

303-01 Engine - 2.3L EcoBoost (201kW/273PS)

2019 Ranger


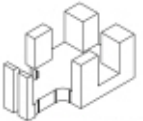




Removal and Installation

Procedure revision date: 01/8/2019

Engine Front Cover

Base Part Number: 6C086

Special Tool(s) / General Equipment

	303-096 (T74P-6150-A) Installer, Camshaft Front Oil Seal TKIT-2009TC-F
 E121926	303-1521 Alignment Tool, Crankshaft Position Sensor TKIT-2010C-FLM
 E274102	303-1685 Alignment Tool, Camshaft
 E274106	303-1689 Holding Tool, Crank Damper
 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
Plastic Scraper	
Oil Drain Equipment	

Materials

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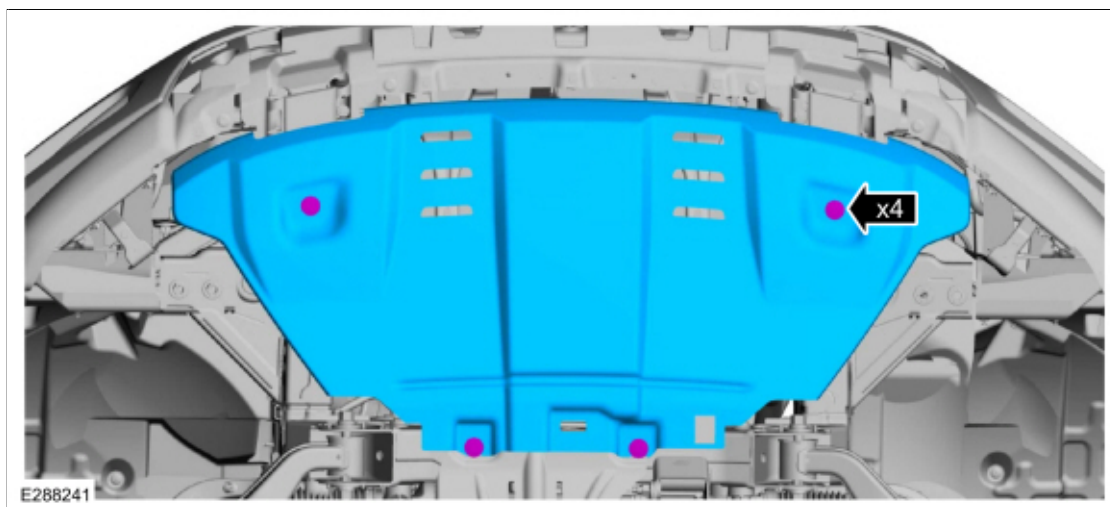
Motorcraft® High Performance Engine RTV Silicone TA-357	WSE-M4G323-A6
Motorcraft® Silicone Gasket Remover ZC-30-A	-
Motorcraft® Metal Surface Prep Wipes ZC-31-B	-
Motorcraft® Metal Brake Parts Cleaner PM-4-A, PM-4-B	-

Removal

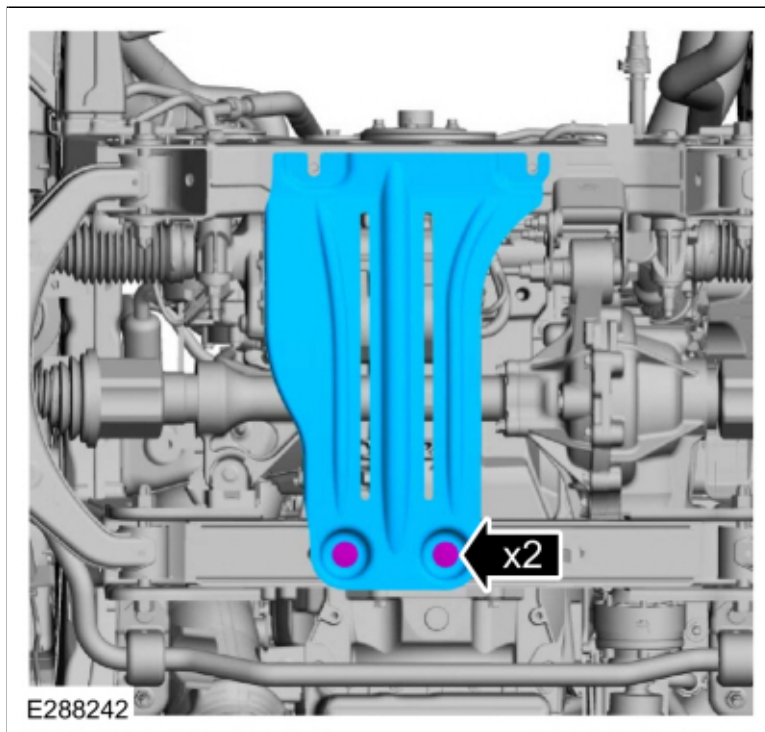
NOTICE: Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by 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.

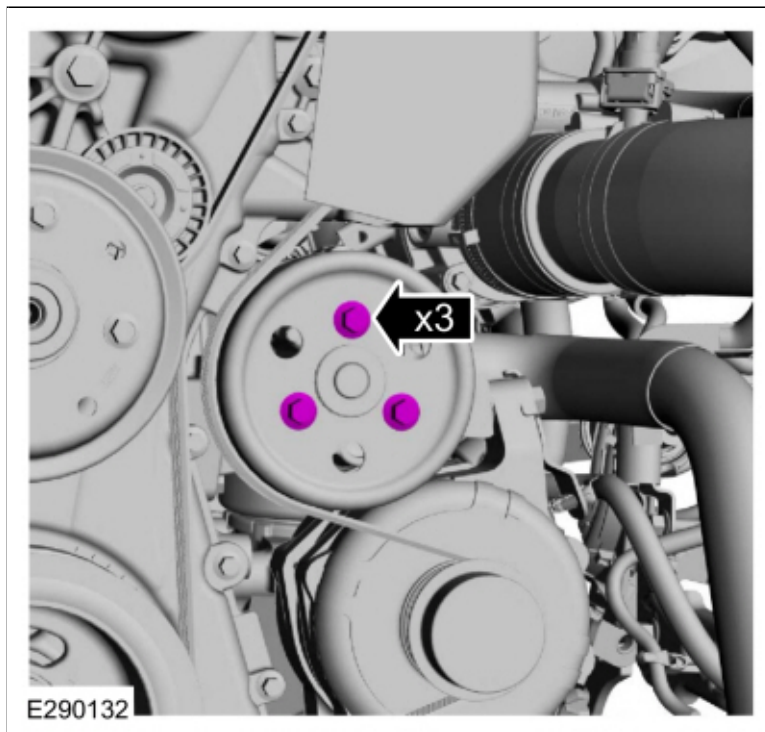
1. With the vehicle in NEUTRAL, position it on a hoist.
Refer to: [Jacking and Lifting](#) (100-02 Jacking and Lifting, Description and Operation).
2. Remove the bolts and the front skid plate.



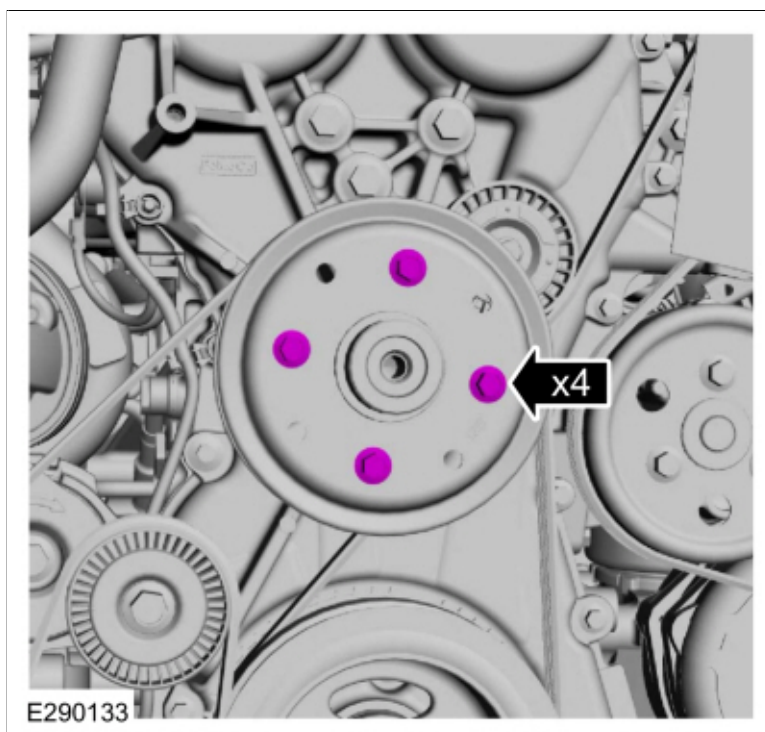
3. Remove the bolts and the rear skid plate.



4. Remove the following items:
 1. Remove the upper and lower cooling fan shrouds.
Refer to: [Cooling Fan Upper Shroud](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
Refer to: [Cooling Fan Lower Shroud](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
 2. Remove the cooling fan.
Refer to: [Cooling Fan](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
5. Loosen the coolant pump pulley bolts.



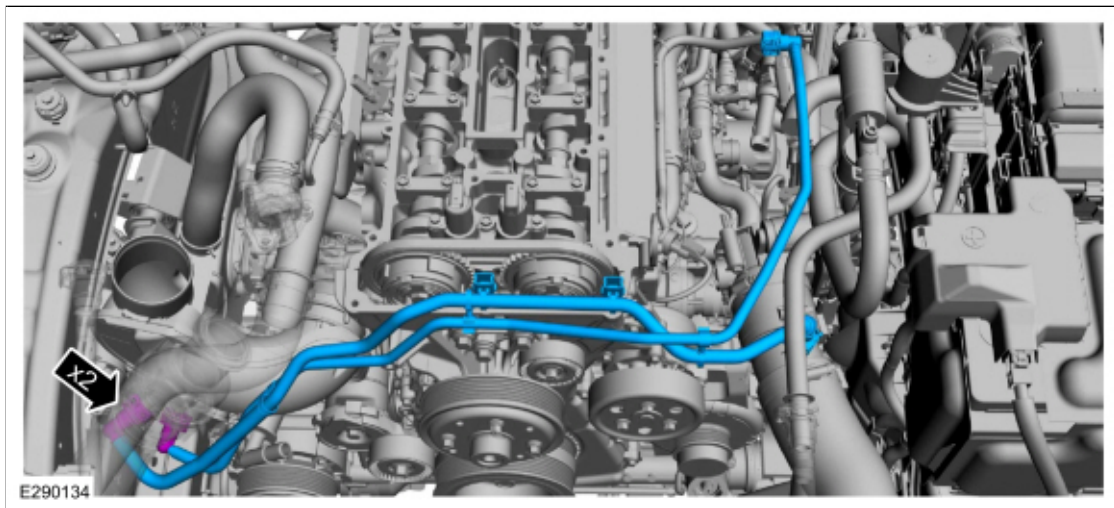
6. Loosen the accessory drive belt pulley bolts.



7. Remove the following items:
1. Remove the accessory drive belt.
Refer to: [Accessory Drive Belt](#) (303-05 Accessory Drive - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
 2. Remove the accessory drive belt tensioner.

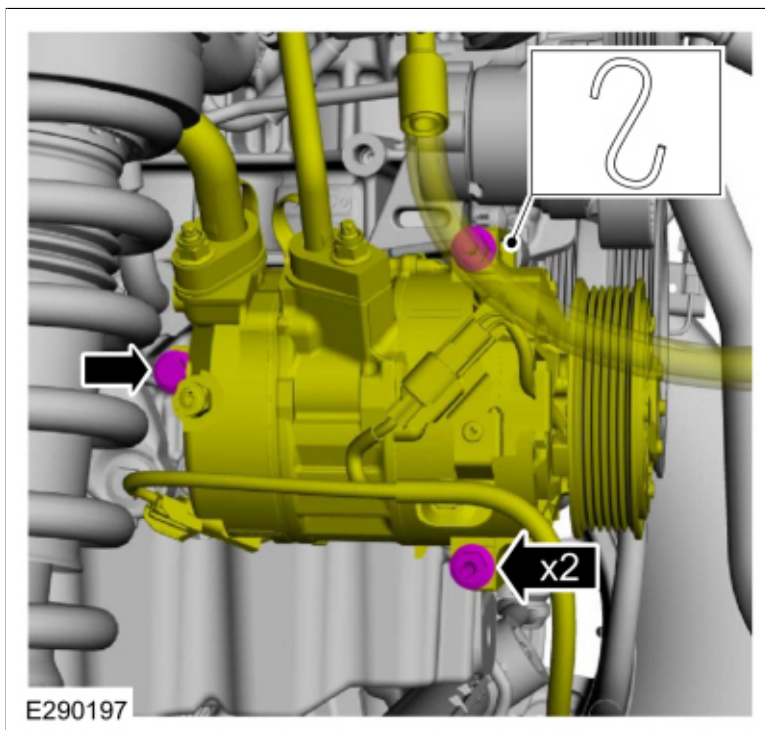
Refer to: [Accessory Drive Belt Tensioner](#) (303-05 Accessory Drive - 2.3L EcoBoost (201kW/273PS), Removal and Installation).

3. Remove the high-pressure fuel pump drive unit.
Refer to: [High-Pressure Fuel Pump Drive Unit](#) (303-04A Fuel Charging and Controls - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
8. Disconnect the EVAP canister tube quick release couplings and remove the EVAP canister tubes.
Refer to: [Quick Release Coupling](#) (310-00 Fuel System - General Information - 2.3L EcoBoost (201kW/273PS), General Procedures).

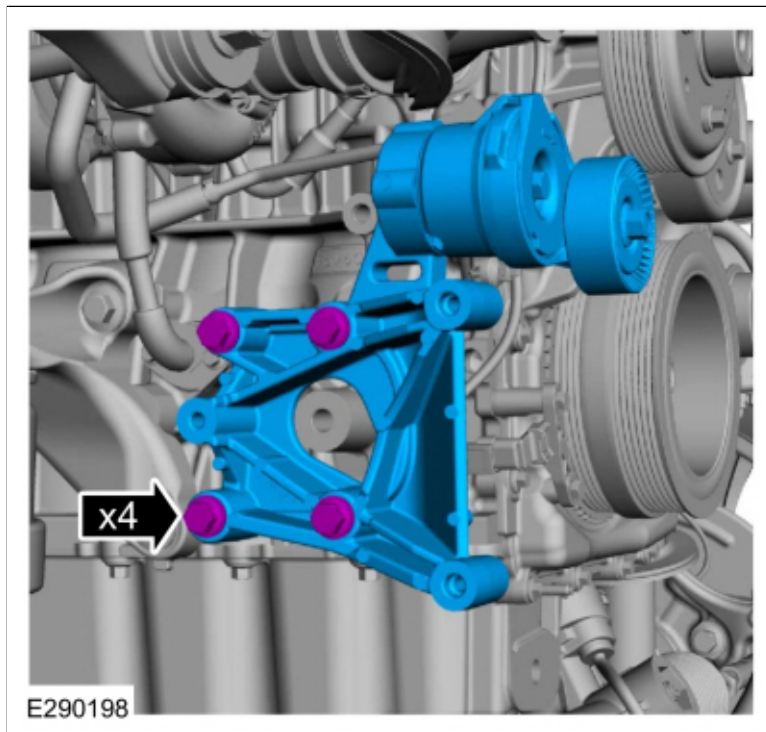


9. **NOTE:** The A/C compressor bolts will stay with the A/C compressor.

Loosen the bolts, position and support the A/C compressor aside.

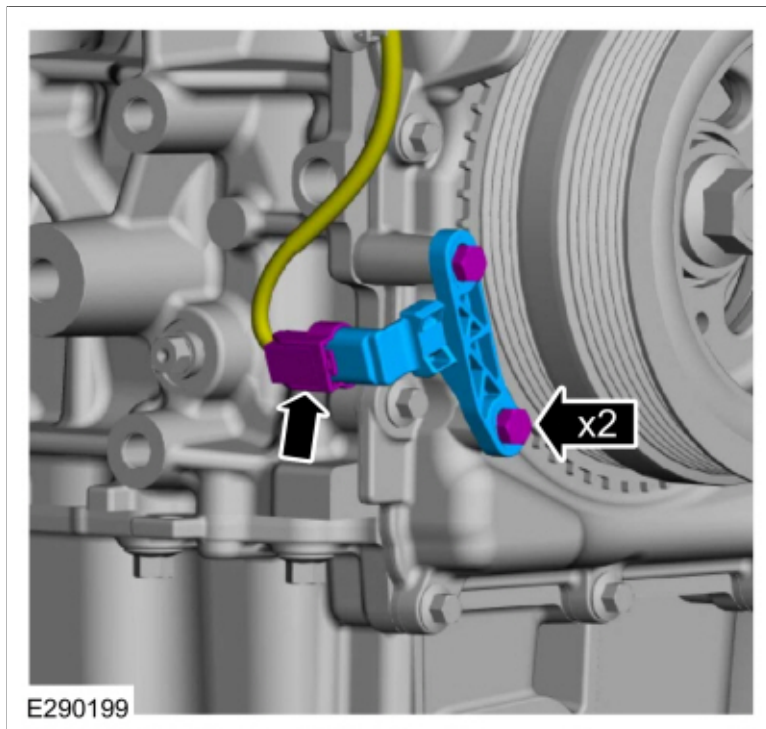


10. Remove the bolts and the A/C compressor bracket.

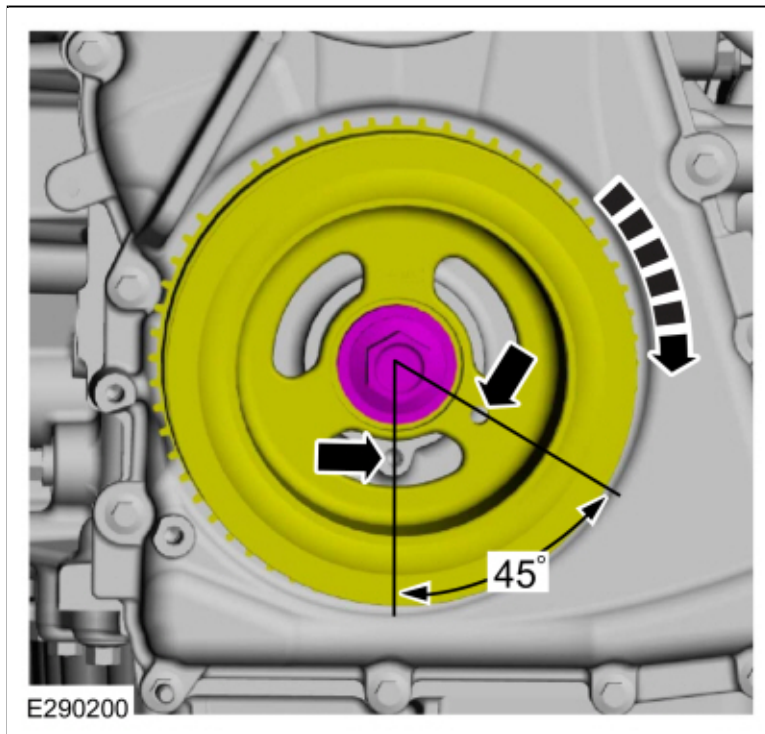


- 11.

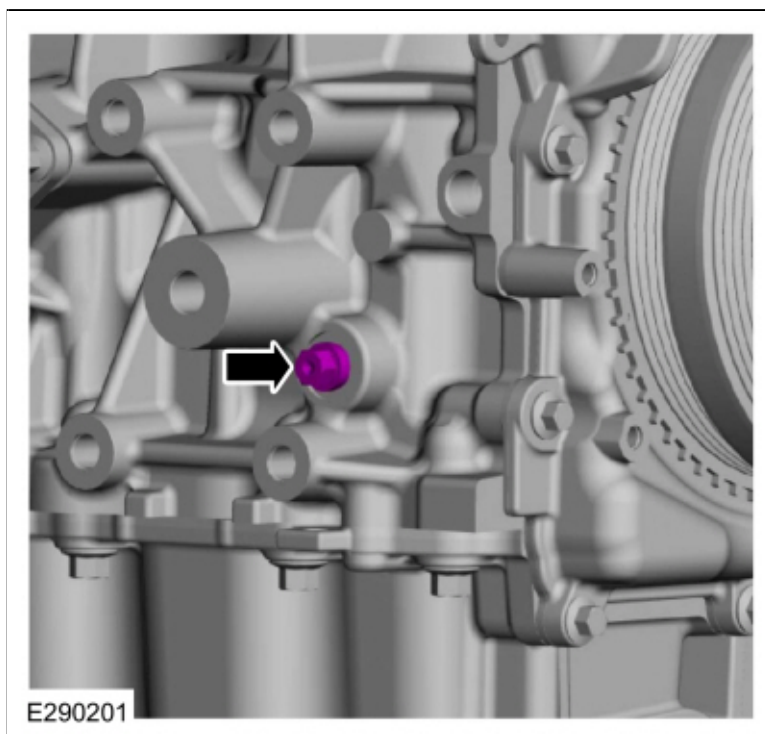
- Disconnect the CKP sensor electrical connector.
- Remove the bolts and the CKP sensor.



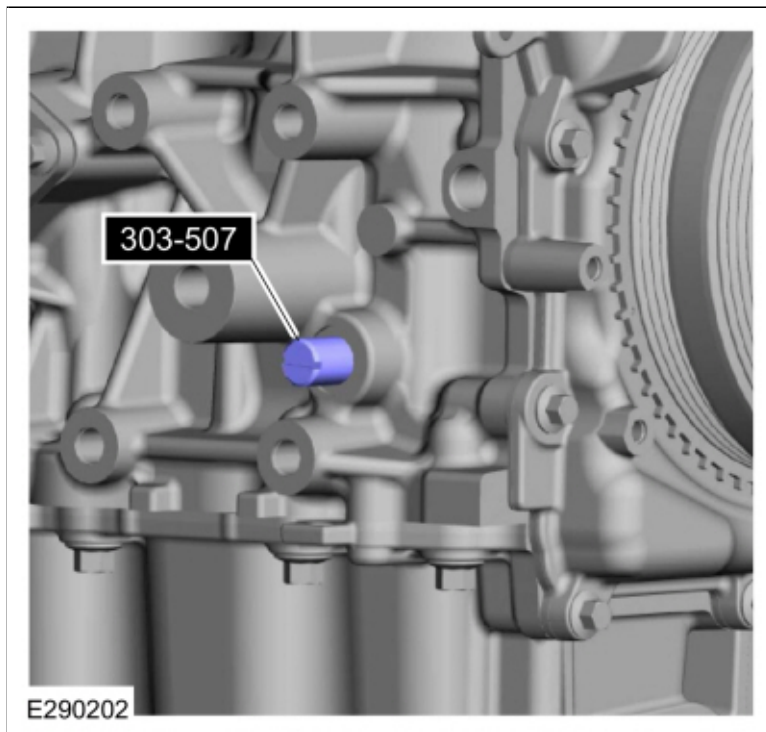
12. Turn the crankshaft clockwise until the No.1 piston is 45 degrees BTDC using the guide holes on the engine front cover and the crankshaft pulley.



13. Remove the engine plug bolt.



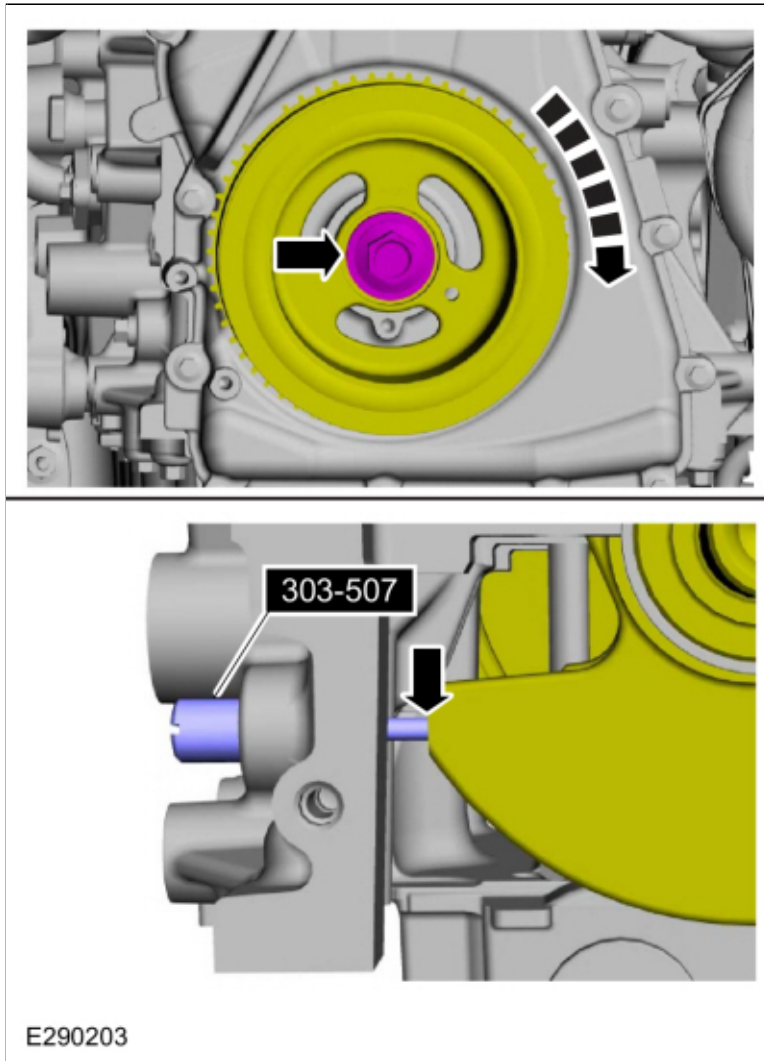
14. Install Special Service Tool: [303-507 Timing Peg, Crankshaft TDC](#).



15. **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.

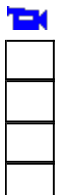
Rotate the crankshaft clockwise until the contacts the special tool.
Use Special Service Tool: [303-507 Timing Peg, Crankshaft TDC](#).

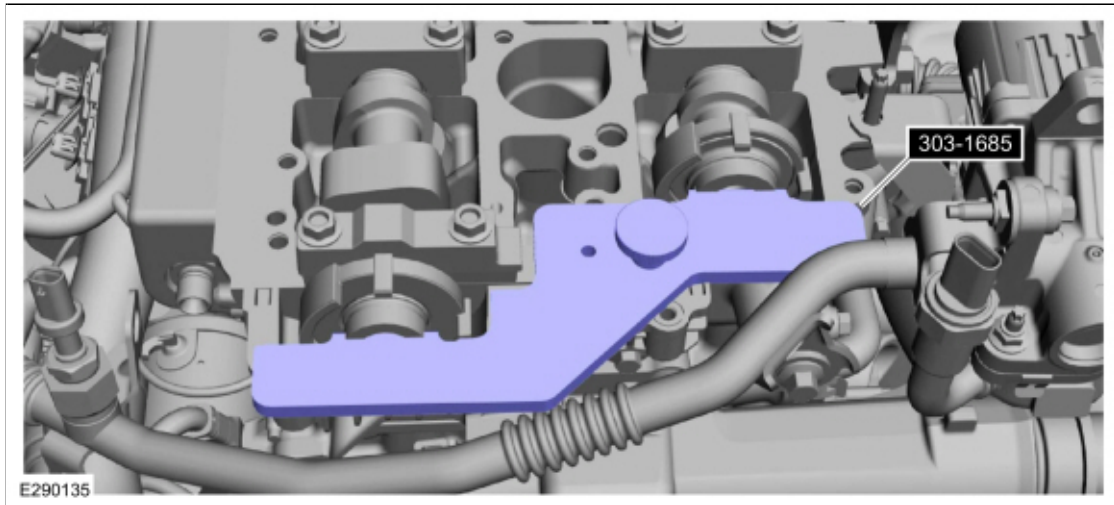


16. **NOTICE:** The Camshaft Alignment Tool is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

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](#).



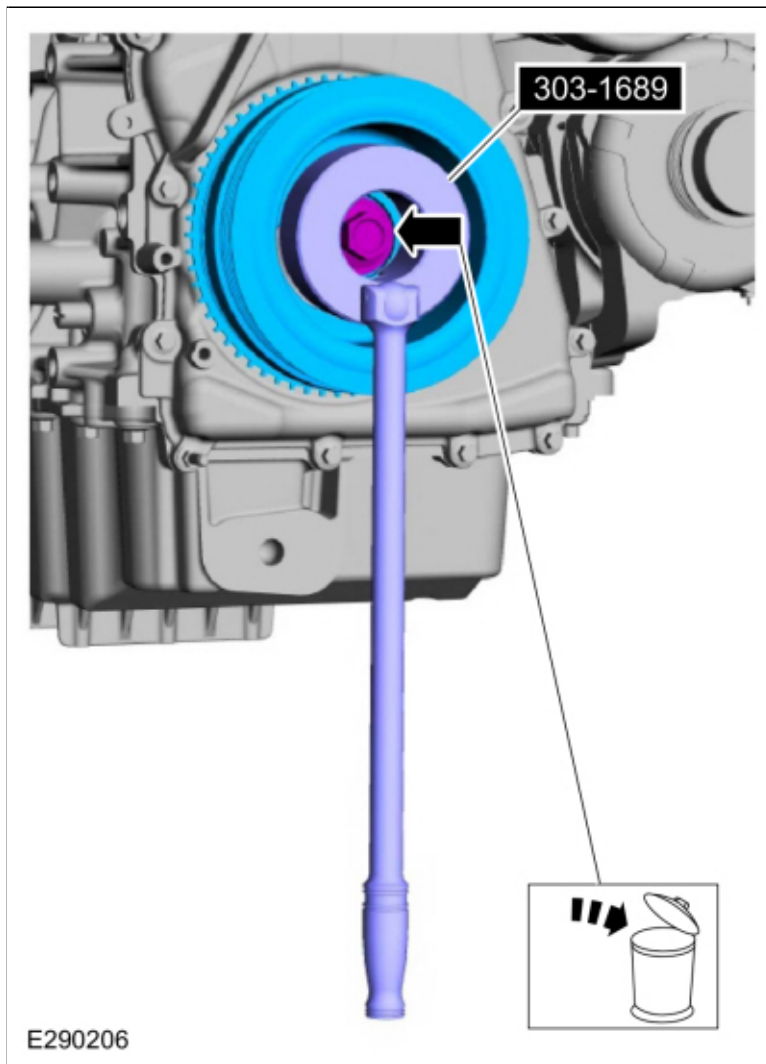


17. **NOTICE:** The crankshaft must remain in the TDC position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Crank Damper Holding Tool and the bolt should be removed using an air impact wrench (1/2-in drive minimum).

- 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.

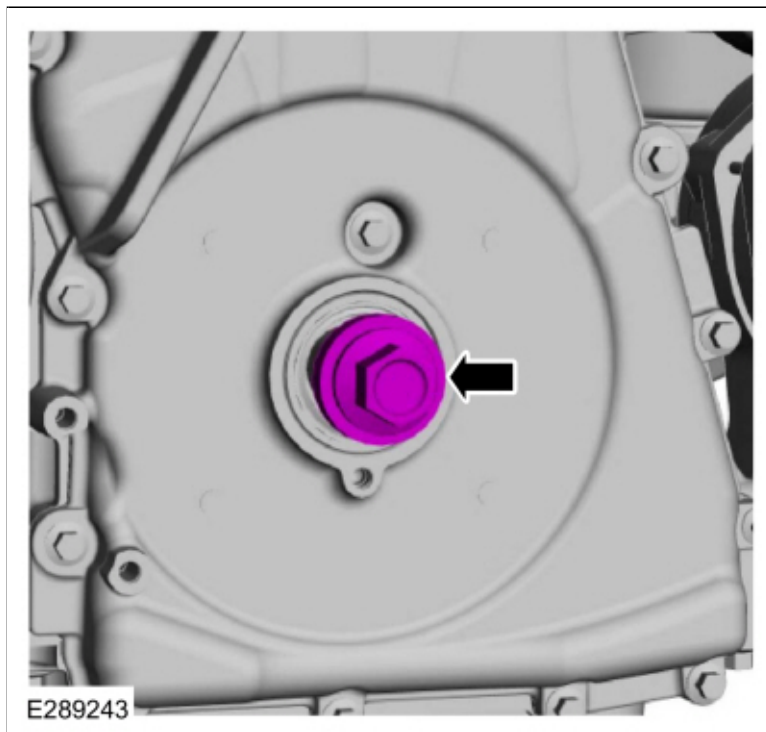
Discard the bolt.





18. Install the old crankshaft pulley bolt.



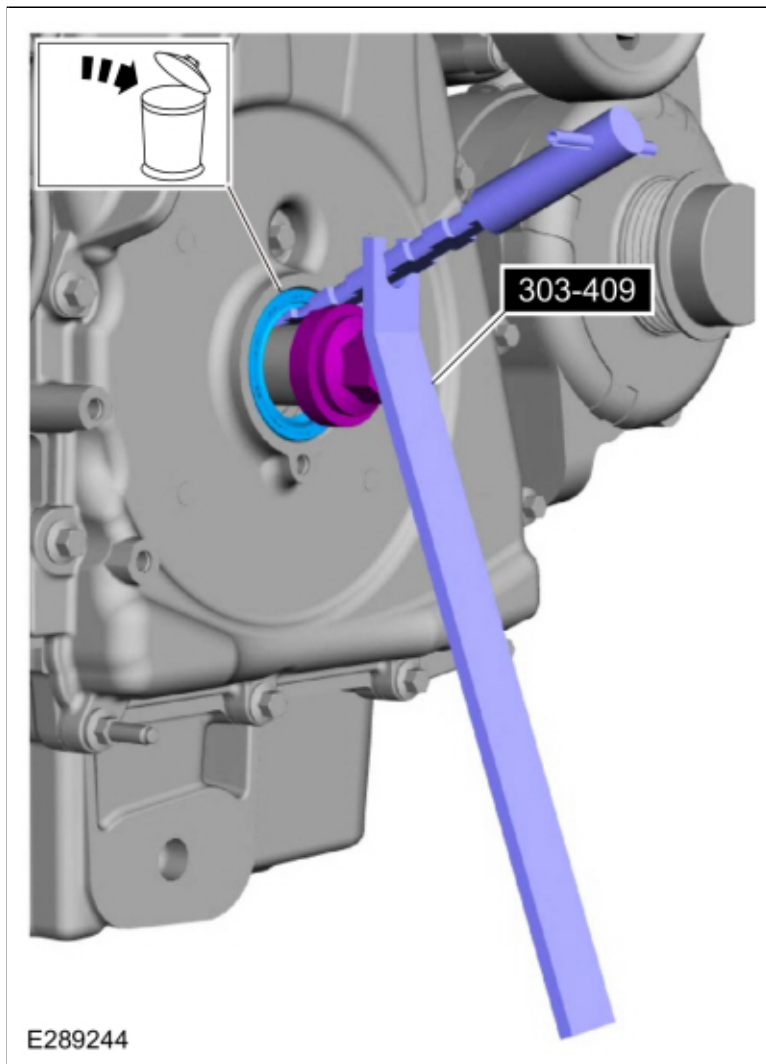


19. **NOTICE:** Use care not to damage the engine front cover or the crankshaft when removing the seal.

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

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

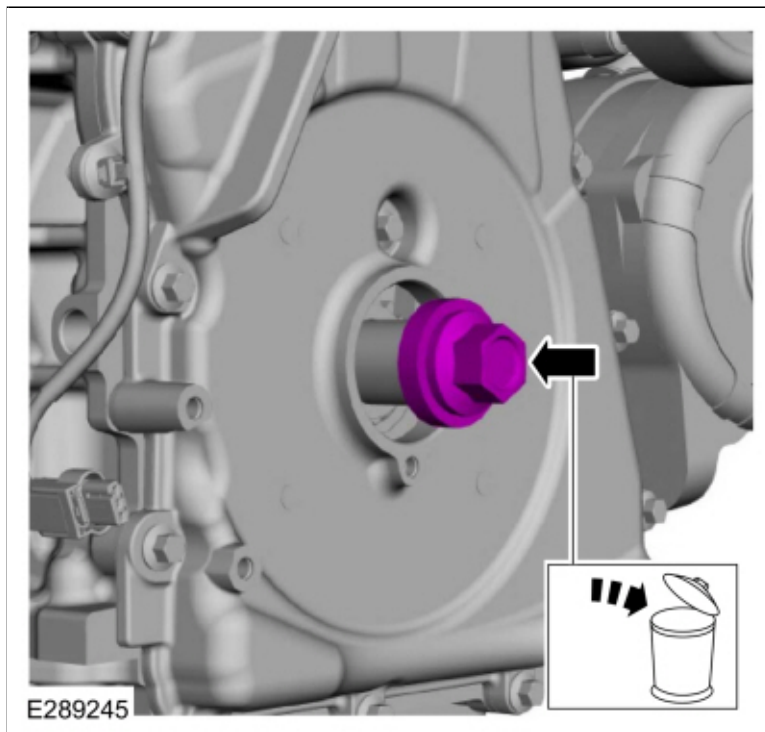




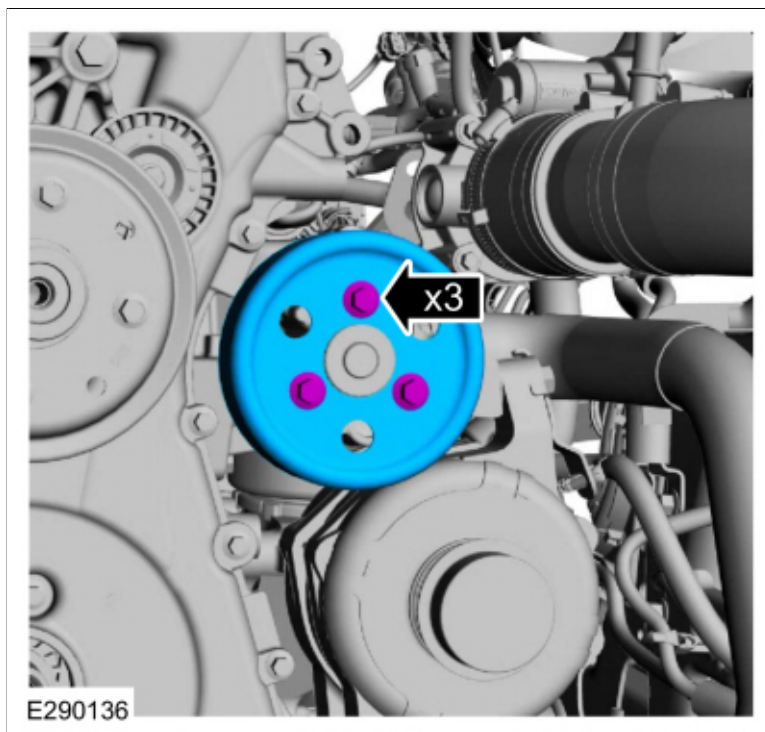
20. **NOTE:** *If necessary, retain the original crankshaft pulley bolt to use in other procedures.*

Remove and discard the crankshaft pulley bolt.

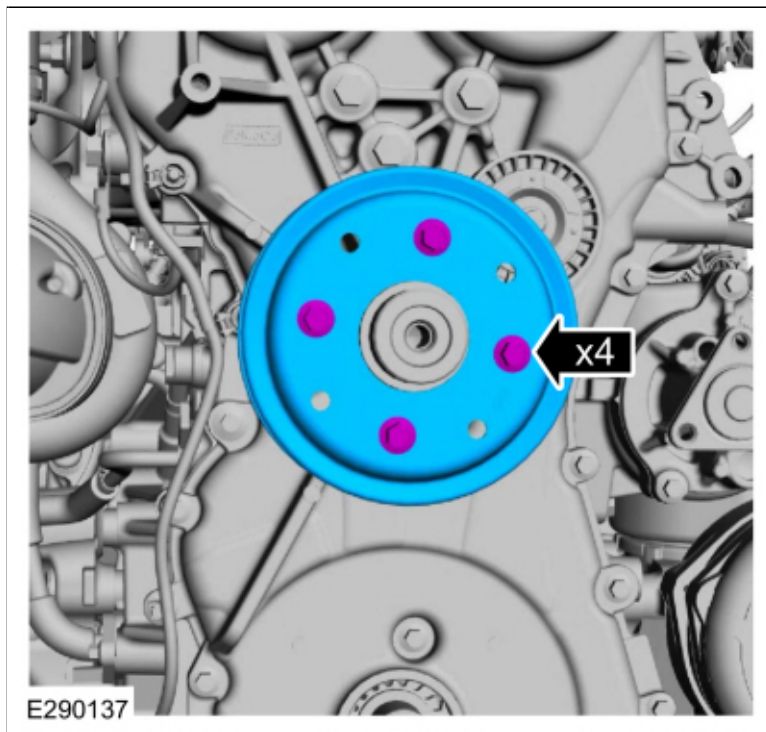




21. Remove the bolts and the coolant pump pulley.

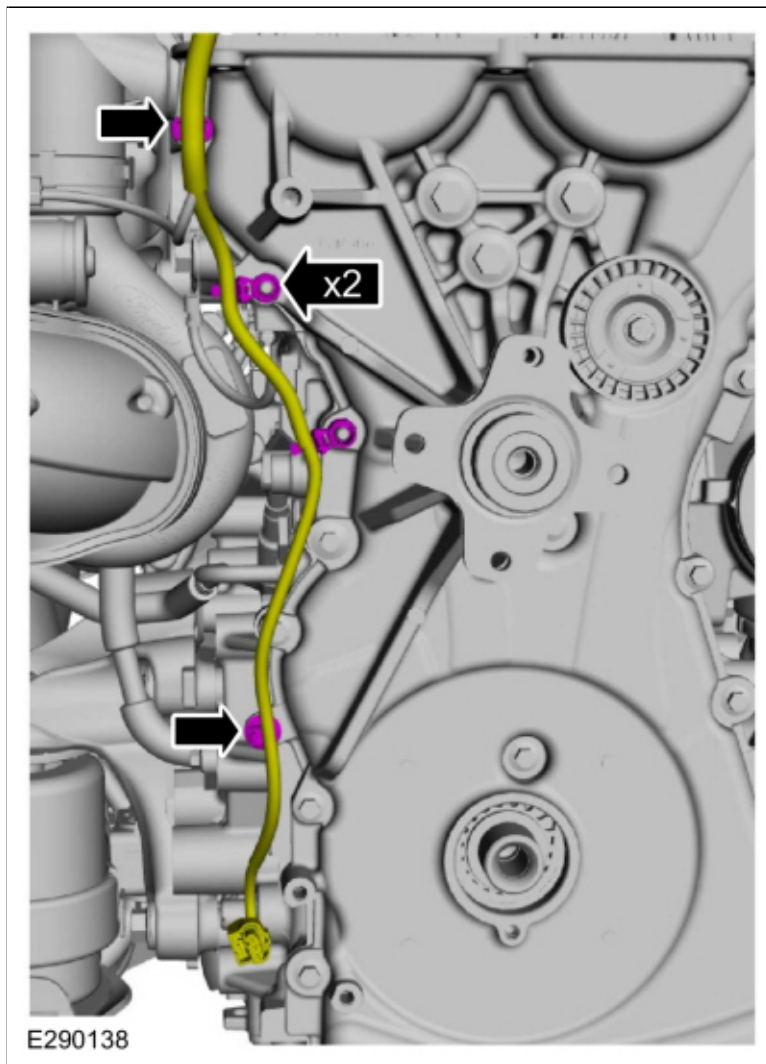


22. Remove the bolts and the accessory drive belt pulley.

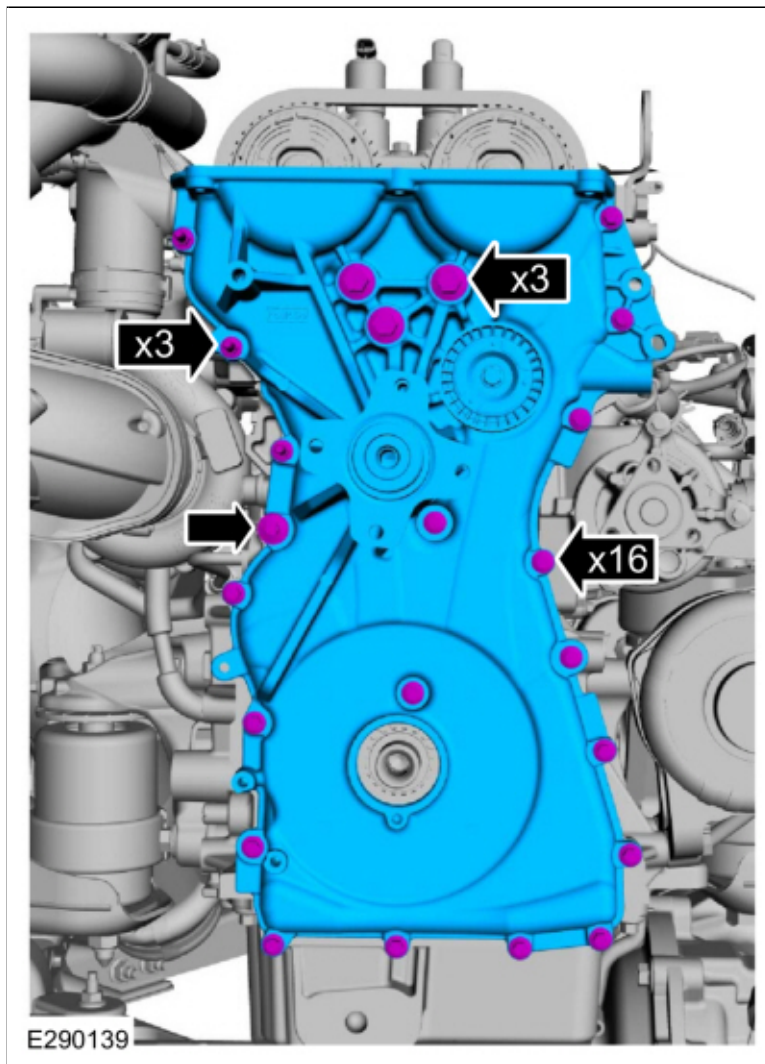


23. Detach wiring harness retainers from the engine front cover and stud bolts.



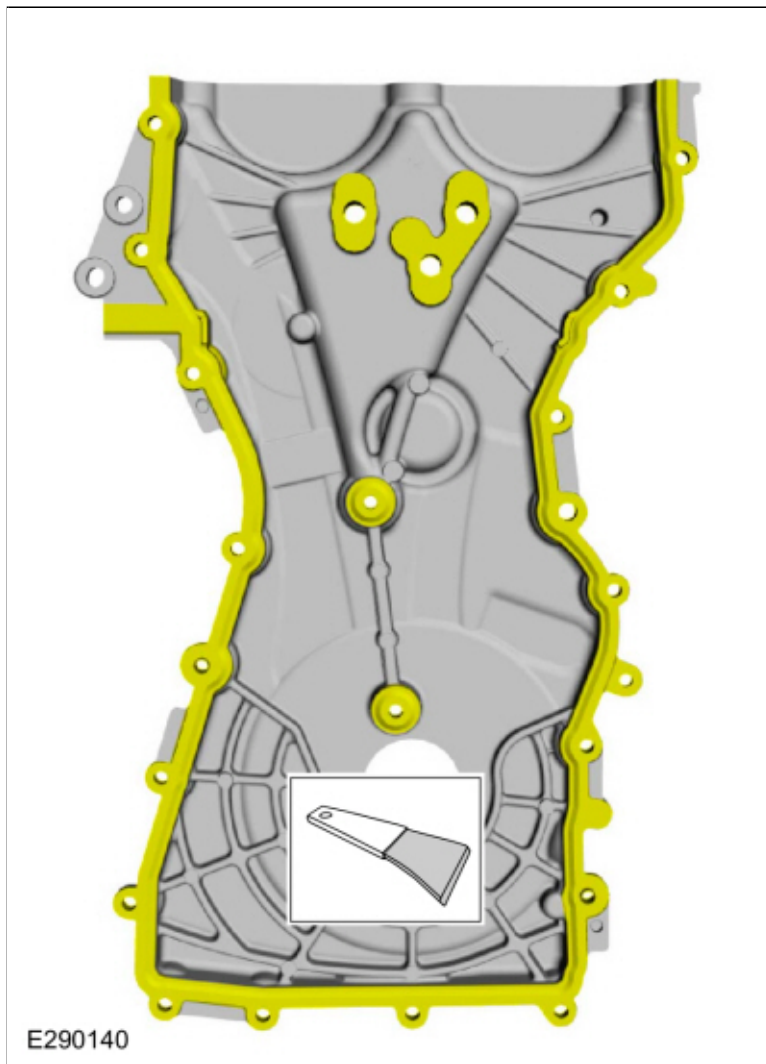


24. Remove the fasteners and the engine front cover.



25. **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.



26. **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.

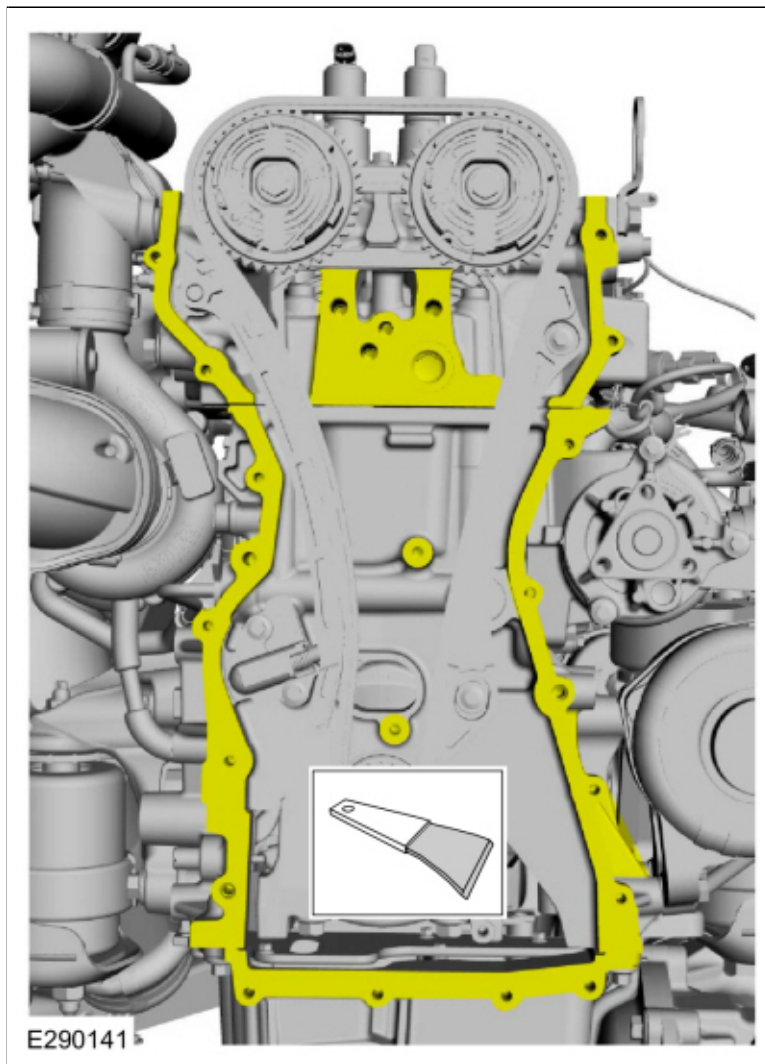
Make sure that the mating faces of the engine block and oil pan are clean and free of foreign material. Refer to: [RTV Sealing Surface Cleaning and Preparation](#) (303-00 Engine System - General Information, General Procedures).

Use the General Equipment: Plastic Scraper

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

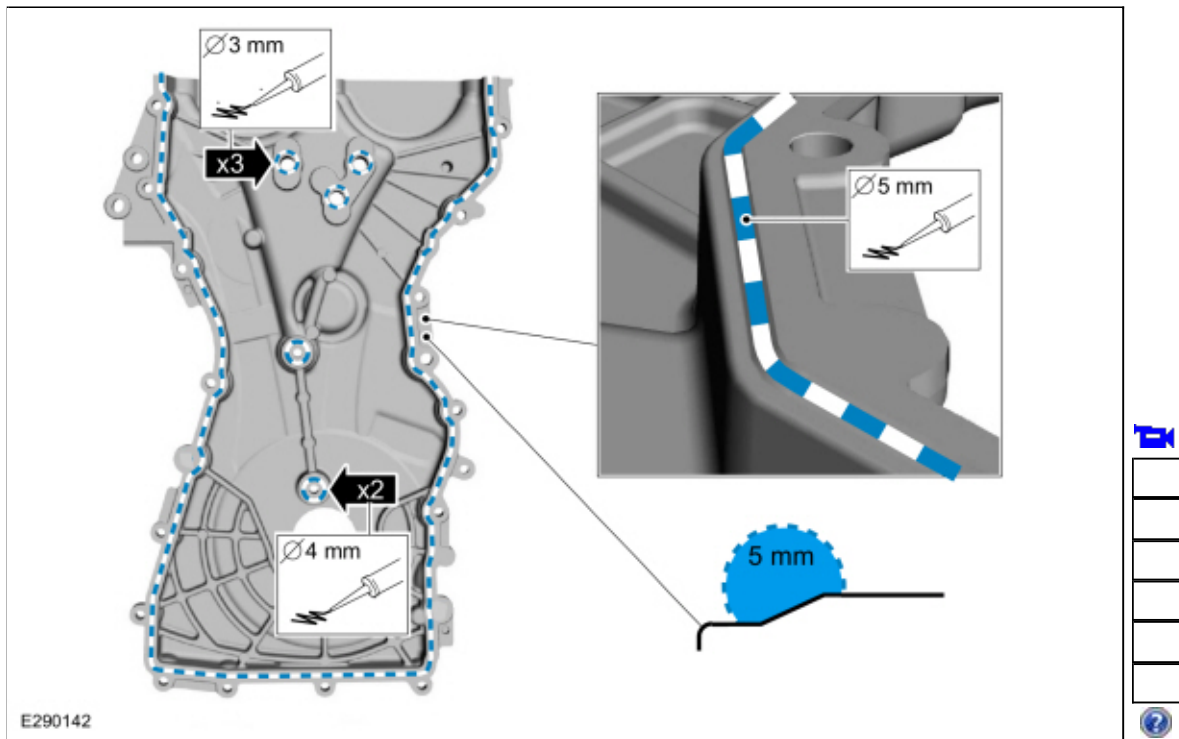
Material: Motorcraft® Metal Brake Parts Cleaner / PM-4-A, PM-4-B

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



Installation

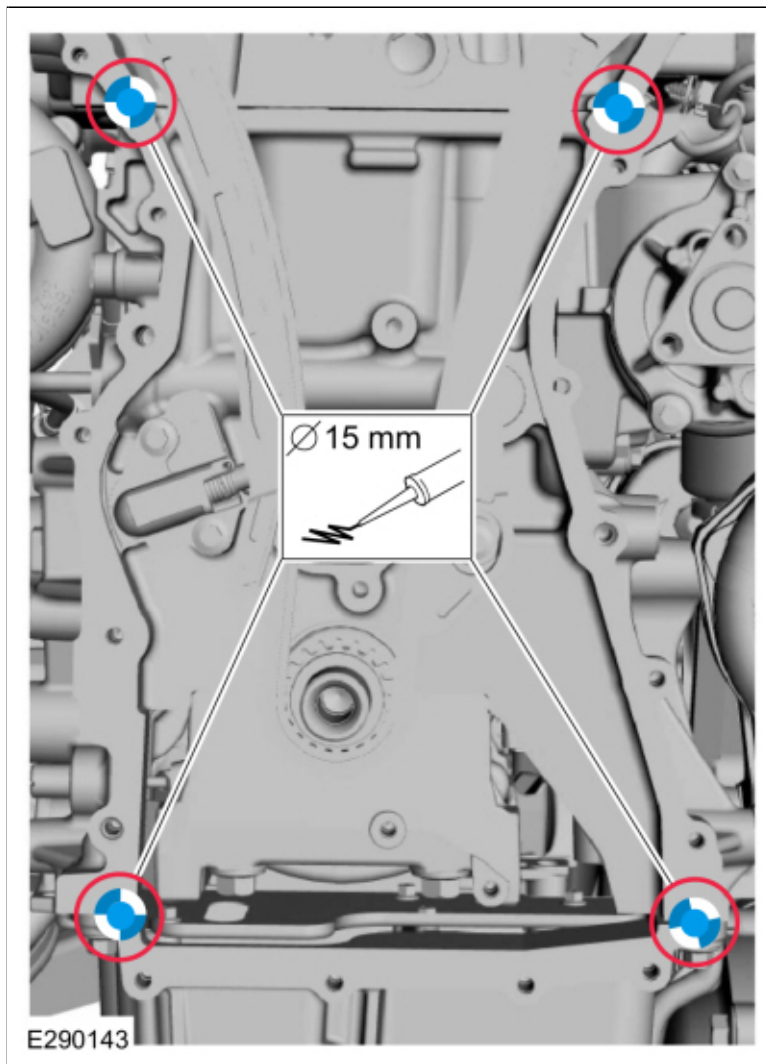
1. **NOTE:** The engine front cover must be secured within 10 minutes of Silicone Gasket and Sealant application. If the engine front cover is not secured within 10 minutes, the sealant must be removed and the sealing area cleaned.
 - Apply a 3 mm (0.12 in) bead of silicone sealant on the 3 upper bosses, 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)



2. **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.

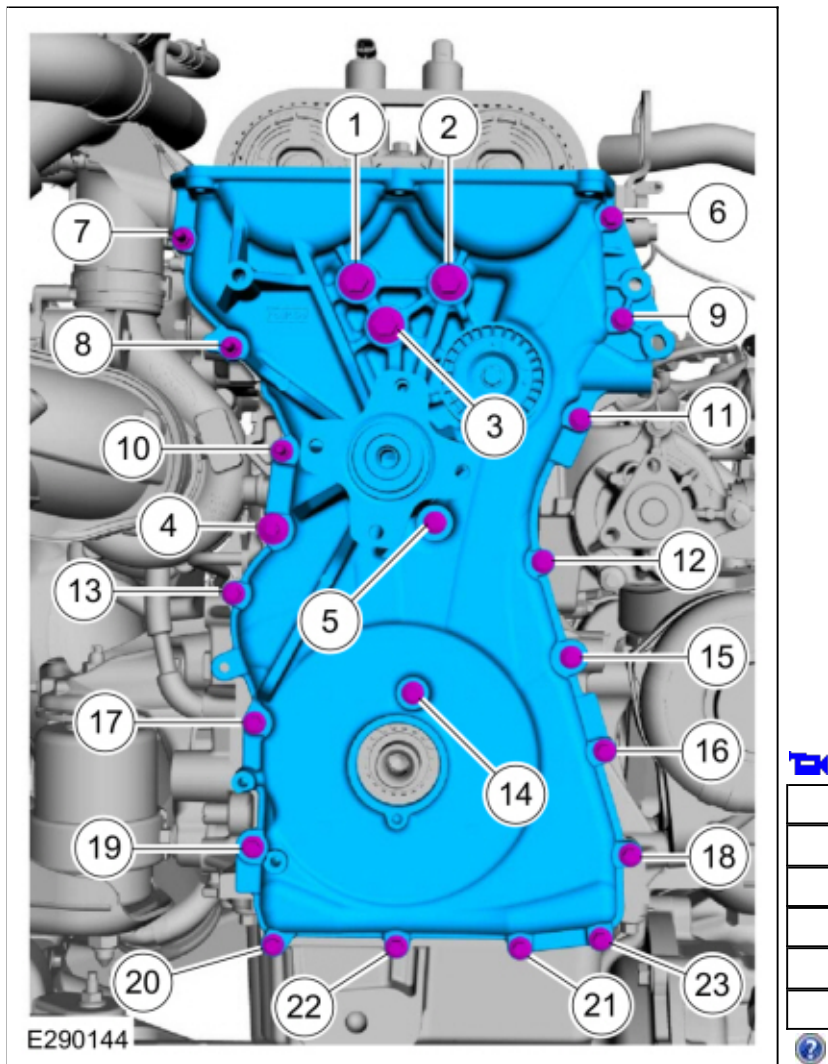
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



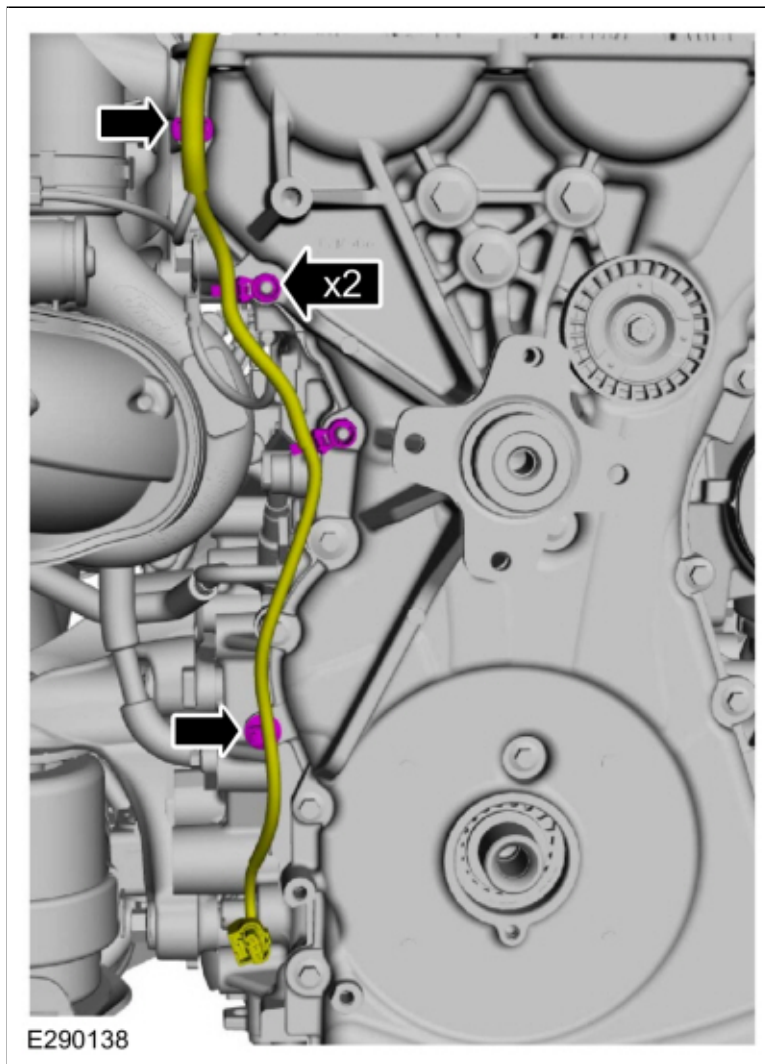
3. Install the engine front cover and the fasteners and tighten in the sequence shown.

Torque:

Bolts 1 - 3: 35 lb.ft (48 Nm)
 Bolt 4: 18 lb.ft (25 Nm)
 Bolts 5 - 22: 97 lb.in (11 Nm)

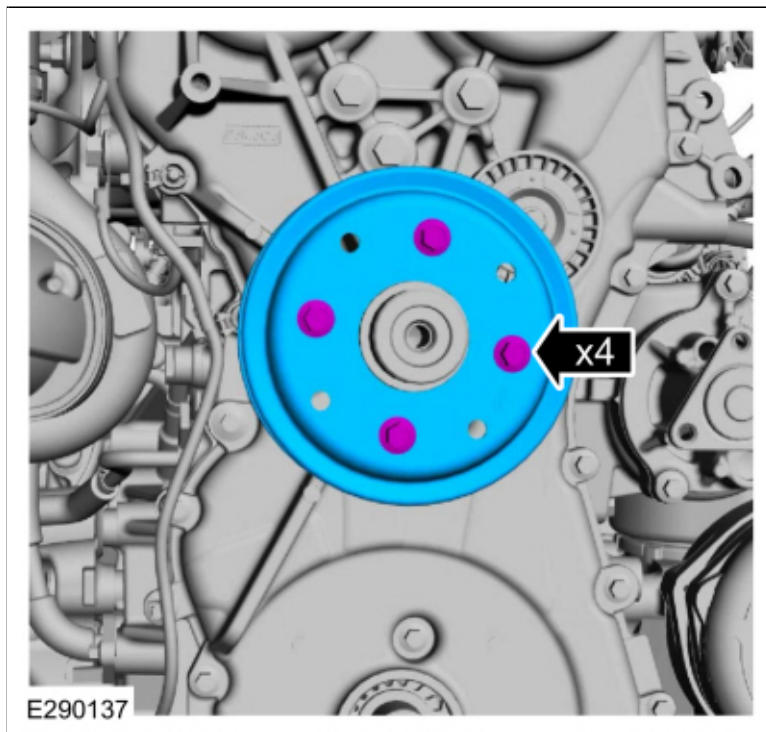


4. Attach wiring harness retainers to the engine front cover and stud bolts.

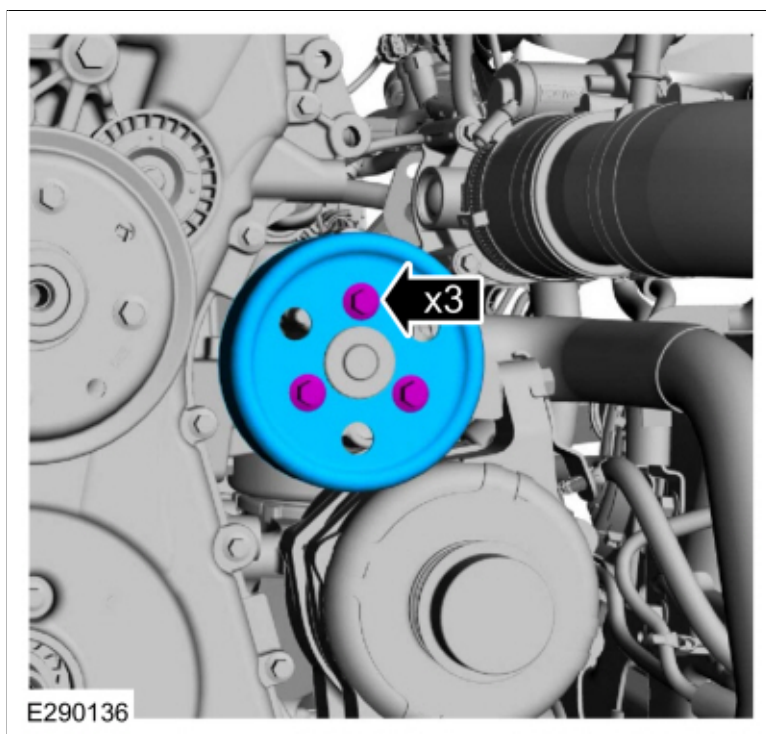


5. Install the accessory drive belt pulley and bolts finger-tight.





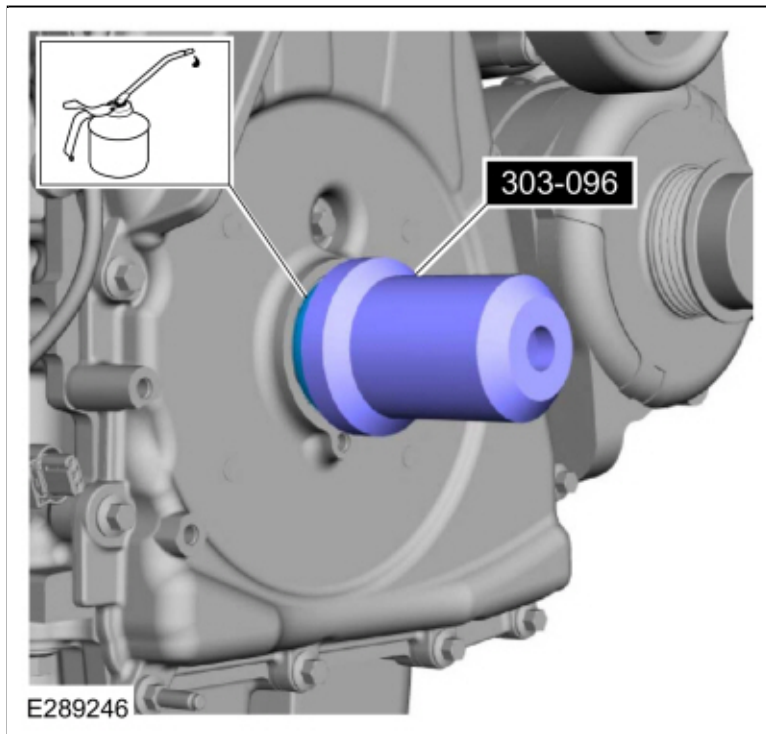
6. Install the coolant pump pulley and bolts finger-tight.



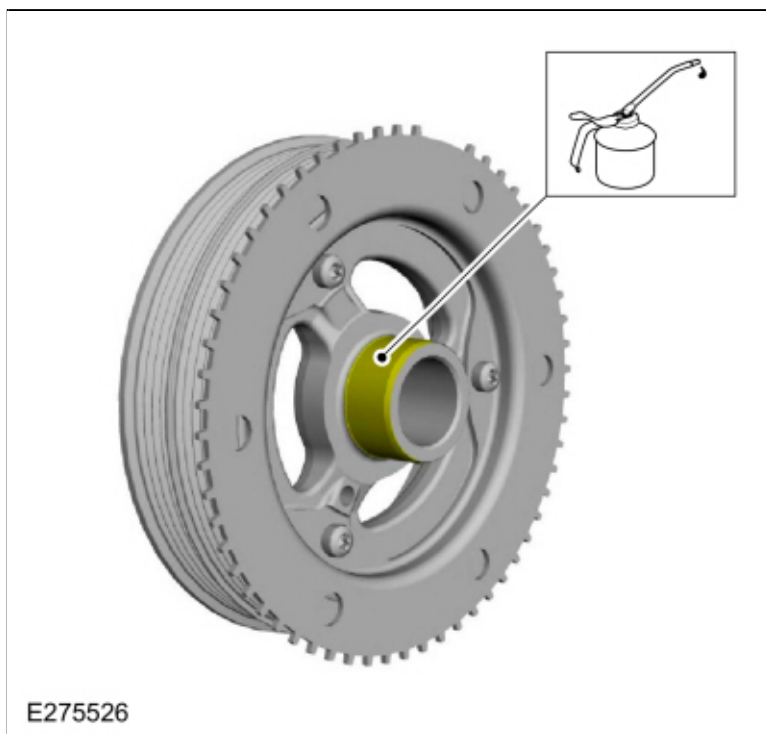
- 7.
- Lubricate the crankshaft front seal with clean engine oil.
 - **NOTE:** Remove the through-bolt from the Camshaft Front Oil Seal Installer.

Using the special tools, install the crankshaft front seal.

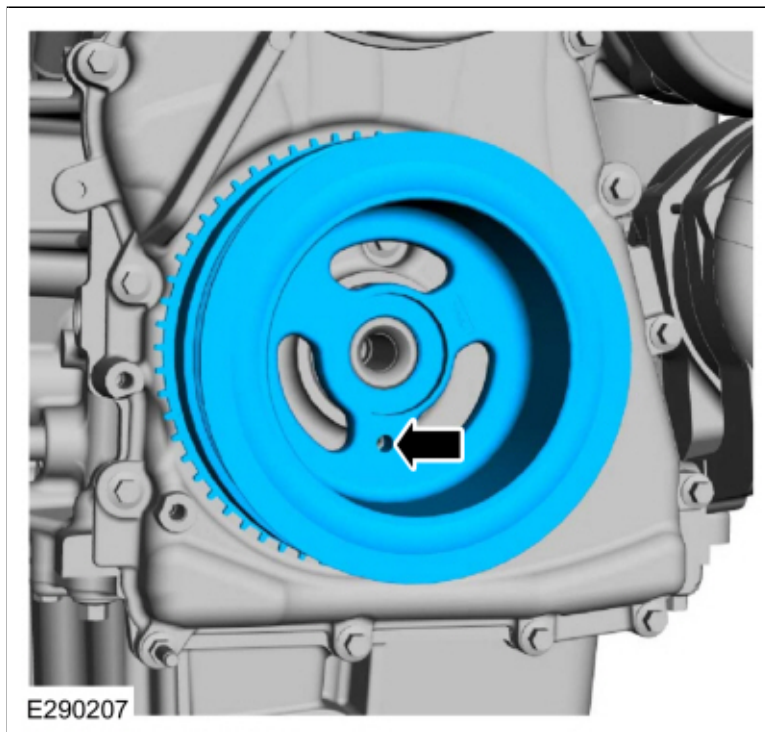
Use Special Service Tool: [303-096 \(T74P-6150-A\) Installer, Camshaft Front Oil Seal](#).



8. Lubricate the crankshaft pulley with clean engine oil.

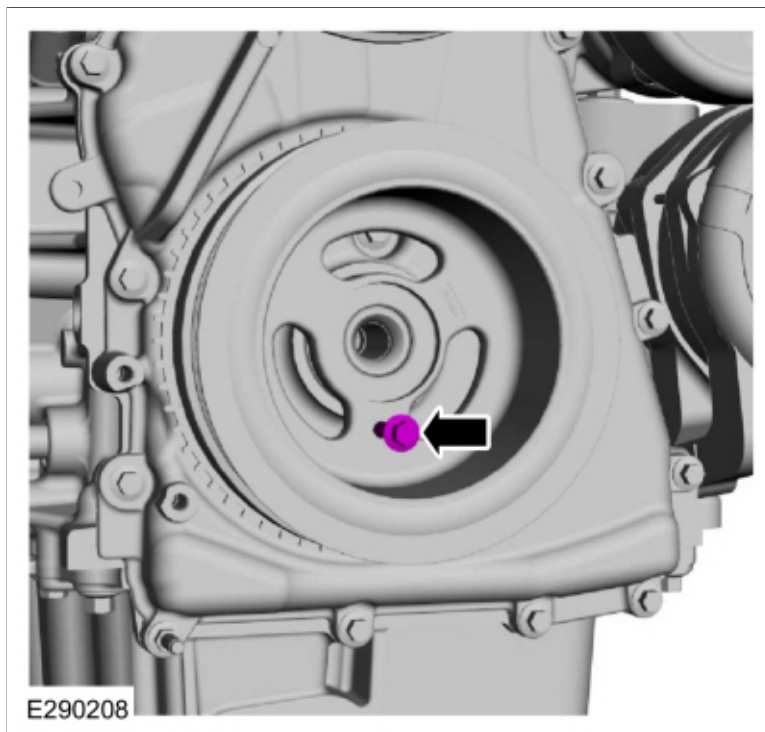


9. Position the crankshaft pulley onto the crankshaft with the access hole at the 6 o'clock position.



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

Install an M6 bolt.



11. **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.

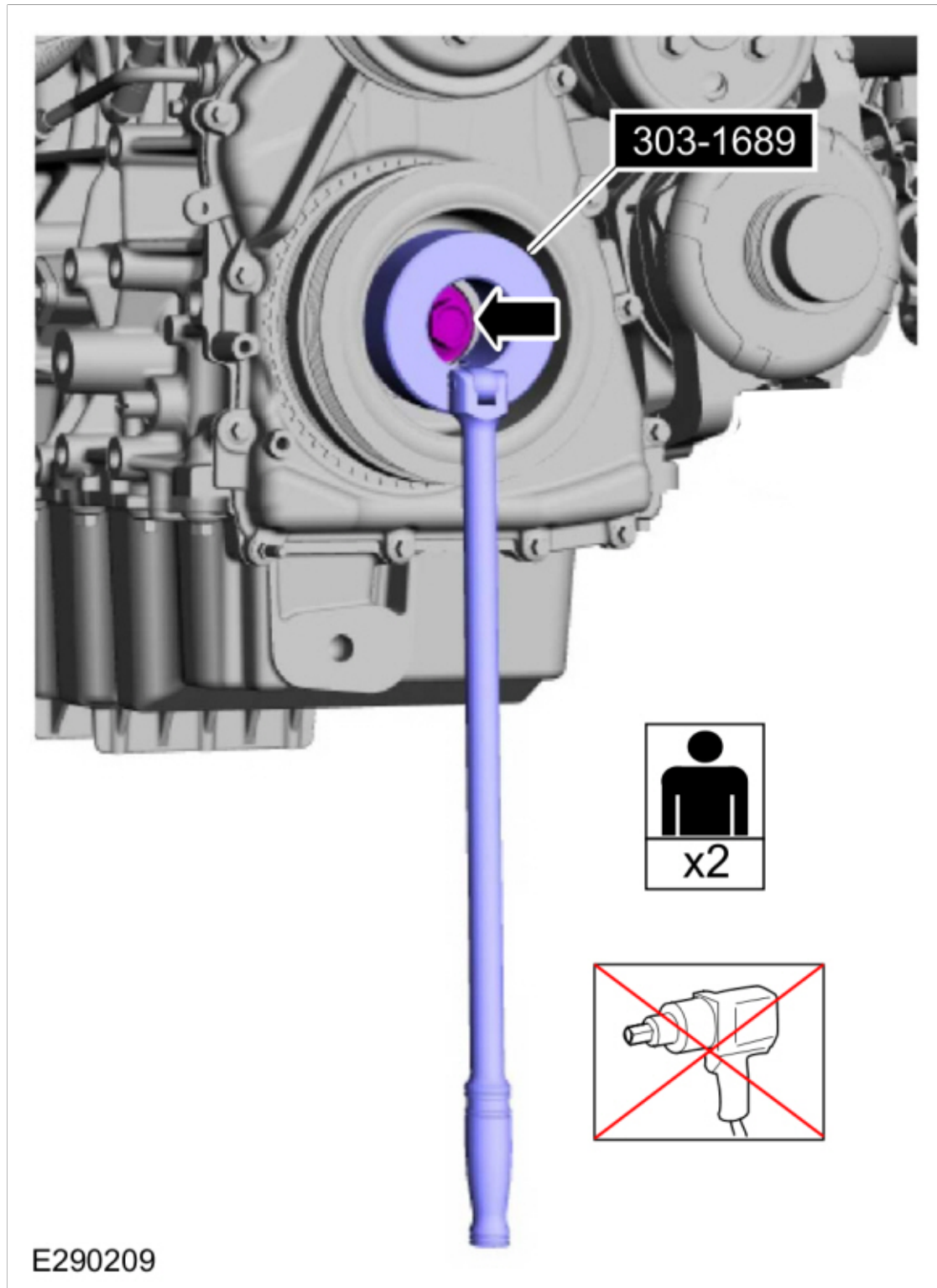
With the aid of an assistant and using the special tool, install the new crankshaft bolt and washer and tighten.

Use Special Service Tool: [303-1689 Holding Tool, Crank Damper](#).

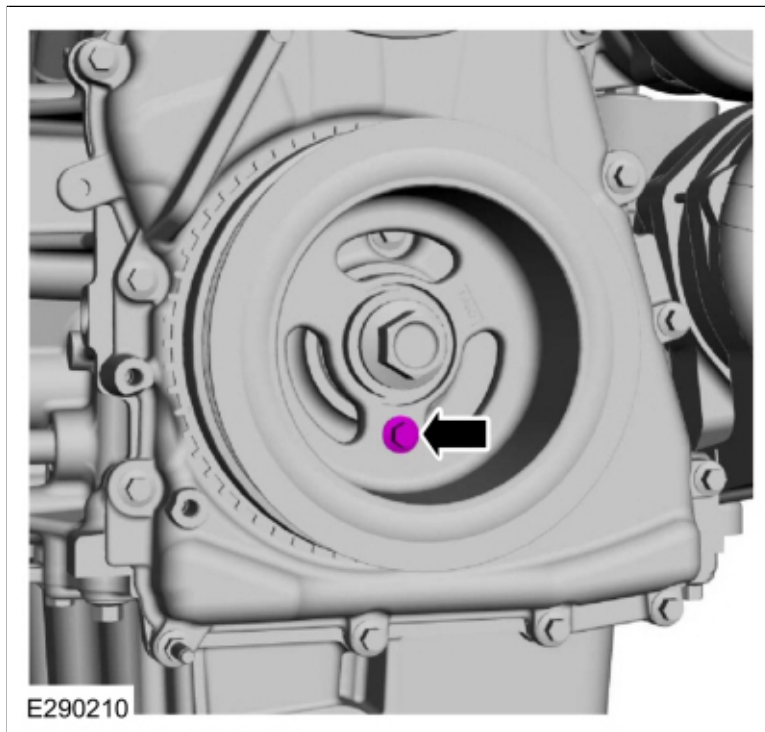
Torque:

Stage 1: 74 lb.ft (100 Nm)

Stage 2: 90°

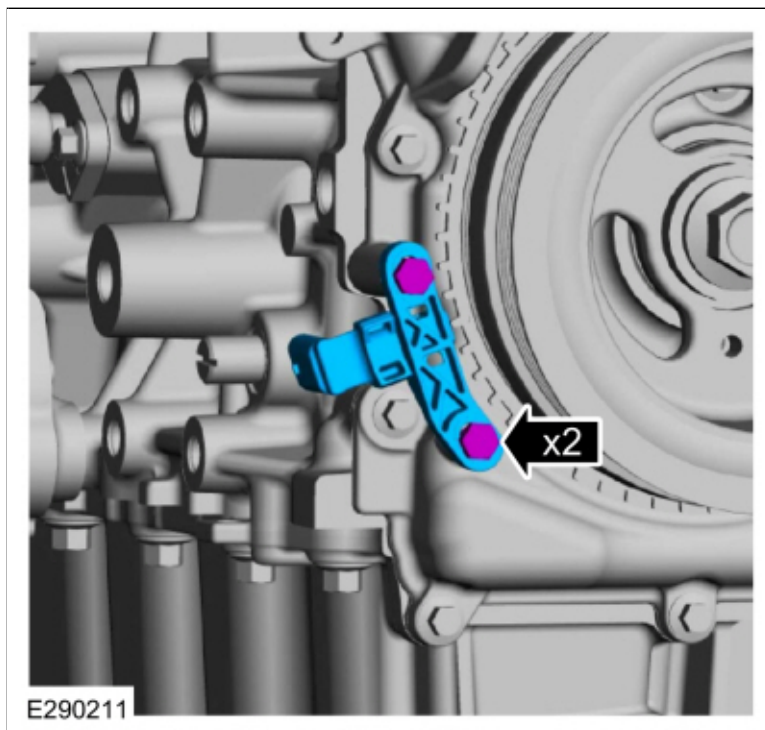


12. Remove the M6 bolt.

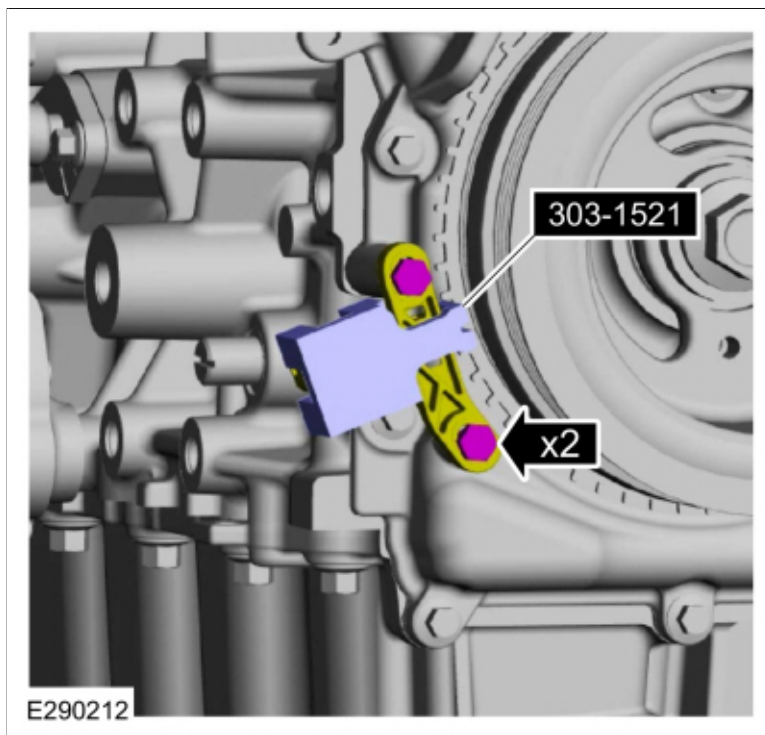


13. **NOTE:** Do not tighten the CKP sensor bolts at this time.

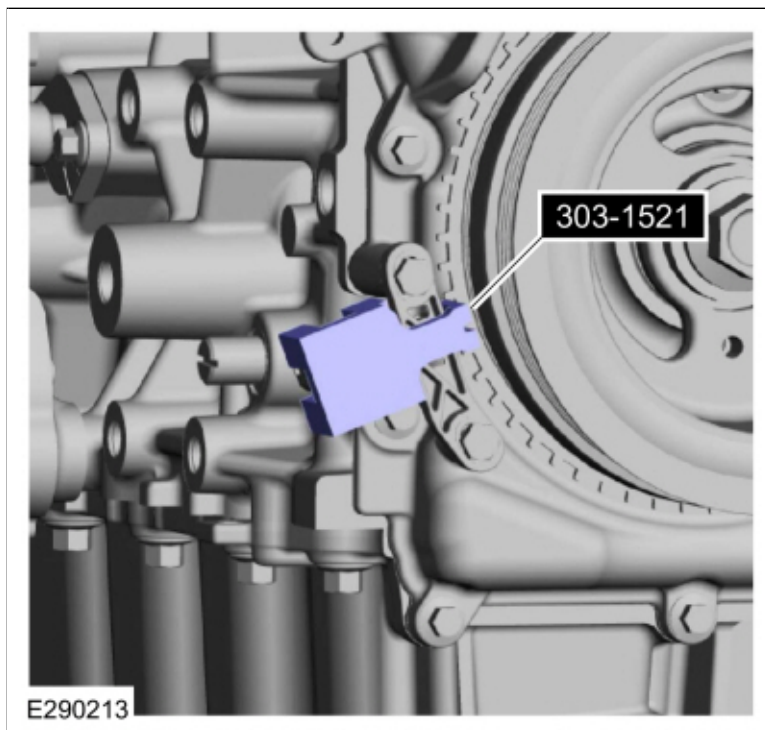
Install the CKP sensor and the bolts finger tight.



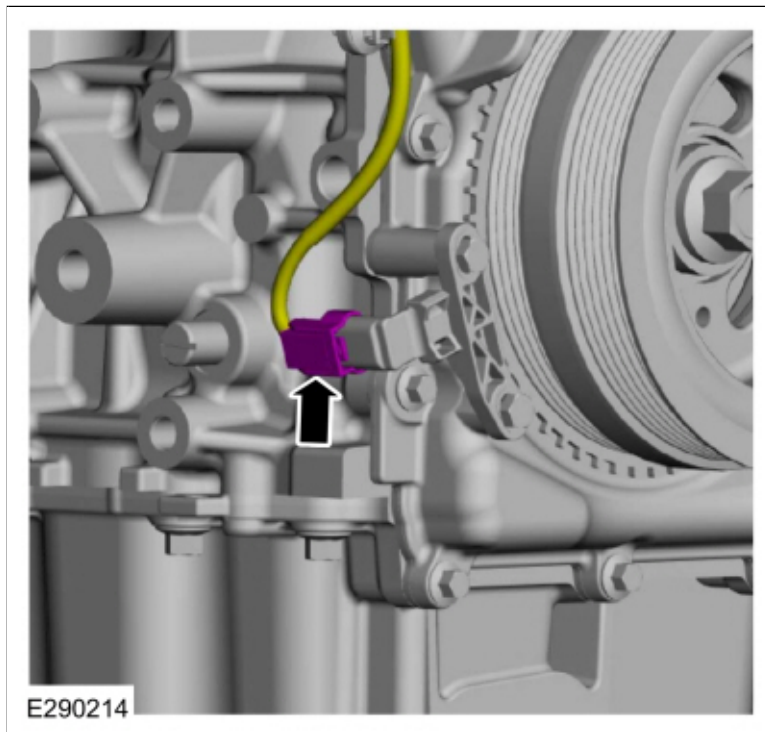
14. Install the special tool onto the CKP sensor and the tooth of the crankshaft pulley trigger wheel and tighten the bolts.
Use Special Service Tool: [303-1521 Alignment Tool, Crankshaft Position Sensor](#).
Torque: 97 lb.in (11 Nm)



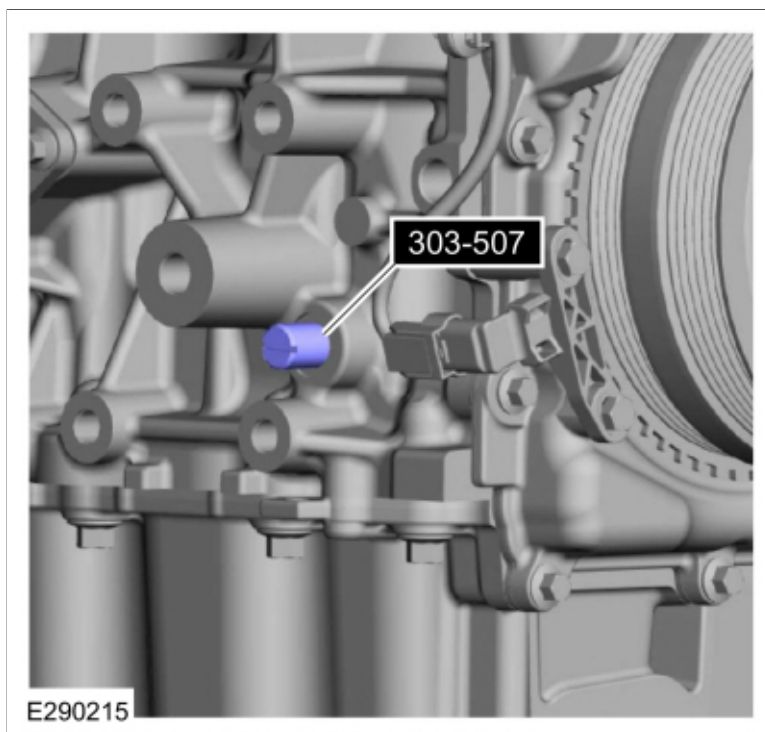
15. Remove Special Service Tool: [303-1521 Alignment Tool, Crankshaft Position Sensor](#).



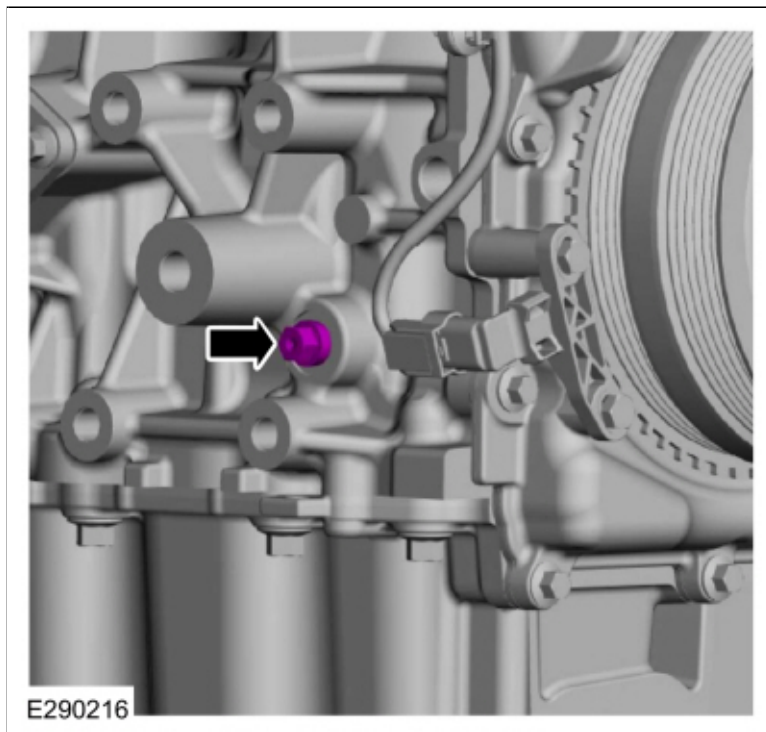
16. Connect the CKP sensor electrical connector.



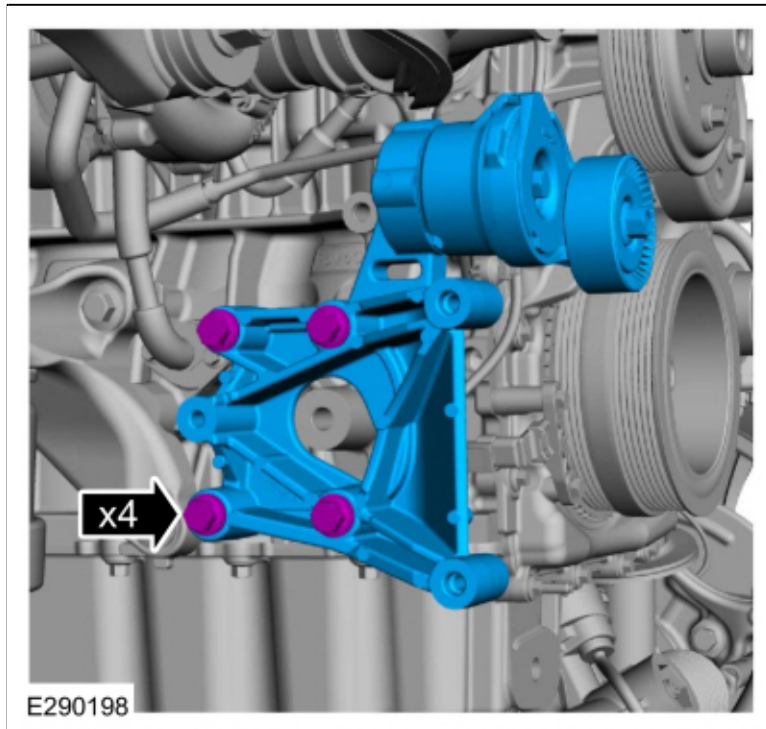
17. Remove Special Service Tool: [303-507 Timing Peg, Crankshaft TDC](#).



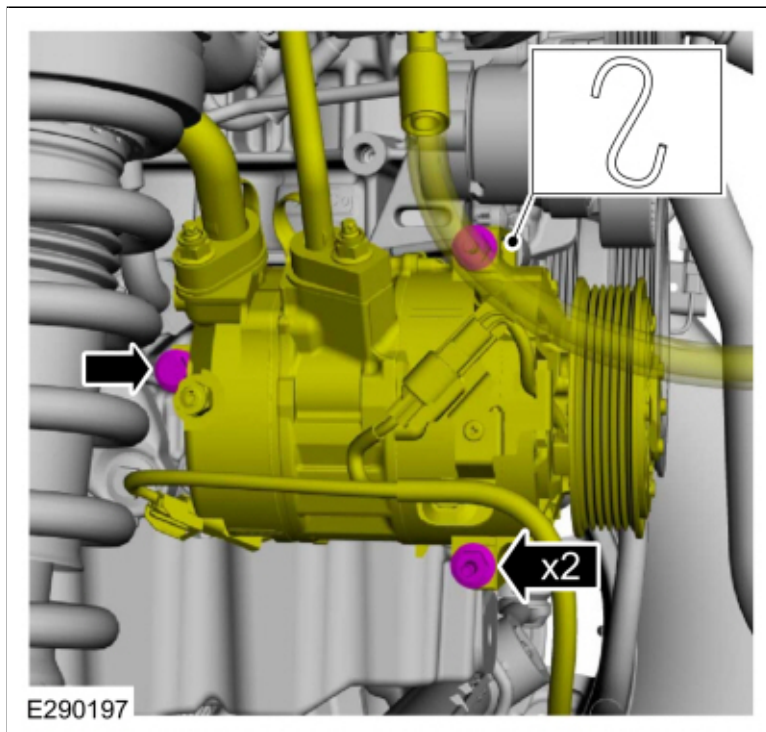
18. Install the engine plug bolt.
Torque: 177 lb.in (20 Nm)



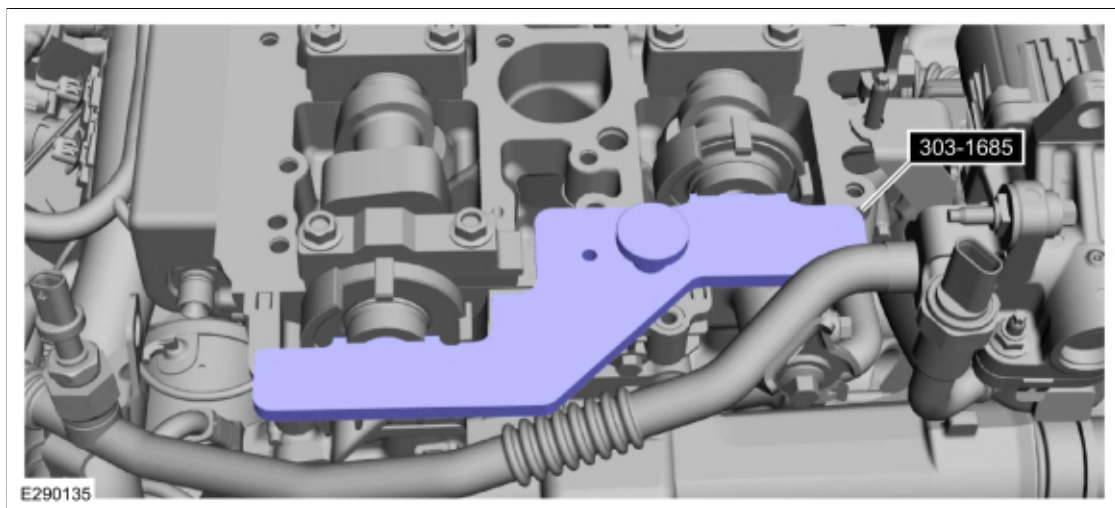
19. Install the A/C compressor bracket and the bolts.
Torque: 35 lb.ft (48 Nm)



20. Remove the support and position the A/C compressor and tighten the bolts.
Torque: 18 lb.ft (25 Nm)

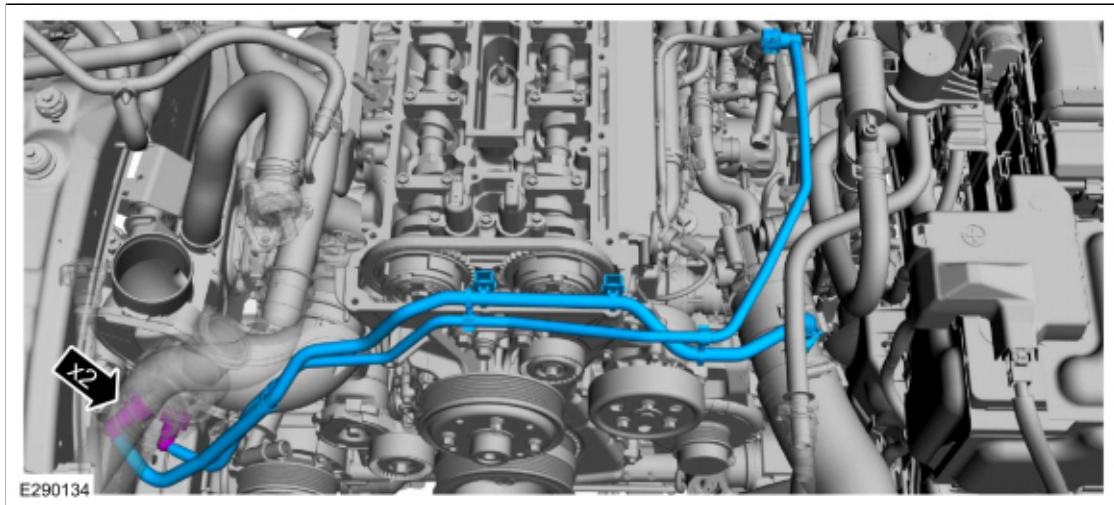


21. Remove Special Service Tool: [303-1685 Alignment Tool, Camshaft](#).



22. Install and connect the EVAP canister tube quick release couplings.
Refer to: [Quick Release Coupling](#) (310-00 Fuel System - General Information - 2.3L EcoBoost (201kW/273PS), General Procedures).



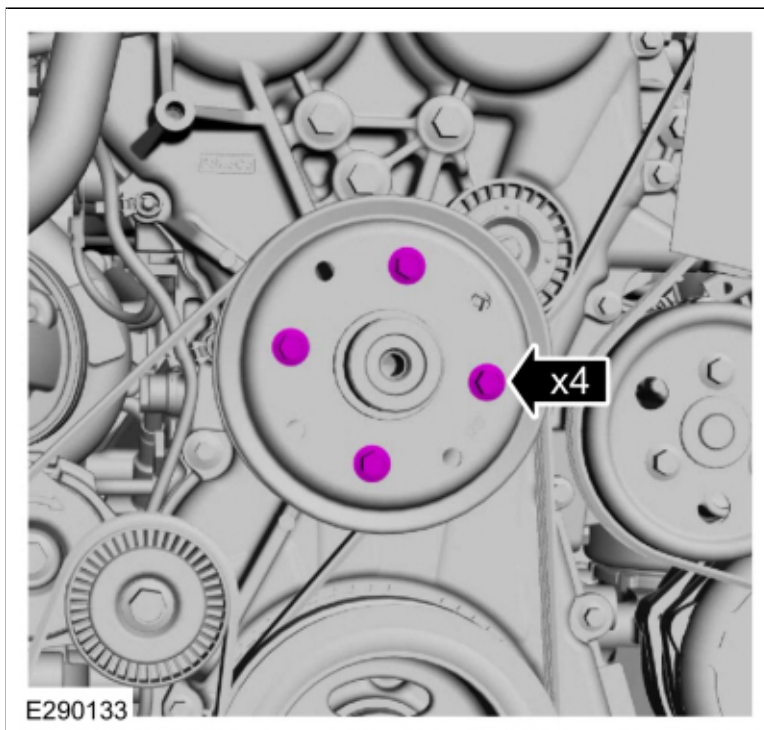


23. Install the following items:

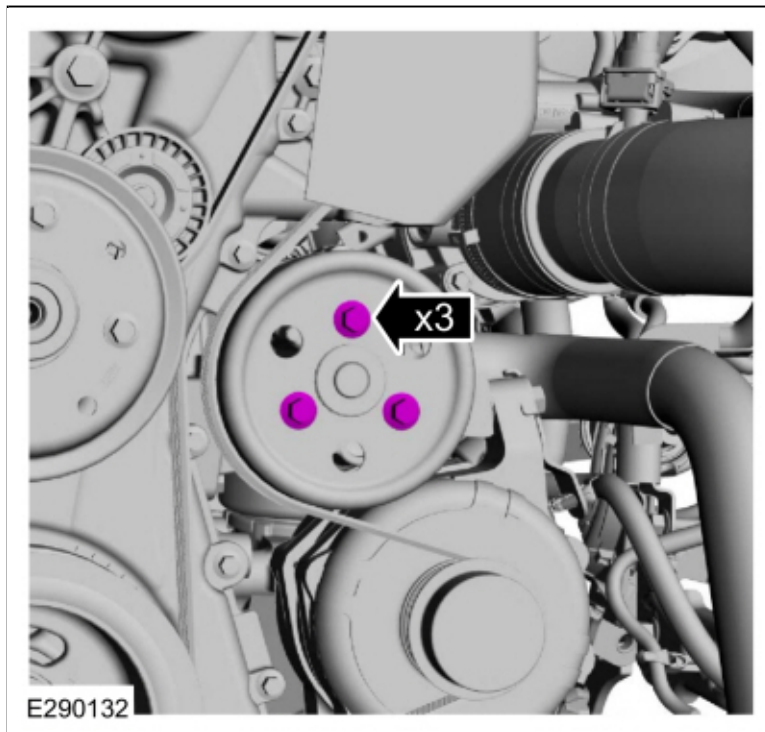
1. Install the high-pressure fuel pump drive unit.
Refer to: [High-Pressure Fuel Pump Drive Unit](#) (303-04A Fuel Charging and Controls - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
2. Install the accessory drive belt tensioner.
Refer to: [Accessory Drive Belt Tensioner](#) (303-05 Accessory Drive - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
3. Install the accessory drive belt.
Refer to: [Accessory Drive Belt](#) (303-05 Accessory Drive - 2.3L EcoBoost (201kW/273PS), Removal and Installation).

24. Tighten the accessory drive belt pulley bolts.

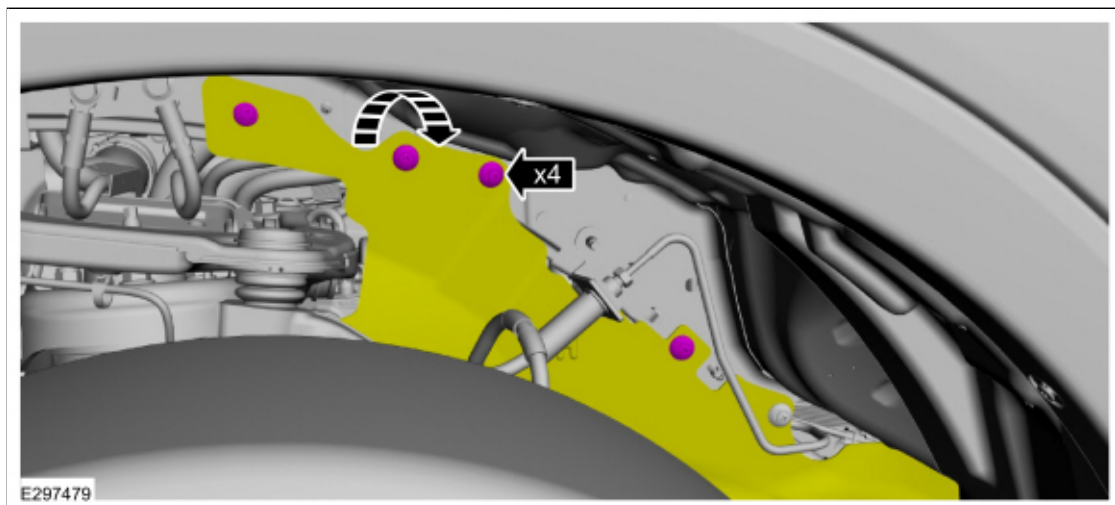
Torque: 18 lb.ft (25 Nm)



25. Tighten the coolant pump pulley bolts.
Torque: 18 lb.ft (25 Nm)

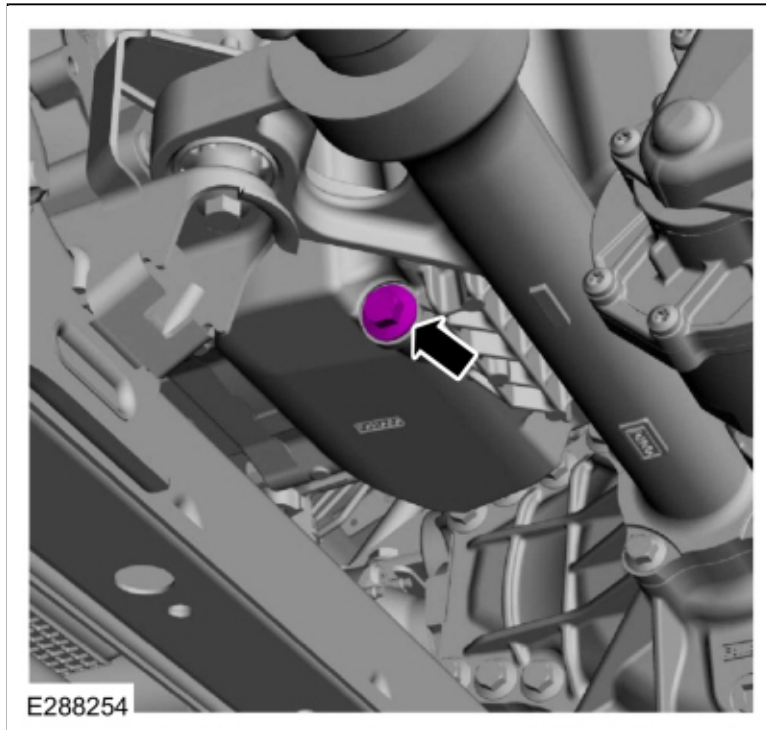


26. Install the following items:
1. Install the cooling fan.
Refer to: [Cooling Fan](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
 2. Install the upper and lower cooling fan shrouds.
Refer to: [Cooling Fan Upper Shroud](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
Refer to: [Cooling Fan Lower Shroud](#) (303-03 Engine Cooling - 2.3L EcoBoost (201kW/273PS), Removal and Installation).
27. Remove the retainers and the position the LH side splash shield down for access to the oil filter.



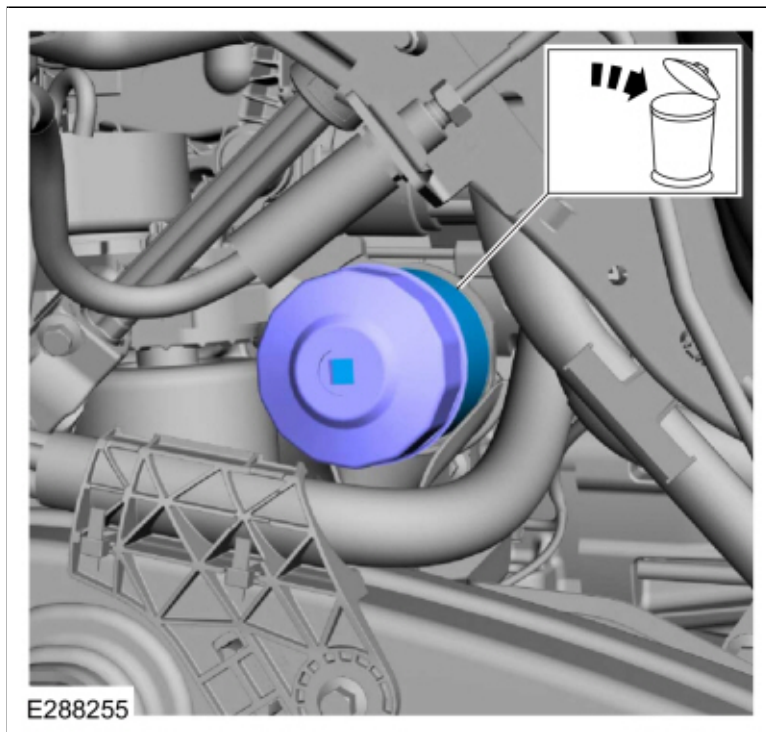
28.

- Remove the oil pan drain bolt and drain the engine oil.
Use the General Equipment: Oil Drain Equipment
- Install the oil pan drain bolt.
Torque: 20 lb.ft (27 Nm)



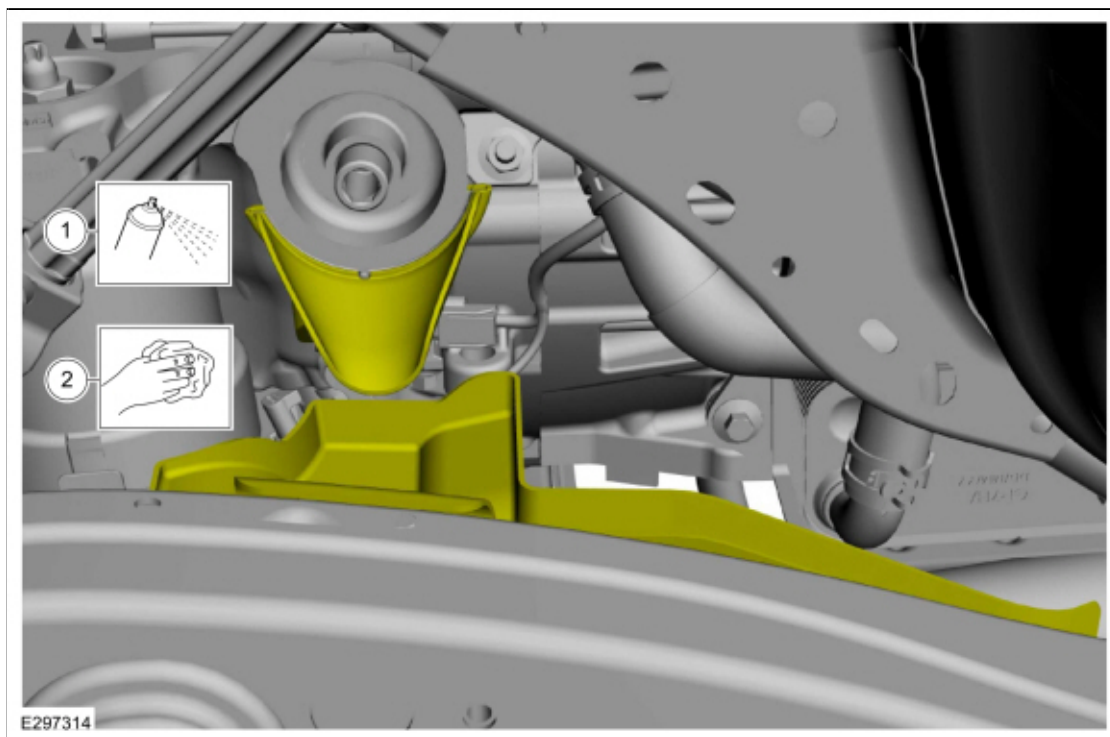
29. **NOTE:** Use a commercially available end cap oil filter wrench.

Remove and discard the engine oil filter.
Use the General Equipment: Oil Drain Equipment



30.

1. Using brake cleaner, clean the drain troughs.
Use the General Equipment: Oil Drain Equipment
Material: Motorcraft® Metal Brake Parts Cleaner / PM-4-A, PM-4-B
2. Wipe the drain troughs clean.



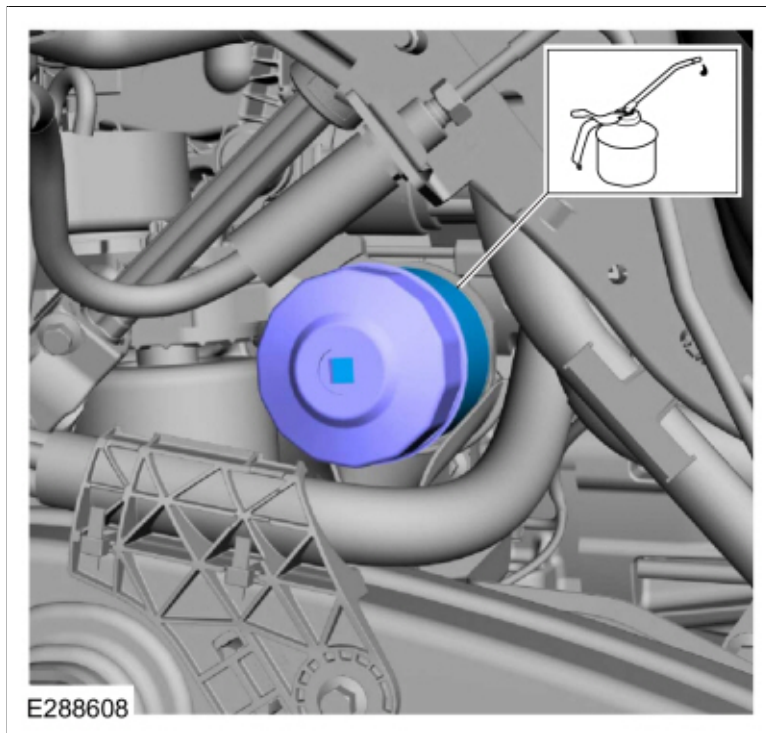
31. **NOTE:** Use a commercially available end cap oil filter wrench.

Lubricate the oil filter seal with clean engine oil and install.

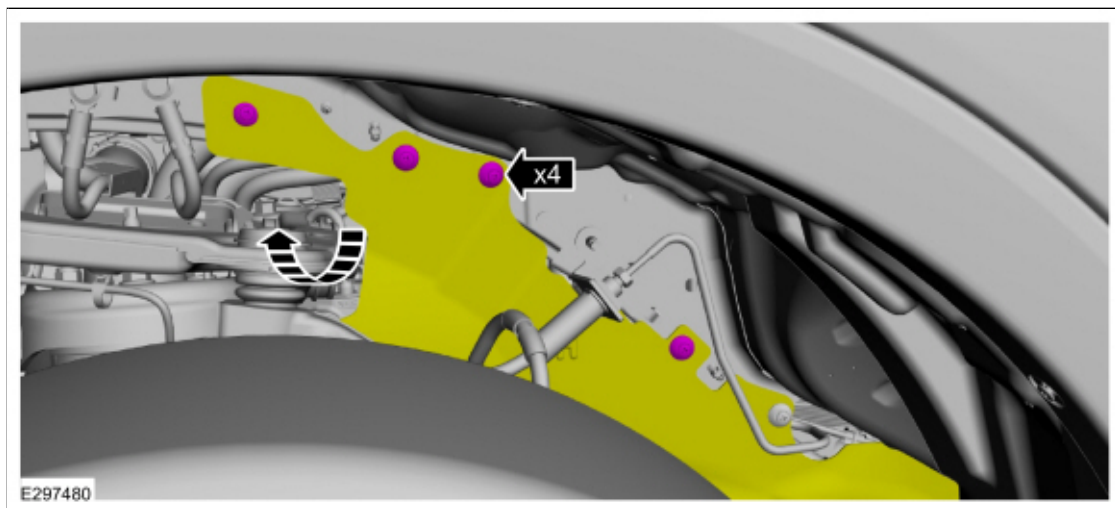
Torque:

Stage 1: 71 lb.in (8 Nm)

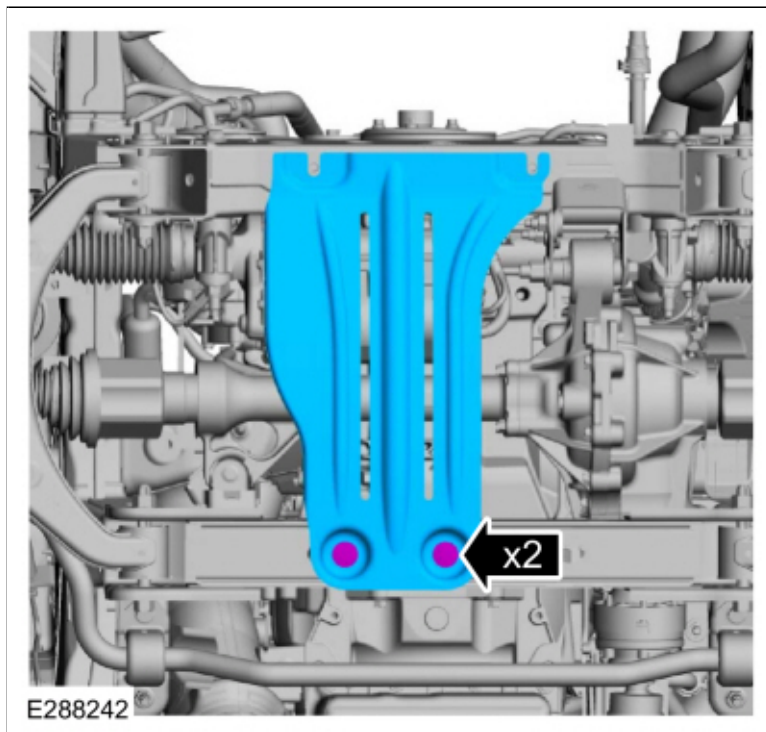
Stage 2: 180°



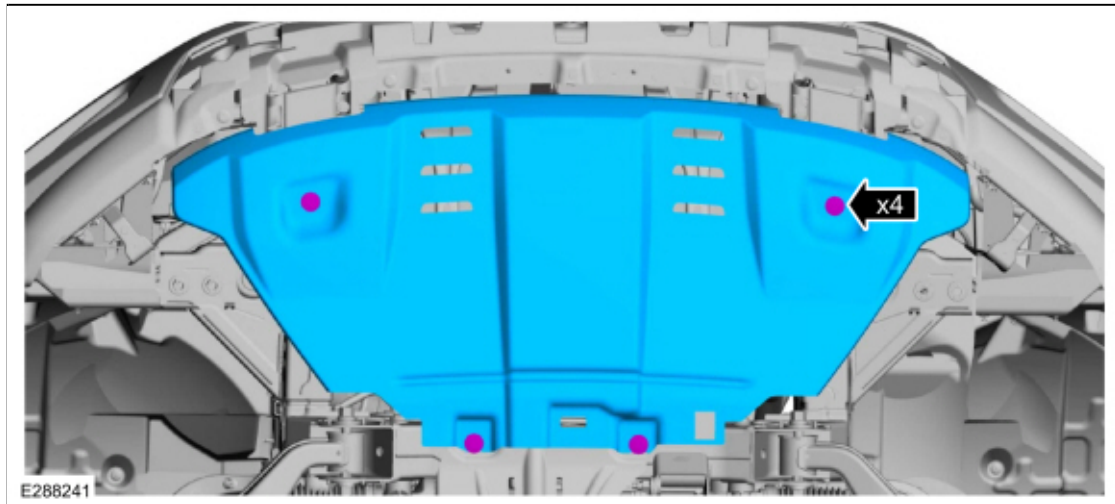
32. Position the LH fender splash shield and install the retainers.



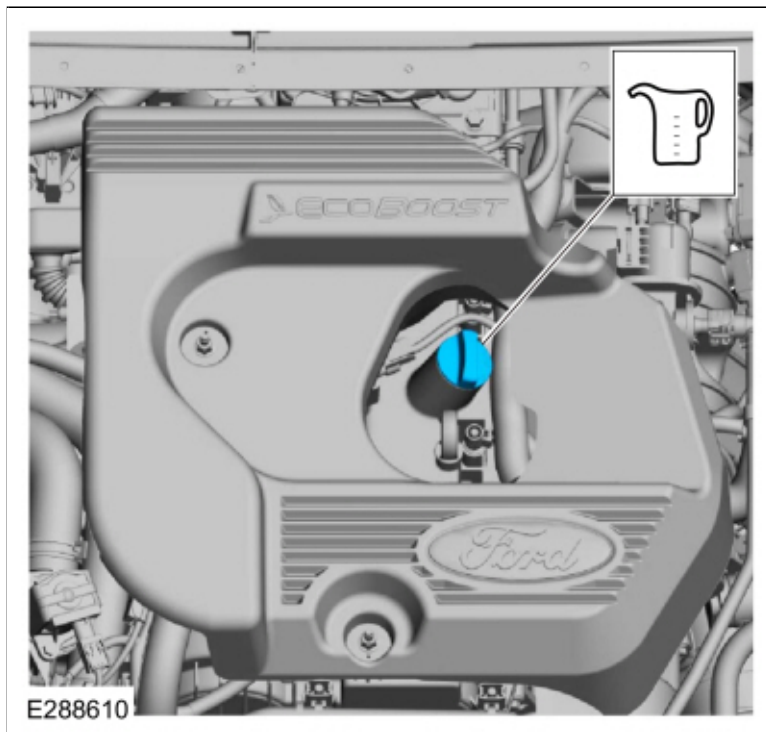
33. Install the rear skid plate and the bolts.
Torque: 22 lb.ft (30 Nm)



34. Install the front skid plate and the bolts.
Torque: 22 lb.ft (30 Nm)



35. Fill the engine with clean engine oil.
 Refer to: [Specifications](#) (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Specifications).



36. Use the Powertrain Control Module (PCM) Misfire Monitor Profile Correction routine in the diagnostic scan tool.

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