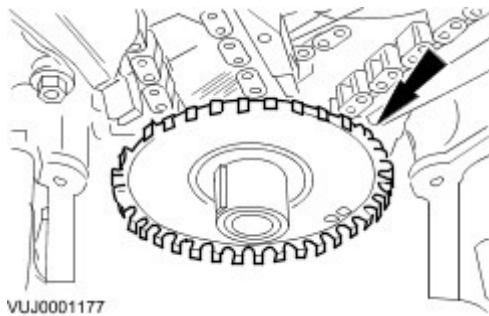



# Timing Drive Components (12.65.13)

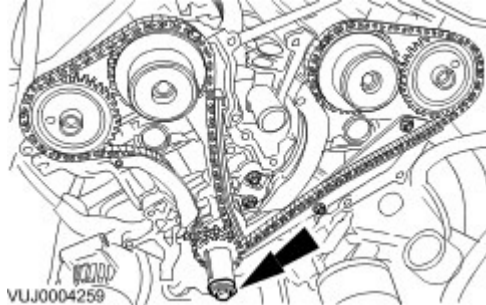
## Removal


- 1 . Remove the engine front cover. For additional information, refer to  
For additional information, refer to .
- 2 . Remove the spark plugs.
- 3 . Remove the crankshaft position (CKP) sensor pulse wheel.



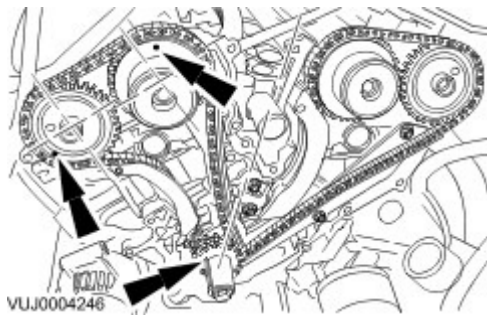
- 4 .  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

Install the crankshaft pulley retaining bolt and washer.

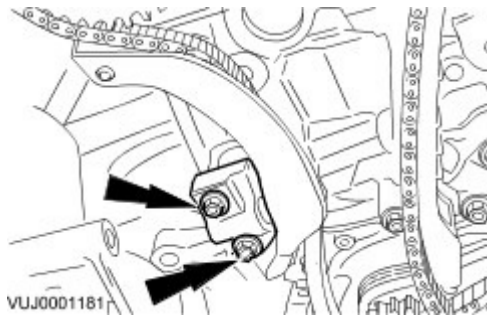


- 5 .  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

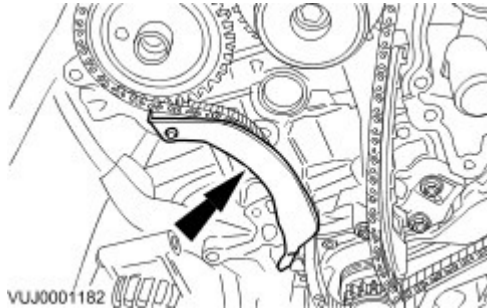
Rotate the crankshaft clockwise until the crankshaft keyway is at the 7 O'clock position, the alignment mark on the right-hand intake camshaft sprocket is at the 1 O'clock position and the alignment mark on the right-hand exhaust camshaft sprocket is at the 8 O'clock position.



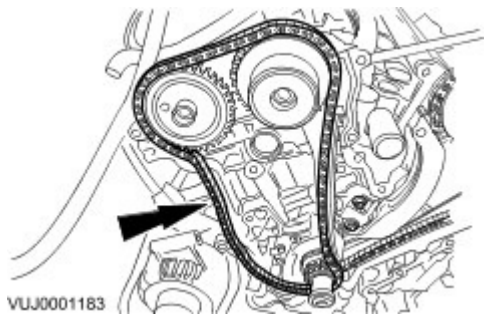
6 . Remove the right-hand timing chain tensioner.



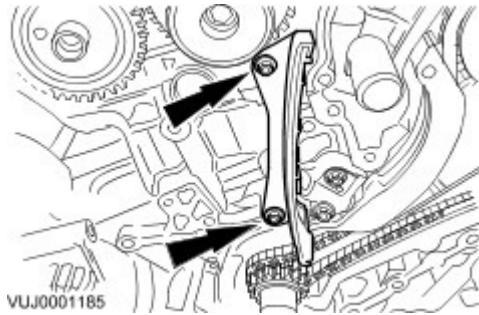
7 . Remove the right-hand timing chain outer guide.




8 . Remove the right-hand timing chain.

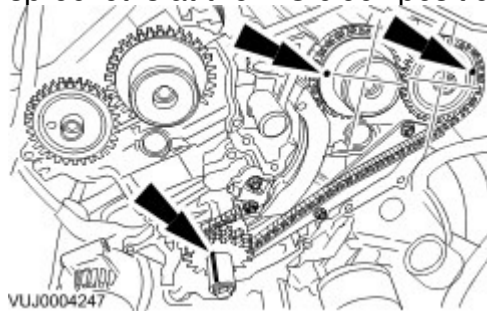



9 . Remove the right-hand timing chain inner guide.



10.  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

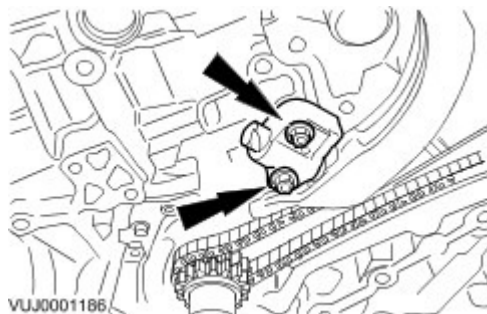
Rotate the crankshaft clockwise until the crankshaft keyway is at the 11 O'clock position, the alignment mark on the left-hand intake camshaft sprocket is at the 9 O'clock position and the alignment mark on the left-hand exhaust camshaft sprocket is at the 2 O'clock position.



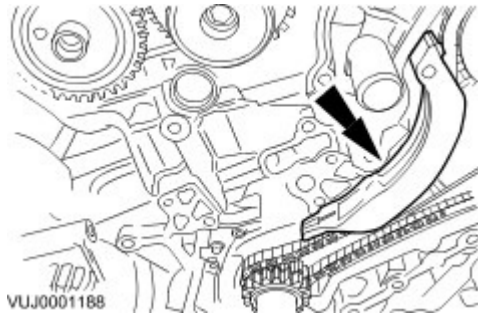
11.  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

Remove the crankshaft pulley retaining bolt and washer.

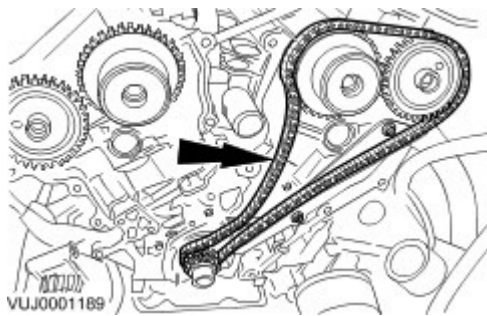
12. Remove the left-hand timing chain tensioner.



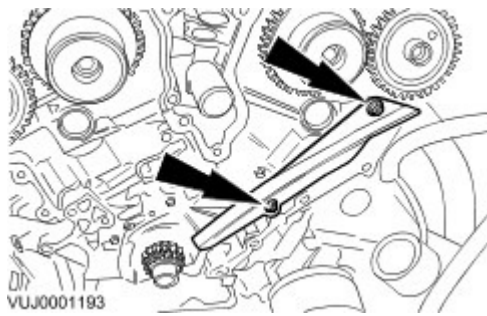
13 . Remove the left-hand timing chain inner guide.



14 . Remove the left-hand timing chain.



15 . Remove the left-hand timing chain outer guide.

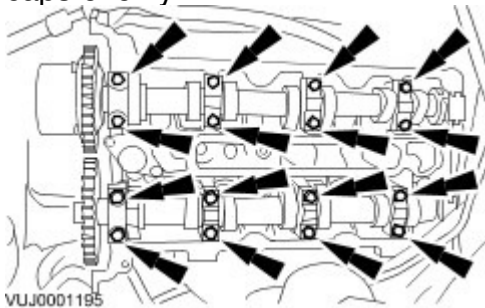


16 . Remove the crankshaft sprocket.

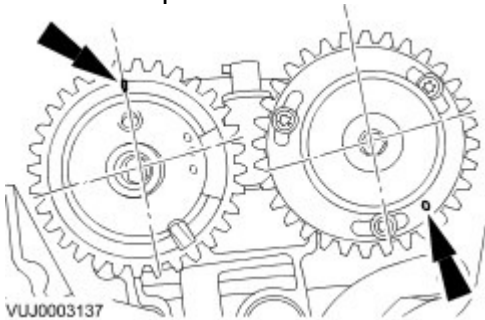



## Installation

1. Remove the right-hand intake camshaft and right-hand exhaust camshaft bearing caps evenly.



2. Rotate the right-hand intake camshaft clockwise until the camshaft sprocket alignment mark is at the 5 O'clock position and rotate the right-hand exhaust camshaft sprocket clockwise until the camshaft sprocket alignment mark is at the 12 O'clock position.



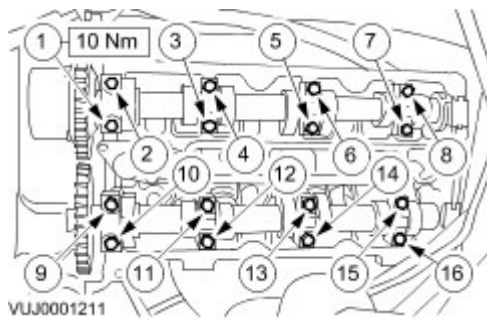
3.  **CAUTION : Do not install the cylinder head camshaft journal thrust caps until the camshaft journal caps are installed or damage to the thrust caps may occur.**

### NOTE :

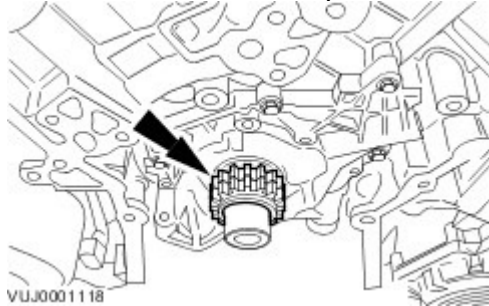
Lubricate the camshafts and the camshaft bearing caps with oil ESR-M99C80-A or equivalent meeting Jaguar specification prior to installation.

Install the right-hand intake camshaft and right-hand exhaust camshaft bearing caps in their original position.

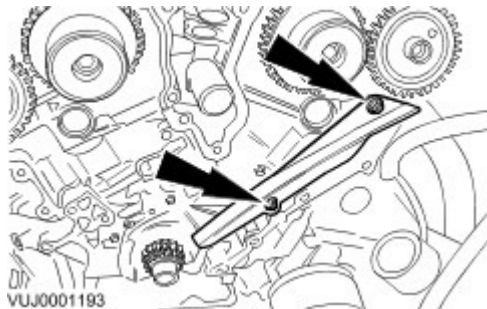
- Install the camshaft bearing cap retaining bolts evenly.
- Tighten the retaining bolts in the sequence shown to 10 Nm.





- 4 . Install the crankshaft sprocket.



- 5 . Install the left-hand timing chain outer guide.  
 ► Tighten to 25 Nm.



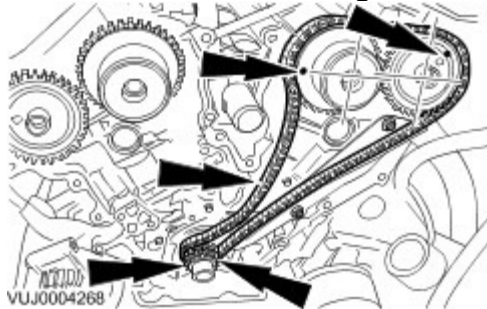
- 6 .  **CAUTION** : Make sure the crankshaft keyway is at the 11 O'clock position, the alignment mark on the left-hand intake camshaft sprocket is at the 9 O'clock position and the alignment mark on the left-hand exhaust camshaft sprocket is at the 2 O'clock position.

-  **CAUTION** : Make sure the timing chain alignment marks are correctly positioned to the crankshaft sprocket and camshaft sprocket alignment marks.

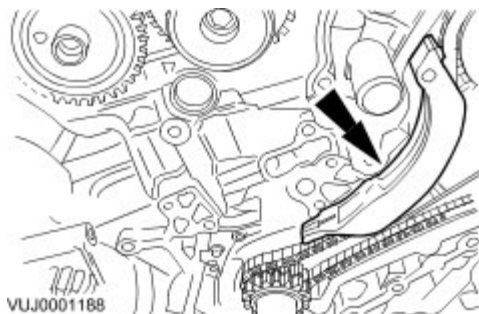


**CAUTION : Make sure the timing chain slack is on the tensioned side of the timing chain.**

Install the left-hand timing chain.

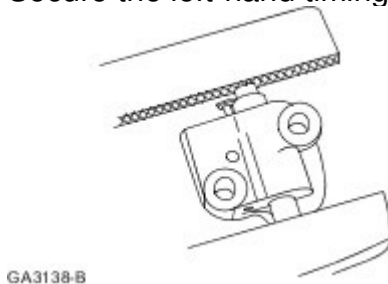


7. Install the left-hand timing chain inner guide.



**CAUTION : Use suitable protective covers on the vice jaws to protect the timing chain tensioner.**

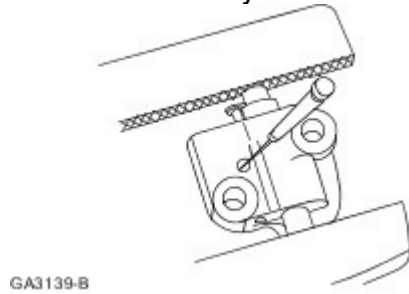
Secure the left-hand timing chain tensioner in the vice jaws.



**CAUTION : During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.**



Using a suitable tool, hold the left-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



10 . **NOTE :**

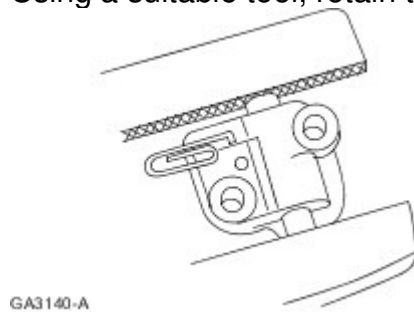
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the left-hand timing chain tensioner.

11 . **NOTE :**

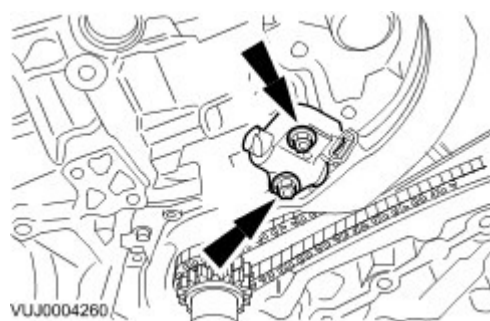
The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

Using a suitable tool, retain the left-hand timing chain tensioner piston.



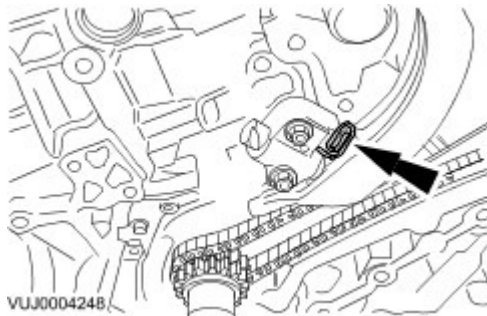
12 . Install the left-hand timing chain tensioner.

▶ Tighten to 25 Nm.

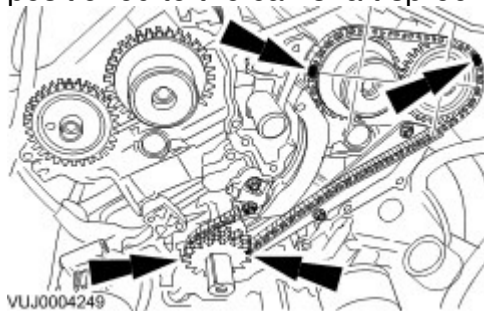





- 13 . Release the tension in the left-hand timing chain tensioner.  
 ➤ Remove the retaining tool.




- 14 . Make sure the left-hand timing chain alignment marks have remained correctly positioned to the camshaft sprocket and crankshaft sprocket alignment marks.

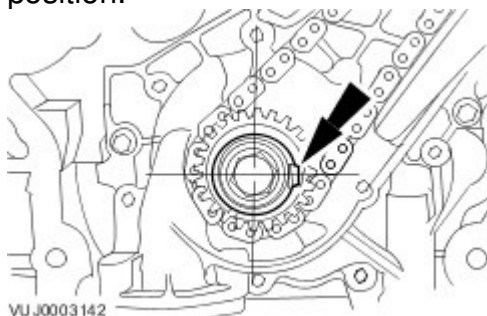


- 15 .  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

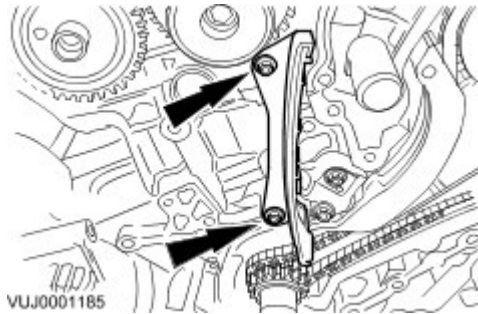
Install the crankshaft pulley retaining bolt and washer.


- 16 .  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

Rotate the crankshaft clockwise until the crankshaft keyway is at the 3 O'clock position.




- 17 . Install the right-hand timing chain inner guide.  
▶ Tighten to 25 Nm.

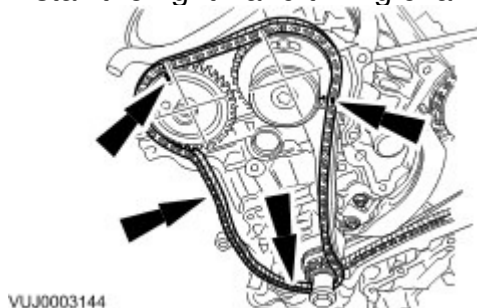


- 18 .  **CAUTION : Make sure the crankshaft keyway is at the 3 O'clock position, the alignment mark on the right-hand intake camshaft sprocket is at the 5 O'clock position and the alignment mark on the right-hand exhaust camshaft sprocket is at the 12 O'clock position.**

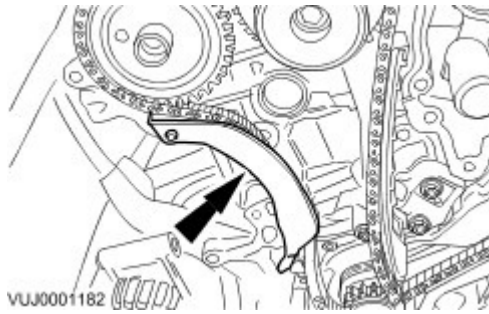
 **CAUTION : Make sure the timing chain alignment marks are correctly positioned to the crankshaft sprocket and camshaft sprocket alignment marks.**

 **CAUTION : Make sure the timing chain slack is on the tensioned side of the timing chain.**

Install the right-hand timing chain.

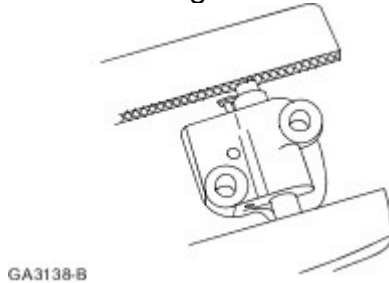



- 19 . Install the right-hand timing chain outer guide.



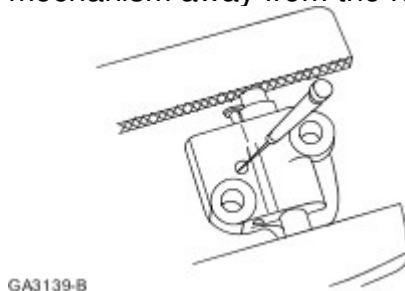
- 20 .  **CAUTION :** Use suitable protective covers on the vice jaws to protect the timing chain tensioner.

Secure the right-hand timing chain tensioner in the vice jaws.



- 21 .  **CAUTION :** During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Using a suitable tool, hold the right-hand timing chain tensioner ratchet lock mechanism away from the ratchet stem.



- 22 . **NOTE :**

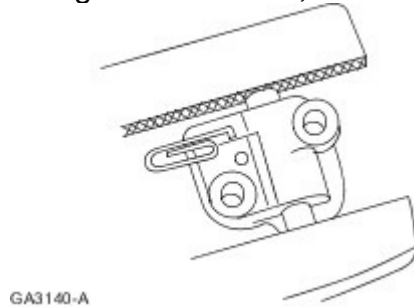
The timing chain tensioner piston should retract with minimal force. If binding occurs, reposition the timing chain tensioner to eliminate side loading.

Slowly compress the right-hand timing chain tensioner.

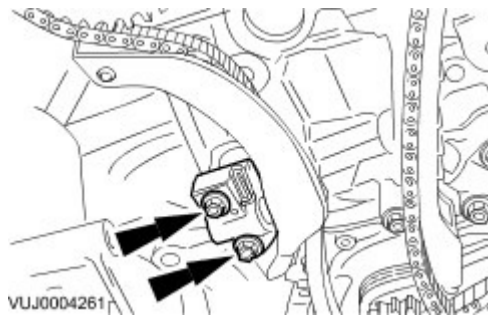
**23 . NOTE :**

The retaining tool must remain in the timing chain tensioner until the timing chain tensioner is installed to the engine with the piston bottomed in the bore.

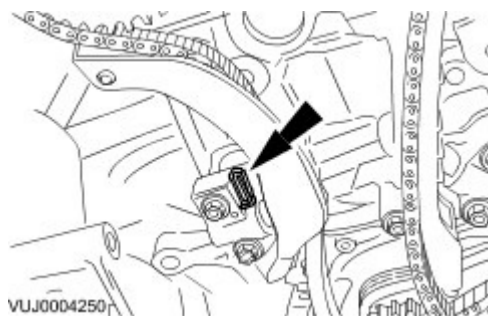
Using a suitable tool, retain the right-hand timing chain tensioner piston.

**24 . Install the right-hand timing chain tensioner.**

▶ Tighten to 25 Nm.

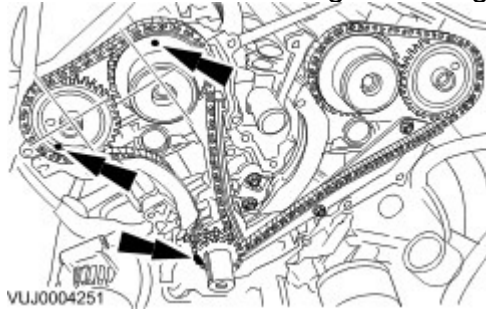
**25 . Release the tension in the right-hand timing chain tensioner.**


▶ Remove the retaining tool.

**26 .**

**CAUTION : Make sure the right-hand timing chain alignment marks have remained correctly positioned to the camshaft sprocket and crankshaft sprocket alignment marks.**

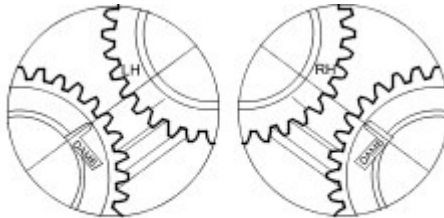
Make sure all the timing chain alignment marks are in the positions shown.




27.  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

Check the engine valve timing is correctly set.

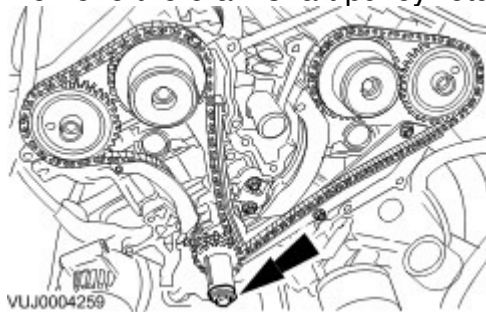
- ▶ Rotate the crankshaft two complete turns clockwise. Make sure the alignment marks on the rear of the camshaft sprockets are in line when the crankshaft keyway is at the 11 O'clock position.



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28.  **CAUTION : Do not rotate the crankshaft counterclockwise. The timing chains may bind causing engine damage.**

Remove the crankshaft pulley retaining bolt and washer.

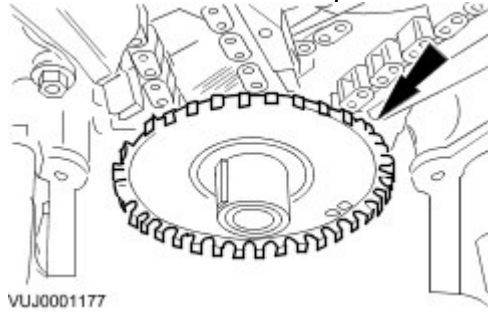


29. **NOTE :**

Make sure the CKP sensor pulse wheel is correctly installed with the teeth

pointing outwards.

Install the CKP sensor pulse wheel.



30 . Install the spark plugs.

▶ Tighten to 15 Nm.

31 . Install the engine front cover. For additional information, refer to

For additional information, refer to .