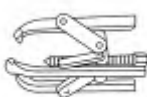
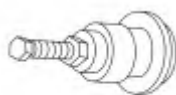


SECTION 303-01C: Engine — 5.0L (4V)
IN-VEHICLE REPAIR

2014 F-150 Workshop Manual
Procedure revision date: 10/25/2013

Engine Front Cover

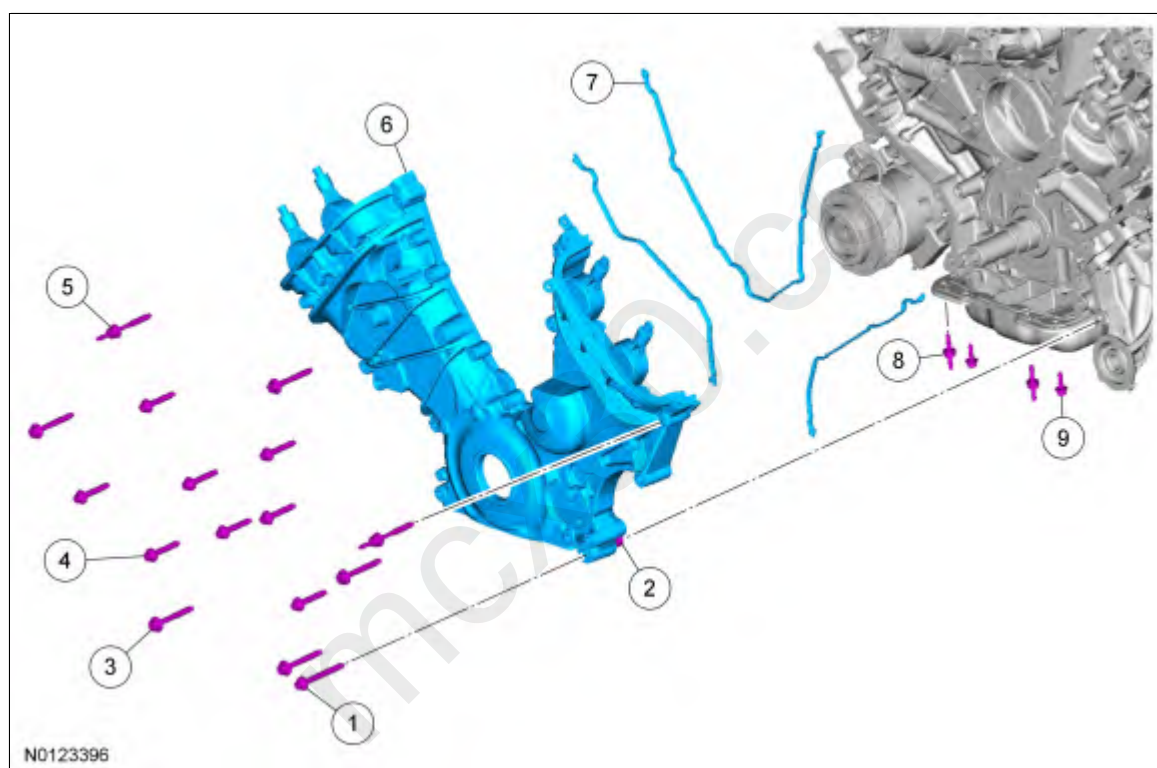
Special Tool(s)

 ST1184-A	3 Jaw Puller 303-D121 or equivalent
 ST1328-A	Installer, Front Cover Oil Seal 303-335 (T88T-6701-A2 plate only)
 ST3249-A	Installer, Front Crank Seal and Damper 303-1531
 ST1385-A	Remover, Oil Seal 303-409 (T92C-6700-CH)
 ST1438-A	Strap Wrench 303-D055 (D85L-6000-A) or equivalent
 ST2834-A	Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Material

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	—

Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Motorcraft® Silicone Gasket Remover ZC-30	—
Motorcraft® Specialty Orange Engine Coolant VC-3-B (US); CVC-3-B (Canada)	WSS-M97B44-D
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

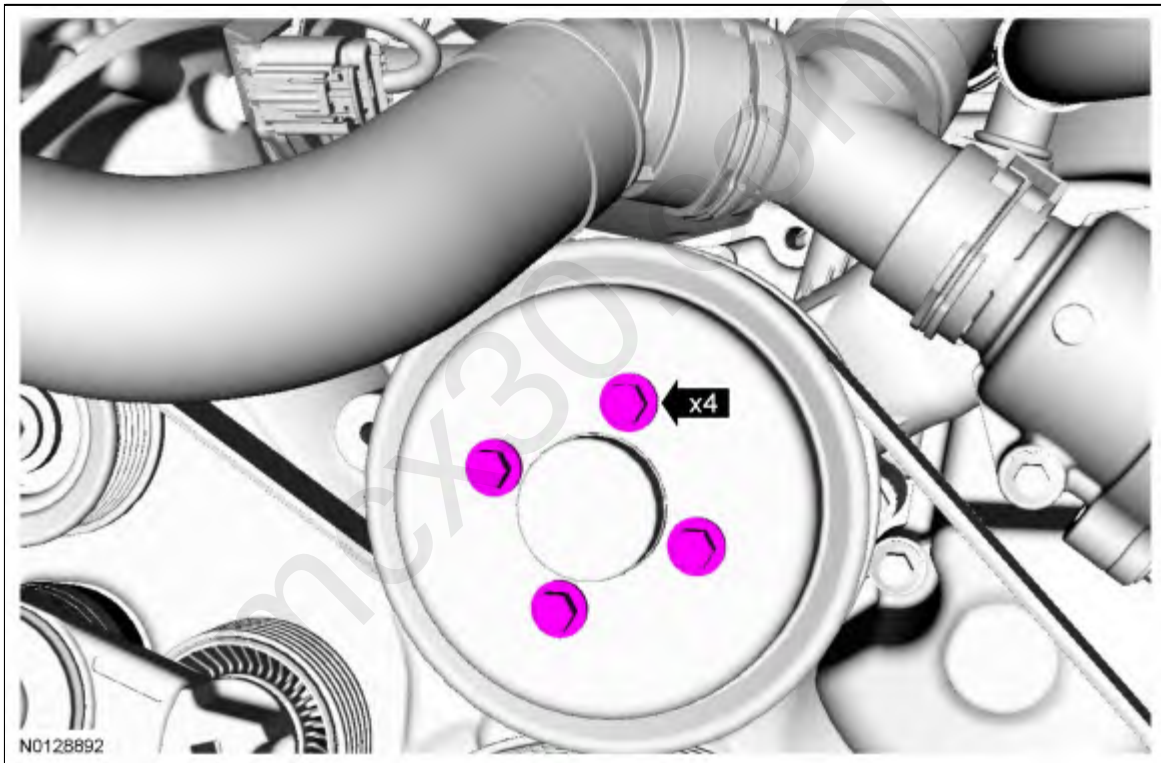


Item	Part Number	Description
1	W503304	Engine front cover-to-oil filter adapter bolt
2	W715209	Engine front cover-to-oil filter adapter jackscrew (part of 6019)
3	W704920	Engine front cover bolt (5 required)
4	W714925	Engine front cover bolt (8 required)
5	W704919	Engine front cover stud bolt (2 required)
6	6019	Engine front cover
7	6020	Engine front cover gasket (3 required)
8	W714963	Oil pan stud bolt (2 required)

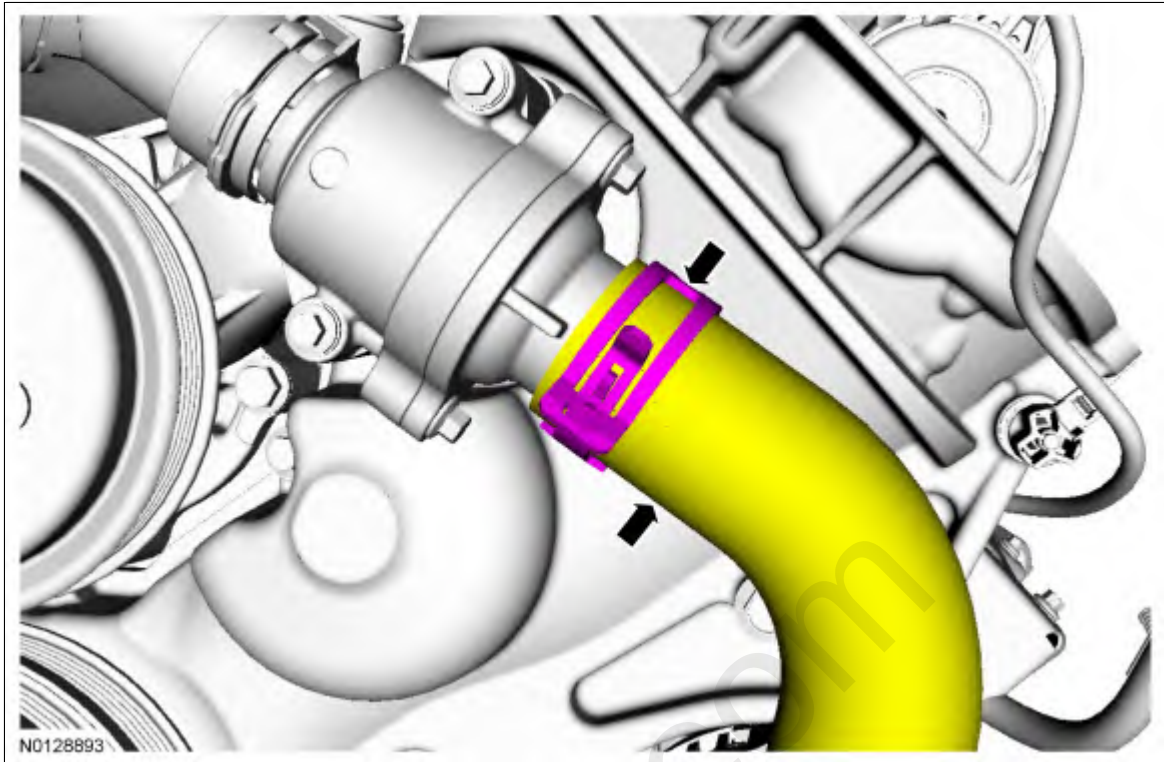
9	W714962	Oil pan bolt (2 required)
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Removal

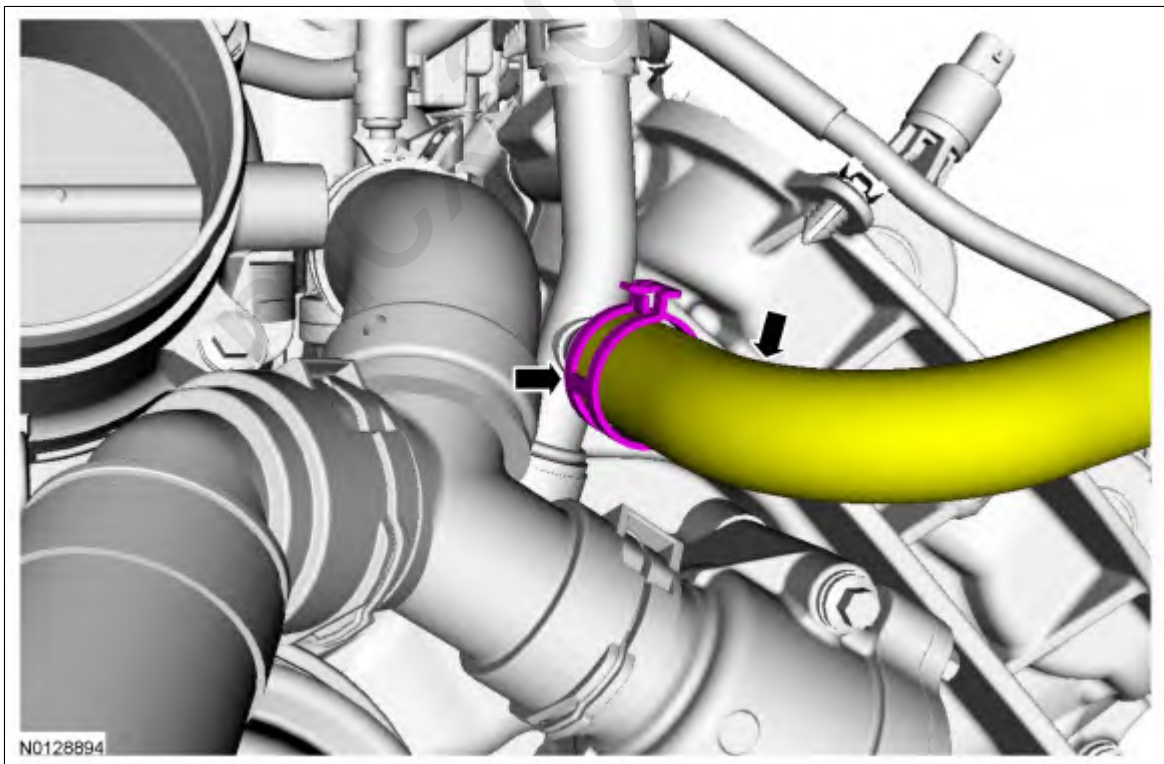
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to [Section 100-02](#).
2. Disconnect the battery ground cable. For additional information, refer to [Section 414-01](#).
3. Drain the engine cooling system. For additional information, refer to [Section 303-03](#).
4. Remove the RH and LH valve covers. For additional information, refer to [Valve Cover — RH](#) and [Valve Cover — LH](#) in this section.
5. Loosen the 4 coolant pump pulley bolts.



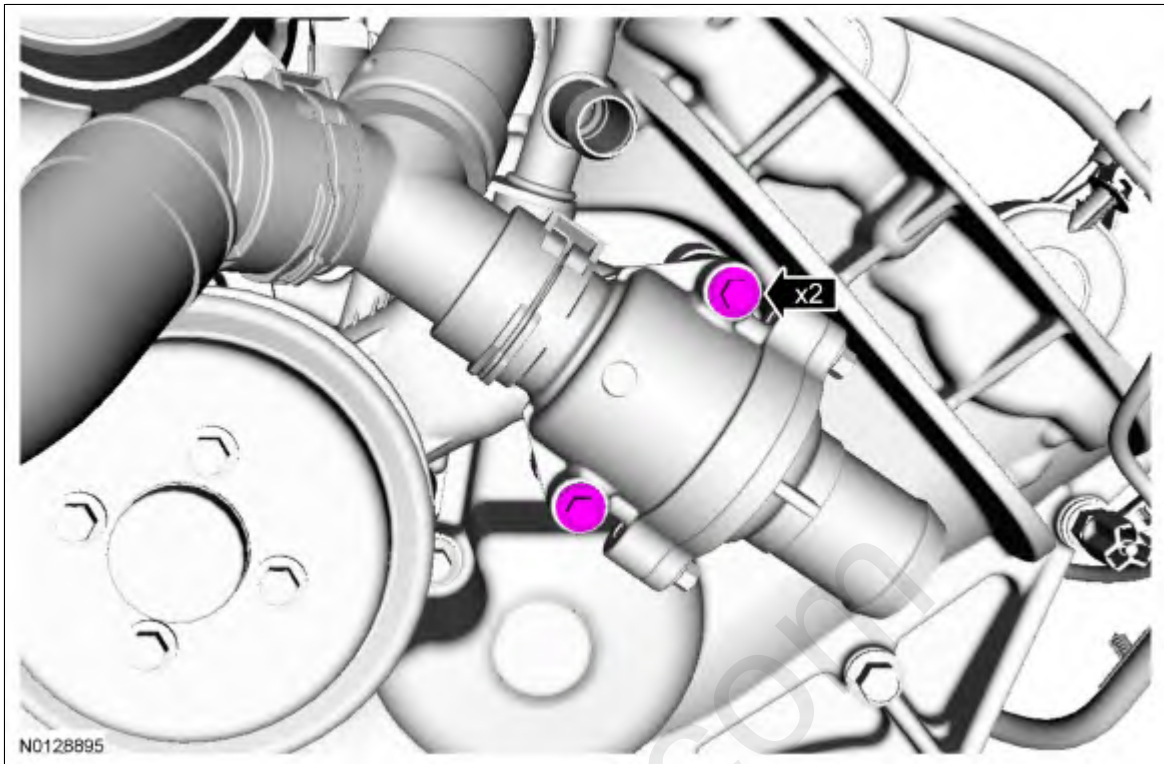
6. Remove the accessory drive and A/C compressor belts. For additional information, refer to [Section 303-05](#).
7. Release the clamp and disconnect the lower radiator hose from the thermostat housing assembly.



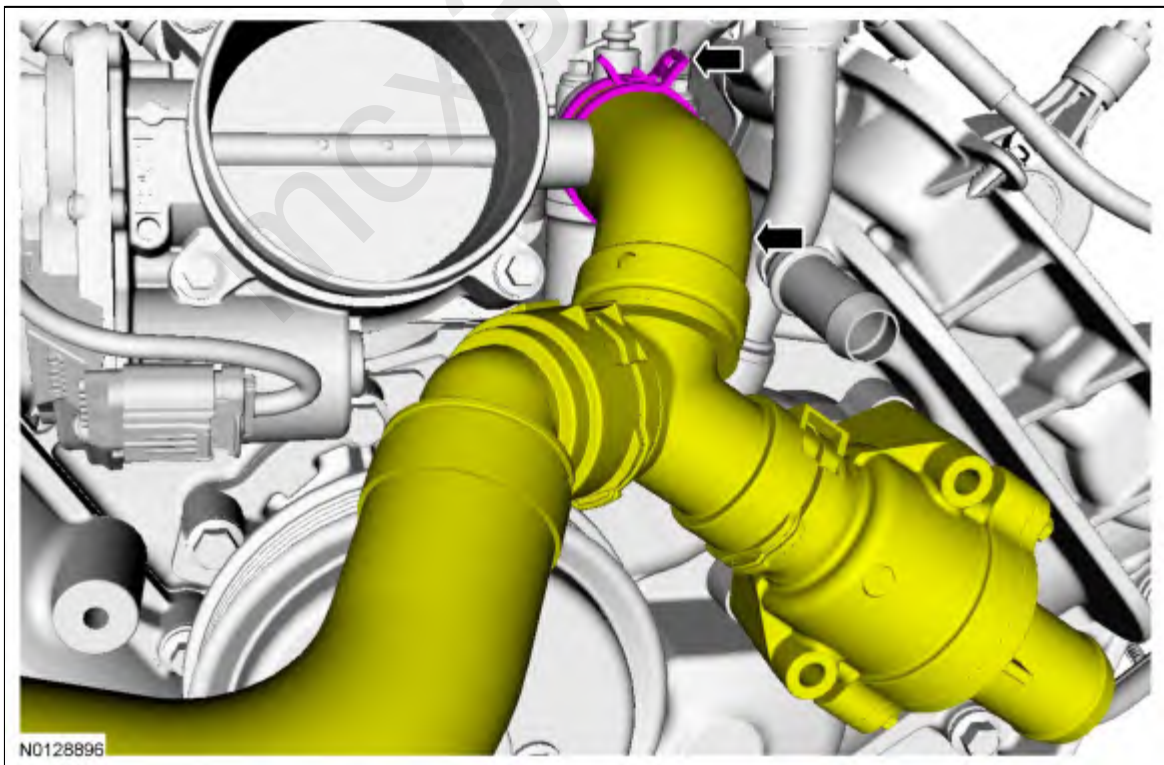
8. Release the clamp and disconnect the degas coolant hose.



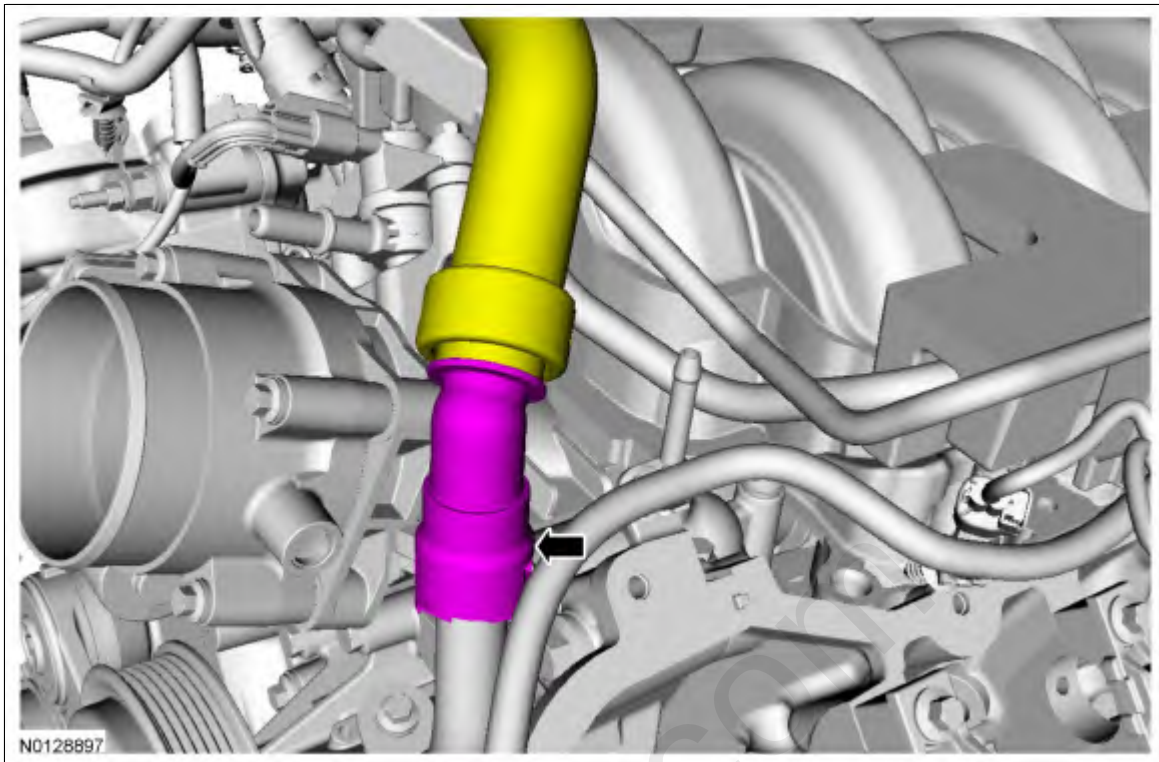
9. Remove the 2 thermostat housing bolts.



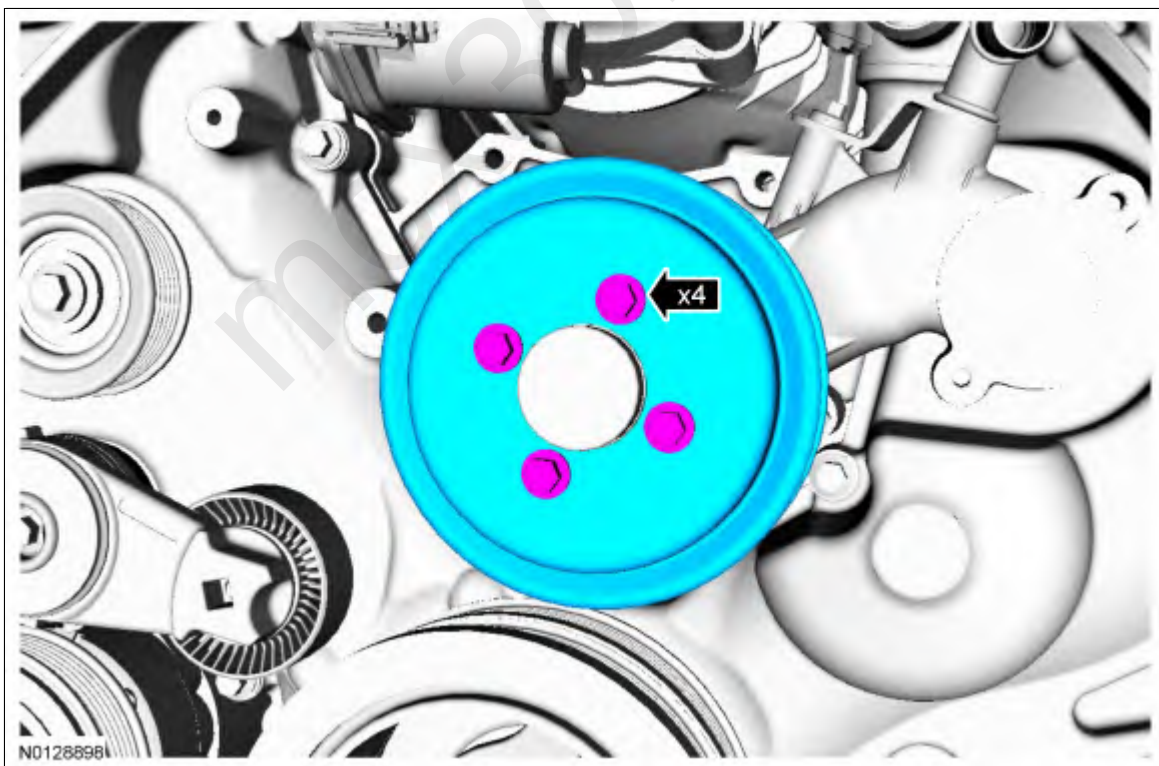
10. Release the clamp and position the upper radiator hose T-connector/thermostat housing assembly aside.
- Remove and discard the thermostat housing O-ring seal.



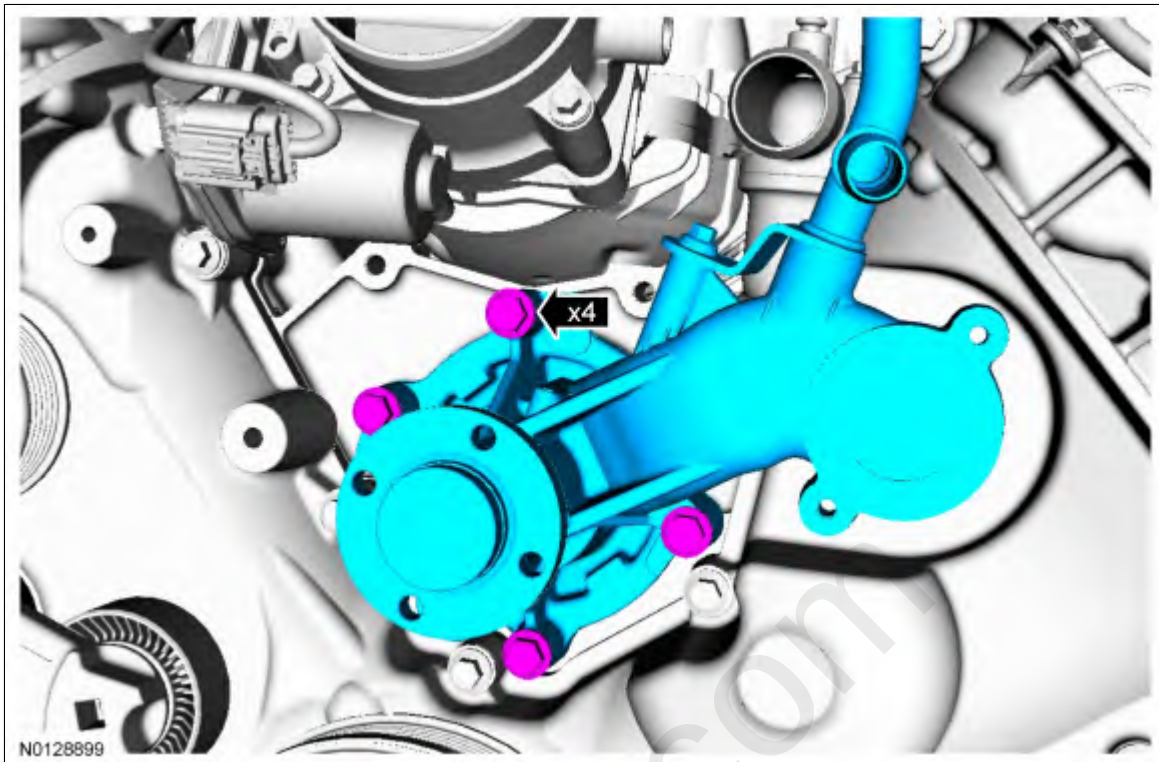
11. Disconnect the heater hose.



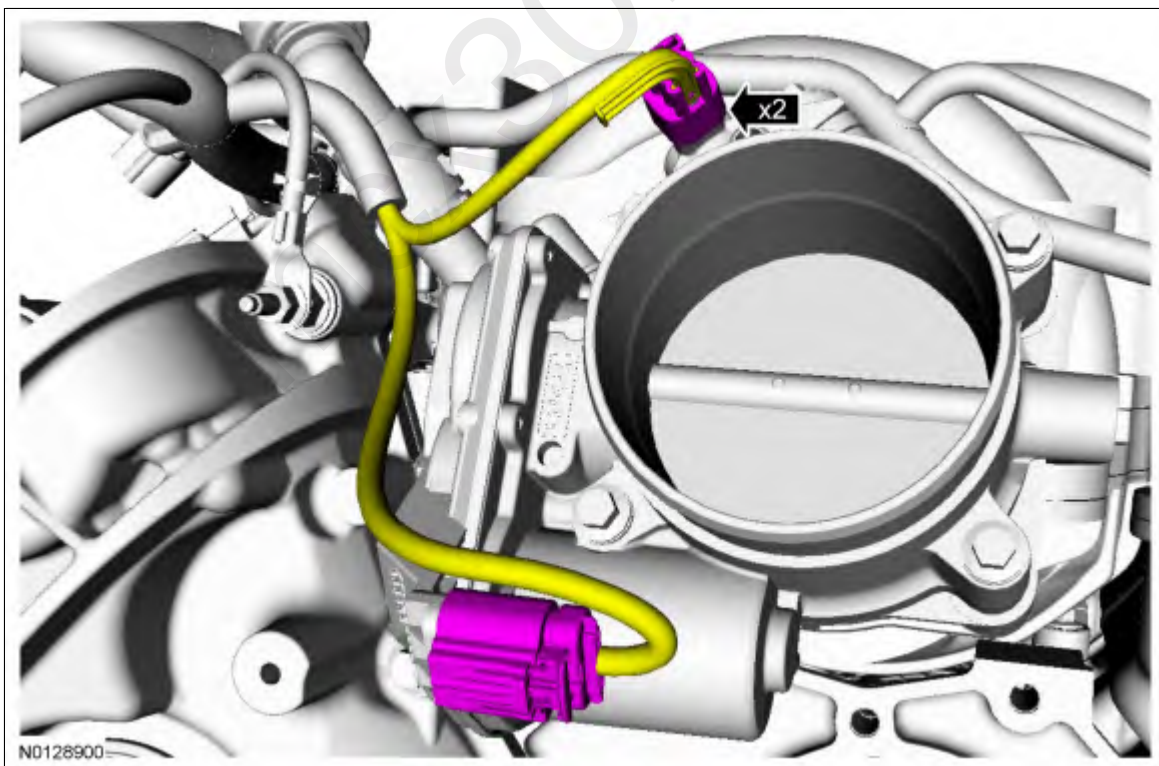
12. Remove the 4 bolts and the coolant pump pulley.



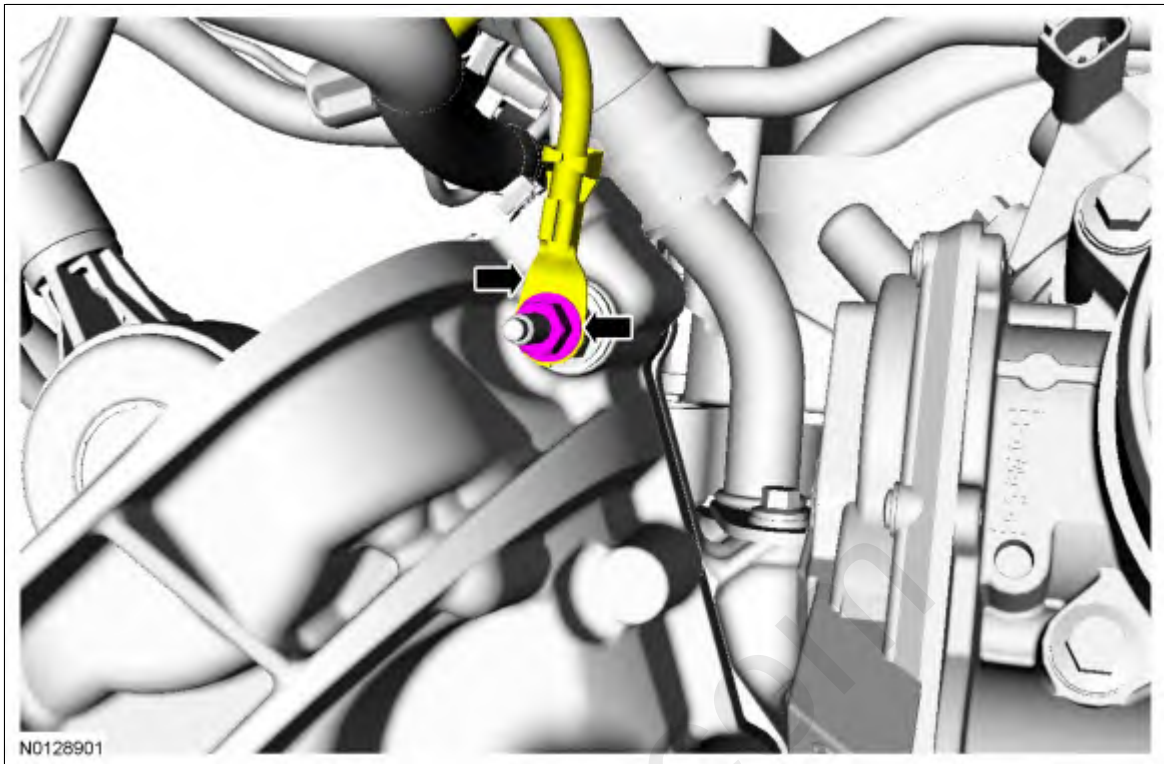
13. Remove the 4 bolts and the coolant pump.
- Remove and discard the O-ring seal.



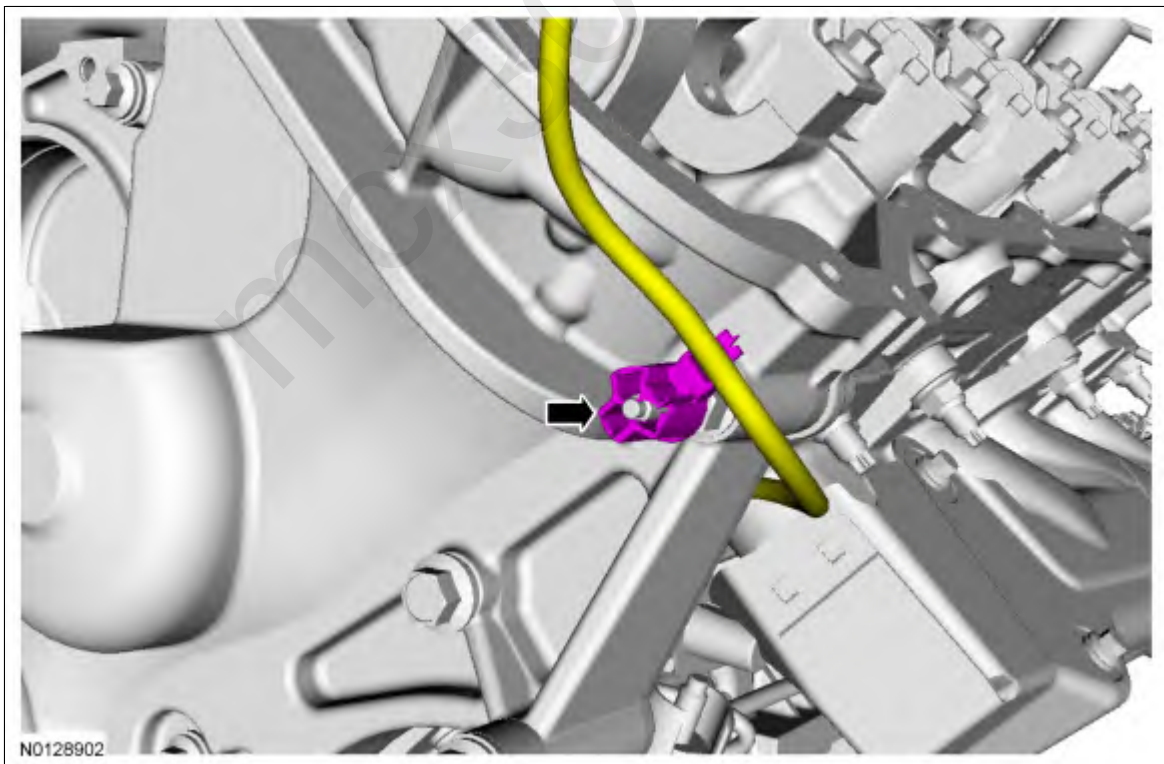
14. Disconnect the throttle body and Evaporative Emission (EVAP) purge valve electrical connectors.



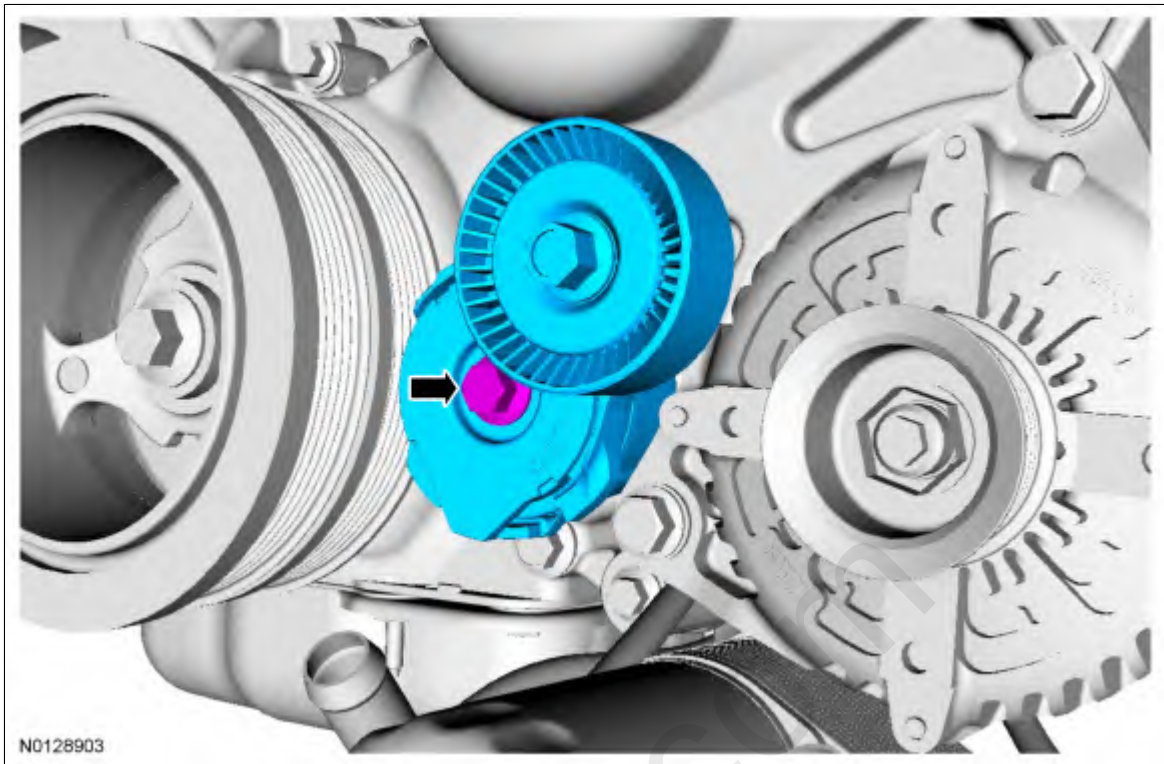
15. Remove the nut and the ground wire from the engine front cover stud bolt.



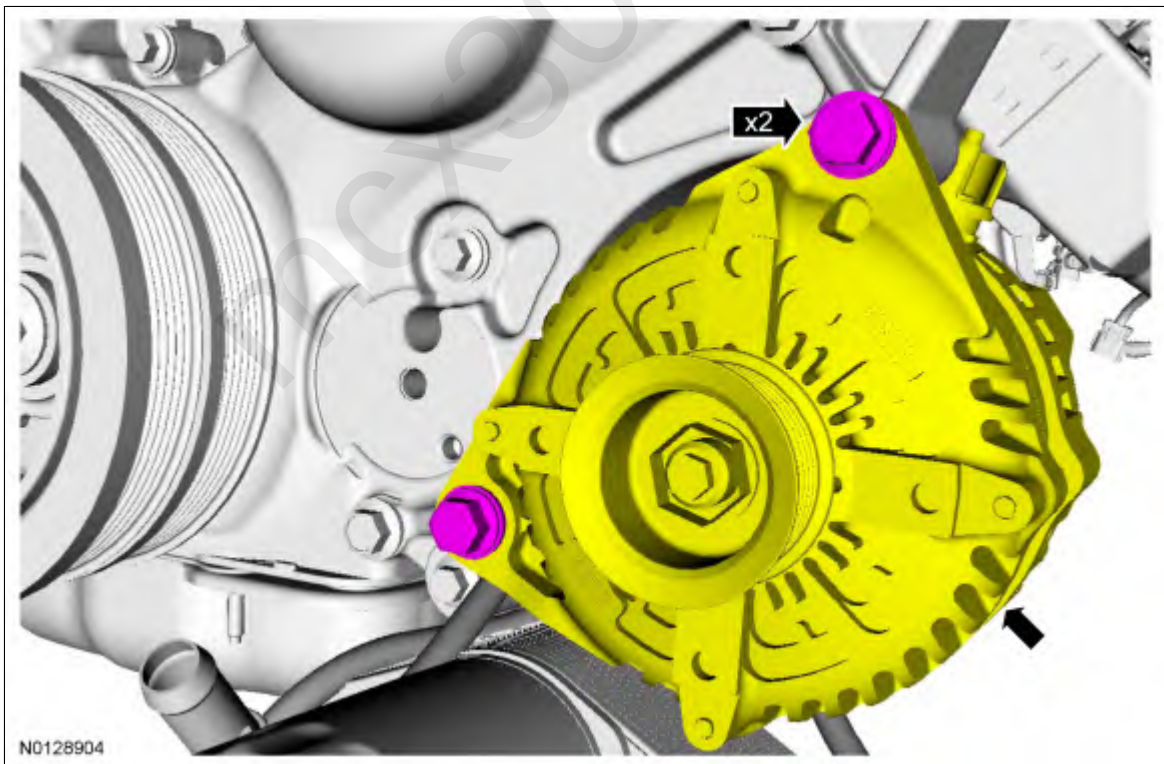
16. Detach the wiring harness retainer from the engine front cover stud bolt.



17. Remove the bolt and the accessory drive belt tensioner.



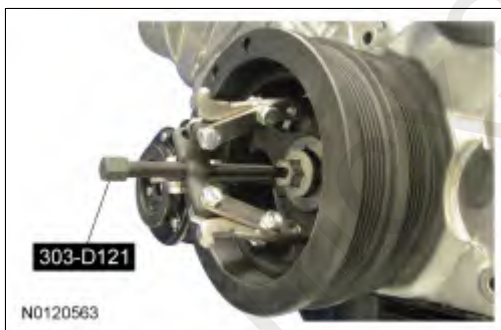
18. Remove the 2 bolts and position the generator aside.



19. Remove the crankshaft pulley bolt and washer.



20. Using the 3 Jaw Puller and the crankshaft pulley bolt, remove the crankshaft pulley.
- Discard the crankshaft pulley bolt.

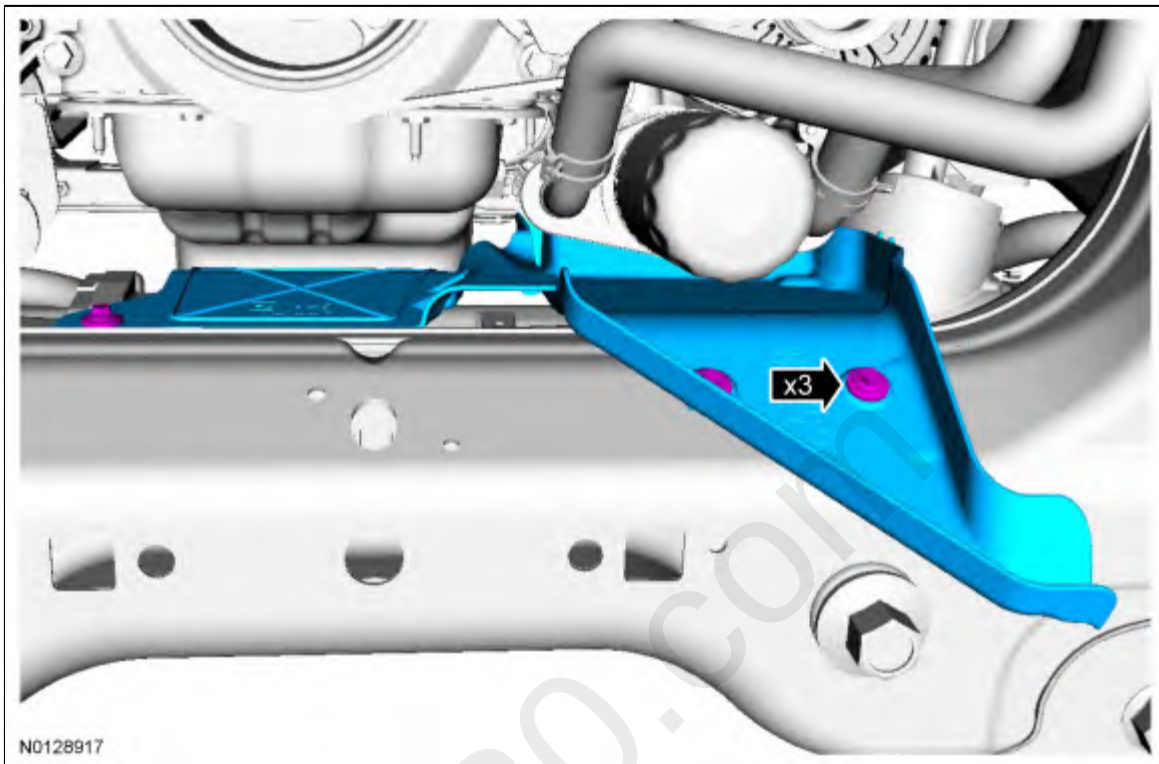


21. **NOTICE:** Use care not to damage the engine front cover or the crankshaft when removing the seal.

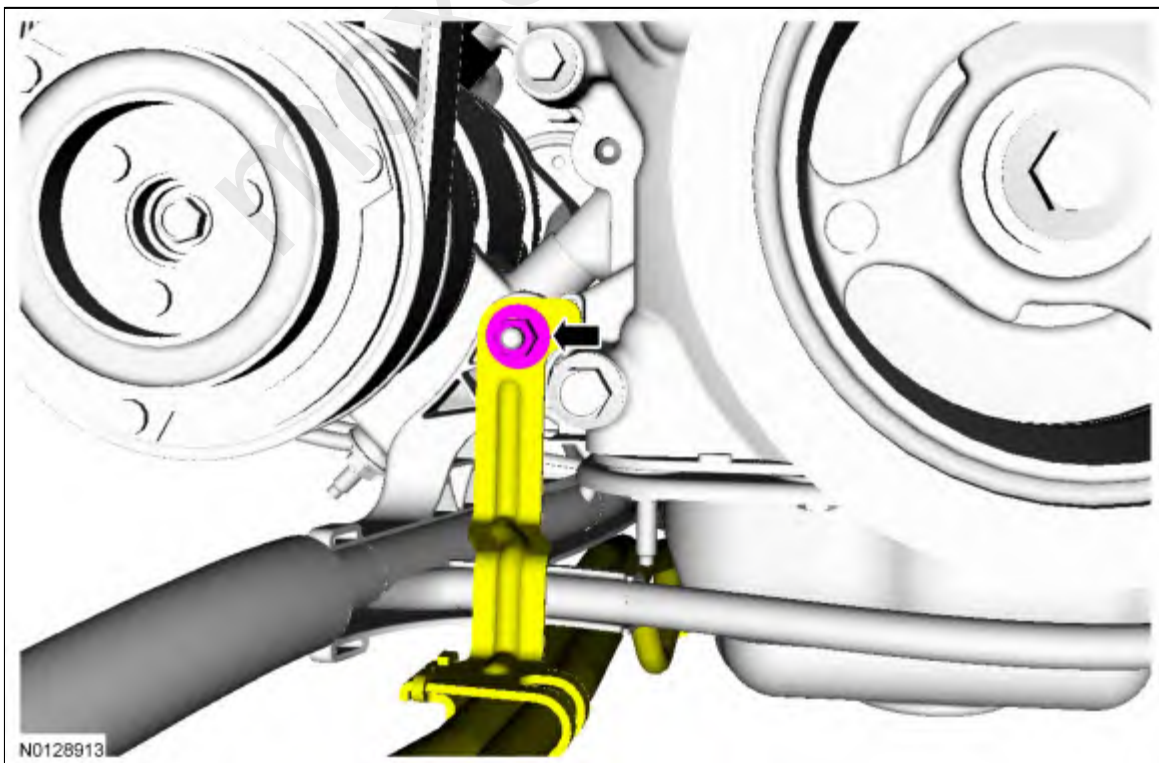
Using the Oil Seal Remover, remove the crankshaft front oil seal.



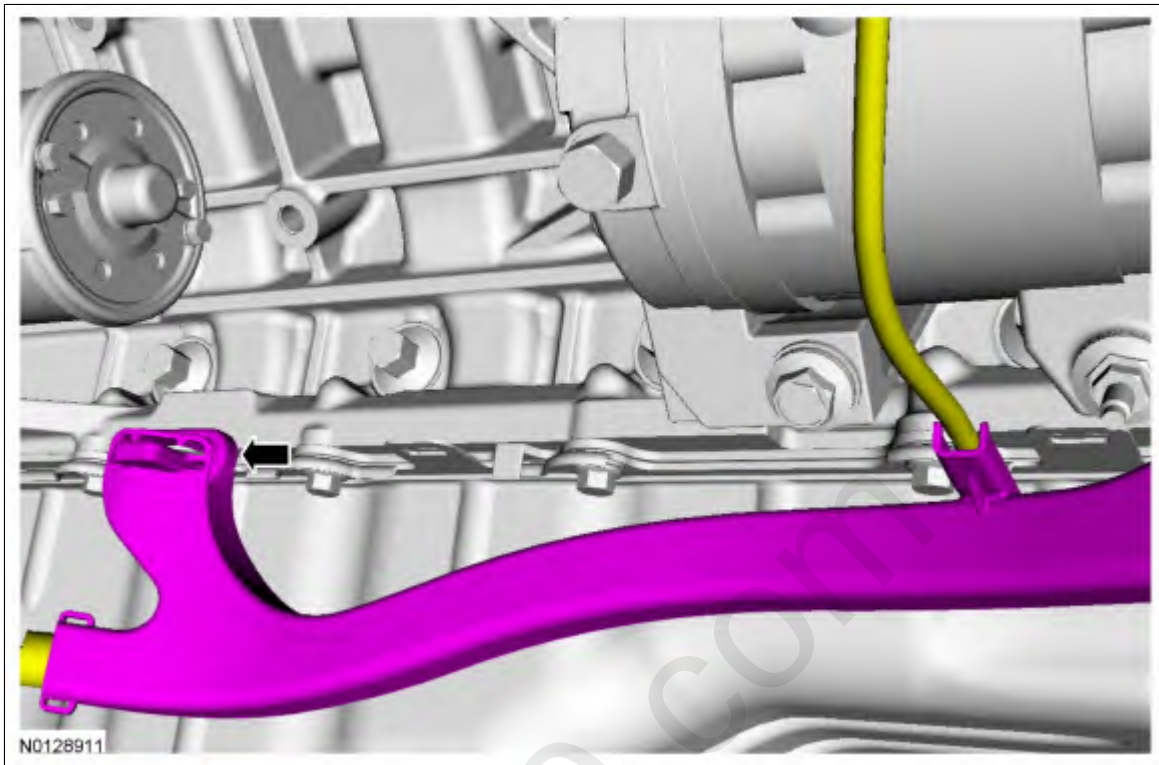
22. Remove the 4 bolts and the skid plate.
23. Remove the 3 bolts and the oil drain gutter.



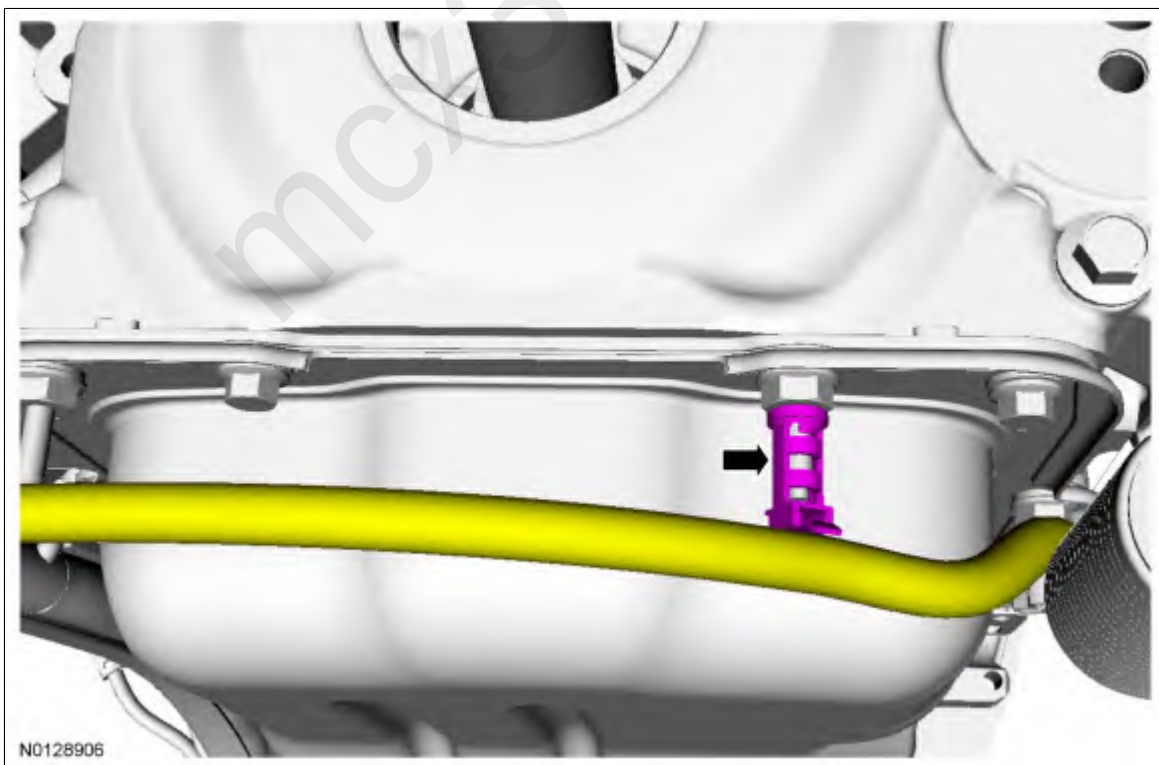
24. Remove the nut and the transmission cooler tube bracket from the engine front cover stud bolt.



25. Detach the starter motor wiring harness retainer from the oil pan.

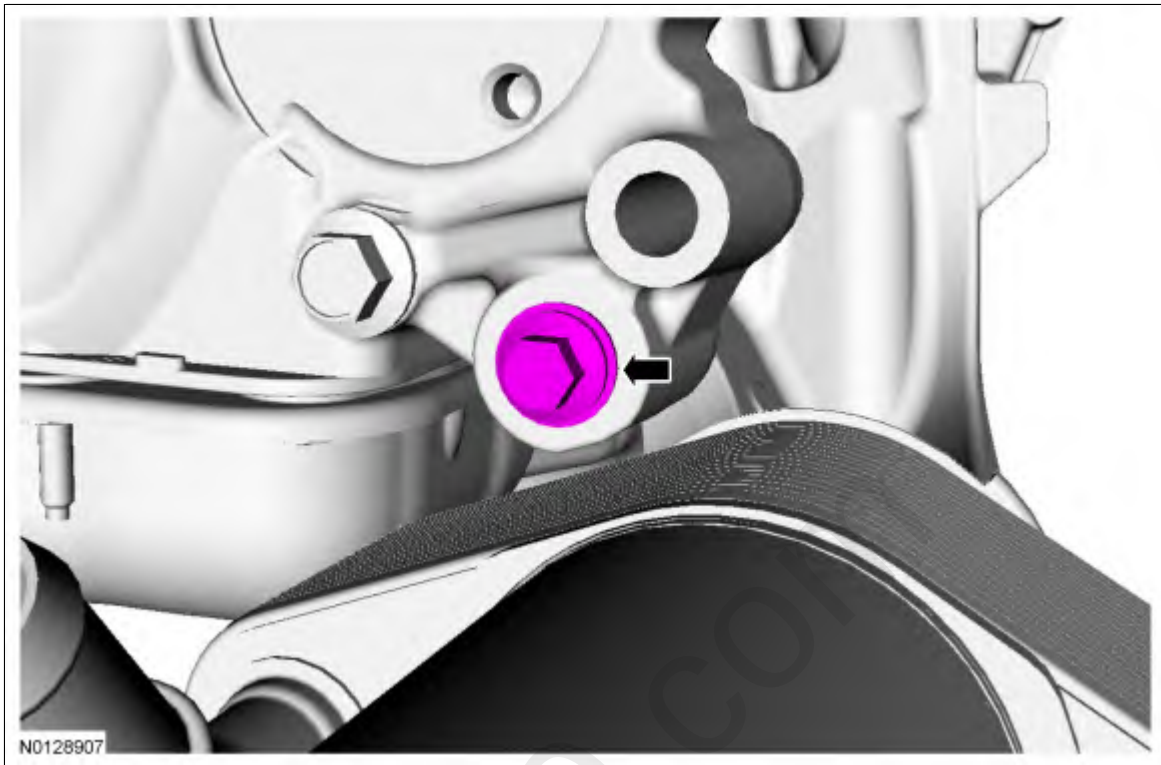


26. Detach the wiring harness retainer from the oil pan stud bolt.

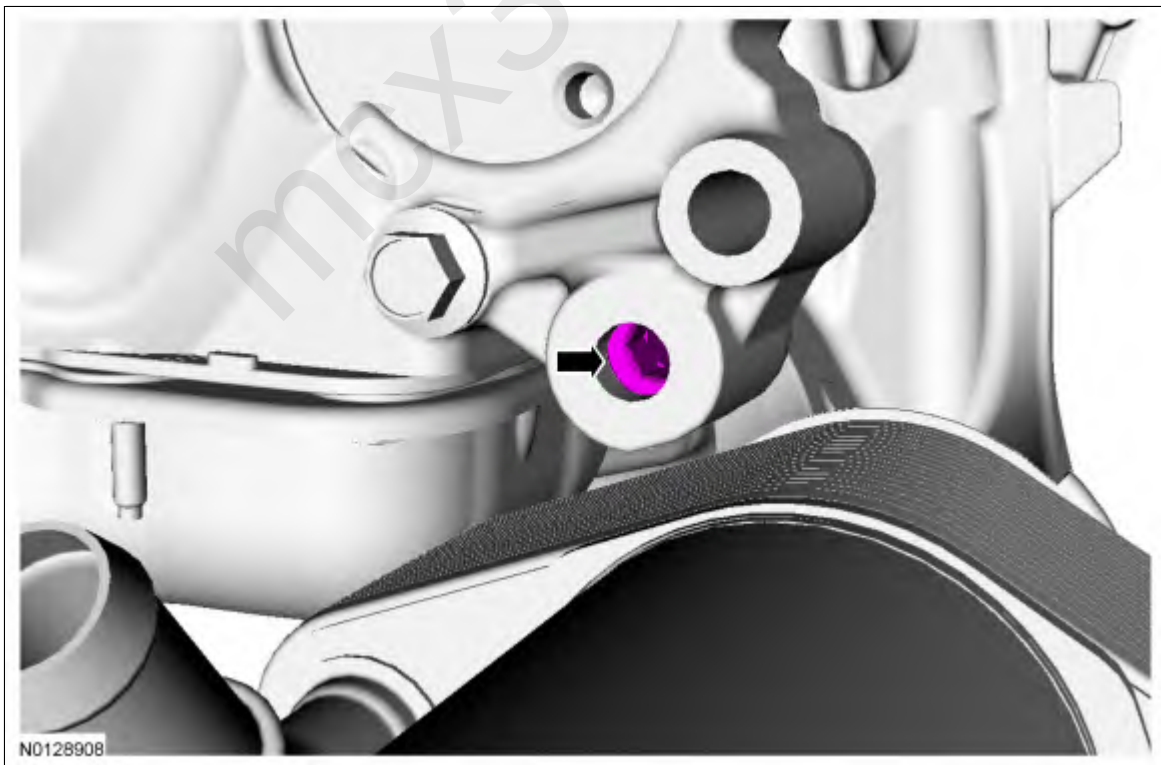


27. Remove the 2 front oil pan stud bolts and 2 front oil pan bolts.

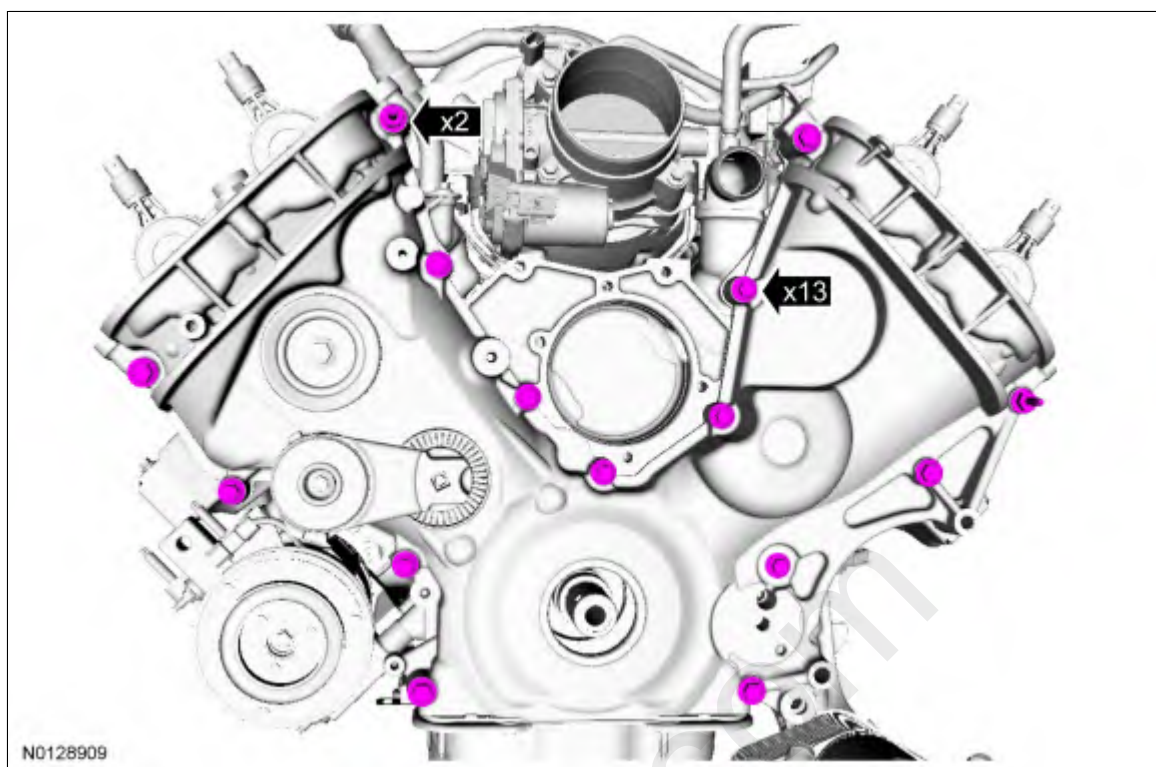
28. Remove the engine front cover-to-oil filter adapter bolt.



29. Using a 10 mm (0.393 in) Hex Bit loosen the engine front cover-to-oil filter adapter jack screw.



30. Remove the 13 engine front cover bolts and the 2 stud bolts.



31. **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. Use a plastic scraping tool to remove all traces of old sealant.

Remove the engine front cover.

- Remove and discard the engine front cover gaskets.
- Clean the mating surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the mating surfaces.



32. Drain the engine oil.
 - Install the drain plug and tighten to 26 Nm (19 lb-ft).

Installation

1. **NOTICE:** The Variable Camshaft Timing (VCT) variable force solenoid pins must be fully depressed to avoid interference with the VCT valve tips when installing the engine front cover. Failure to follow these instructions can result in damage to the engine.

NOTE: LH shown, RH similar.

Fully depress the VCT variable force solenoid pins.



2. **NOTE:** The engine front cover must be installed and all fasteners final tightened within 5 minutes of applying the sealer. If this cannot be accomplished, install the engine front cover and tighten fasteners 6, 7, 8, 9, 10 and 11 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer. All of the fasteners must then be final tightened within 1 hour of applying the sealer. If this time limit is exceeded, all sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

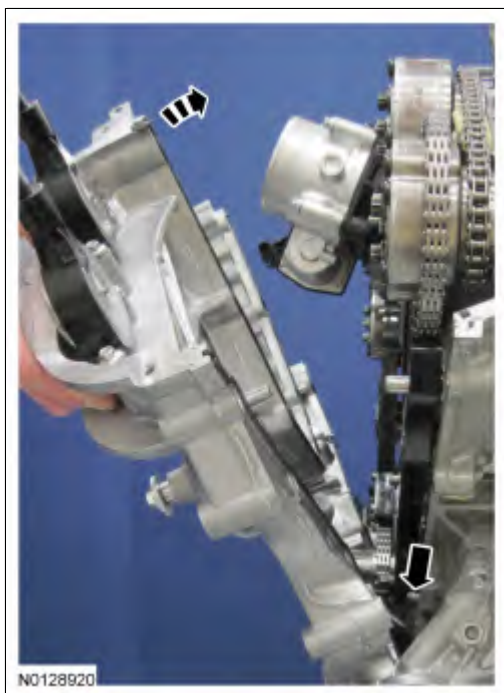
Apply a bead of silicone gasket and sealant to the cylinder head-to-cylinder block joints and the oil pan-to-cylinder block joints as illustrated.



3. **NOTE:** Make sure that the engine front cover gaskets are in place on the engine front cover before installation.

Using new gaskets, position the engine front cover onto the dowels.

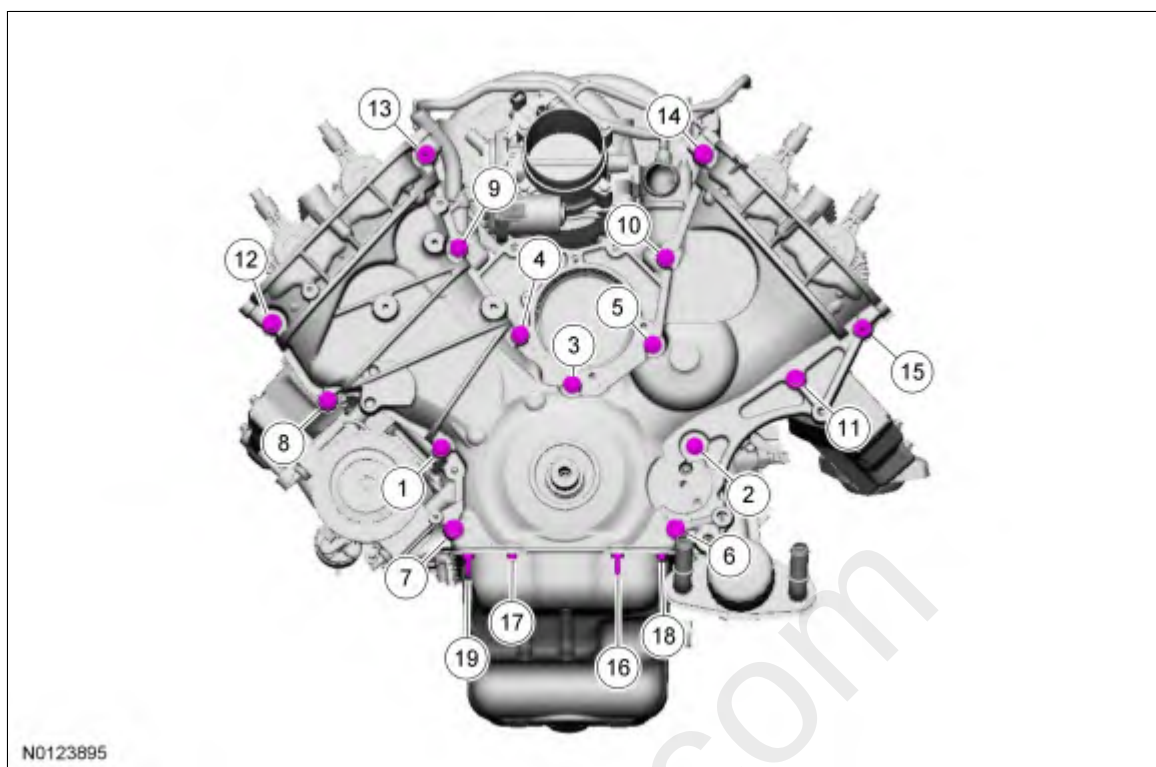
- Install the 13 engine front cover bolts, 2 stud bolts, the 2 oil pan-to-engine front cover bolts and the 2 oil pan-to-engine front cover stud bolts finger-tight.



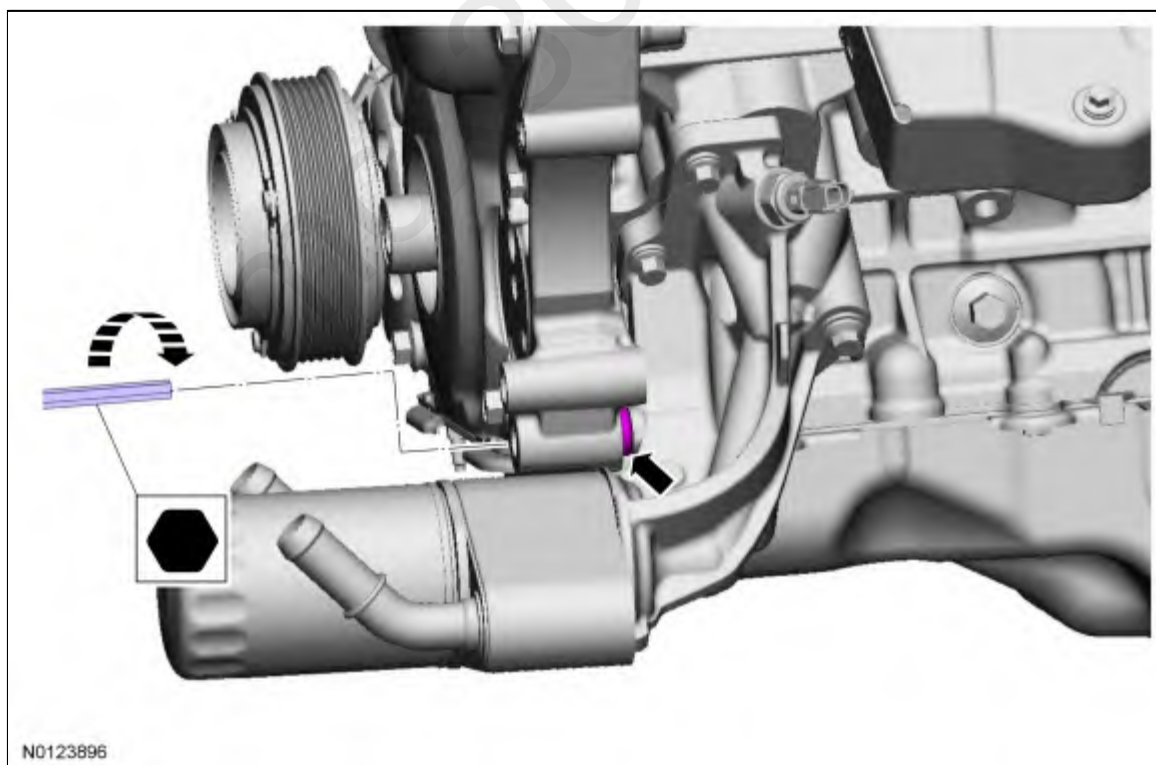
4. **NOTE:** The engine front cover must be installed and all fasteners final tightened within 5 minutes of applying the sealer. If this cannot be accomplished, install the engine front cover and tighten fasteners 6, 7, 8, 9, 10 and 11 to 8 Nm (71 lb-in) within 5 minutes of applying the sealer. All of the fasteners must then be final tightened within 1 hour of applying the sealer. If this time limit is exceeded, all sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

Tighten the bolts in the sequence shown in 2 stages.

- Stage 1: Tighten bolts 1-15 to 25 Nm (18 lb-ft) and bolts 16-19 to 10 Nm (89 lb-in).
- Stage 2: Tighten bolts 1-15 an additional 60 degrees and bolts 16-19 an additional 45 degrees.



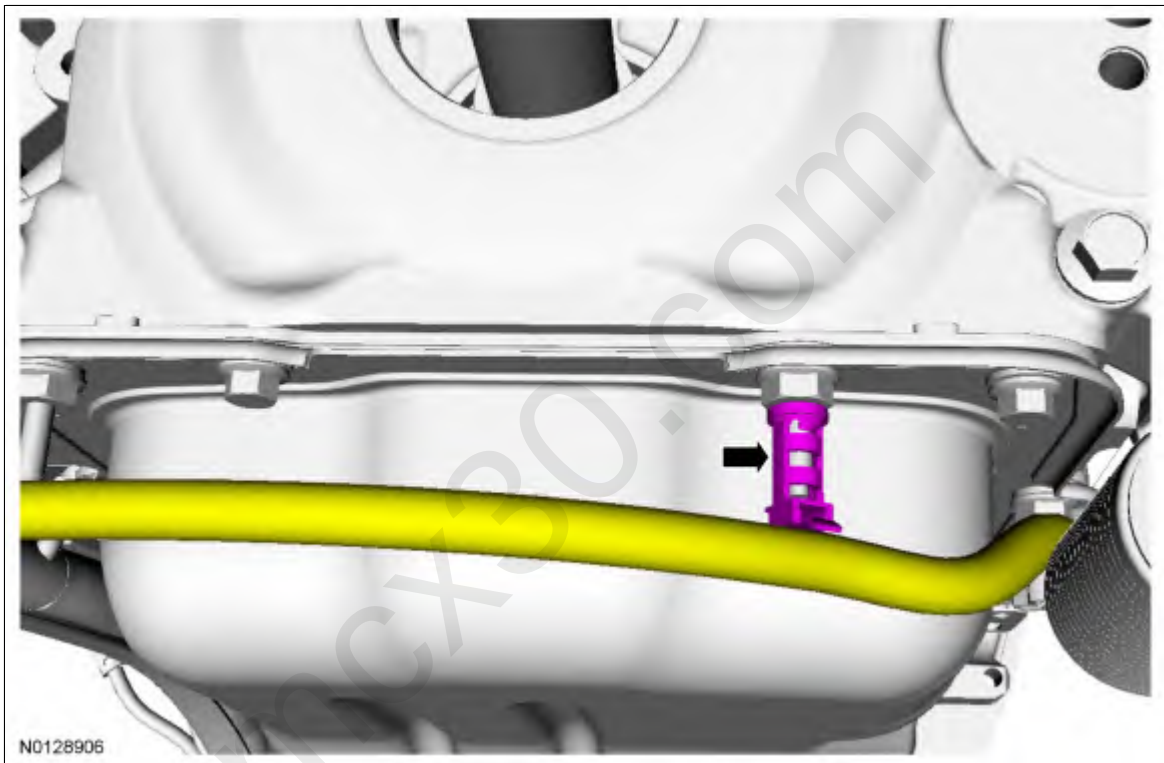
5. Using a 10 mm Hex Bit, rotate the engine front cover jackscrew into contact with the oil filter adapter to 5 Nm (44 lb-in).



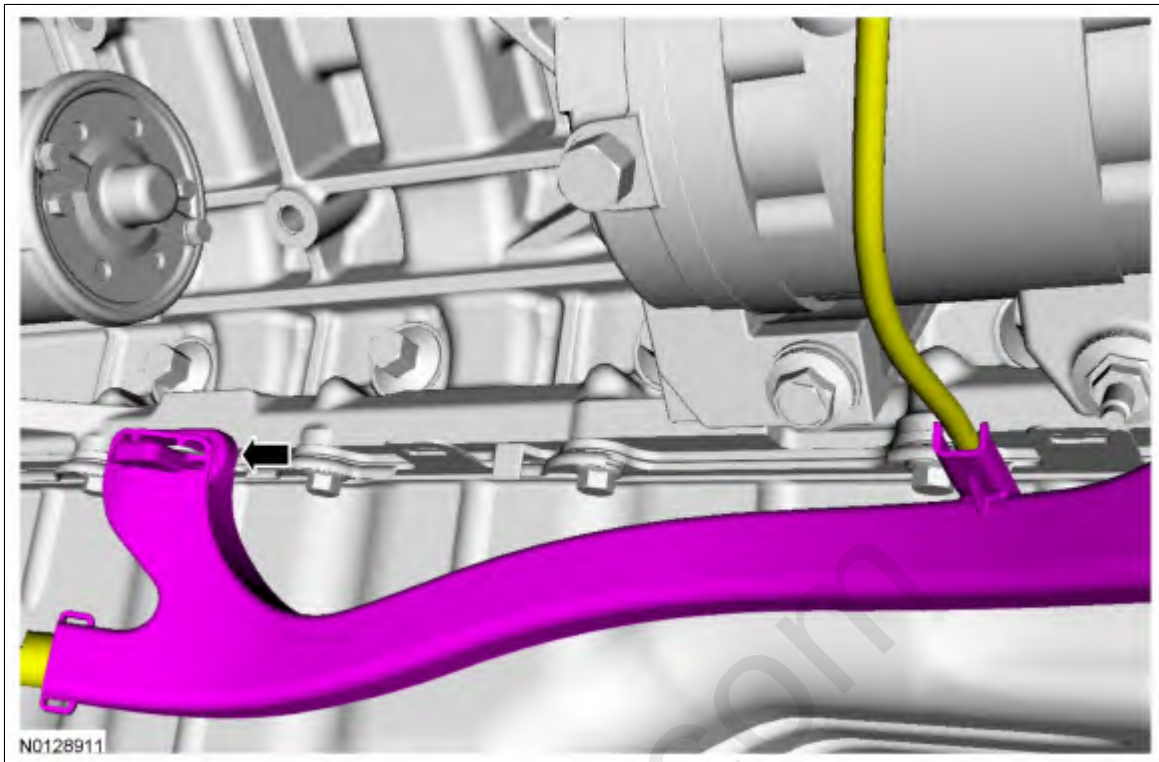
6. Install the engine front cover-to-oil filter adapter bolt and tighten to 25 Nm (18 lb-ft) plus an additional 60 degrees.



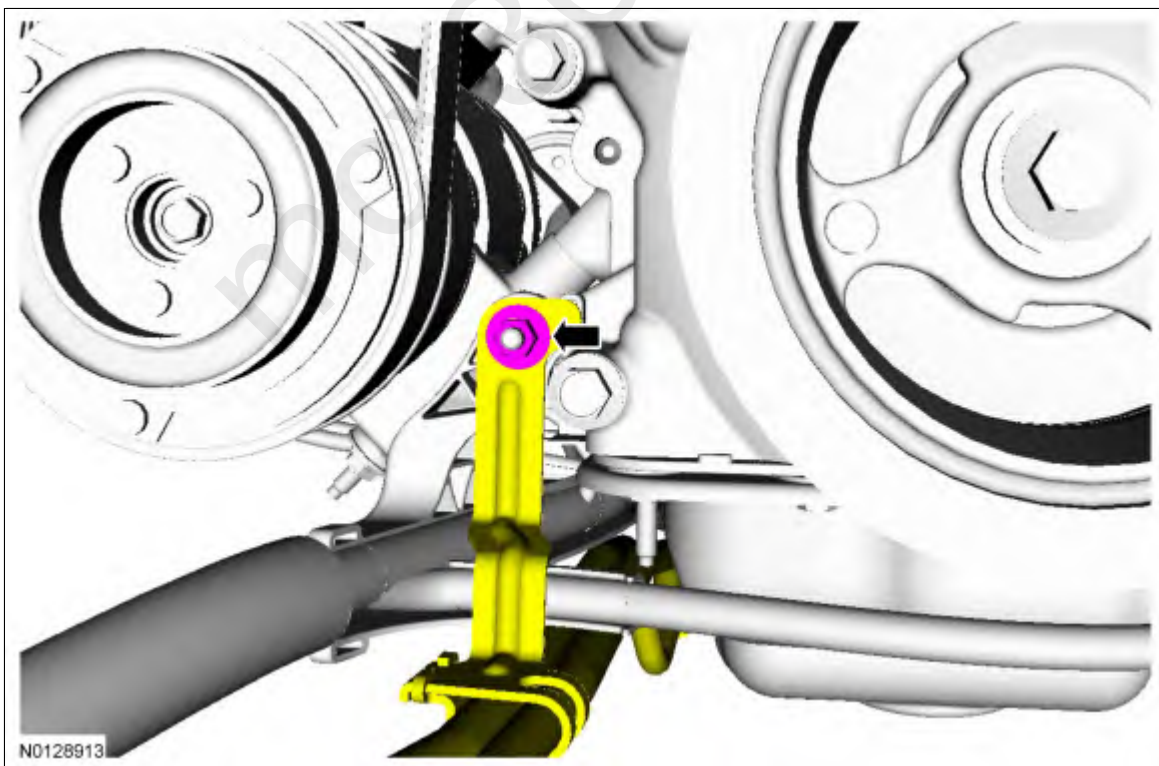
7. Position the wiring harness and install the wiring harness retainer to the oil pan stud bolt.



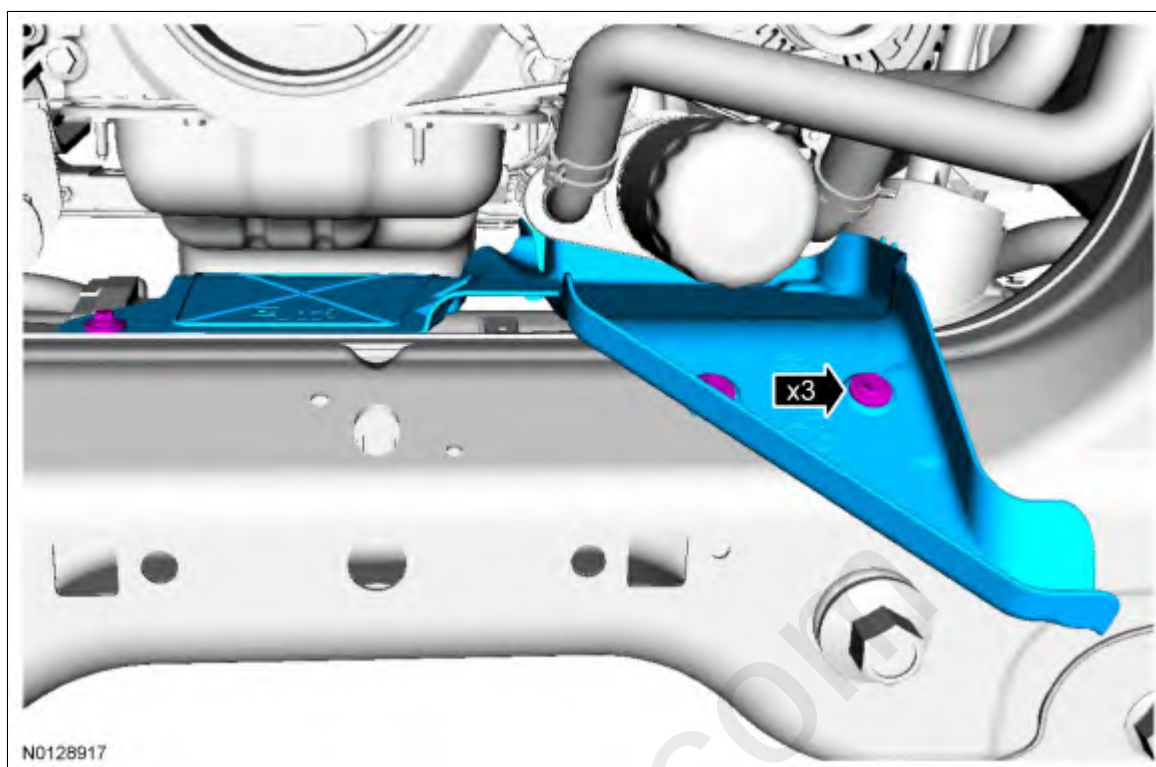
8. Attach the starter motor wiring harness retainer to the oil pan.



9. Install the transmission cooler line bracket and the nut to the engine front cover stud bolt.
- Tighten to 13 Nm (115 lb-in).

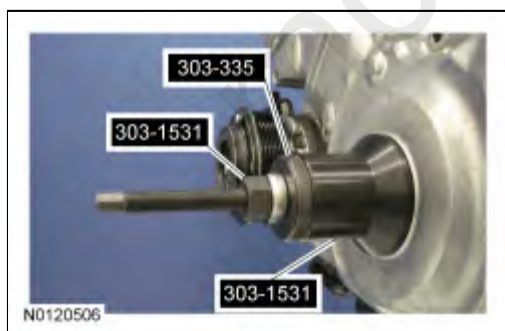


10. Install the oil drain gutter and the 3 bolts.
- Tighten to 10 Nm (89 lb-in).



11. Install the skid plate and the 4 bolts.
 - Tighten to 48 Nm (35 lb-ft).
12. **NOTE:** Lubricate the engine front cover bore and the crankshaft front oil seal inner lip with clean engine oil.

Using the Front Crank Seal and Damper Installer and the Front Cover Oil Seal Installer (plate only), install the crankshaft front oil seal.



13. **NOTE:** If not secured within 5 minutes, the sealant must be removed and the sealing area cleaned with silicone gasket remover and metal surface prep. Failure to follow this procedure can cause future oil leakage.

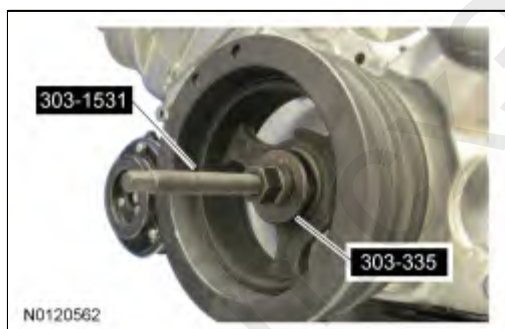
Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.



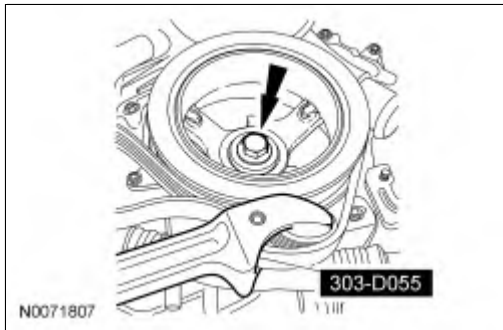
14. Lubricate the crankshaft pulley sealing surface with clean engine oil prior to installation.



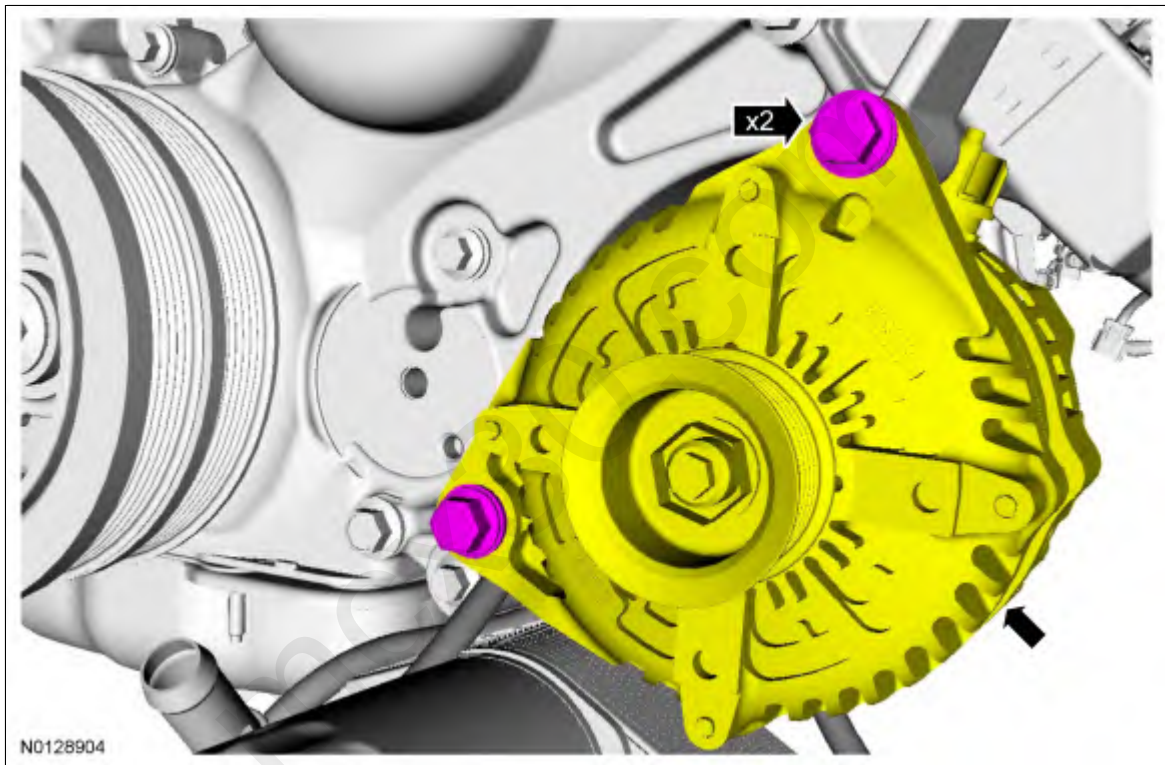
15. Using the Front Crank Seal and Damper Installer and the Front Cover Oil Seal Installer (plate only), install the crankshaft pulley.



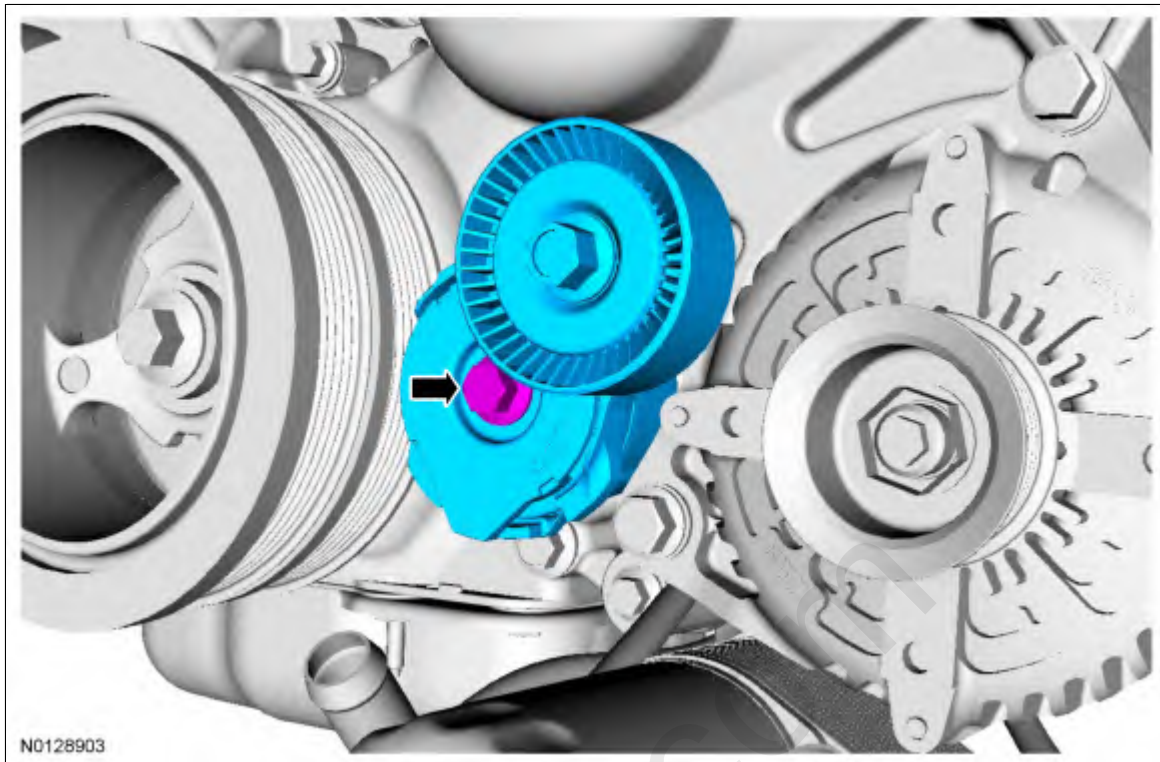
16. Using the Strap Wrench, install a new crankshaft pulley bolt and the original washer, tighten the bolt in 4 stages:
- Stage 1: Tighten to 140 Nm (103 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 100 Nm (74 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.



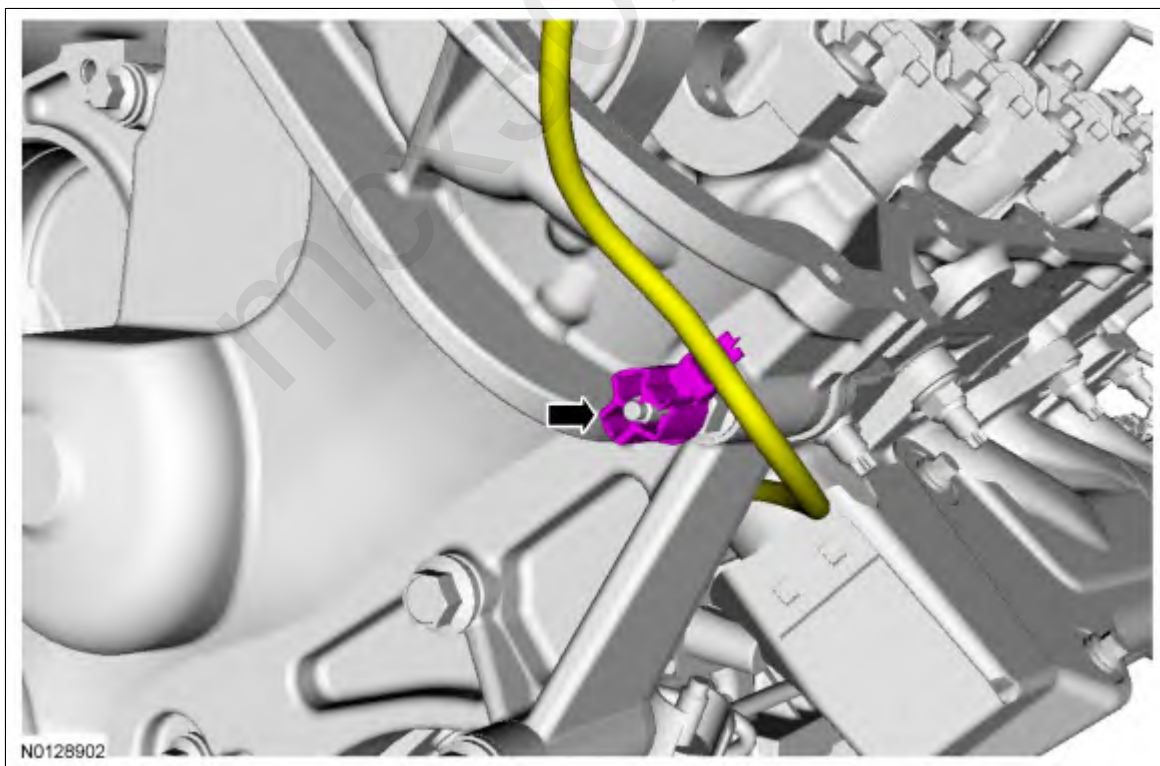
17. Install the generator and the 2 bolts.
- Tighten to 48 Nm (35 lb-ft).



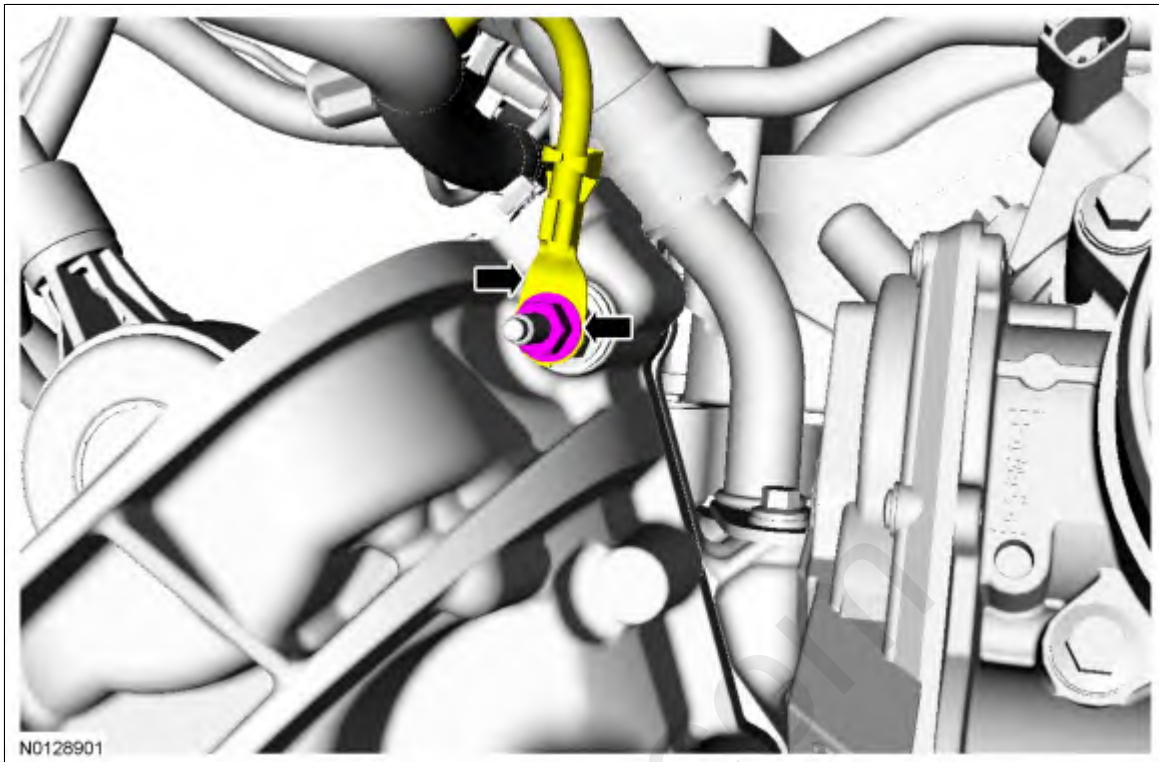
18. Install the accessory drive belt tensioner and bolt.
- Tighten to 48 Nm (35 lb-ft).



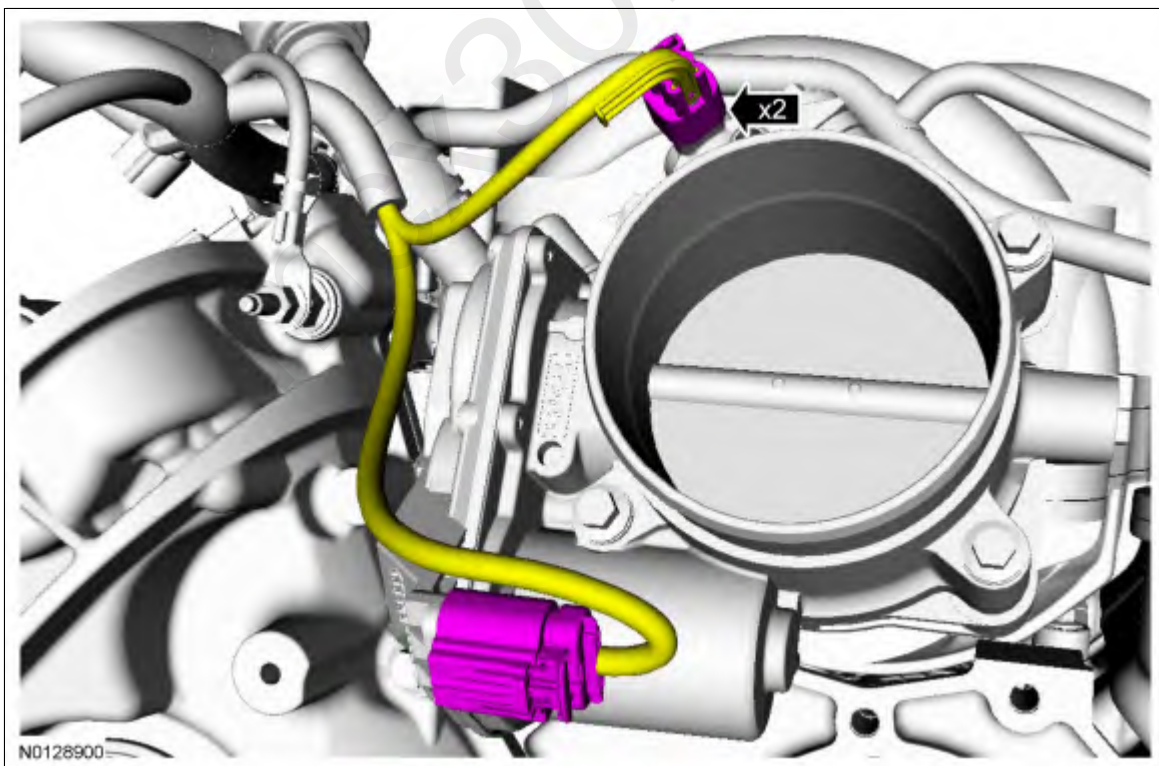
19. Attach the wiring harness retainer to the engine front cover stud bolt.



20. Install the ground wire and nut to the engine front cover stud bolt.
- Tighten to 10 Nm (89 lb-in).



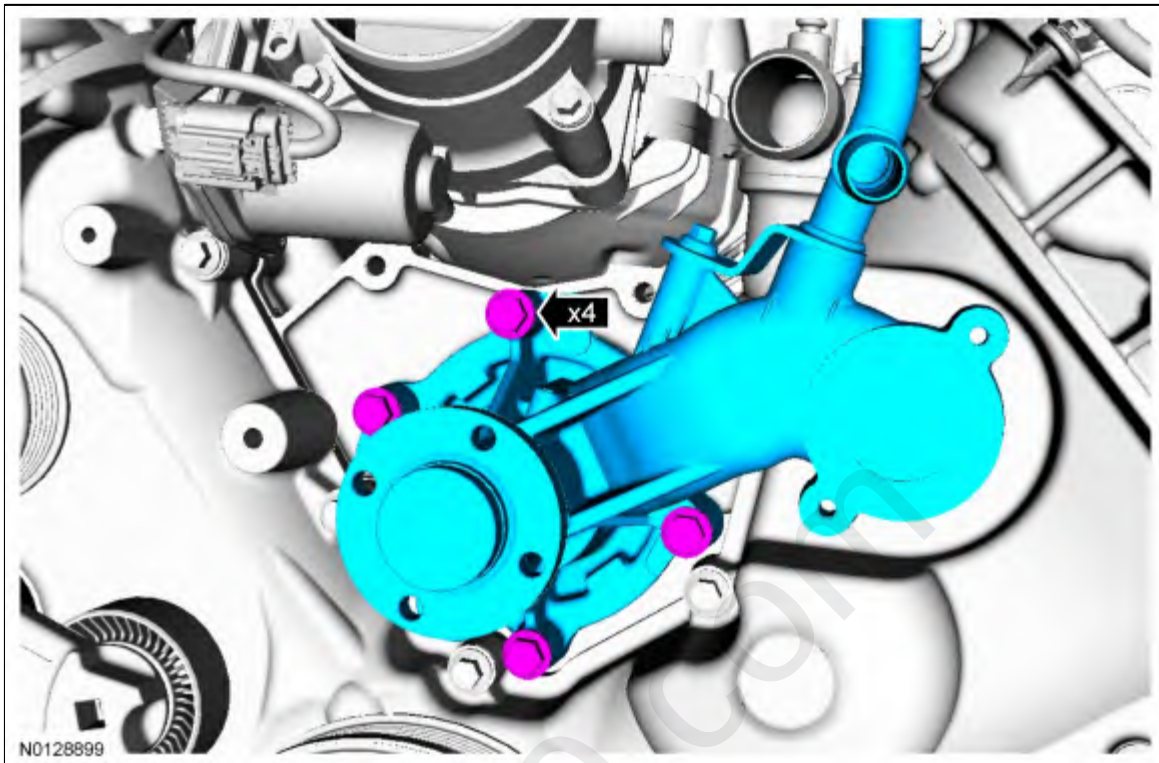
21. Connect the throttle body and EVAP purge valve electrical connectors.



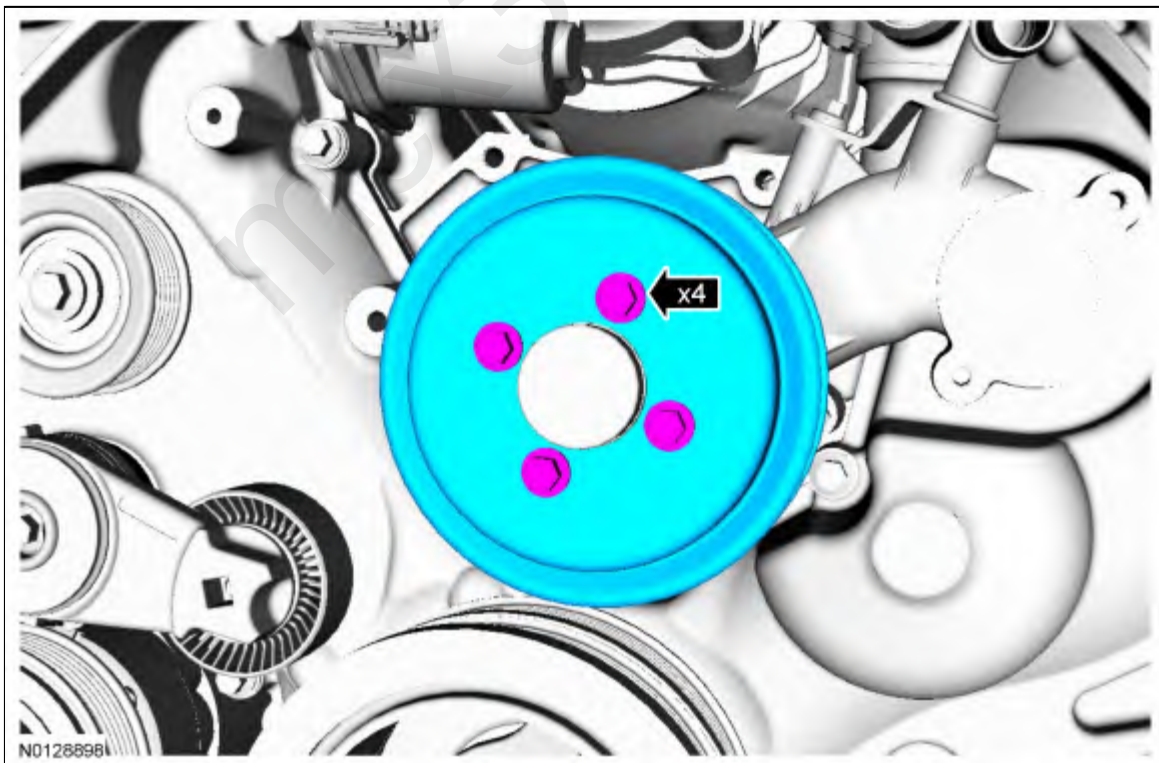
22. **NOTE:** Lubricate the new coolant pump O-ring seal with clean engine coolant.

Using a new O-ring seal, install the coolant pump and the 4 bolts.

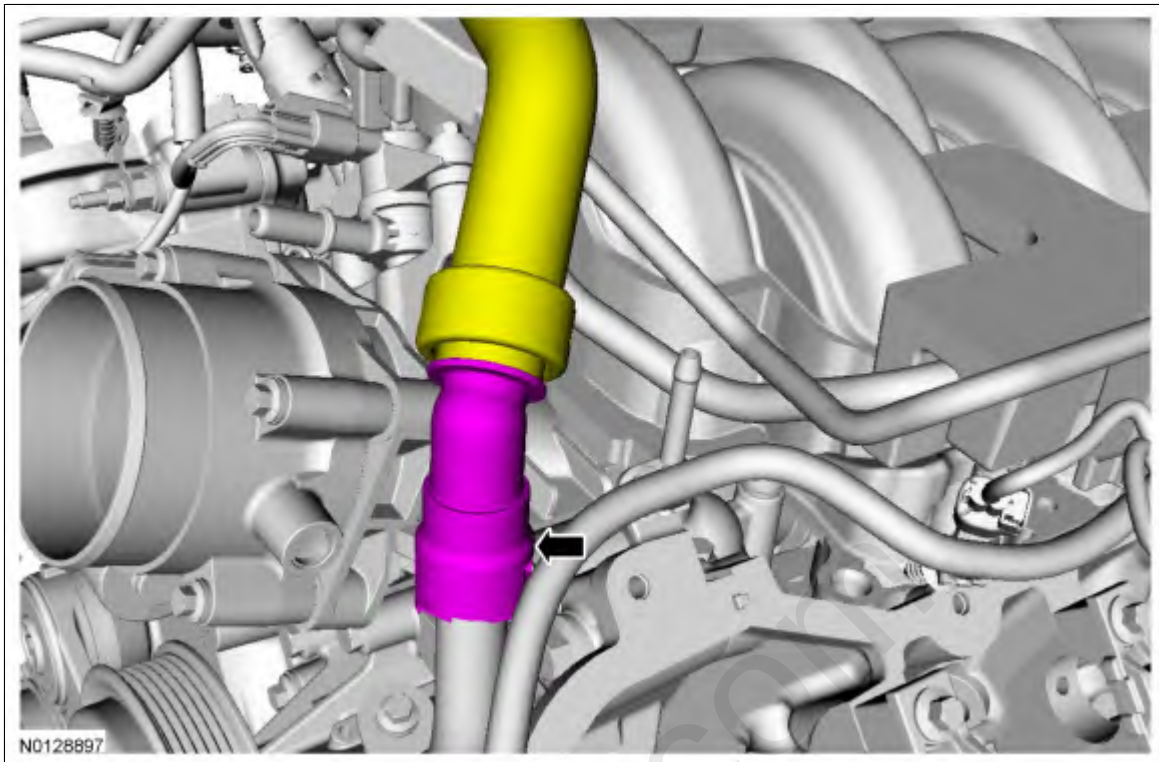
- Tighten to 20 Nm (177 lb-in) plus an additional 60 degrees.



23. Install the coolant pump pulley and the 4 bolts.

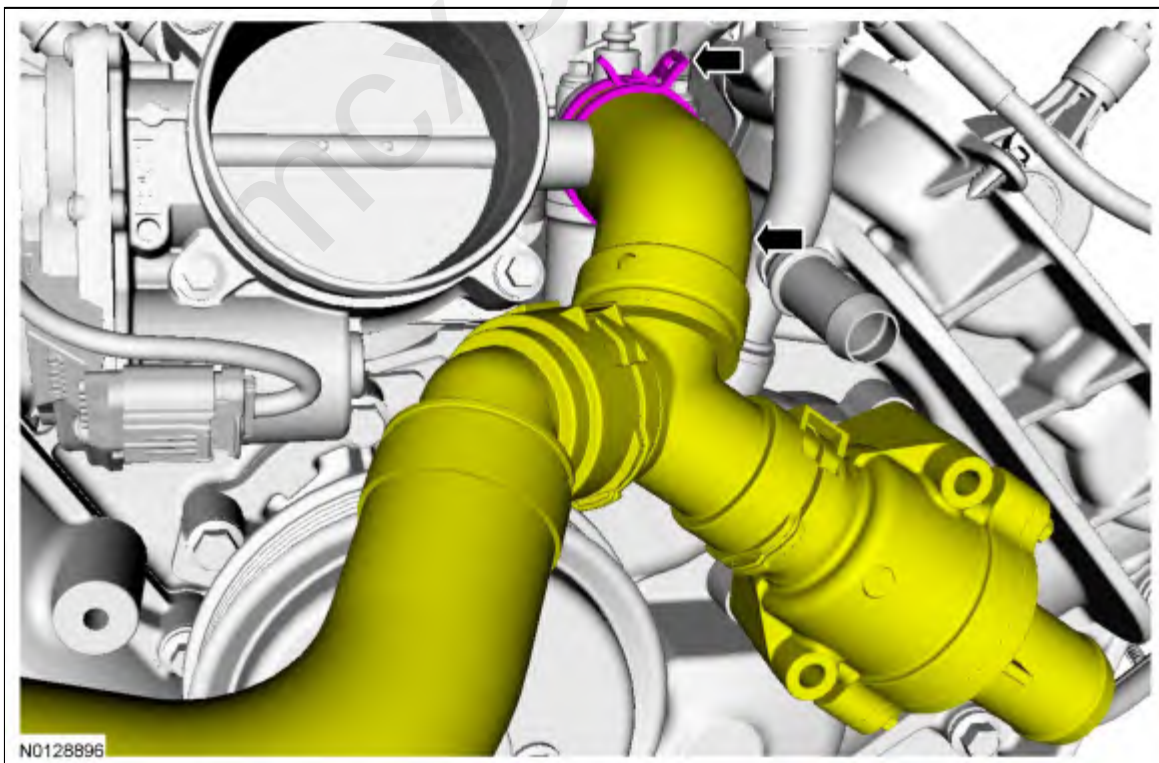


24. Connect the heater hose.

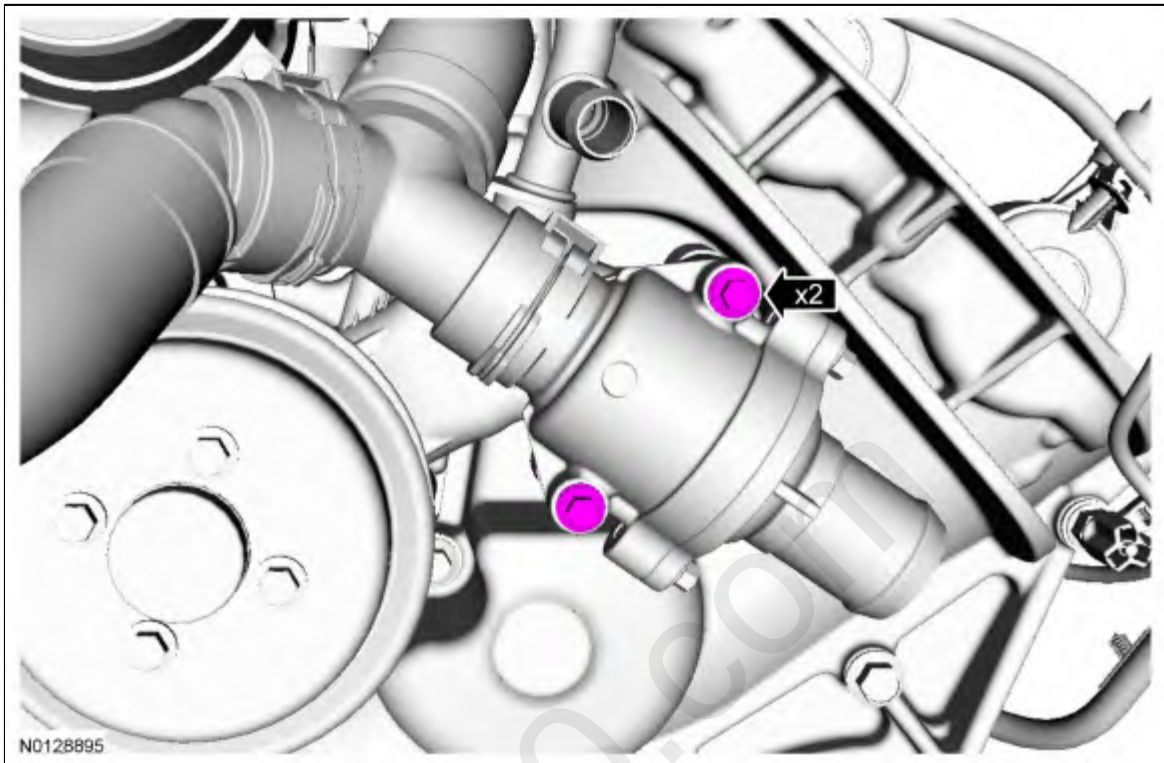


25. **NOTE:** Lubricate the new thermostat housing O-ring seal with clean engine coolant.

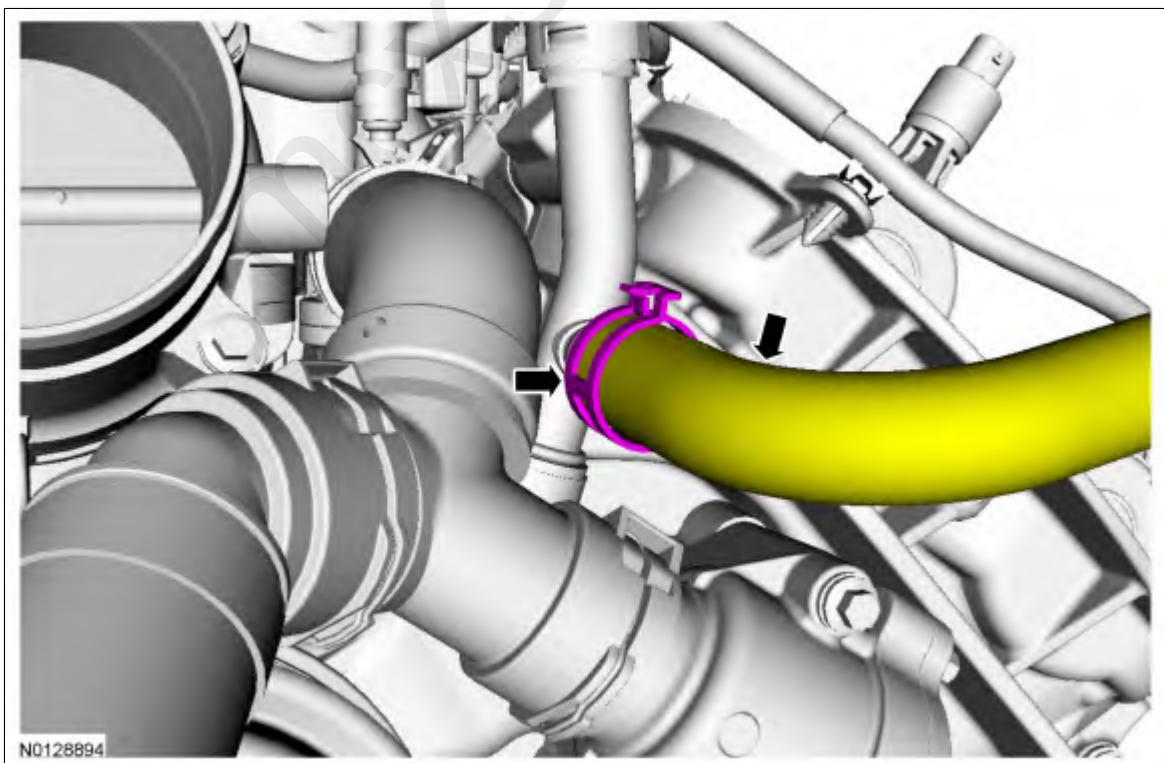
Using a new thermostat housing O-ring seal, install the upper radiator hose T-connector/thermostat housing assembly and clamp.



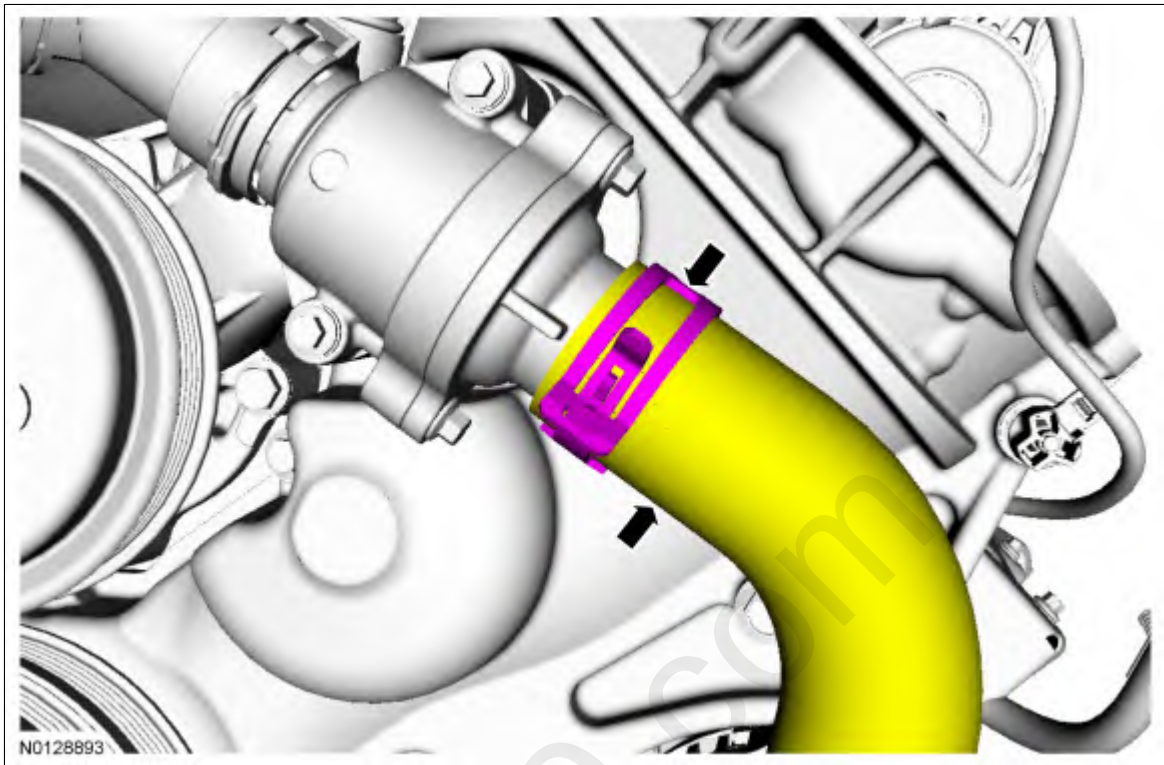
26. Install the 2 thermostat housing bolts.
- Tighten to 10 Nm (89 lb-in).



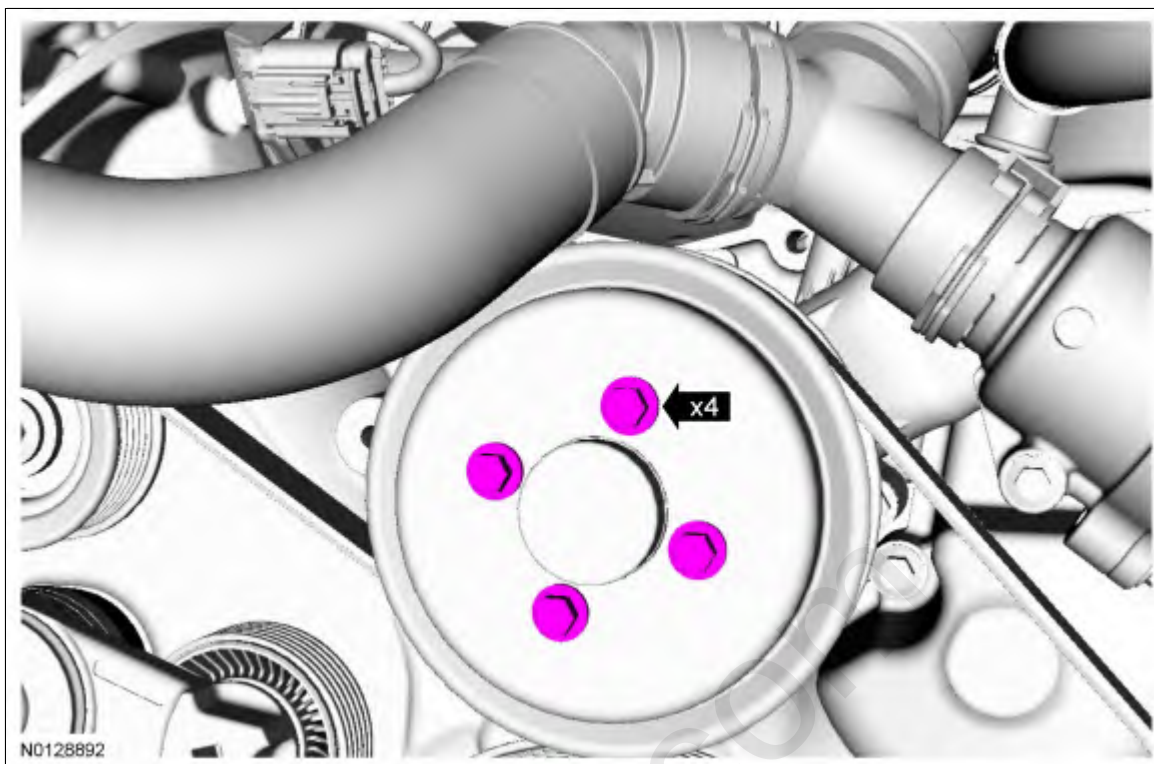
27. Connect the degas coolant hose and clamp.



28. Connect the lower radiator hose and clamp to the thermostat housing assembly.



29. Install the accessory drive and A/C compressor belts. For additional information, refer to [Section 303-05](#).
30. Tighten the 4 coolant pump pulley bolts to 25 Nm (18 lb-ft).



31. Install the RH and LH valve covers. For additional information, refer to [Valve Cover — RH](#) and [Valve Cover — LH](#) in this section.
 32. Fill the crankcase with clean engine oil.
 33. Connect the battery ground cable. For additional information, refer [Section 414-01](#).
 34. Fill and bleed the engine cooling system. For additional information, refer to [Section 303-03](#).
 35. After completing the repairs, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure following the on-screen instructions.
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