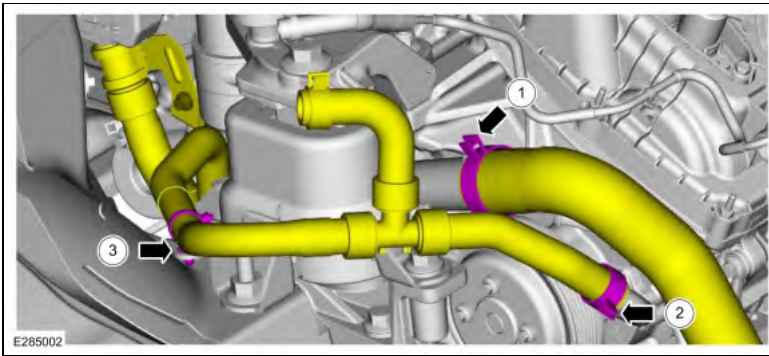


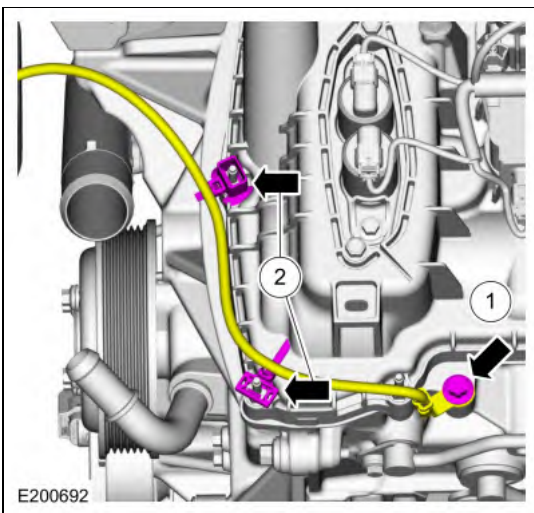
9.

1. Release the clamp and disconnect the lower radiator hose.
Use the General Equipment: Hose Clamp Remover/Installer
2. Release the clamp and disconnect the heater hose.
3. Detach the heater hose retainer.



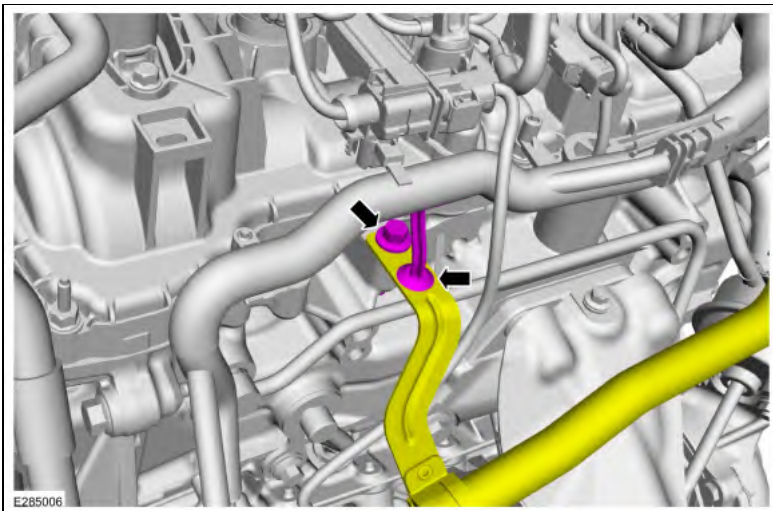
10.

1. Remove the ground wire bolt.
2. Detach the retainers and position the ground wire aside.



11.

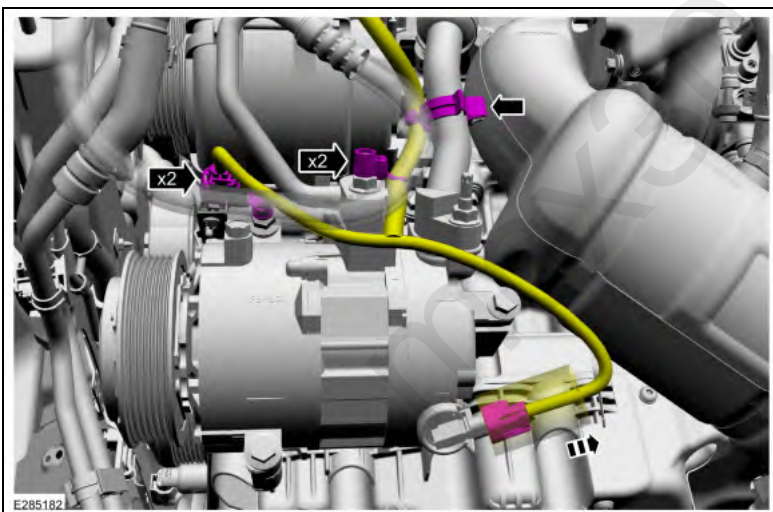
- Detach the wiring harness retainer.
- Remove the bolt and position the bracket aside.



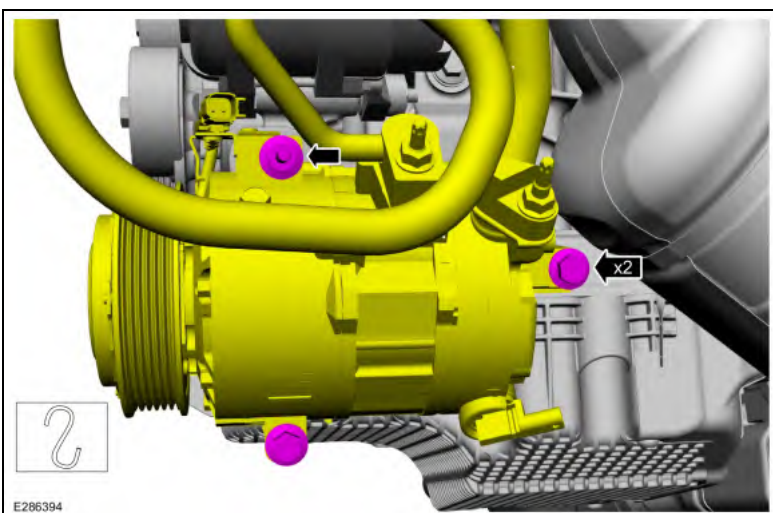
12. Remove the following items:

1. Cowl panel grille.
Refer to: Cowl Panel Grille (501-02 Front End Body Panels, Removal and Installation).
2. LH valve cover.
Refer to: Valve Cover LH (303-01B Engine - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
3. RH valve cover.
Refer to: Valve Cover RH (303-01B Engine - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
4. RH fender splash shield.
Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).
5. Refer to: Roll Restrictor RH (307-01B Automatic Transmission - 8-Speed Automatic Transmission 8F57, Removal and Installation).
6. Accessory drive belt tensioner.
Refer to: Accessory Drive Belt Tensioner (303-05B Accessory Drive - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
7. Oil pressure control solenoid.
Refer to: Oil Pressure Control Solenoid (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Removal and Installation).

13. Detach the wiring harness retainers, slide up the insulator and disconnect the electrical connectors.

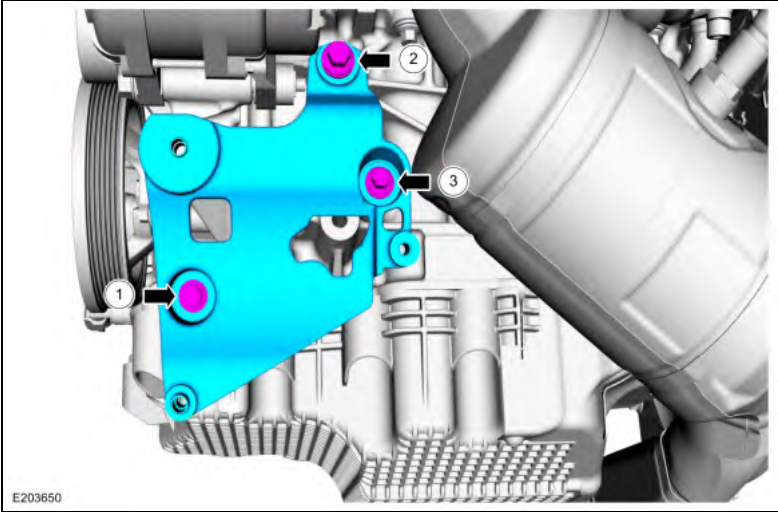


14. Remove the bolts, stud bolt and position the A/C compressor aside and support with a length of mechanics wire.

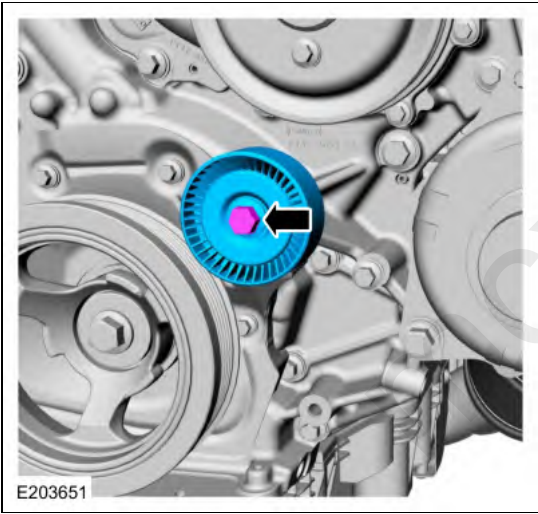


15.

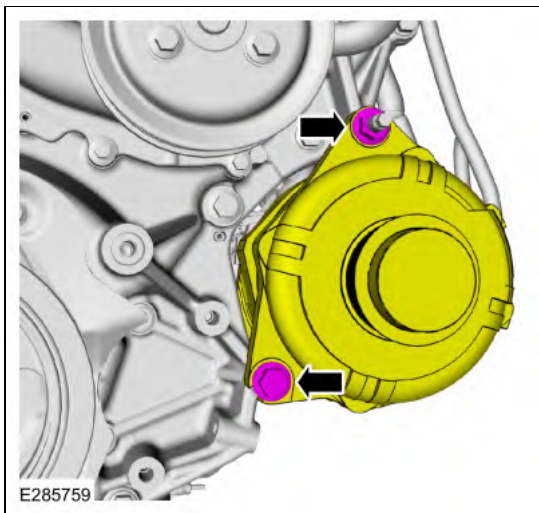
- 1. Remove the M8 x 50mm bolt.
- 2. Remove the M10 x 43mm bolt.
- 3. Remove the M8 x 30mm bolt and the A/C compressor mounting bracket.



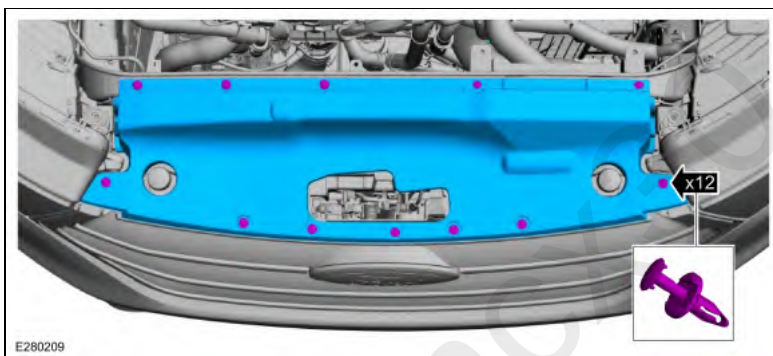
16. Remove the bolt and the idler pulley.



17. Remove the nut, the bolt and position the generator aside.

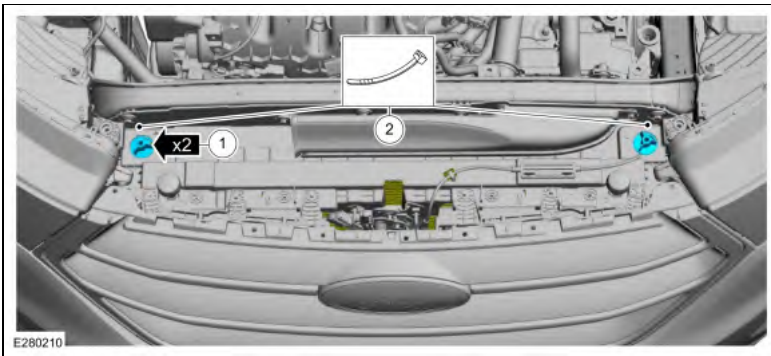


18. Remove the retainers and the upper air deflector.

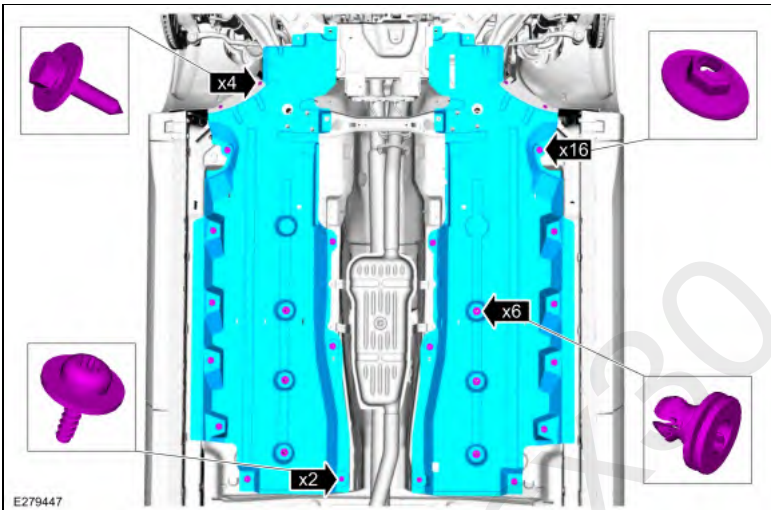


19. **NOTICE: Make sure the cooling module is secure before removing the bottom cooling module support panel.**

1. Remove the upper cooling module support brackets.
2. Using cable ties or mechanics wire through the upper location holes, to support the cooling module.
Use the General Equipment: Cable Ties



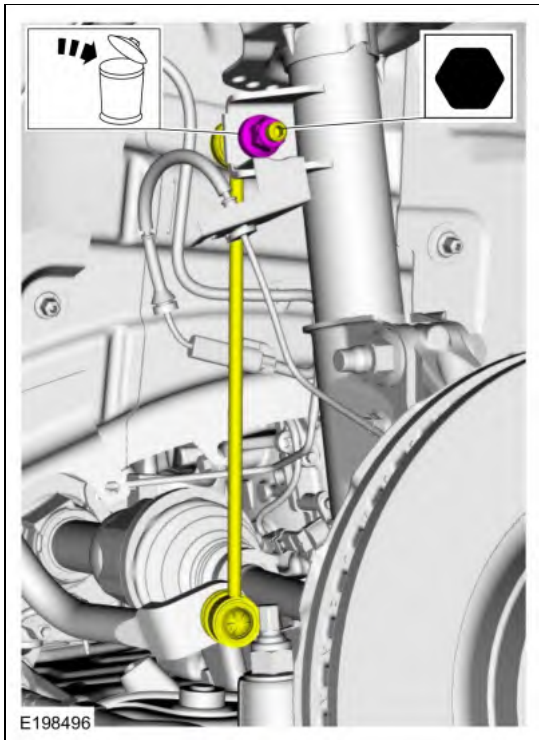
20. Remove the retainers and the underbody shields.



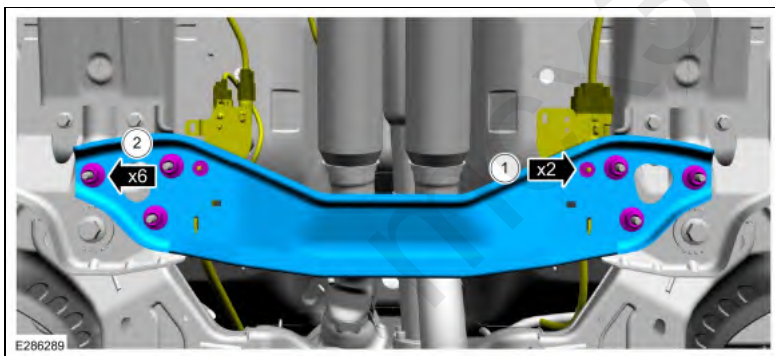
21. Drain the engine cooling system
Refer to: Engine Cooling System Draining, Vacuum Filling and Bleeding (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), General Procedures).

22. **NOTICE:** Use the internal or external hex-holding feature to prevent the ball and stud from turning while removing or installing the stabilizer bar link nuts. The link boot seal must not be allowed to twist while tightening the link nuts or damage to the boot seal will occur.

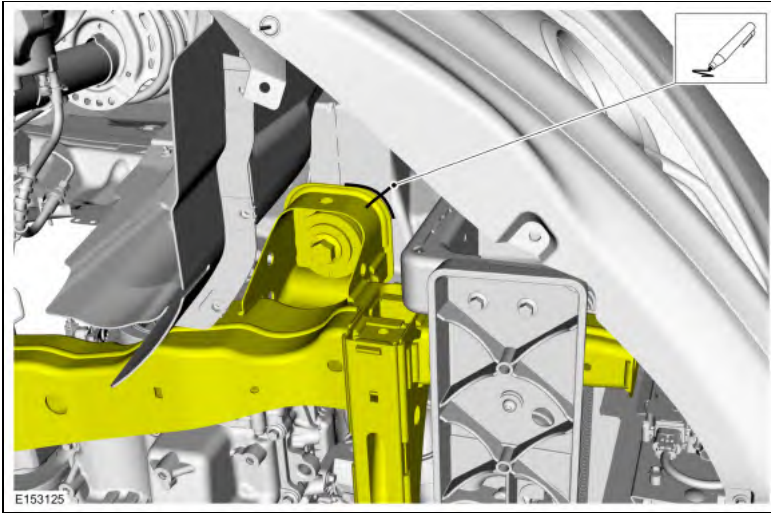
Remove the nut and position the RH sway bar link aside.



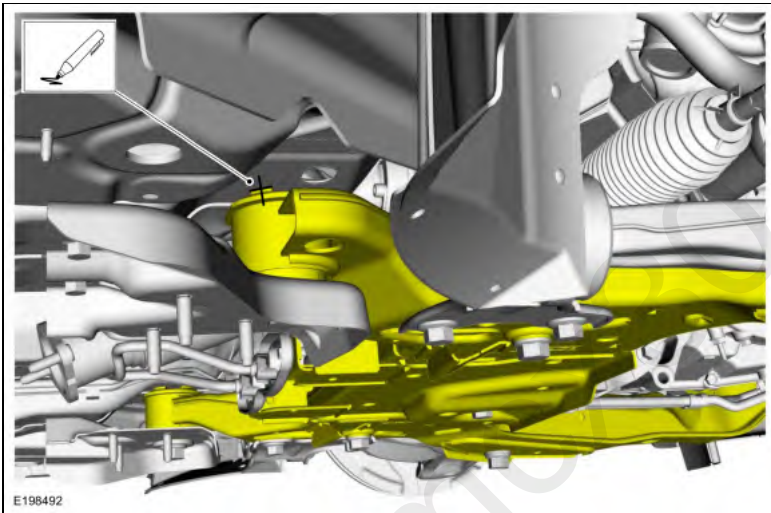
- 23.
1. If equipped, remove the nuts and position the wiring harness support bracket(s) aside.
 2. Remove the nuts and the subframe support bracket.



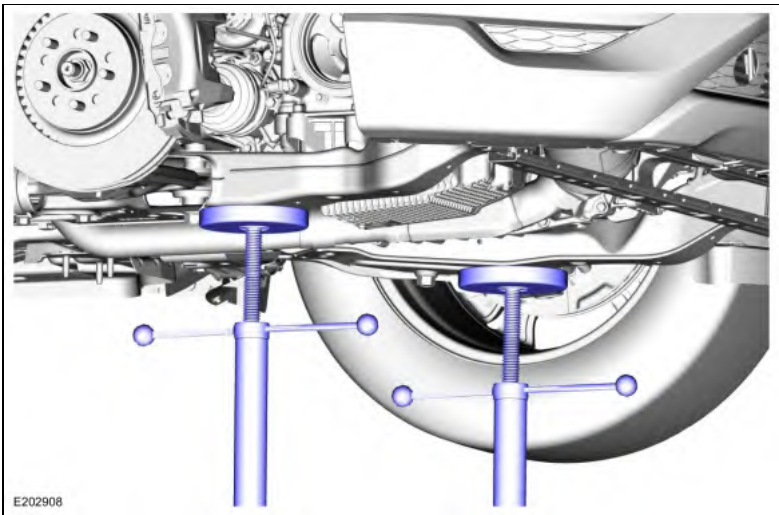
24. Mark the subframe location.



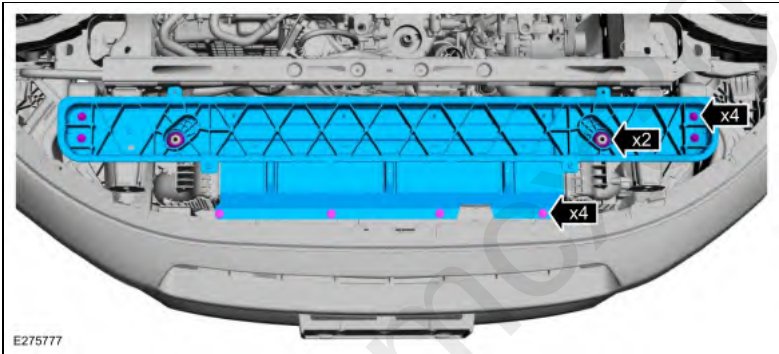
25. Mark the subframe location.



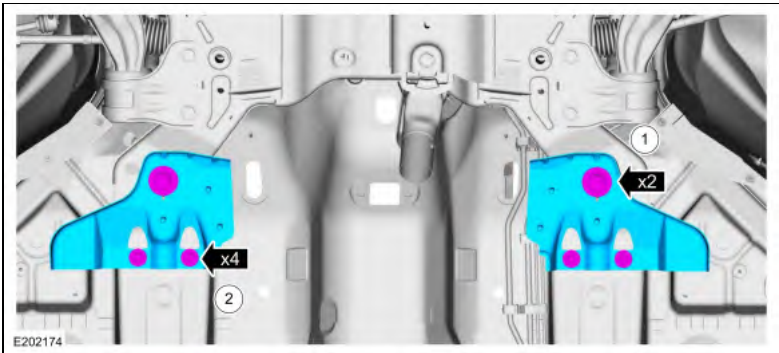
26. Position adjustable stands under the sides of the subframe.
Use the General Equipment: Vehicle/Axle Stands



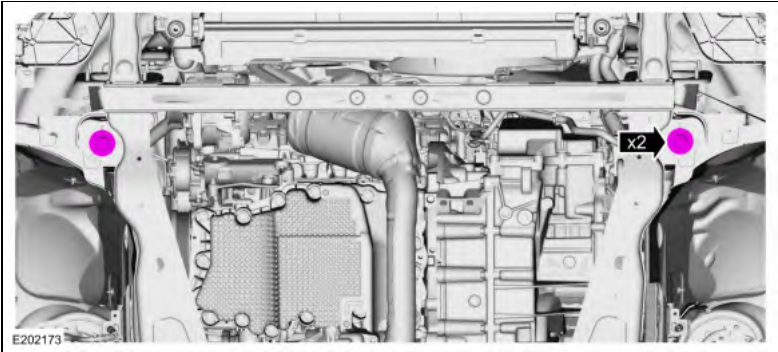
27. **NOTICE:** Make sure the cooling module is secure.
- Remove the pin-type retainers.
 - Remove the bolts and the cooling module support panel.



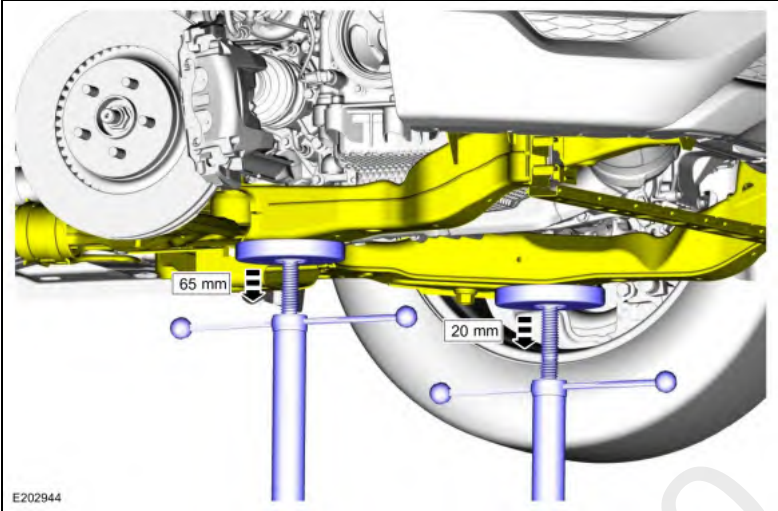
28. **NOTE:** The original subframe fasteners will be used later in this procedure, do not discard the bolts until instructed to in this procedure.
1. Remove the subframe bolts.
 2. Remove the bolts and the subframe brackets.



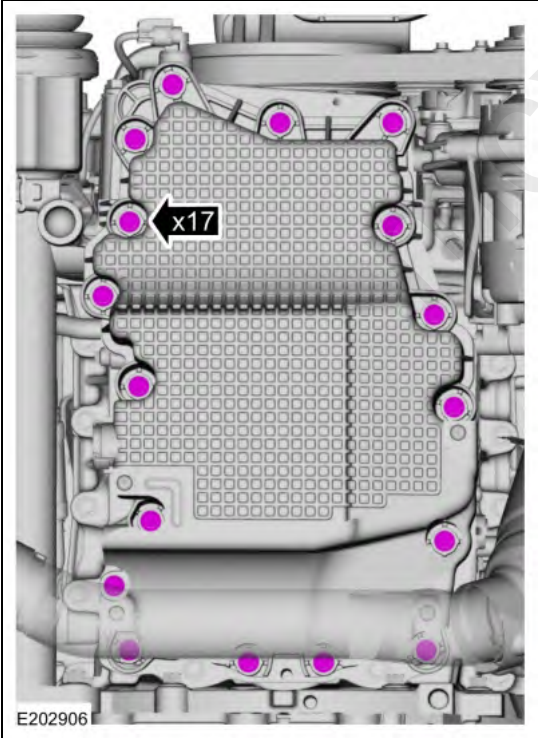
29. Remove the subframe bolts.



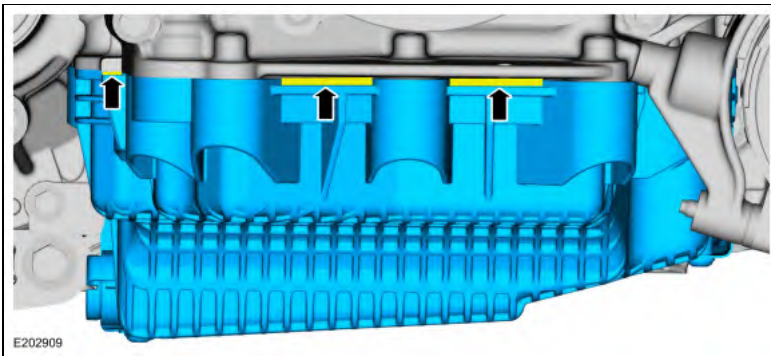
30. Using the adjustable stands lower the LH side of the subframe 20 mm (0.75 in) and lower the RH 65 mm (2.5 in).
Use the General Equipment: Vehicle/Axle Stands



31. Remove the oil pan bolts.



32. Using a large flat-bladed screwdriver and the indicated pry pads, release the sealer and separate the oil pan from the bottom of the engine.
Use the General Equipment: Flat-Bladed Screwdriver

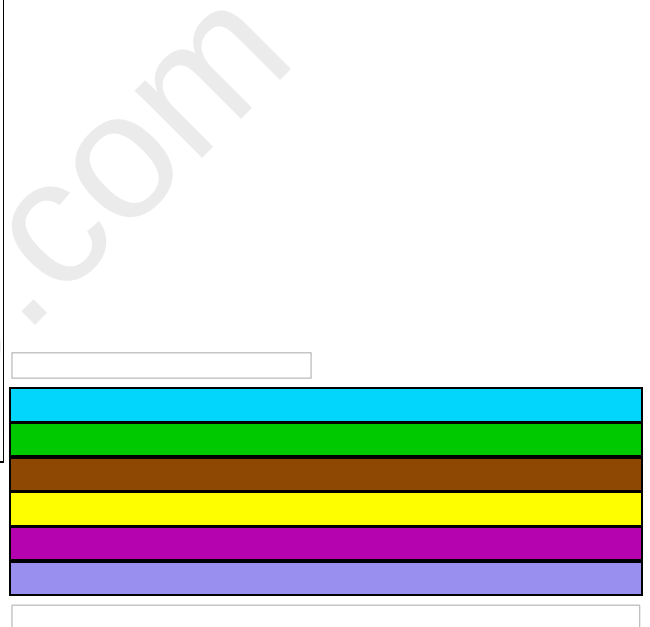
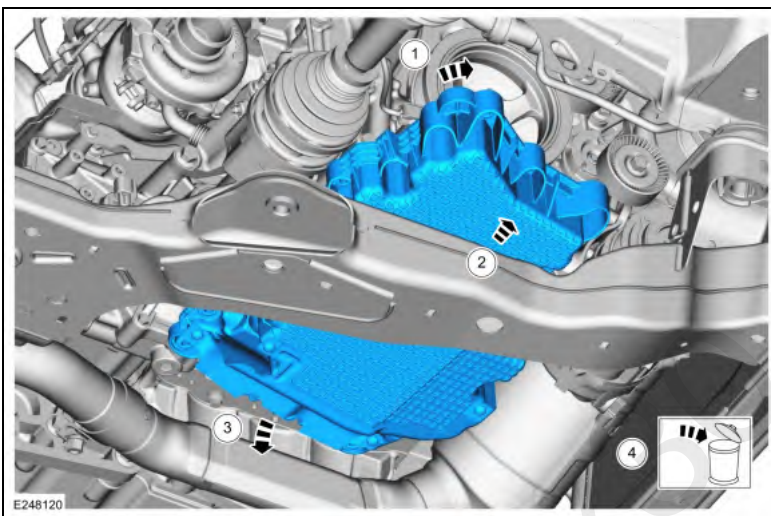


33. **NOTE:** Suspension components and jackstand removed from graphic for clarity.

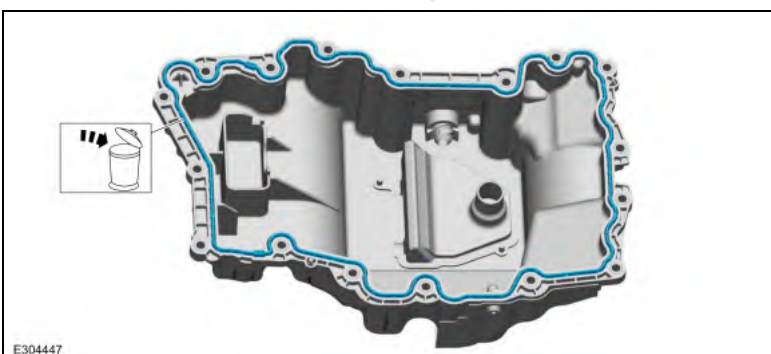
1. Rotate the front of the oil pan slightly toward the front of the vehicle.
2. Position the front of the oil pan to the RH side of the vehicle above the subframe.
3. Lower the rear of the oil pan to clear the exhaust and remove the oil pan.

4. **NOTE:** Do not reuse the oil pans sealed by Motorcraft® High Performance Engine RTV Silicone. Oil pans sealed by Motorcraft® High Performance Engine RTV Silicone are to be removed and discarded. The replacement oil pan will have a press-in-place gasket.

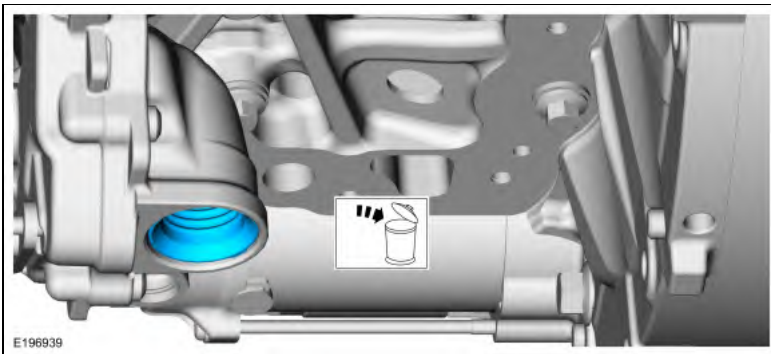
Discard the oil pan if it is sealed with Motorcraft® High Performance Engine RTV Silicone.



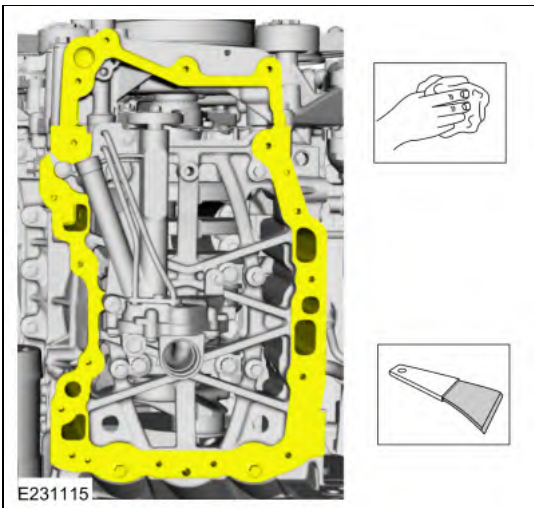
34. If equipped, remove and discard the oil pan press-in-place gasket.



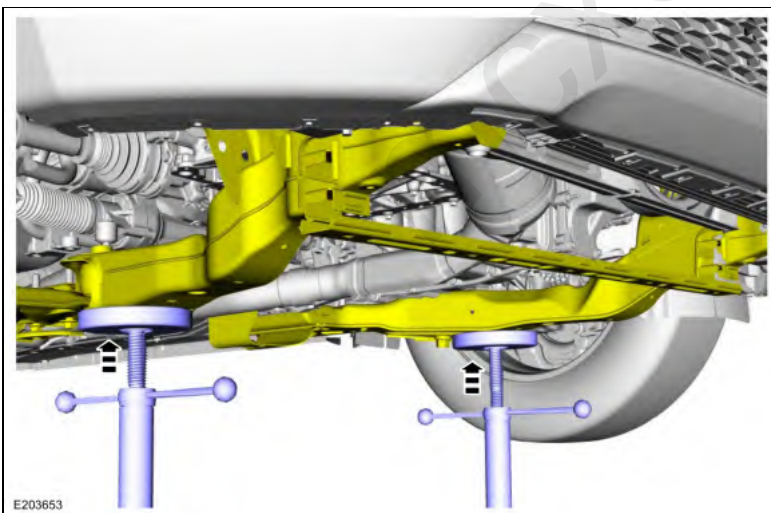
35. Remove and discard the oil pump seal.



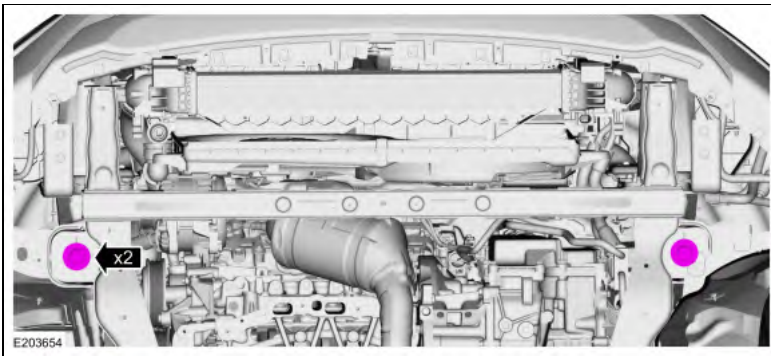
36. Clean and prepare the RTV sealing surface.
 Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).
 Use the General Equipment: Plastic Scraper



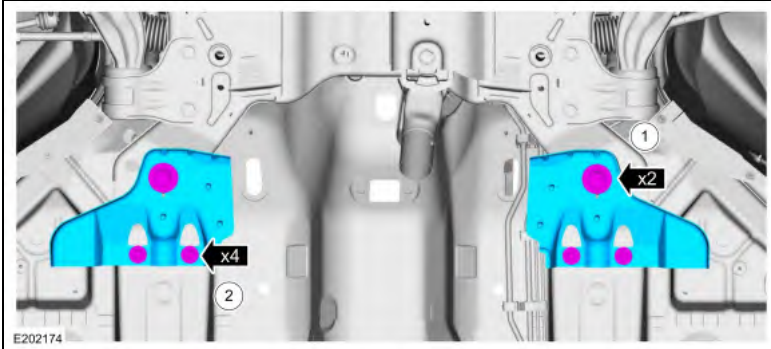
37. Using the adjustable stands, raise the subframe into the installed position.
 Use the General Equipment: Vehicle/Axle Stands



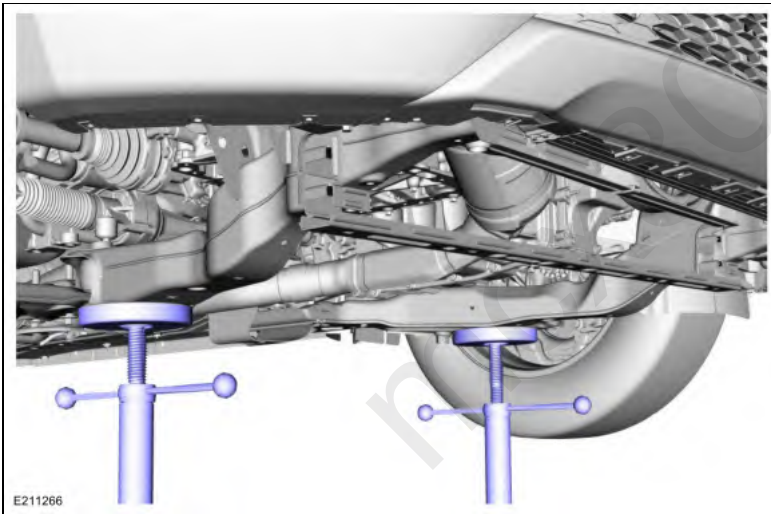
38. Install the original subframe bolts.



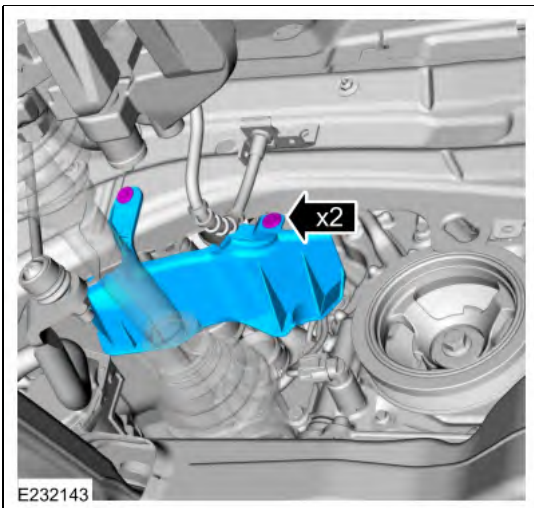
- 39.
1. Install the subframe brackets and the original subframe bolts.
 2. Install the subframe bracket bolts.



40. Remove the stands.
Remove the General Equipment: Vehicle/Axle Stands

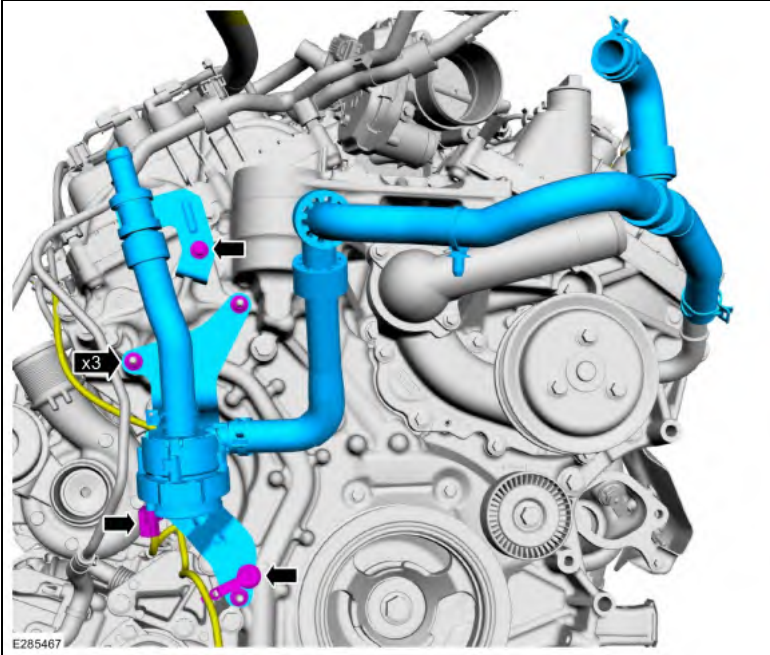


41. Remove the retainers and the splash shield.

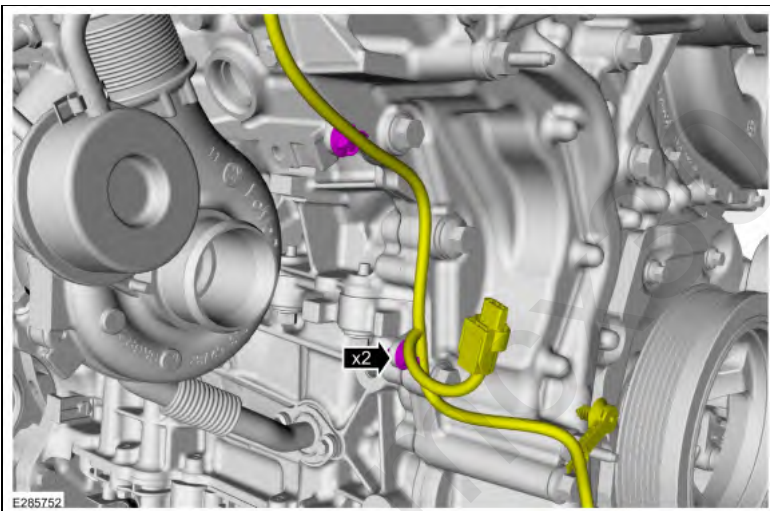


- 42.

- Disconnect the coolant pump electrical connector.
- Detach the wiring harness retainer.
- Remove the nuts, bolt and the coolant pump and hose assembly.



43. Detach the wiring harness retainers.

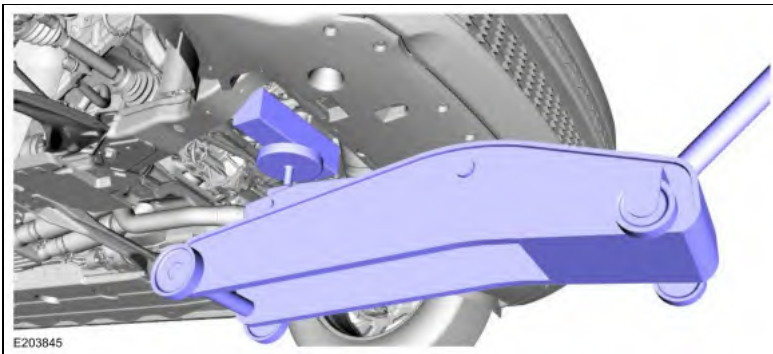


44. **NOTICE:** Failure to position the wood block and floor jack as illustrated can result in damage to the oil pump. The floor jack will be used to lower and raise the engine during the remainder of the removal procedure.

Support the engine with a floor jack and a wooden block placed under the engine block skirt stiffener.

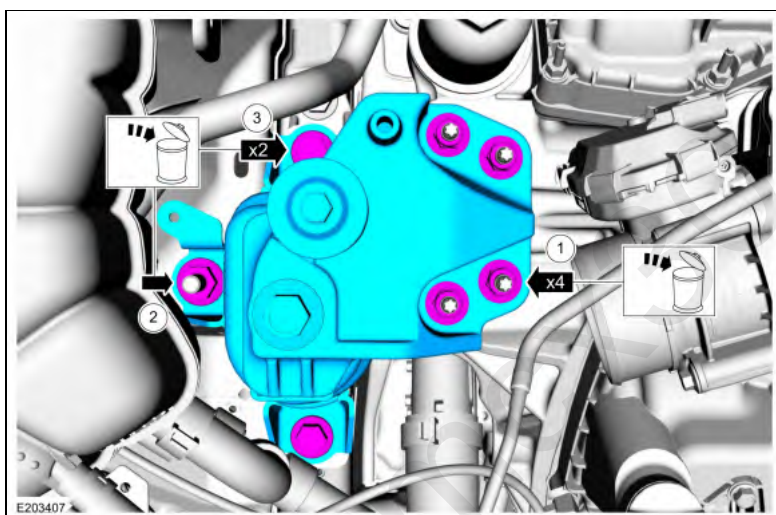
Use the General Equipment: Wooden Block

Use the General Equipment: Trolley Jack

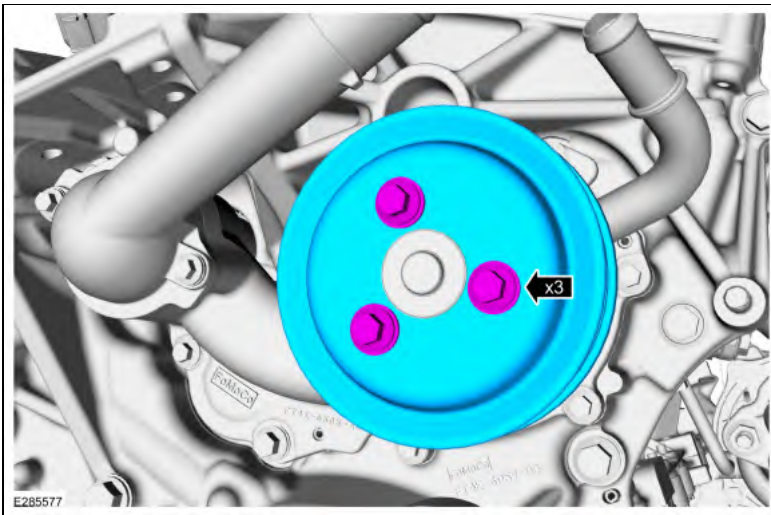


45. **NOTICE:** The engine mount and bracket are serviced as an assembly. Do not remove the engine mount bracket-to-engine mount bolt, this fastener is not serviceable.

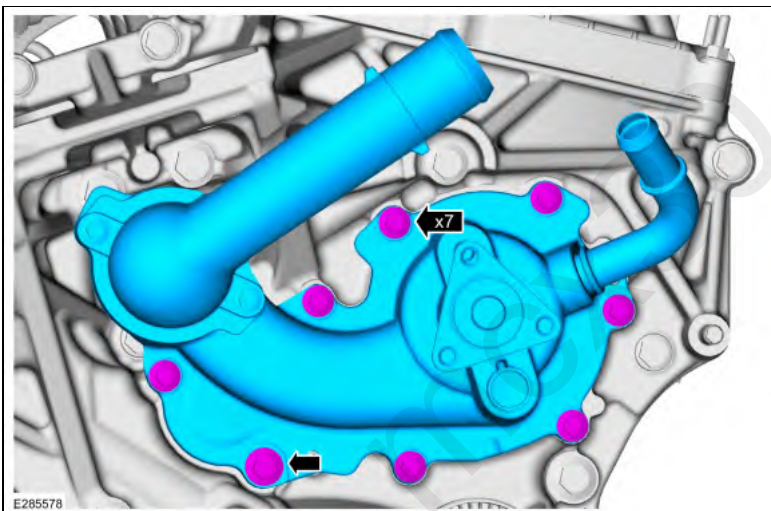
1. Remove and discard the engine mount bracket-to-engine nuts.
2. Remove and discard the engine mount-to-frame nut.
3. Remove and discard the engine mount-to-frame bolts.
4. Remove the engine mount and bracket assembly.



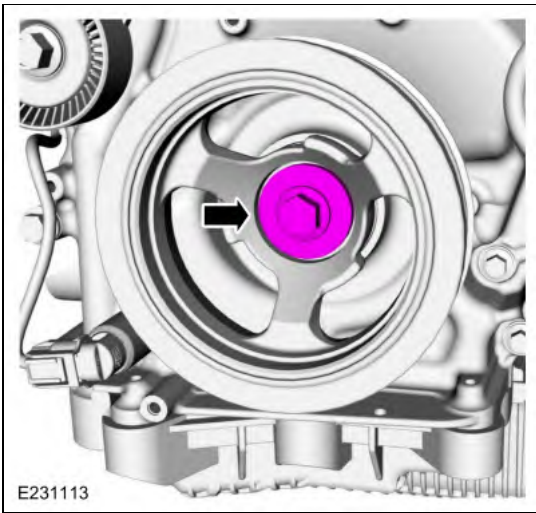
46. Remove the bolts and the coolant pump pulley.



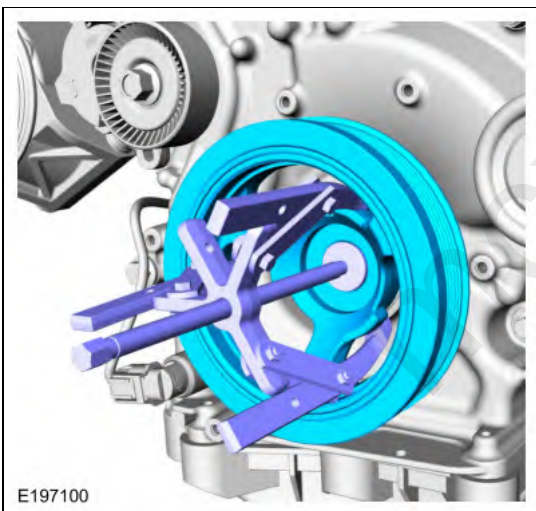
47. Remove the bolts and the coolant pump.



- 48.
- Inspect the coolant pump gasket and replace if necessary.
 - **NOTE:** The grommet may remain in the coolant pump housing. If this occurs, remove the grommet from the coolant pump housing.
- Remove the grommet from the coolant inlet pipe. Inspect the grommet and replace if necessary.



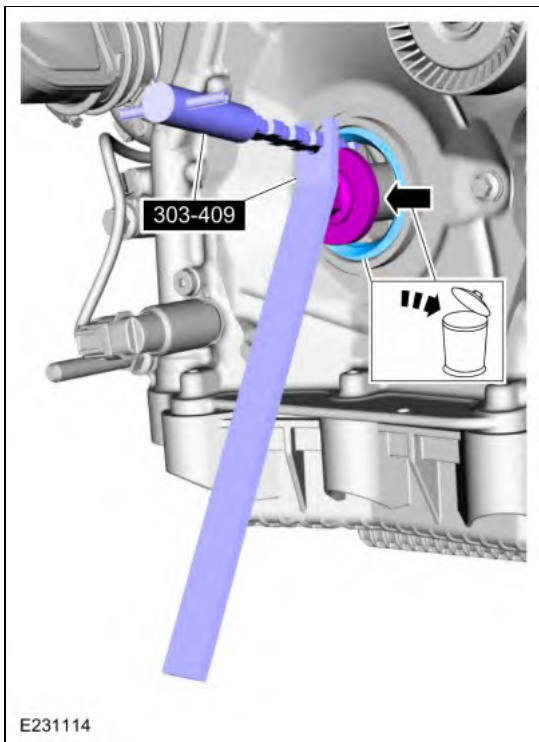
51. Using the 3 Leg Puller and a step plate, remove the crankshaft pulley.
Use the General Equipment: Three Leg Puller



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

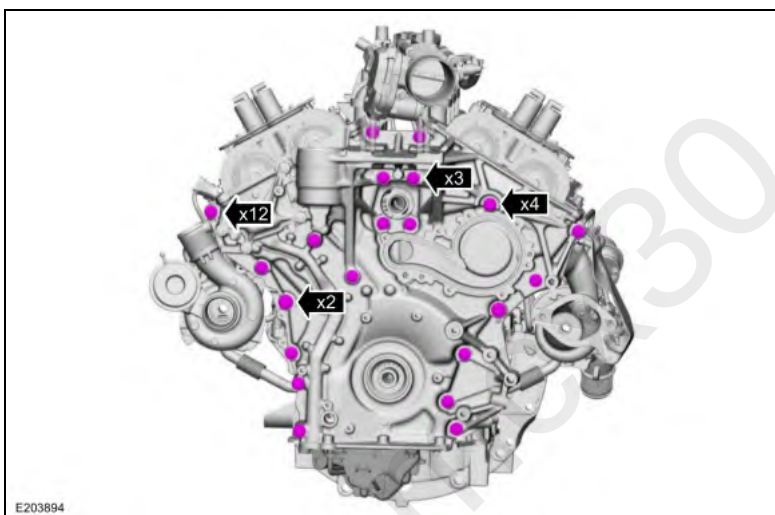
1. Install the crankshaft pulley bolt.
2. Using the special tool, remove and discard the crankshaft front oil seal.
Use Special Service Tool: 303-409 (T92C-6700-CH) Remover, Crankshaft Seal.
3. **NOTE:** If further disassembly of the engine will be performed, retain the original crankshaft pulley bolt for turning the crankshaft while the pulley is removed.

Remove and discard the crankshaft pulley bolt.

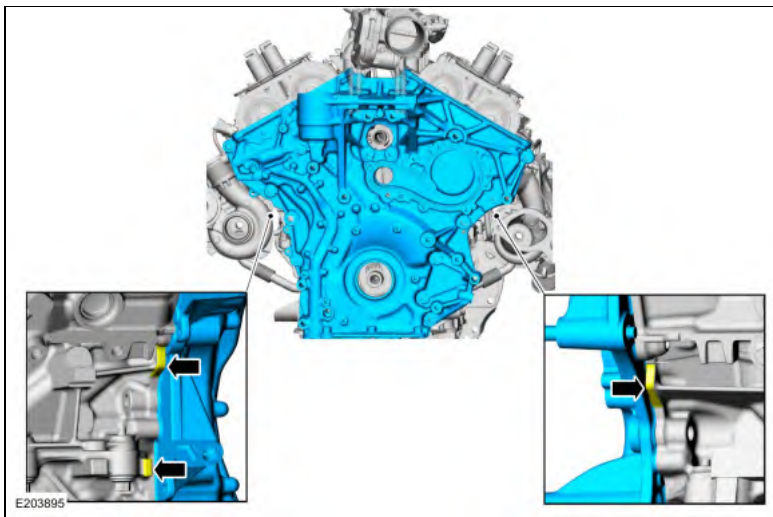


53. **NOTE:** There are 4 different types of fasteners, note location of each fastener for assembly.

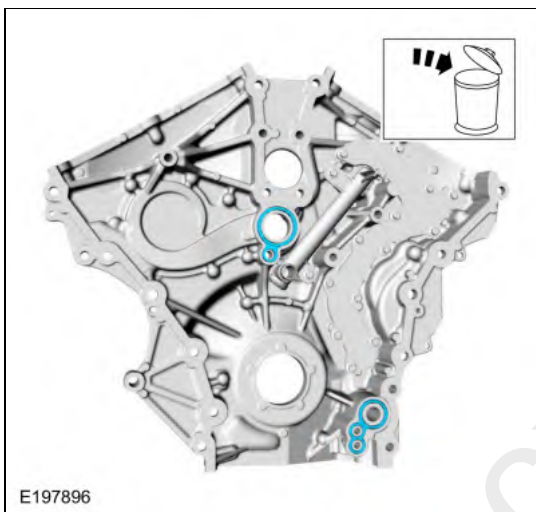
Remove the engine front cover fasteners.



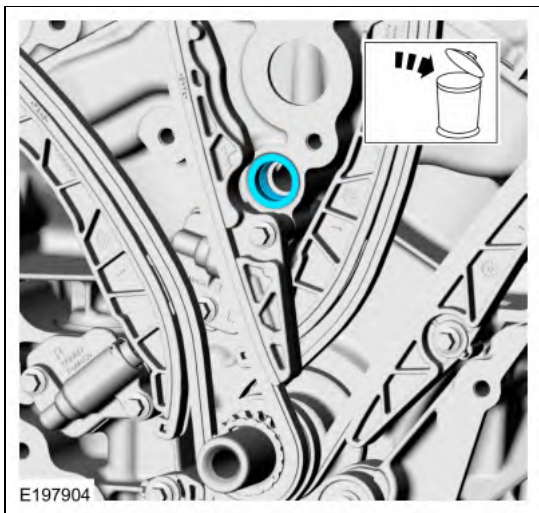
54. Using a large flat-bladed screwdriver and the indicated pry pads, release the sealer and remove the engine front cover.
Use the General Equipment: Flat-Bladed Screwdriver



55. Remove and discard the engine front cover gaskets.

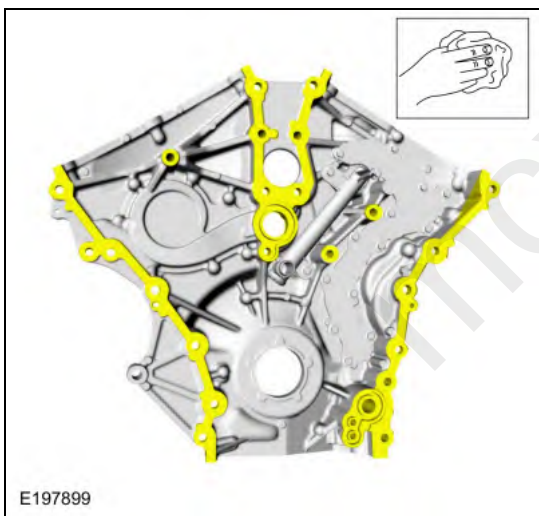


56. Remove and discard the oil gallery seal (6G068).

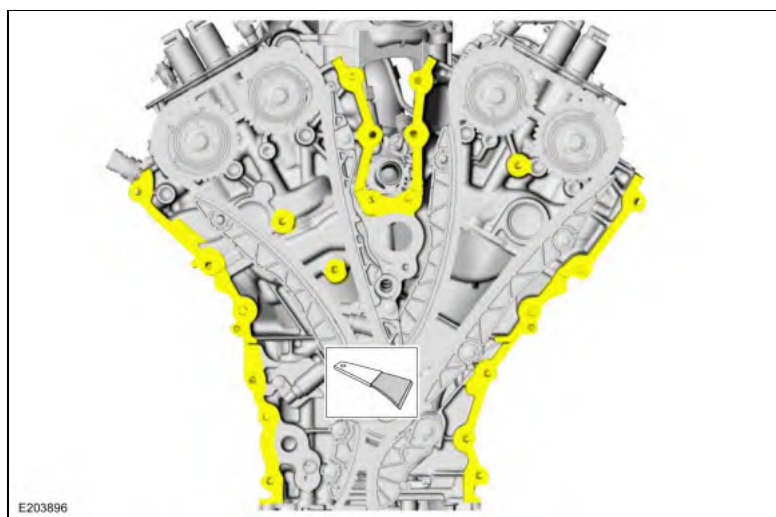


57.

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

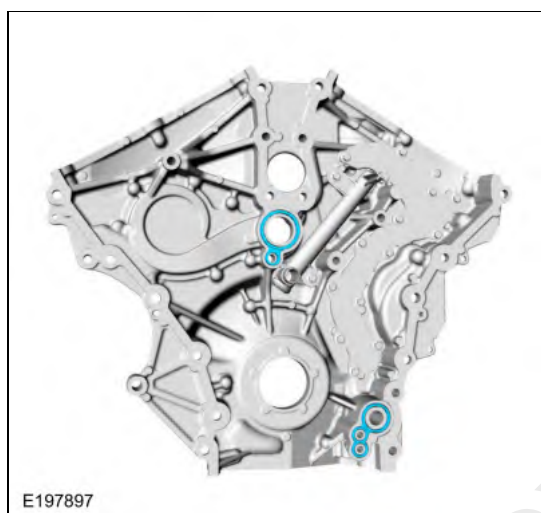


58. Clean and prepare the RTV sealing surface.
Refer to: RTV Sealing Surface Cleaning and Preparation (303-00 Engine System - General Information, General Procedures).
Use the General Equipment: Plastic Scraper

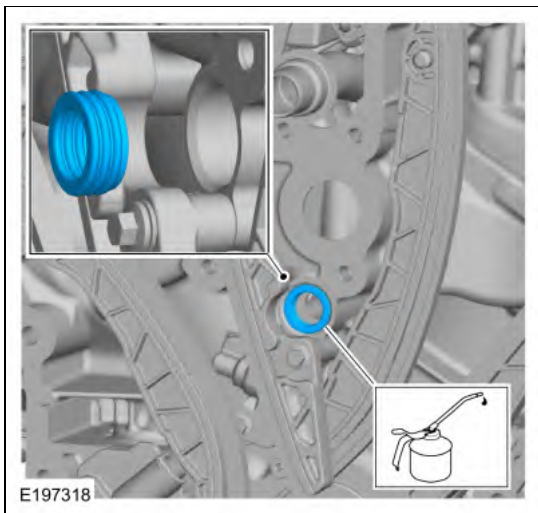


Installation

1. Install new engine front cover gaskets.



2. Lubricate and install a new oil gallery seal (6G068).

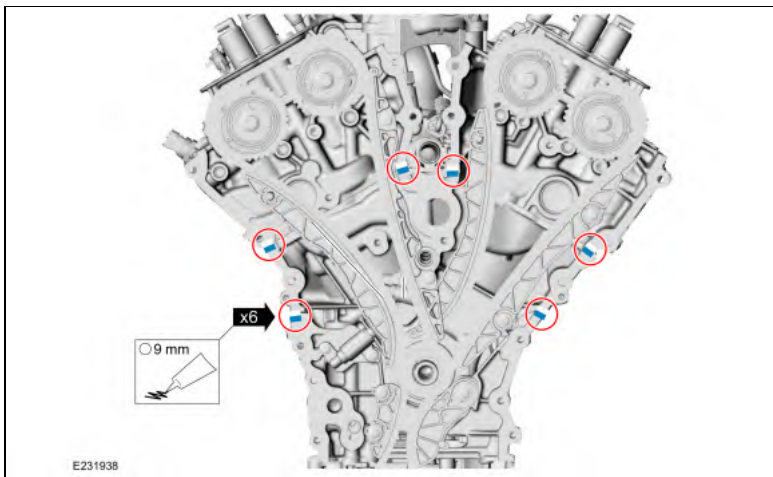


3. **NOTICE:** Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

NOTE: The engine front cover must be installed within 10 minutes of applying the sealer and the bolts must be installed and tightened to 2-5 Nm (18-44 lb-in) within 15 of applying the sealer. Final tightening of the bolts must be completed within 60 minutes of applying the sealer. Failure to follow this procedure can cause future oil leakage.

Apply a 9 mm (0.35 in) bead of Motorcraft® High Performance Engine RTV Silicone to the cylinder block skirt-to-cylinder block joint and the cylinder head-to-cylinder block joint areas as indicated.

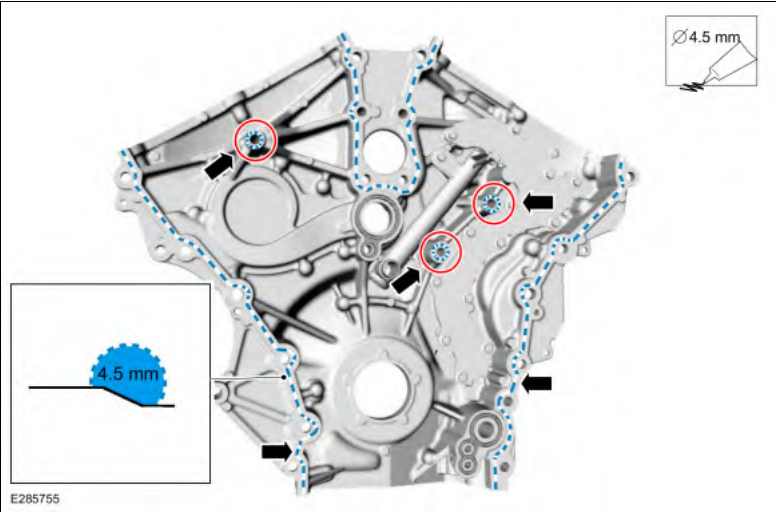
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



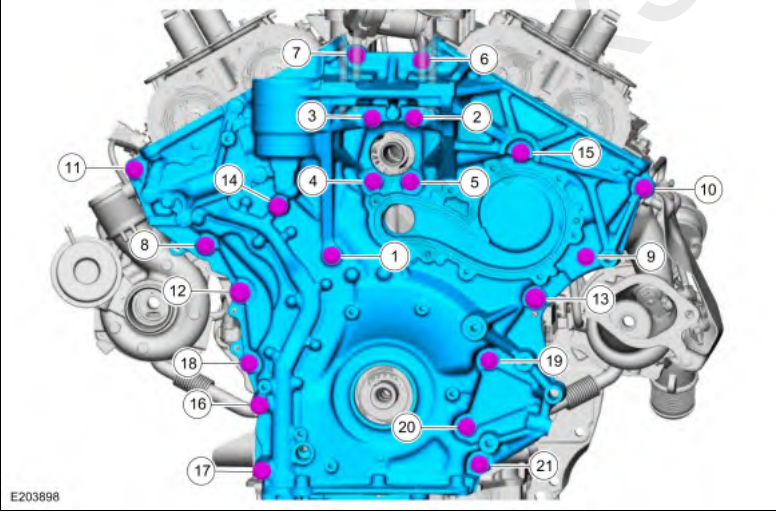
4. **NOTICE:** Failure to use Motorcraft® High Performance Engine RTV Silicone may cause the engine oil to foam excessively and result in serious engine damage.

NOTE: The engine front cover must be installed within 10 minutes of applying the sealer and the bolts must be installed and tightened to 2-5 Nm (18-44 lb-in) within 15 of applying the sealer. Final tightening of the bolts must be completed within 60 minutes of applying the sealer. Failure to follow this procedure can cause future oil leakage.

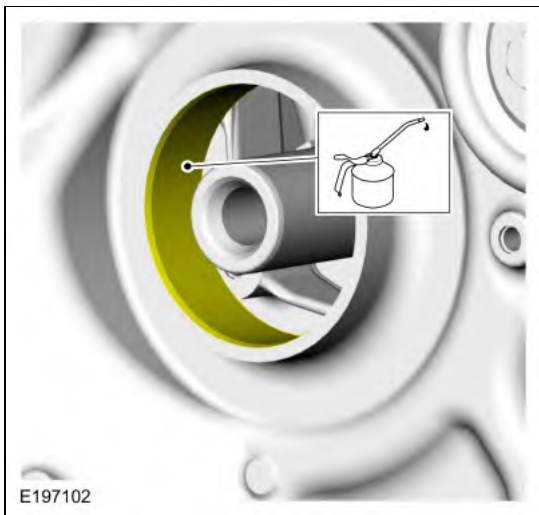
1. Apply a 4.5 mm (0.18 in) bead of Motorcraft® High Performance Engine RTV Silicone to the engine front cover sealing surfaces of the inner bolt bosses.
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)
2. Apply a 4.5 mm (0.18 in) bead of Motorcraft® High Performance Engine RTV Silicone to the chamfer of the engine front cover sealing surfaces.
Material: Motorcraft® High Performance Engine RTV Silicone / TA-357 (WSE-M4G323-A6)



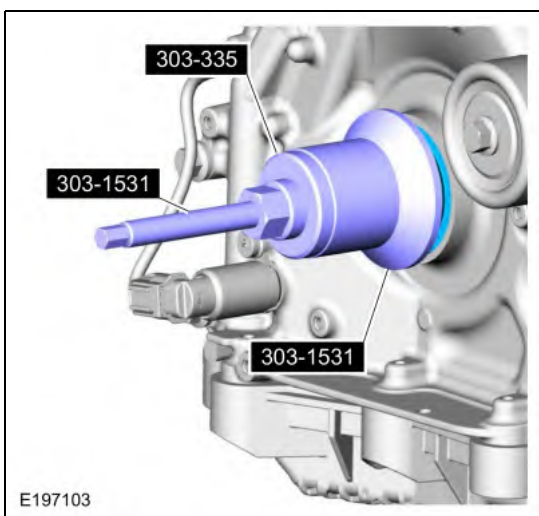
5. .
- Install the engine front cover and the fasteners.
- Torque:*
- Stage 1: Tighten bolts 1 thru 11 to: 18 lb.ft (24 Nm)
 - Stage 2: Tighten bolts 12 thru 13 to: 35 lb.ft (48 Nm)
 - Stage 3: Tighten bolts 14 thru 21 to: 18 lb.ft (24 Nm)



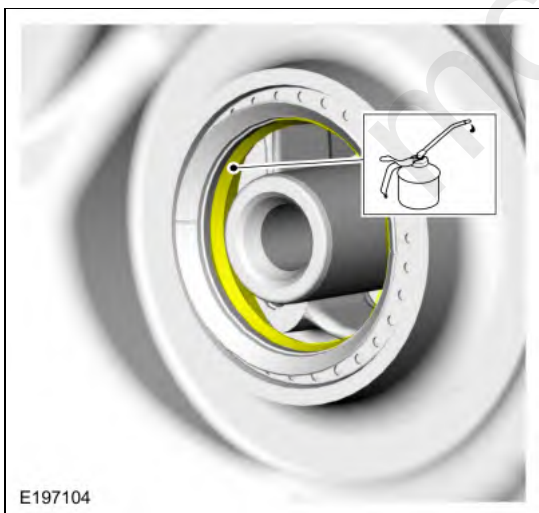
6. Lubricate the engine front cover bore with clean engine oil.



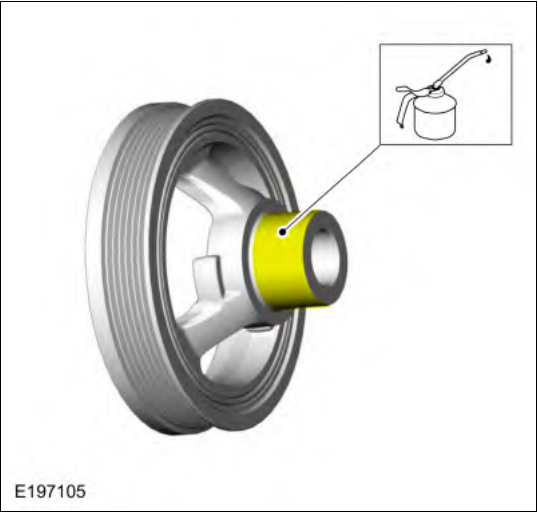
7. Using the special tools, install the new crankshaft front oil seal.
Use Special Service Tool: 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal. , 303-1531 Installer, Front Crank Seal and Damper.



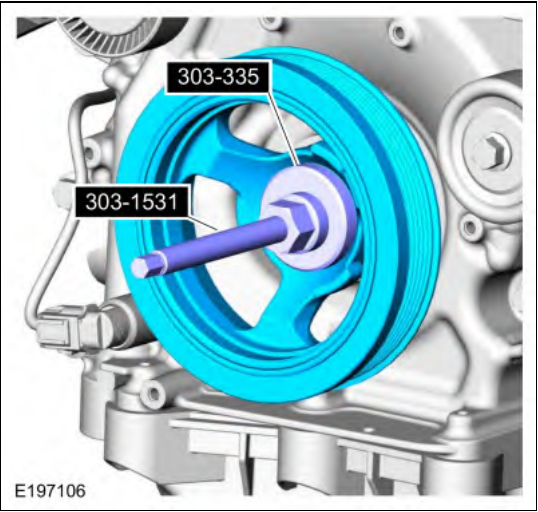
8. Lubricate the crankshaft front seal inner lip with clean engine oil.



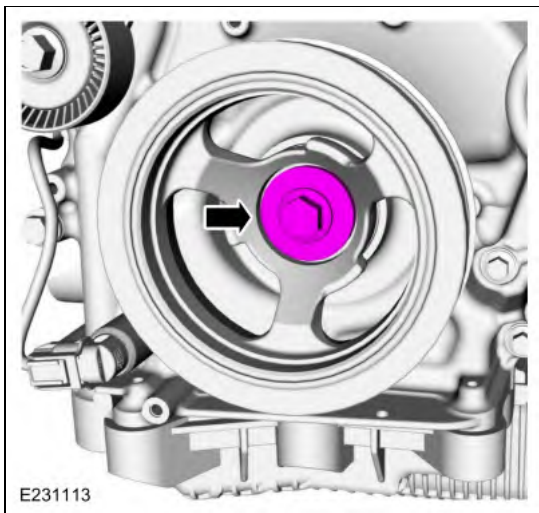
9. Lubricate the crankshaft pulley sealing surface with clean engine oil prior to installation.



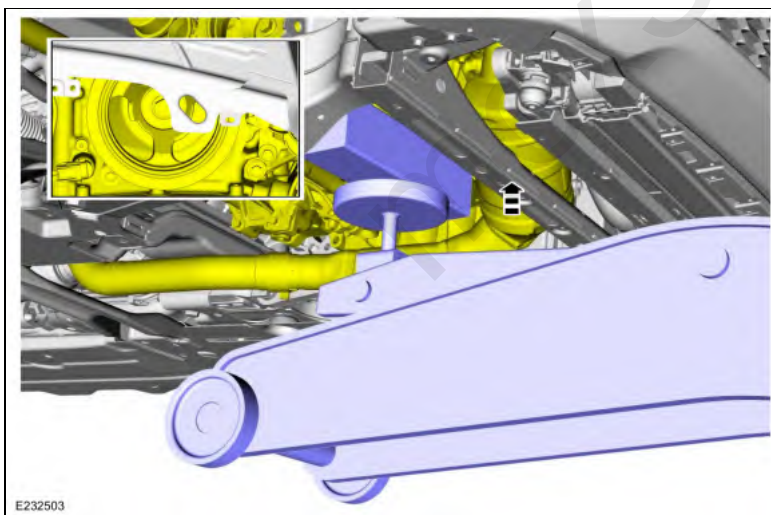
10. Using the special tools, install the crankshaft pulley.
Use Special Service Tool: 303-335 (T88T-6701-A) Installer, Front Cover Oil Seal. , 303-1531 Installer, Front Crank Seal and Damper.



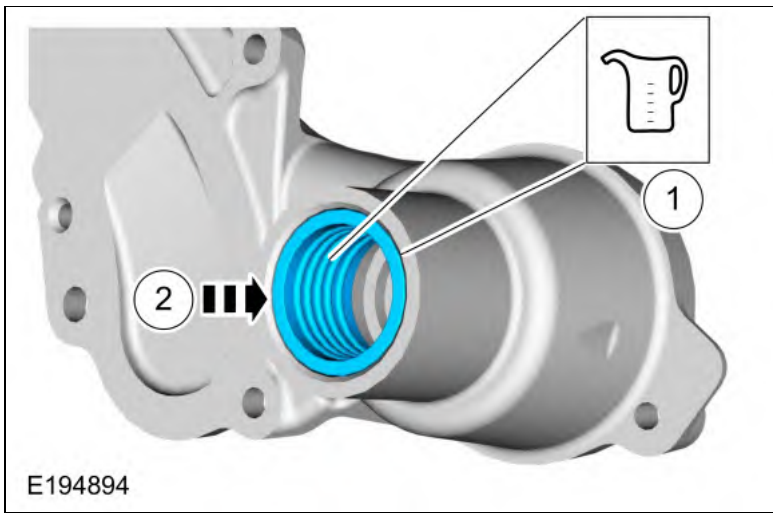
11. Install a new crankshaft pulley bolt finger tight.



12. Using the floor jack, raise the engine to the installed position.
 Use the General Equipment: Wooden Block
 Use the General Equipment: Trolley Jack



- 13.
- Lubricate the inside and the outside diameter of the grommet with clean engine coolant.
 - Install the grommet so it is flush with the rear of the coolant pump housing.



14. **NOTE:** Verify the front cover dowel pins are aligned to the coolant pump and that the coolant pump is fully seated prior to installing the fasteners.

- Using a new gasket, install the coolant pump and the fasteners.

Torque:

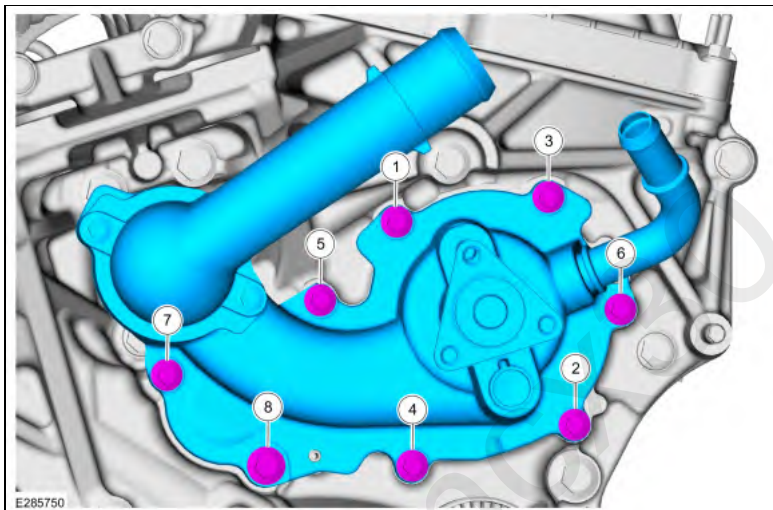
Fasteners 1-7:

Stage 1: 89 lb.in (10 Nm)

Stage 2: 45°

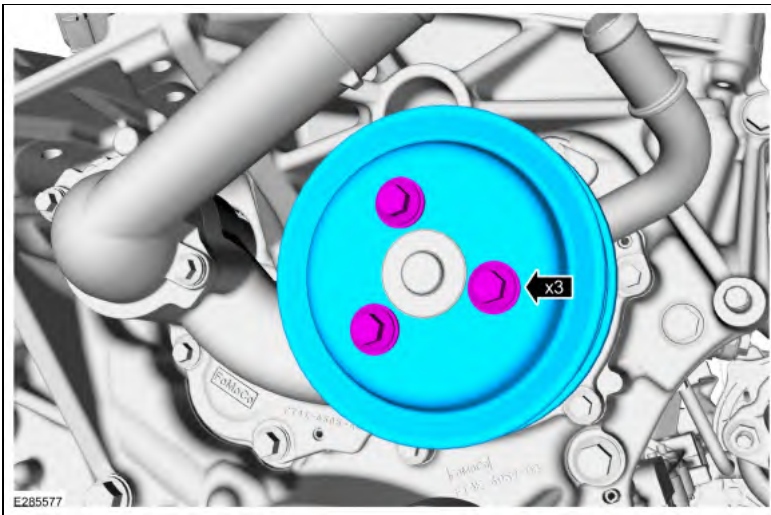
- Torque:*

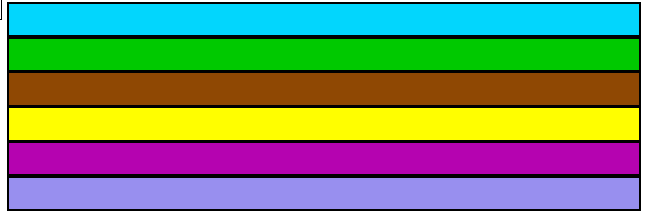
Fastener 8: 18 lb.ft (24 Nm)



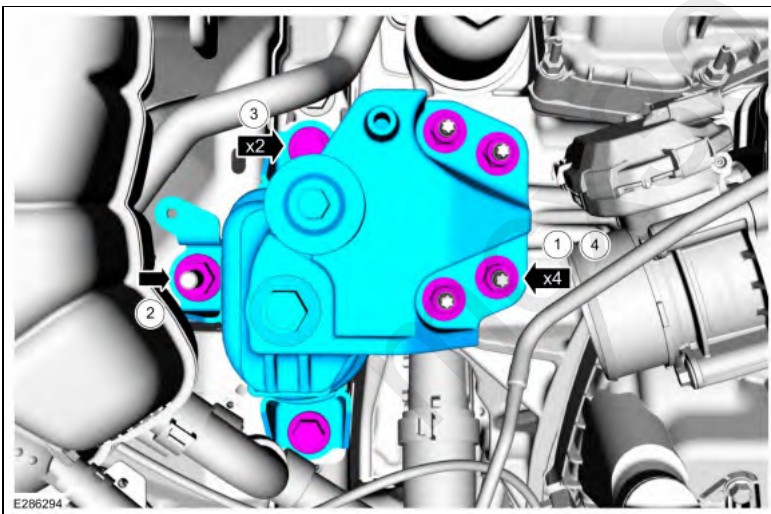
15. Install the coolant pump pulley and the bolts.

Torque: 89 lb.in (10 Nm)



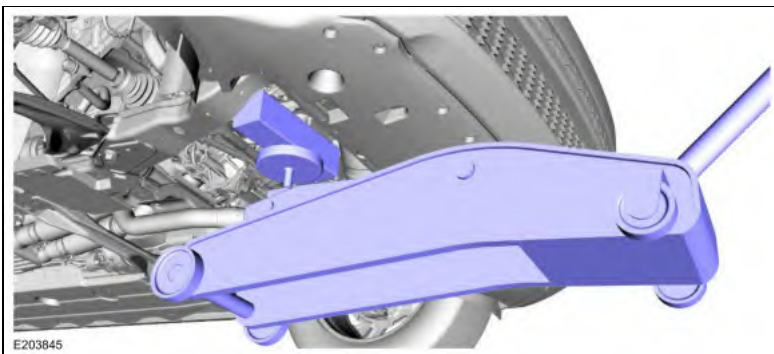


16. Install the engine mount and bracket assembly.
1. Install the new engine mount bracket-to-engine nuts finger tight.
 2. Install the new engine mount-to-frame nut finger tight.
 3. Install the new engine mount-to-frame bolts finger tight.
 4. Tighten the engine mount bracket-to-engine nuts.
- Torque: 59 lb.ft (80 Nm)*



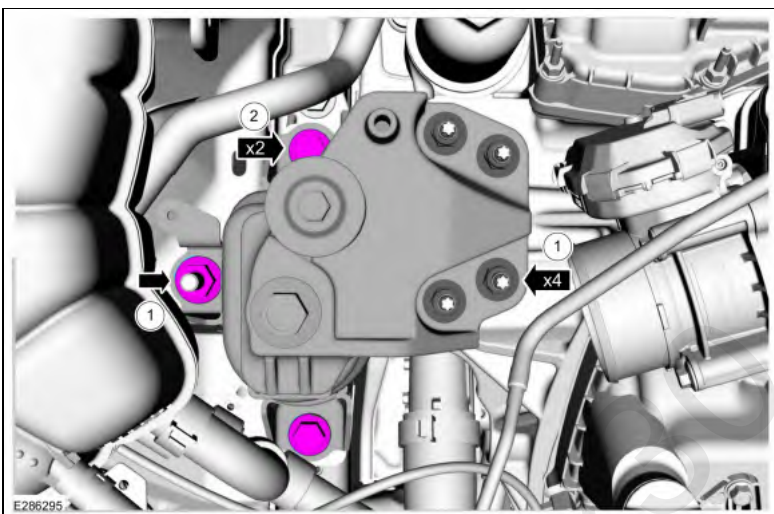


17. Remove.
- Use the General Equipment: Wooden Block
- Use the General Equipment: Trolley Jack



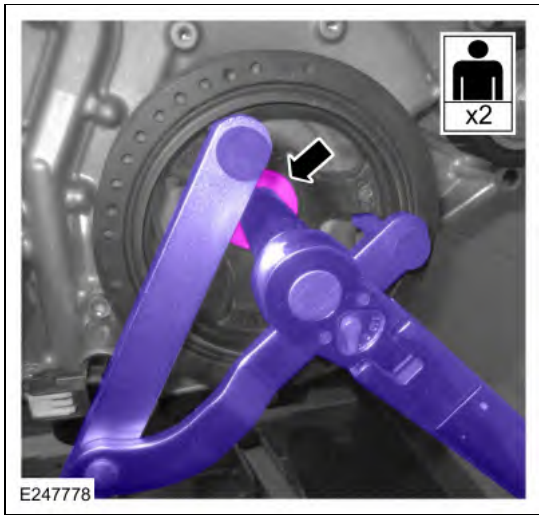
18.

1. Tighten the engine mount-to-frame nut.
Torque: 66 lb.ft (90 Nm)
2. Tighten the engine mount-to-frame bolts.
Torque: 81 lb.ft (110 Nm)

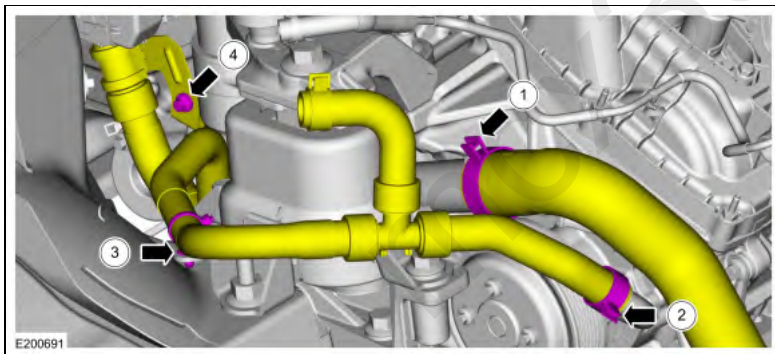


19. **NOTE:** Use a universal pulley holder (such as an OTC 4754, or equivalent).

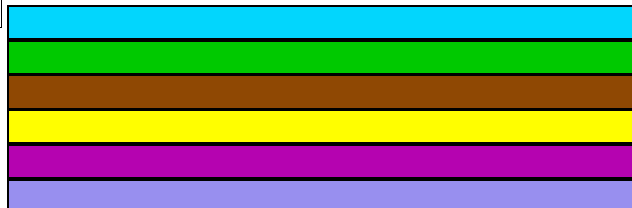
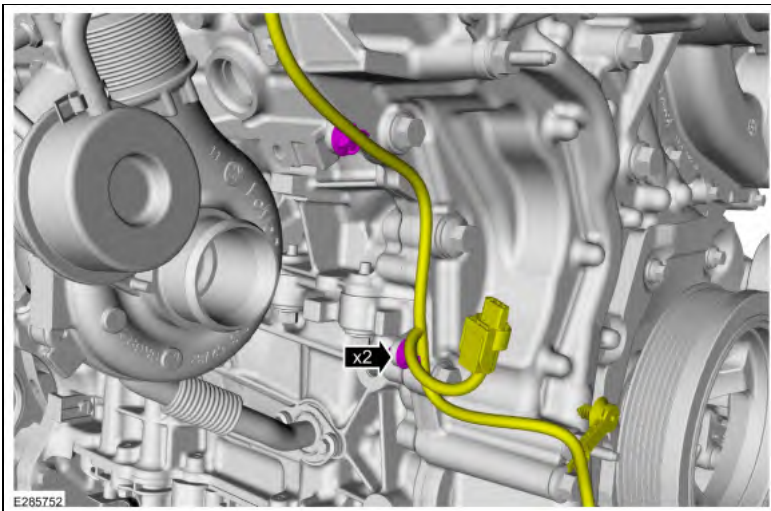
Using a universal pulley holder, tighten the new crankshaft pulley bolt.
Torque:
 Stage 1: 166 lb.ft (225 Nm)
 Stage 2: Loosen: 360°
 Stage 3: 26 lb.ft (35 Nm)
 Stage 4: 270°



- 20.
1. Connect the lower radiator hose.
Use the General Equipment: Hose Clamp Remover/Installer
 2. Connect the heater hose.
Use the General Equipment: Hose Clamp Remover/Installer
 3. Attach the heater hose retainer.
 4. Install the bolt.
Torque: 80 lb.in (9 Nm)

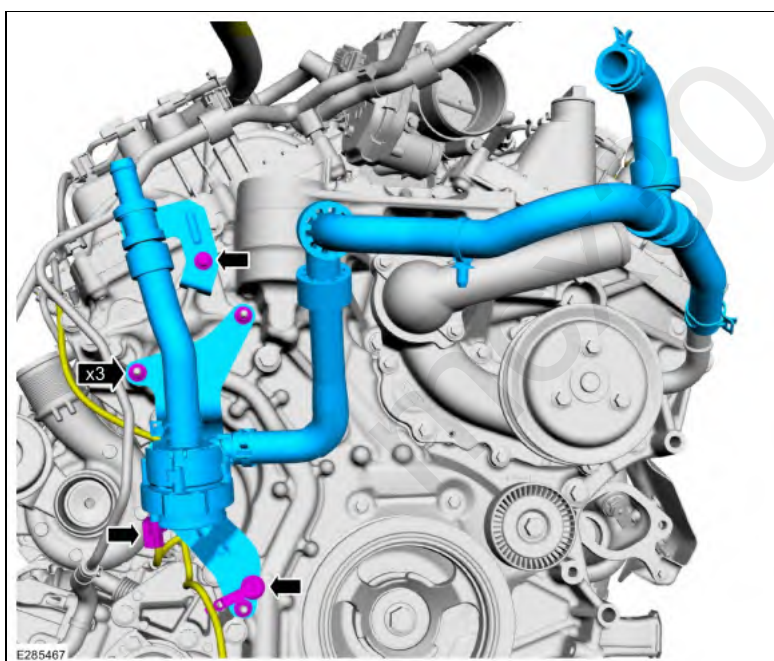


21. Attach the wiring harness retainers.

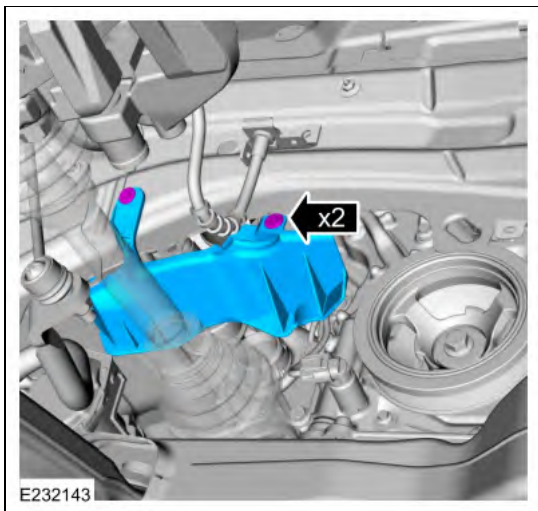


22.

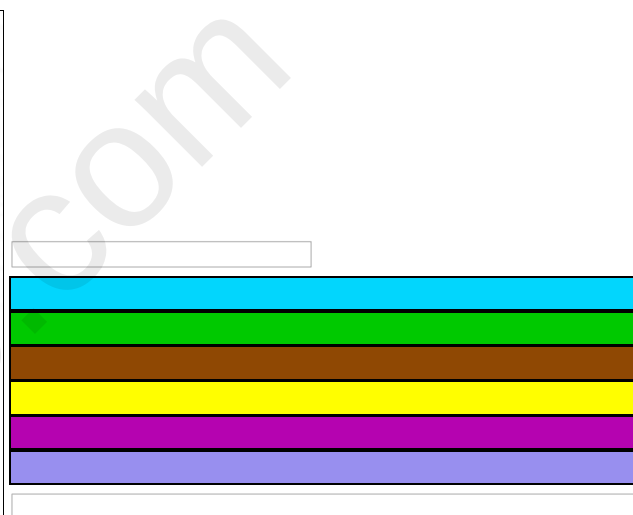
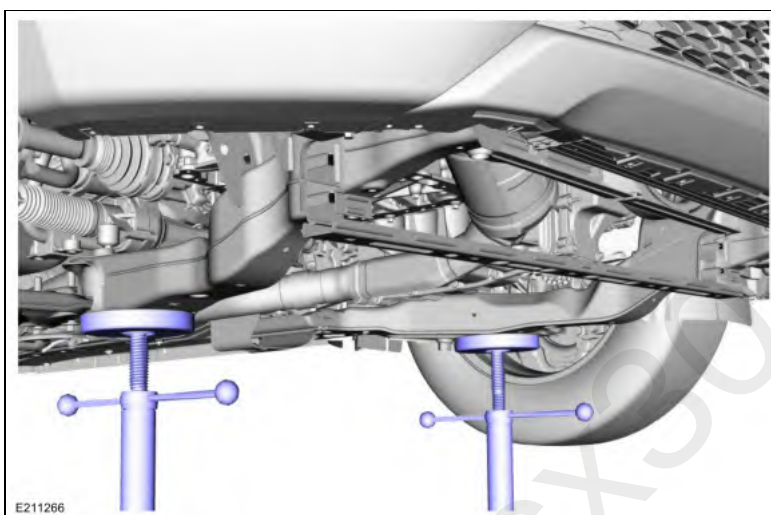
- Install the coolant pump and hose assembly, the nuts and the bolt.
Torque: 80 lb.in (9 Nm)
- Attach the wiring harness retainer.
- Connect the coolant pump electrical connector.



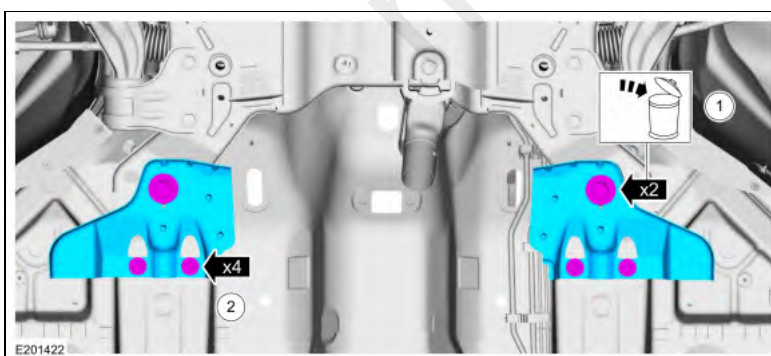
23. Install the splash shield and the retainers.



24. Install the stands.
Install the General Equipment: Vehicle/Axle Stands

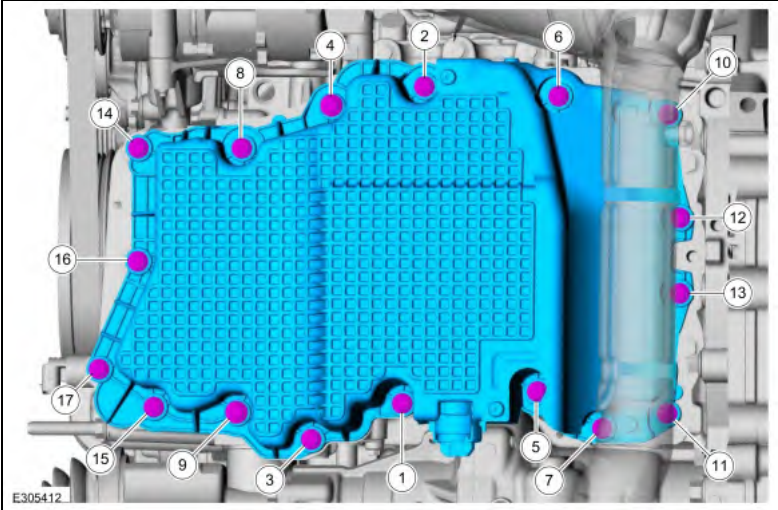


- 25.
1. Remove and discard the subframe bolts.
 2. Remove the bolts and the subframe brackets.

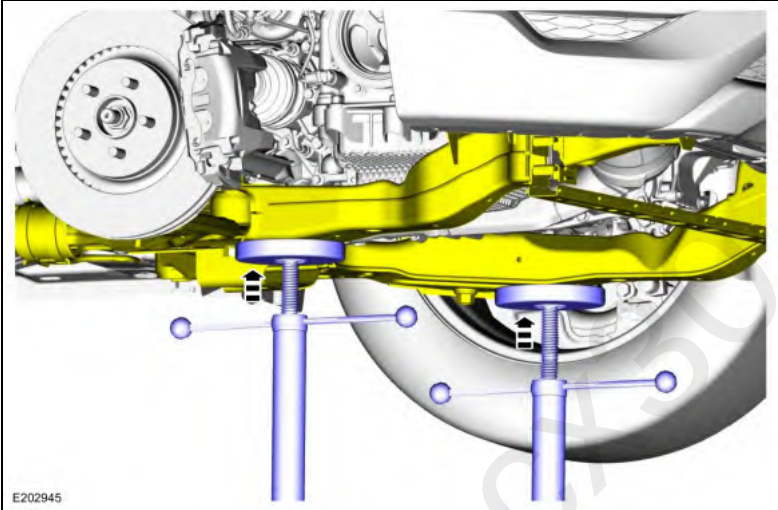


26. Remove and discard the subframe bolts.

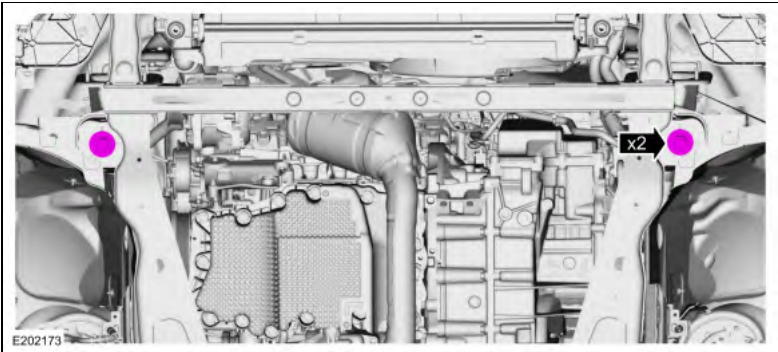
30. Install the oil pan and the bolts.
- Torque:*
- Stage 1: 31 lb.in (3.5 Nm)
- Stage 2: 89 lb.in (10 Nm)



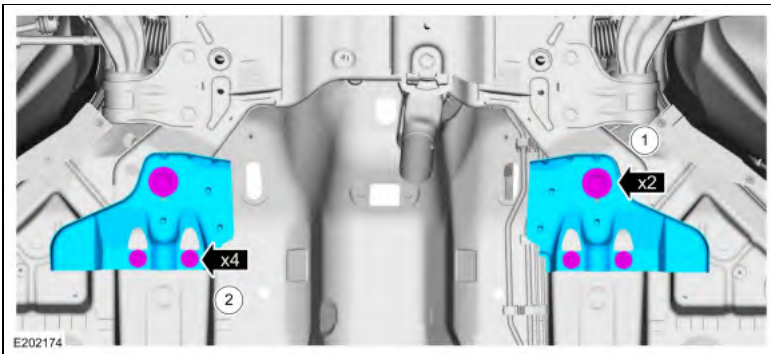
31. Using the adjustable stands raise the subframe into the installed position.
- Use the General Equipment: Vehicle/Axle Stands



32. **NOTE:** Align the reference marks made during removal.
- NOTE:** Only tighten the bolts finger tight at this stage.
- Install the new subframe bolts.

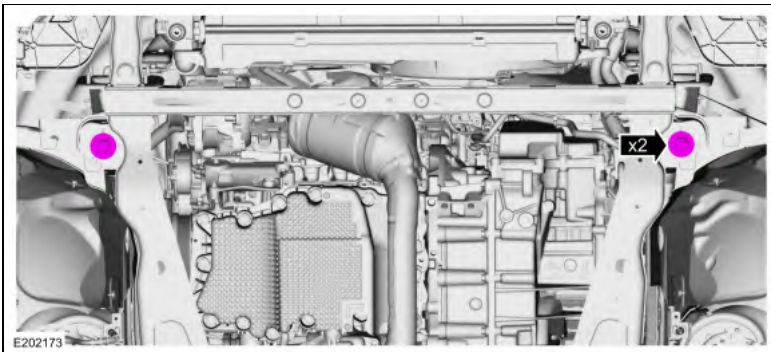


33. **NOTE:** Align the reference marks made during removal.
- NOTE:** Only tighten the bolts finger tight at this stage.
1. Install the subframe brackets and the new subframe bolts.
 2. Install the subframe bracket bolts.



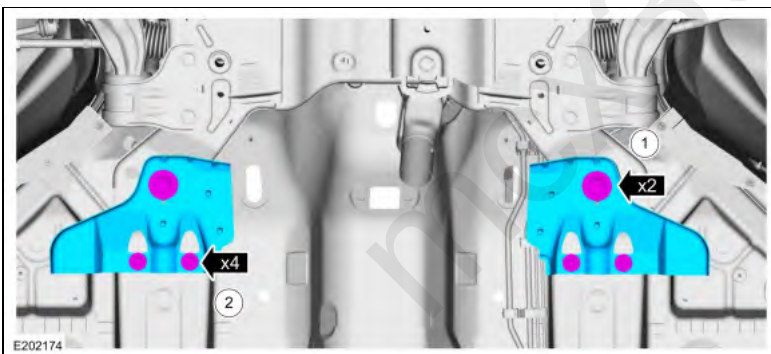
34. **NOTE:** While tightening the subframe bolts, make sure the front subframe does not move.

Tighten the subframe bolts.
Torque: 173 lb.ft (235 Nm)

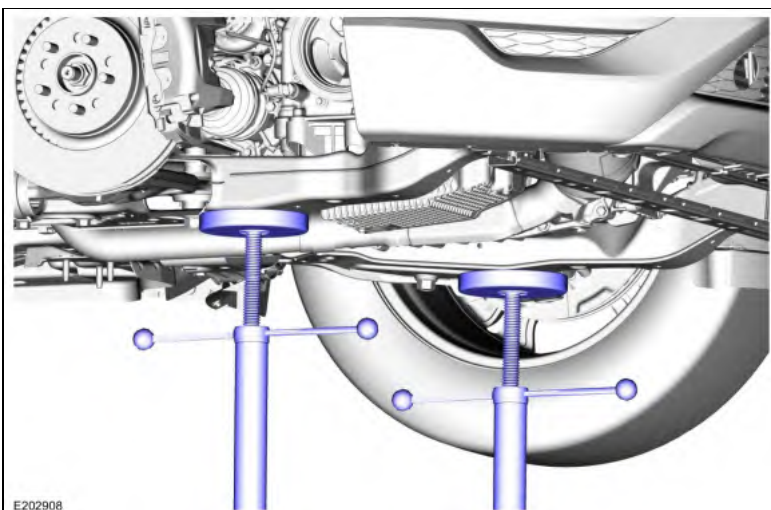


35.

1. Tighten.
Torque:
Stage 1: 76 lb.ft (103 Nm)
Stage 2: 270°
2. Tighten.
Torque: 35 lb.ft (48 Nm)

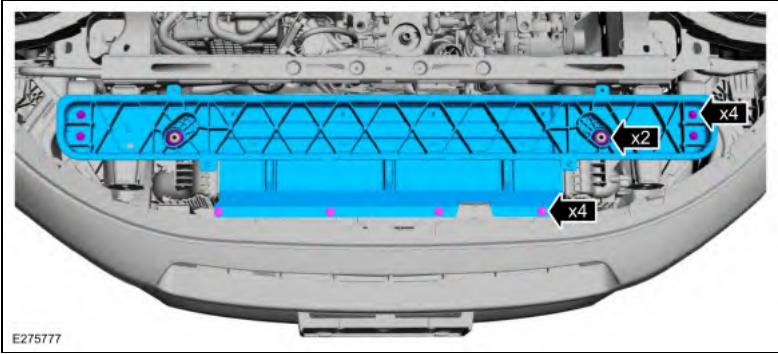


36. Remove.
Use the General Equipment: Vehicle/Axle Stands



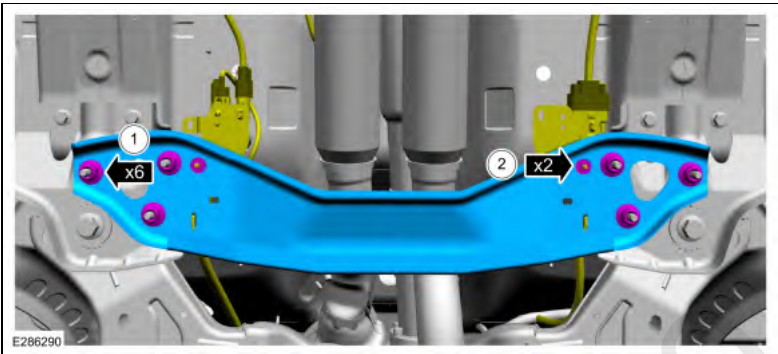
37.

- Install the cooling module support panel and the bolts.
Torque: 18 lb.ft (24 Nm)
- Install the pin-type retainers.



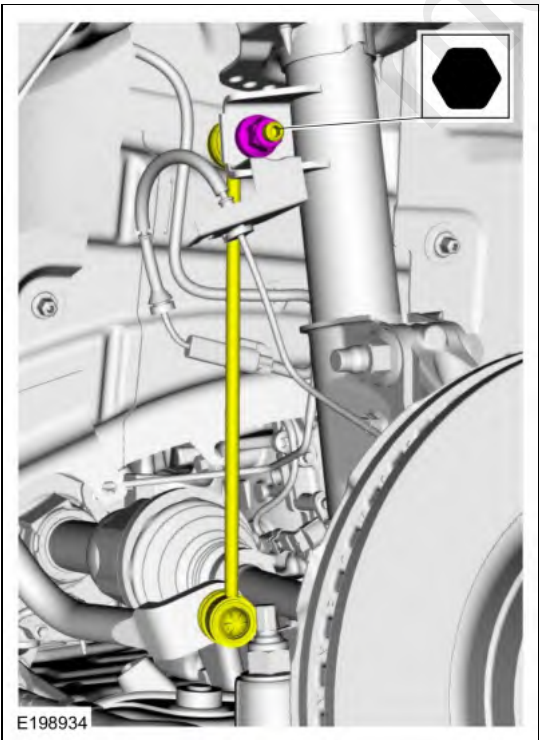
38.

1. Install the subframe support bracket and the nuts.
Torque: 30 lb.ft (40 Nm)
2. If equipped, install the wiring harness support bracket(s) and the nut(s).
Torque: 80 lb.in (9 Nm)

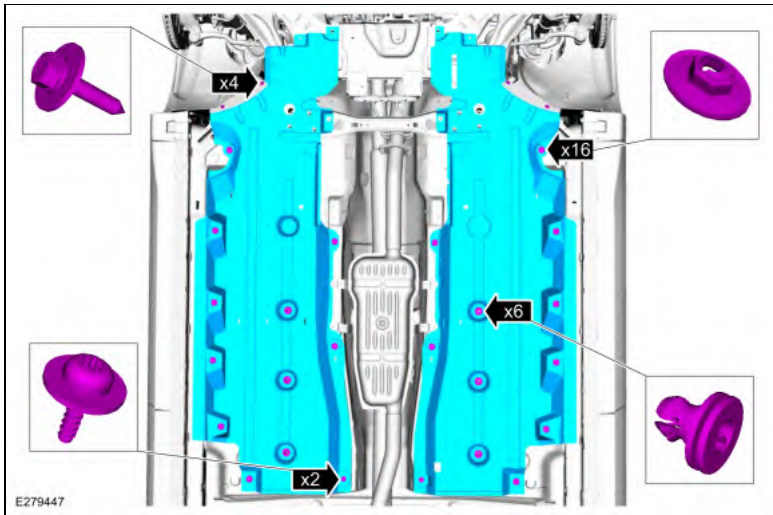


39. **NOTICE:** Use the internal or external hex-holding feature to prevent the ball and stud from turning while removing or installing the stabilizer bar link nuts. The link boot seal must not be allowed to twist while tightening the link nuts or damage to the boot seal will occur.

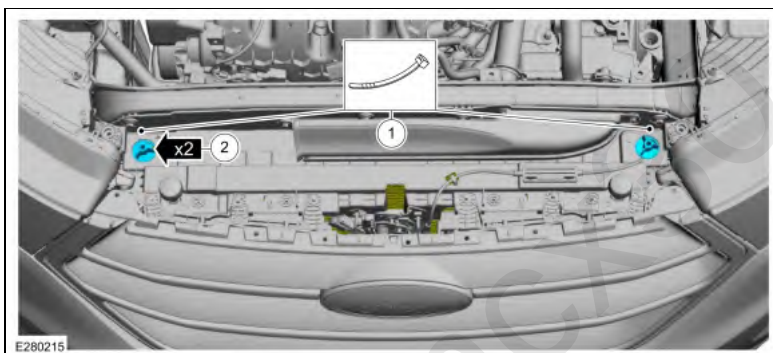
Position the RH sway bar link and install the new nut.
Torque: 85 lb.ft (115 Nm)



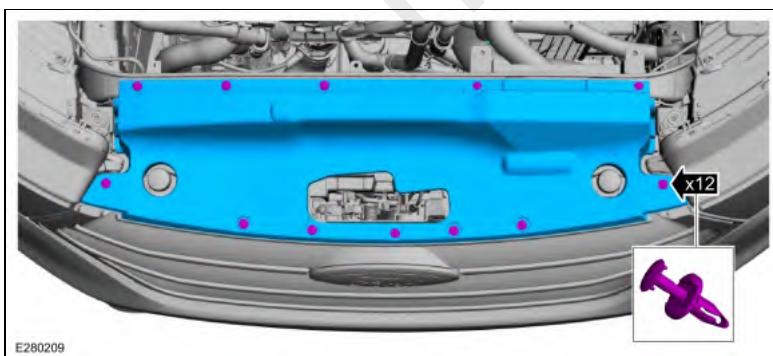
40. Install the underbody shields and the retainers.



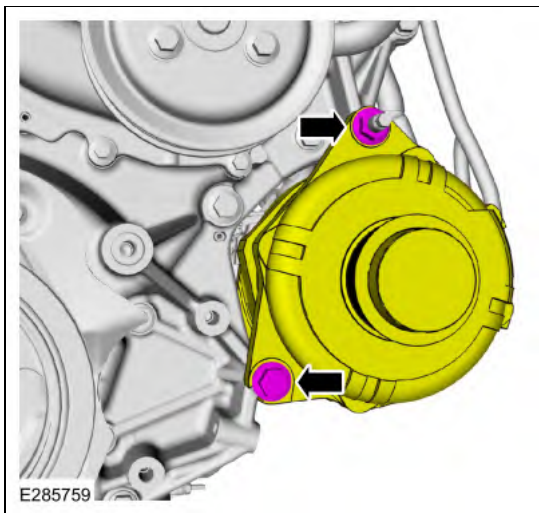
- 41.
1. Remove the cable ties or mechanics wire.
 2. Install the upper cooling module support brackets.



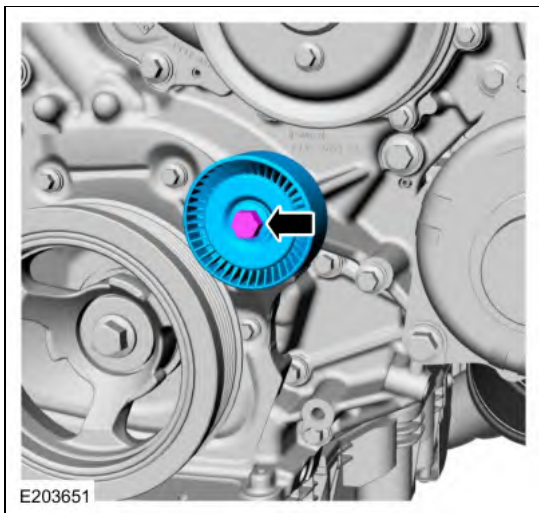
42. Install the upper air deflector and the retainers.



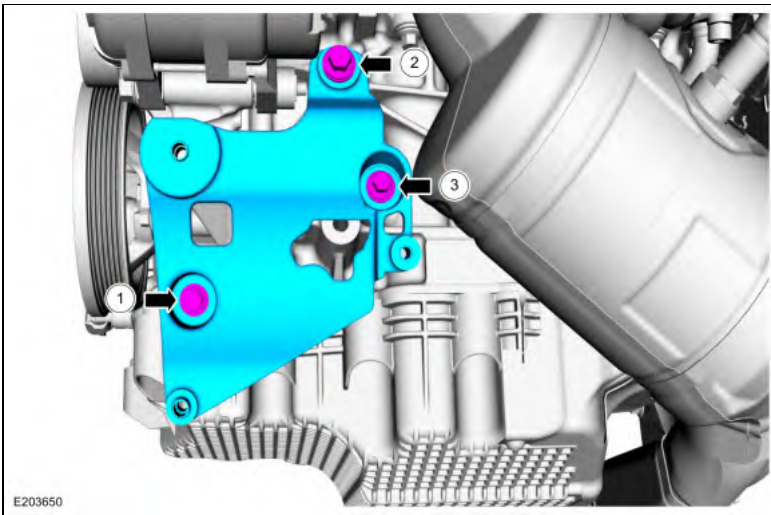
43. Position the generator and install the bolt and nut.
Torque: 35 lb.ft (47 Nm)



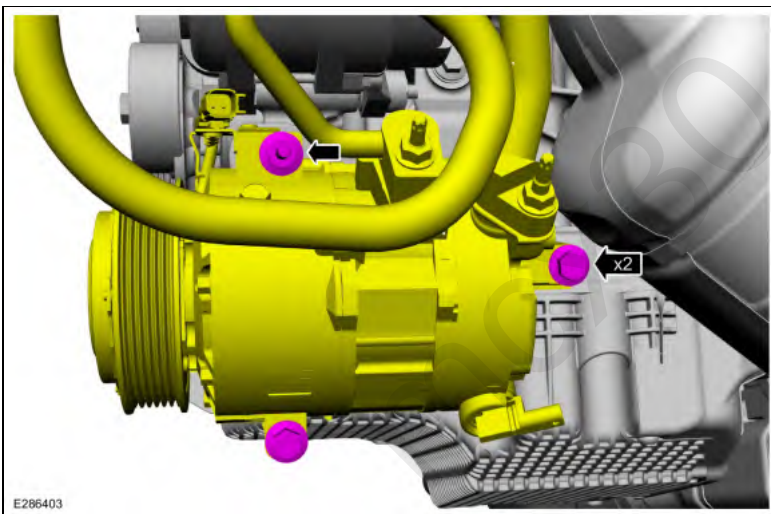
44. Install the idler pulley and the bolt.
Torque: 35 lb.ft (48 Nm)



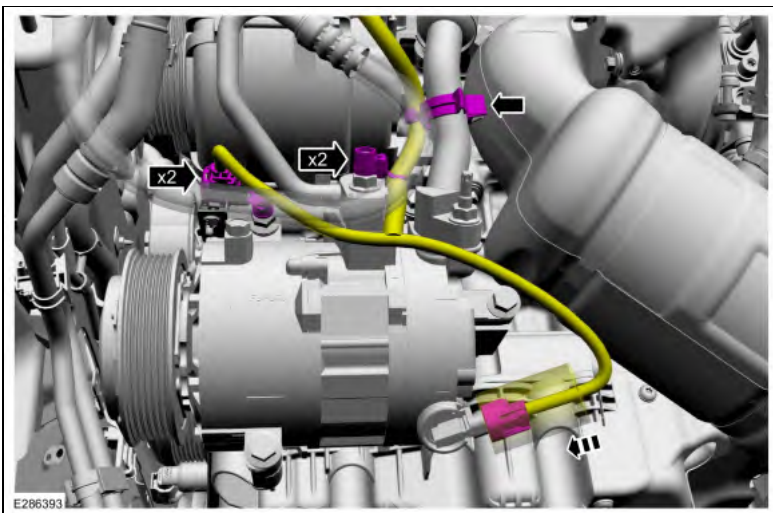
- 45.
1. Install the M8 x 50 mm bolt.
Torque: 18 lb.ft (25 Nm)
 2. Install the M10 x 43 mm bolt.
Torque: 35 lb.ft (47 Nm)
 3. Install the M8 x 30 mm bolt and the A/C compressor mounting bracket.
Torque: 18 lb.ft (25 Nm)



46. Position the A/C compressor and install the bolts and the stud bolt.
Torque: 18 lb.ft (25 Nm)

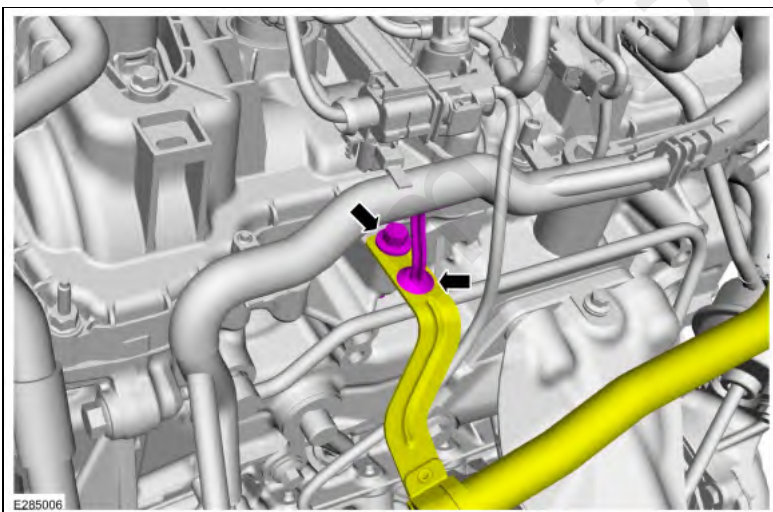


- 47.
- Connect the A/C compressor electrical connectors.
 - Slide the insulator over the A/C compressor electrical connector.
 - Attach the wiring harness retainers.

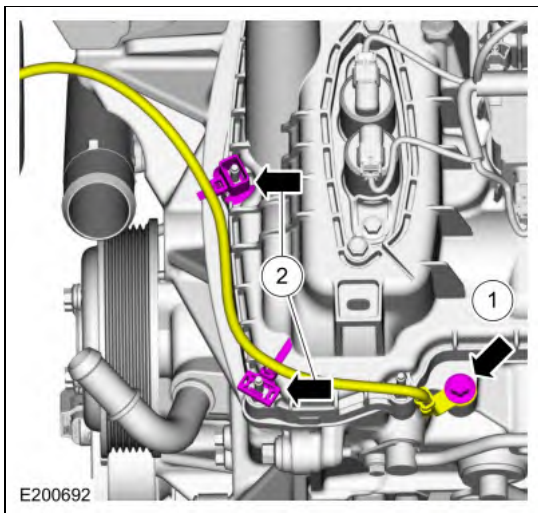


48. Install the following items:
1. Refer to: Oil Pressure Control Solenoid (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
 2. Refer to: Accessory Drive Belt Tensioner (303-05B Accessory Drive - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
 3. Refer to: Roll Restrictor RH (307-01B Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F57, Removal and Installation).
 4. RH fender splash shield.
Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).
 5. Refer to: Valve Cover RH (303-01B Engine - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
 6. Refer to: Valve Cover LH (303-01B Engine - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
 7. Cowl panel grille.
Refer to: Cowl Panel Grille (501-02 Front End Body Panels, Removal and Installation).

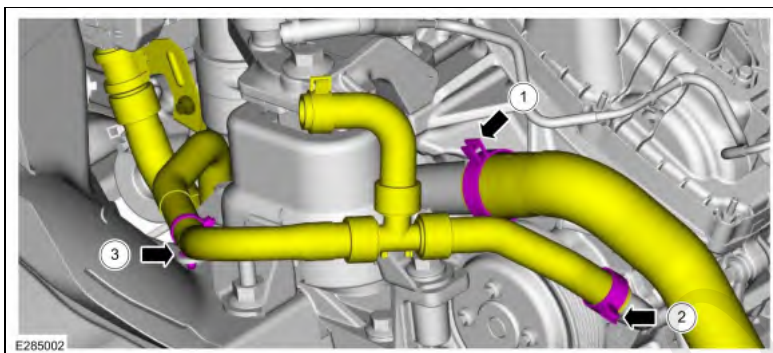
- Position the bracket and install the bolt.
Torque: 159 lb.in (18 Nm)
- Attach the wiring harness retainer.



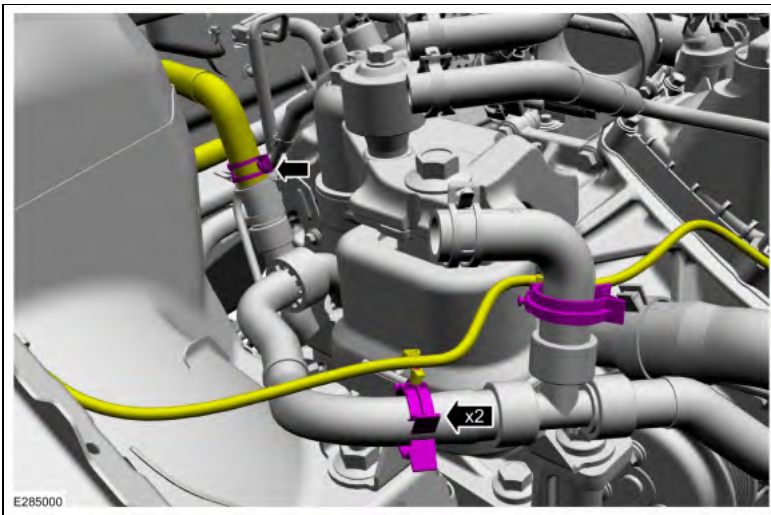
50.
 1. Install the ground wire and the bolt.
Torque: 159 lb.in (18 Nm)
 2. Attach the wiring harness retainers.



- 51.
1. Install the lower radiator hose and clamp.
Use the General Equipment: Hose Clamp Remover/Installer
 2. Install the heater hose and clamp.
 3. Attach the heater hose retainer.

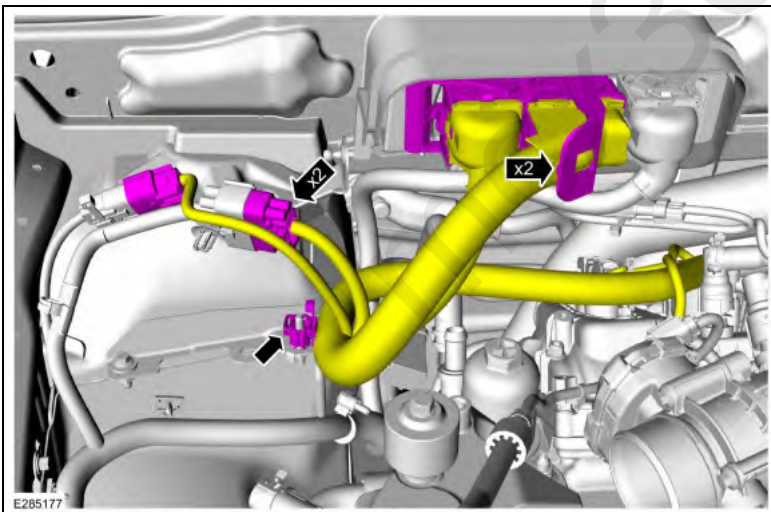


- 52.
1. Install the heater hose and clamp.
Use the General Equipment: Hose Clamp Remover/Installer
 2. Attach the wiring harness retainers.



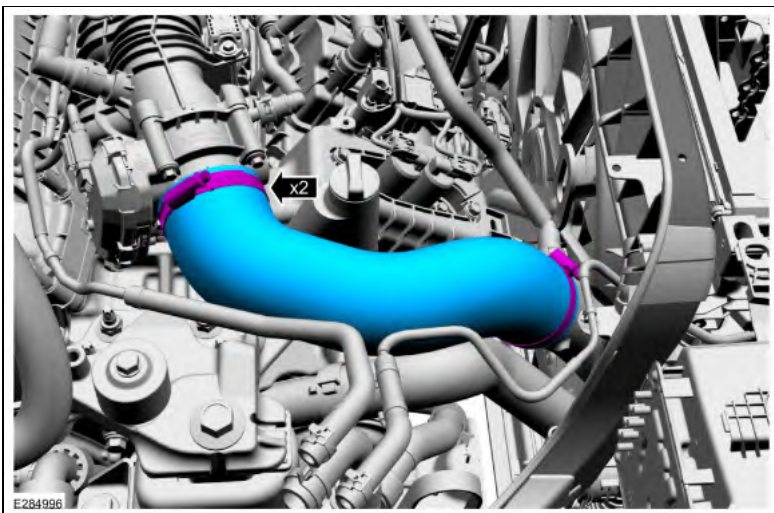
53.

- Connect the engine harness electrical connectors and attach the retainer.
- Connect the PCM electrical connectors.



54. **NOTICE:** When removing any turbocharger air intake system components, make sure to cover any open ports to prevent debris from entering the system. The turbocharger compressor vanes can be damaged by even the smallest particles. All components need to be inspected and cleaned prior to installation or reassembly.

1. Uncover, clean and inspect all open ports.
2. Install the CAC outlet pipe and tighten the clamps.
Torque: 44 lb.in (5 Nm)



55. Install the degas bottle.
Refer to: Degas Bottle (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
56. Install a new engine oil filter and fill the engine with clean engine oil.
Refer to: Engine Oil Draining and Filling (303-01B Engine - 2.7L EcoBoost (238kW/324PS), General Procedures).
57. Connect the battery ground cable.
Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).
58. Fill and bleed the engine cooling system.
Refer to: Engine Cooling System Draining, Vacuum Filling and Bleeding (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), General Procedures).
59. Use the Powertrain Control Module (PCM) Misfire Monitor Profile Correction routine in the diagnostic scan tool.

Engine Mount

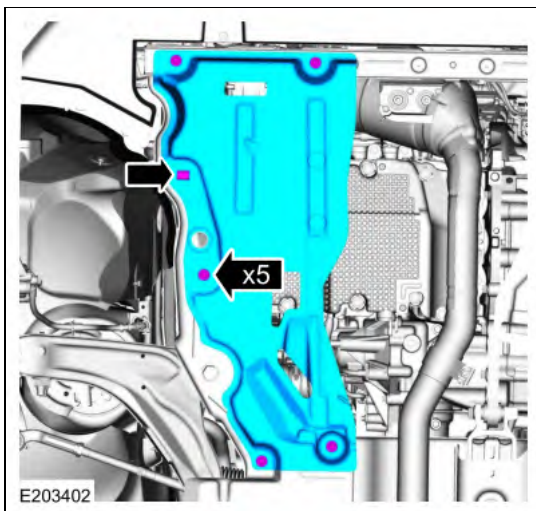
Special Tool(s) / General Equipment

Trolley Jack
Wooden Block

Removal

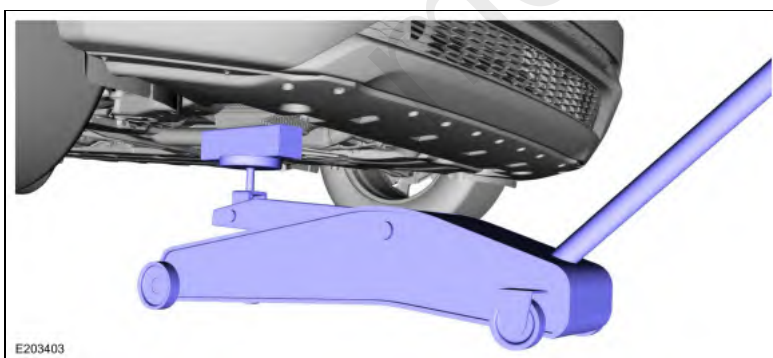
NOTICE: When removing any turbocharger air intake system components, make sure to cover any open ports to prevent debris from entering the system. The turbocharger compressor vanes can be damaged by even the smallest particles. All components need to be inspected and cleaned prior to installation or reassembly.

1. With the vehicle in NEUTRAL, position it on a hoist.
Refer to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).
2. Remove the retainers and the RH underbody shield.

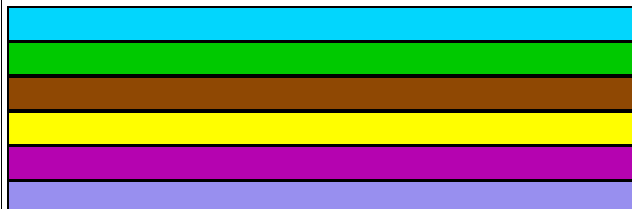
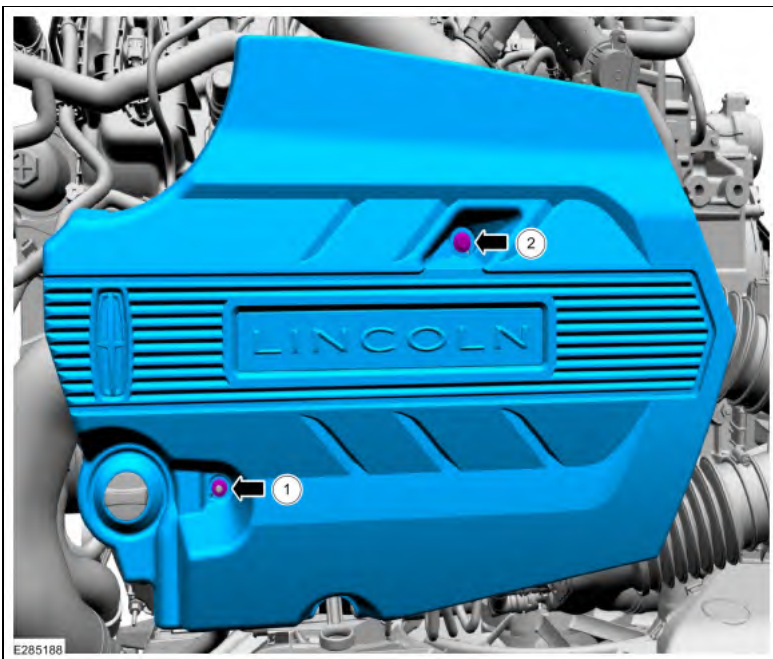


3. **NOTICE:** Failure to position the wood block and floor jack as illustrated can result in damage to the oil pan.

Support the engine with a floor jack and a wooden block.
Use the General Equipment: Wooden Block
Use the General Equipment: Trolley Jack

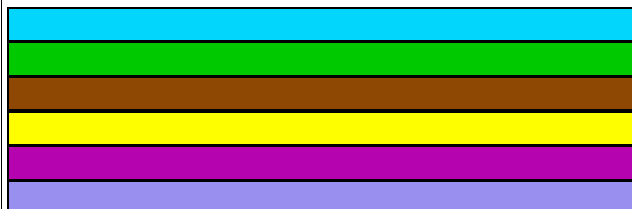
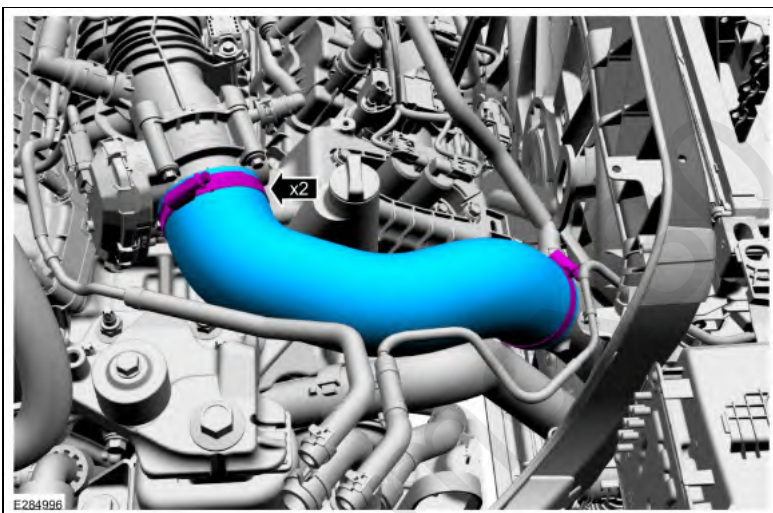


4.
 1. Remove the nut.
 2. Remove the bolt.
 - Remove the engine appearance cover.
 - If the engine appearance cover stud bolt is loosened or removed, it must be installed/tightened.
Torque: 62 lb.in (7 Nm)



5. **NOTICE:** When removing any turbocharger air intake system components, make sure to cover any open ports to prevent debris from entering the system. The turbocharger compressor vanes can be damaged by even the smallest particles. All components need to be inspected and cleaned prior to installation or reassembly.

1. Loosen the clamps and remove the CAC outlet pipe.
 - Cover all open ports.



6. Detach the retainer and position the coolant hose aside.