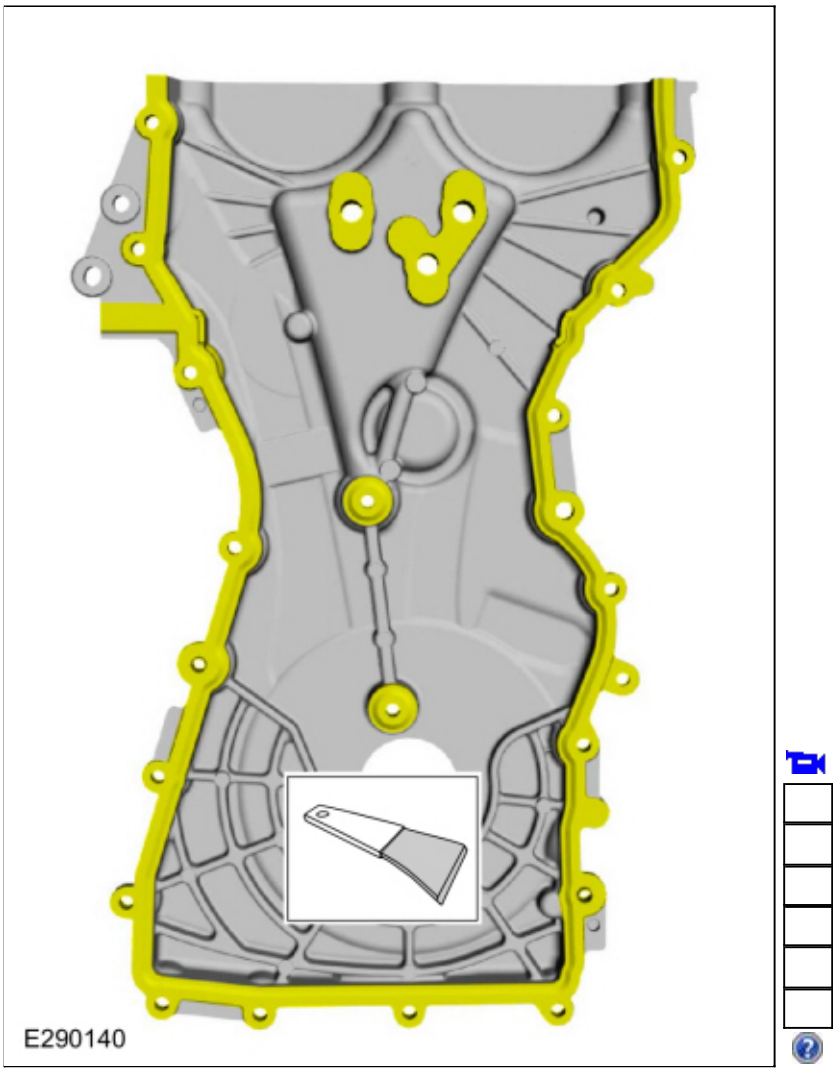


42. Remove the fasteners and the engine front cover.



43. **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.**

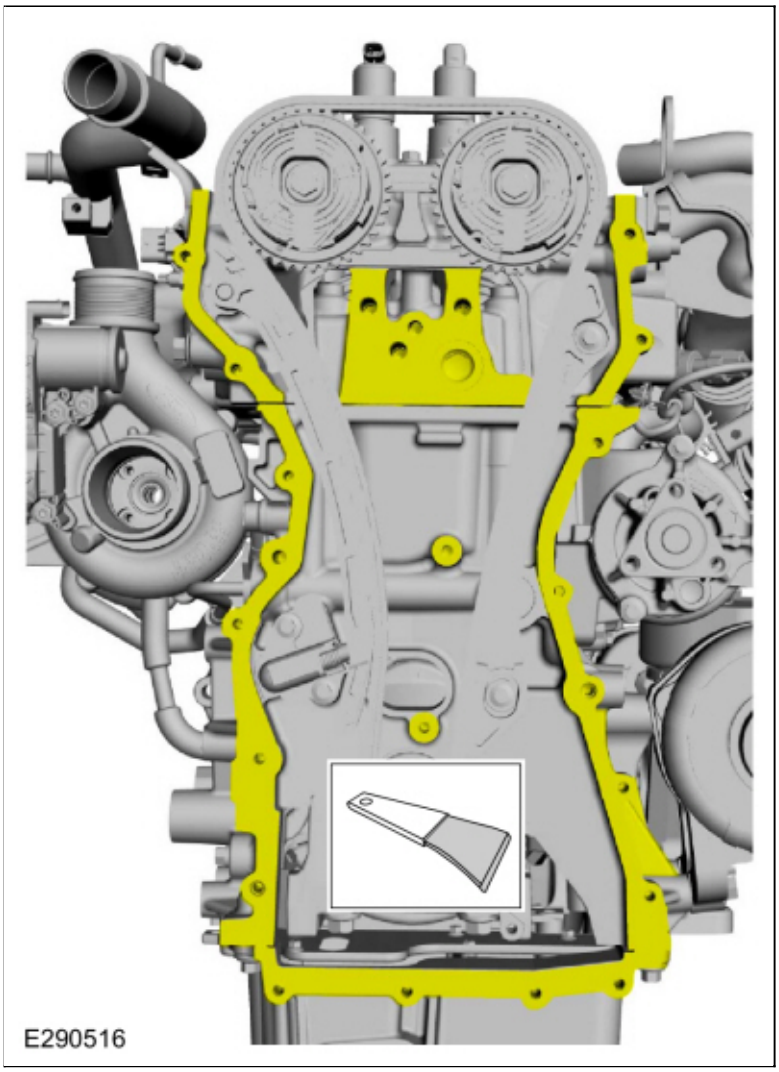
- Make sure that the mating faces of the engine front cover are clean and free of foreign material. Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).
  Material: Motorcraft® Silicone Gasket Remover / ZC-30-A
  Material: Motorcraft® 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.



44. **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.**

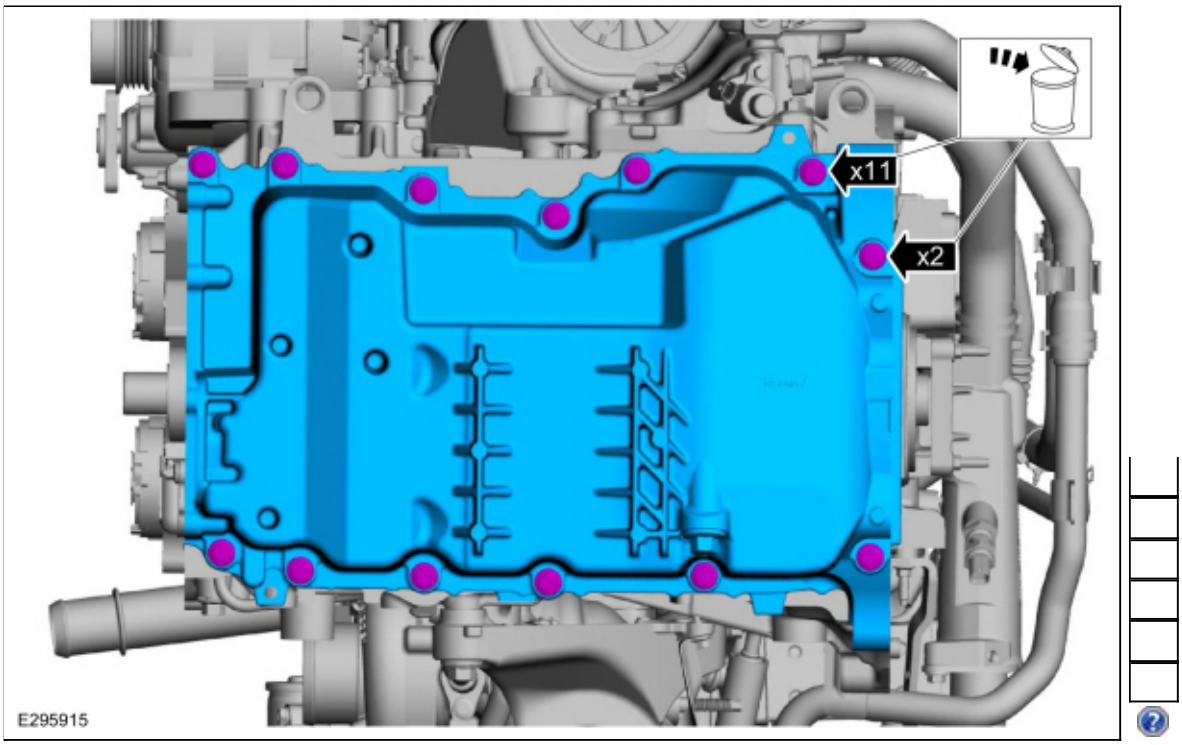
    NOTICE: Do not use metal scrapers, wire brushes, power abrasive discs or 3M™ Roloc® Bristle Disk (2-in white part number 07528) to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. They also cause contamination that will cause premature engine failure. Remove all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



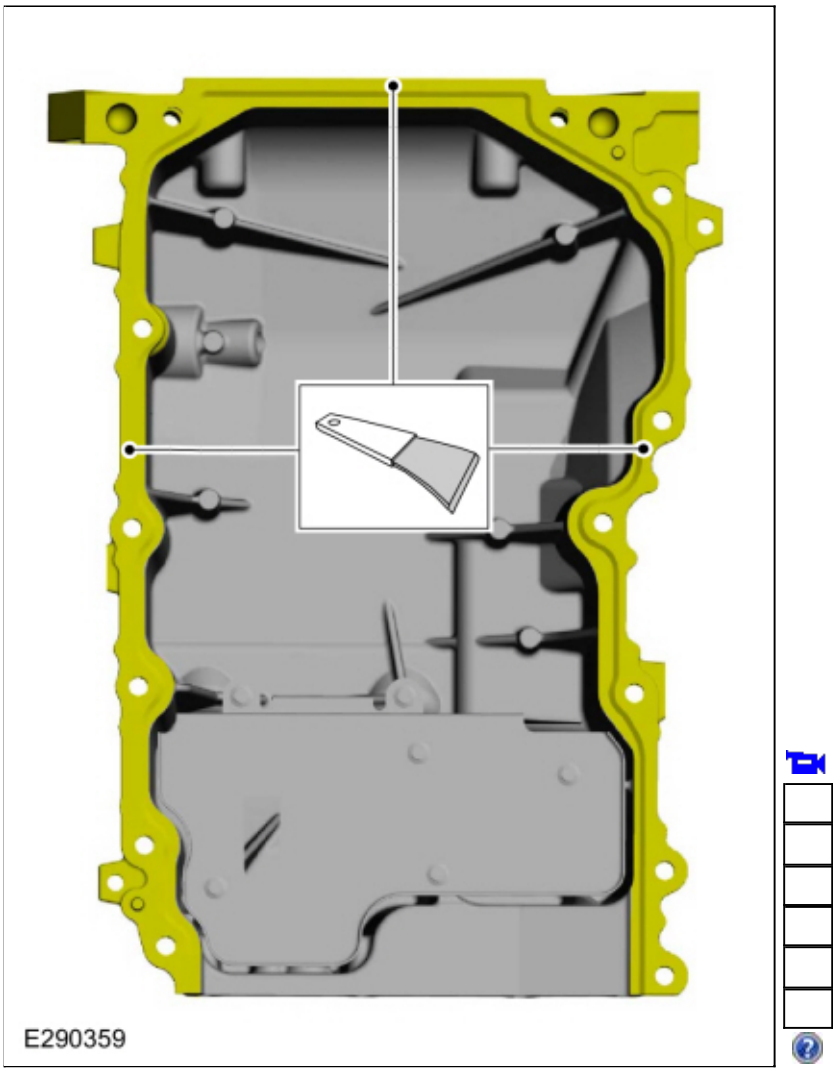
45. **NOTICE: Do not strike the oil pan sideways to remove, the oil pan is doweled and will damage the oil pan and engine block.**

- Remove the bolts and the oil pan.
- Discard the bolts.



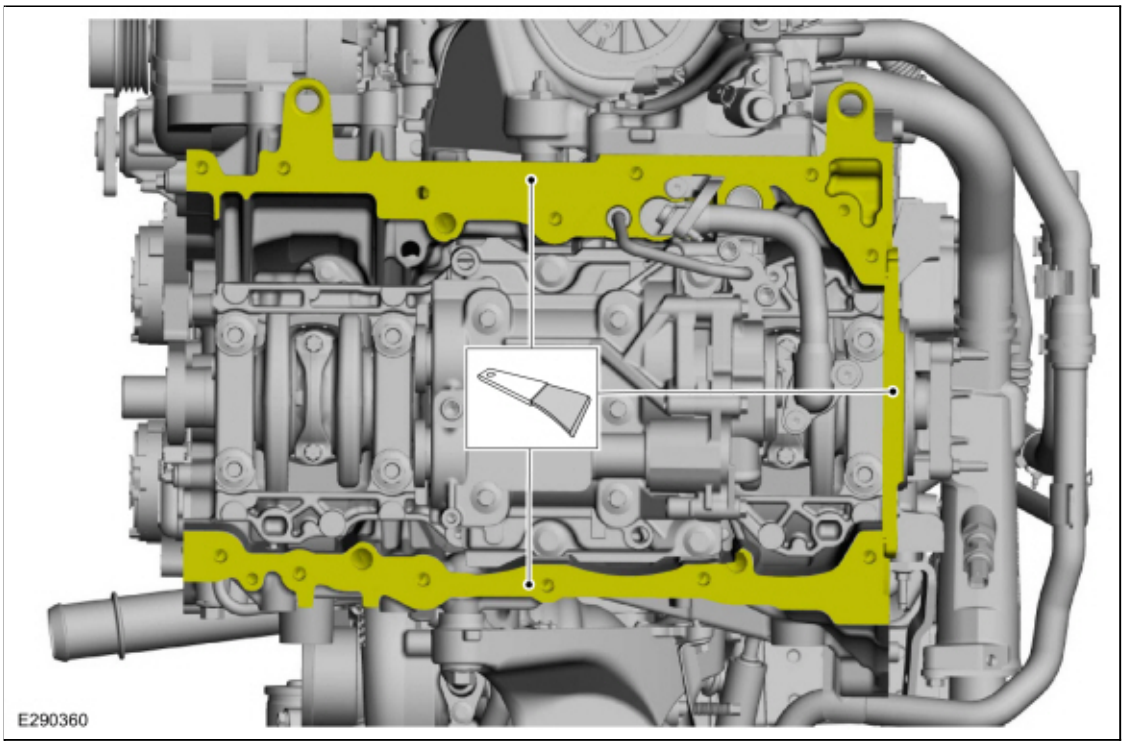
46. **NOTICE: Only use a 3M™ Roloc® Bristle Disk (2-in white, part number 07528) in a suitable tool turning at the recommended speed of 15,000 rpm, to clean the oil pan. Do not use metal scrapers, wire brushes or any other power abrasive disk to clean. These tools cause scratches and gouges that make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



47. **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.**

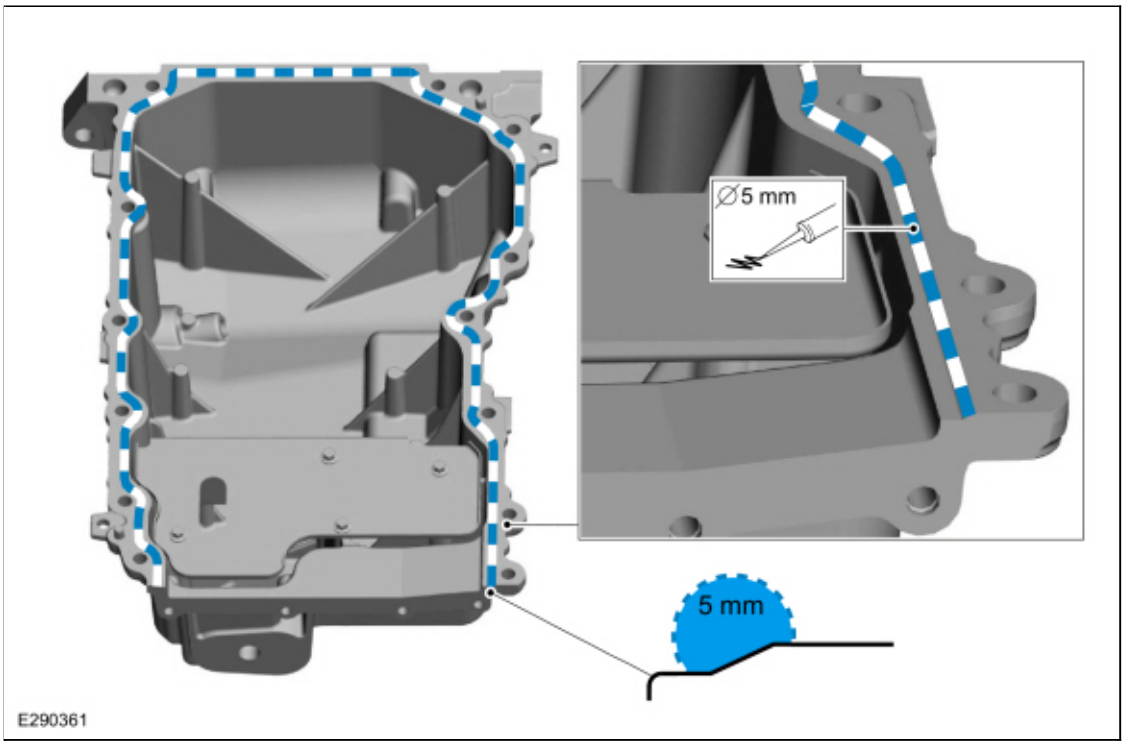
Make sure that the mating faces of the engine block are clean and free of foreign material.
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).
Use the General Equipment: Plastic Scraper
Material: Motorcraft® Silicone Gasket Remover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



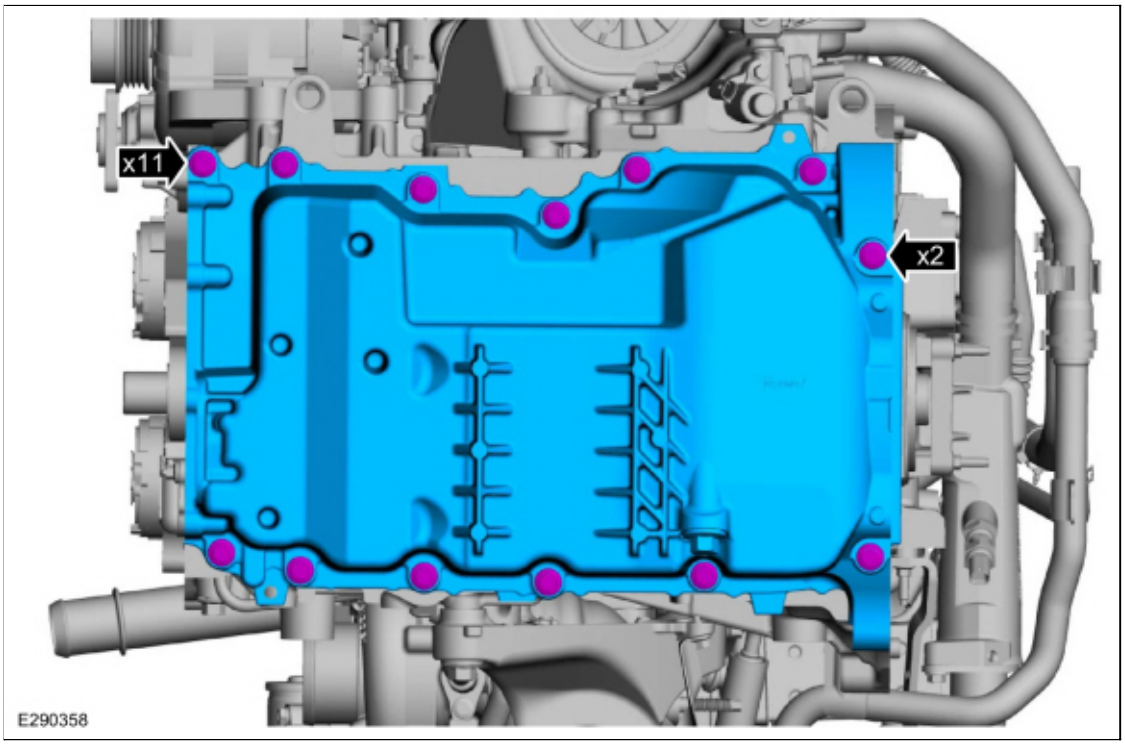
Installation

1. **NOTE:** *If the oil pan is not secured within 10 minutes of silicone sealant application, the silicone sealant must be removed and the sealing area cleaned. Allow to dry until there is no sign of wetness, or 10 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.*

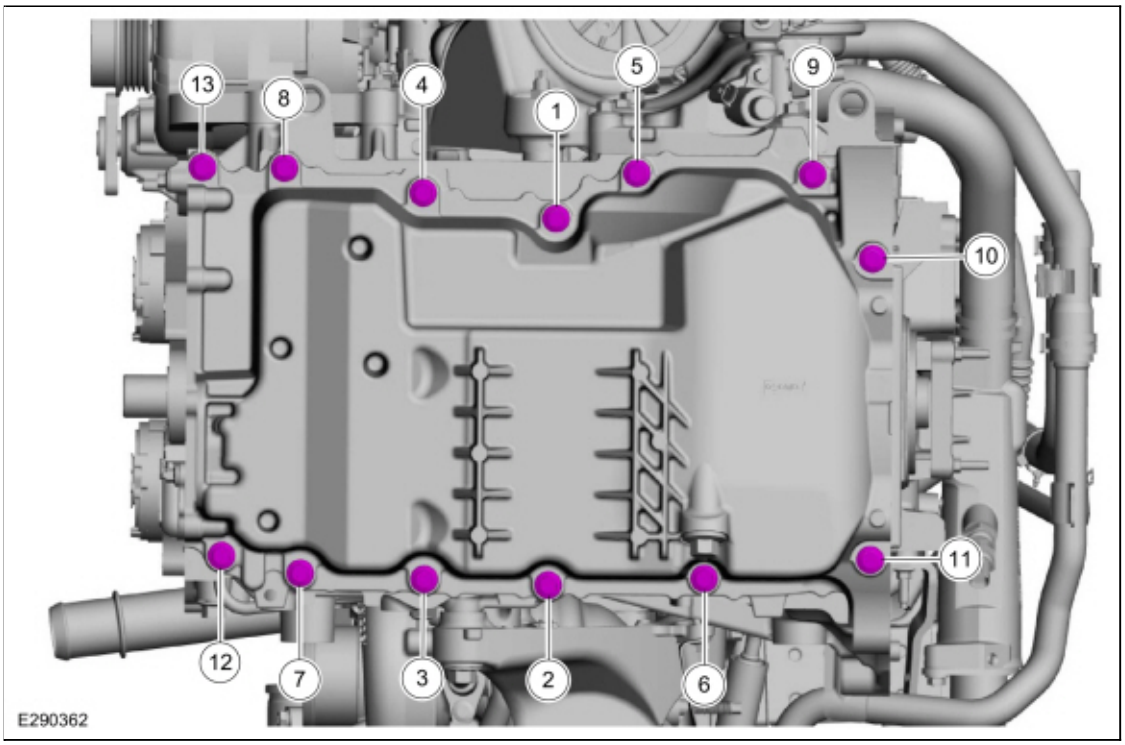
   Apply a 5 mm bead of silicone sealant on the chamfer, as shown.
   Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



2. Install the oil pan and the new bolts finger-tight.

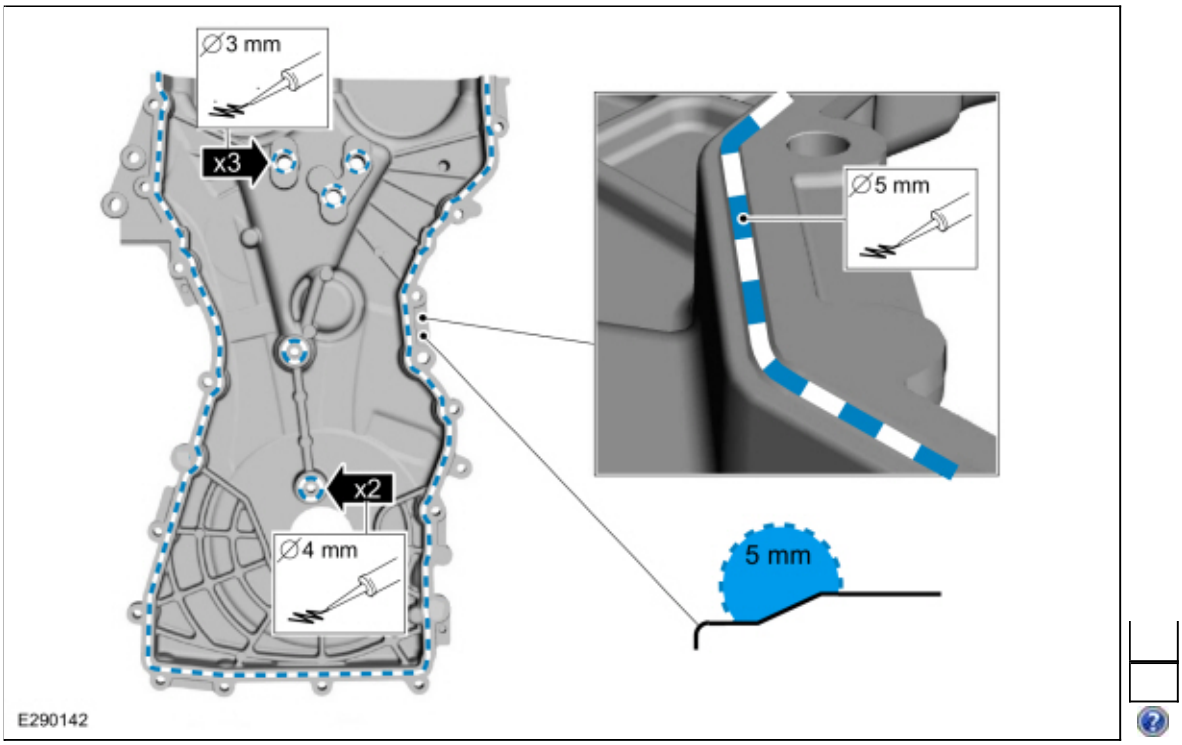


3. Tighten the bolts in sequence shown.
Torque: 18 lb.ft (25 Nm)



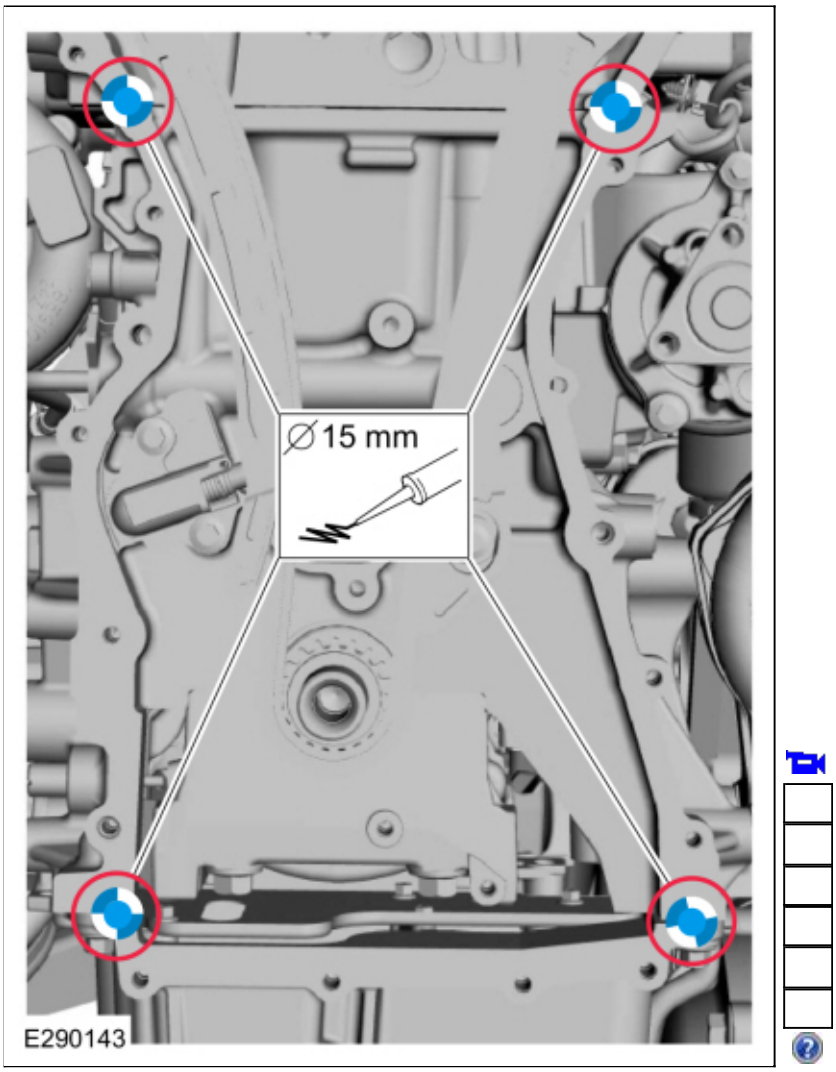
4. **NOTE:** *The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned.*

   - Apply a 3 mm (0.12 in) bead of silicone sealant on the 3 upper bosses, as shown.
     Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)
   - Apply a 4 mm (0.16 in) bead of silicone sealant on the chamfer on the 2 lower bosses, as shown.
     Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)
   - Apply a 5 mm (0.19 in) bead of silicone sealant on the chamfer, as shown.
     Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

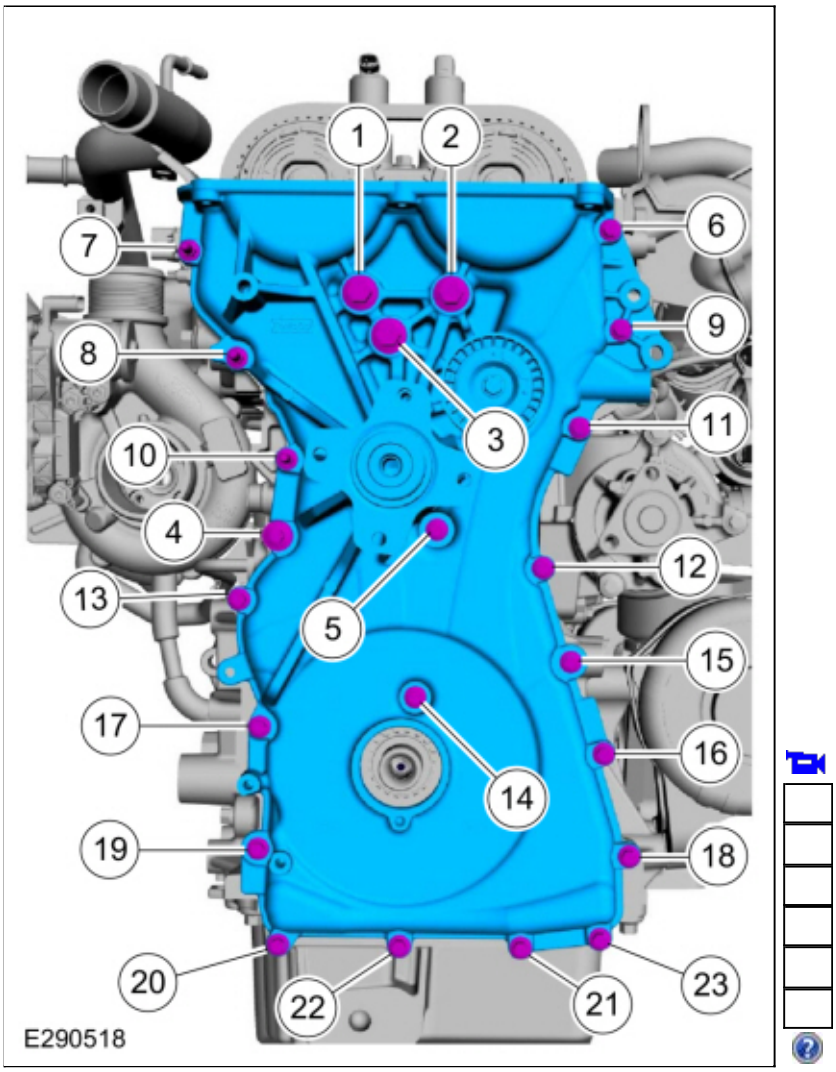


5. **NOTE:** *The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the engine front cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned.*

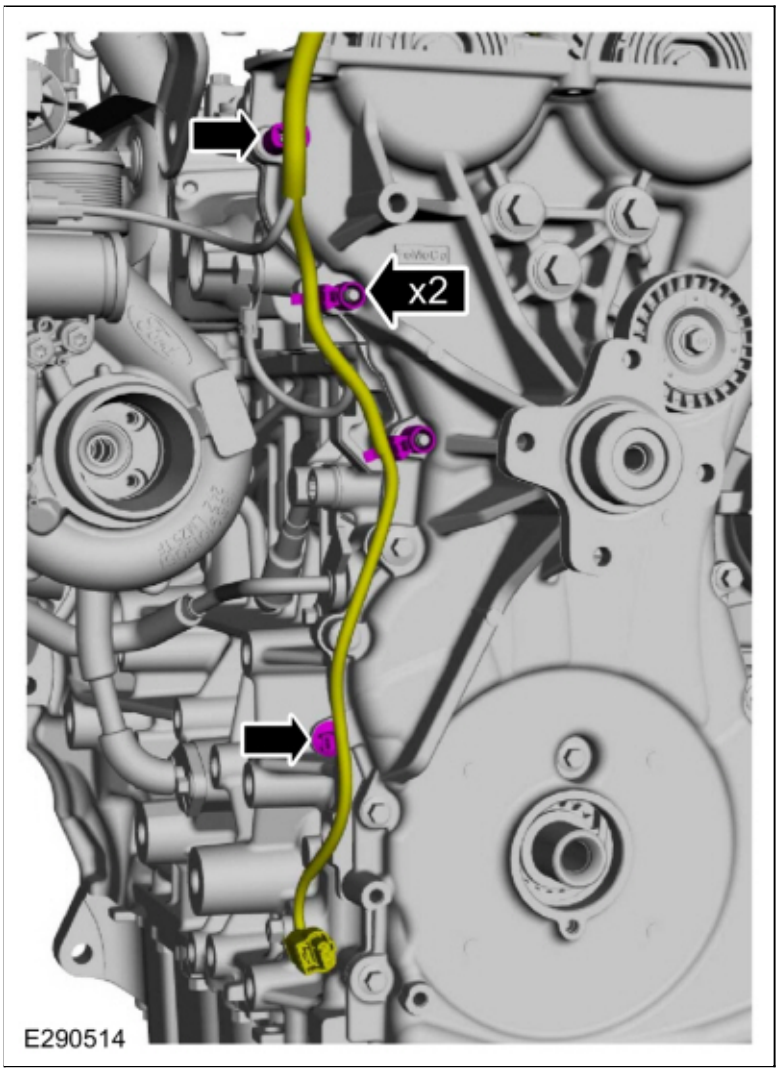
   Apply a 15 mm (0.59 in) drop of silicone sealant at the cylinder head-to-cylinder block and cylinder block-to-oil pan joint areas.
   Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



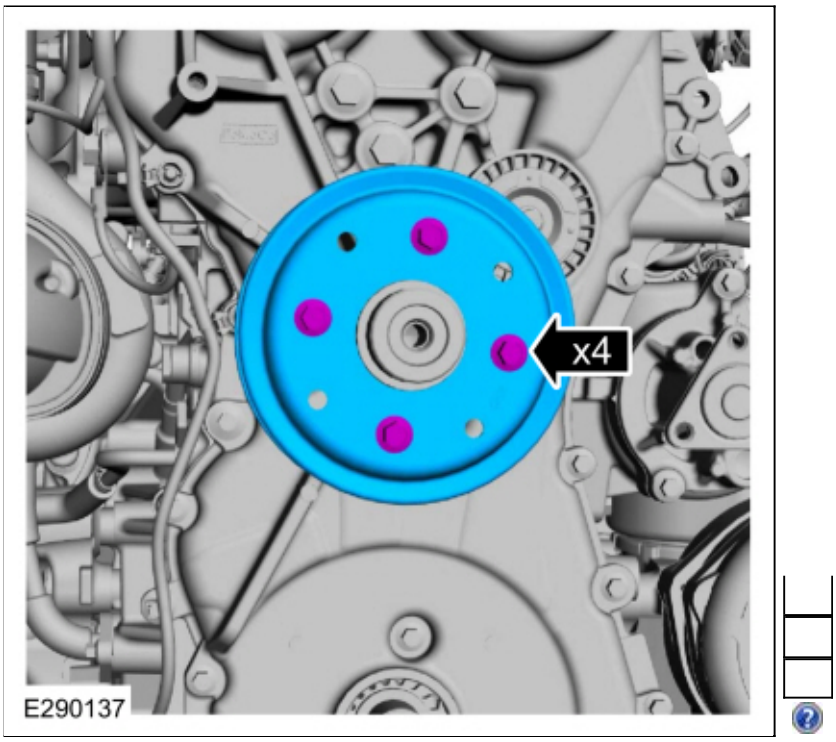
6. Install the engine front cover and the fasteners and tighten in the sequence shown.
   Torque:
   Bolts 1 - 3: 35 lb.ft (48 Nm)
   Bolt 4: 18 lb.ft (25 Nm)
   Bolts 5 - 22: 97 lb.in (11 Nm)



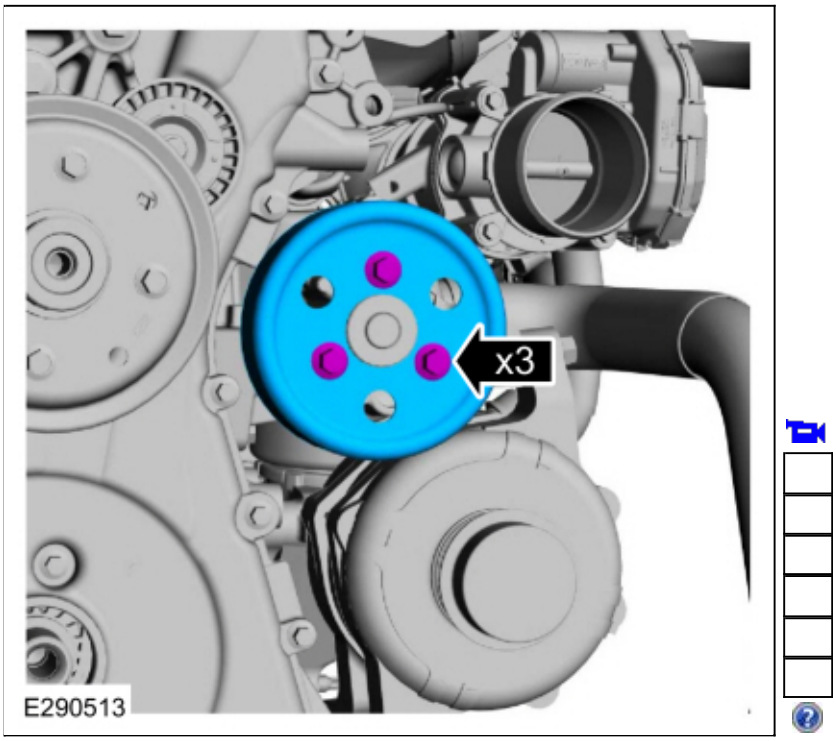
7. Attach wiring harness retainers to the engine front cover and stud bolts.



8. Install the accessory drive belt pulley and tighten the bolts.
   Torque: 18 lb.ft (25 Nm)



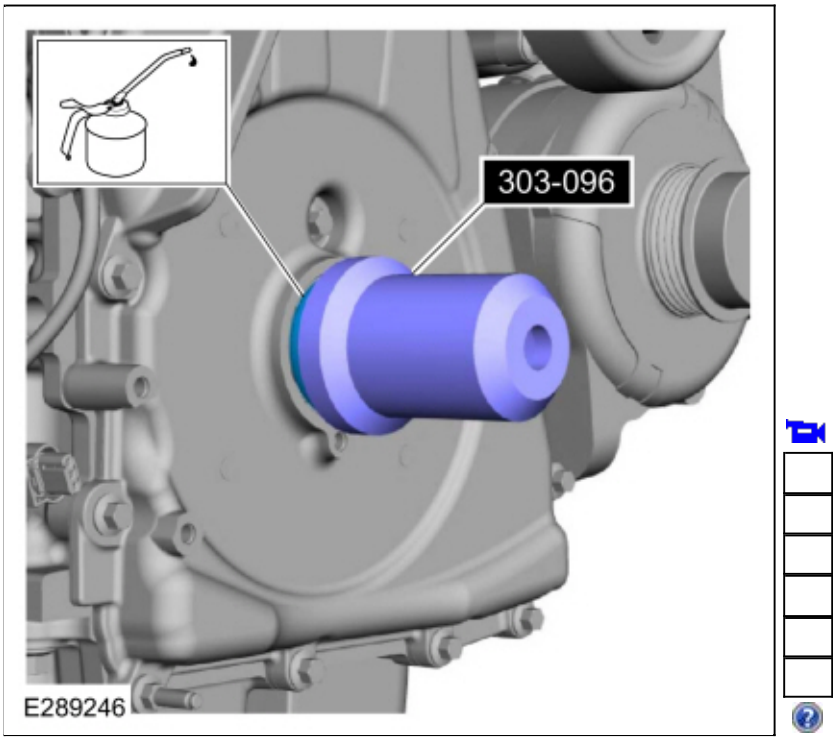
9. Install the coolant pump pulley and tighten the bolts.
Torque: 18 lb.ft (25 Nm)



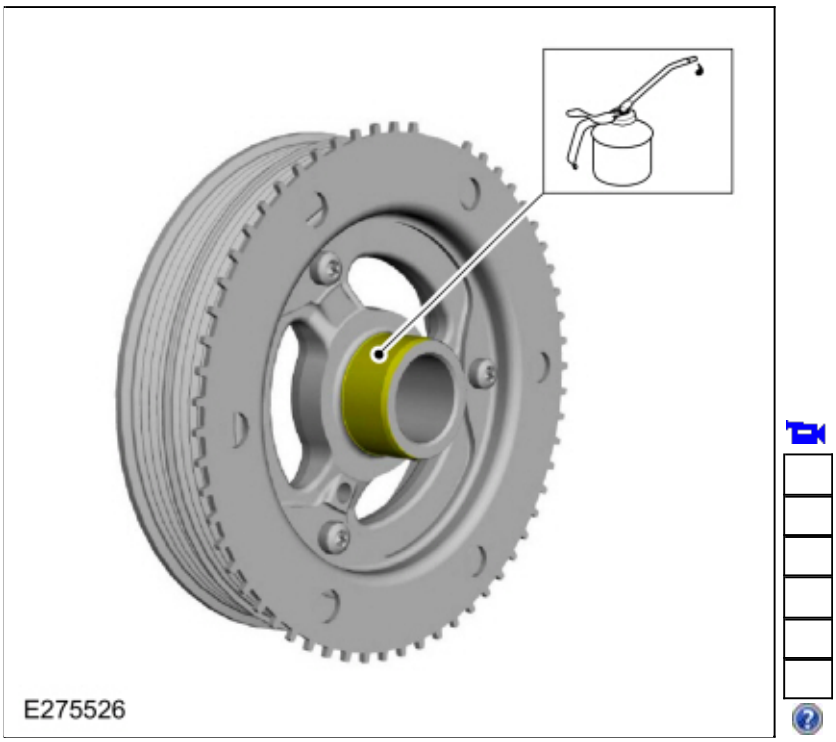
10.

- Lubricate the crankshaft front seal with clean engine oil.
- **NOTE:** *Remove the through-bolt from the Camshaft Front Oil Seal Installer.*

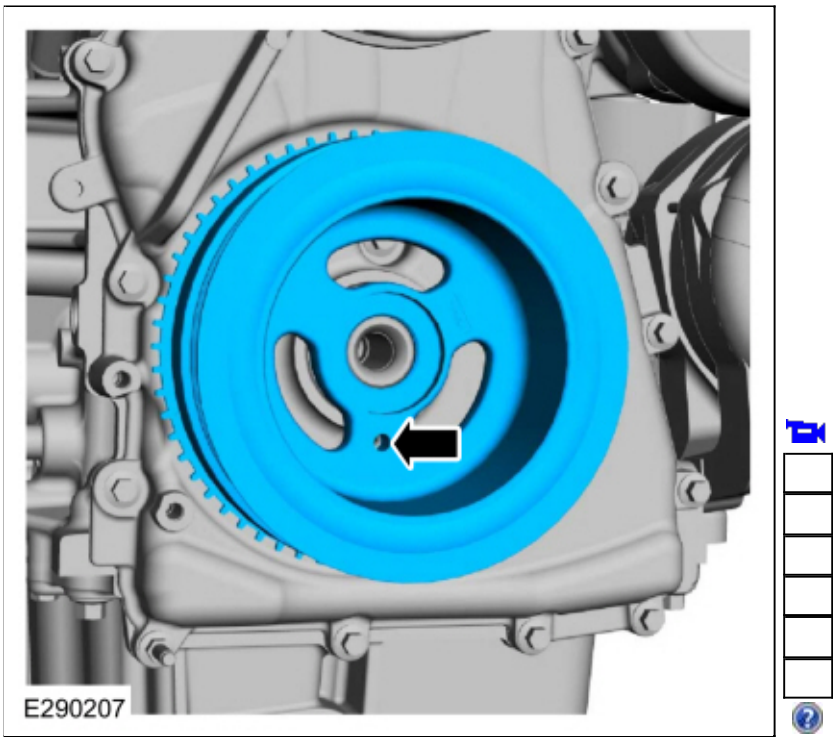
Using the special tools, install the crankshaft front seal.
Use Special Service Tool: 303-096 (T74P-6150-A) Installer, Camshaft Front Oil Seal.



11. Lubricate the crankshaft pulley with clean engine oil.

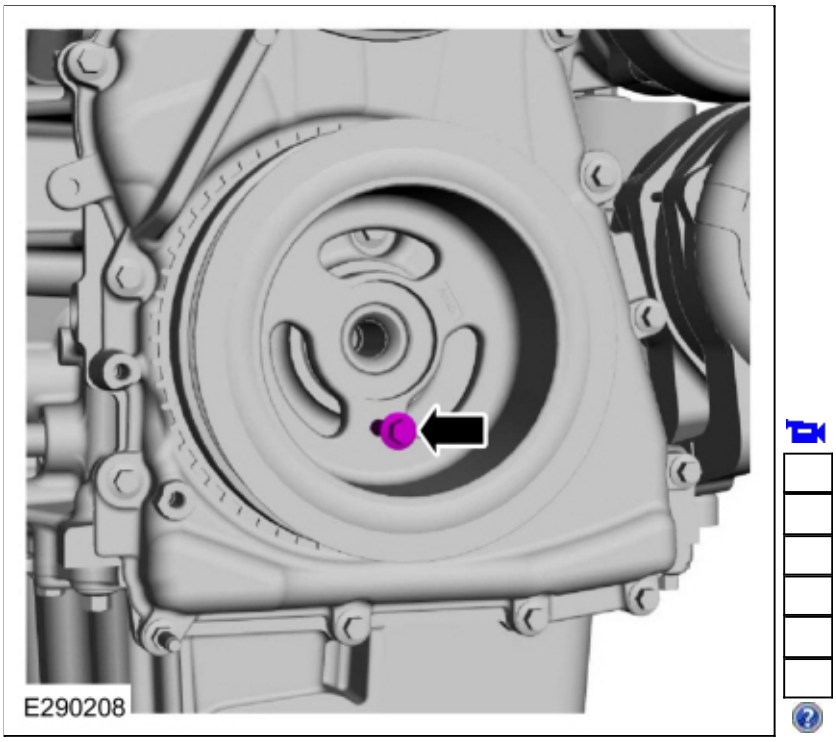


12. Position the crankshaft pulley onto the crankshaft with the access hole at the 6 o'clock position.



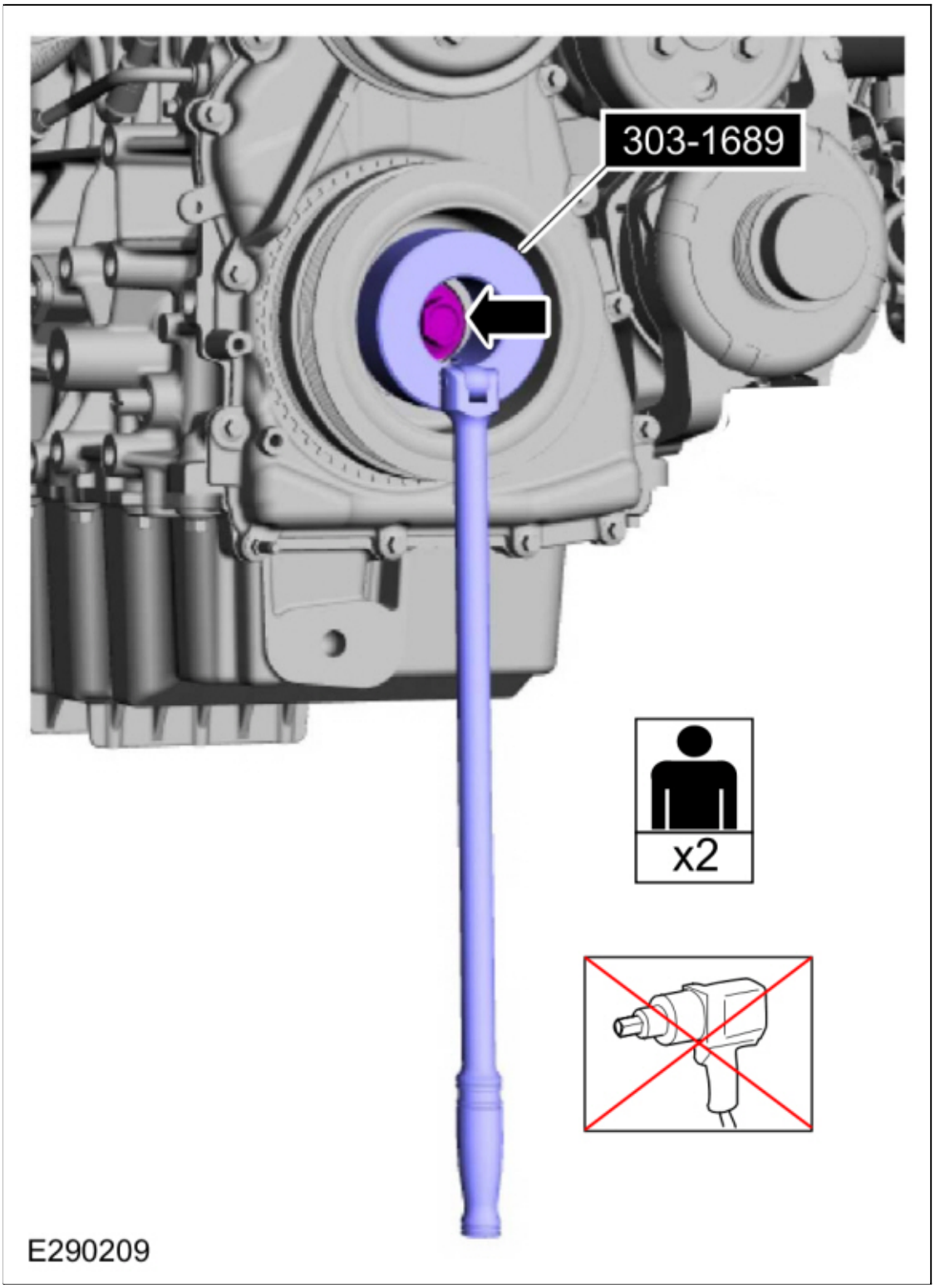
13. **NOTE:** *This step will correctly align the crankshaft pulley to the crankshaft.*

    Install an M6 bolt.

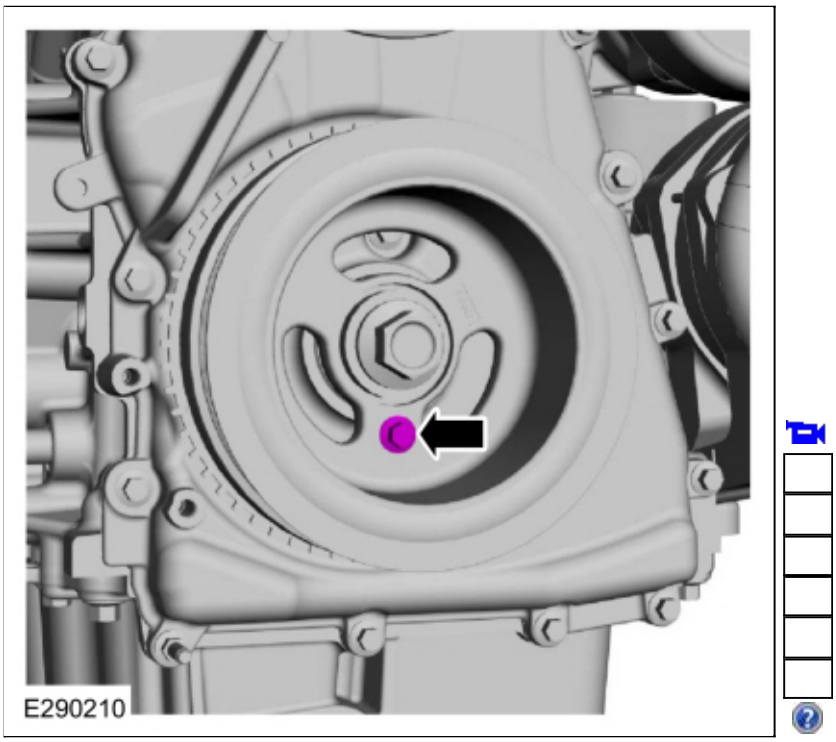


14. **NOTICE: The crankshaft must remain in the TDC position during installation of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Crank Damper Holding Tool and the bolt should be installed using hand tools only.**

Using the special tool, install the new crankshaft bolt and washer and tighten.
Use Special Service Tool: 303-1689 Holding Tool, Crank Damper.
Torque:
Stage 1: 74 lb.ft (100 Nm)
Stage 2: 90°

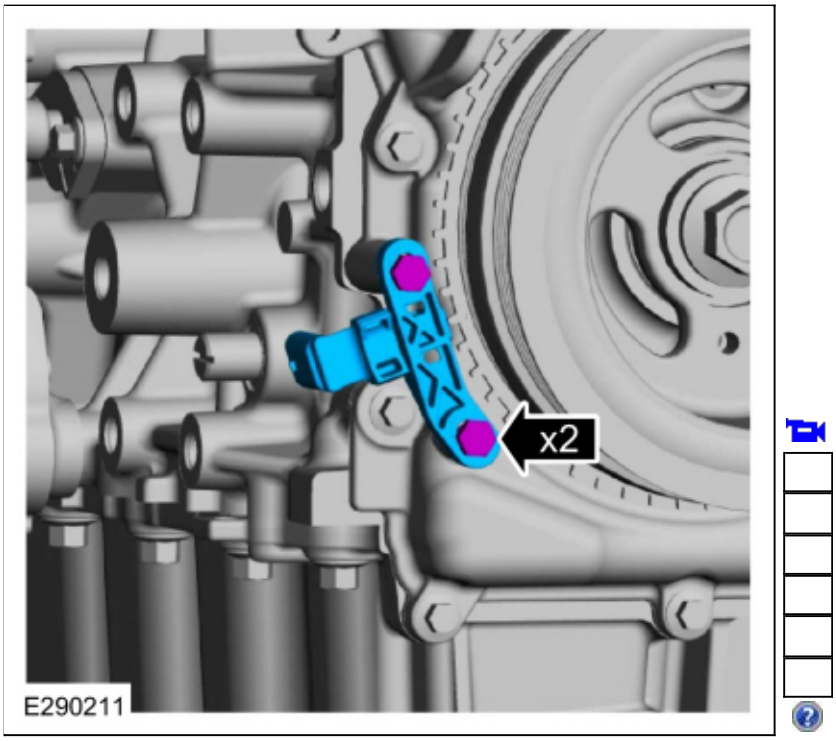


15. Remove the M6 bolt.

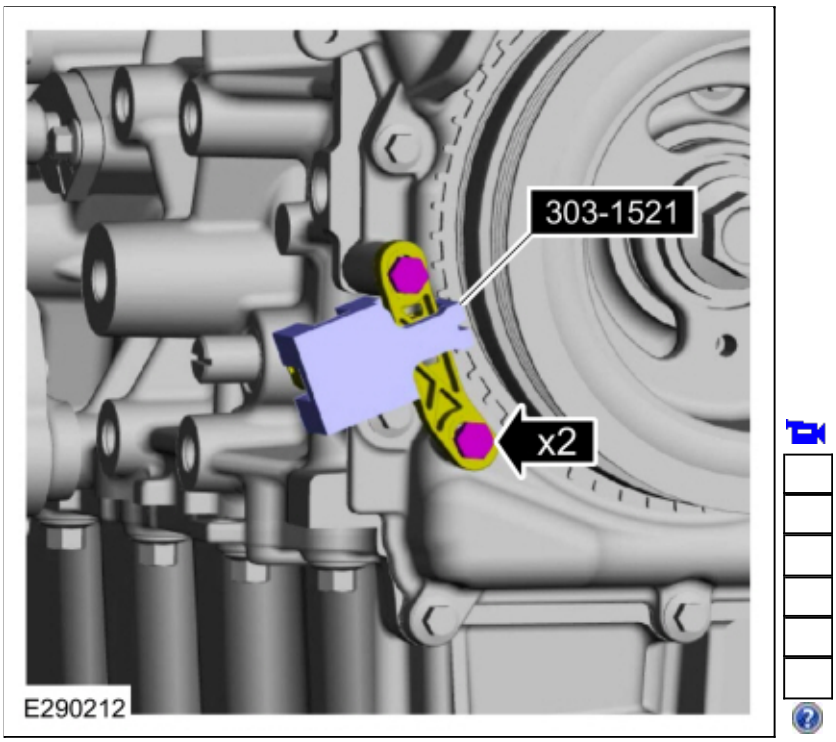


16. **NOTE:** *Do not tighten the CKP sensor bolts at this time.*

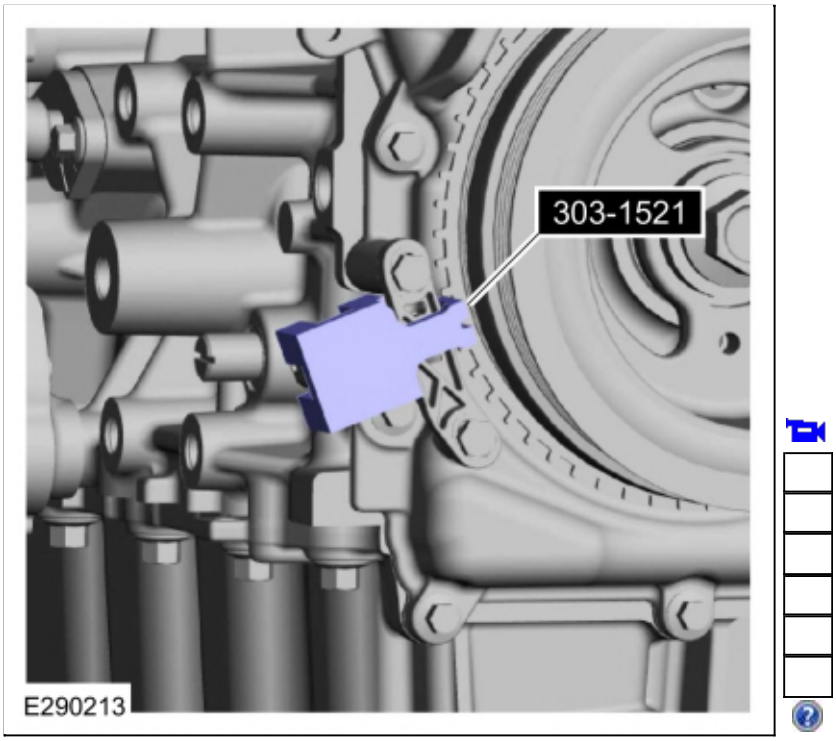
Install the CKP sensor and the bolts finger tight.



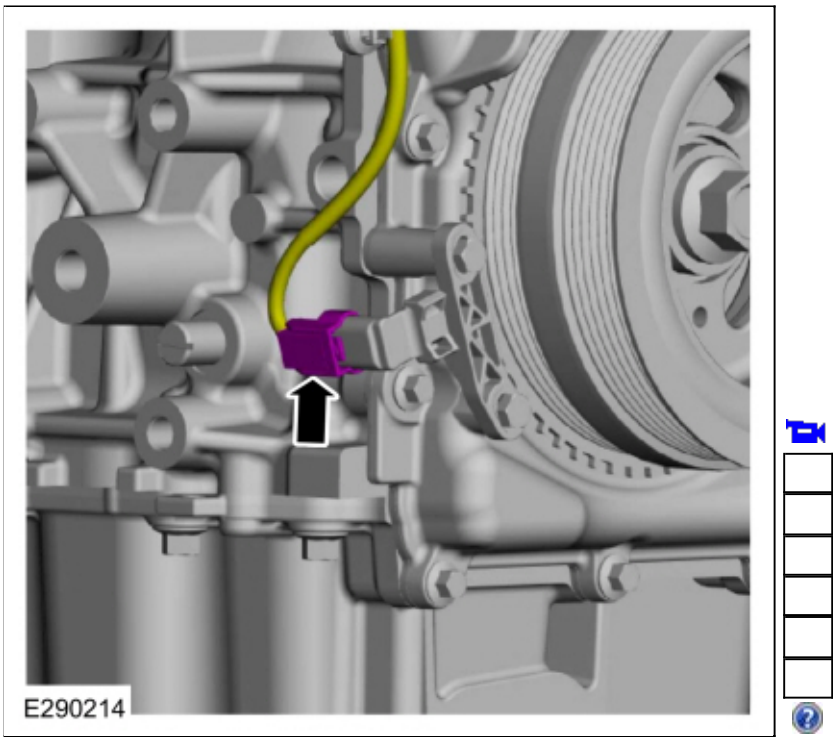
17. Install the special tool onto the CKP sensor and the tooth of the crankshaft pulley trigger wheel.
Use Special Service Tool: 303-1521 Alignment Tool, Crankshaft Position Sensor.
Torque: 97 lb.in (11 Nm)



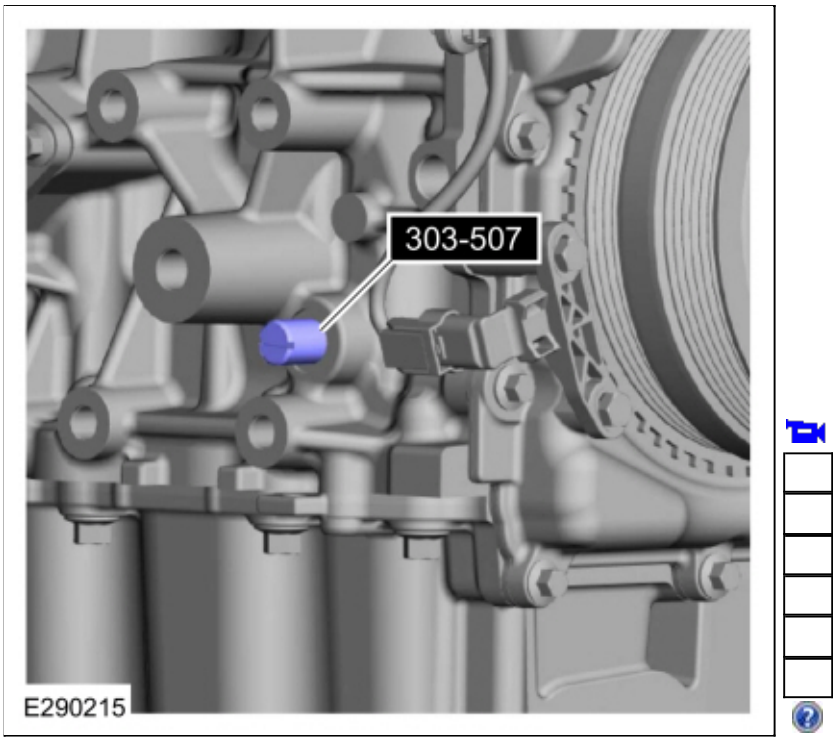
18. Remove Special Service Tool: 303-1521 Alignment Tool, Crankshaft Position Sensor.



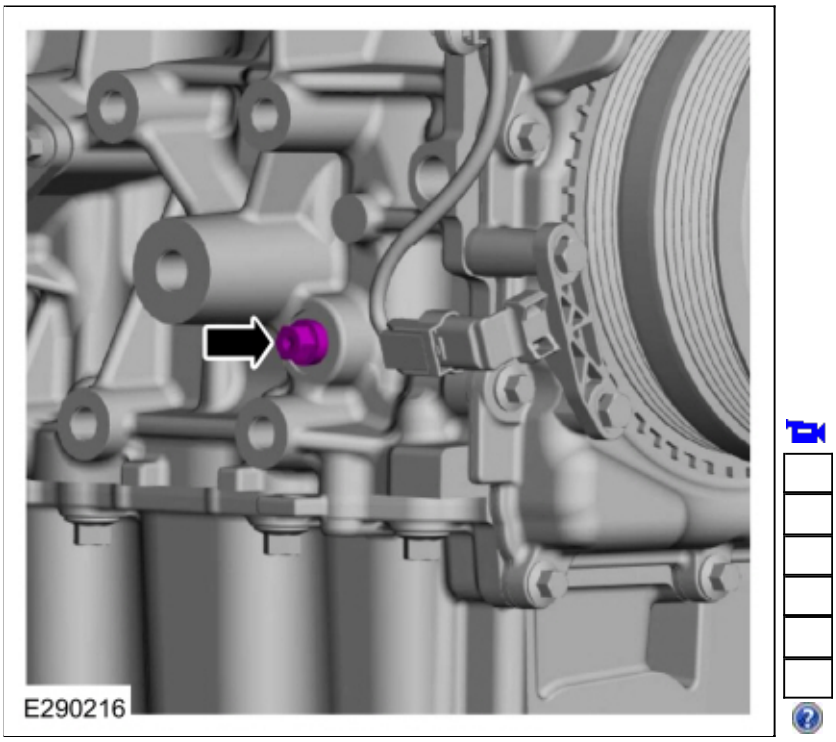
19. Connect the CKP sensor electrical connector.



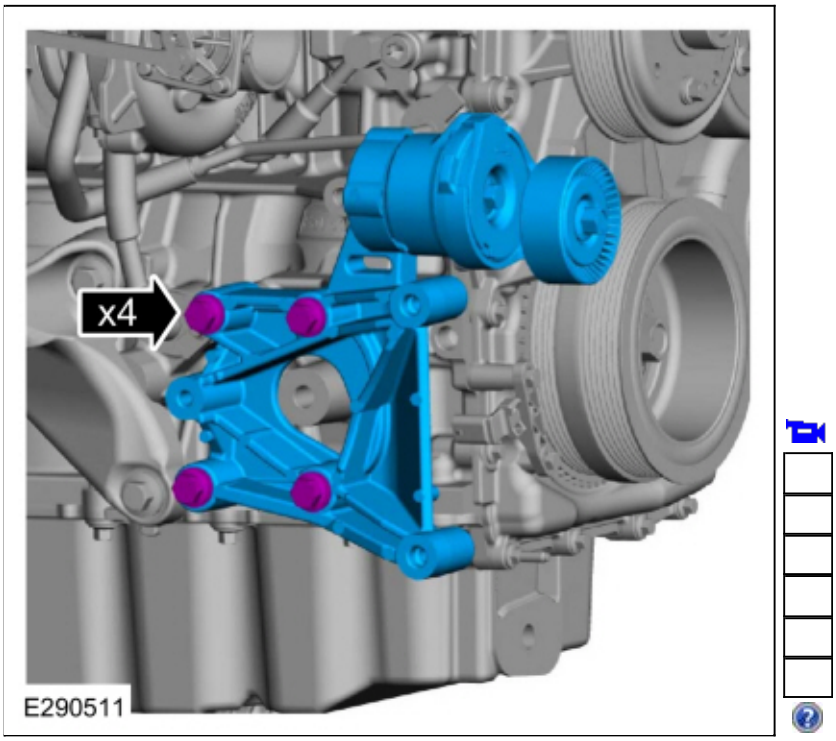
20. Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



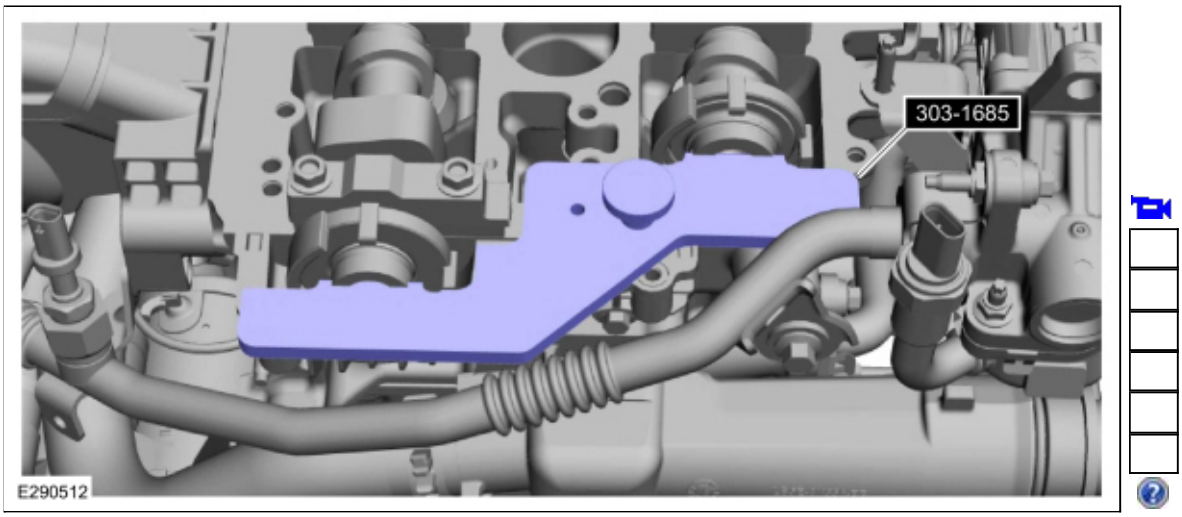
21. Install the engine plug bolt.
Torque: 177 lb.in (20 Nm)



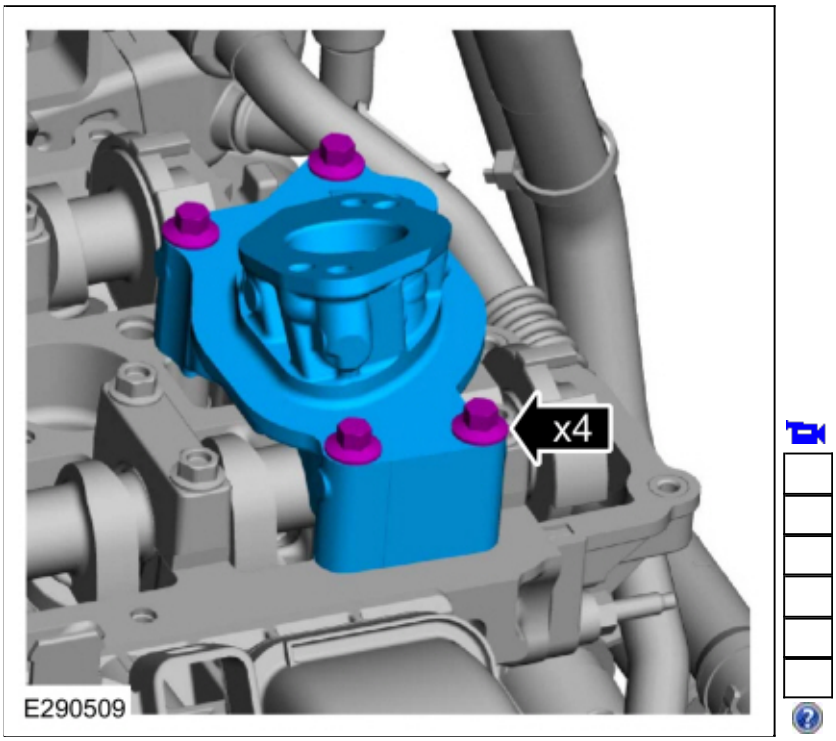
22. Install the A/C compressor bracket and the bolts.
Torque: 35 lb.ft (48 Nm)



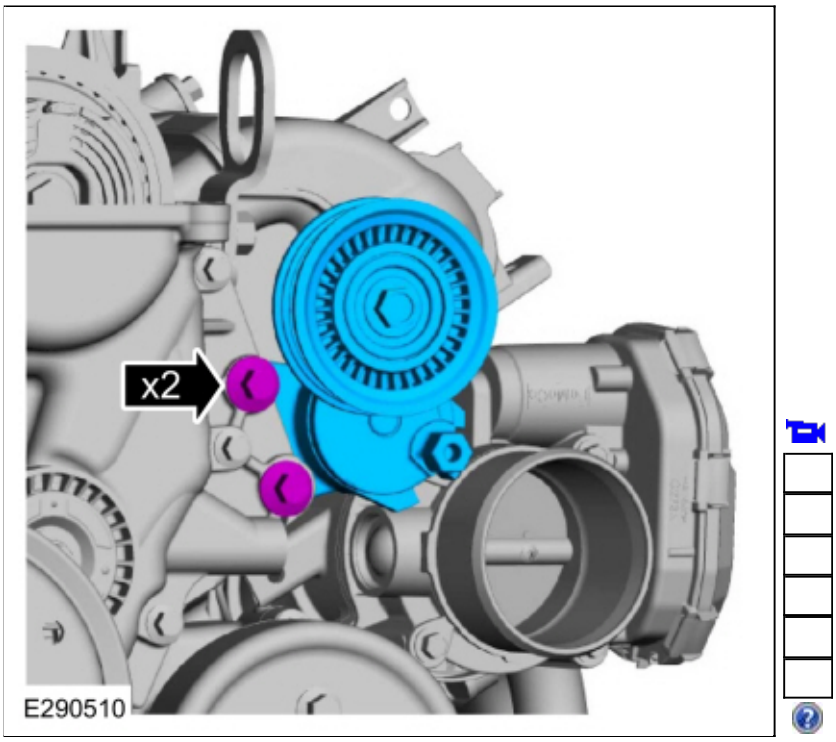
23. Remove Special Service Tool: 303-1685 Alignment Tool, Camshaft.



24. Install the high-pressure fuel pump drive unit and the bolts.
Torque: 97 lb.in (11 Nm)

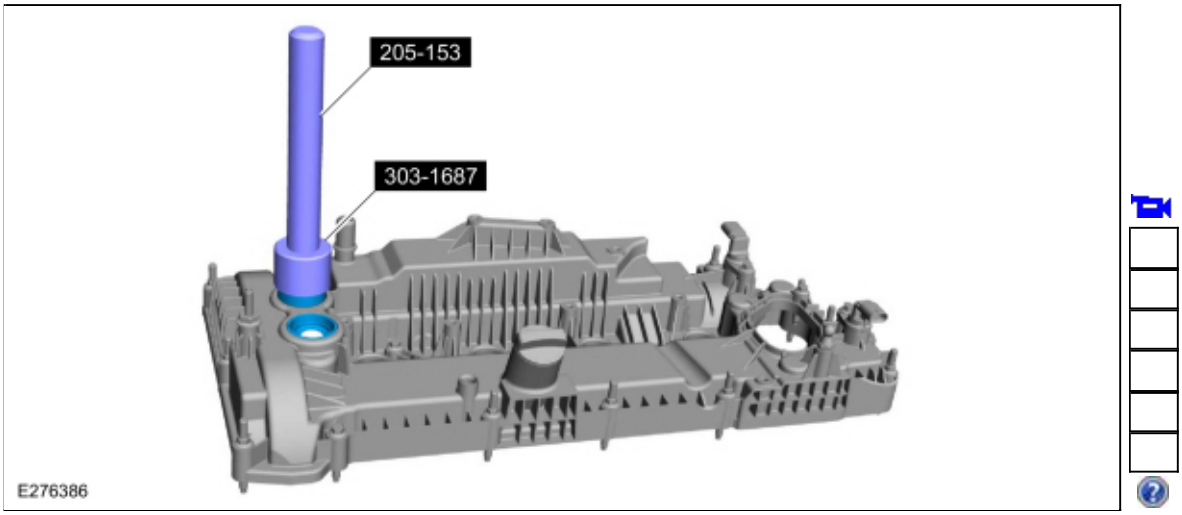


25. Install the accessory drive belt tensioner and the bolts.
Torque: 18 lb.ft (25 Nm)

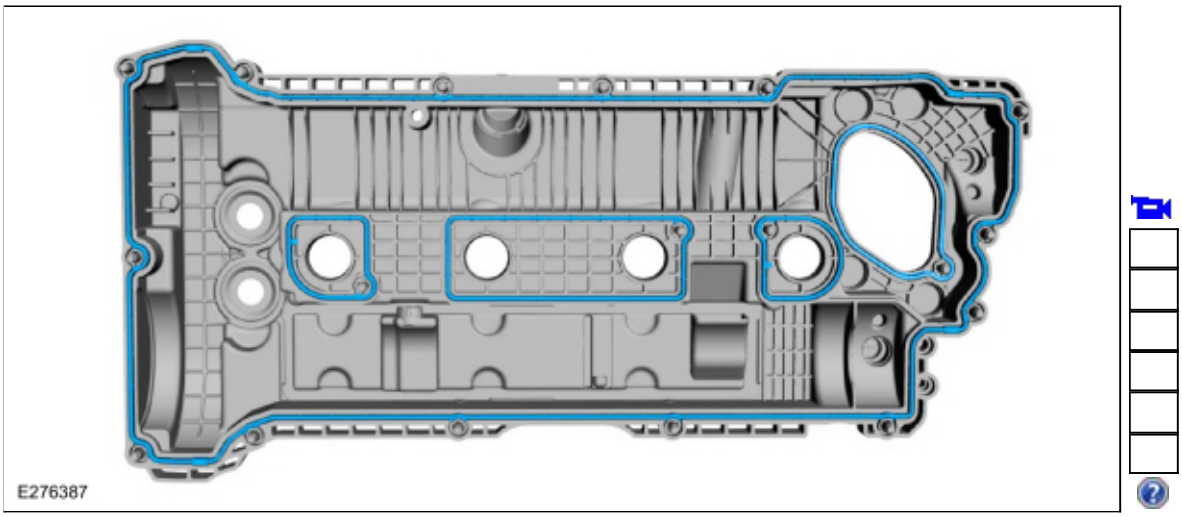


26. **NOTE:** *Installation of new seals is only required if damaged seals were removed during removal.*

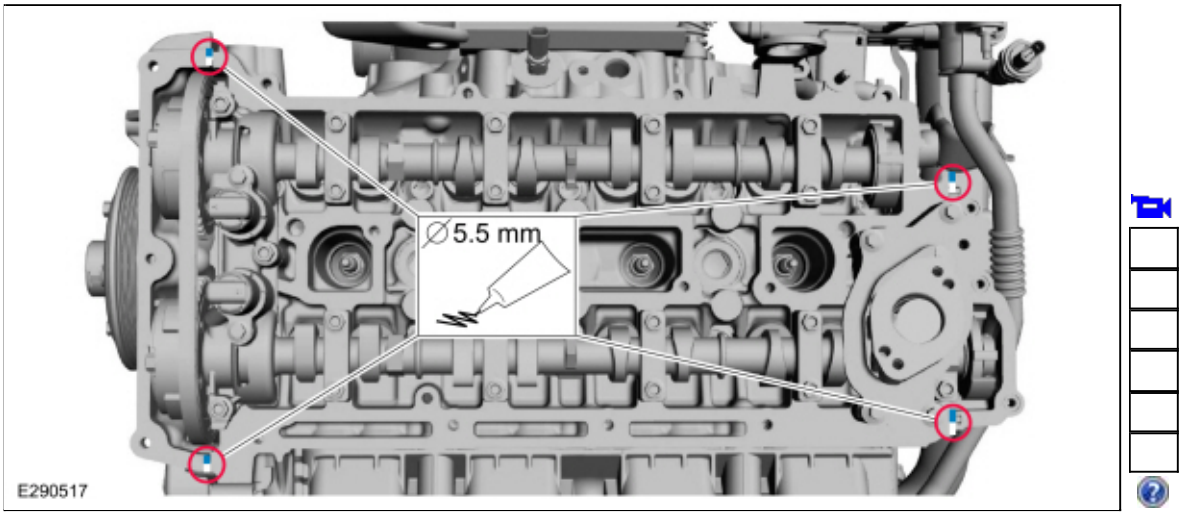
    If removed, using the special tools, install the VCT oil control solenoid seals.
    Use Special Service Tool: 205-153 (T80T-4000-W) Handle. , 303-1687 Installer, VCT Solenoid Seal.



27. Install a new valve cover gaskets.

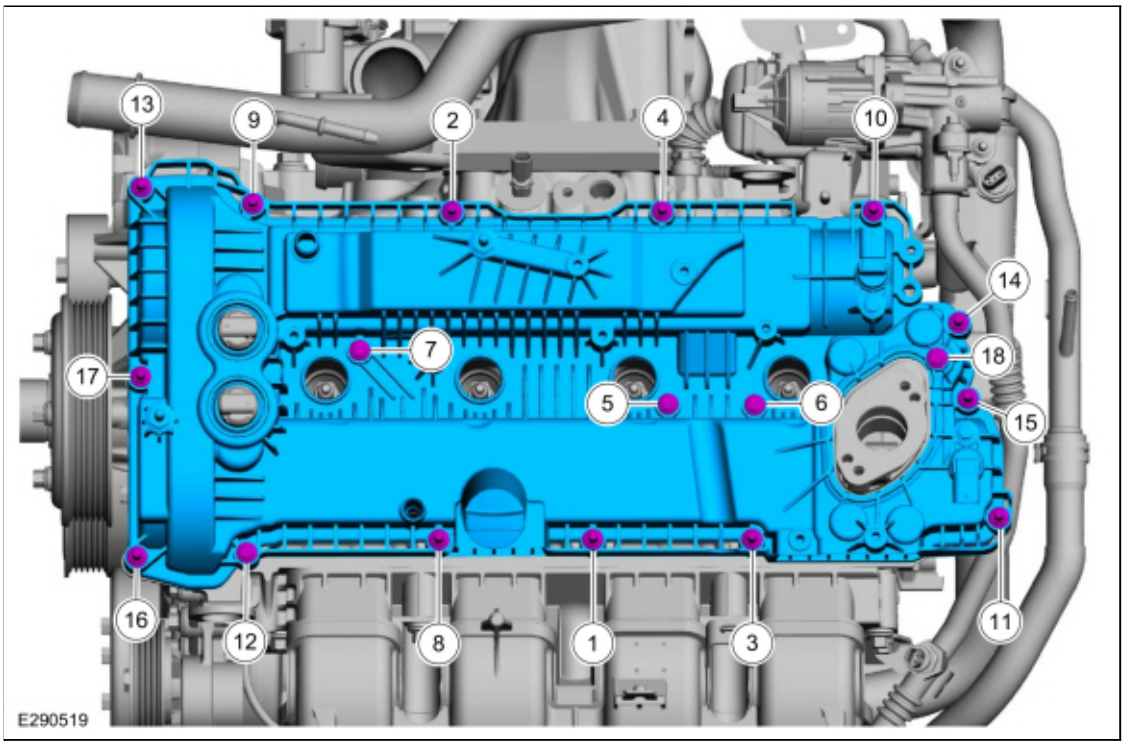


28. Apply a 5.5 mm (0.22 in) bead of silicone sealant in the 4 places shown.
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)

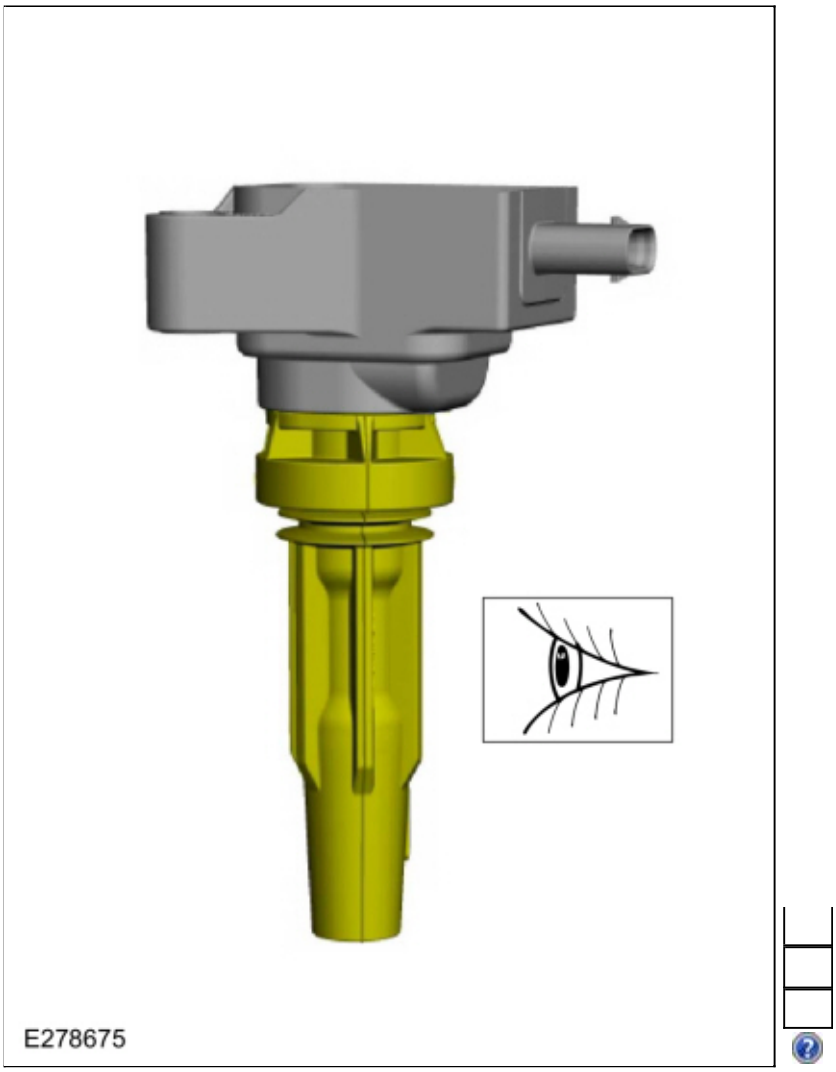


29. **NOTE:** *The valve cover must be secured within 10 minutes of silicone gasket application. If the valve cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned.*

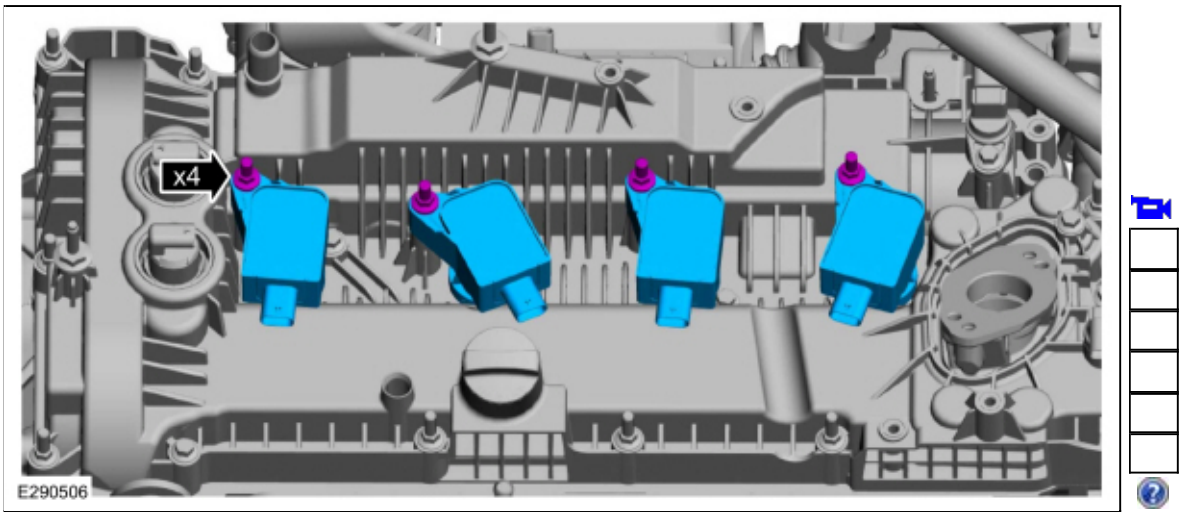
Install the valve cover and tighten the fasteners in sequence shown.
Torque: 97 lb.in (11 Nm)



30. Inspect and replace any ignition coil-on-plug rubber boots with cracks, rips or tears.

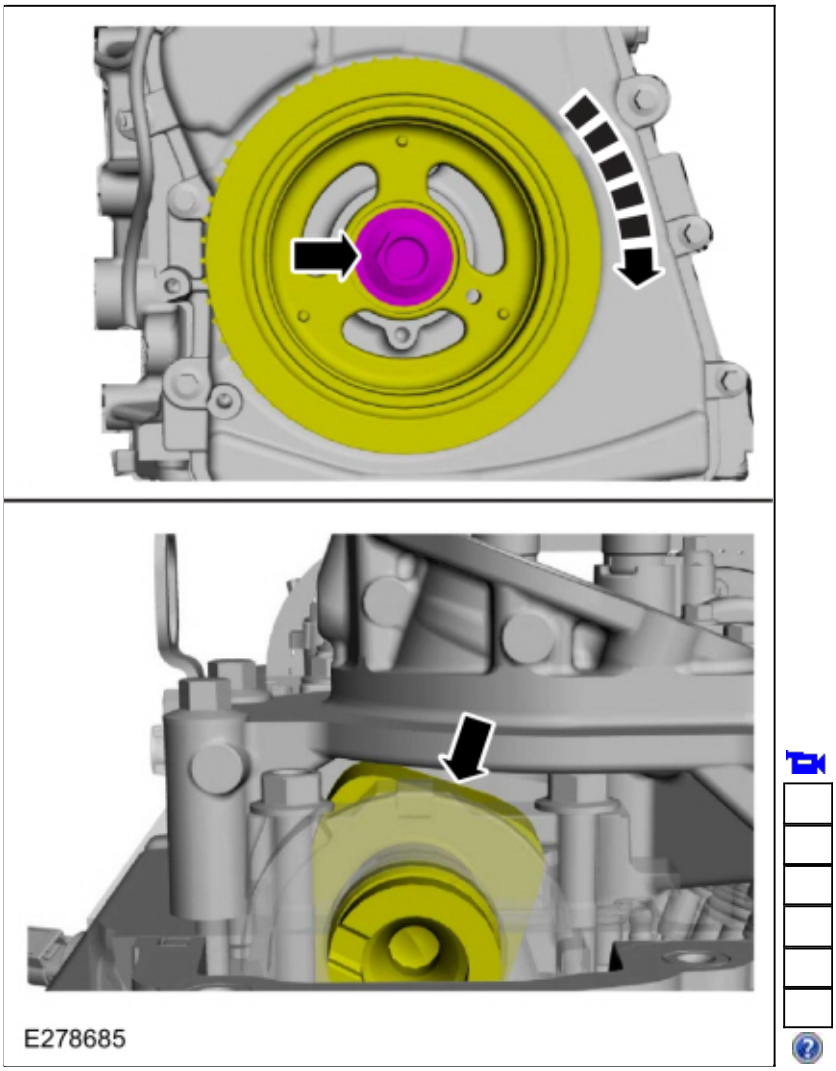


31. Install the ignition coil-on-plugs and the fasteners.
Torque: 97 lb.in (11 Nm)

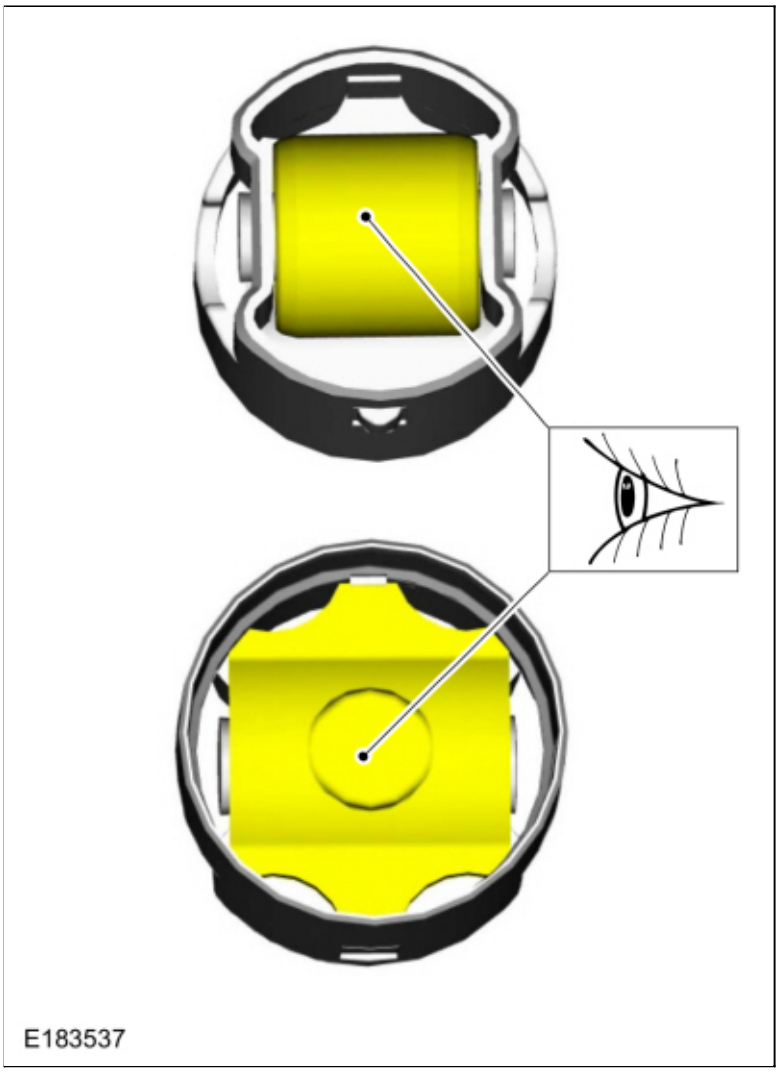


32. **NOTICE: The high-pressure fuel pump tappet cam lobe must be positioned at zero lift before installing the high-pressure fuel pump drive unit.**

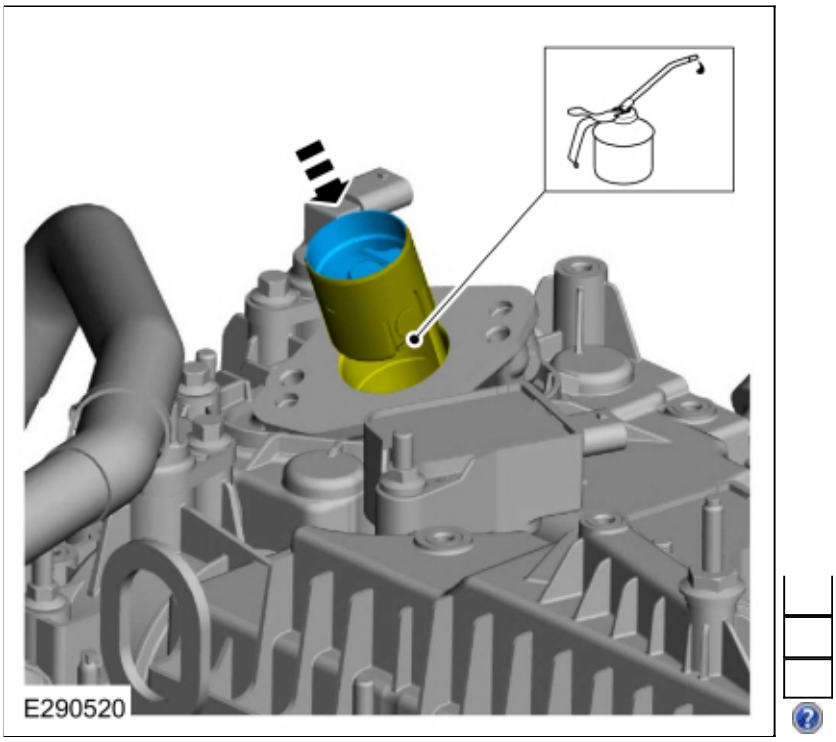
    Rotate the crankshaft to position the camshaft at zero lift.



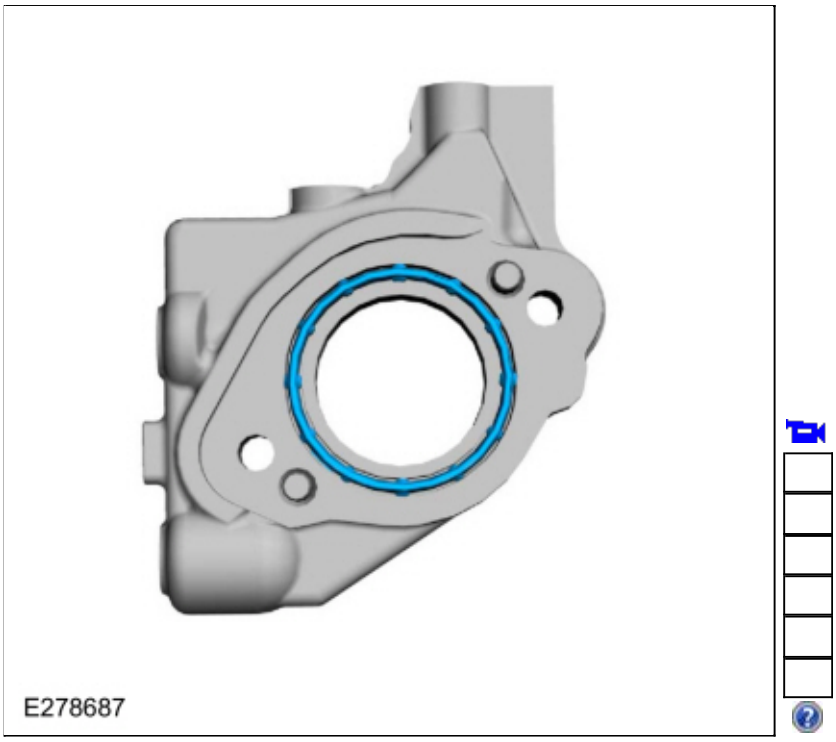
33. Inspect the high-pressure fuel pump tappet for flat spots or scoring, especially in the indicated areas. If any damage is found, inspect the high-pressure fuel pump and the high-pressure fuel pump tappet drive lobe. Install new components as necessary.



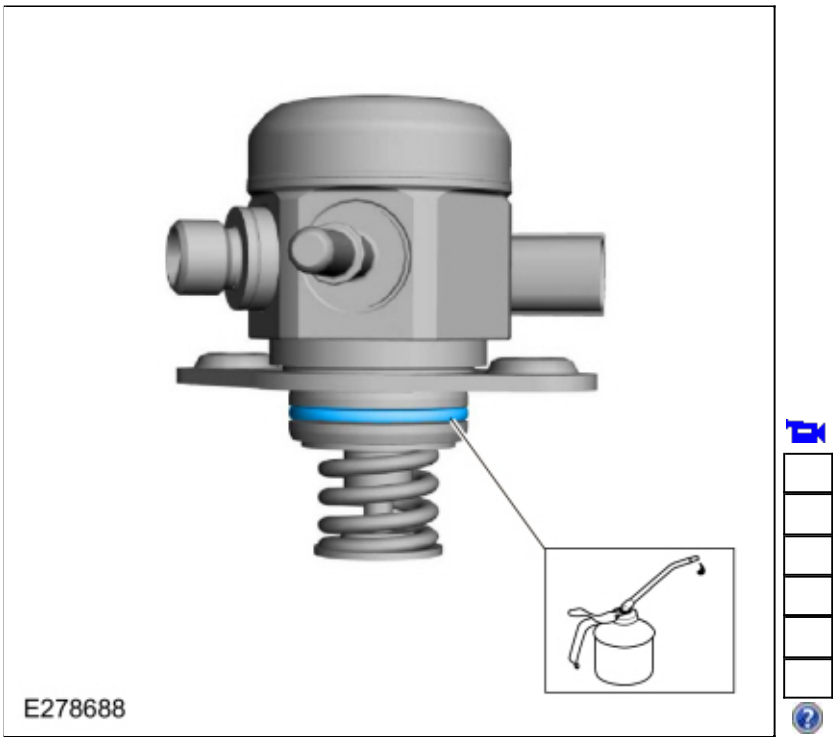
34. Lubricate with clean engine oil and install the high-pressure fuel pump tappet.



35. Install a new fuel pump mounting plate O-ring seal.

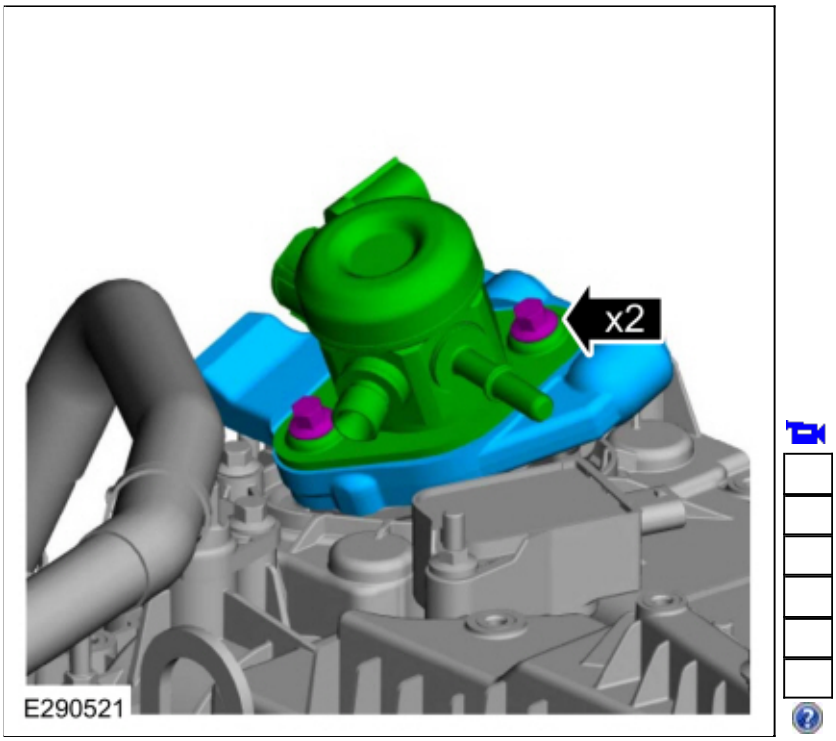


36. Install a new high-pressure fuel pump O-ring seal.



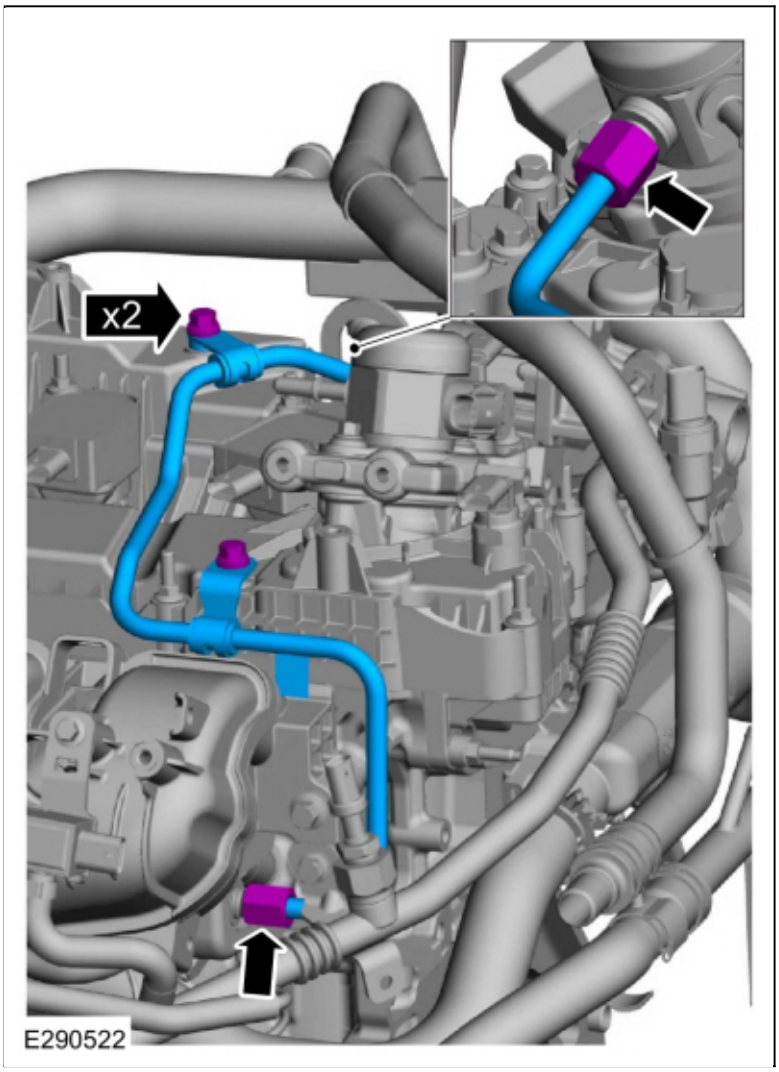
37. **NOTE:** *Install new bolts.*

Install the high-pressure fuel pump, mounting plate and alternately tighten each new bolt one complete revolution until seated in 2 stages.
Torque:
Stage 1: 115 lb.in (13 Nm)
Stage 2: 45°

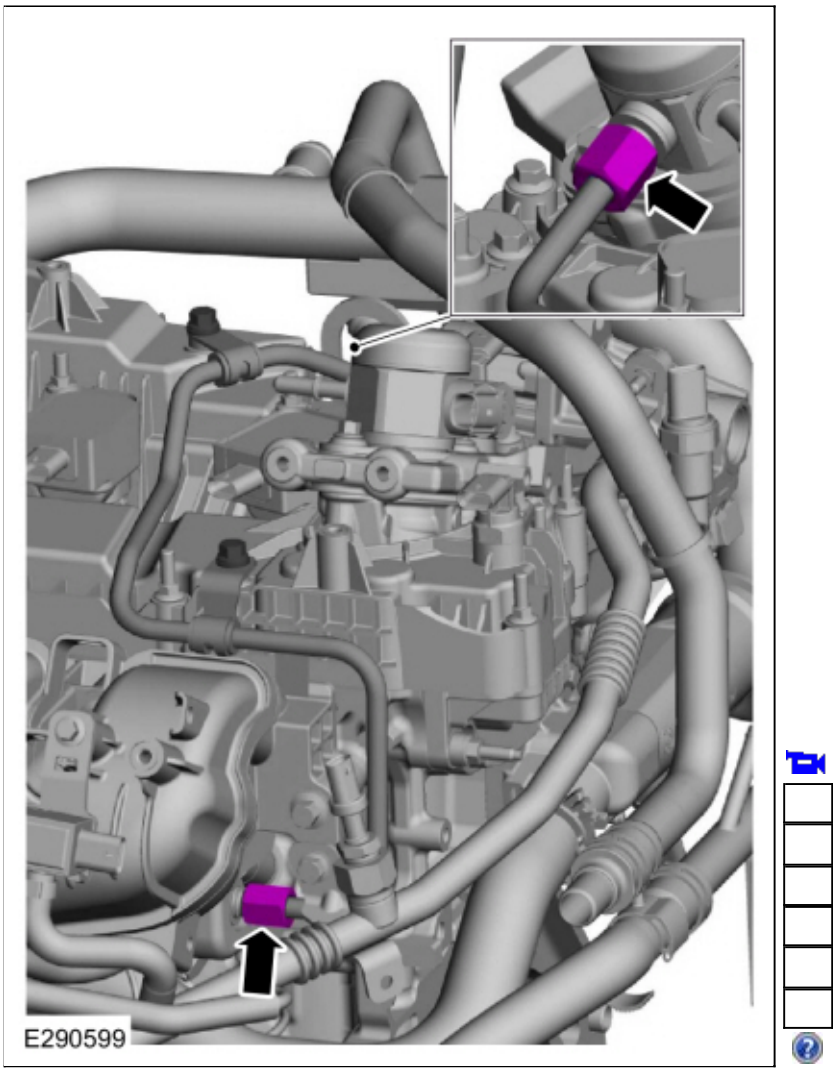


38. **NOTE:** *Install a new fuel tube.*

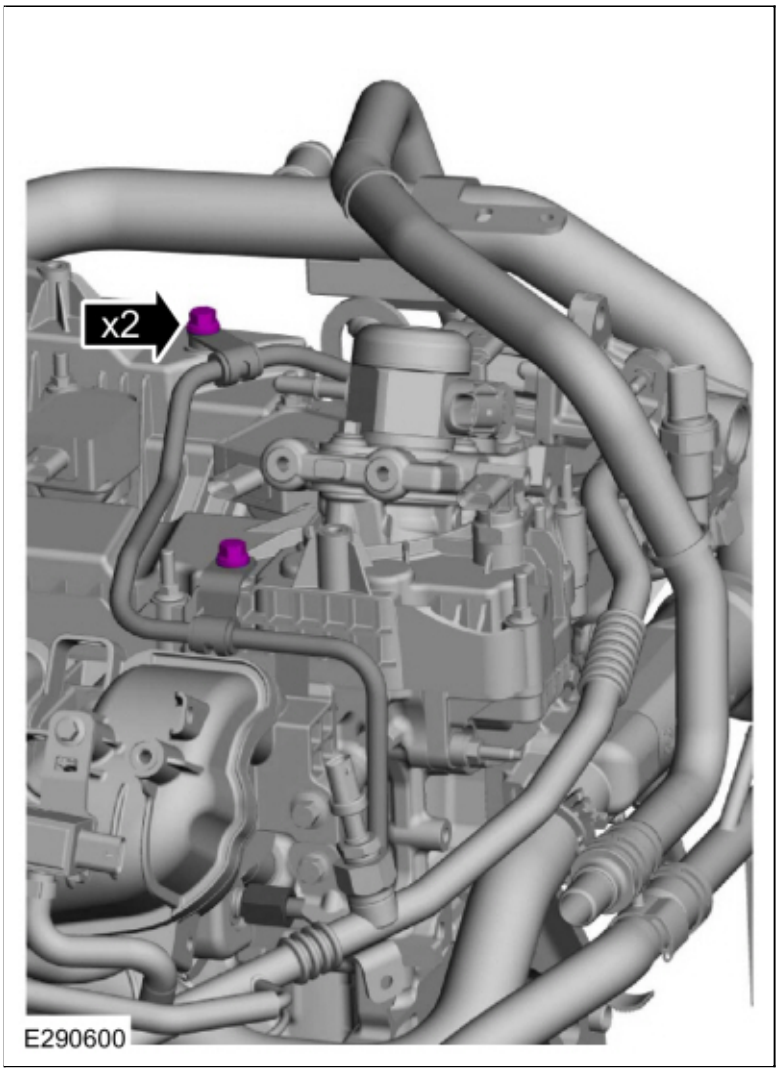
- Install the fuel tube and the bolts finger-tight.
- Install the flare nuts finger-tight.



39. Tighten the flare nuts in 2 stages.
Torque:
Stage 1: 89 lb.in (10 Nm)
Stage 2: 38°

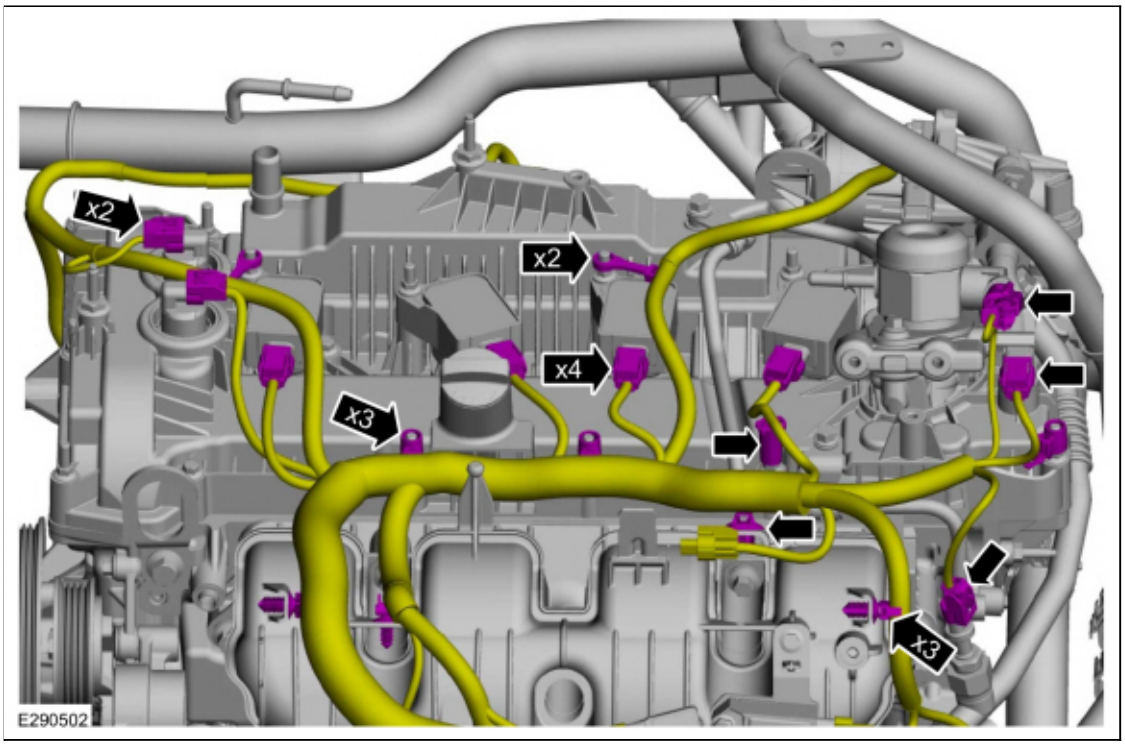


40. Tighten the bolts.
Torque: 97 lb.in (11 Nm)

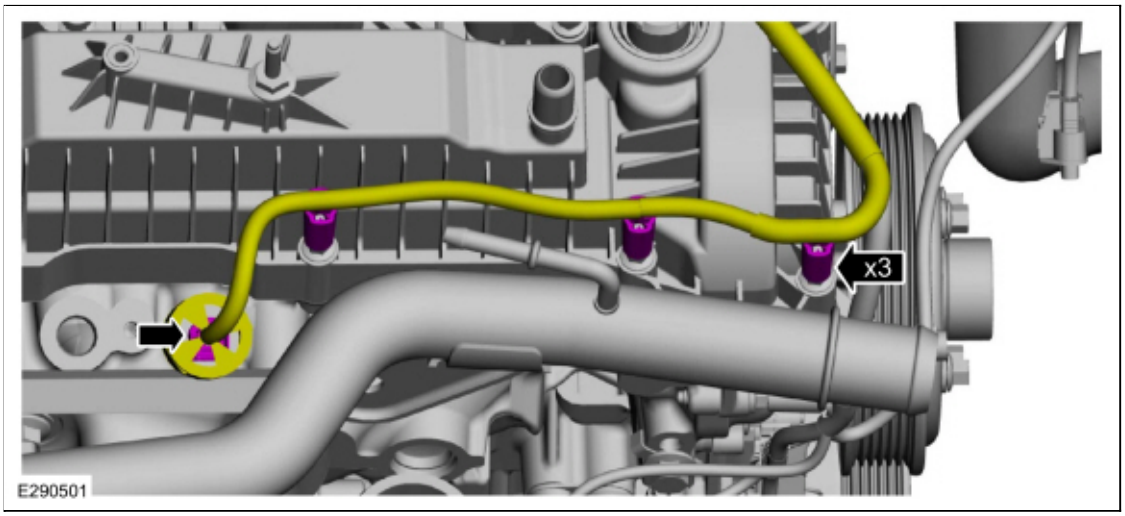


41.

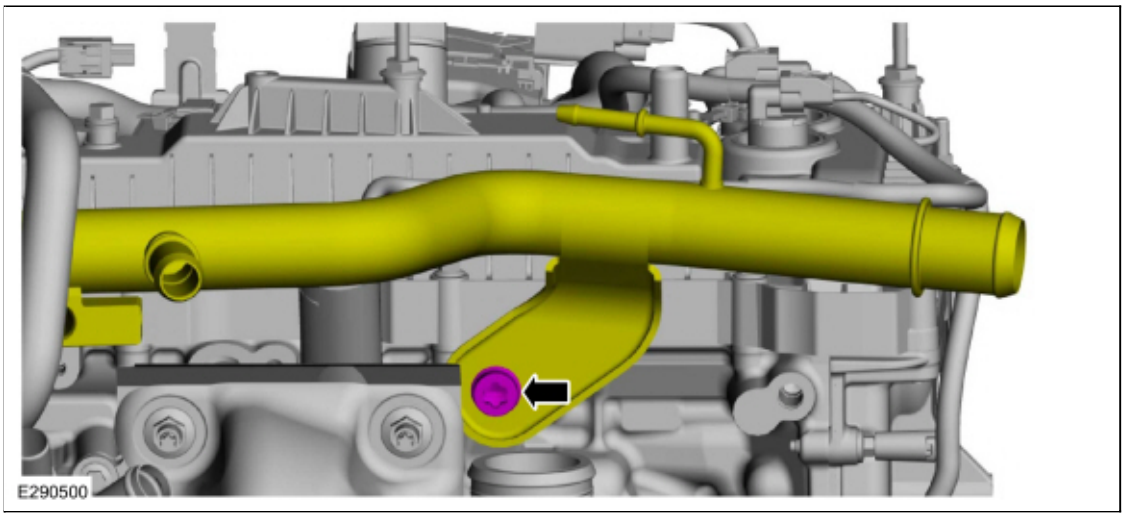
- Position the wiring harness.
- Attach the wiring harness retainers.
- Connect the wiring harness electrical connectors.



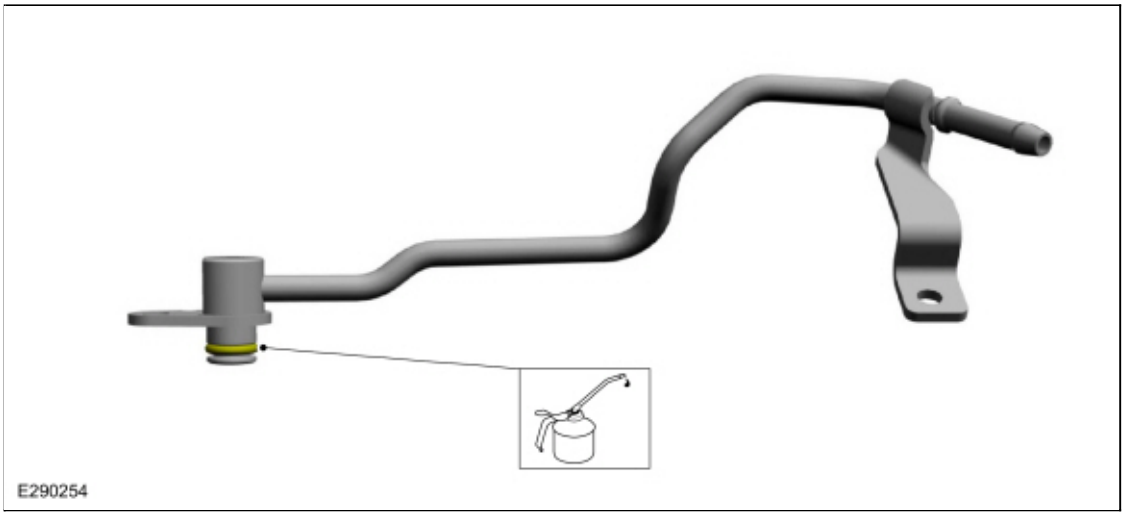
42. Connect the CHT sensor wiring harness electrical connector and attach the retainers.



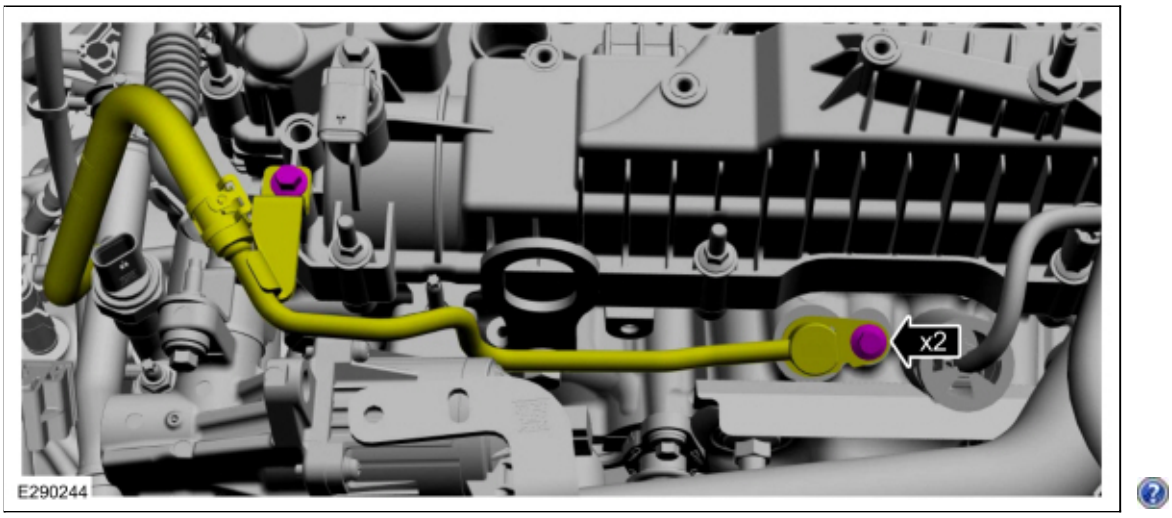
43. Position the coolant tube and install the bolt.
Torque: 35 lb.ft (48 Nm)



44. Lubricate the coolant tube O-ring seal with clean engine coolant.

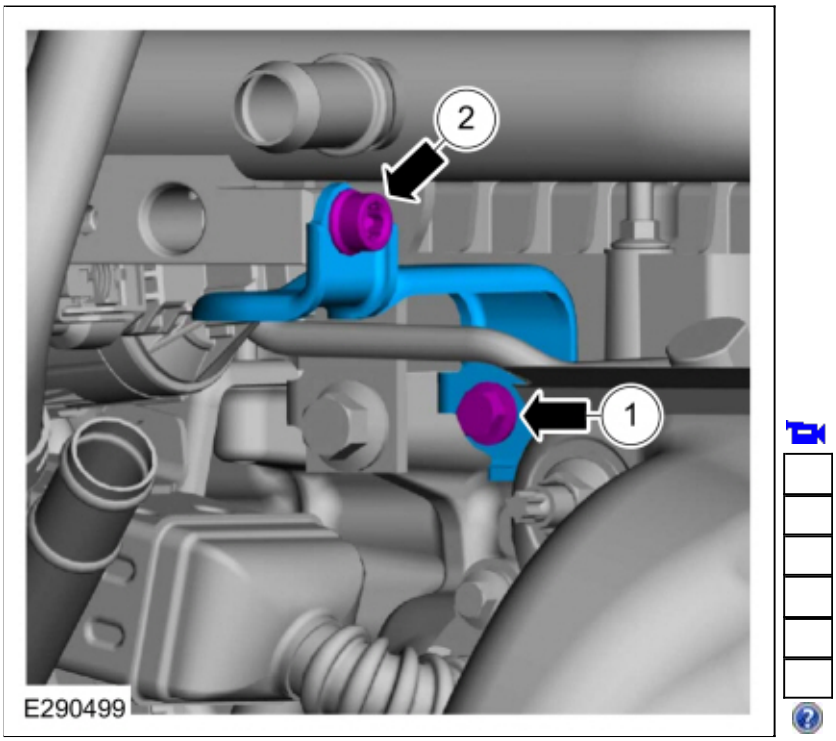


45. Install the coolant tube and the bolts.
Torque: 97 lb.in (11 Nm)

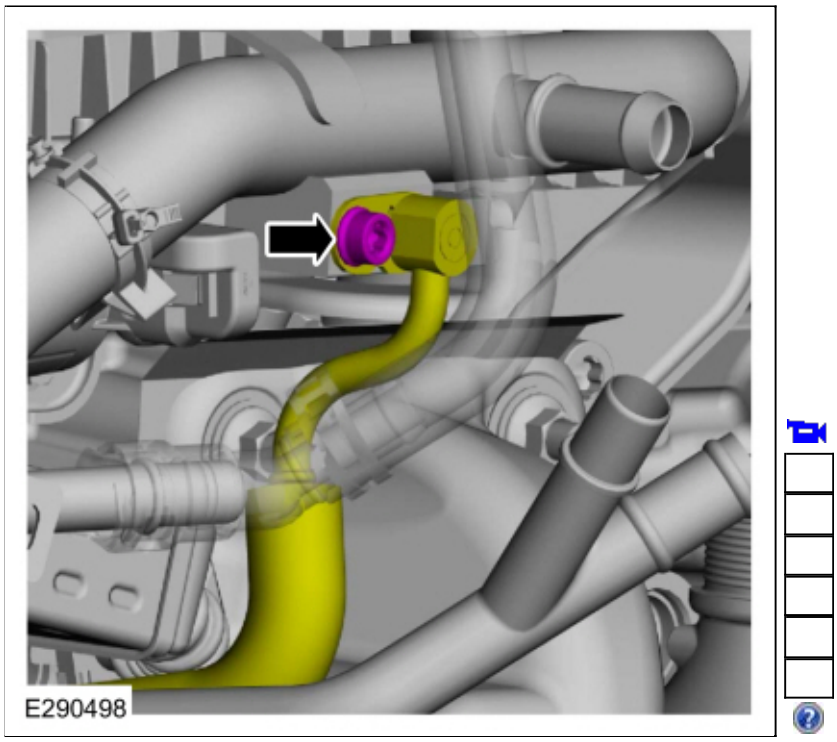


46.

1. Install the coolant tube support bracket and the bolt.
   Torque: 97 lb.in (11 Nm)
2. Install the coolant tube support bracket bolt.
   Torque: 97 lb.in (11 Nm)

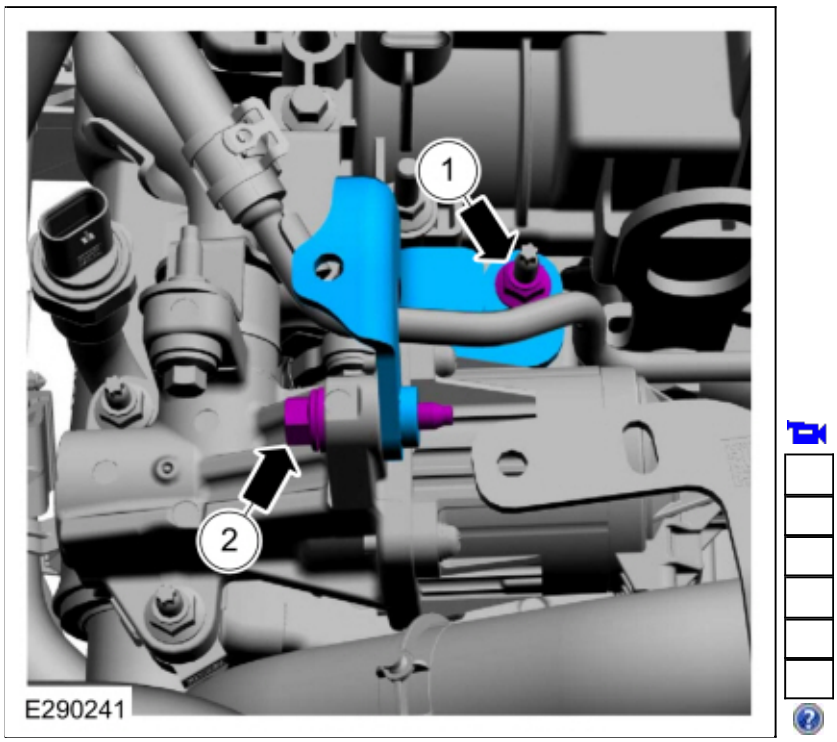


47. Position the turbocharger coolant tube and install the bolt.
   Torque: 97 lb.in (11 Nm)



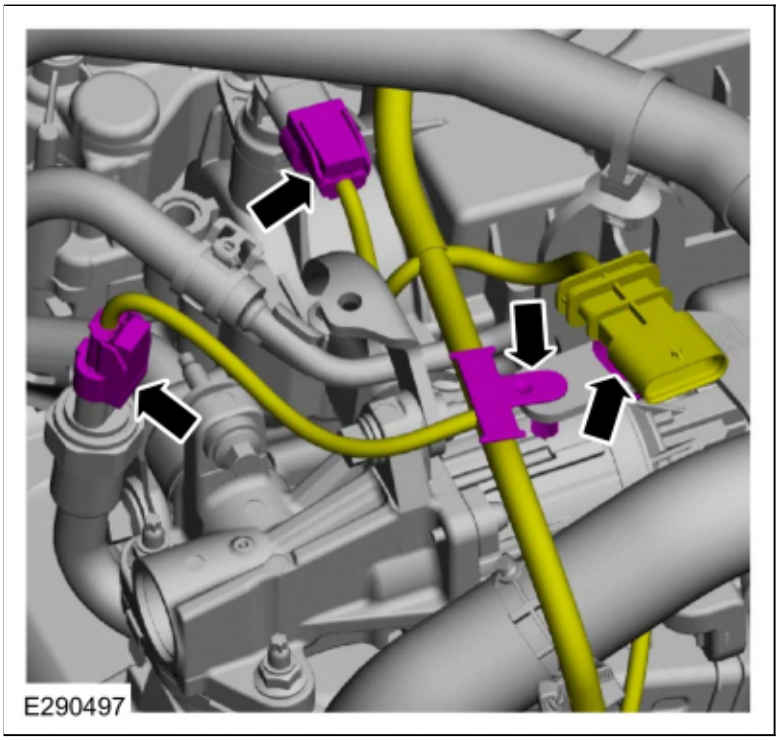
48.

1. Install the EGR valve bracket and the bolt.
   Torque: 97 lb.in (11 Nm)
2. Install the EGR valve bracket nut.
   Torque: 97 lb.in (11 Nm)

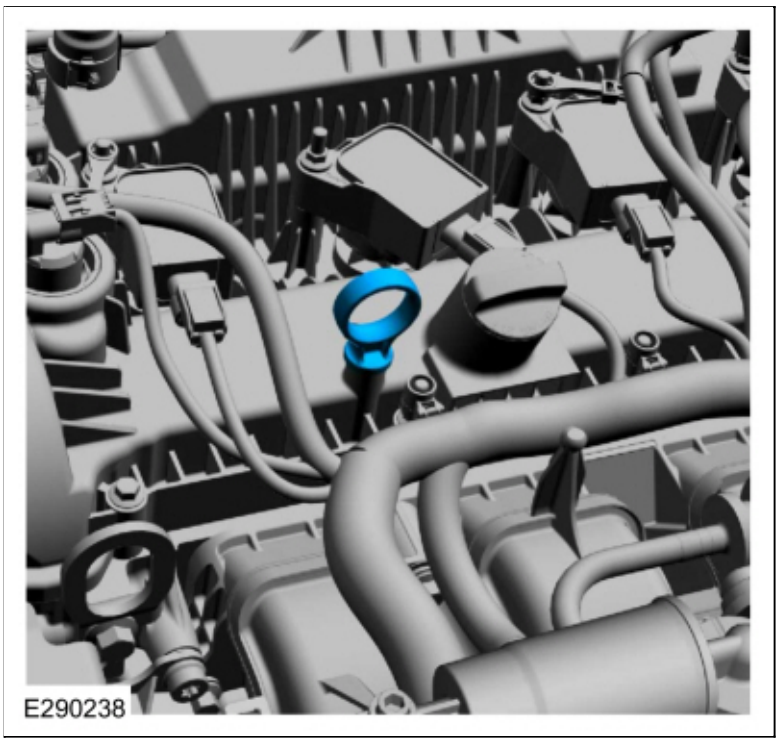


49.

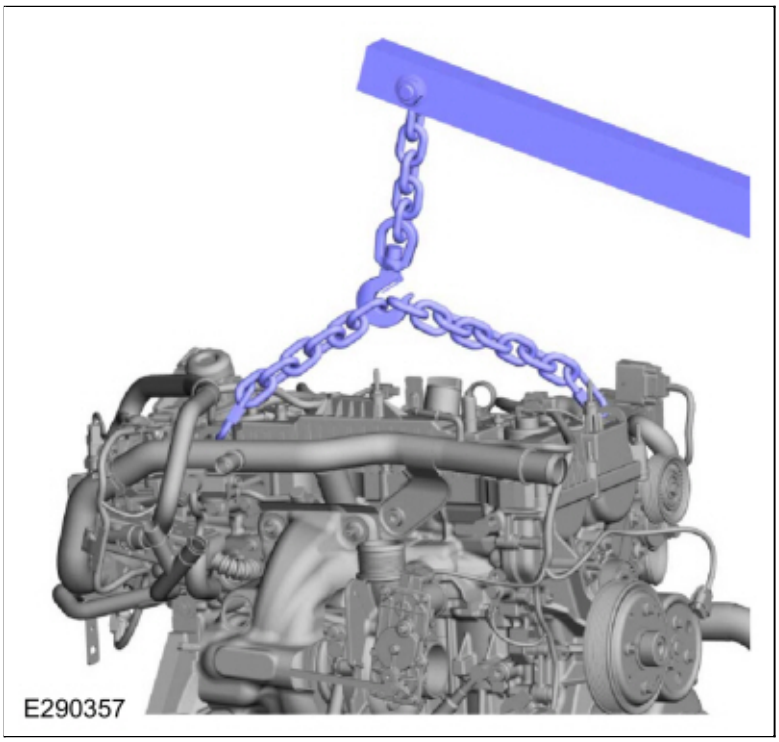
- Attach the HO2S electrical connector to the bracket.
- Connect the wiring harness electrical connectors and retainer.
- Position the wiring harness retainer on the rear engine lift eye.



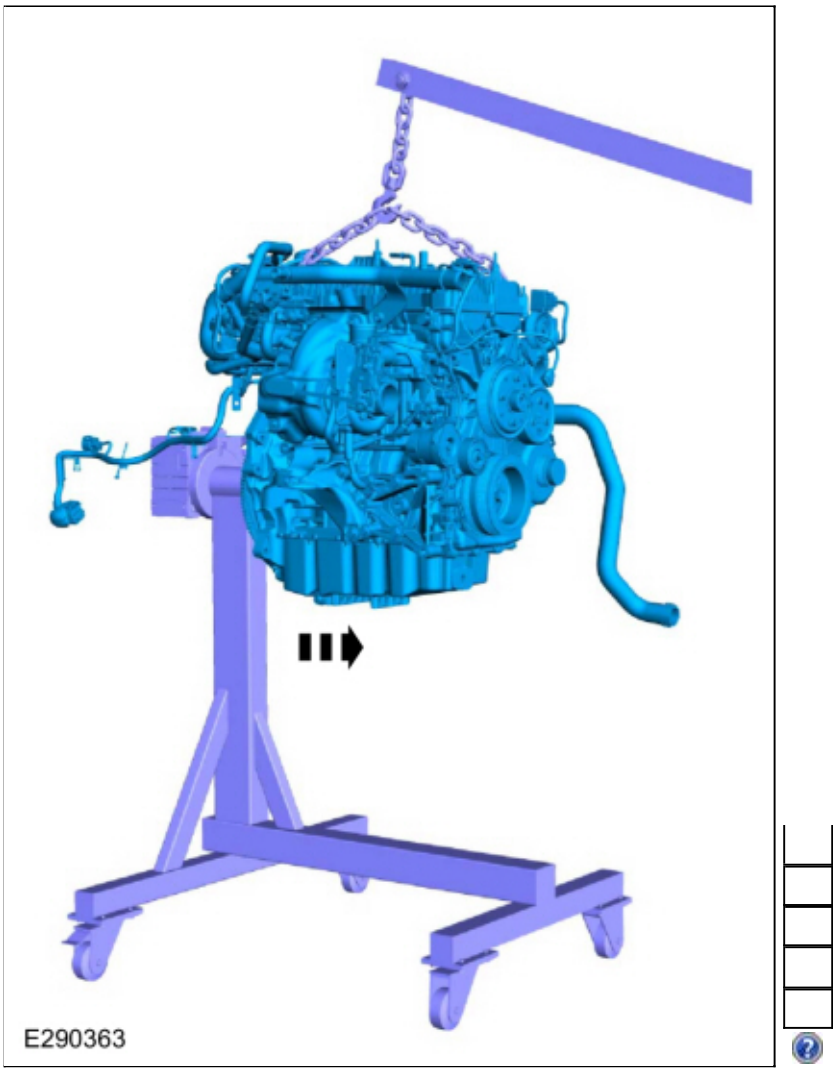
50. Remove the oil level indicator.



51. Install the engine lift equipment.



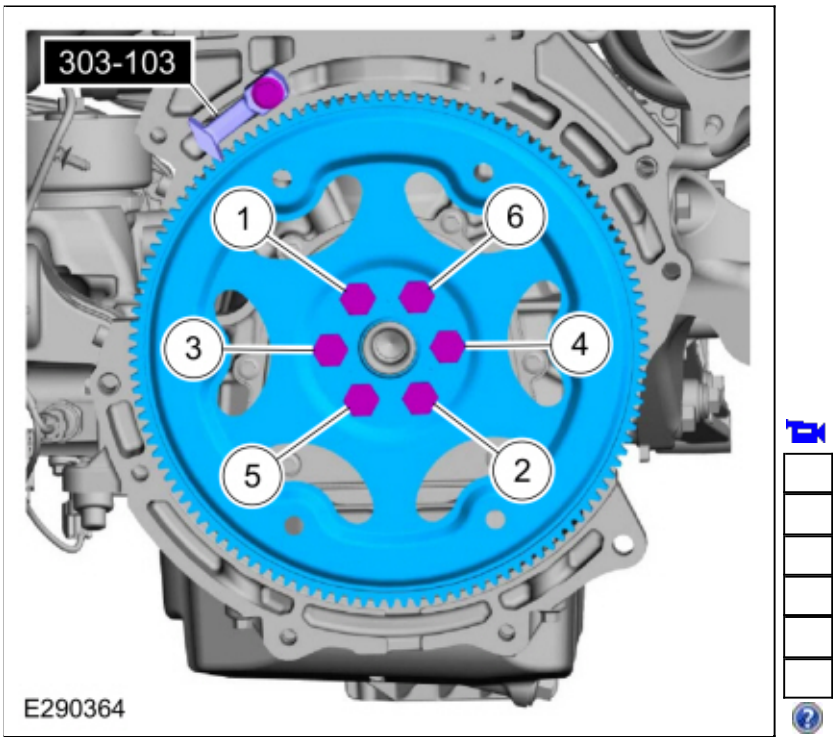
52. Using a floor crane, remove the engine from the mounting stand.
Use the General Equipment: Mounting Stand



53.

- **NOTE:** *Special bolts are used for installation. Do not use standard bolts.*

  Install the flexplate and the new bolts finger-tight.
- Install Special Service Tool: 303-103 (T74P-6375-A) Holding Tool, Flywheel.
- Tighten the bolts in sequence shown in 3 stages.
  Torque:
  Stage 1: 37 lb.ft (50 Nm)
  Stage 2: 59 lb.ft (80 Nm)
  Stage 3: 83 lb.ft (112 Nm)



54. Install the engine.
Refer to: Engine (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal).