

ENGINE

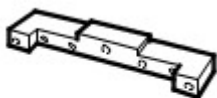
EXHAUST CAMSHAFT SPROCKET RH [G222798]

IN-VEHICLE REPAIR

12.65.73	EXHAUST CAMSHAFT SPROCKET - BANK 1 - RENEW	ALL DERIVATIVES	1.60	USED WITHINS
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SPECIAL TOOL[S]



E36401

**303-530**

Camshaft setting



E36408

### **303-531**

Crankshaft setting



E36402

### **303-532**

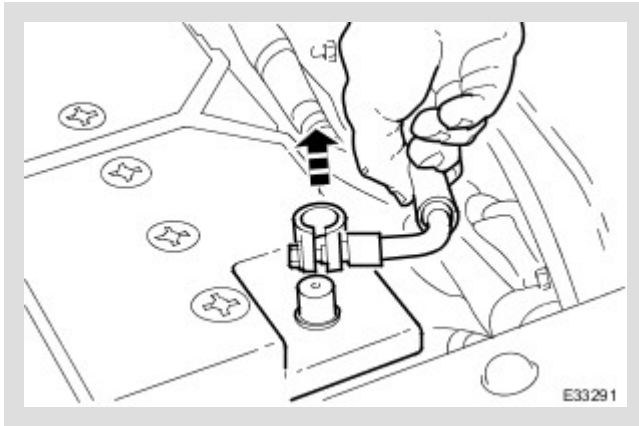
Timing chain tensioning

## **REMOVAL**

1. Open the engine compartment and fit paintwork protection sheets.
2. Set the engine compartment cover to the service access position.

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3. Open the driver's door, or both doors if necessary, to allow the side glass to drop. Make sure that the doors remain open until after the battery has been disconnected.
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4.



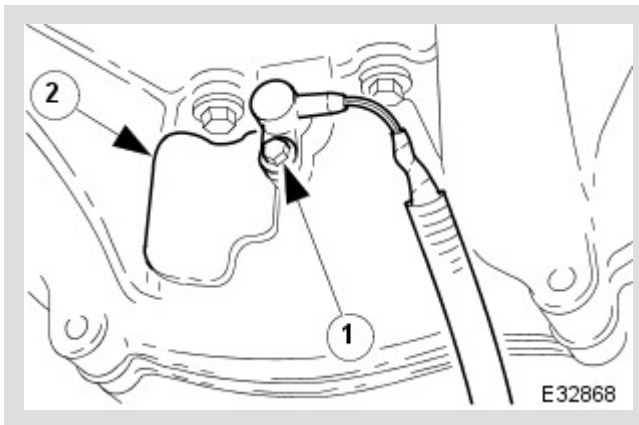
Disconnect the battery ground cable.

Remove the battery cover.

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5. Remove the LH valve cover. For additional information, refer to: [Left Valve Cover](#) (303-01 Engine, In-vehicle Repair).
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6. Raise the vehicle on a ramp.
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7.



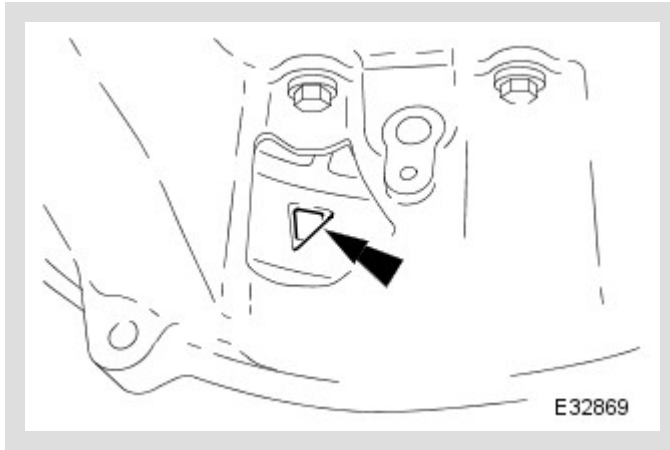
Remove the crankshaft position sensor.

1. Remove the bolt which secures the crankshaft position sensor to the flywheel housing.

Remove the sensor and allow it to hang free under the engine.

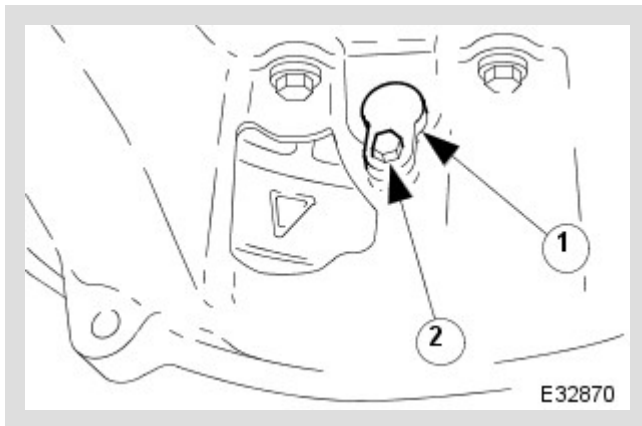
2. Remove the access grommet (for torque converter bolts) from the housing.
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8.



Rotate the crankshaft until the triangular arrow indent on the drive plate is visible through the access hole; confirm that the timing flat on each camshaft is uppermost.

9.



Install the crankshaft setting peg 303-531 to the crankshaft position sensor location.

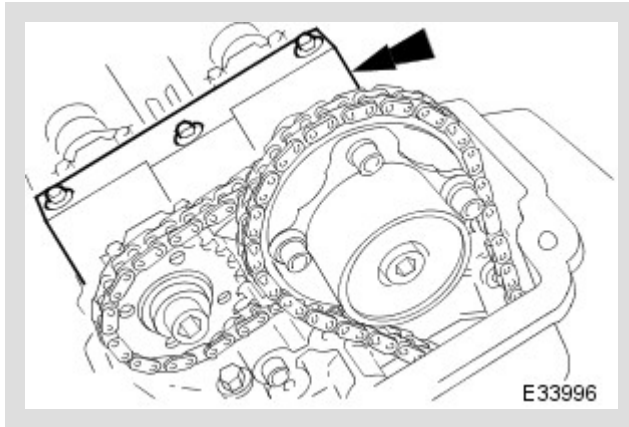
1. Install the crankshaft setting peg 303-531.

Position the crankshaft so that the setting peg engages fully into the timing slot.

2. Install and tighten the bolt to secure the setting peg.

10. Lower the vehicle on the ramp.

11.

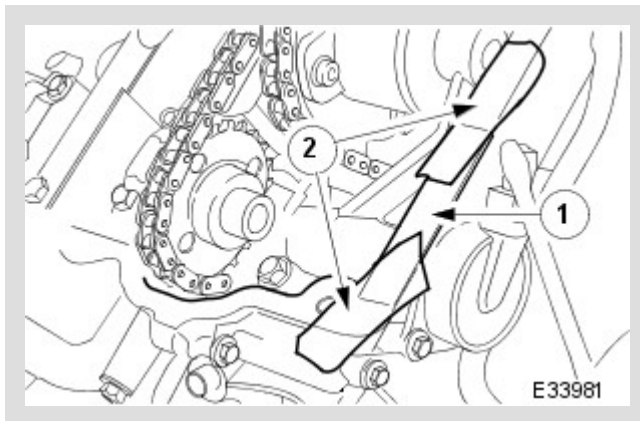


Install the camshaft locking tool 303-530 to RH camshafts, aligning the shafts slightly as necessary.

12.

**⚠ CAUTION:**

Use a length of steel strip that will not fall into the timing cover.



Protect the upper face of the timing cover from scratches, when removing the bolt which secures the sprocket.

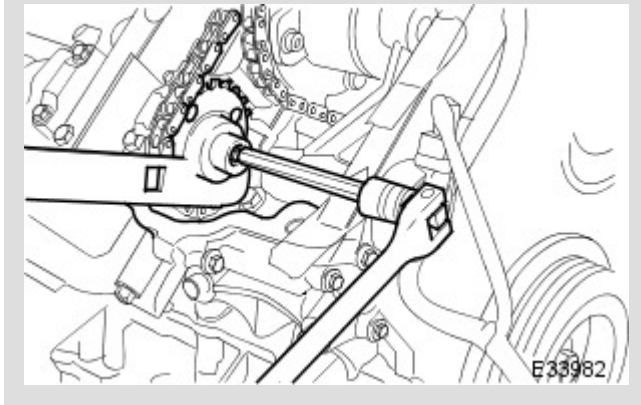
1. Place a flat piece of steel strip along the timing cover horizontal jointing face, adjacent to the exhaust camshaft sprocket.
2. Secure the steel strip in place with adhesive tape.

13.



A ball-ended hexagon drive bit is required to remove the sprocket securing bolt. A suitable tool is available from Snap On as (FABLM10E) Long Series 10mm AF.

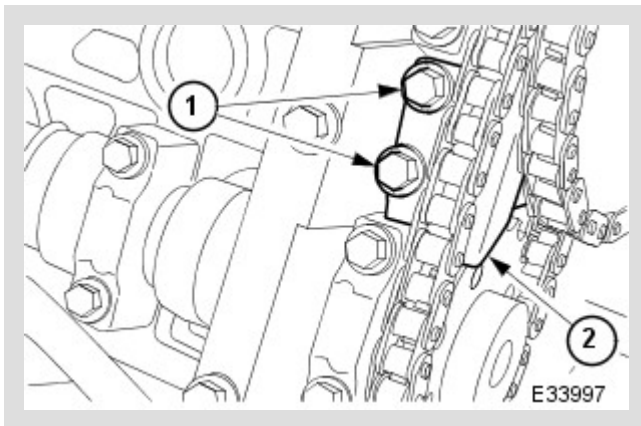
14.



Remove the bolt which secures the sprocket to the exhaust camshaft.

Move the sprocket forward from the camshaft boss.

15.



Remove the secondary chain tensioner. The tensioner piston cannot be pushed into the body with the assembly in position.

**1.** Remove the two bolts which secure the tensioner.

Lift the tensioner, sprocket (release it fully from the camshaft) and chain assembly.

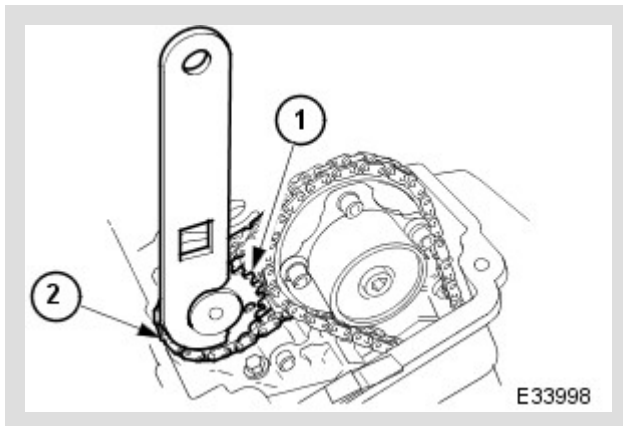
**2.** Remove the tensioner rearward from between the chain.

**16.** Remove the sprocket and leave the chain resting on the cylinder head.

**17.** Clean and inspect all relevant components.

## INSTALLATION

1.

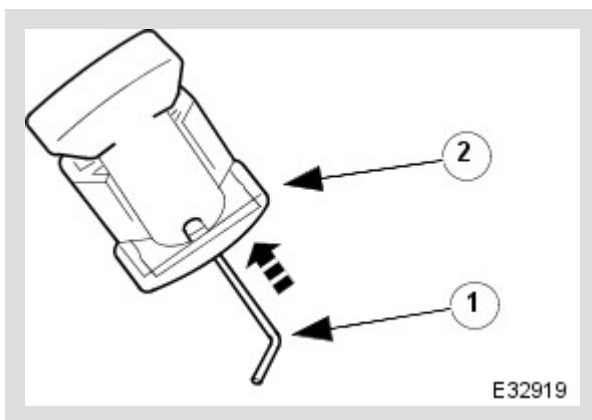


Install the sprocket to the secondary chain.

1. With the sprocket installed to the chain, temporarily position (do not install the securing bolt) the sprocket onto the camshaft.
2. Adjust the position of the sprocket within the chain to allow the chain tensioning tool 303-532 to be approximately vertical, as shown.

Remove the chain tensioning tool; during future operations, do not move the sprocket within the chain.

2.

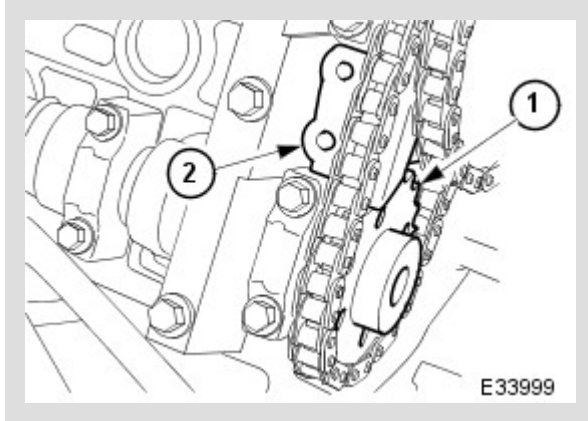


Push the tensioner piston into the body to provide clearance for installing.

1. Insert a thin rigid wire through the hole in the end of the tensioner piston to displace the ball from the non-return valve seat.
2. With the wire in position, press the piston fully into the tensioner body.

Remove the wire.

3.

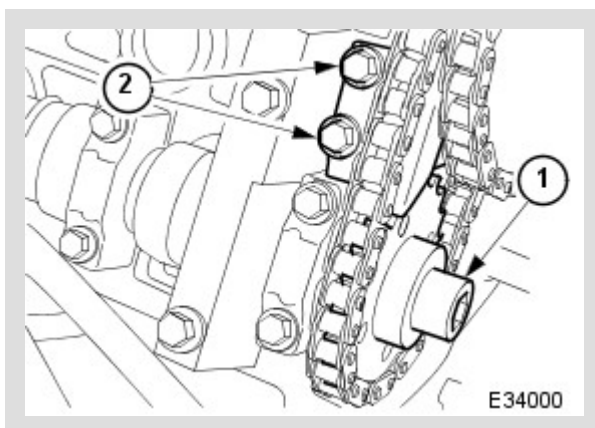


Install the chain tensioner between the chain path.

1. Reposition the sprocket, still captive in the chain, upwards for access.
2. Install the chain tensioner between the sprockets.

Position the cam sprocket, chain and tensioner assembly into position and locate the sprocket onto the camshaft spigot.

4.



Install the chain tensioner to the engine.

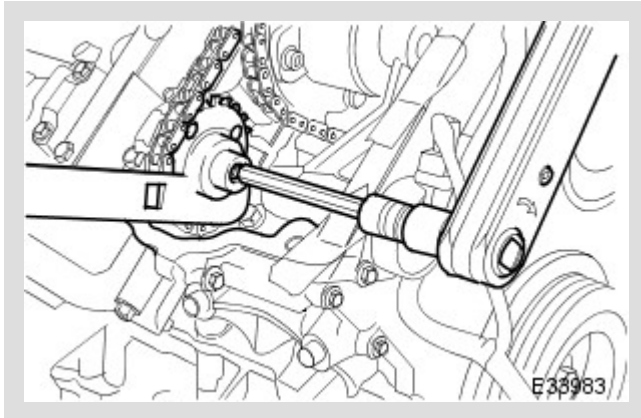
1. Fully seat the sprocket onto the camshaft and install the securing bolt, hand tight.
2. Install the two bolts which secure the tensioner and tighten to 12 Nm.



5.

**ⓘ CAUTION:**

Make sure that a new bolt is installed.



Install the camshaft sprocket.

Install the chain tensioner tool 303-532 to the sprocket holes.

Apply force to the tool in an anti-clockwise direction to tension the chain on its drive side.

Whilst applying the opposing force to the sprocket and chain, tighten the sprocket securing bolt to 20 Nm + 90°.

Remove the chain tensioning tool.

6. Remove the tape and steel strip from the timing cover upper face. Wipe any residue of tape from the joint face.

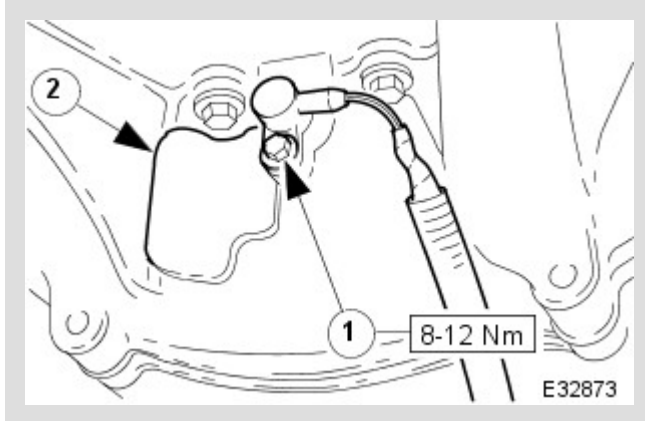
7. Remove the camshaft locking tool.

8. Install the LH valve cover. For additional information, refer to: [Left Valve Cover](#) (303-01 Engine, In-vehicle Repair).

9. Raise the vehicle on the ramp.

10. Remove the crankshaft setting tool 303-531.

11.



Install the crankshaft position sensor.

1. Install the sensor to the flywheel housing and fit the securing bolt. Tighten to 10 Nm.
2. Install the access grommet to the housing.

12. Lower the ramp.

13. Move the engine compartment cover from the service position and connect the gas struts.

14. Remove the paint protection sheets and close the engine compartment cover.

15. Connect the battery and install the battery cover. For additional information, refer to: [Battery Connect](#) (414-01 Battery, Mounting and Cables, General Procedures).

**PUBLISHED: 11-MAY-2011**  
**1997.0 X100, 414-01**

**BATTERY, MOUNTING AND CABLES**

**BATTERY CONNECT** [G222938]

## GENERAL PROCEDURES

1.

### NOTE:

Whether one, or both, cables are disconnected, a minimum of 30 seconds MUST elapse between disconnection of the FIRST cable and reconnection of the LAST cable. A clean final connection must be made; do not allow temporary contact.

Connect the battery terminal(s).

2. Reset the clock.

3. Enter the radio security code. If necessary, refer to the Sound System Handbook.

4. Cycle (both) door drop glass up and down to establish the upper and lower datum points.

Switch the ignition ON .

Lower the glass to the stop and hold the switch in the DOWN position for a further five seconds.

Raise the glass fully and hold the switch in the UP position for a further five seconds.

5. Switch the ignition OFF .

**PUBLISHED: 11-MAY-2011**  
**1997.0 X100, 303-01**

## ENGINE

### LEFT VALVE COVER (G222818)

## IN-VEHICLE REPAIR

<b>12.29.43</b>	<b>CAMSHAFT COVER - EACH - RENEW</b>	<b>ALL DERIVATIVES</b>	<b>1.20</b>	<b>USED WITHINS</b>
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<b>12.29.43</b>	<b>CAMSHAFT COVER - EACH - RENEW</b>	<b>ALL DERIVATIVES</b>	<b>1.10</b>	<b>USED WITHINS</b>
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12.29.43

**CAMSHAFT  
COVER -  
EACH -  
RENEW**

**ALL  
DERIVATIVES**

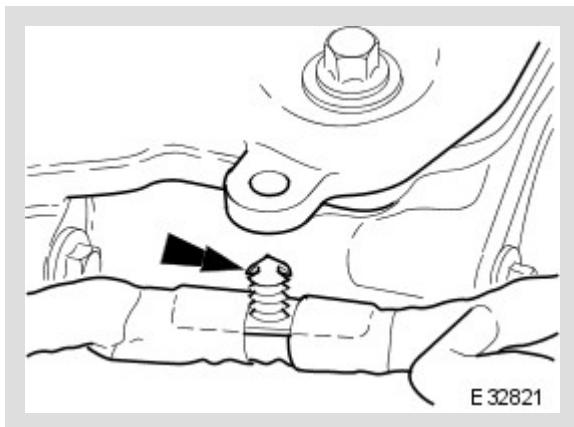
1.20

**USED WITHINS**

## REMOVAL

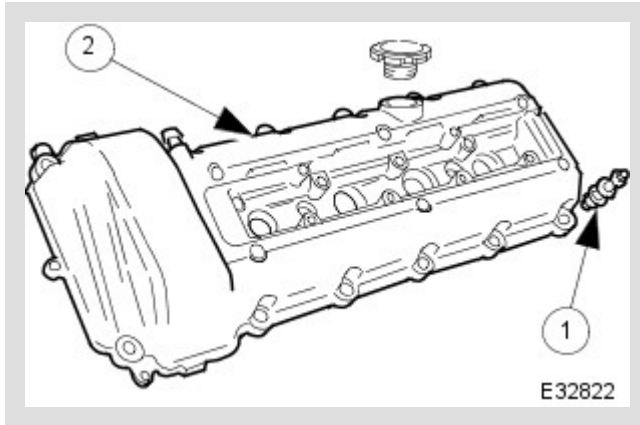
1. Open the engine compartment and fit paintwork protection sheets.
2. Carefully remove the left hand engine cover, taking care not to damage the plastic fixings or the rubber inserts.
3. Remove the on-plug ignition coils from the 'B' bank. Refer to Operation 18.20.42.
4. Remove the purge valve, from the evaporative control system. Refer to Operation 17.45.01.

5.



Release the clips which secure the engine harness to the cam cover.

6.

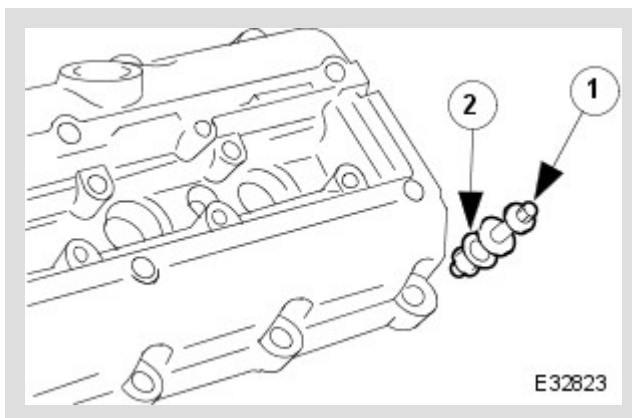


Remove the cam cover assembly.

1. Release the fourteen screws which secure the cam cover. The screws stay in place, held by the seals.
2. Remove the cam cover, screws and seals, as an assembly.

Remove the oil filler cap.

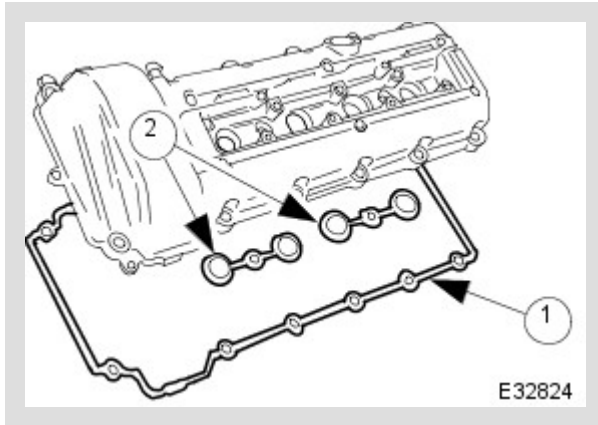
7.



Separate the screws and seals from the cam cover.

1. One at a time, remove each securing screw from the cam cover.
2. Remove the rubber sealing ring from each securing screw.

8.



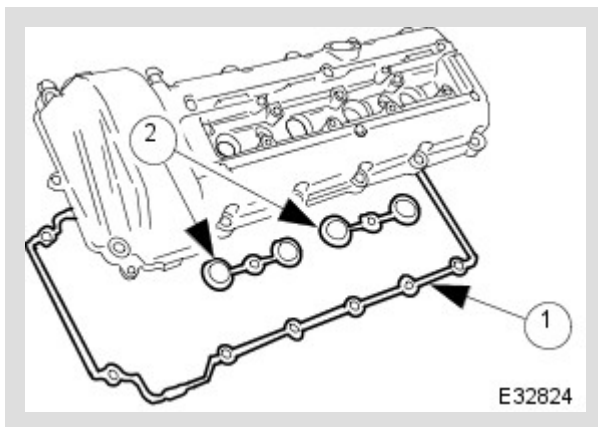
Remove the main seals from the cam cover.

1. Remove and discard the outer seal.
2. Remove and discard the two seals from around the spark plug apertures.

9. Clean all relevant parts and mating faces.

## INSTALLATION

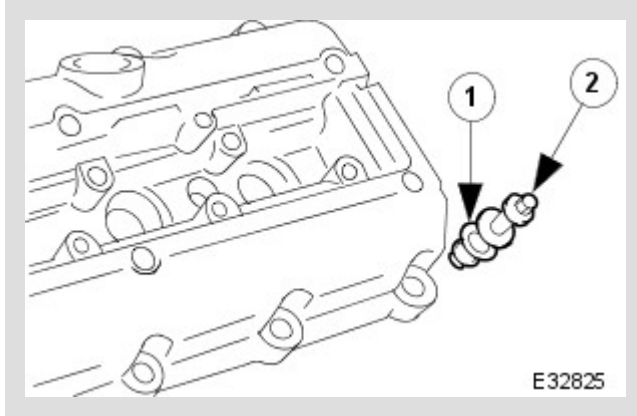
1.



Fit new seals to the cam cover.

1. Fit the new outer seal.
2. Fit the two new spark plug aperture seals.

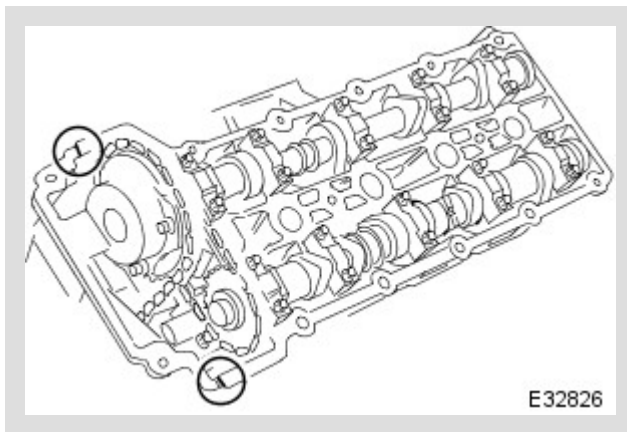
2.



Fit the securing screws to the cam covers.

1. Fit a new sealing ring to each screw assembly.
2. Fit the screws to the cam covers. Each screw is retained by the cam cover gasket.

3.

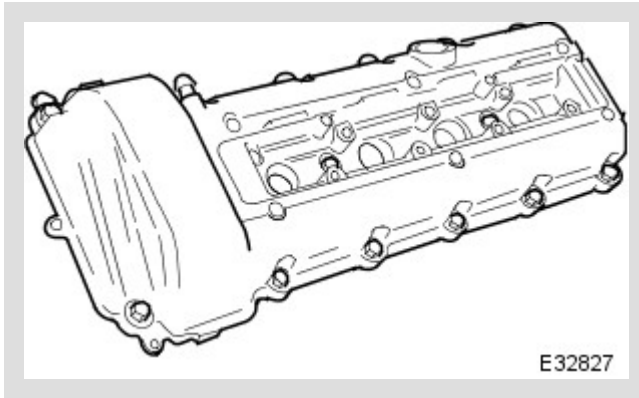


Apply RTV sealant WSS-M4G320-A3 to two places on the joint between the front of the cam cover and the cylinder head.

The application of sealant must be 3mm diameter by 12mm long. Fit the cam cover immediately after applying the sealant.

The cover should be fitted directly to the head without smearing the sealant or the seals.

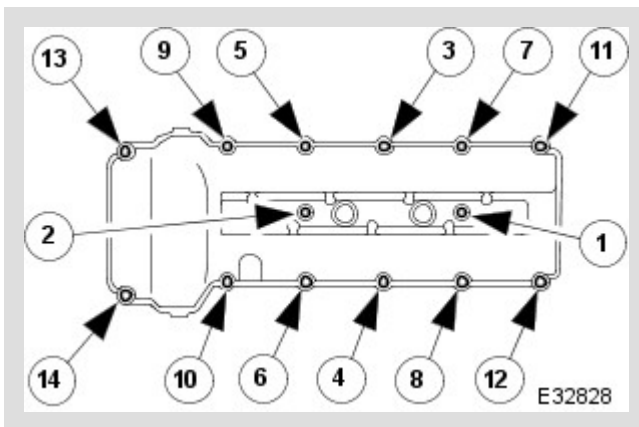
4.



Refit the cam cover.

Position the cam cover onto the cylinder head without smearing the sealant and start the threads of each securing screw.

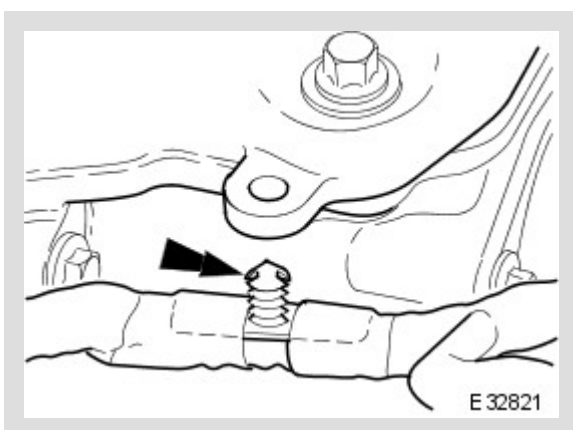
5.



Tighten the securing screws to 9-11 Nm. Tighten in the sequence indicated.

6. Fit the oil filler cap.

7.



Reposition the clips which secure the engine harness to the cam cover.

8. Refit the on-plug ignition coils and the coil cover. Refer to Operation 18.20.42.



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9. Refit the purge valve. Refer to Operation 17.45.01.

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10. Reconnect the air flow meter multi-plug.

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11. Refit the left hand engine cover.

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12. Remove the paintwork protection sheets and close the engine compartment.