

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

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

Camshaft — LH

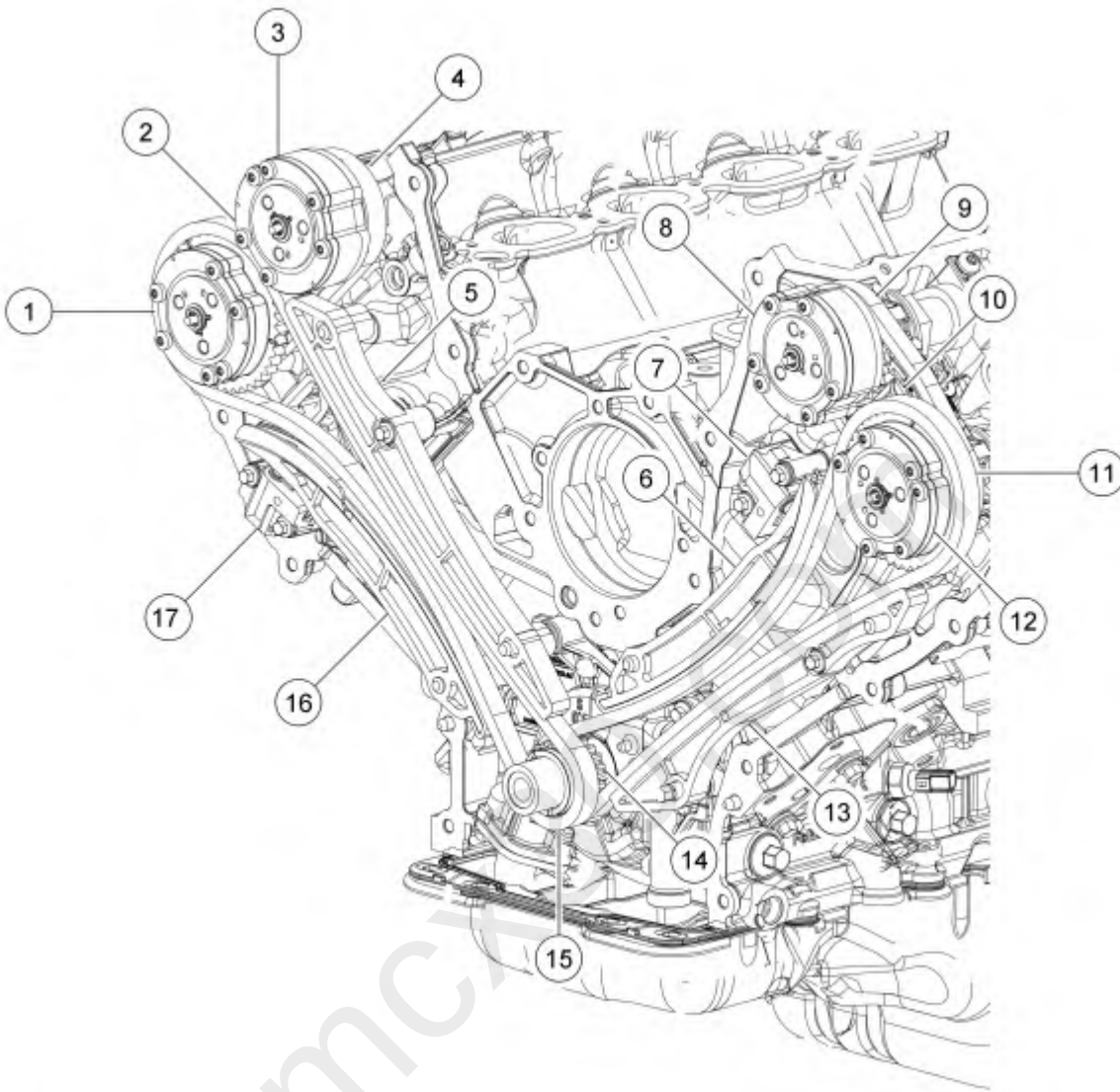
Special Tool(s)

 ST1335-A	Holding Tool, Crankshaft 303-448 (T93P-6303-A)
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Material

Item	Specification
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

Timing Drive Components

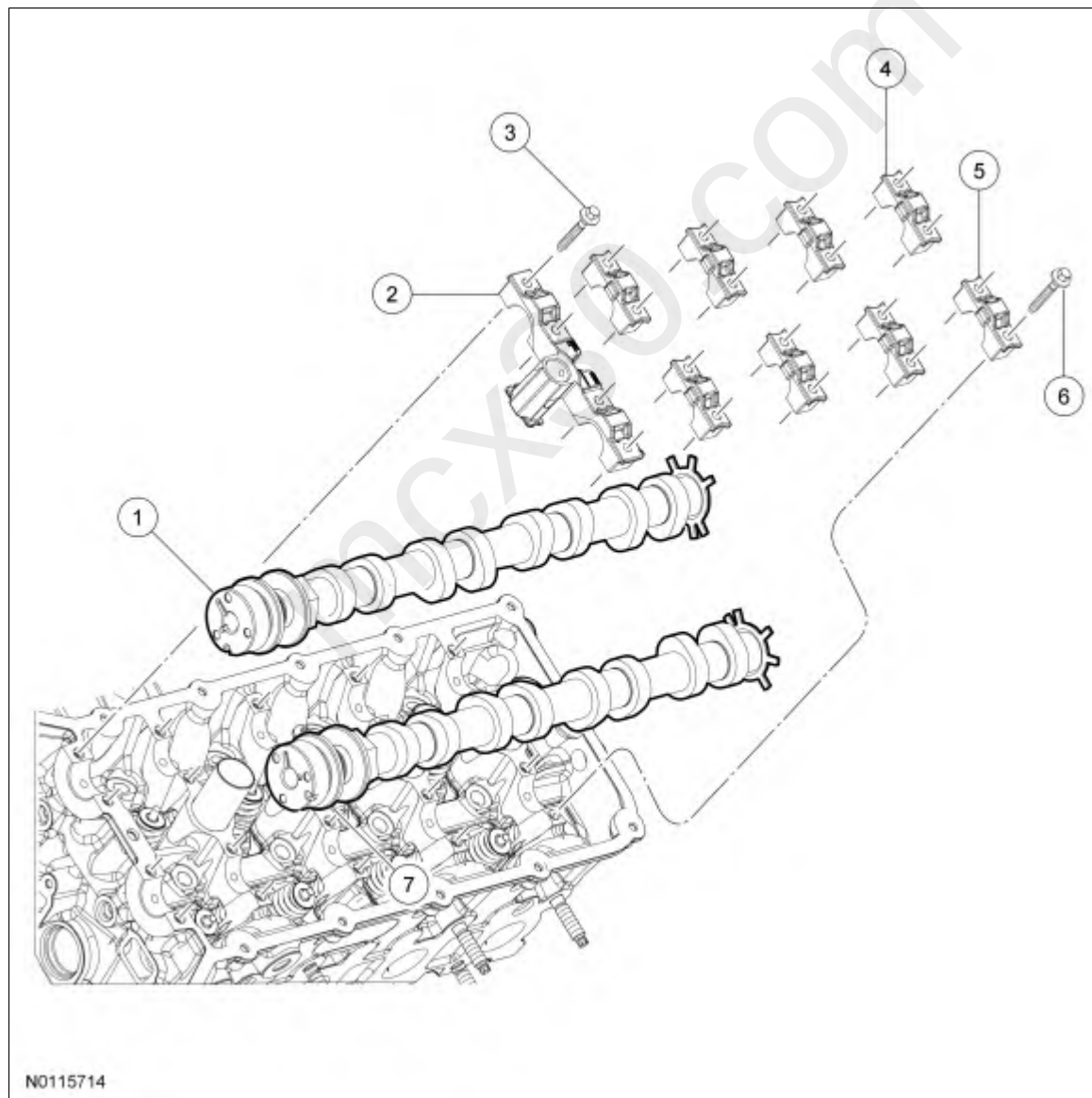


N0115713

Item	Part Number	Description
1	6256	RH exhaust Variable Camshaft Timing (VCT) assembly
2	6K254	RH secondary timing chain tensioner
3	6256	RH intake <u>VCT</u> assembly
4	6268	RH secondary timing chain
5	6M256	RH timing chain guide
6	6K255	LH timing chain tensioner arm
7	6L266	LH primary timing chain tensioner
8	6256	LH intake <u>VCT</u> assembly

9	6268	LH secondary timing chain
10	6K254	LH secondary timing chain tensioner
11	6268	LH primary timing chain
12	6256	LH exhaust VCT_assembly
13	6B274	LH timing chain guide
14	6306	Crankshaft sprocket
15	6268	RH primary timing chain
16	6K255	RH timing chain tensioner arm
17	6L266	RH primary timing chain tensioner

Camshafts



	Part	
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Item	Number	Description
1	6250	LH intake camshaft
2	—	Front camshaft bearing mega cap (part of 6049)
3	N806183	Front camshaft bearing mega cap bolt (4 required)
4	—	Intake camshaft bearing cap (part of 6049) (4 required)
5	—	Exhaust camshaft bearing cap (part of 6049) (4 required)
6	N806183	Intake/exhaust camshaft bearing cap bolt (16 required)
7	6250	LH exhaust camshaft

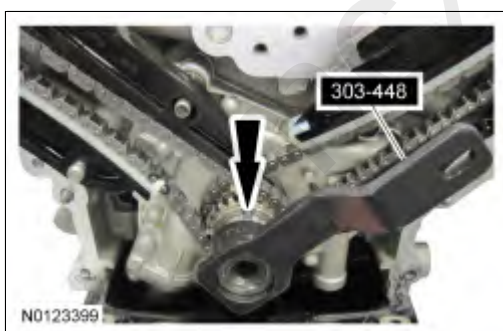
Removal

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, can cause engine failure.

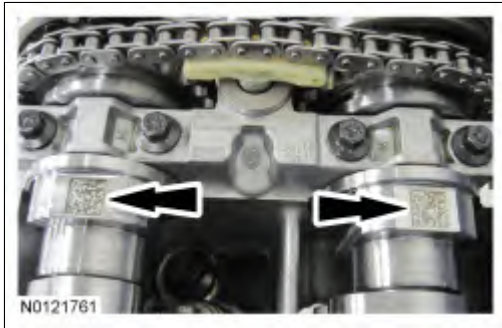
NOTE: If the RH camshafts are being serviced at the same time as the LH camshafts, remove the RH camshafts first. For additional information, refer to [Camshaft — RH](#) in this section.

NOTE: If the components are to be reinstalled, they must be installed in their original location. Mark the components for installation into their original location.

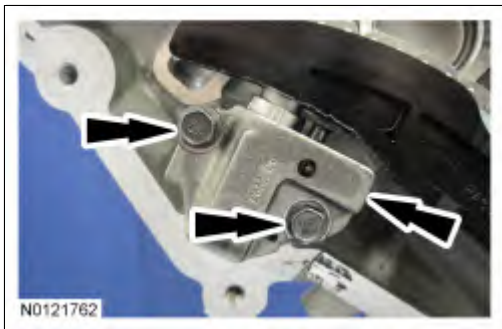
1. Remove the engine front cover. For additional information, refer to [Engine Front Cover](#) in this section.
2. Using the crankshaft holding tool, rotate the crankshaft clockwise until the keyway is at the 12 o'clock position.



3. Verify the data matrix on the camshafts is facing up, if not, rotate the crankshaft clockwise one revolution.



4. Remove the 2 bolts and the RH primary timing chain tensioner.



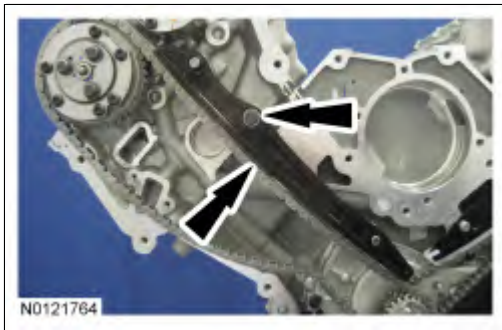
5. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the RH timing chain tensioner arm. Return the crankshaft keyway to the 12 o'clock position after removing the RH timing chain tensioner arm.

Remove the RH timing chain tensioner arm.



6. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the RH timing chain guide. Return the crankshaft keyway to the 12 o'clock position after removing the RH timing chain guide.

Remove the bolt and the RH timing chain guide.



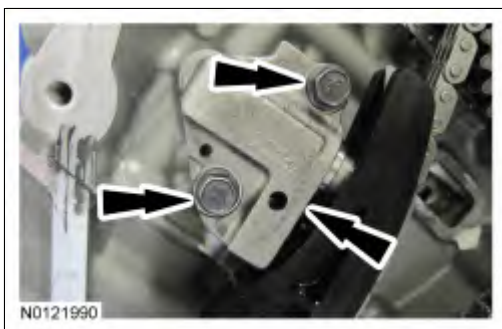
7. Remove the RH primary timing chain.



8. Using the crankshaft holding tool, rotate the crankshaft counterclockwise until the crankshaft keyway is at the 9 o'clock position.



9. Remove the 2 bolts and the LH primary timing chain tensioner.



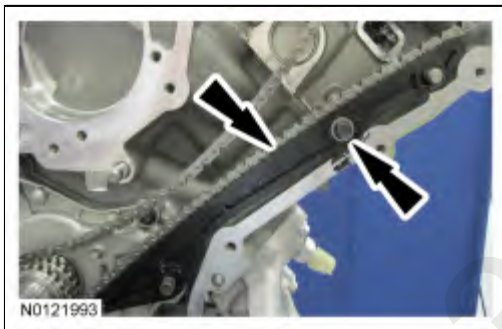
10. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the LH timing chain tensioner arm. Return the crankshaft keyway to the 9 o'clock position after removing the LH timing chain tensioner arm.

Remove the LH timing chain tensioner arm.

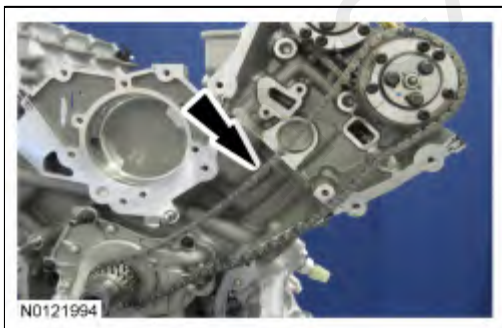


11. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to remove the LH timing chain guide. Return the crankshaft keyway to the 9 o'clock position after removing the LH timing chain guide.

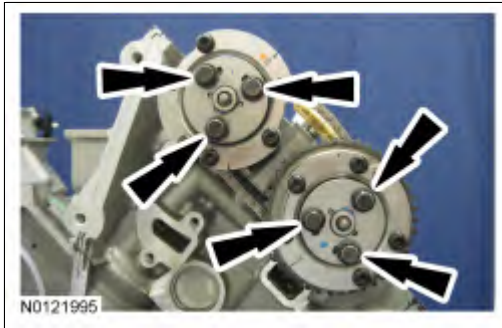
Remove the bolt and the LH timing chain guide.



12. Remove the LH primary timing chain.



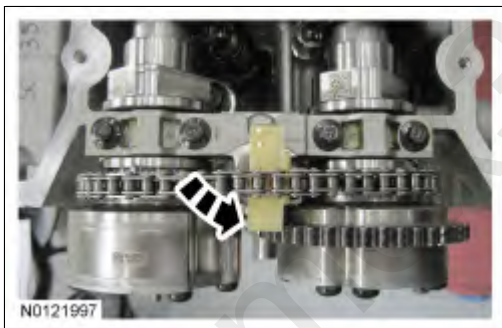
13. Remove the 3 LH intake Variable Camshaft Timing (VCT) assembly bolts and the 3 LH exhaust VCT assembly bolts.



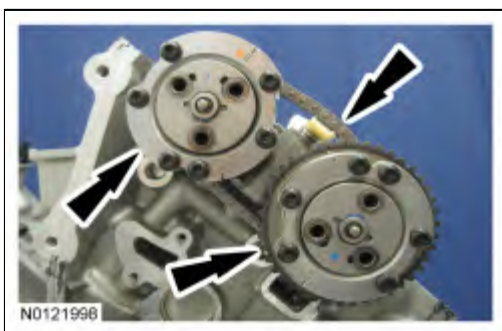
14. Slide the LH VCT assemblies and secondary timing chain forward 2 mm (0.078 in).



15. Depress the LH secondary timing chain tensioner and turn the tensioner 90 degrees.



16. Remove the LH VCT assemblies and the LH secondary timing chain.



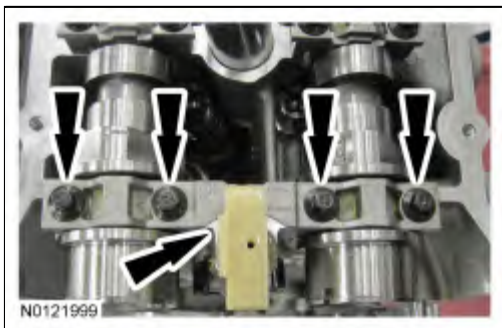
17. **NOTE:** Intake camshaft shown, exhaust camshaft similar.

Remove the VCT system oil filter from the intake and exhaust camshafts.



18. **NOTICE:** The front camshaft bearing mega cap must be removed first and then the remaining camshaft bearing caps. Failure to follow this direction may result in damage to the engine.

Remove the 4 bolts and the LH front camshaft bearing mega cap.



19. Remove the 16 bolts and the 8 camshaft bearing caps.
20. Remove the LH intake and exhaust camshafts.

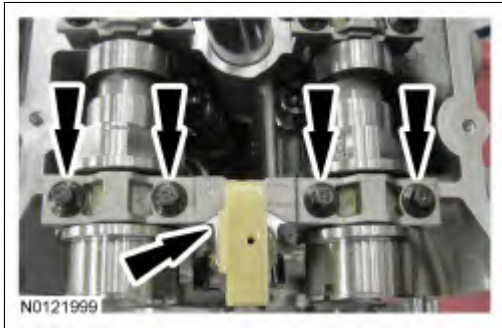
Installation

1. **NOTE:** Lubricate the camshafts with clean engine oil prior to installation.

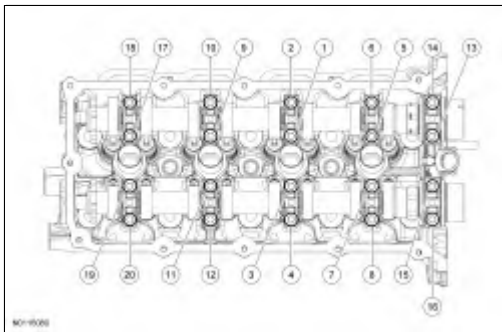
Install the LH intake and exhaust camshafts in the neutral position. Align the D-slots as shown in the illustration.



2. Install the 8 camshaft bearing caps and the 16 bolts. Do not tighten the bolts at this time.
3. Install the LH front camshaft bearing mega cap and the 4 bolts. Do not tighten the bolts at this time.



4. Tighten the bolts in the sequence shown in 2 stages.
 - Stage 1: Tighten to 6 Nm (53 lb-in).
 - Stage 2: Tighten an additional 45 degrees.

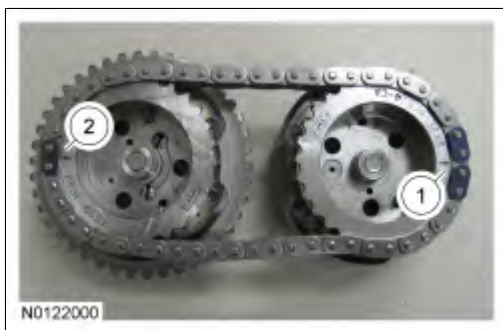


5. **NOTE:** Intake camshaft shown, exhaust camshaft similar.

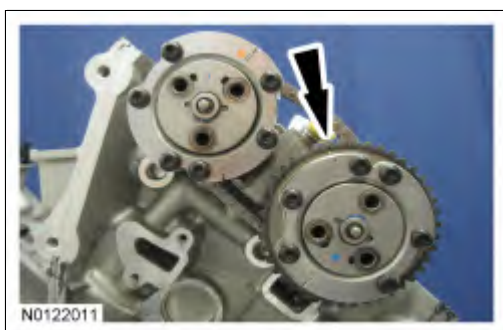
Install the VCT system oil filter in the intake and exhaust camshafts.



6. Install the secondary timing chain onto the LH VCT assemblies. Align the colored links on the secondary timing chain with the timing marks on the VCT assemblies as shown in the illustration.
 1. The timing mark on the intake VCT assembly should align between the 2 consecutive colored links.
 2. The timing mark on the exhaust VCT assembly should align with the single colored link.



7. Install the LH VCT assemblies and the secondary timing chain onto the LH camshafts to a position 2 mm (0.078 in) from fully seated. The timing mark on the exhaust VCT assembly should be in the 11 o'clock position.



8. **NOTE:** It may be necessary to rotate the exhaust camshaft slightly (using a wrench on the flats of the camshaft) to seat the VCT assemblies onto the camshafts.

Rotate the secondary timing chain tensioner 90 degrees so the ramped area is facing forward and fully seat the VCT assemblies onto the camshafts.

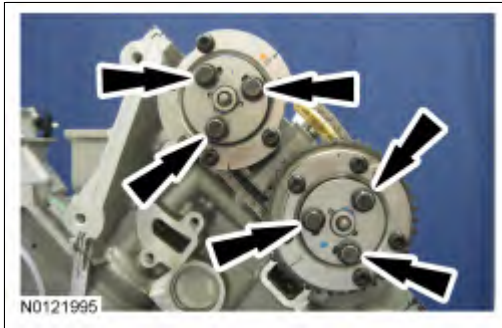
- If the secondary timing chain is not centered over the tensioner, reposition the VCT assemblies until they are fully seated on the camshafts.



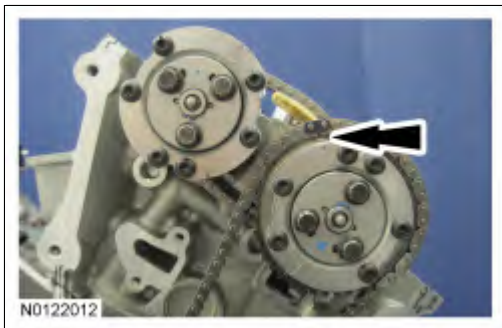
9. **NOTE:** Use a wrench on the flats of the camshaft to hold the camshafts while tightening the VCT assembly bolts.

Install the 3 LH intake VCT assembly bolts and the 3 LH exhaust VCT assembly bolts.

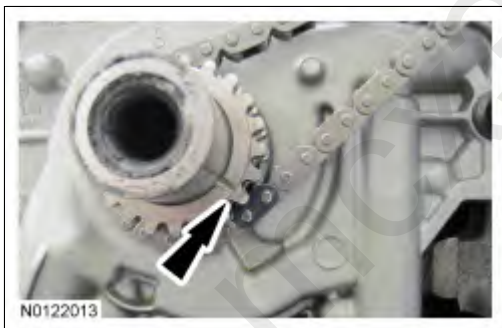
- Tighten to 15 Nm (133 lb-in) plus an additional 90 degrees.



10. Install the LH primary timing chain.
 - Align the colored link on the timing chain with the timing mark on the LH VCT assembly.



11. Align the remaining colored link on the timing chain with the timing mark on the crankshaft sprocket.



12. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the LH timing chain guide. Return the crankshaft keyway to the 9 o'clock position after installing the LH timing chain guide.

Install the LH timing chain guide and bolt.

- Tighten to 10 Nm (89 lb-in).



13. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the LH timing chain tensioner arm. Return the crankshaft keyway to the 9 o'clock position after installing the LH timing chain tensioner arm.

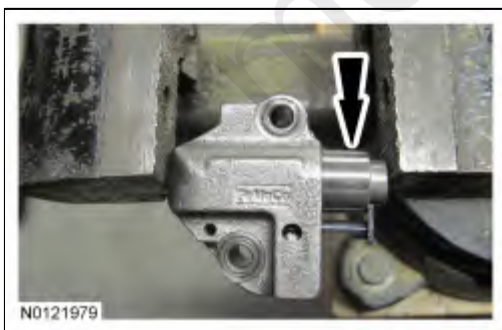
Install the LH timing chain tensioner arm.



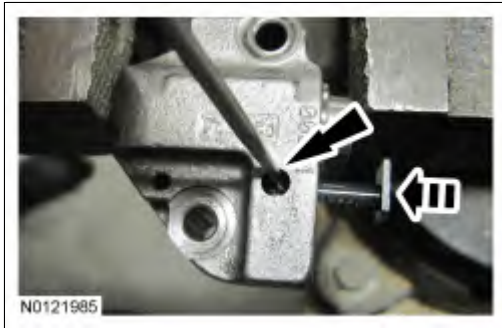
NOTE: Complete the following 3 steps on both the LH and RH primary timing chain tensioners.

14. **NOTICE:** Do not compress the ratchet assembly or damage to the tensioner will occur.

Compress the primary timing chain tensioner plunger, using an edge of a vise.



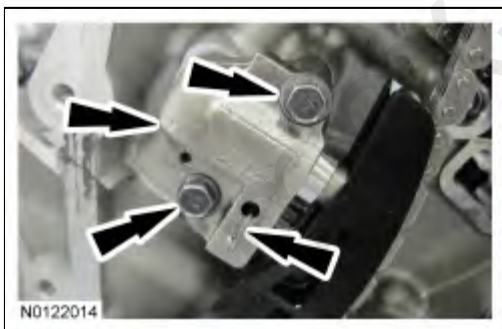
15. Using a small screwdriver or pick, push back and hold the ratchet mechanism, then push the ratchet arm back into the tensioner housing.



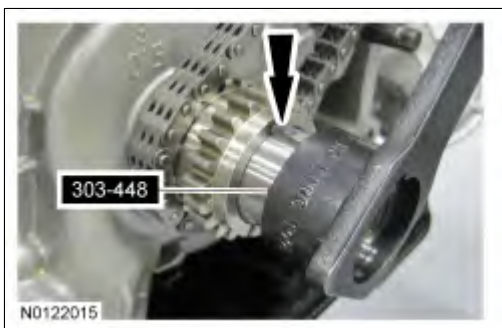
16. Install a suitable pin into the hole of the tensioner housing to hold the ratchet assembly and plunger in place during installation.



17. Install the LH primary timing chain tensioner and 2 bolts.
- Tighten to 10 Nm (89 lb-in).
 - Remove the holding pin from the tensioner.



18. Using the crankshaft holding tool, rotate the crankshaft clockwise until the crankshaft keyway is at the 12 o'clock position.



19. Install the RH primary timing chain.
- Align the colored link on the timing chain with the timing mark on the RH VCT assembly.



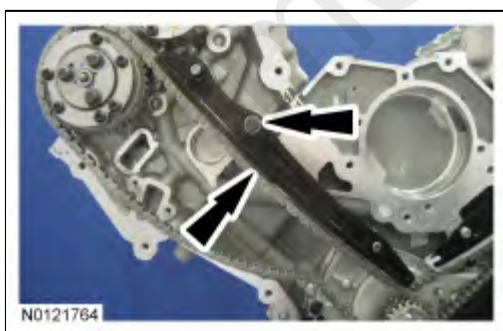
20. Align the remaining colored link on the timing chain with the timing mark on the crankshaft sprocket.



21. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the RH timing chain guide. Return the crankshaft keyway to the 12 o'clock position after installing the RH timing chain guide.

Install the RH timing chain guide and bolt.

- Tighten to 10 Nm (89 lb-in).



22. **NOTE:** It may be necessary to rotate the crankshaft slightly to provide enough slack in the chain to install the RH timing chain tensioner arm. Return the crankshaft keyway to the 12 o'clock position after installing the RH timing chain tensioner arm.

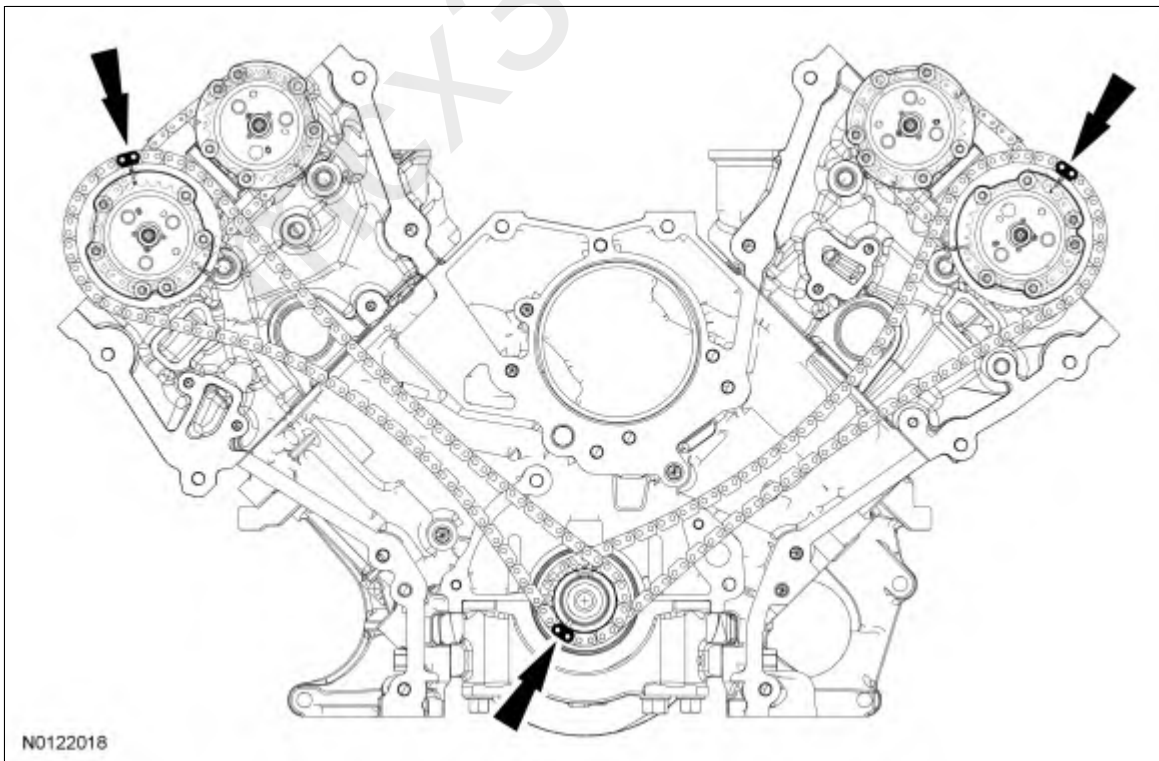
Install the RH timing chain tensioner arm.



23. Install the RH primary timing chain tensioner and 2 bolts.
- Tighten to 10 Nm (89 lb-in).
 - Remove the holding pin from the tensioner.



24. With the crankshaft keyway still at the 12 o'clock position, verify the timing mark alignment is correct.



25. Install the engine front cover. For additional information, refer to [Engine Front Cover](#) in this section.

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