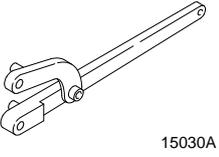
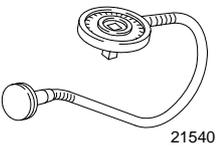


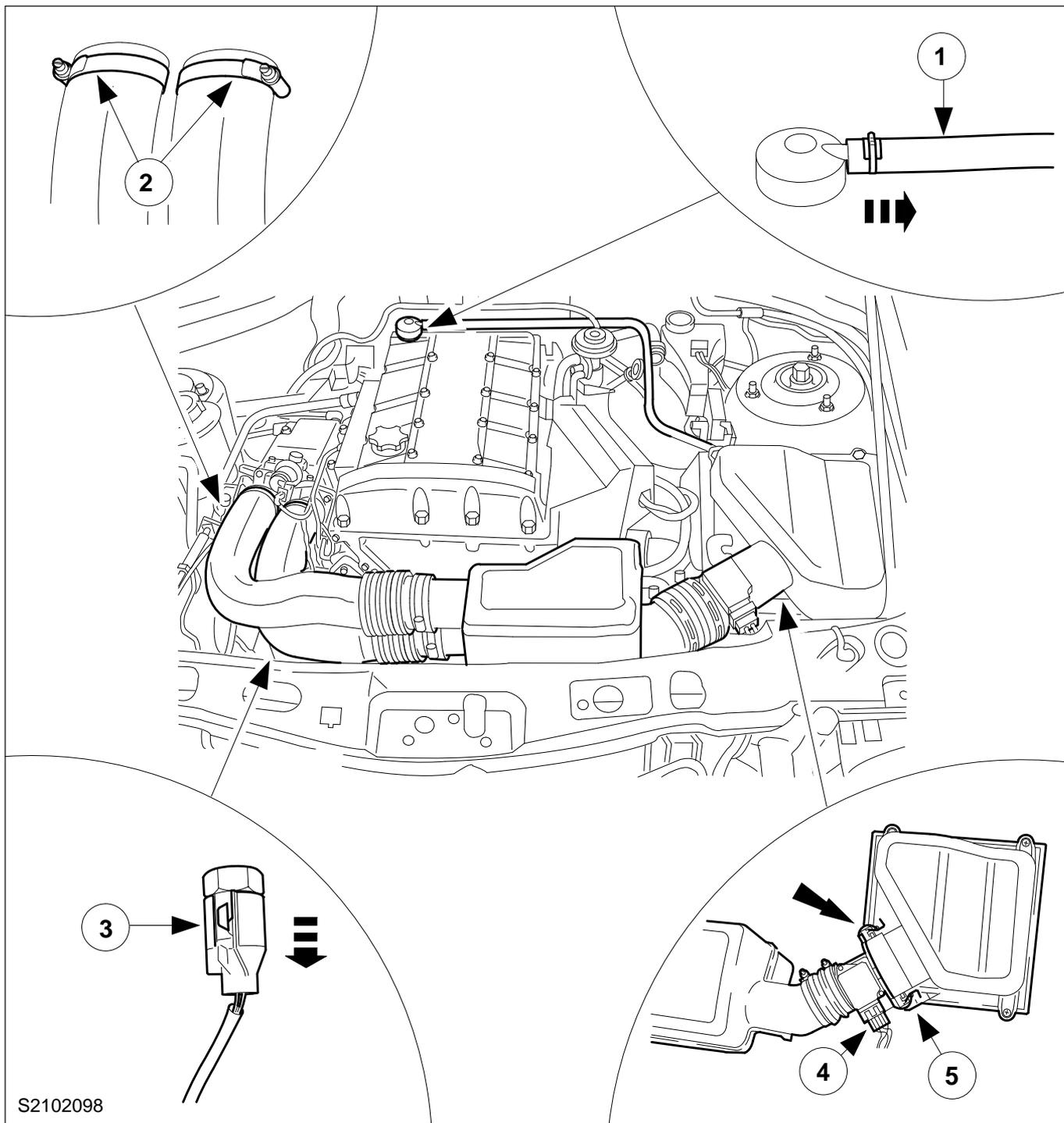
**Cylinder Head – Remove and Install (21 164 0)****Special Tools**

 15030A	<b>15-030A</b> Universal flange-holding wrench
 21540	<b>21-540</b> Angle gauge

**Remove****1. Preparatory measures:**

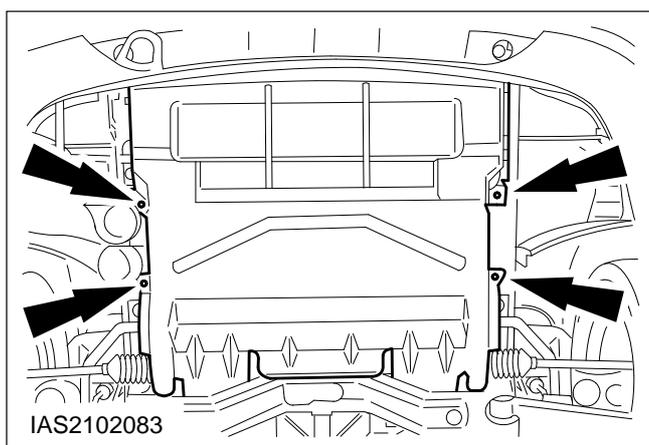
- Make a note of the radio keycode.
- Make a note of the preset radio stations.

**2. Remove the battery cover (one nut).****3. Disconnect the battery earth lead.****4. Open the coolant reservoir.**

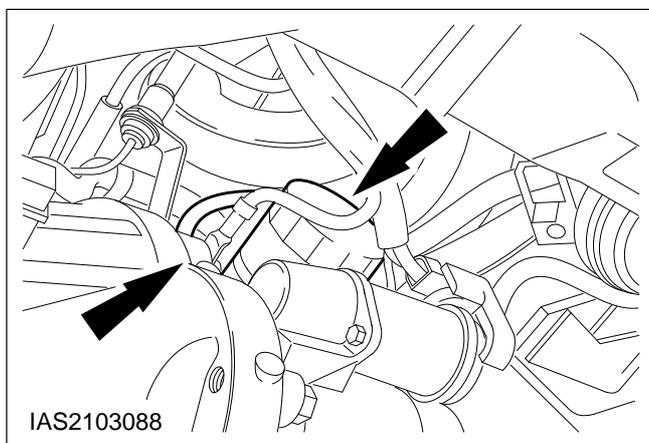
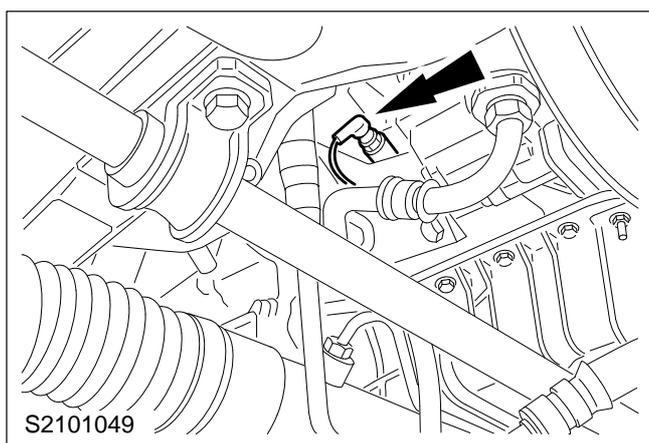


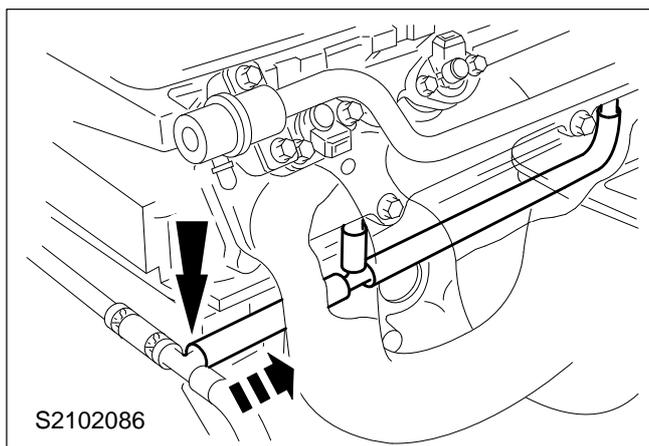
**5. Remove the resonator with the intake pipes.**

- 1 Detach the crankcase ventilation hose.
- 2 Release the two hose clips.
- 3 Disconnect the intake air temperature (IAT) sensor multiplug.
- 4 Disconnect the multiplug from the mass air flow (MAF) sensor.
- 5 Disconnect the resonator from the air cleaner (two spring band clamps).

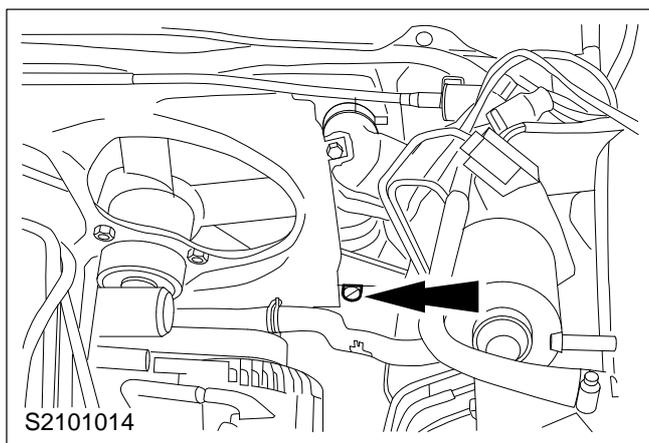
**6. Detach the engine undershield.**

Raise the vehicle.

**7. Detach the oil filter.****8. Disconnect the crankshaft position (CKP) sensor multiplug.****9. Disconnect the oil pressure switch plug.**

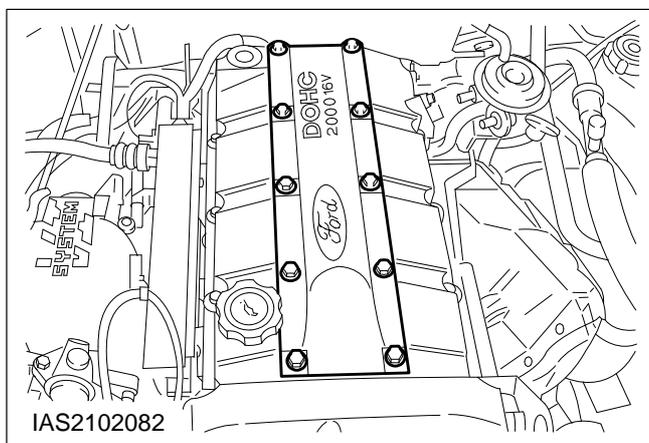


**10. Disconnect the crankcase breather (PCV) hose.**

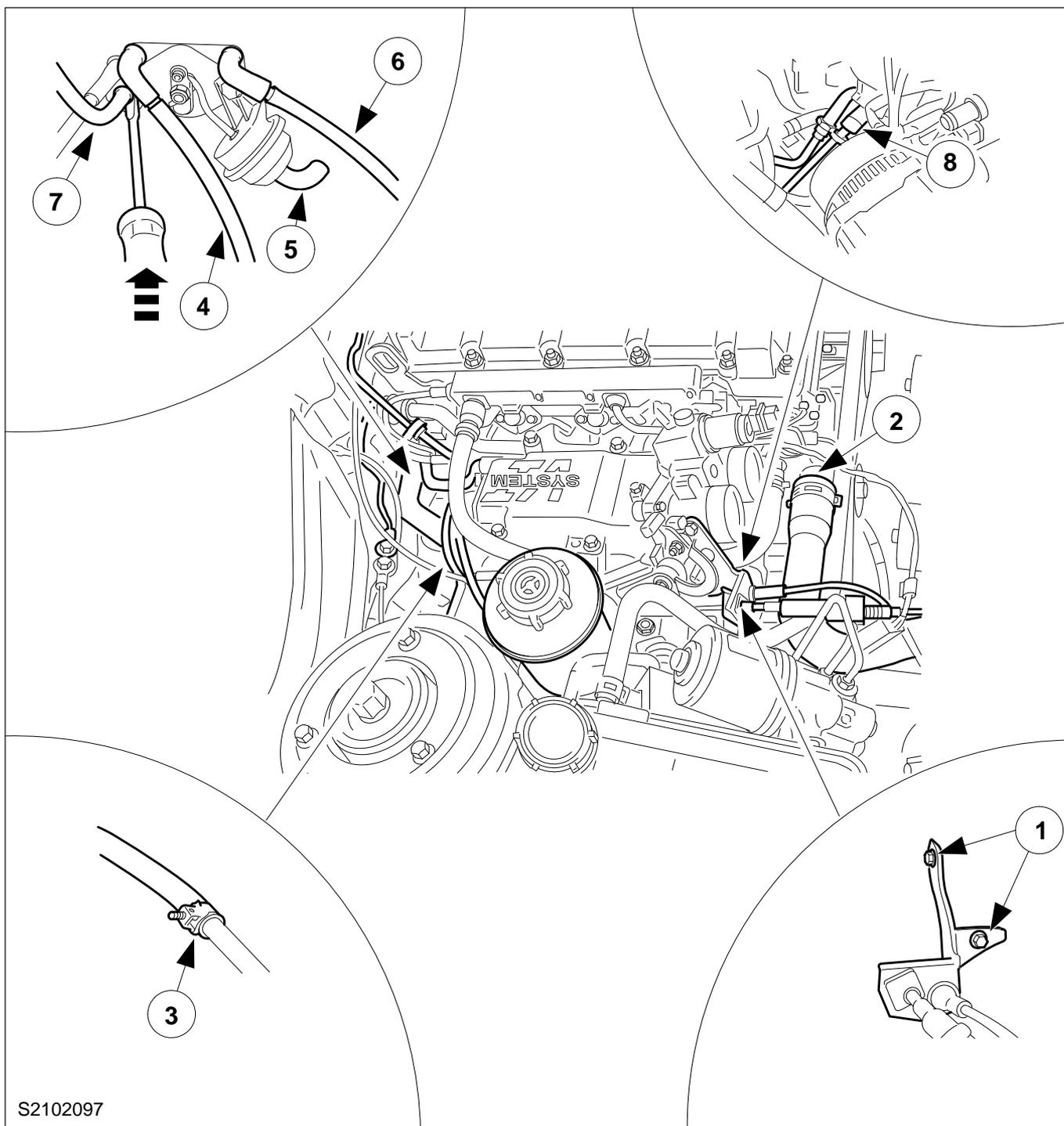


**11. Drain off the coolant.**

- Lower the vehicle.
- Tighten the drain plug again.



**12. Detach the ignition coil cover (ten bolts).**



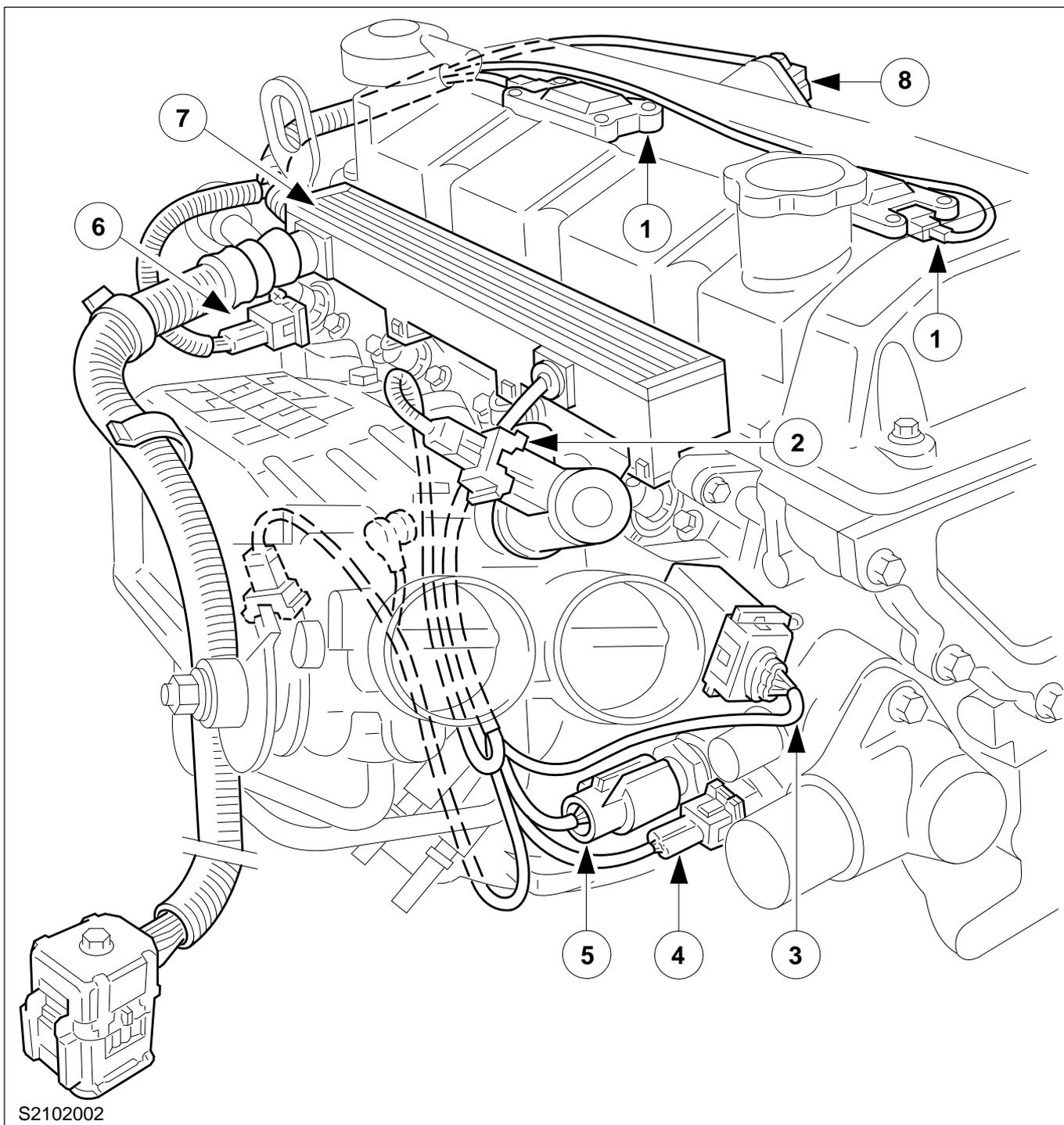
S2102097

**13. Detach the components on the right-hand side of the engine compartment:**

- 1 Unhook the throttle cable and remove it.
- 2 Disconnect the coolant hose from the thermostat housing.
- 3 Disconnect the coolant hose from the heater.

Vacuum lines:

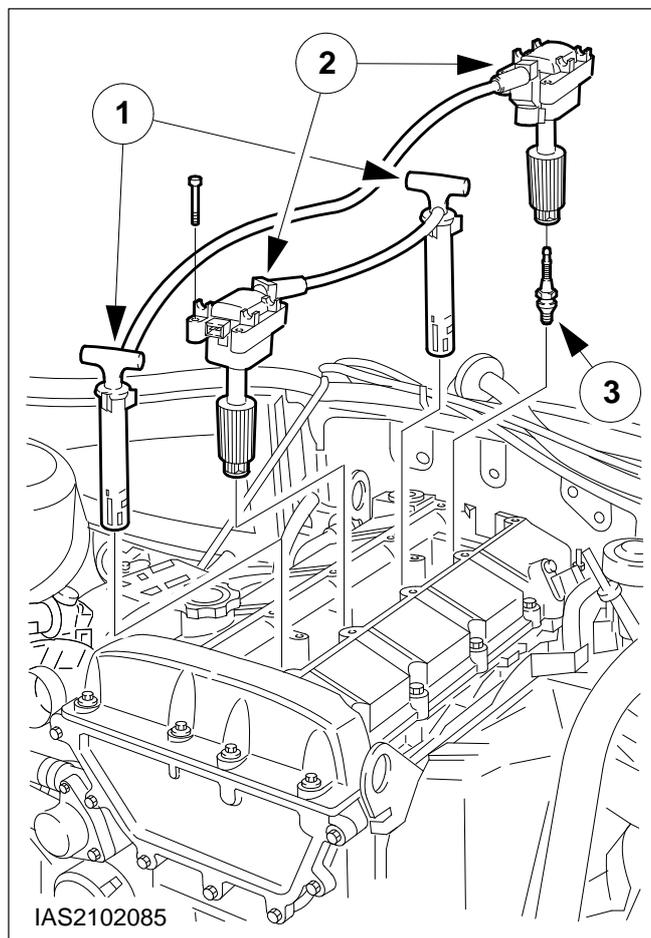
- 4 To evaporative emission system valve (EVAP).
- 5 From the variable intake system (VIS) control motor.
- 6 To the solenoid (VIS+EGR).
- 7 To the brake servo.
- 8 Disconnect the fuel pipes.



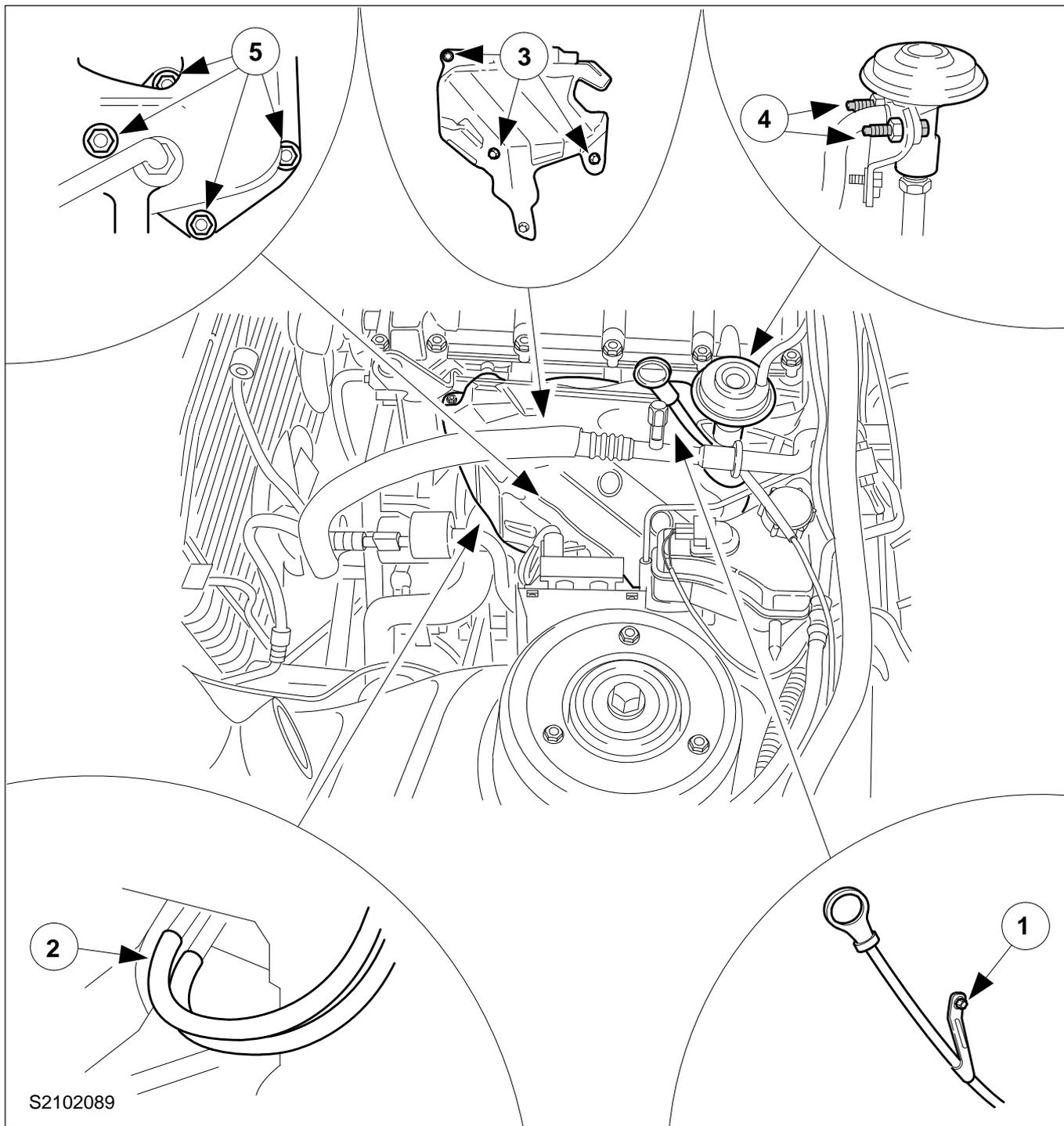
S2102002

**14. Disconnect the multiplugs.**

- Detach the ignition coil cover.
- 1 Ignition coils.
  - 2 Idle speed control (ISC) valve.
  - 3 Throttle position (TP) sensor.
  - 4 Coolant temperature display sender
  - 5 Engine coolant temperature (ECT) sensor.
  - 6 Injectors.
  - 7 Withdraw the injector wiring rail.
  - 8 Camshaft position (CMP) sensor.

**15. Remove the spark plugs.**

- 1 Disconnect the spark plug connectors.
- 2 Remove the ignition coils (two bolts for each).
- 3 Remove the spark plugs.



S2102089

**16. Detach the components on the left-hand side of the engine:**

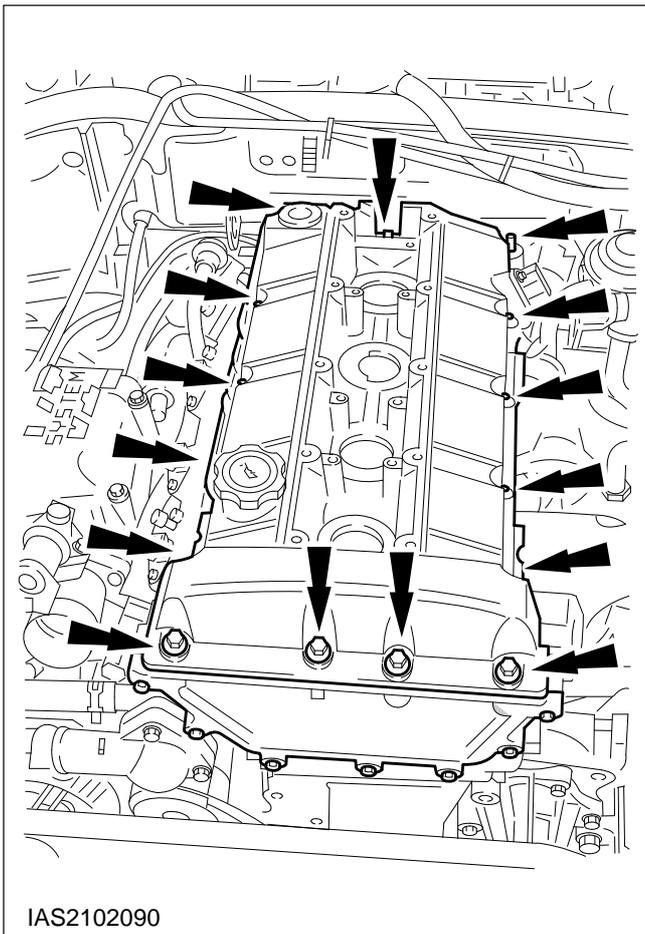
- 1 Dipstick tube.
- 2 Pull the vacuum hoses off the exhaust gas recirculation (EGR) tubes.
- 3 Heat shield.
- 4 Exhaust gas recirculation valve (EGR valve)
- 5 Disconnect the catalytic converter from the exhaust manifold.

**17. Remove the cylinder head cover (eleven bolts, four nuts).**

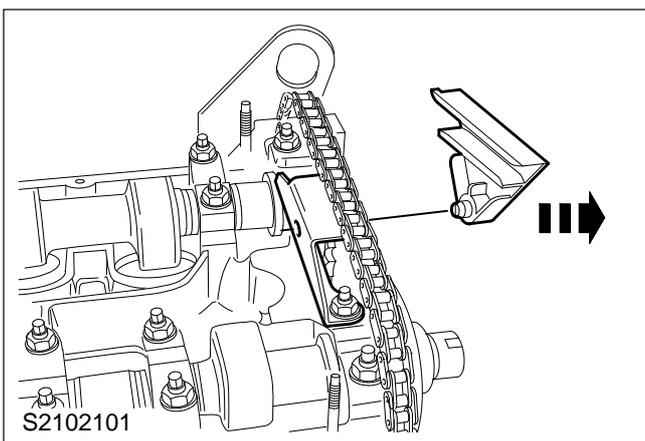
Remove the gasket.

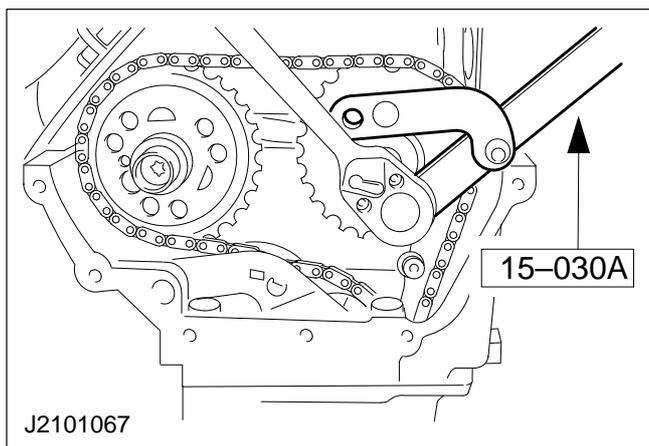
**18. Remove the upper timing gear cover.**

Remove the gasket.

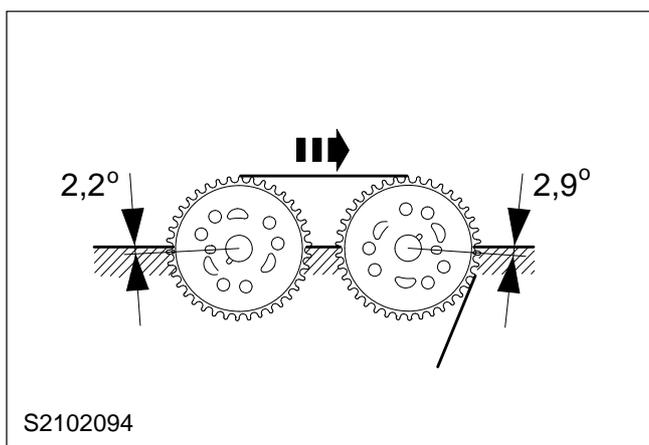


**NOTE:** The chain guide rail must be renewed during assembly.

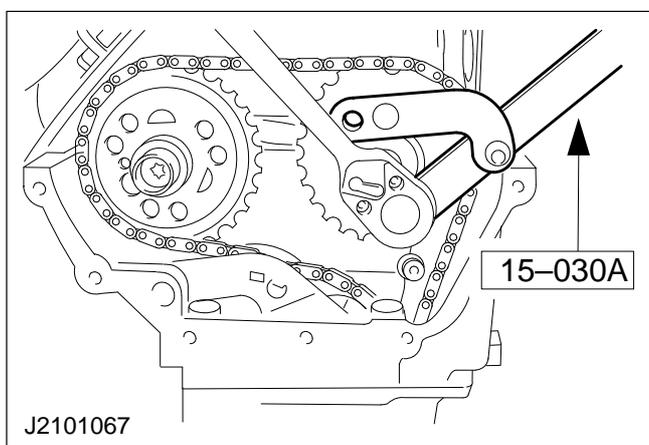
**19. Detach the upper chain guide rail.**



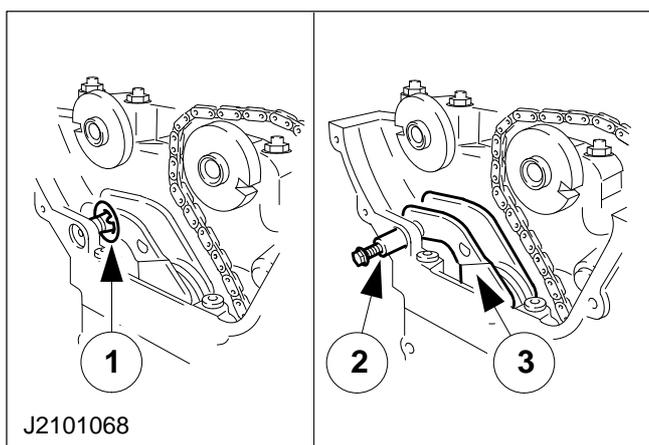
**20. Loosen the camshaft sprockets.**



**21. Set the camshaft sprockets to the marks.**

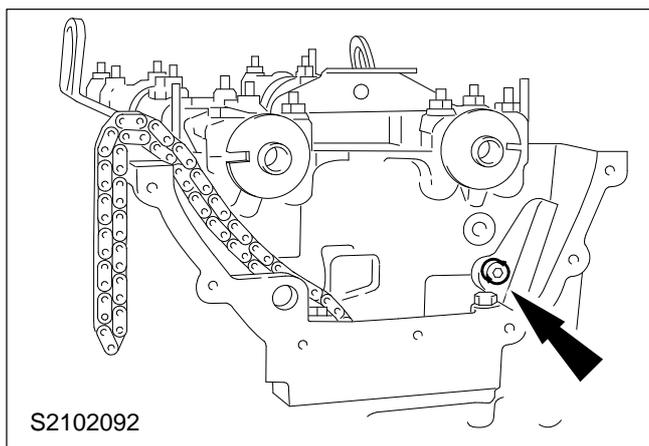


**22. Remove the camshaft sprockets with the timing chain.**

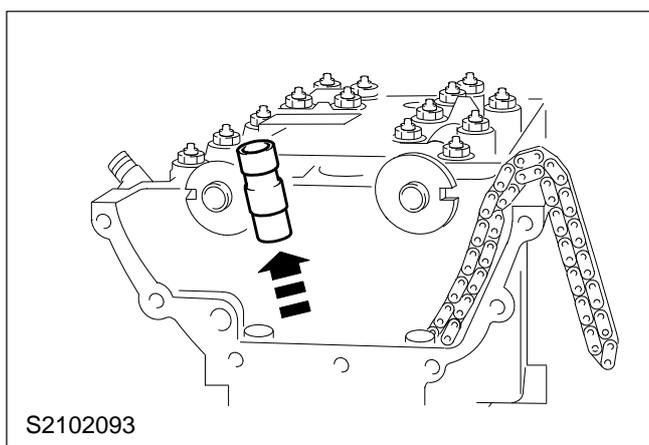


**23. Remove the chain tensioner arm.**

- 1 Remove the retaining ring with a pair of pliers.
- 2 Withdraw the chain tensioner pivot with a bolt (M6).
- 3 Remove the chain tensioner arm from the housing.

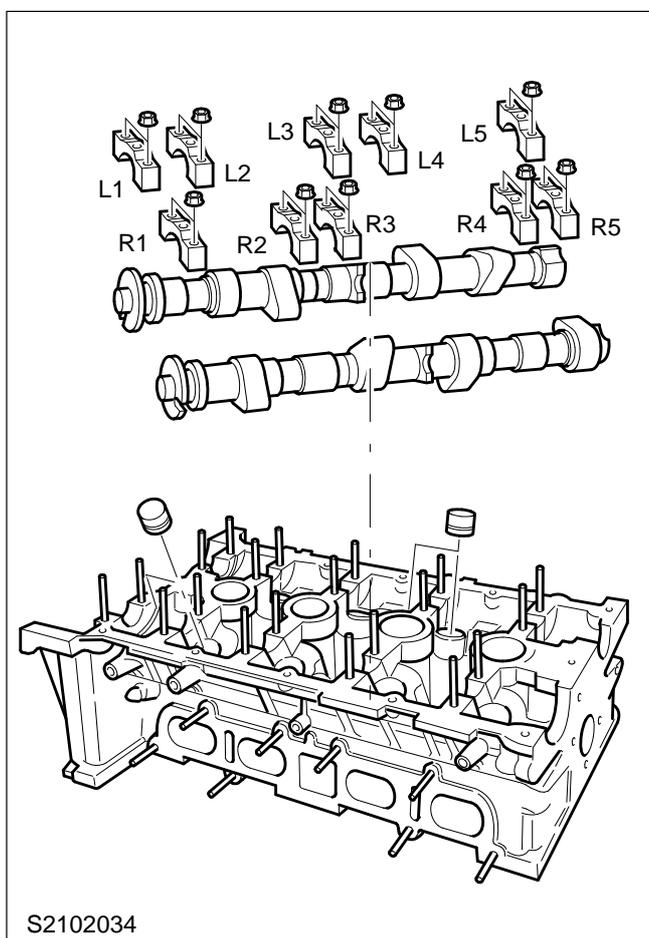


#### 24. Slacken the chain guide bolt.



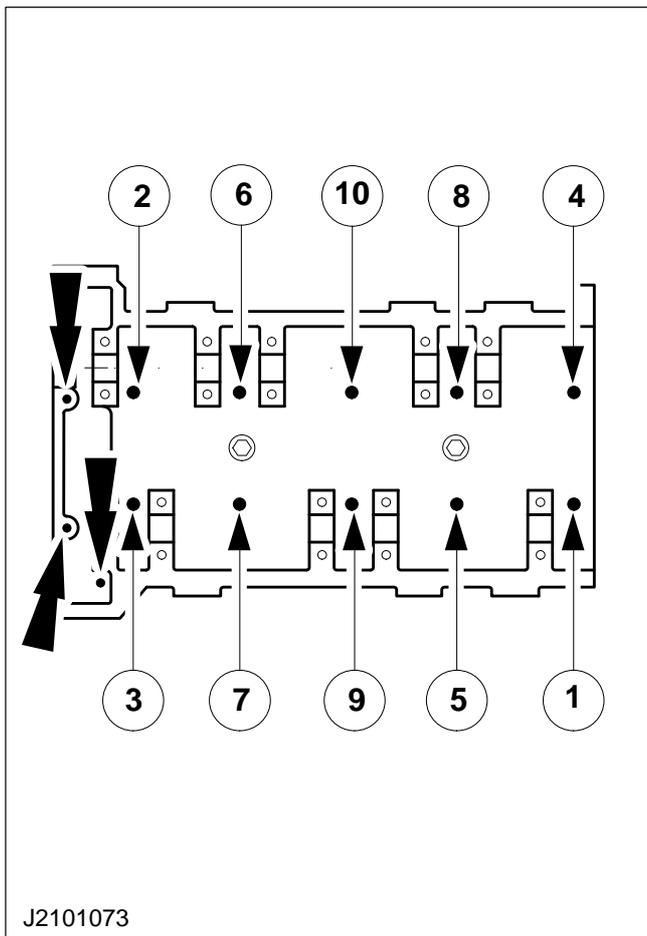
#### 25. Remove the chain tensioner plunger.

- ⚠ CAUTION:** Do not re-use the plunger.  
Tie the timing chain up to one side.



#### 26. Remove the camshafts.

- Detach the chain guide bracket with the front bearing caps.
- Remove the hydraulic tappets and keep them in order.

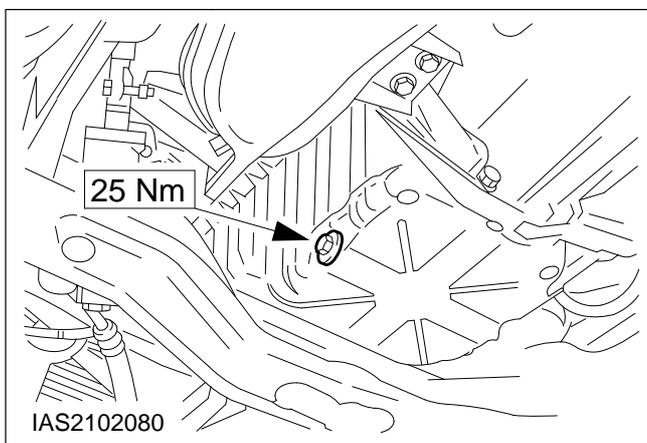


**CAUTION:** The cylinder head should be left to cool down to 30 °C or below before the bolts are slackened.

**CAUTION:** Cylinder head bolts should not be re-used.

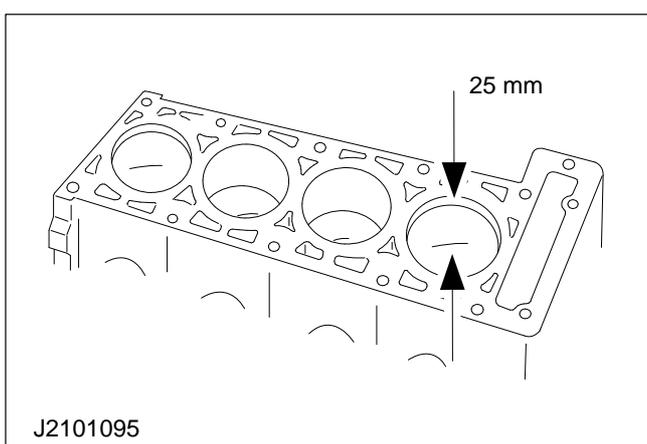
### 27. Detach the cylinder head.

**NOTE:** Bolt-slackening sequence. Release the three auxiliary bolts first.



### 28. Drain off the engine oil.

Tighten the drain plug with a new seal ring.

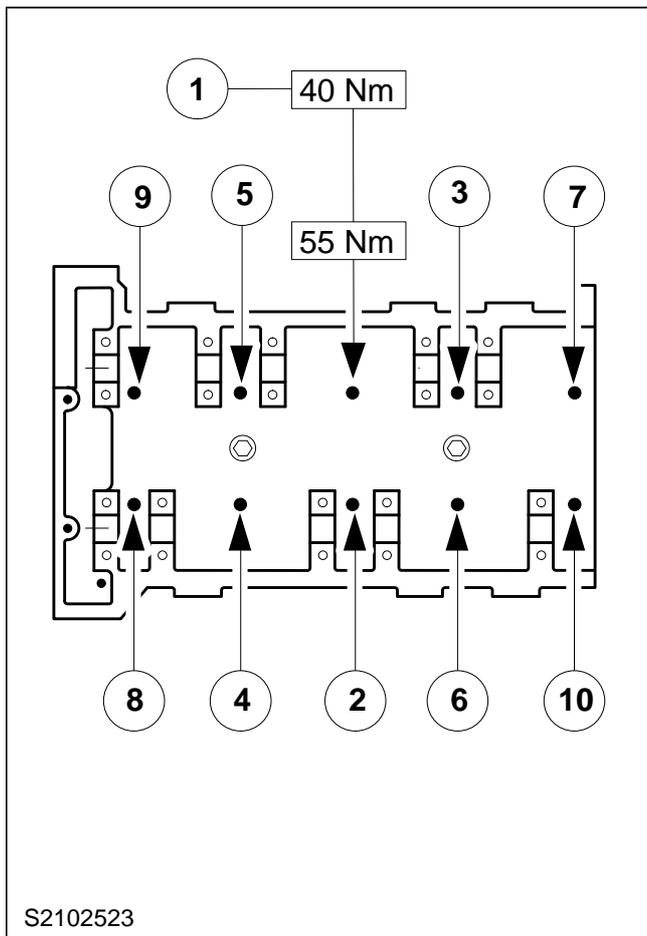


### Fit the cylinder head

### 29. Preparatory measures.

The mating faces of the cylinder head and cylinder block must be dry and clean.

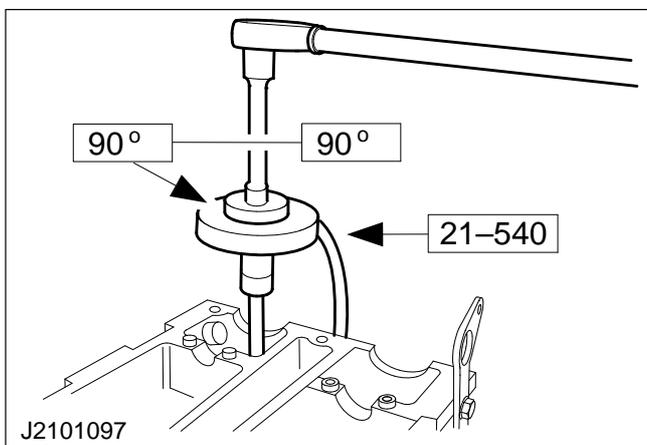
### 30. Turn the crankshaft until the piston of cylinder no. 1 is at 25 mm before TDC.



**CAUTION:** Use new bolts.

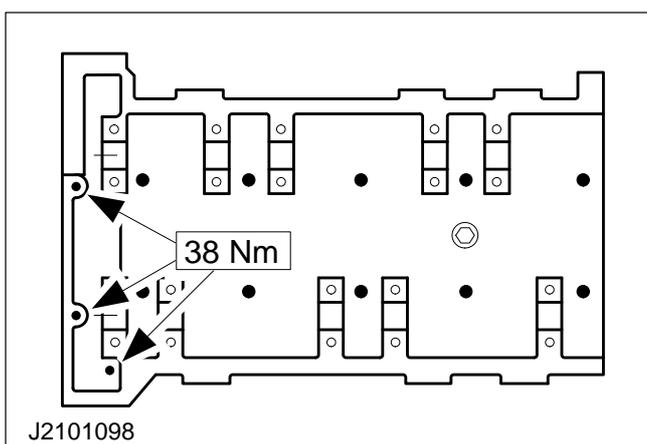
**NOTE:** The cylinder head gasket and the cylinder head are guided into the correct installation position by guide sleeves.

**31. Fit a new cylinder head gasket. Fit the cylinder head and tighten the bolts.**

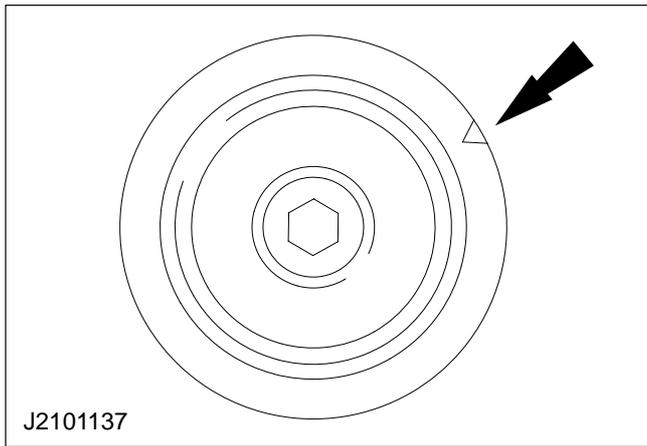


**CAUTION:** The cylinder head bolts must not be re-torqued.

**32. Tighten the cylinder head bolts in two stages.**



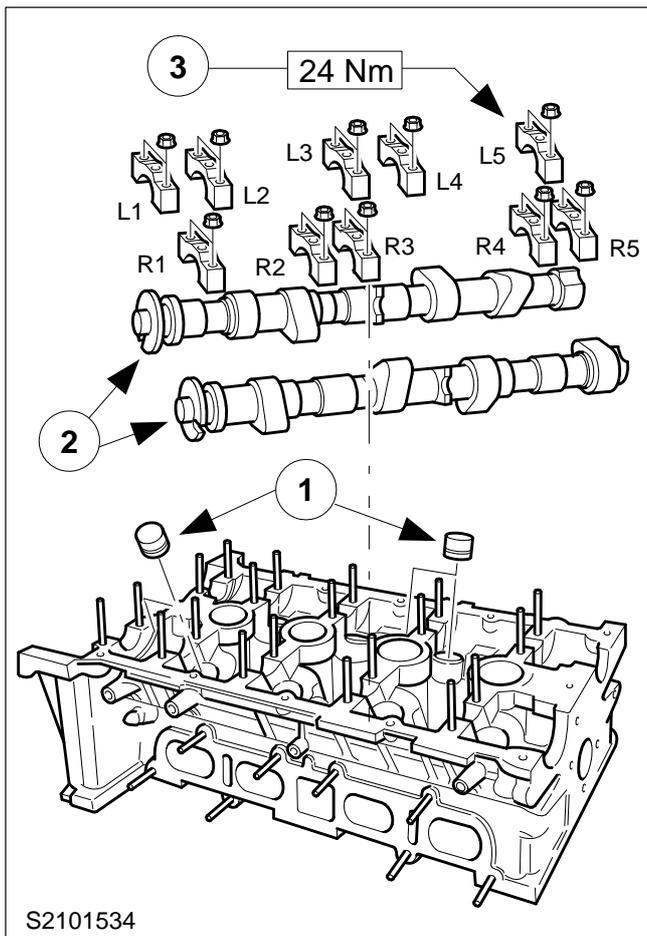
**33. Tighten the auxiliary cylinder head bolts.**



### Install the camshafts

#### 34. Turn the crankshaft until the piston of cylinder no. 1 is at approx. 25 mm before TDC.

Position of the crankshaft belt pulley/vibration damper.



#### 35. Install the camshafts.

**CAUTION:** Before the camshafts are installed, the piston of cylinder no. 1 must be at a point approx. 25 mm before TDC.

**CAUTION:** After installation of the camshafts, it is imperative to wait 15 minutes before the engine is turned.

- Oil the bearings.

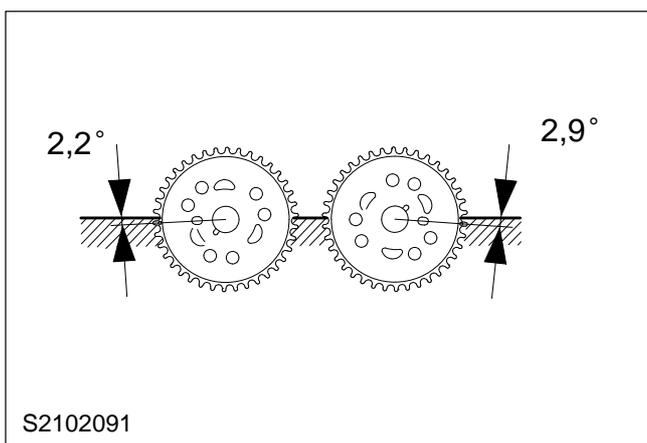
1 Fit the hydraulic tappets.

2 Fit the camshafts so that none of the cams is at full lift.

**NOTE:** R is the inlet side, L is the exhaust side.

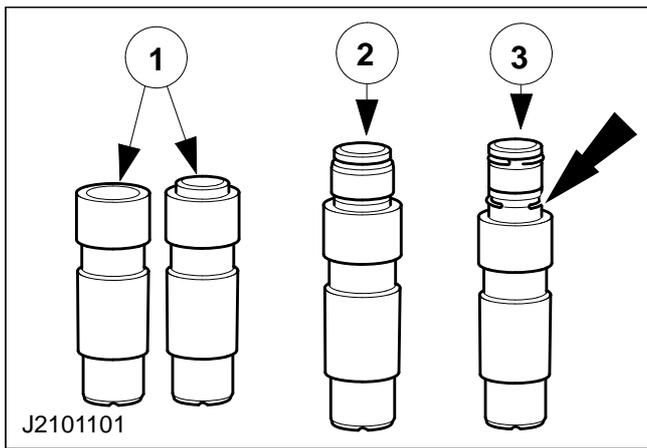
3 Fit the camshaft bearing caps so that the position markings can be read from the rear.

- Fit the chain guide bracket with the front bearing caps.



### Install the timing chain

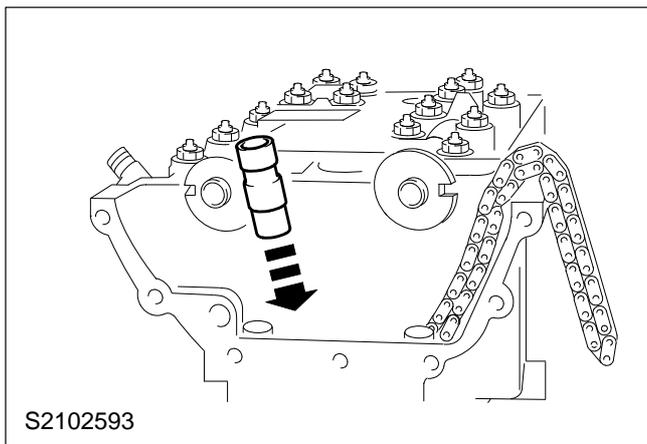
#### 36. Bring the camshafts and crankshaft to TDC.



**⚠ CAUTION:** Fully and partially released plungers (whether new or used) must not be fitted.

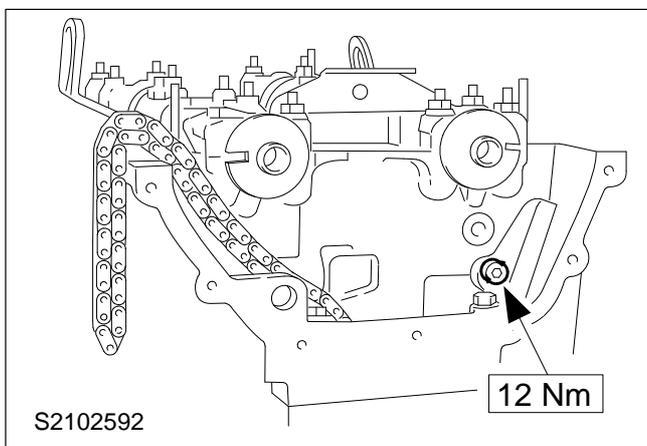
**37. Check the new oil-filled plunger of the chain tensioner.**

- 1 Plunger latched.
- 2 Plunger partly released.
- 3 Plunger fully released (the detent ring is visible).

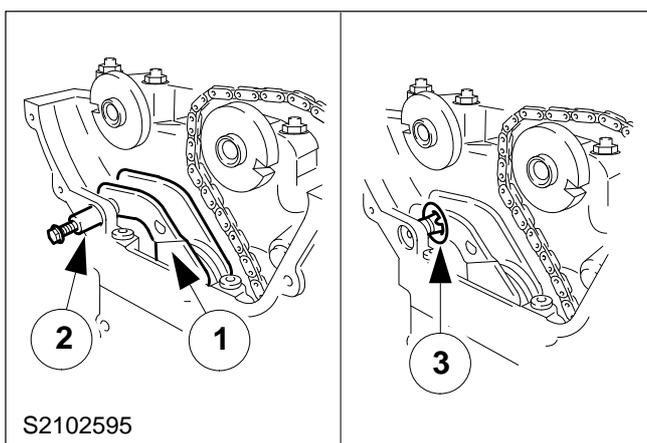


**⚠ CAUTION:** Only use a new latched plunger.

**38. Install the oil-filled plunger of the chain tensioner.**

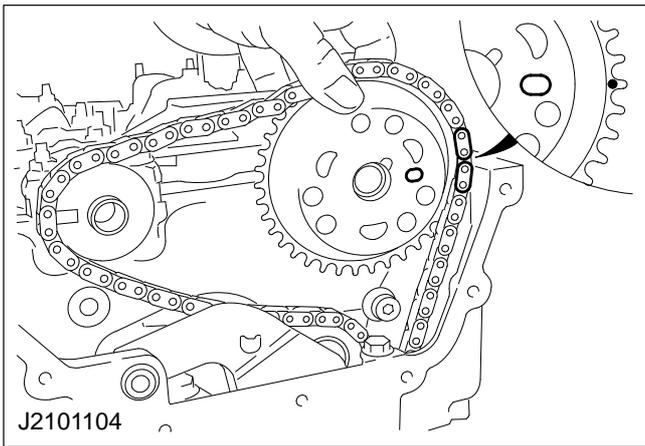


**39. Tighten the chain guide bolt.**



**40. Install the chain tensioner.**

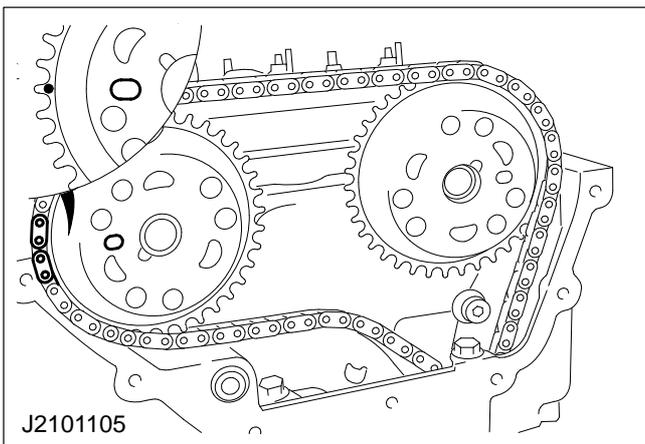
- 1 Insert the chain tensioner.
- 2 Insert the pivot.
- 3 Fit the circlip.



**41. Fit the camshaft timing pulley (inlet side) with the timing chain at the top.**

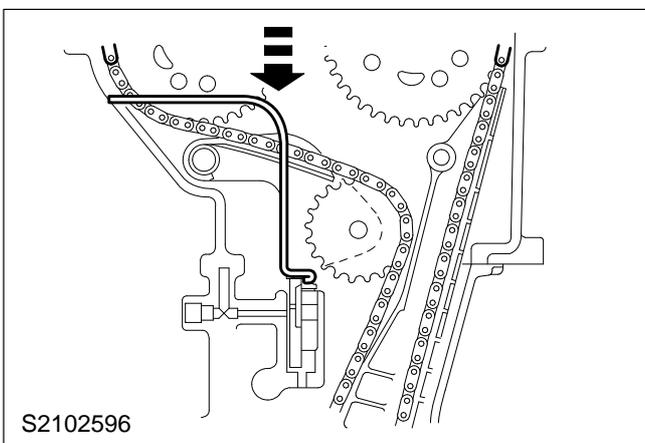
**NOTE:** The timing chain must be taut on the long side.

If necessary, turn the camshaft slightly.



**NOTE:** The timing chain may sag slightly between the camshaft timing sprockets.

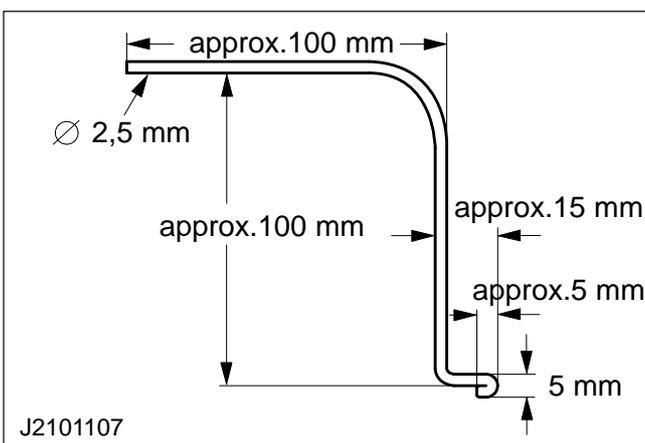
**42. Fit the camshaft timing pulley (exhaust side) with the timing chain at the top.**



**NOTE:** If the chain tensioner arm does not reach the plunger, the plunger must be released using an auxiliary tool.

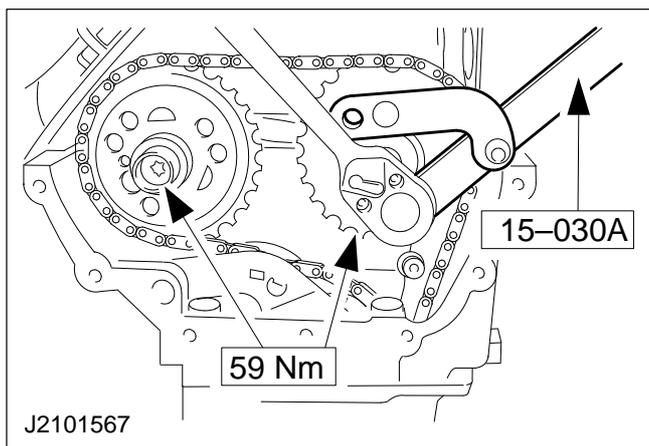
**43. Release the oil-filled plunger of the chain tensioner.**

Press the chain tensioner arm down by hand and unlatch the oil-filled plunger.

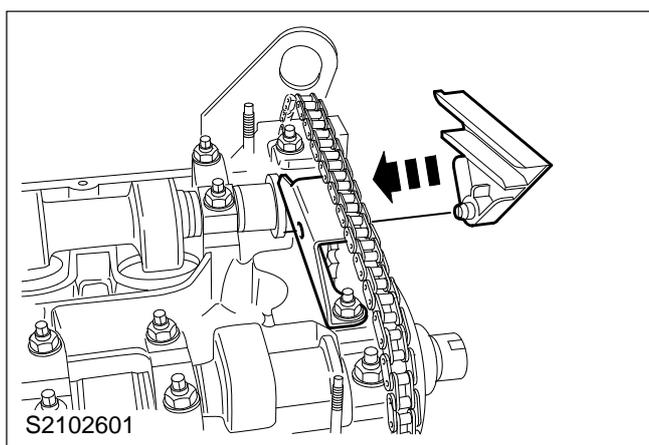


**44. Fabricate an auxiliary tool.**

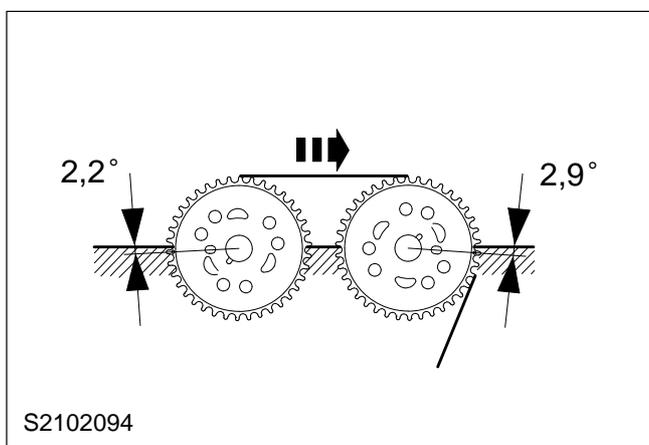
Use a 120 mm length of 2,5 mm welding rod.



#### 45. Secure the camshaft sprockets.



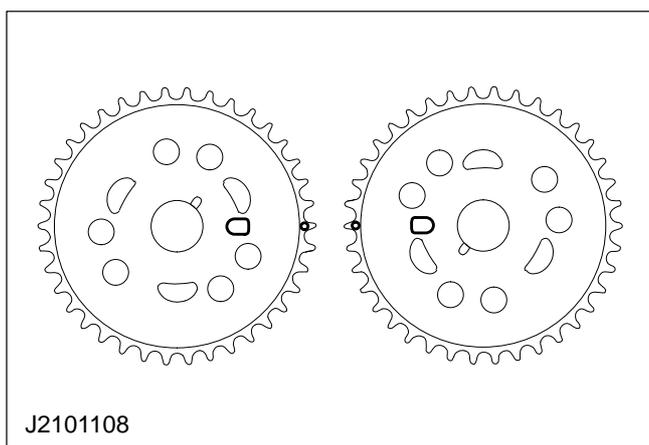
#### 46. Clip the new chain guide rail in the bracket at the top.



**NOTE:** If it is necessary to correct the valve timings (timing chain must be released) a new plunger must be fitted for the chain tensioner.

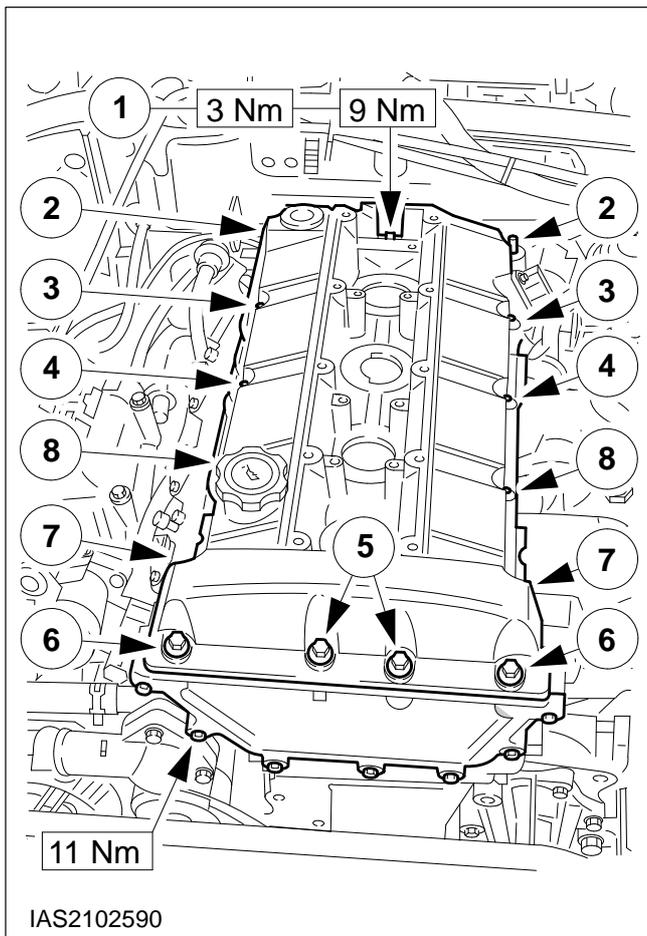
#### 47. Checking the valve timings.

Turn the engine in the normal direction of rotation and line up the sprockets on the mark.



#### 48. Additional check.

- Turn the engine in the normal direction of rotation to the next TDC position.
- The markings on the camshaft sprockets must be exactly opposite each other at the height of the cylinder head top edge.

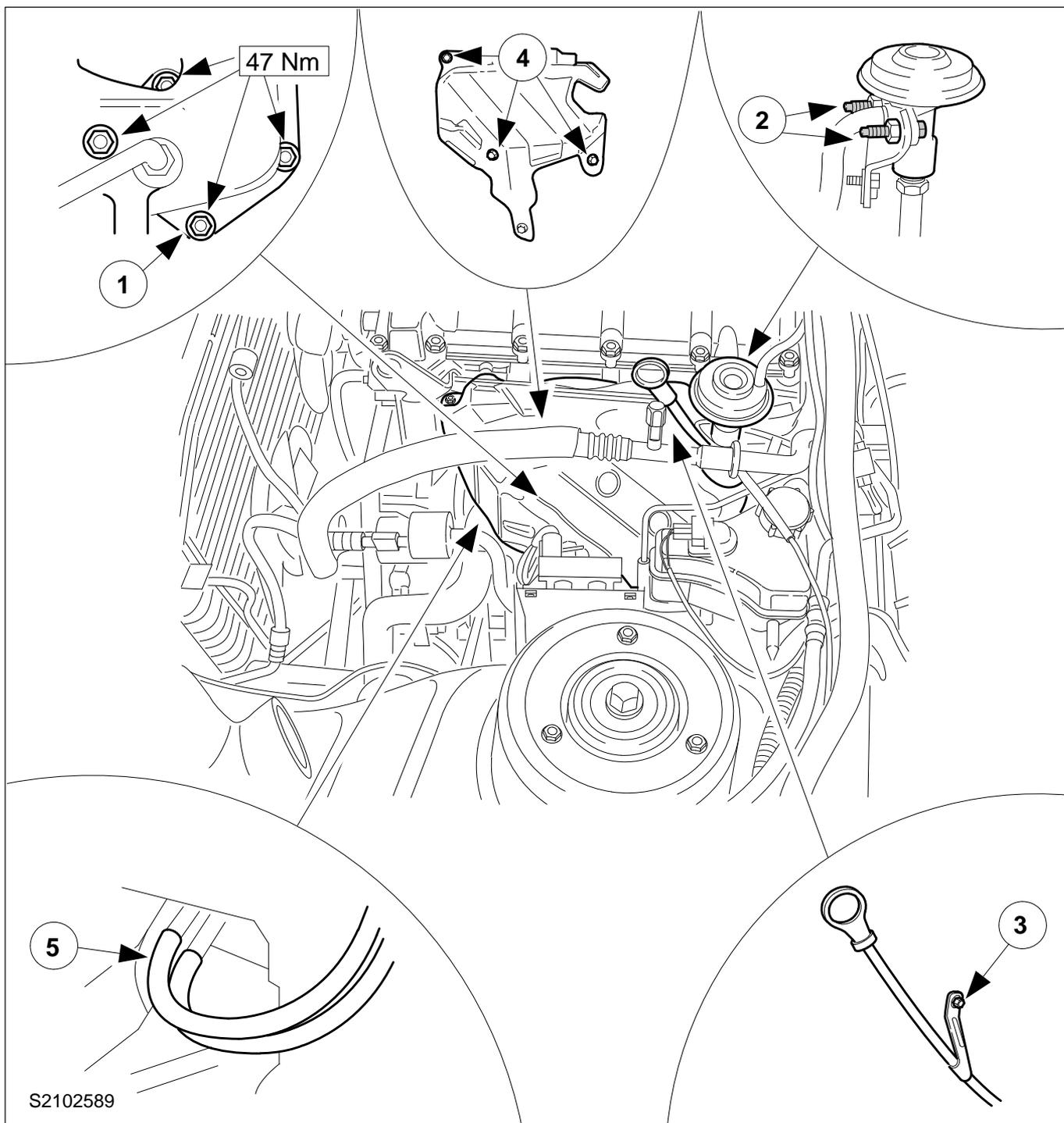


**NOTE:** Bolt tightening sequence.

**49. Fit the upper timing gear cover with a new gasket.**

**NOTE:** The upper edge of the cover should be located at no more than 0,13 mm below the cylinder head cover mating face.

**50. Fit the cylinder head cover with a new gasket (eleven bolts, four nuts) and tighten the bolts in two stages.**

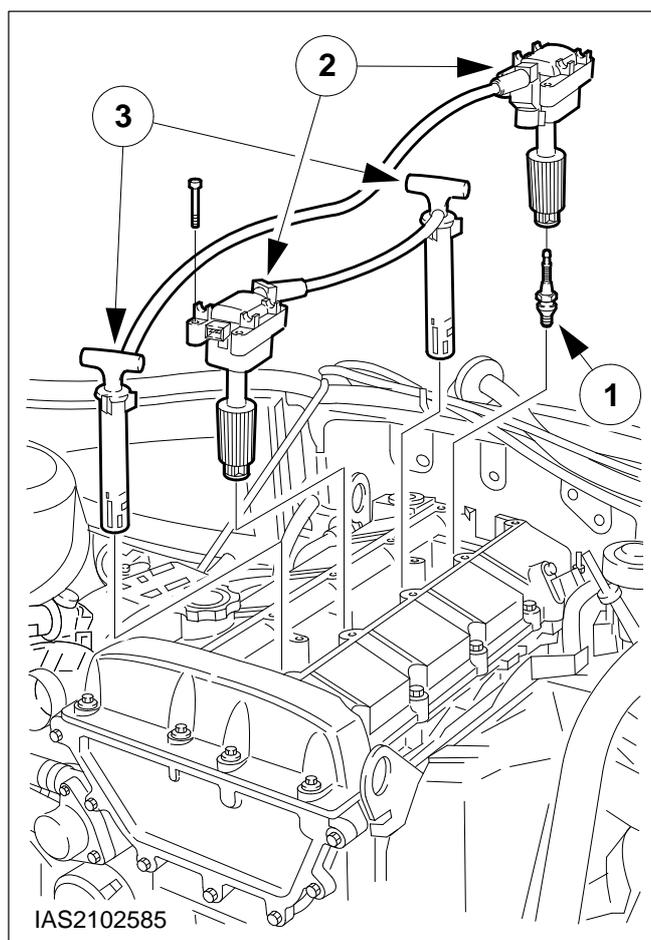


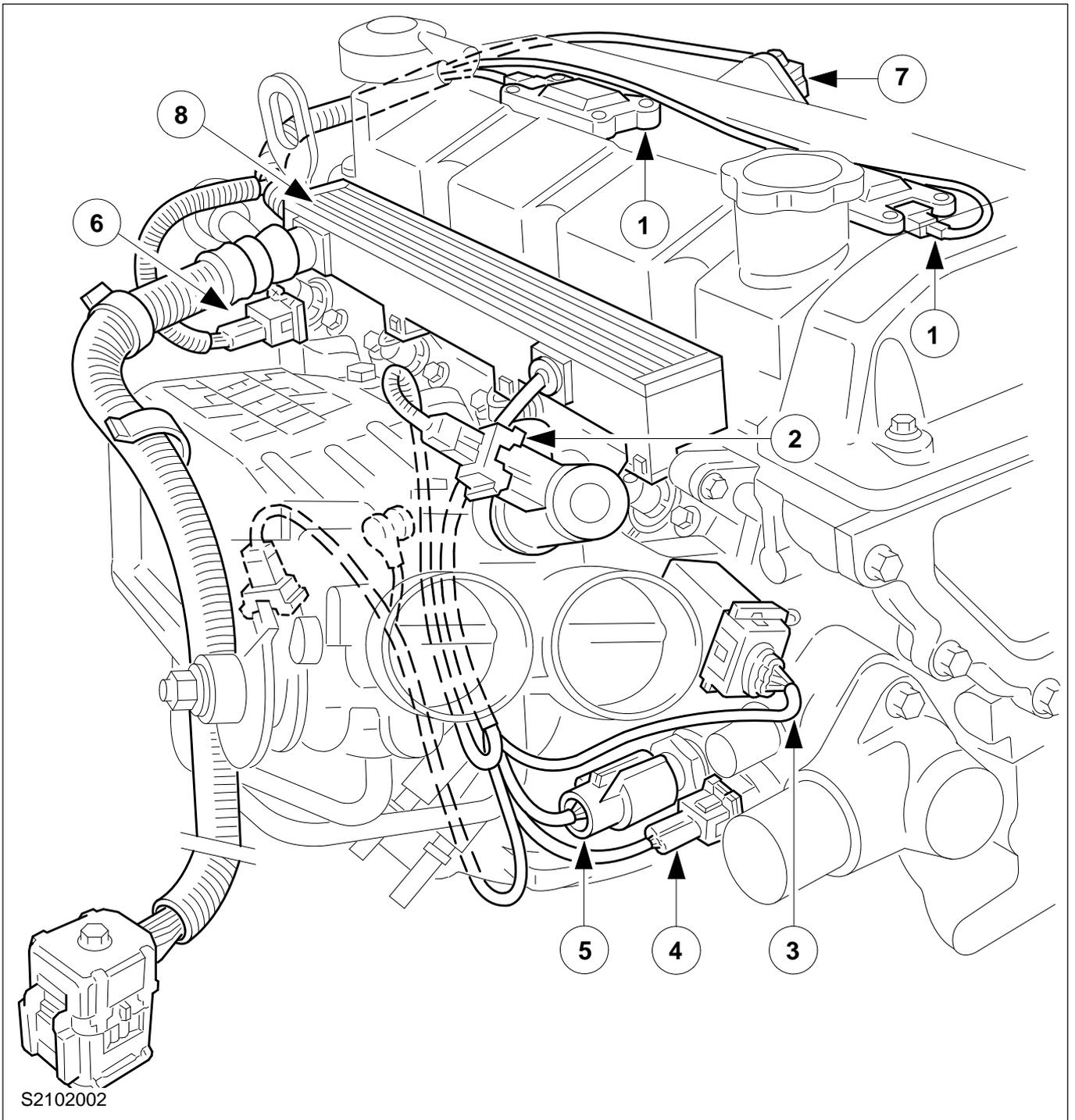
**51. Install the components on the left-hand side of the engine.**

- 1 Fit the catalytic converter to the exhaust manifold.
- 2 Fit the exhaust gas recirculation (EGR) valve in the bracket.
- 3 Fit the dipstick tube.
- 4 Fit the exhaust manifold heat shield.
- 5 Connect the vacuum hoses to the exhaust gas recirculation (EGR) pipes.

**52. Fit the spark plugs, ignition coils and spark plug connectors.**

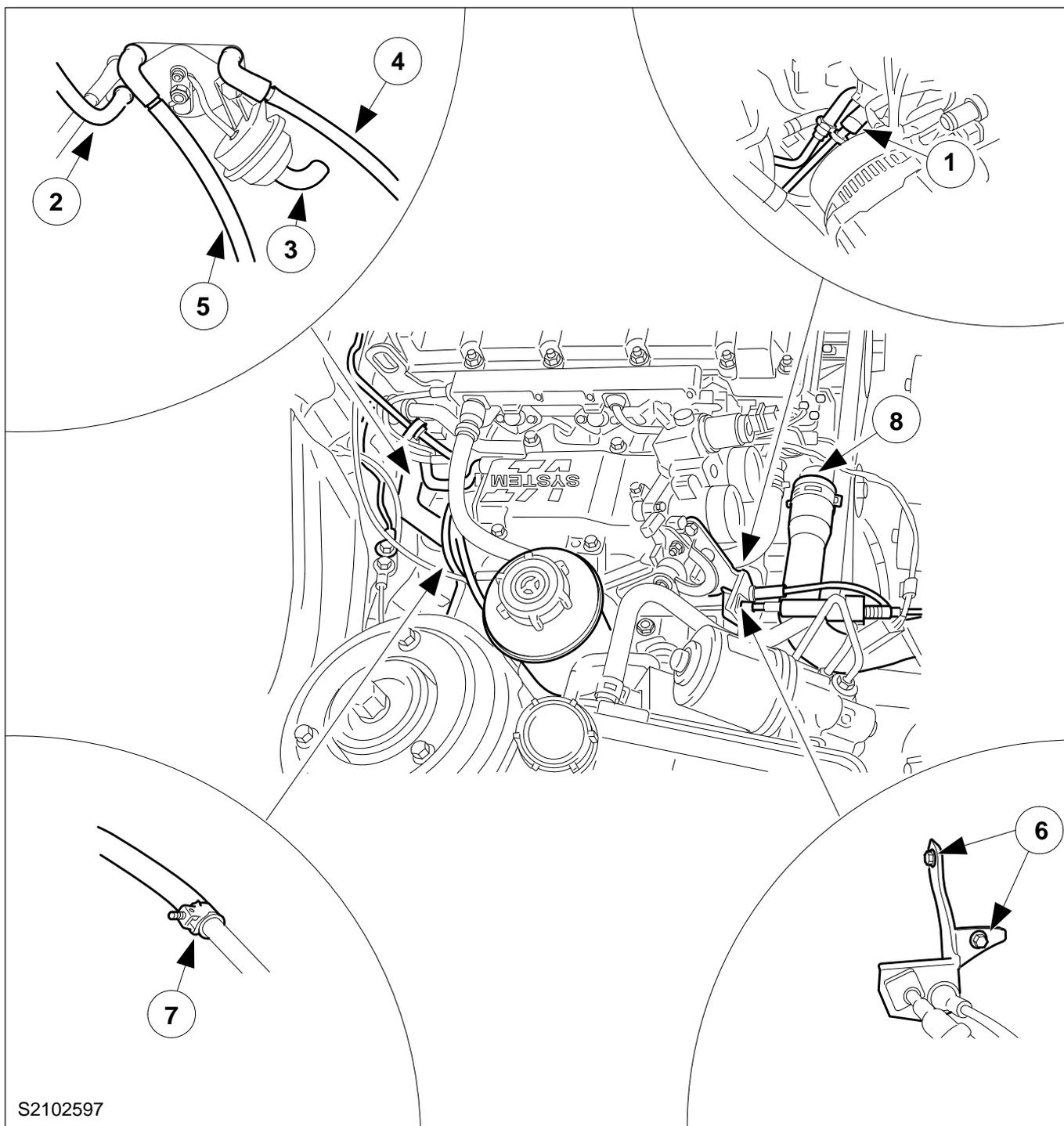
- 1 Spark plug
- 2 Ignition coils (two bolts)
- 3 Spark plug connectors





**53. Connect the multiplugs.**

- 1 Ignition coils.
- 2 ISC valve
- 3 TPS
- 4 Coolant temperature display sender
- 5 ECT sensor
- 6 Injectors.
- 7 CMP sensor
- 8 Injector wiring rail.



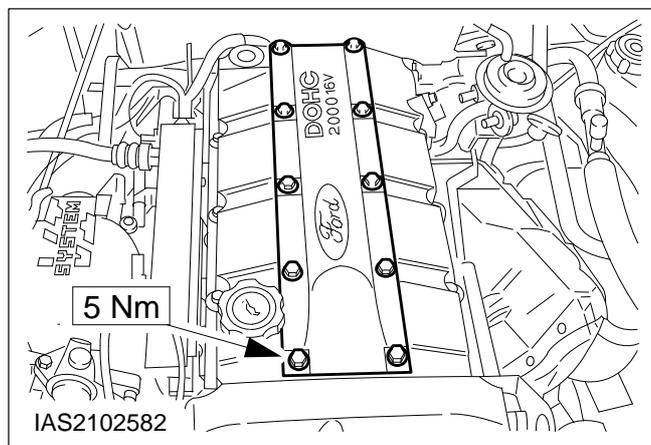
S2102597

#### 54. Install the components on the right-hand side of the engine compartment.

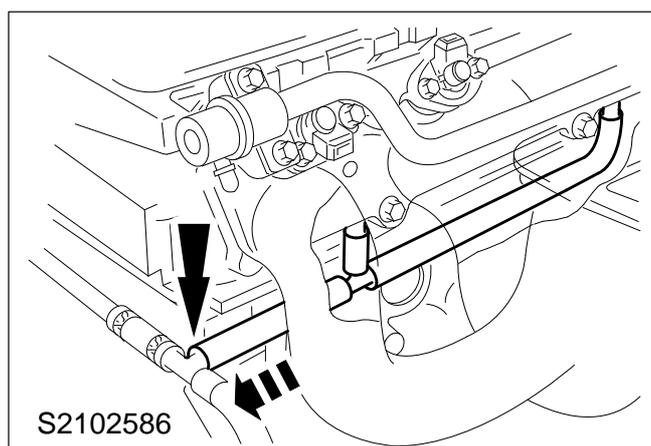
- Connect the fuel pipes.

Vacuum hoses:

- 1 To the brake servo.
- 2 To the variable intake system (VIS) control motor.
- 3 To the solenoid (VIS+EGR).
- 4 To evaporative emission system valve (EVAP).
- 5 Fit the throttle cable and the speed control cable and secure them.
- 6 Heater coolant hose.
- 7 Coolant hose to thermostat housing.

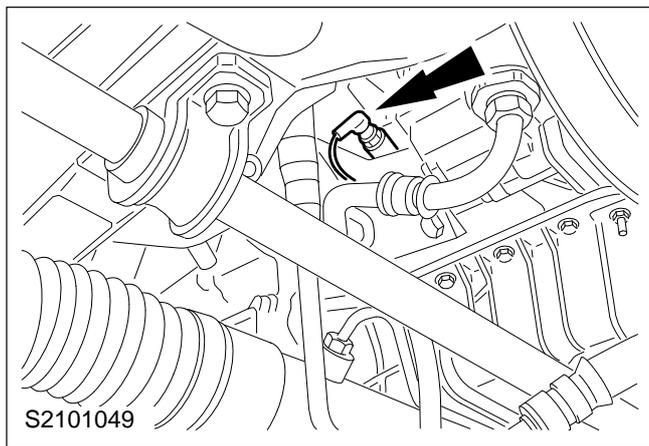


#### 55. Fit the ignition coil cover.

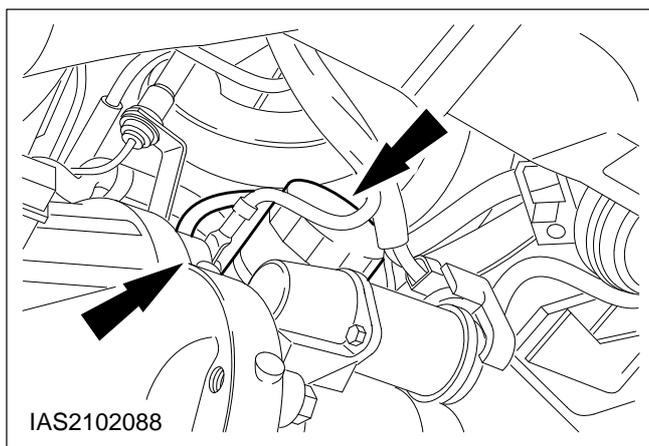


#### 56. Raise the vehicle.

#### 57. Connect the crankcase breather hose.



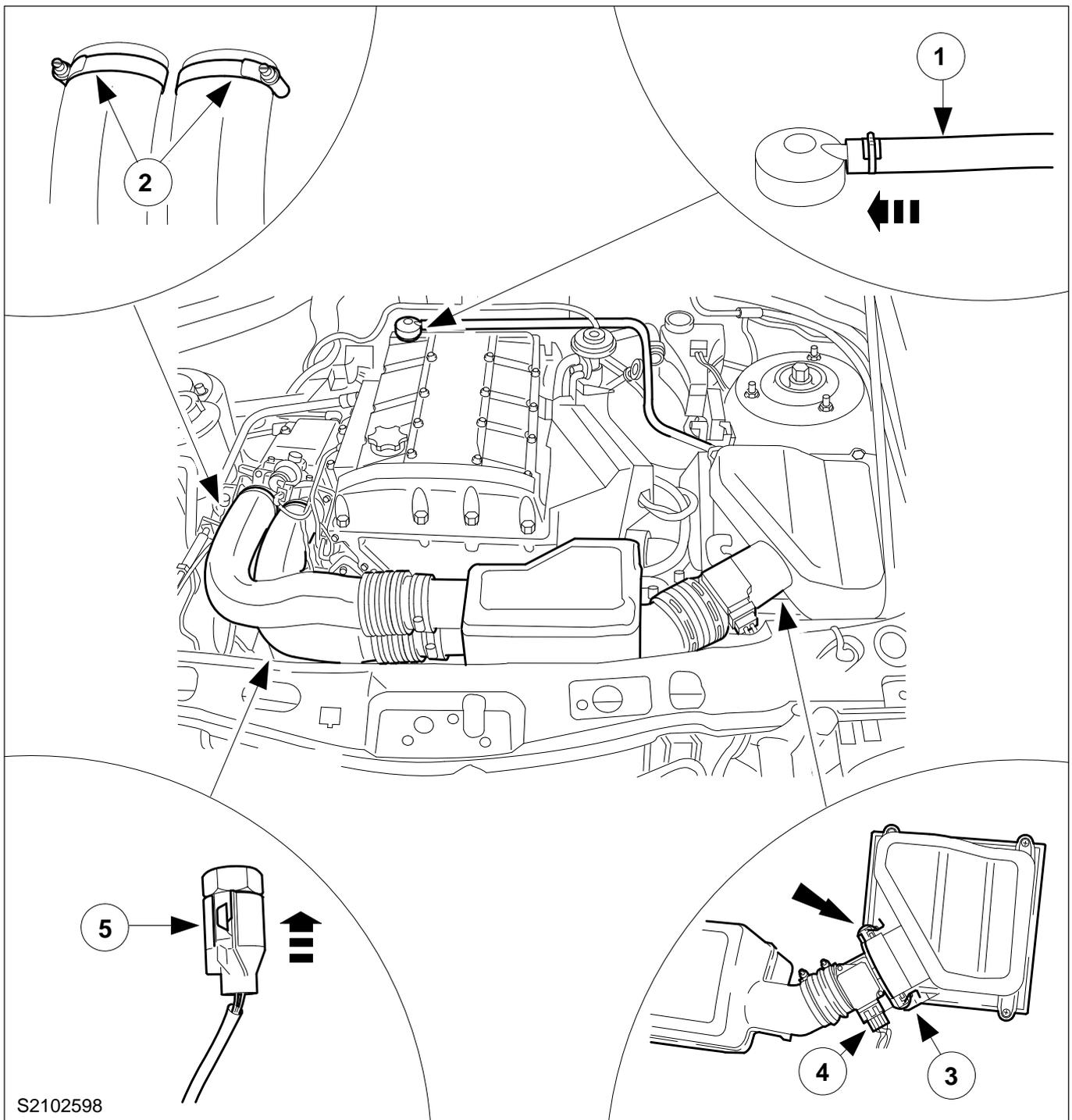
**58. Connect the oil pressure switch plug.**



**59. Fit a new oil filter.**

**60. Connect the crankshaft position (CKP) sensor multiplug.**

**61. Fit the engine undershield.**



S2102598

## 62. Fit the resonator with the intake pipes.

- Lower the vehicle.
- 1 Install the crankcase ventilation hose.
- 2 Tighten the two hose clips.
- 3 Fit the resonator to the air cleaner (two spring band clips).
- 4 Push on the MAF multiplug.
- 5 Push on the IAT sensor multiplug.

**63. Finishing operations:**

- Top up the engine oil.
- Top up the coolant.
- Connect the battery earth lead.
- Check the routing of the vacuum hoses and the wiring and secure them using cable ties as required.
- Enter the radio keycode and reprogramme the preset radio stations.
- Set the clock.
- Carry out a road test to allow the PCM (EEC IV) to re-learn values.
- Check the fluid levels after the road test and correct them as necessary.