

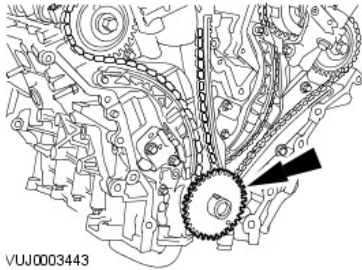
Engine - Timing Drive Components

In-vehicle Repair

Removal

1. Remove the engine front cover.
For additional information, refer to: [Engine Front Cover](#) (303-01 Engine, In-vehicle Repair).
2. Remove the spark plugs.
3. **NOTE:** Note the position of the crankshaft position (CKP) sensor pulse wheel during removal. It must be returned to its original position during installation.

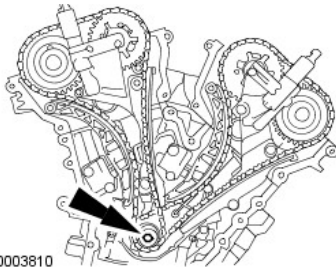
Remove the crankshaft position (CKP) sensor pulse wheel.



VUJ0003443

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

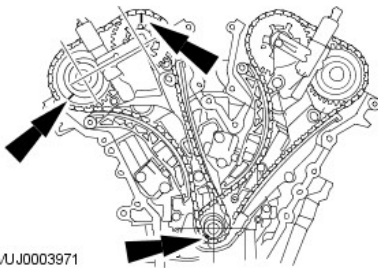
Install the crankshaft pulley retaining bolt and washer.



VUJ0003810

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.



VUJ0003971

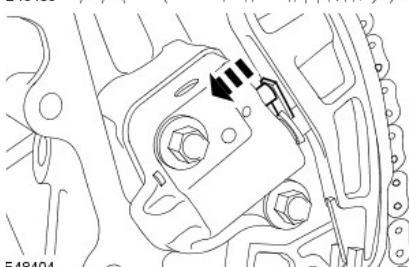
6. Release the timing chain tensioner ratchet.



E48403

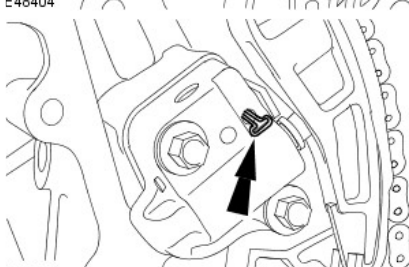
7. **NOTE:** Keep the timing chain tensioner ratchet released.

Reposition the timing chain tensioner plunger.

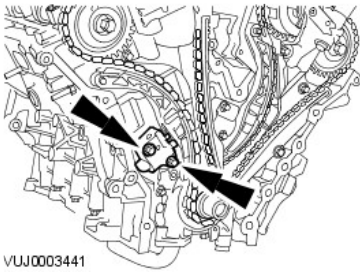


E48404

8. Retain the timing chain tensioner plunger.

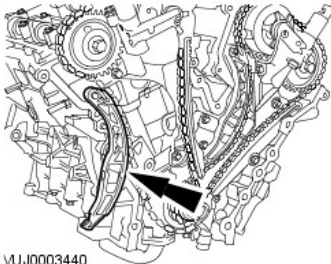


E48405



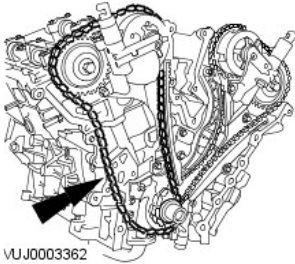
VJJ0003441

9. Remove the right-hand timing chain tensioner.



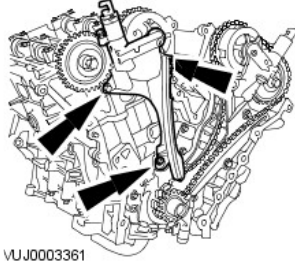
VJJ0003440

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



VJJ0003362

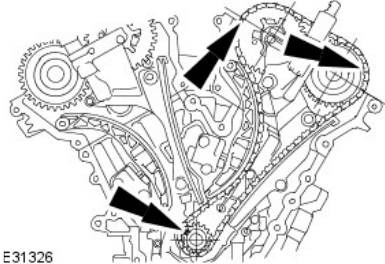
11. Remove the right-hand timing chain.



VJJ0003361

12.  CAUTION: Inspect and replace the O-ring seal if necessary.

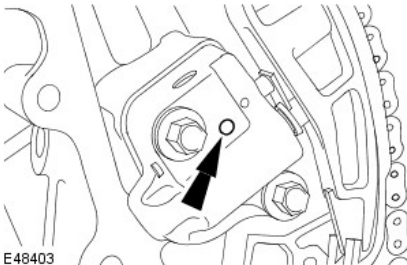
Remove the right-hand timing chain inner guide.



E31326

13.  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.



E48403

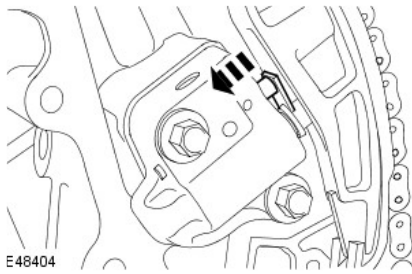
14. NOTE: Right-hand bank shown, left-hand bank similar.

Release the timing chain tensioner ratchet.

15. NOTE: Right-hand bank shown, left-hand bank similar.

NOTE: Keep the timing chain tensioner ratchet released.

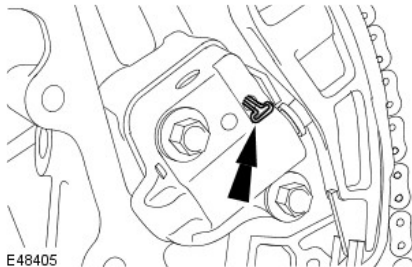
Reposition the timing chain tensioner plunger.



E48404

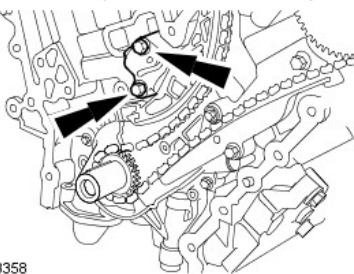
16. **NOTE:** Right-hand bank shown, left-hand bank similar.

Retain the timing chain tensioner plunger.



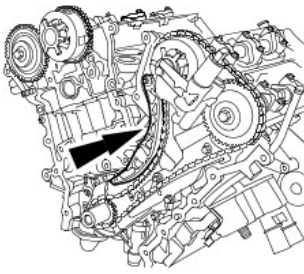
E48405

17. Remove the left-hand timing chain tensioner.



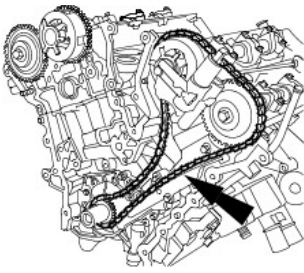
VUJ0003358

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



VUJ0003357

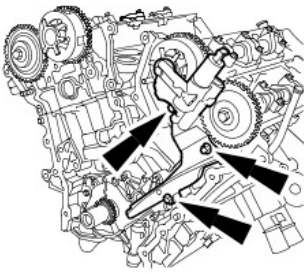
19. Remove the left-hand timing chain.




VUJ0003356

20.  **CAUTION:** Inspect and replace the O-ring seal if necessary.

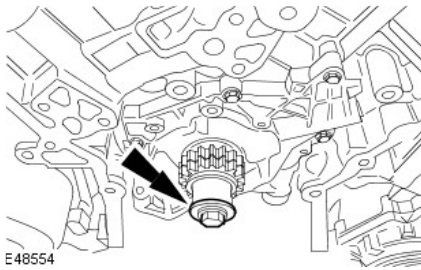
Remove the left-hand timing chain outer guide.



VUJ0003355

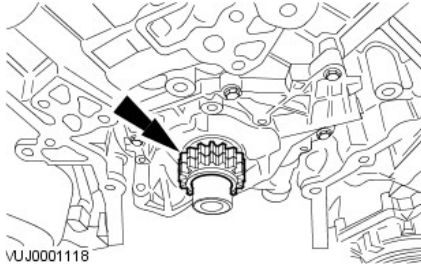
21.  **CAUTION:** Make sure the crankshaft keyway is at the 9 O'clock position before any further engine repairs are carried out.

Remove the crankshaft pulley retaining bolt and washer.



E48554

22. Remove the crankshaft sprocket.

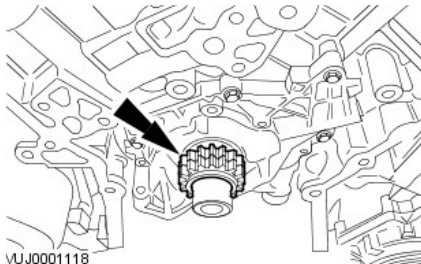


VUJ0001118


Installation

1. **NOTE:** Make sure the crankshaft sprocket timing marks are facing outwards.

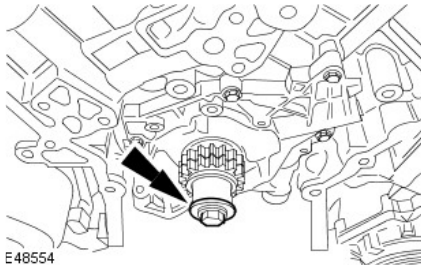
Install the crankshaft sprocket.



VUJ0001118

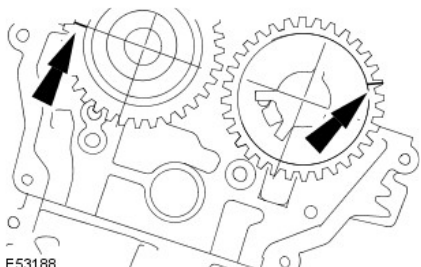
2.  **CAUTION:** Make sure the crankshaft keyway is at the 9 O'clock position before the camshaft positions are aligned.

Install the crankshaft pulley retaining bolt and washer.



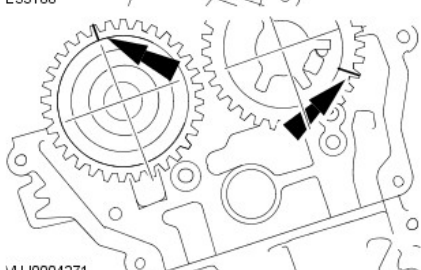
E48554

3. Rotate the left-hand intake camshaft clockwise until the camshaft sprocket alignment mark is at the 9 O'clock position and rotate the left-hand exhaust camshaft sprocket clockwise until the camshaft sprocket alignment mark is at the 2 O'clock position.



E53188

4. 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.

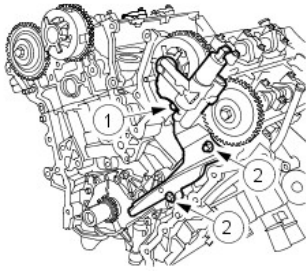


VUJ0004271

5. Rotate the crankshaft clockwise until the keyway is at the 11 O'clock position.

6. **CAUTIONS:**

 Inspect and replace the O-ring seal if necessary.

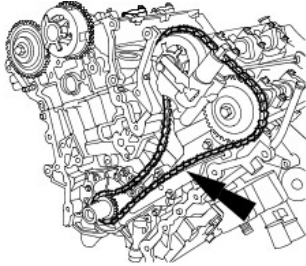


VJJ0003807

-  Make sure the O-ring seal is correctly installed.


Install the left-hand timing chain outer guide.

- Tighten the retaining bolts in the sequence shown in two stages.
- Stage 1: Tighten bolt 1 to 25 Nm.
- Stage 2: Tighten bolts 2 to 25 Nm.



VJJ0003356

7. CAUTIONS:

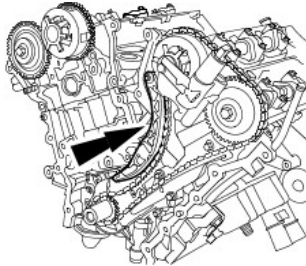
-  Make sure the crankshaft keyway is at the 11 O'clock position, the alignment mark on the left-hand intake camshaft sprocket is at the 9 O'clock position and the alignment mark on the left-hand exhaust camshaft sprocket is at the 2 O'clock position.

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

-  Make sure the timing chain slack is on the tensioned side of the timing chain.

Install the left-hand timing chain.

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

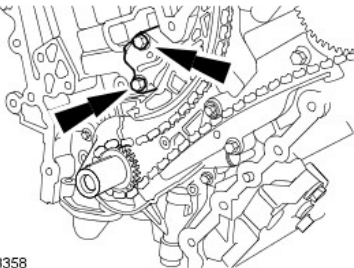


VJJ0003357

9.  CAUTION: Do not manually adjust the timing chain tensioner.

Install the left-hand timing chain tensioner.

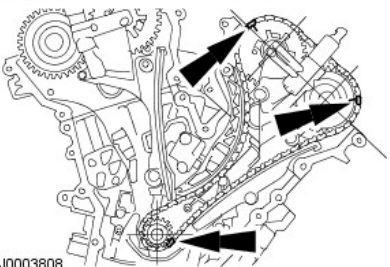
- Tighten to 25 Nm.



VJJ0003358

10.  CAUTION: Do not manually adjust the timing chain tensioner.

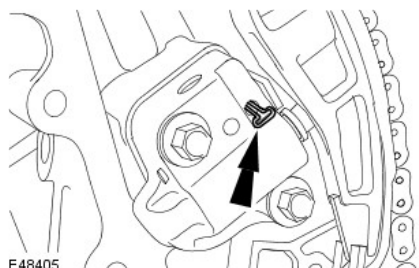
Make sure the left-hand timing chain alignment marks have remained correctly positioned to the camshaft sprocket and crankshaft sprocket alignment marks.



VJJ0003808

11.  CAUTION: Do not manually adjust the timing chain tensioner.

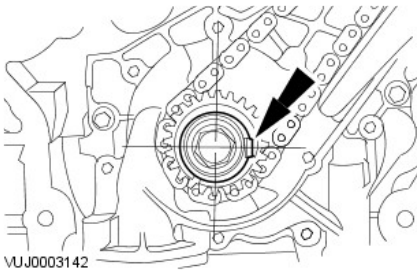
Remove the timing chain tensioner retaining pin.



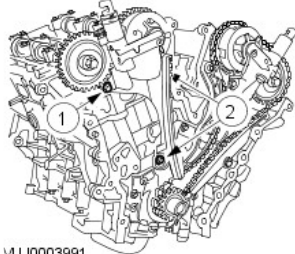
E48405

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

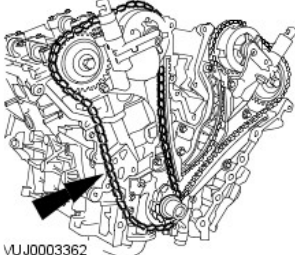
Rotate the crankshaft clockwise until the crankshaft keyway is at the 3 O'clock position.



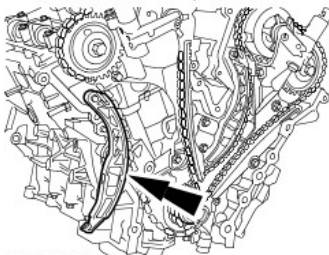
VUJ0003142



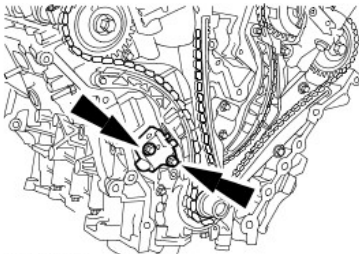
VUJ0003991



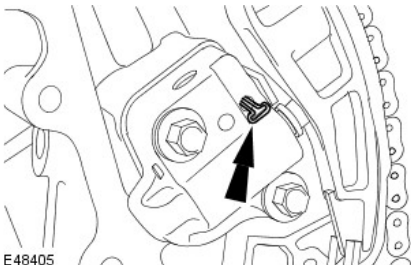
VUJ0003362



VUJ0003440





VUJ0003441



E48405




13. CAUTIONS:

-  Inspect and replace the O-ring seal if necessary.
-  Make sure the O-ring seal is correctly installed.

Install the right-hand timing chain inner guide.

- Tighten the retaining bolts in the sequence shown in two stages.
- Stage 1: Tighten bolt 1 to 25 Nm.
- Stage 2: Tighten bolts 2 to 25 Nm.

14. CAUTIONS:

-  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.
-  Make sure the timing chain alignment marks are correctly positioned to the crankshaft sprocket and camshaft sprocket alignment marks.
-  Make sure the timing chain slack is on the tensioned side of the timing chain.

Install the right-hand timing chain.

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

16.  CAUTION: Do not manually adjust the timing chain tensioner.

Install the right-hand timing chain tensioner.

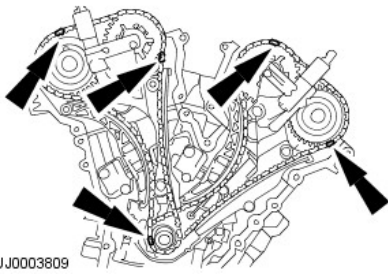
- Tighten to 25 Nm.

17.  CAUTION: Do not manually adjust the timing chain tensioner.

Remove the timing chain tensioner retaining pin.

18. CAUTIONS:

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



VUJ0003809

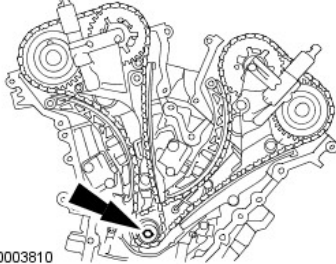
 Do not manually adjust the timing chain tensioner.

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

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

NOTE: Rotate the crankshaft using hand tools only

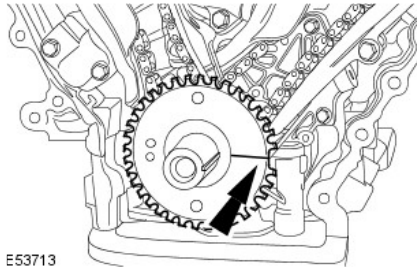
Rotate the crankshaft two complete turns clockwise to make sure the valves and pistons do not clash.



VUJ0003810

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

Remove the crankshaft pulley retaining bolt and washer.



E53713

21. CAUTIONS:

 Make sure the CKP sensor pulse wheel is correctly installed with the missing tooth aligned to the crankshaft keyway.

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

Install the CKP sensor pulse wheel.

22. Install the spark plugs.
 • Tighten to 15 Nm.
23. Install the engine front cover.
 For additional information, refer to: [Engine Front Cover](#) (303-01 Engine, In-vehicle Repair).