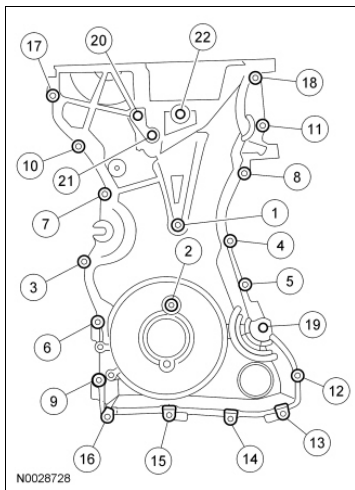


3. Install the engine front cover. Tighten the bolts in the sequence shown, to the following specifications:

- Tighten the 8-mm bolts to 10 Nm (89 lb-in).
- Tighten the 13-mm bolts to 48 Nm (35 lb-ft).



4. Install the accessory drive idler pulley. For additional information, refer to [Section 303-05](#) .

5. Lower the engine to the installed position.

6. Install the engine mount. For additional information, refer to [Engine Mount](#) in this section.

7. Install the power steering pump. For additional information, refer to [Section 211-02](#) .

8. Install the coolant expansion tank. For additional information, refer to [Section 303-03](#) .

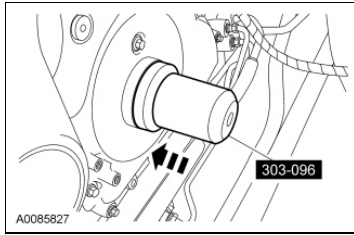
9. Install the coolant pump pulley and the 3 bolts.

- Do not tighten at this time.

10. **NOTE:** Remove the through-bolt from the Camshaft Front Oil Seal Installer.

**NOTE:** Lubricate the oil seal with clean engine oil.

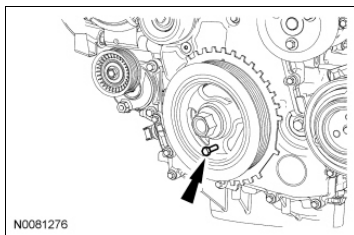
Using the Camshaft Front Oil Seal Installer, install the crankshaft front oil seal.



11. Install the crankshaft pulley. For additional information, refer to Crankshaft Pulley in this section.

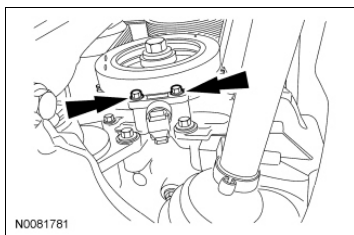
12. **NOTICE:** Only hand-tighten the bolt or damage to the front cover can occur.

Install a standard 6 mm x 18 mm bolt through the crankshaft pulley and thread it into the front cover.



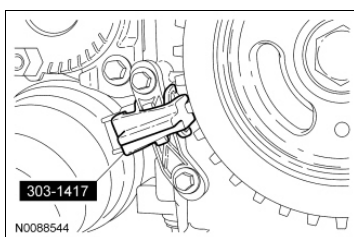
13. Install the CKP sensor and the 2 bolts.

- Do not tighten the bolts at this time.



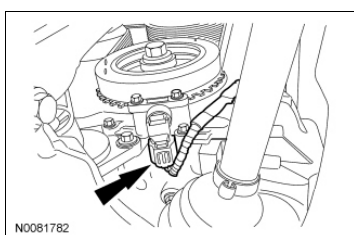
14. Using the Crankshaft Sensor Aligner, adjust the CKP sensor.

- Tighten the 2 bolts to 7 Nm (62 lb-in).

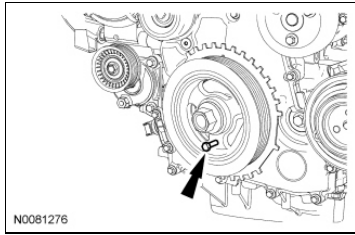


15. Connect the CKP sensor electrical connector.

- Attach the 2 wiring harness retainers to the engine front cover.



16. Remove the 6 mm x 18 mm bolt.



17. Tighten the coolant pump pulley bolts.
    - Tighten to 20 Nm (177 lb-in).
  18. Repower the SRS . For additional information, refer to [Section 501-20B](#) .
  19. Fill the power steering system. For additional information, refer to [Section 211-00](#) .
-

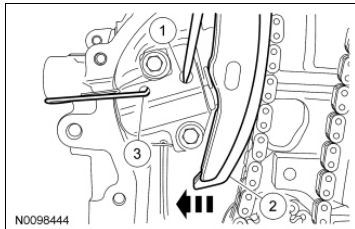
## Timing Drive Components

### Removal

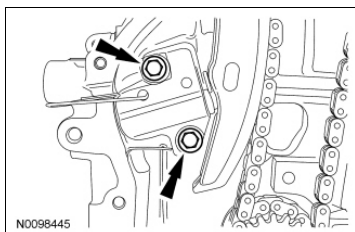
**NOTICE:** Do not loosen or remove the crankshaft pulley bolt without first installing the special tools as instructed in this procedure. The crankshaft pulley and the crankshaft timing sprocket are not keyed to the crankshaft. The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. 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. 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.

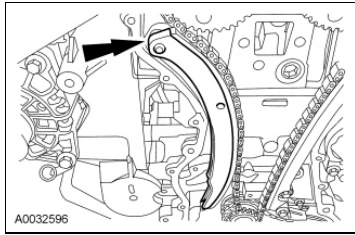
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to [Section 100-02](#).
2. Remove the engine front cover. For additional information, refer to [Engine Front Cover](#) in this section.
3. Compress the timing chain tensioner in the following sequence.
  1. Using a small pick, release and hold the ratchet mechanism.
  2. While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.
  3. Insert a paper clip into the hole to retain the tensioner.



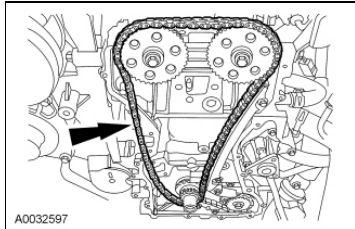
4. Remove the 2 bolts and the timing chain tensioner.



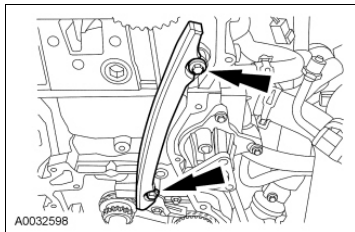
5. Remove the RH timing chain guide.



6. Remove the timing chain.



7. Remove the bolts and the LH timing chain guide.

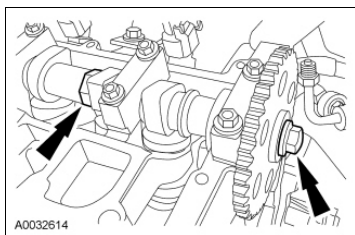


8. **NOTICE:** Do not rely on the Camshaft Alignment Plate to prevent camshaft rotation. Damage to the tool or the camshaft can occur.

**NOTE:** Intake camshaft drive gear shown, exhaust camshaft drive gear similar.

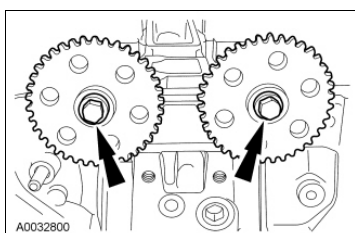
Remove the bolts and the camshaft drive gears.

- Use the flats on the camshaft to prevent camshaft rotation.

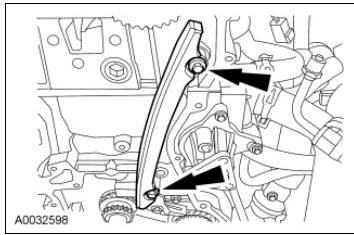


## Installation

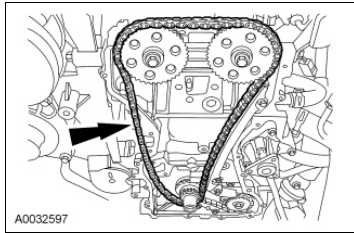
1. Install the camshaft drive gears and the bolts. Do not tighten the bolts at this time.



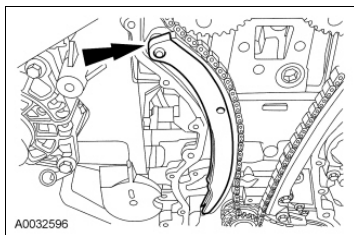
2. Install the LH timing chain guide and bolts.
  - Tighten to 10 Nm (89 lb-in).



3. Install the timing chain.



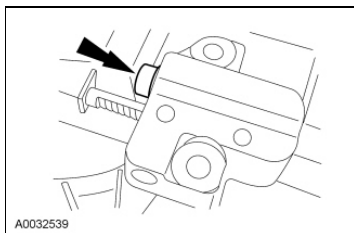
4. Install the RH timing chain guide.



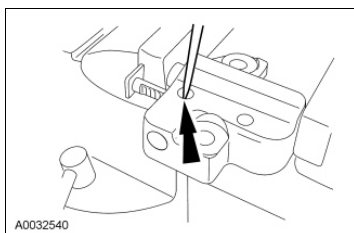
**NOTE:** If the timing chain tensioner plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

5. **NOTICE:** Do not compress the ratchet assembly. This will damage the ratchet assembly.

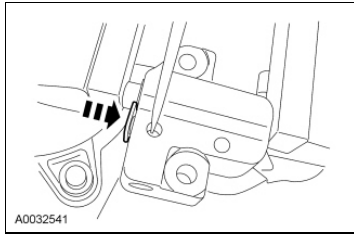
Using the edge of a vise, compress the timing chain tensioner plunger.



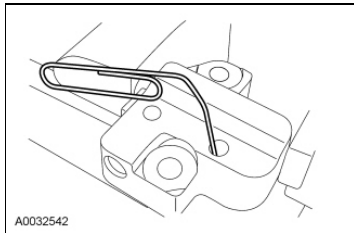
6. Using a small pick, push back and hold the ratchet mechanism.



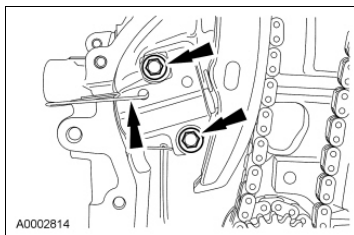
7. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.



8. Install a paper clip into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.



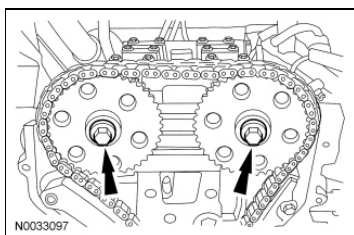
9. Install the timing chain tensioner and the 2 bolts.
  - Tighten to 10 Nm (89 lb-in).
  - Remove the paper clip to release the piston.



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

Using the flats on the camshafts to prevent camshaft rotation, tighten the camshaft drive gear bolts.

- Tighten to 72 Nm (53 lb-ft).





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





**Camshafts**

## Special Tool(s)

 ST2645-A	Alignment Plate, Camshaft 303-465 (T94P-6256-CH)
 ST2638-A	Timing Peg, Crankshaft TDC 303-507

## General Equipment

6 mm x 18 mm bolt
M6 x 30 mm bolt

## 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
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

**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.

**NOTICE:** Do not rotate the camshafts unless instructed to in this procedure. Rotating the camshafts or crankshaft with timing components loosened or removed can cause serious damage to the valves and pistons.

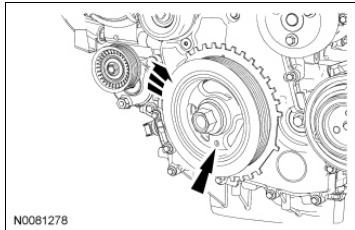
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to [Section 100-02](#) .
2. Remove the coolant expansion tank. For additional information, refer to [Section 303-03](#) .
3. Remove the RF wheel and tire. For additional information, refer to [Section 204-04](#) .
4. Check the valve clearance. For additional information, refer to [Valve Clearance Check](#) in this section.

5. Remove the accessory drivebelt. For additional information, refer to [Section 303-05](#) .

6. **NOTICE:** Failure to position the No. 1 piston at Top Dead Center (TDC) can result in damage to the engine. Turn the engine in the normal direction of rotation only.

Using the crankshaft pulley bolt, turn the crankshaft clockwise to position the No. 1 piston at Top Dead Center (TDC).

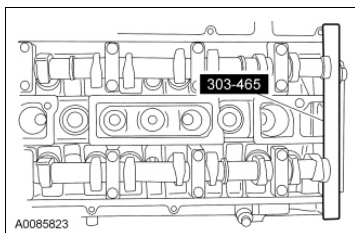
- The hole in the crankshaft pulley should be in the 6 o'clock position.



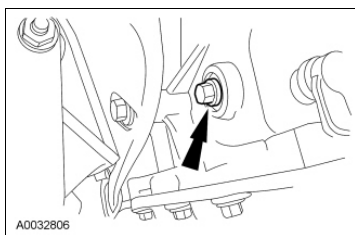
7. **NOTICE:** The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

**NOTE:** The camshaft timing slots are offset. If the Camshaft Alignment Plate cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.

Install the Camshaft Alignment Plate in the slots on the rear of both camshafts.

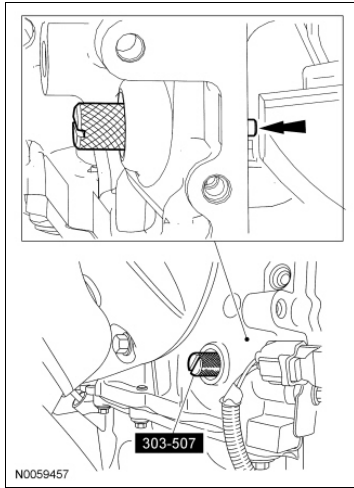


8. Remove the engine plug bolt.



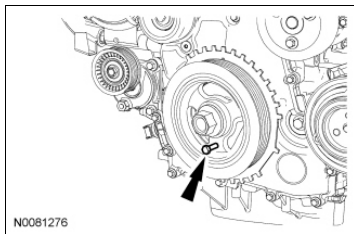
9. **NOTE:** The Crankshaft TDC Timing Peg will contact the crankshaft and prevent it from turning past TDC . However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain at the TDC position during the camshaft removal and installation.

Install the Crankshaft TDC Timing Peg.

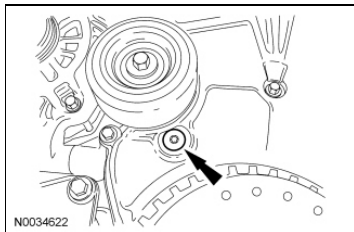


10. **NOTICE:** Only hand-tighten the bolt or damage to the front cover can occur.

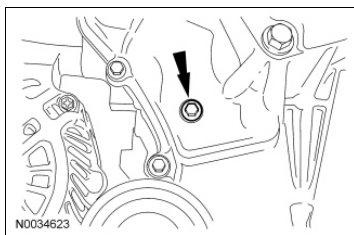
Install a standard 6 mm x 18 mm bolt through the crankshaft pulley and thread it into the front cover.



11. Remove the front cover lower timing hole plug from the engine front cover.



12. Remove the front cover upper timing hole plug from the engine front cover.



13. Reposition the Camshaft Alignment Plate to the slot on the rear of the intake camshaft only.

