



Published : Feb 10, 2005

Timing Drive Components (12.65.13)

Special Service Tools



Camshaft setting/locking tool
303-530



Crankshaft locking tool
303-645




Timing chain tensioning tool
303-532

Removal

NOTE :

This procedure covers the removal and installation of the following components: timing chains, chain guides, tensioners and sprockets.

1. Disconnect the battery ground cable. For additional information, refer to [Specifications](#) (Section 414-00)

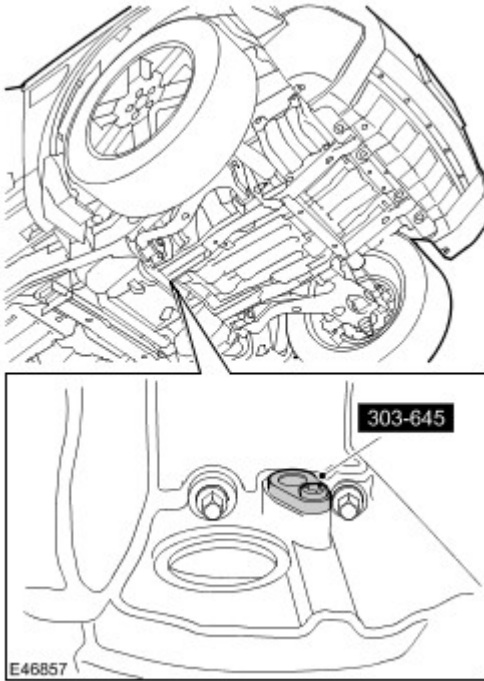
2.  **WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.**

Raise and support the vehicle.

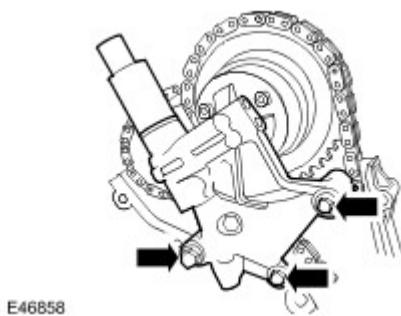
3. Remove the engine front cover. For additional information, refer to [Engine Front Cover \(12.65.01\)](#) (Section 303-01)
- 4.

Remove the crankshaft position (CKP) sensor. For additional information, refer to [Crankshaft Position \(CKP\) Sensor \(18.30.12\)](#) (Section 303-14)

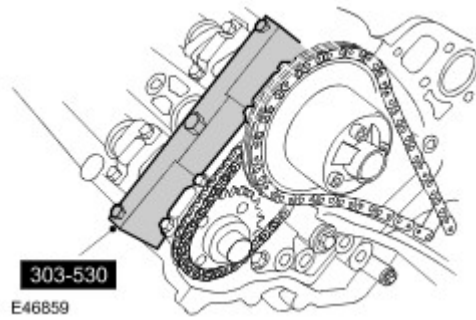
- 5 . Lock the crankshaft.
- Install the special tool.
 - Install the screw.



- 6 . Remove the RH variable camshaft timing (VCT) control solenoid housing.
- Remove the 3 bolts.
 - Remove and discard the O-ring seals.

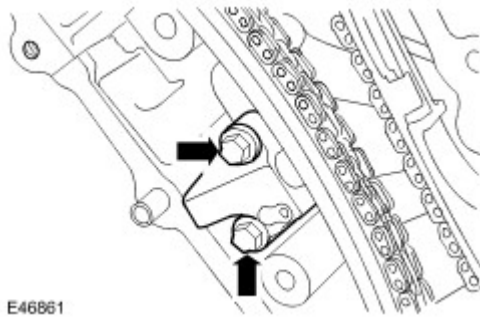


- 7 . Install the special tool to the RH cylinder head.
- Install the 3 bolts.



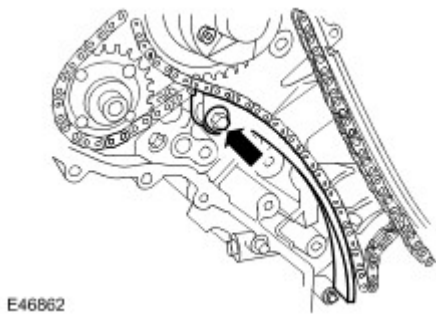
8. Remove the RH primary timing chain tensioner assembly.

➤ Remove the 2 bolts.



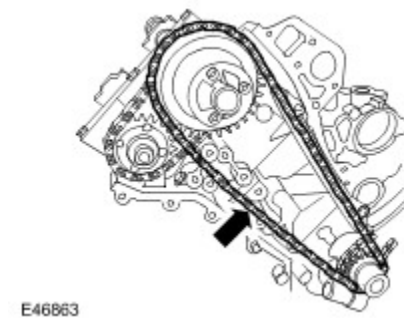
9. Remove the RH primary timing chain tensioner guide.

➤ Remove the bolt.



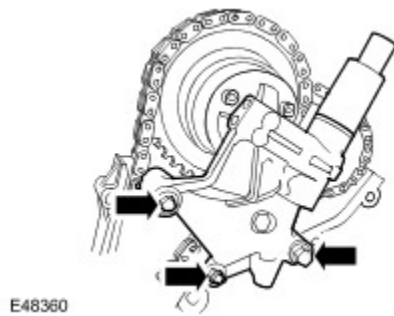
10. Remove the RH primary timing chain.

➤ Remove the bolt retaining the chain guide.

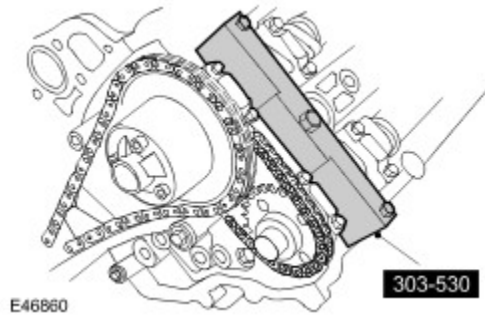


11. Remove the LH variable camshaft timing (VCT) control solenoid housing.

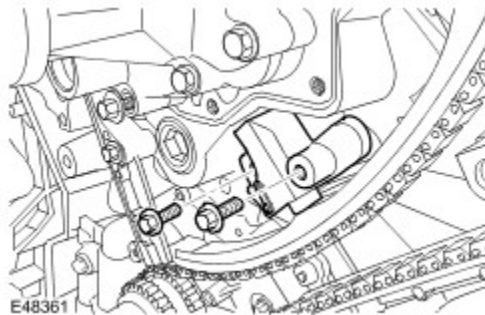
- ▶ Remove the 2 bolts.
- ▶ Remove the nut.
- ▶ Remove and discard the O-ring seals.



12. Install the special tool to the LH cylinder head.
- ▶ Install the 3 bolts.

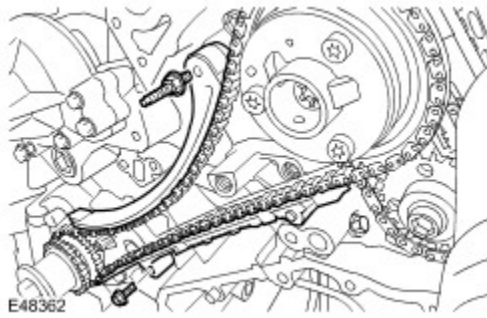


13. Remove the LH primary timing chain tensioner.
- ▶ Remove the 2 bolts.



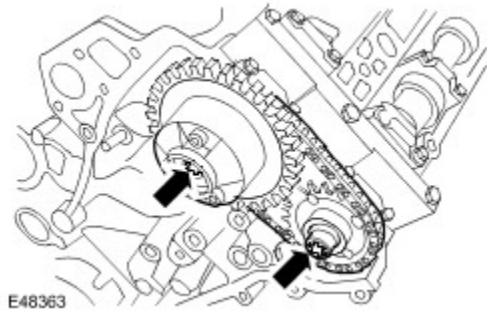
14. Remove the LH upper and lower primary timing chain tensioner guides.
- ▶ Remove the 2 bolts.

15. Remove the LH primary timing chain.



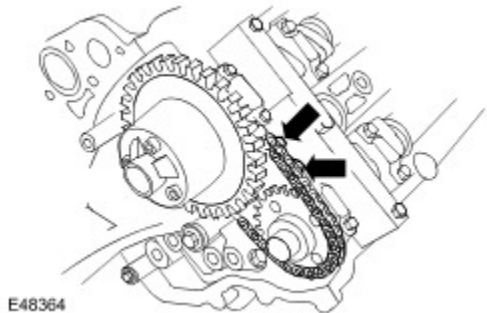
16. Remove the LH camshaft sprocket assembly.

▶ Remove the 2 Torx bolts.



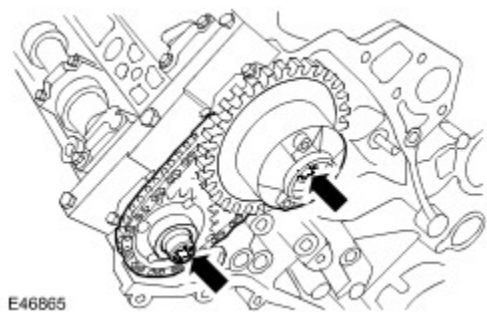
17. Remove the LH secondary timing chain tensioner and the secondary timing chain.

▶ Remove the 2 bolts.



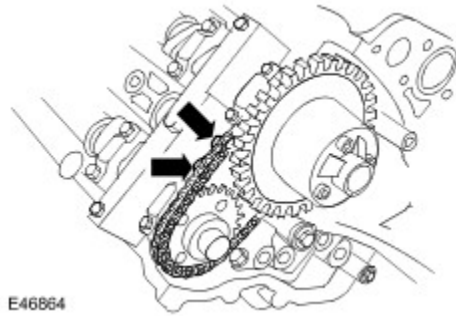
18. Remove the RH camshaft sprocket assembly.

▶ Remove the 2 Torx bolts.



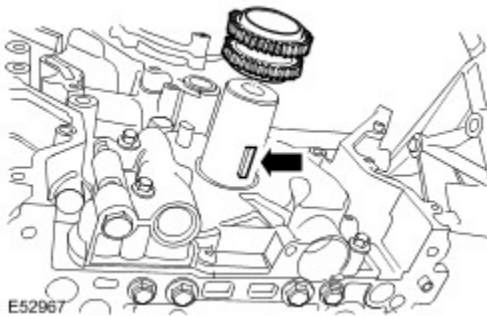
19. Remove the RH secondary timing chain tensioner and the secondary timing chain.

- ▶ Remove the 2 retaining bolts.



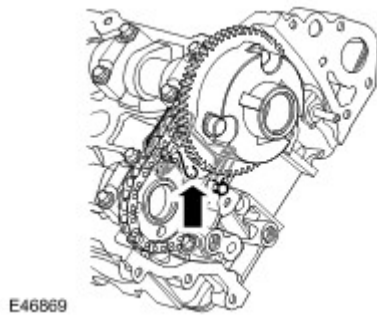
- 20 . **NOTE :**
Note the orientation of the crankshaft sprocket.
Remove the crankshaft sprocket.

- ▶ Remove the crankshaft sprocket key.



Installation

- 1 . Install the crankshaft sprocket key.
▶ Clean the component mating faces.
- 2 . Install the crankshaft sprocket.
- 3 . Depress the LH secondary timing chain tensioner piston.
▶ Using 1 mm diameter metal rod, retain the chain tensioner piston.
- 4 . **NOTE :**
RH illustration shown, LH is similar
Install the LH secondary timing chain tensioner and chain to the camshaft sprockets.



5. Install the LH secondary timing chain tensioner retaining bolts.

➤ Tighten the bolts to 12 Nm (9 lb.ft).

6. Install the LH primary timing chain.

➤ Make sure the timing chain slack is on the tensioner side of the timing chain.

7. Install the LH primary timing chain tensioner guides.

➤ Tighten the bolts to 12 Nm (9 lb.ft).

- 8.



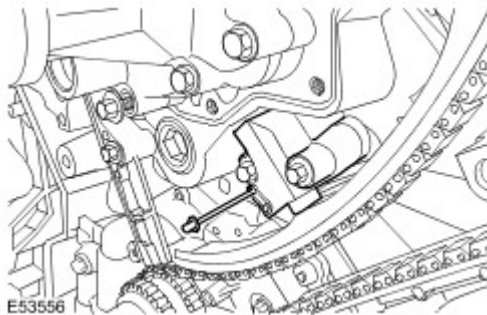
CAUTION: During timing chain tensioner compression, do not release the ratchet stem until the timing chain tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

Install the LH primary timing chain tensioner.

➤ Using 3 mm diameter metal rod, retain the chain tensioner piston.

➤ Tighten the bolts to 12 Nm (9 lb.ft).

➤ Remove the retaining rod.



- 9.



CAUTION: Using the special tool, apply force to the tool in a counter-clockwise direction, to tension the primary timing chain on its drive side.



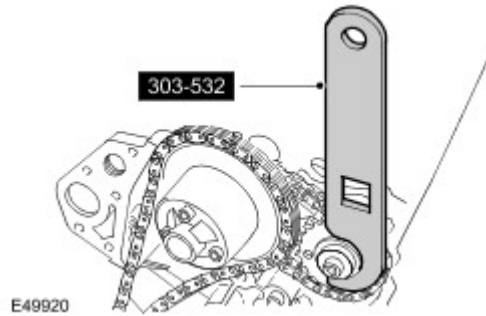
CAUTION: The intake camshaft sprocket retaining bolt **MUST** be tightened before the exhaust camshaft sprocket retaining bolt. Engine damage will occur if this procedure is not followed.

Install the special tool to the LH exhaust camshaft sprocket.

Tighten the intake camshaft sprocket retaining bolt to 120 Nm (88 lb.ft).



Tighten the exhaust camshaft retaining bolt to 120 Nm (88 lb.ft).

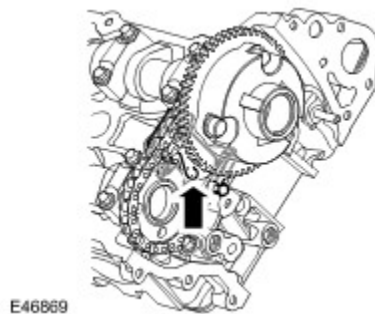


- 10 . Install the LH VCT control solenoid housing.

- Install the new O-ring seals.
- Tighten the new bolts to 22 Nm (16 lb.ft).
- Tighten the nut to 10 Nm (7 lb.ft).

- 11 . Retain the RH secondary timing chain tensioner piston.

- Using 1 mm diameter metal rod, retain the chain tensioner piston.



- 12 . Install the RH secondary timing chain tensioner and the secondary timing chain to the camshaft sprockets.

- 13 . **NOTE :**

Lightly tighten the camshaft sprocket Torx bolts, the sprockets **MUST** be free to move.

Install the RH secondary timing chain and sprockets to the camshafts.

- Install the sprocket retaining Torx bolts to the camshafts.

- 14 . Install the RH secondary timing chain tensioner retaining bolts.

- Tighten the bolts to 12 Nm (9 lb.ft).

- 15 . Tension the secondary timing chain.

- Remove the retaining rod.

- 16 . Install the RH primary timing chain.

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

17. Install the RH primary timing chain tensioner guide.

➤ Tighten the bolts to 12 Nm (9 lb.ft).

18.



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.

Install the RH primary timing chain tensioner.

➤ Using 3 mm diameter metal rod, retain the chain tensioner piston.

➤ Tighten the bolts to 12 Nm (9 lb.ft).

➤ Remove the retaining rod.

19.



CAUTION: The intake camshaft sprocket retaining bolt **MUST** be tightened before the exhaust camshaft sprocket retaining bolt. Engine damage will occur if this procedure is not followed.

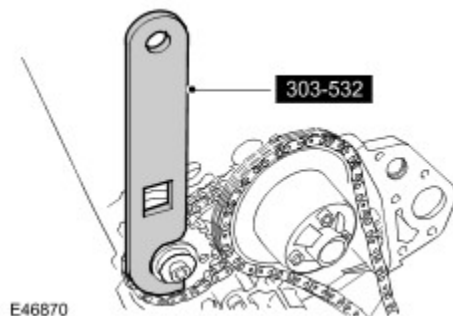


CAUTION: Using the special tool, apply force to the tool in a counter-clockwise direction, to tension the primary timing chain on its drive side.

Install the special tool to the RH exhaust camshaft sprocket.

➤ Tighten the intake camshaft sprocket retaining bolt to 120 Nm (88 lb.ft).

➤ Tighten the exhaust camshaft retaining bolt to 120 Nm (88 lb.ft).



20. Install the RH VCT control solenoid housing.

➤ Install the new O-ring seals.


➤ Tighten the new bolts to 22 Nm (16 lb.ft).

21. Remove the special tool from the RH cylinder head.

22. Remove the special tool from the LH cylinder head.

23. Install the engine front cover. For additional information, refer to [Engine Front Cover \(12.65.01\)](#) (Section 303-01)

24. Remove the crankshaft locking tool.

 Remove the screw.

- 25 . Install the CKP sensor. For additional information, refer to [Crankshaft Position \(CKP\) Sensor \(18.30.12\)](#) (Section 303-14)
- 26 . Connect the battery ground cable. For additional information, refer to [Specifications](#) (Section 414-00)