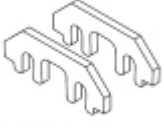


Oil Pump

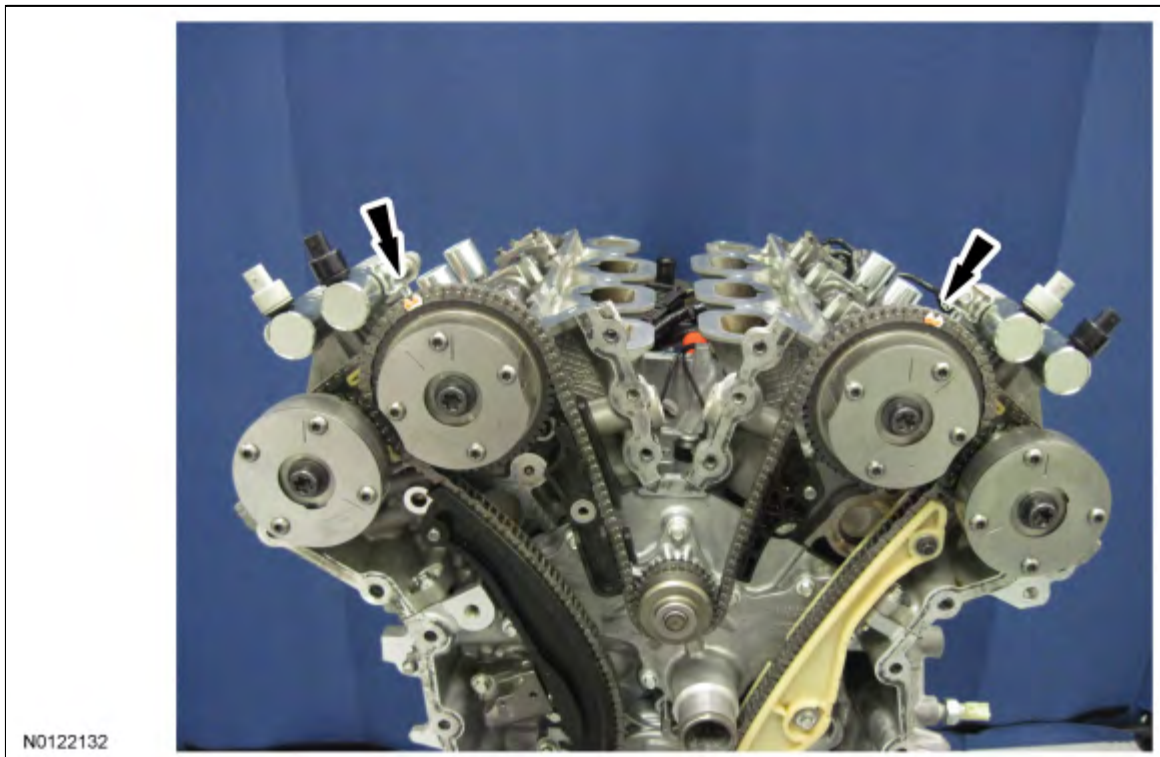
Special Tool(s)

 <p>ST2979-A</p>	Tool, Camshaft Holding 303-1248
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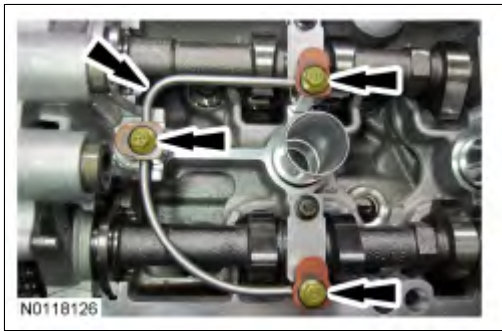
Removal

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

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to [Section 100-02](#).
2. Remove the engine front cover. For additional information, refer to [Engine Front Cover](#) in this section.
3. Rotate the crankshaft clockwise and align the timing marks on the Variable Camshaft Timing (VCT) assemblies as shown.



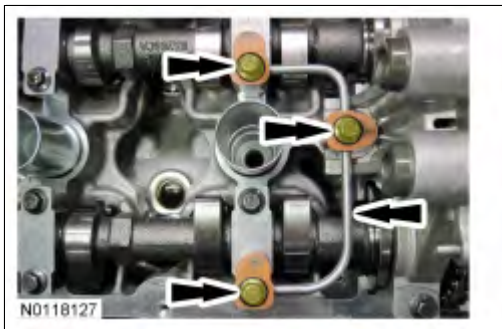
4. Remove the 3 bolts and the LH valve train oil tube.



5. **NOTE:** The Camshaft Holding Tool will hold the camshafts in the Top Dead Center (TDC) position.
Install the Camshaft Holding Tool onto the flats of the LH camshafts.



6. Remove the 3 bolts and the RH valve train oil tube.

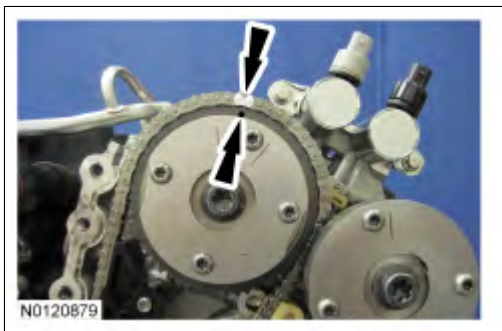


7. **NOTE:** The Camshaft Holding Tool will hold the camshafts in the TDC position.
Install the Camshaft Holding Tool onto the flats of the RH camshafts.

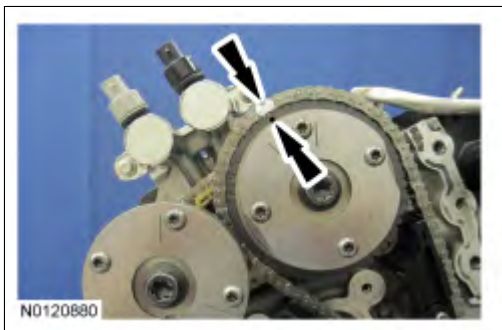


NOTE: The following 3 steps are for primary timing chains that the colored links are not visible.

8. Mark the timing chain link that aligns with the timing mark on the LH intake VCT assembly as shown.



9. Mark the timing chain link that aligns with the timing mark on the RH intake VCT assembly as shown.

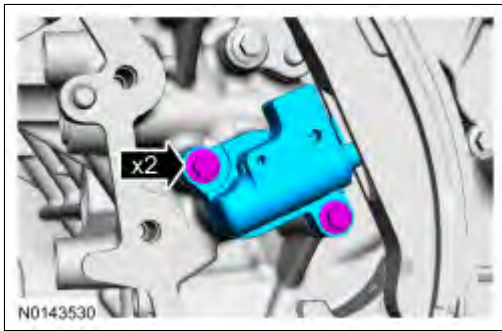


10. **NOTE:** The crankshaft sprocket timing mark should be between the 2 colored links.

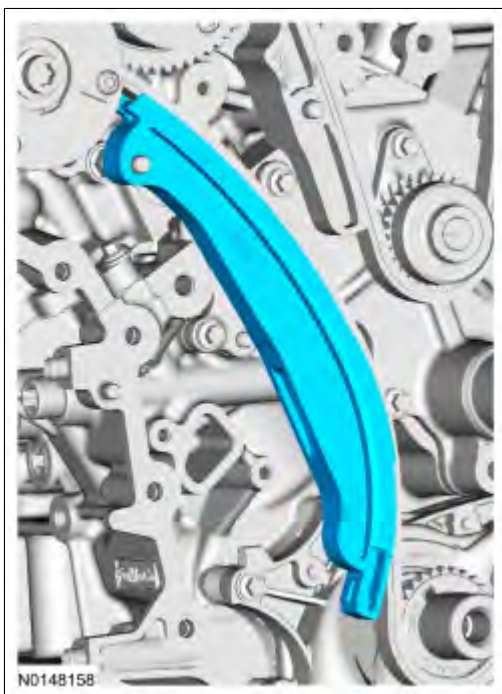
Mark the 2 timing chain links that align with the timing mark on the crankshaft sprocket as shown.



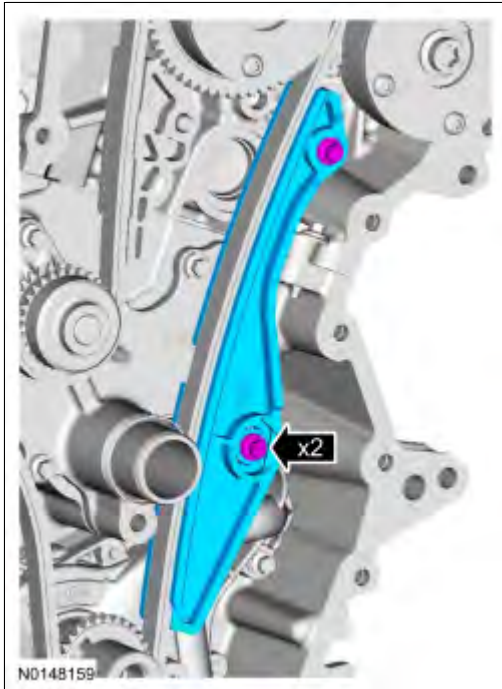
11. Remove the 2 bolts and the primary timing chain tensioner.



12. Remove the primary timing chain tensioner arm.



13. Remove the 2 bolts and the lower LH primary timing chain guide.

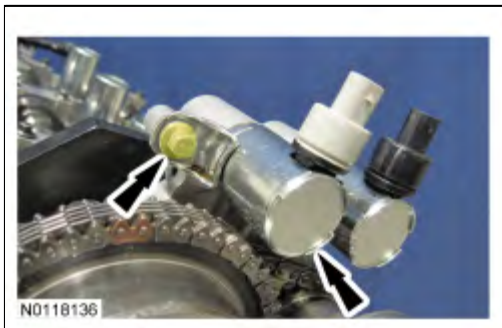


14. **NOTE:** Removal of the VCT oil control solenoid will aid in the removal of the primary timing chain.

NOTE: A slight twisting motion will aid in the removal of the VCT oil control solenoid.

NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

Remove the bolt and the LH intake VCT oil control solenoid.



15. **NOTE:** Removal of the VCT oil control solenoid will aid in the removal of the primary timing chain.

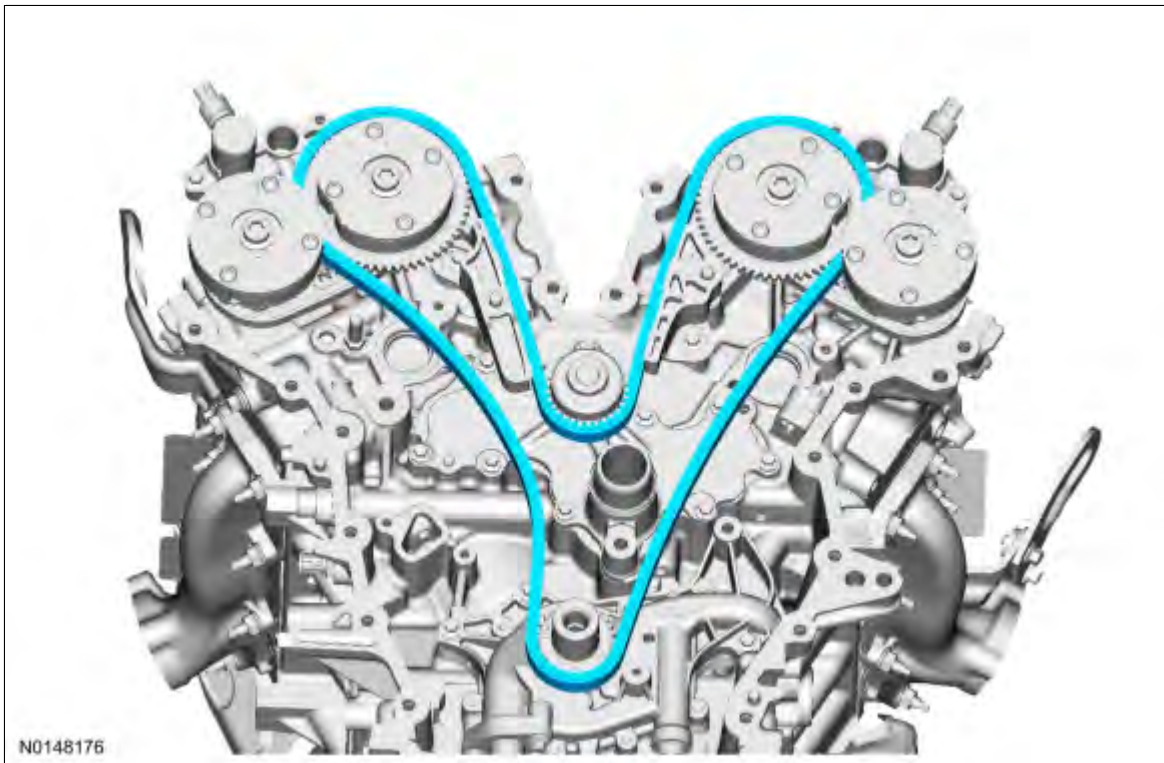
NOTE: A slight twisting motion will aid in the removal of the VCT oil control solenoid.

NOTE: Keep the VCT oil control solenoid clean of dirt and debris.

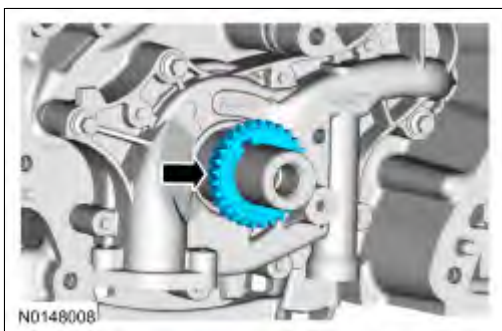
Remove the bolt and the RH intake VCT oil control solenoid.



16. Remove the primary timing chain.



17. Remove the oil pan. For additional information, refer to [Oil Pan](#) in this section.
18. Remove the crankshaft timing chain sprocket.

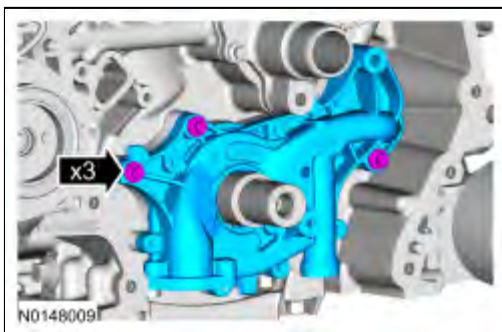


19. Remove the 3 bolts and the oil pump screen and pickup tube.

- Discard the O-ring seal.

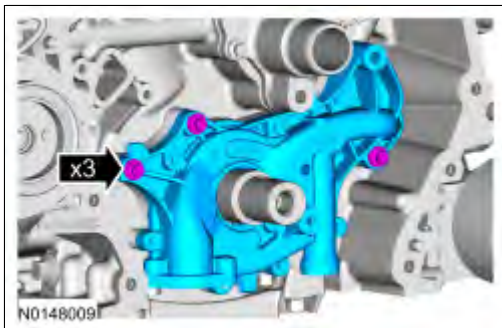


20. Remove the 3 bolts and the oil pump.



Installation

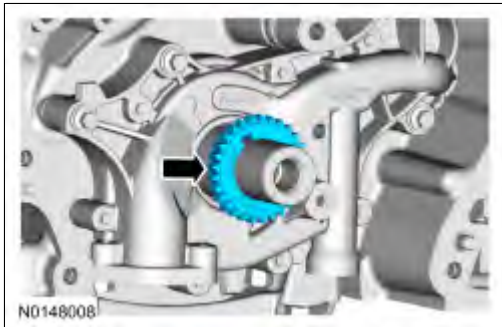
1. Install the oil pump and the 3 bolts.
 - Tighten to 10 Nm (89 lb-in).



2. Using a new O-ring seal, install the oil pump screen and pickup tube and the 3 bolts.
 - Tighten to 10 Nm (89 lb-in).



3. Install the crankshaft timing chain sprocket with timing dot mark out.



4. **NOTE:** Do not fill with clean engine oil until the engine front cover is installed.

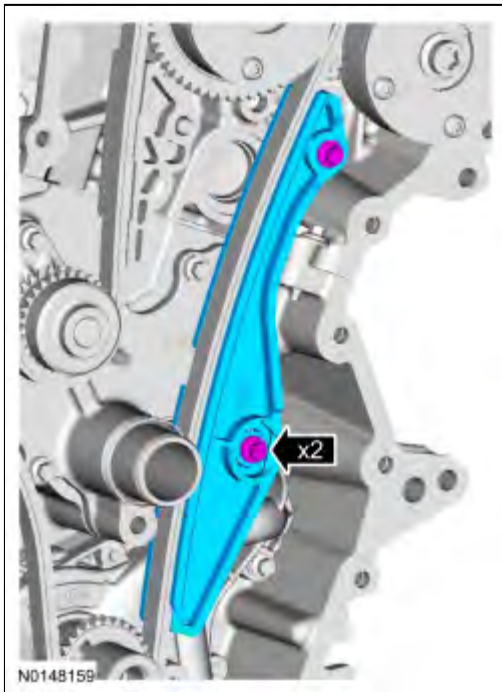
Install the oil pan. For additional information, refer to [Oil Pan](#) in this section.

5. **NOTE:** It may be necessary to rotate the camshafts slightly, to align the timing marks.

Install the primary timing chain with the colored links aligned with the timing marks on the VCT assemblies and the crankshaft sprocket.



6. Install the lower LH primary timing chain guide and the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

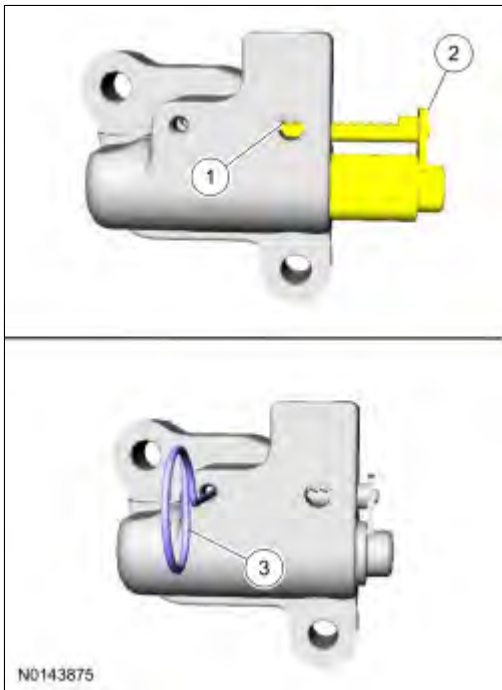


7. Install the primary timing chain tensioner arm.



8. Reset the primary timing chain tensioner.

1. Release the ratchet detent.
2. Using a soft-jawed vise, compress the ratchet plunger.
3. Align the hole in the ratchet plunger with the hole in the tensioner housing and install a suitable lockpin. .



9. **NOTE:** It may be necessary to rotate the camshafts slightly to remove slack from the timing chain to install the tensioner.

Install the primary timing chain tensioner and the 2 bolts.