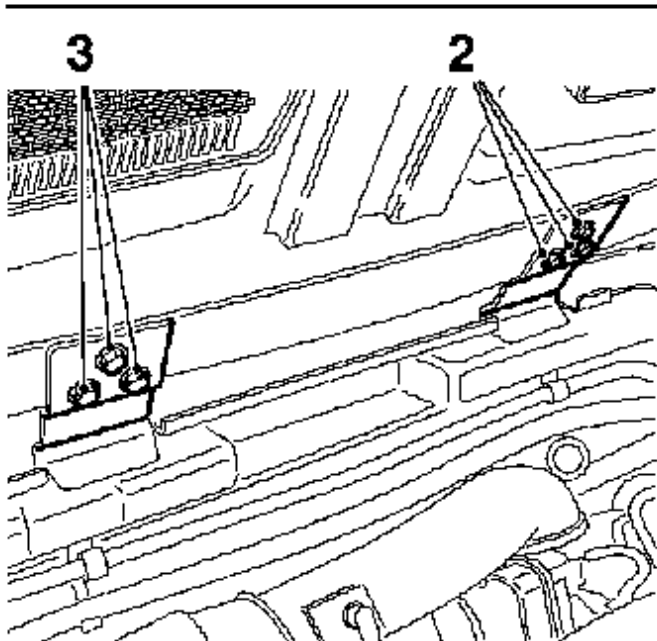
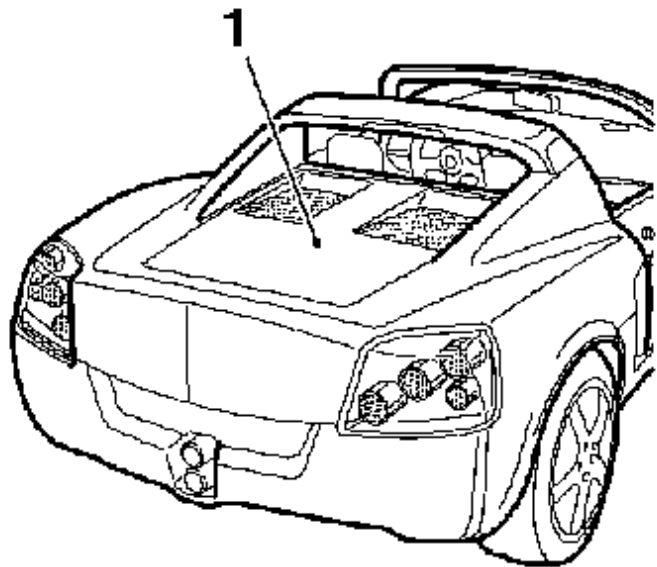


## Cylinder Head, Remove and Install (Z 22 SE)



### Remove

1. Open the bonnet.
2. Disconnect the battery.
3. Open the engine cover (1).
4. Detach the engine cover.
  - 6 bolts (2) and (3)

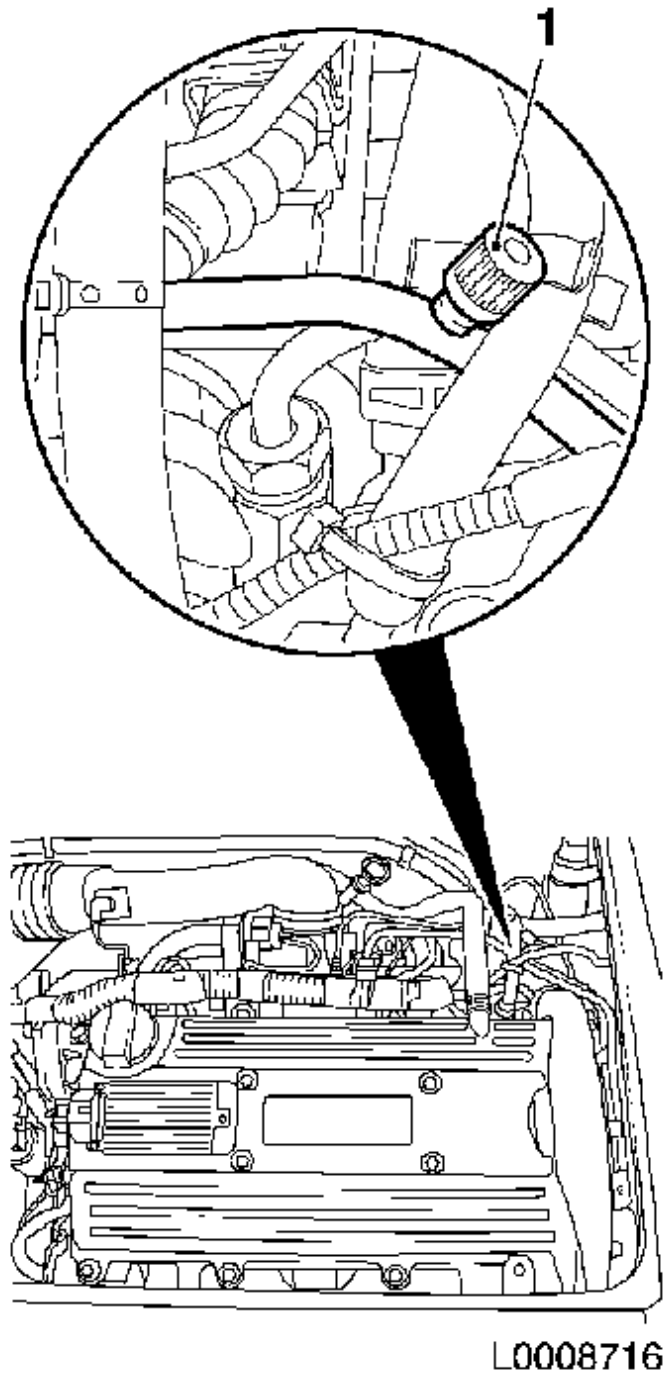


L0008715

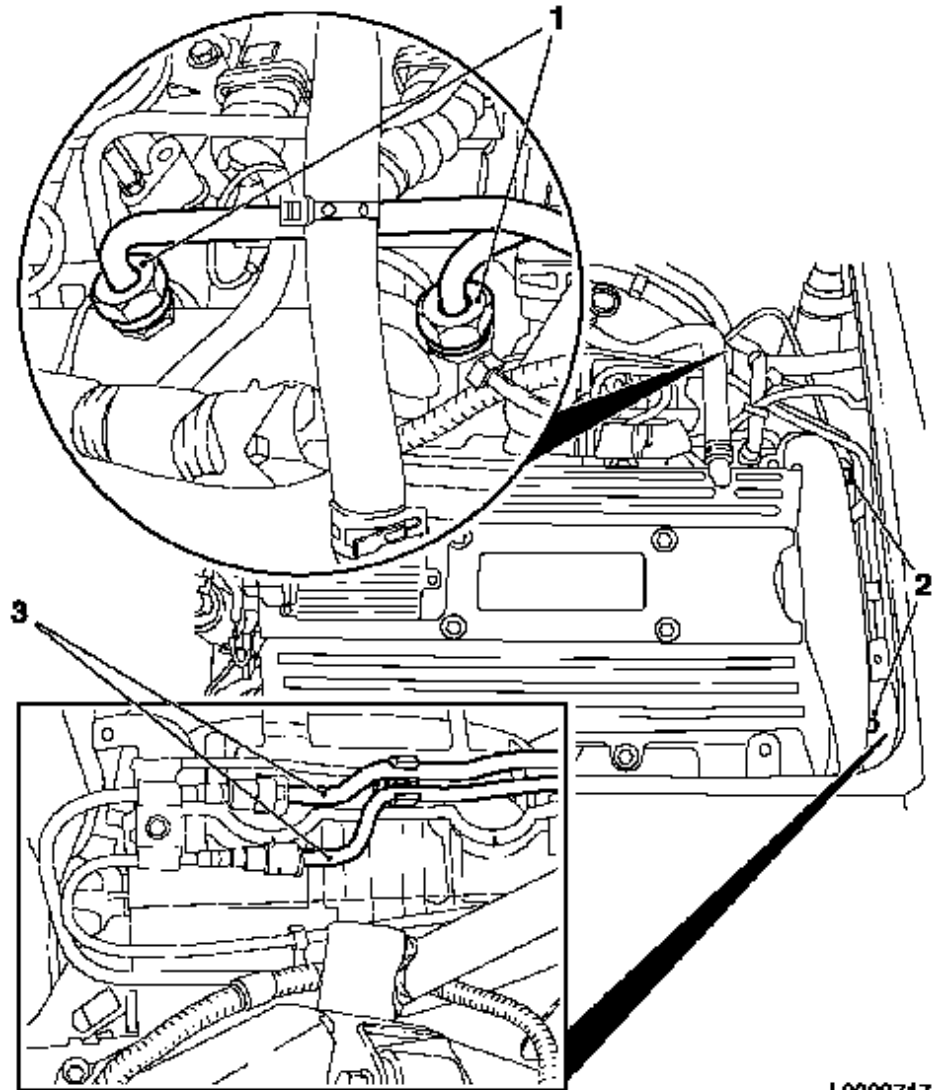
5. Release the fuel pressure.
 

**Important:** Fuel may escape – observe the safety regulations and relevant national legislation.

  - Release the fuel pressure with the pressure tester **KM-J-34730-91** (1) via test connection (2).
    - Collect any escaping fuel in a suitable container.

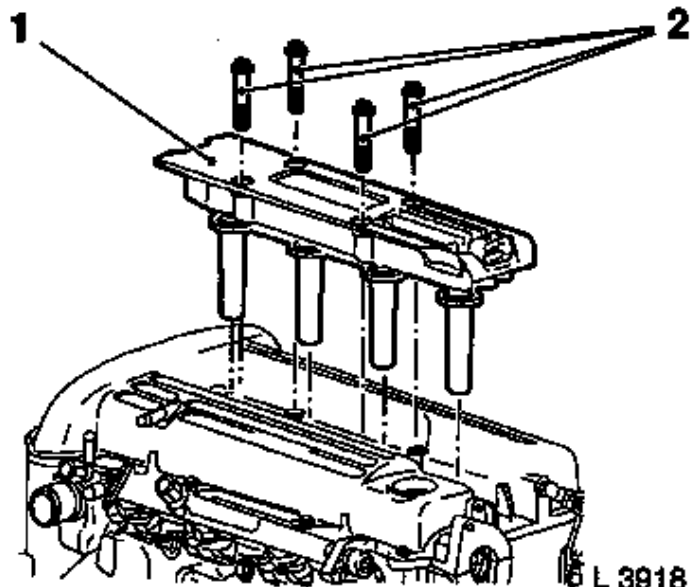


6. Disconnect the fuel lines.
- 2 union nuts (1)
  - 2 bolts (2)
  - Reposition the fuel lines (3) to one side.



L0008717

7. Detach the ignition module (1).
- Release and detach the wiring harness connector.
  - 4 bolts (2)



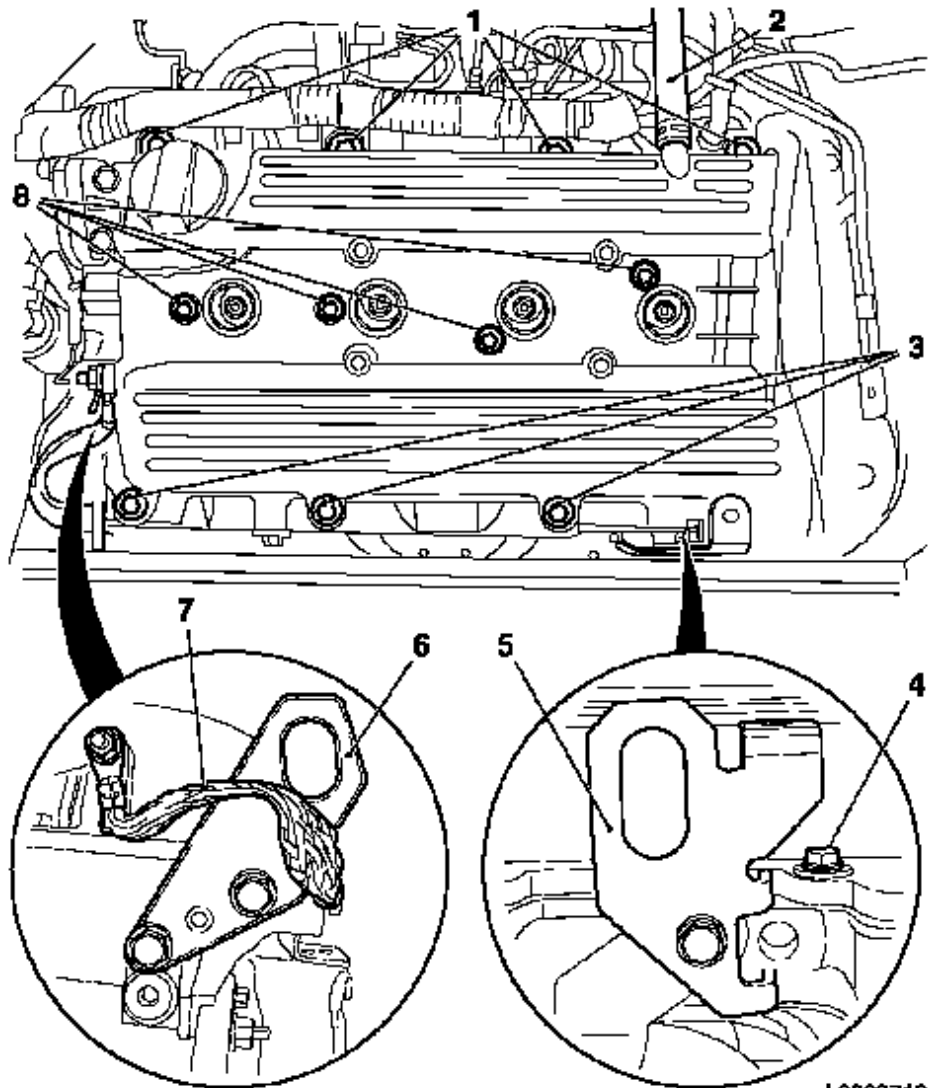
L 3918

**8.** Remove the cylinder head cover.

- Detach the engine breather hose (2).
- Detach the engine lifting eyes (5) and (6).
- 2 bolts, 1 nut
- Detach the ground cable (7).
- 1 bolt
- 12 bolts (1), (3), (4) and (8)

**9.** Detach the ground cable from the cylinder head.

- 1 bolt



L0008718

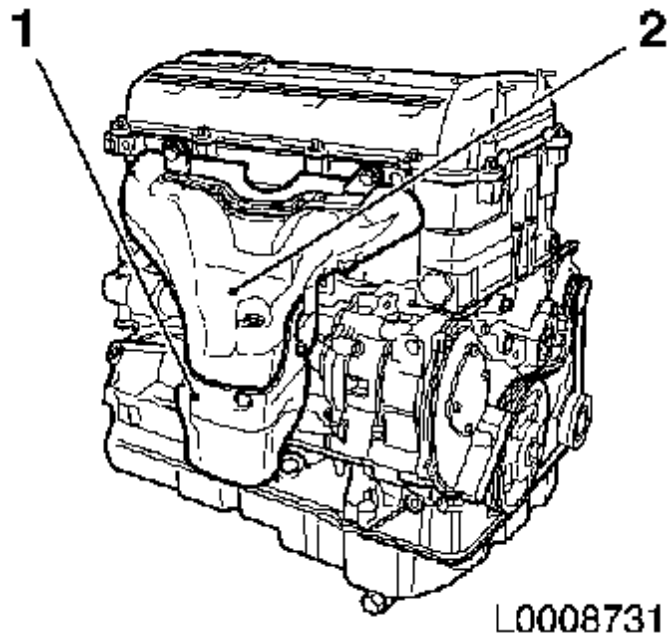
**10.** Remove the lower heat shield (1).

- 3 bolts

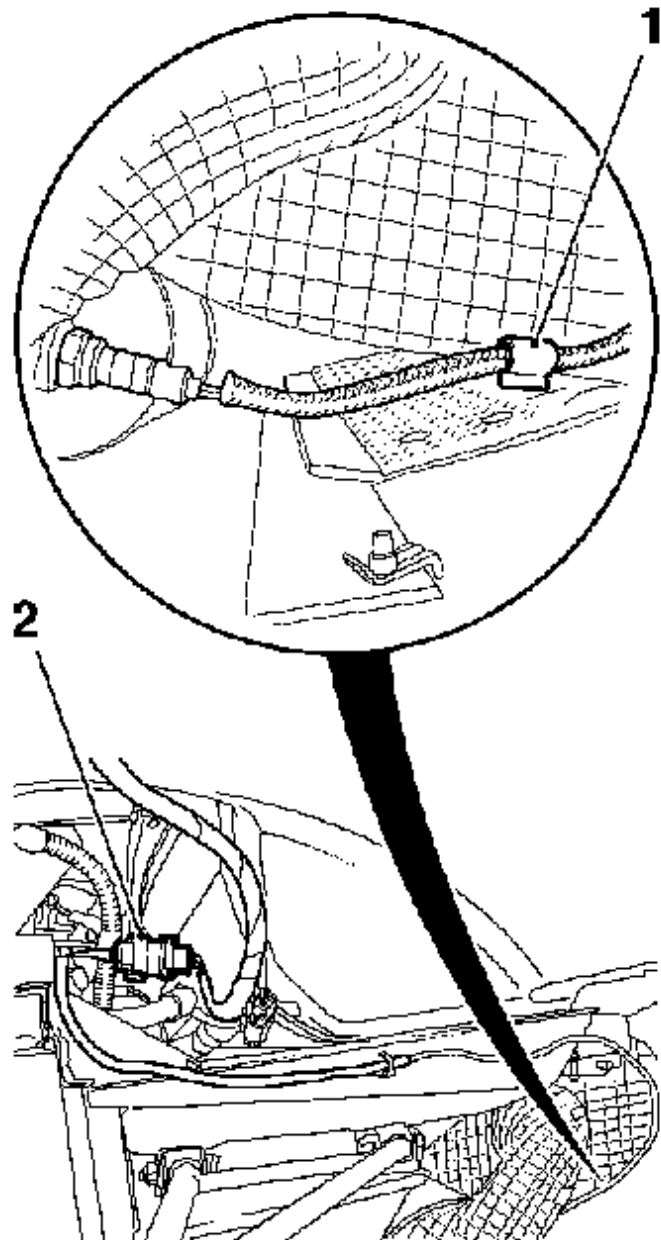
**11.** Detach the upper heat shield (2).

- 3 bolts

**12.** Undo the bolts on the rear wheels.

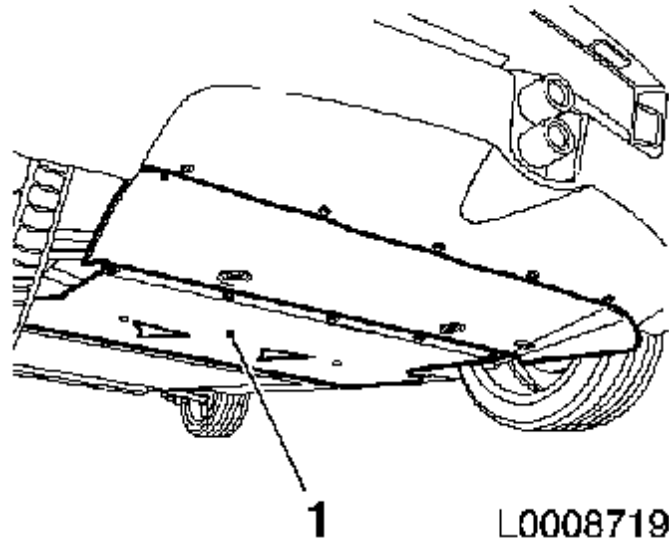


13. Raise the lifting ramp.
14. Detach the rear wheels.
15. Remove the wheel arch trim on the left and right-hand side.
  - 12 bolts
16. Disconnect the lambda probe wiring harness connector (2).
  - Expose the wiring harness.
  - 5 clips, 1 retaining clip (1)
17. Raise the lifting ramp.

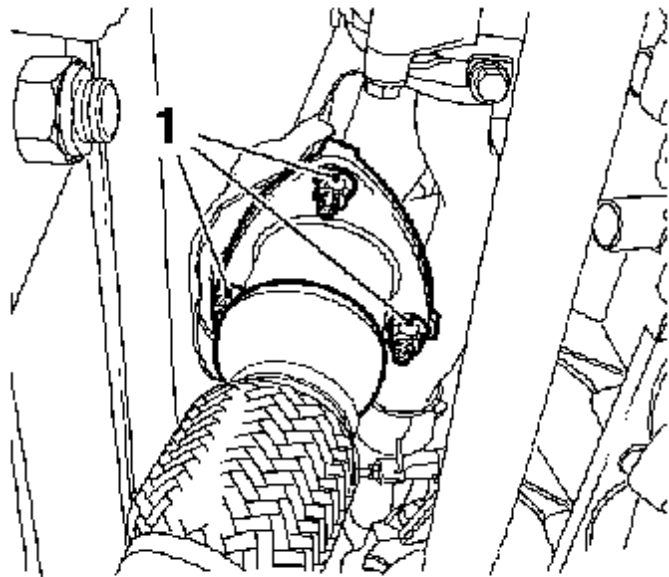


L0008732

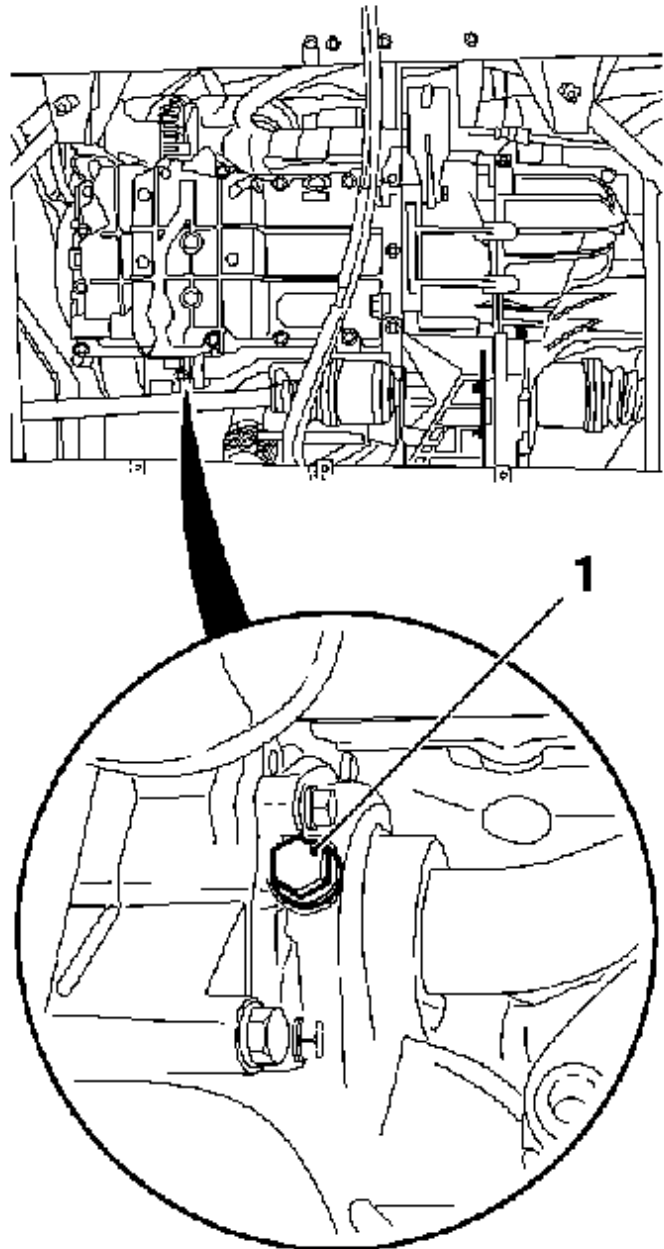
18. Remove the lower engine splash shield (1).
  - 13 bolts
19. Remove the cover from the exhaust system.
  - 14 bolts



20. Detach the front exhaust pipe.
- 3 nuts (1)
  - Remove the gasket.



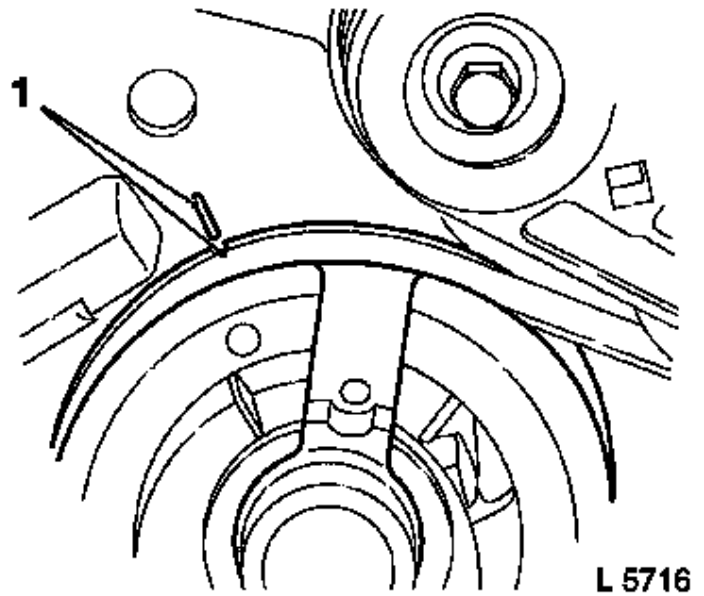
21. Place a drip tray underneath.
22. Drain the coolant.
- Open the coolant drain plug (1) at the radiator and the coolant pump.
  - Tighten the coolant drain plugs.
    - Tightening torque **20 Nm**



L0008724

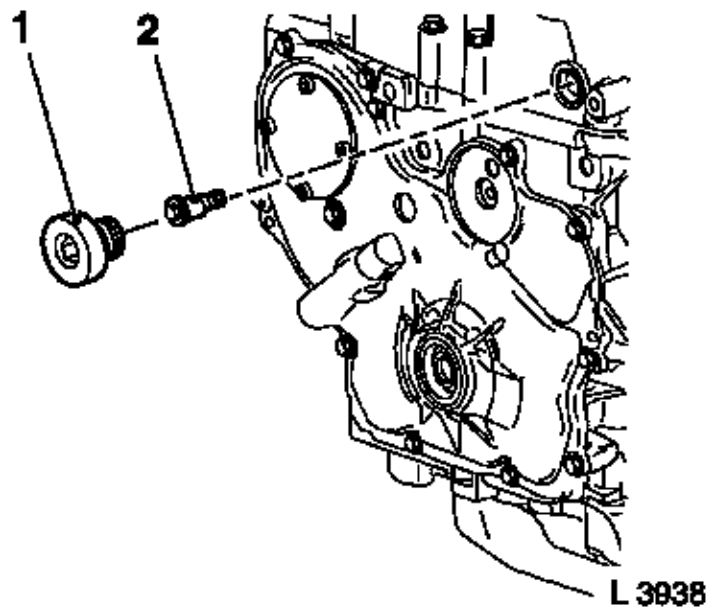
23. Place a drip tray underneath.
24. Drain the engine oil.
  - Open the oil drain plug.
  - Install the oil drain plug using a new oil seal.
    - Tightening torque **25 Nm**
25. Align the crankshaft.
  - Rotate the crankshaft in the normal direction of rotation to TDC on cylinder no. 4 (marking 1).  
**Note:** In this position the cams of cylinder no. 4 point upwards.



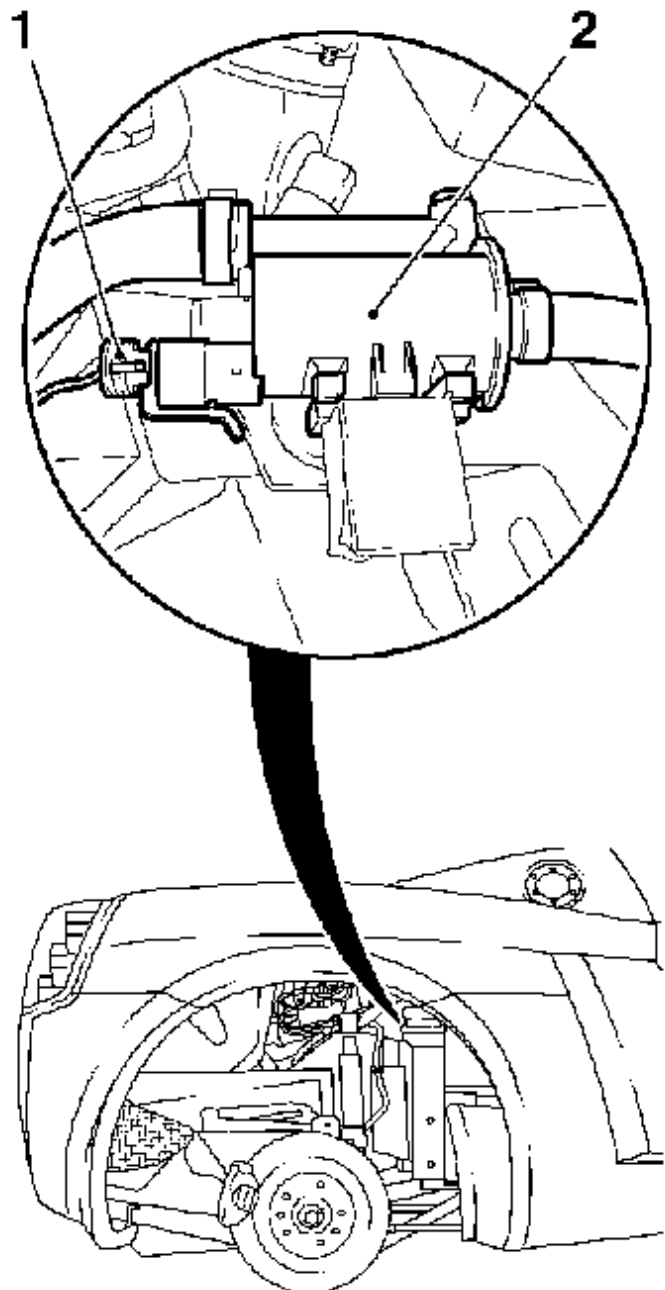


26. Unbolt the camshaft timing chain guide rail.

- Remove the screw plug (1).
- 1 bolt (2)

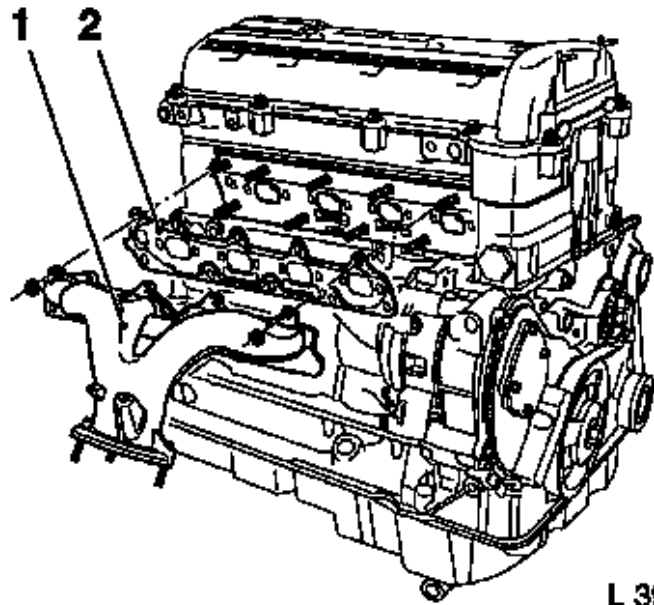


27. Disconnect the wiring harness connector (1) for the tank breather valve (2).



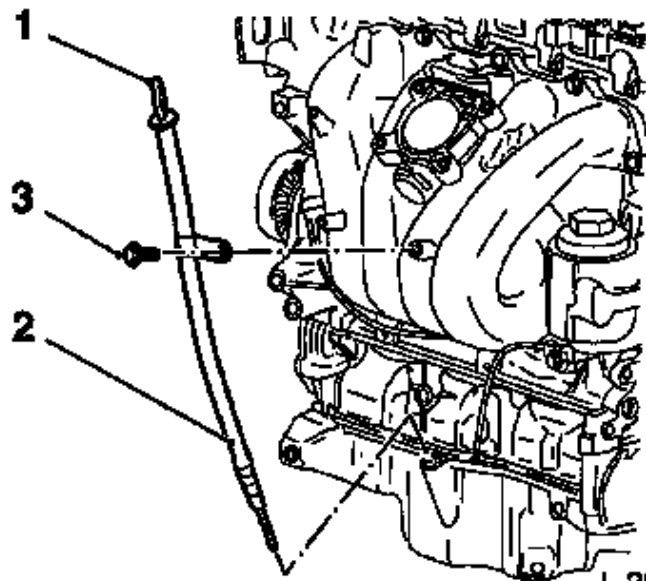
L0008734

28. Remove the exhaust manifold (1).
  - 10 nuts.
  - Remove the gasket (2).
29. Lower the lifting ramp.



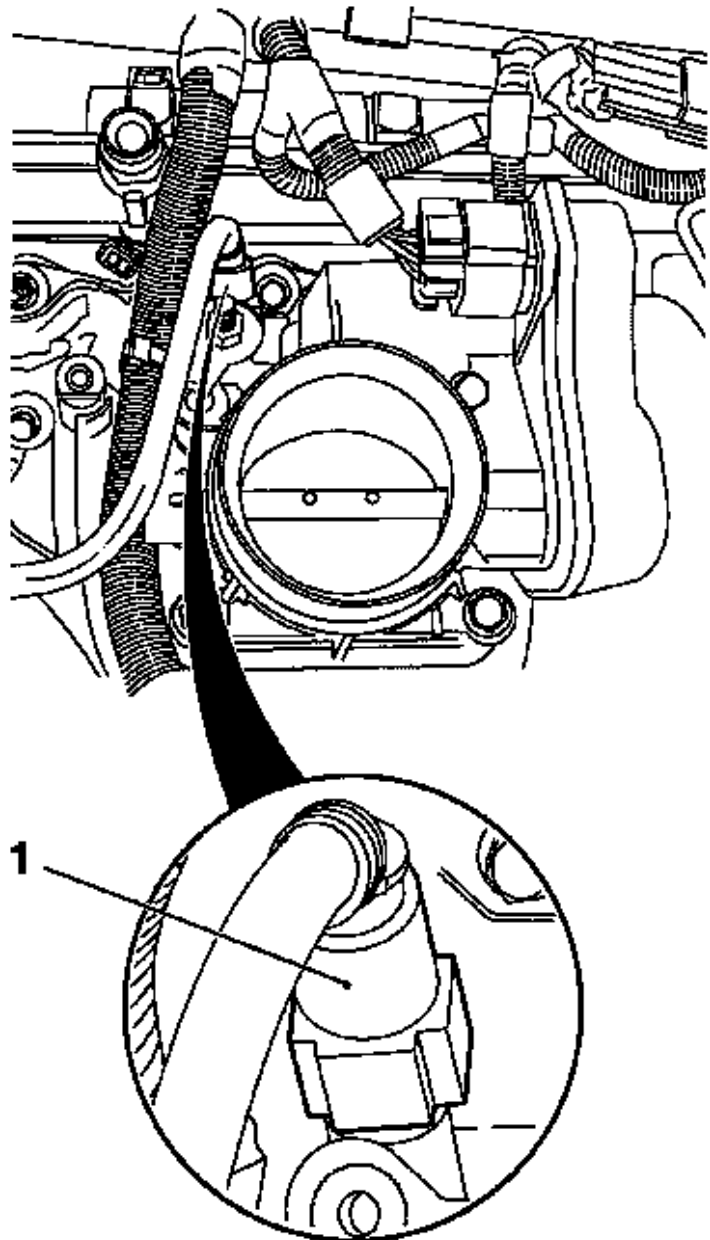
L 3915

30. Undo the bolts on the oil dipstick guide tube (2).
- Pull out the oil dipstick (1).
  - 1 bolt (3)
31. Remove the oil dipstick guide tube.
- Pull the oil dipstick guide tube out from the oil pan and lift it out to the top.



L 3921

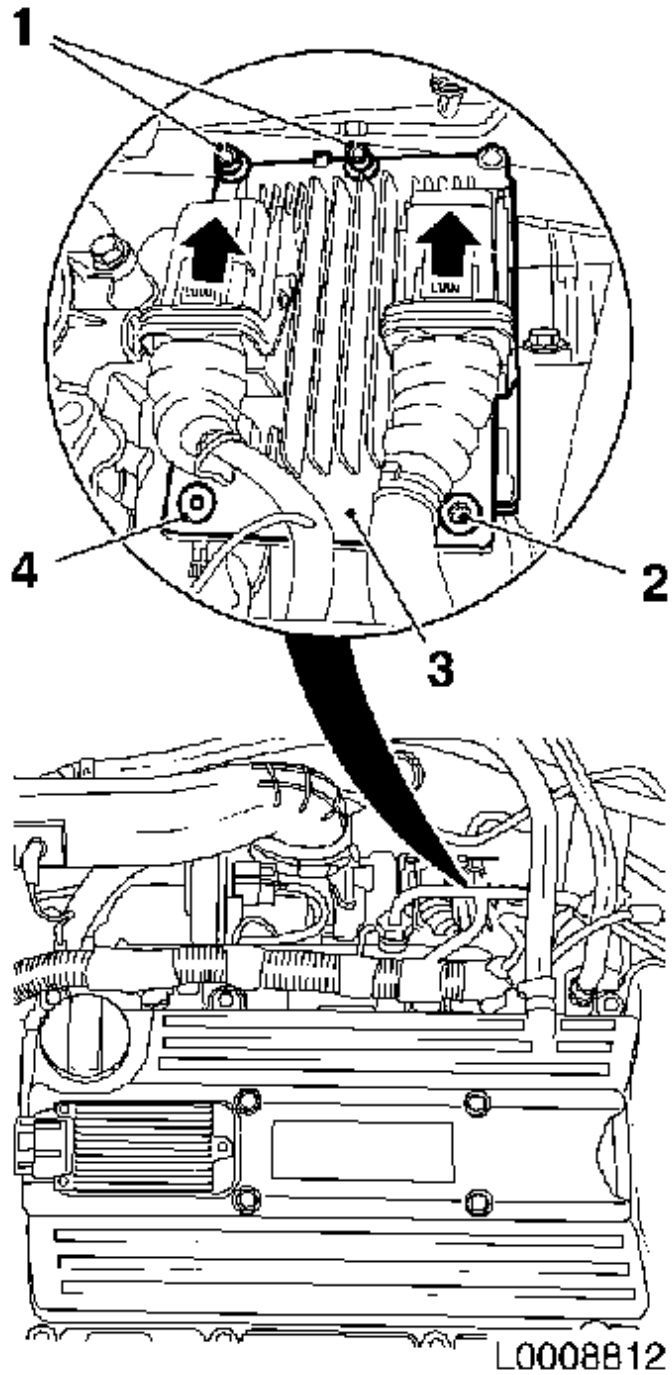
32. Detach the tank breather valve line (1).
- From the intake manifold.
    - Reposition the line to one side.

**L 5997**

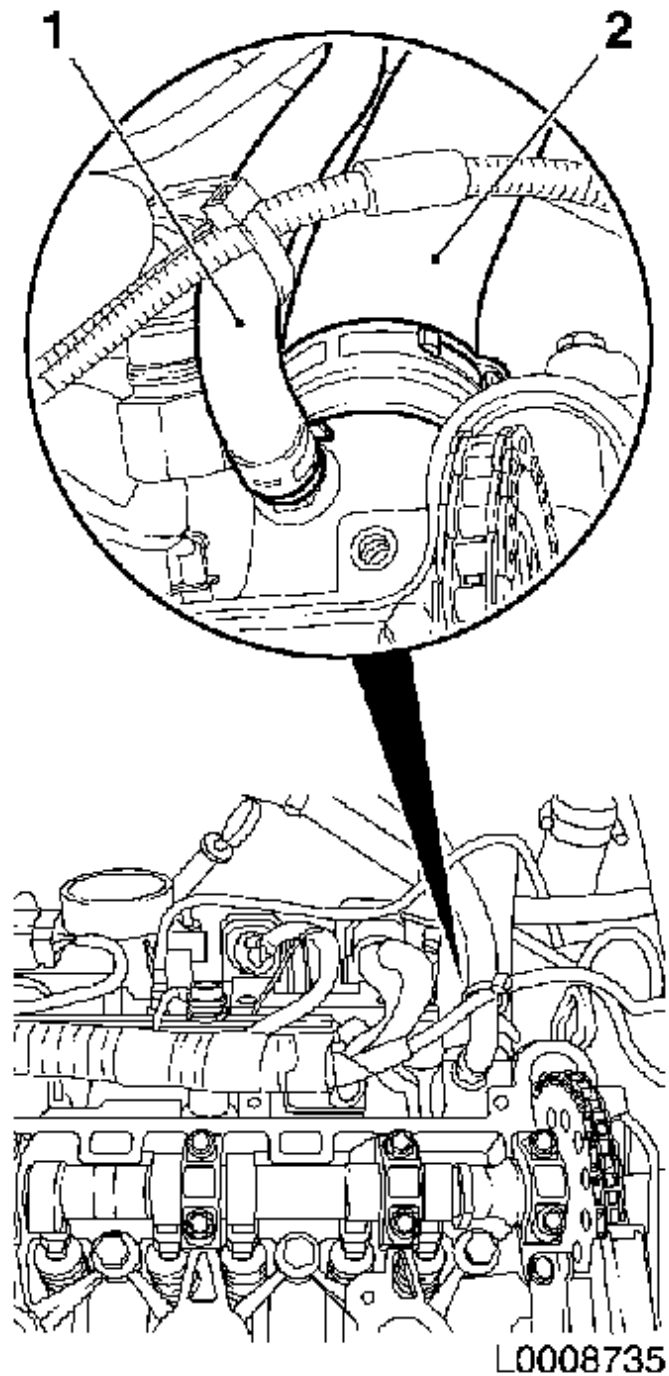
- 33.** Drill out the shear bolt (4).
- Centre-punch
  - Pre-drill
    - Use a 3 mm drill.
    - Max. depth 10 mm
  - Drill out
    - Use a 6.5 mm drill.
    - Until the head of the bolt comes free.
- 34.** Remove retaining bolt (2).
- 35.** Remove the bridge piece (3).
- Reposition the ground cable to one

side.

36. Remove the retaining bolts (1).
  - 2 bolts
37. Take out the engine control unit.



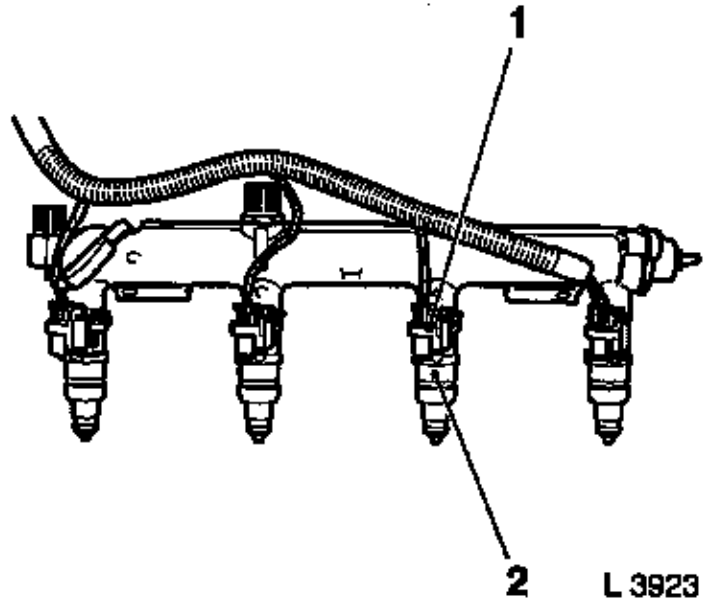
38. Detach the coolant hoses (1) and (2).
  - 2 off



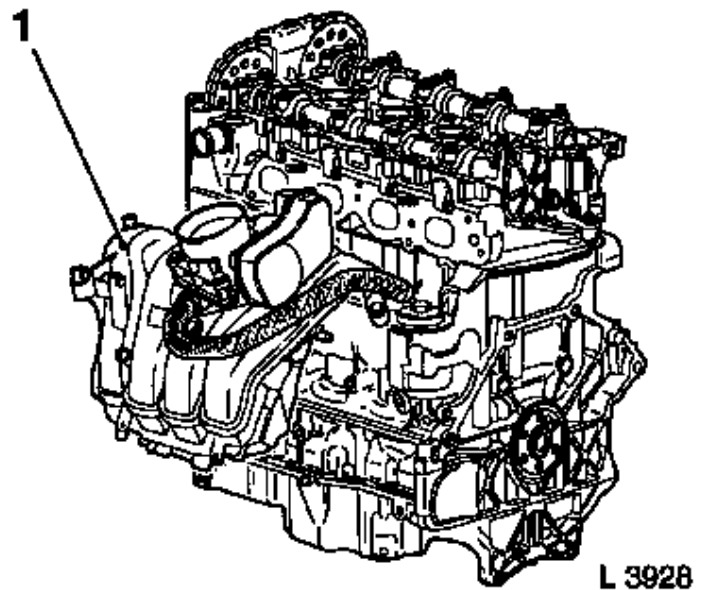
39. Detach the wiring harness connector (1) from the injectors (2).
  - Release and detach the 4 wiring harness connectors.
40. Detach the MAP sensor wiring harness connector.
41. Detach the throttle body wiring harness connector.
  - Release and detach the wiring harness connector.
42. Detach the wiring harness.
  - 2 clips
43. Disconnect the tank breather line from the

intake manifold.

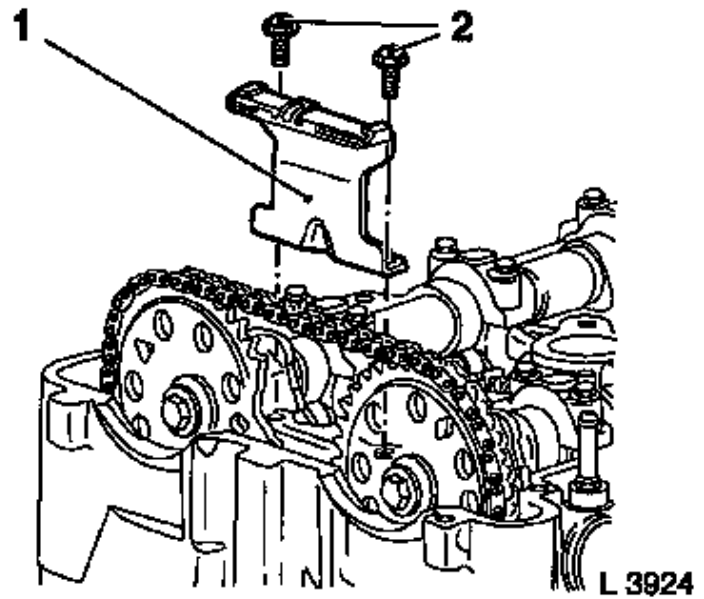
44. Unbolt the exhaust gas recirculation pipe.
  - 2 bolts
45. Detach the wiring harness connector from the exhaust gas recirculation valve.
  - Release and detach the wiring harness connector.
  - Reposition the wiring harness to one side.



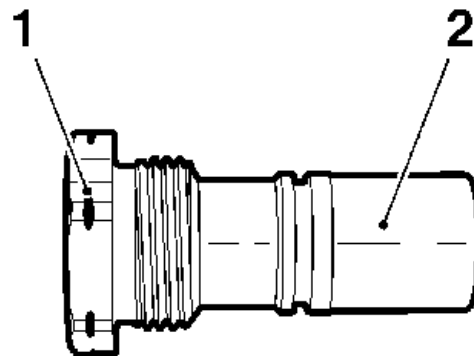
46. Undo the bolts on the intake manifold (1).
  - 5 bolts, 2 nuts, 2 studs
  - Lift out the intake manifold.



47. Remove the guide rail (1).
  - 2 bolts (2)



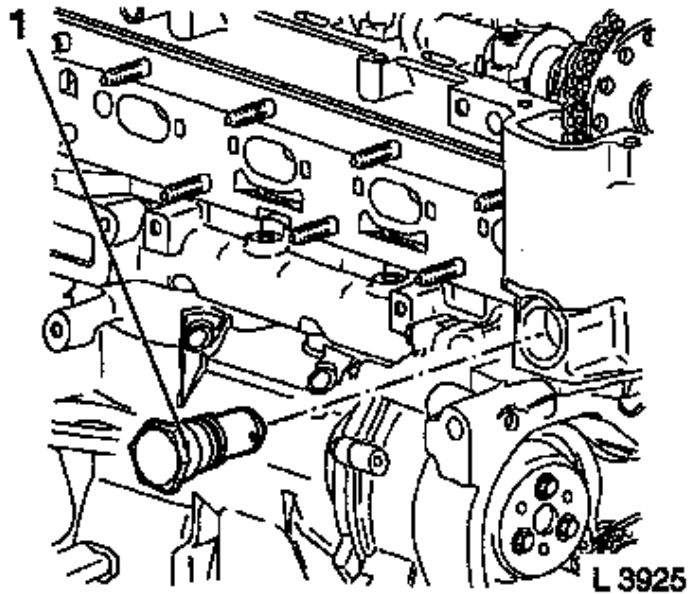
48. Note:  
If there is no marking (1) on the camshaft timing chain tensioner (2), then it should be replaced with a new camshaft timing chain tensioner (part number 24 448 509) including a new camshaft timing chain tensioner rail (part number 24 449 448).



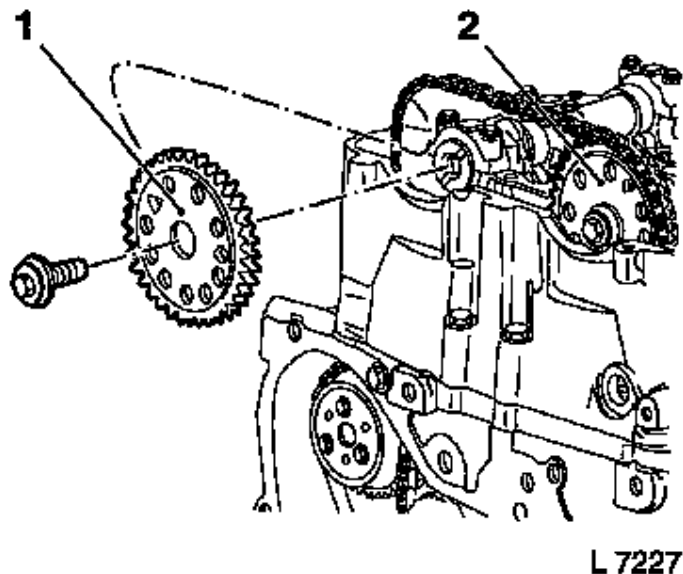
L0008542

49. Remove the camshaft timing chain tensioner (1).





50. Remove the exhaust camshaft sprocket (1).
- Hold the exhaust camshaft by the hexagon.
51. Remove the intake camshaft sprocket (2).
- Hold the intake camshaft by the hexagon.

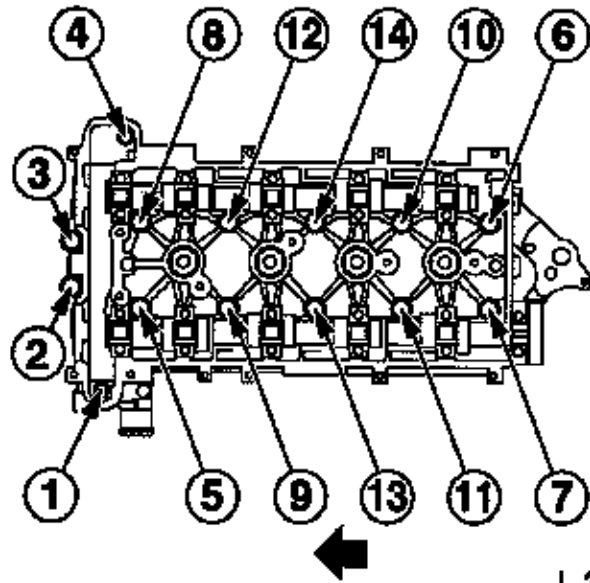


52. Detach the cylinder head.

**Important:** The cylinder head must only be removed when the engine is cold (i.e. at room temperature).

4 Torx bolts and 10 hexagon bolts

53. **Note:** Undo the bolts in the order shown.
- Undo the bolts (90°).
  - Undo the bolts (180°).

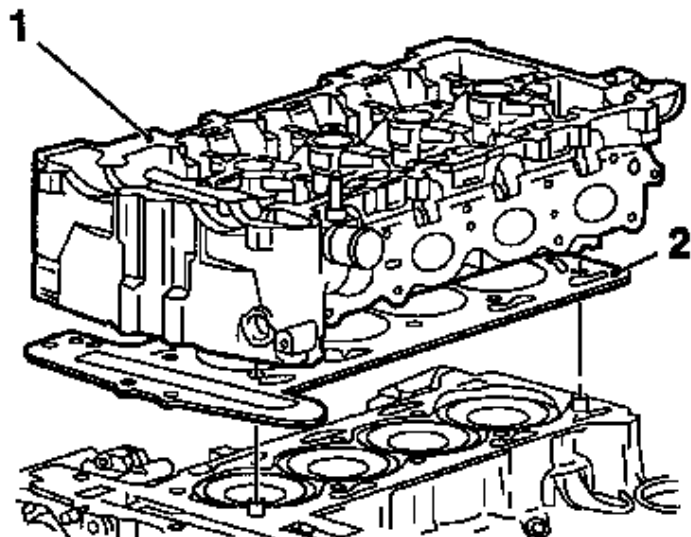


L 3943

54. Remove the cylinder head (1).

**Note:** 2 technicians required

- Place the cylinder head on wooden blocks.
- Take off the cylinder head gasket (2).



L 3944

55. Install new intake manifold gaskets (1) and (2).

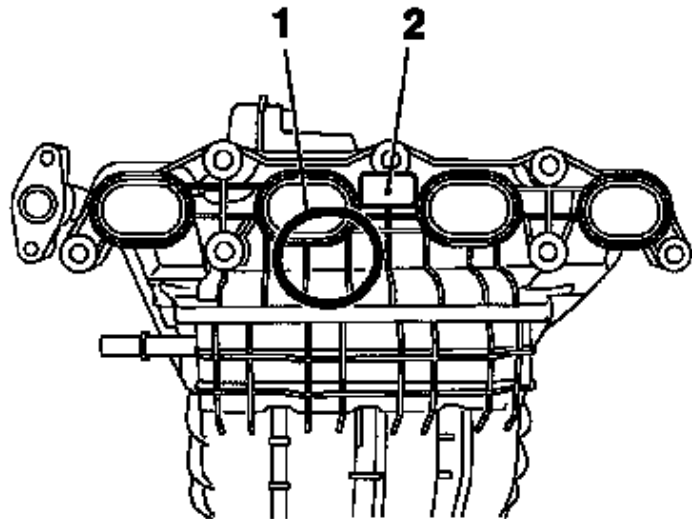
- 5 off

56. Recut the M8 thread.

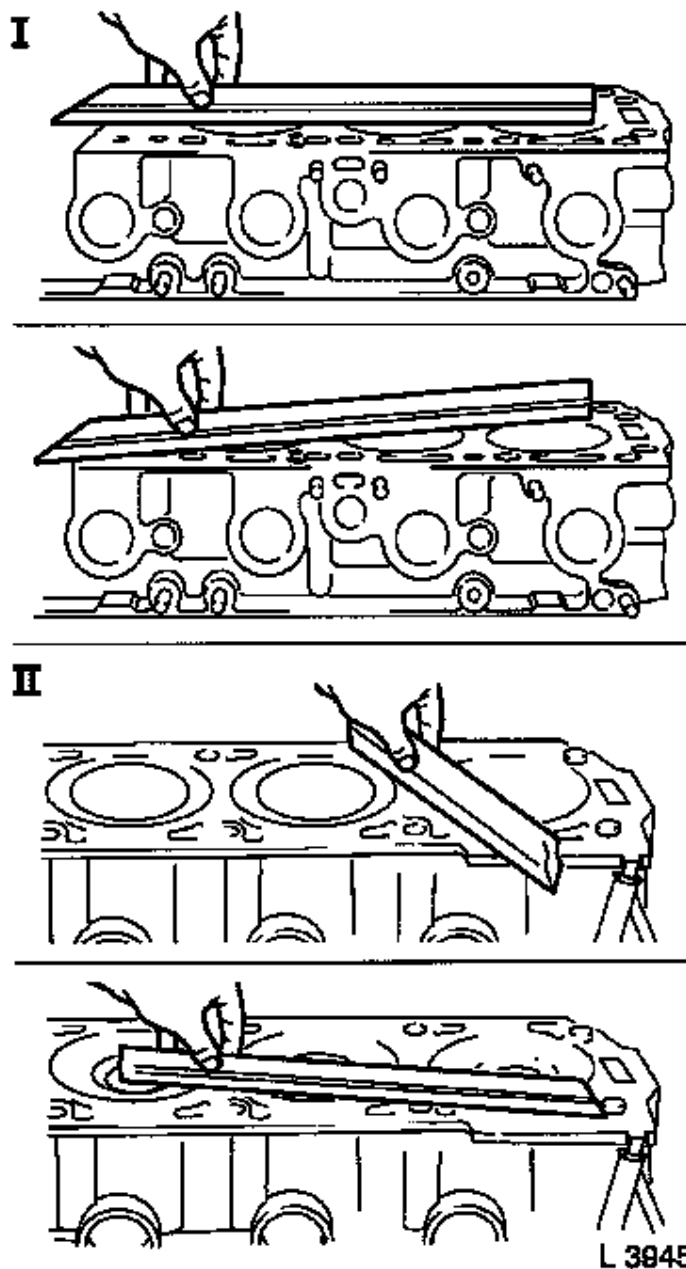
- 4 bolts, 4 bores

57. Clean the sealing surfaces and bores.

- Cylinder block, cylinder head, front exhaust pipe.

**L 5738**

58. Check for plane surface.
- Cylinder block (II), cylinder head (I)
  - Use a straightedge, feeler gauges



### Install

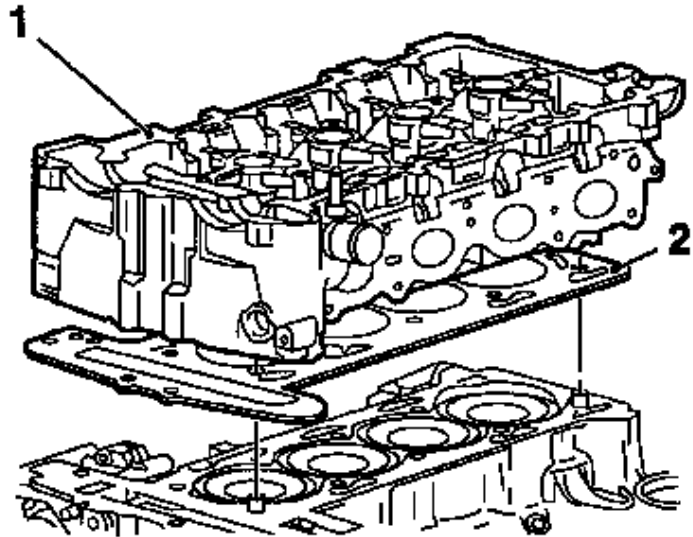
59. Place the cylinder head (1) in place.

**Note:** 2 technicians required

- Fit a new cylinder head gasket (2).  
**Note:** The OBEN / TOP mark must face upwards.

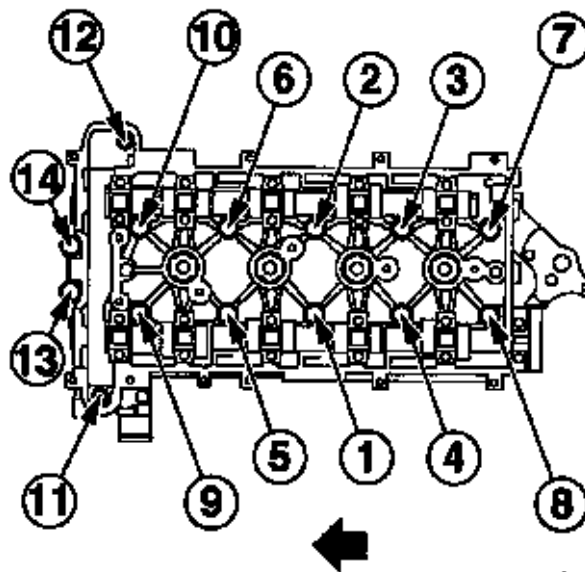
- **Note:**  
When placing the cylinder head on the upper part of the cylinder block, guide the camshaft timing chain up through the timing case, e.g. with a bent piece of electrode wire (to be fabricated by

the technician).



L 3944

60. Attach the cylinder head.
- Use new cylinder head bolts (hexagon bolts).
  - Note:** Observe the tightening sequence.
    - Tightening torque (M10) **30 Nm + 75° + 75° + 15°**
  - Coat the M8 bolts with thread locking compound (red) and insert them.
    - Tightening torque **35 Nm**

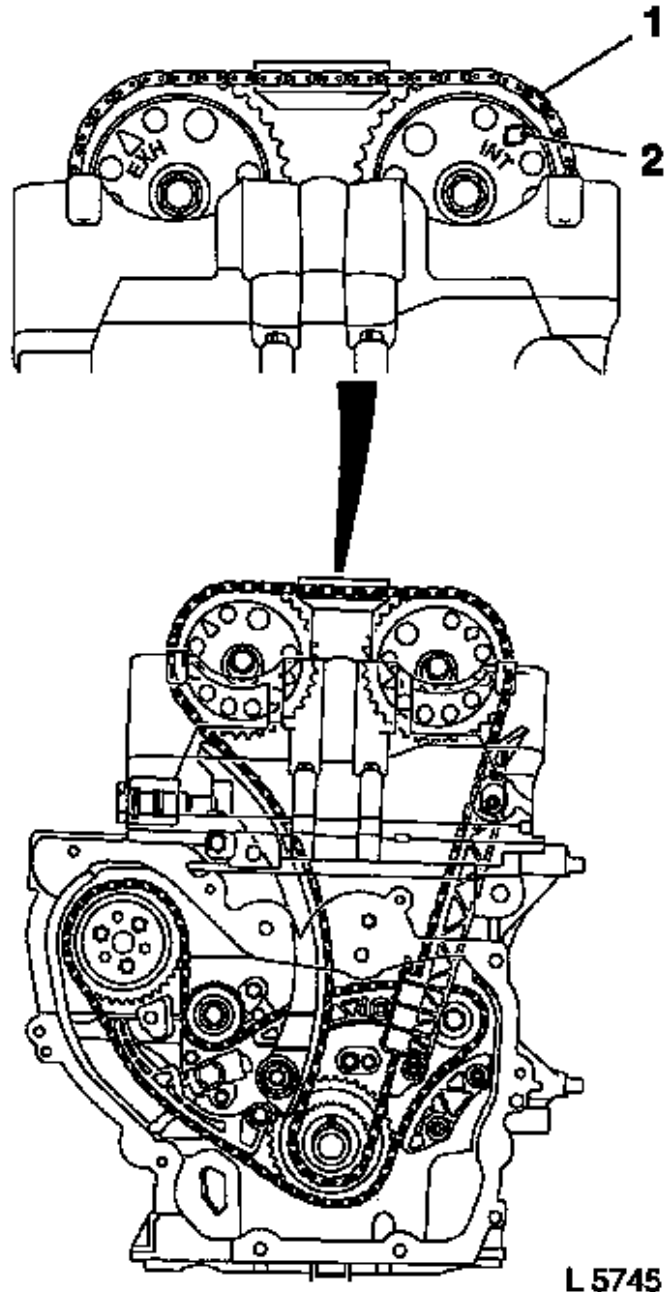


L 5739

61. Install the intake camshaft sprocket.
- Use a new bolt.
  - Tighten finger tight.
62. Attach **KM-6148** to the cylinder head.
63. Secure the intake camshaft sprocket.
- Use the positioning bolt from **KM-6148** to secure it.
64. Fit the camshaft timing chain.
- Feed the camshaft timing chain by hand through the timing case.
  - Note:** The TDC reference points on

the timing chain are indicated by coloured links in the chain. These must line up with the markings on the timing sprockets.

- Chain link (copper colour) (1) to INT marking (2) on the intake camshaft sprocket



65. Install the exhaust camshaft sprocket.

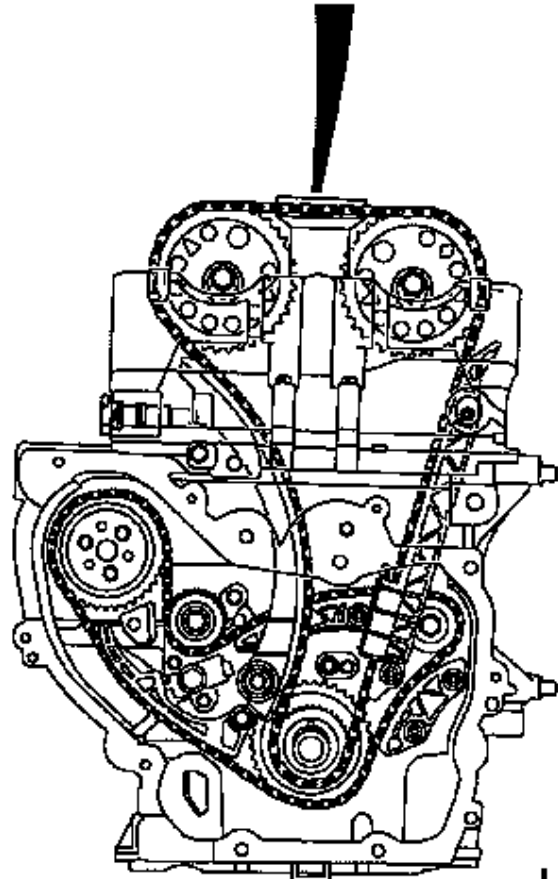
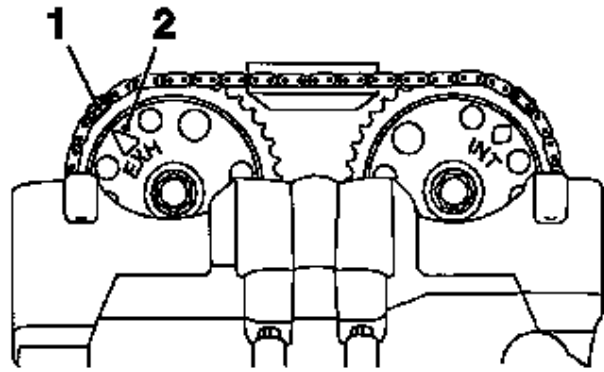
**Important:** Check that the TDC reference points line up.  
Chain link (1) to EXH marking (2) on the exhaust camshaft sprocket

- Pull back the positioning bolt from **KM-6148**.
- Rotate the exhaust camshaft by the hexagon until the exhaust camshaft sprocket is seated in the guide.
- Use a new bolt.

66. Detach **KM-6148**.

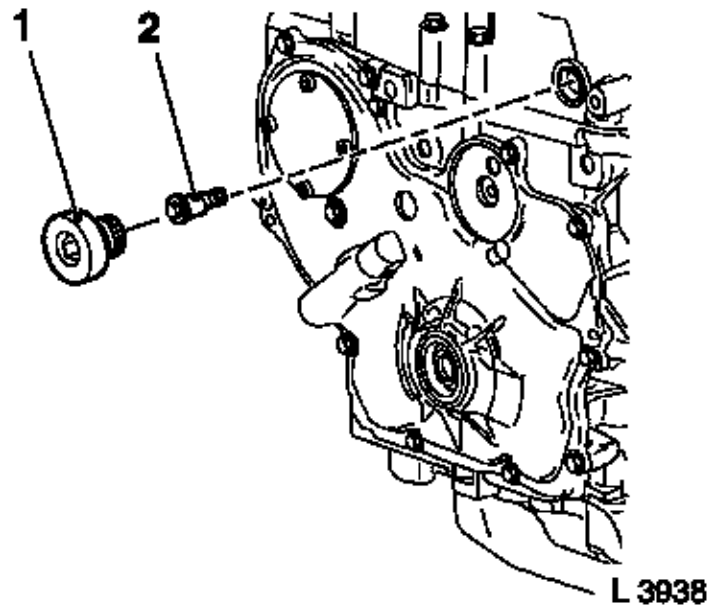
67. Tighten the camshaft sprockets.

- Hold the camshaft by the hexagon.
  - Tightening torque **85 Nm + 30° + 15°**
- 68.** Recut the thread.
- 2 off
- 69.** Install the guide rail.
- Coat the bolts with thread locking compound (red) and insert them.
    - Tightening torque **8 Nm**



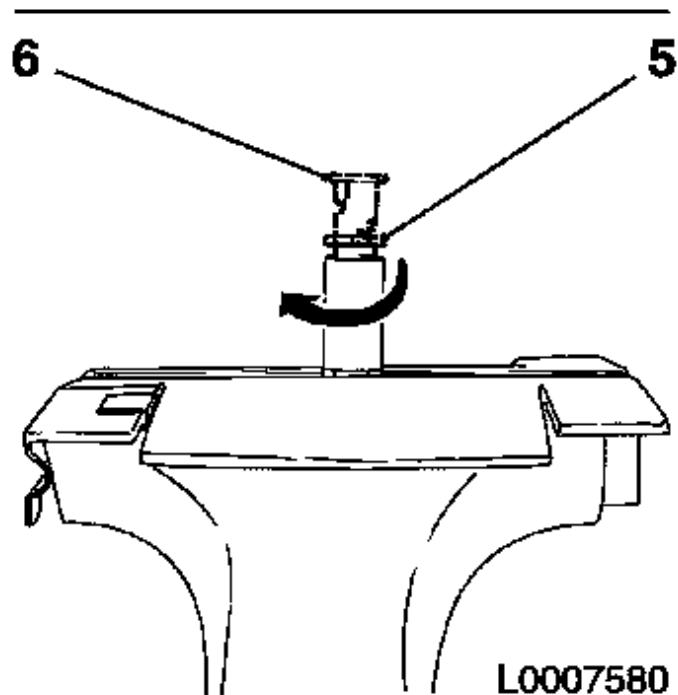
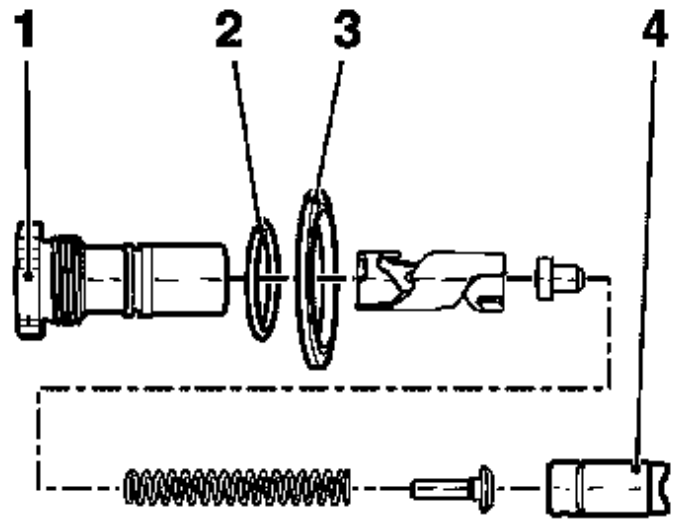
L 5715

- 70.** Raise the vehicle.
- 71.** Attach the camshaft timing chain guide rail.
- 1 bolt (2)
    - Tightening torque **10 Nm**
  - Install the screw plug (1).
    - Tightening torque **65 Nm**
- 72.** Lower the vehicle.



73. Install the camshaft timing chain tensioner.
- Pull out the piston (4) from the housing (1).
    - Clamp the piston at the square into a vice.
    - Turn clockwise to lock the internal piston (6) in the last latch position (5).
    - Insert the piston into the housing.
  - Use new oil seals (2) and (3).
  - Tightening torque **75 Nm**





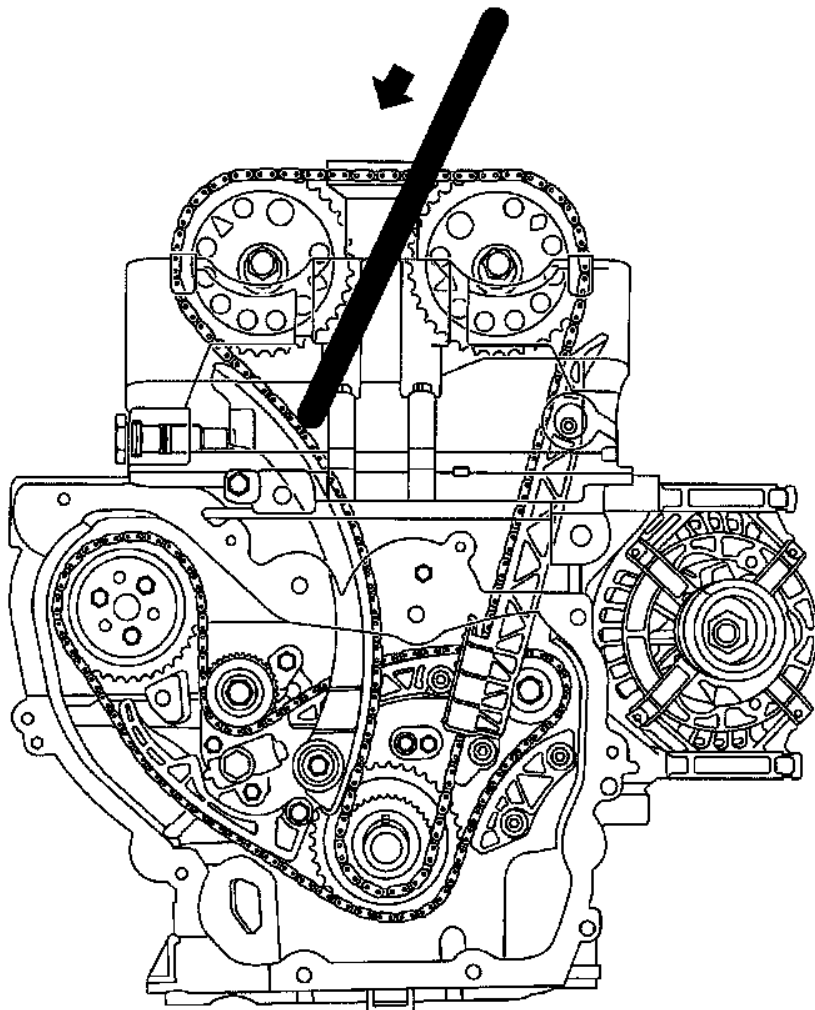
**Important:** Failure to follow this instruction could cause the camshaft timing chain to jump.

74.

Release the camshaft timing chain tensioner by pressing on the tensioner rail or the camshaft timing chain (using a blunt tool – e.g. a rounded assembly lever).

**Note:** If the TDC markings no longer line up with the

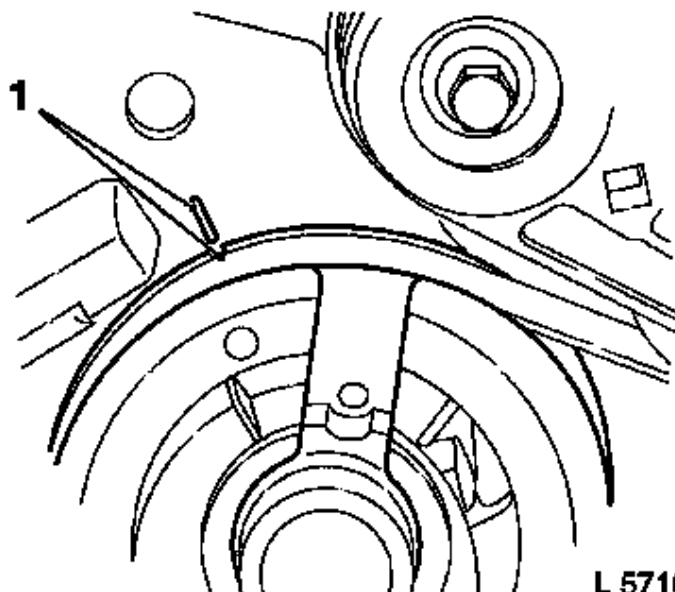
coloured chain links, refit the camshaft timing chain. Once the crankshaft has been rotated another turn they will no longer line up.



J 0935

75. Rotate the crankshaft  $720^\circ$ .
- Rotate the crankshaft in the normal direction of rotation to TDC on cylinder no. 4 (marking 1).
- Note:** In this position the cams of cylinder no. 4 point upwards.

76. Lower the lifting ramp.

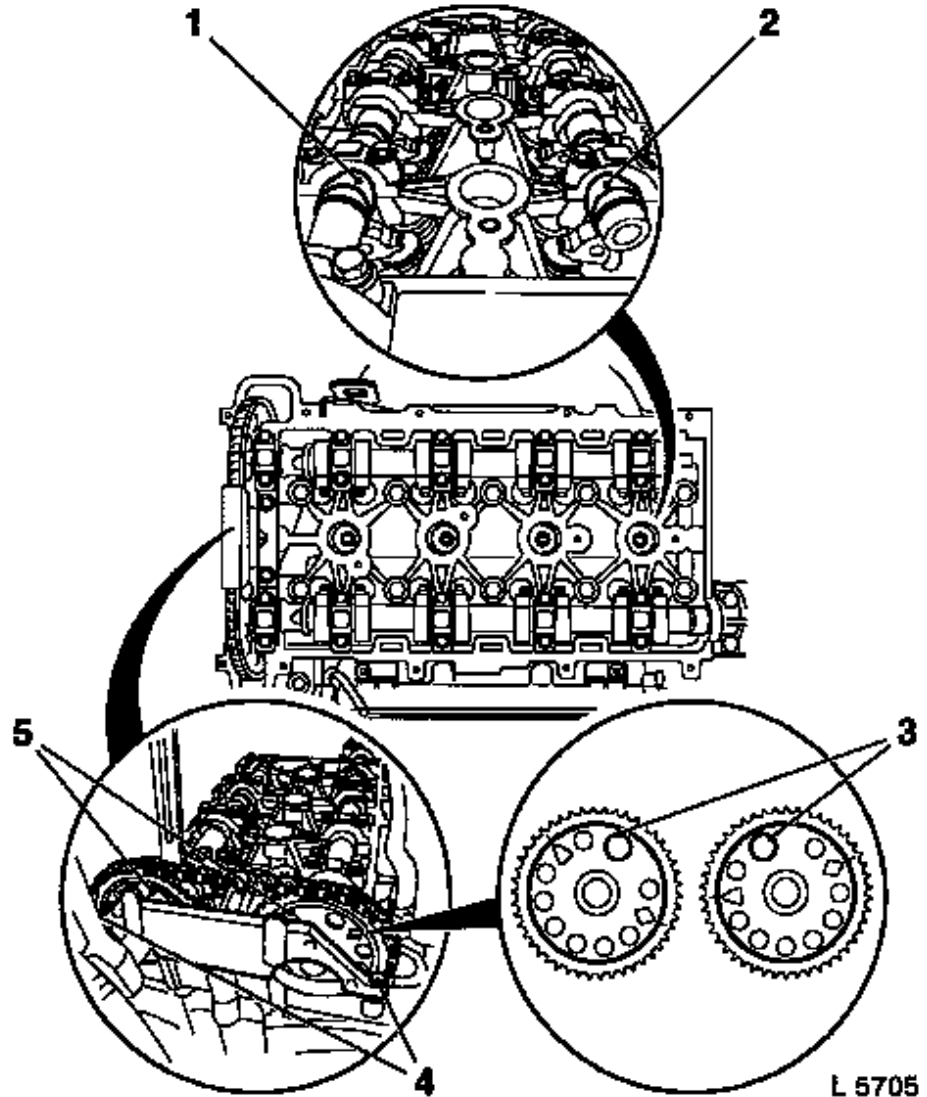


L 5716

77. Attach **KM-6148**.

**Note:** In this position the cams (1) and (2) of cylinder no. 4 point upwards.

- Attach **KM-6148** with the enclosed bolts (4).
- Slide the positioning bolts (5) into the designated bores (3) on the camshaft sprockets.

78. Detach **KM-6148**.

## 79. Attach the intake manifold.

- 5 bolts, 2 nuts, 2 studs
- Tightening torque **9 Nm**

## 80. Route the tank breather valve wiring harness.

- 1 clip

## 81. Attach the exhaust gas recirculation pipe.

- Clean the sealing surfaces.
- Use a new gasket.
- Tightening torque **9 Nm**
- Attach the engine cover bracket.
- Tightening torque **8 Nm**

## 82. Attach the tank breather line.

## 83. Attach the wiring harness.

## 84. Attach the wiring harness connector for the throttle body.

- Secure the wiring harness connector(s).

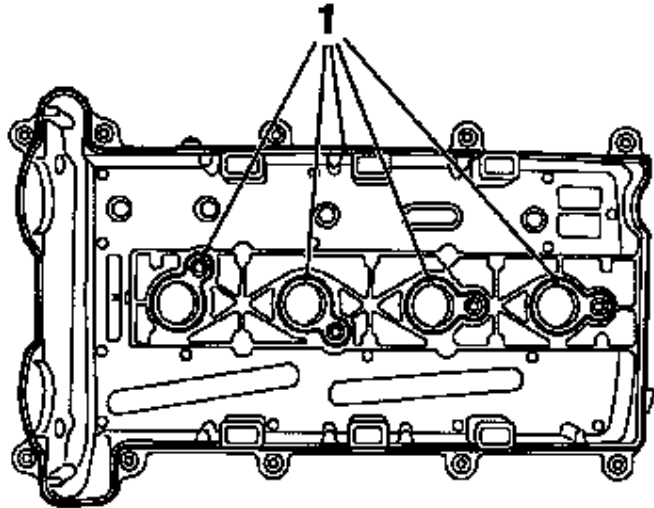
## 85. Attach the MAP sensor wiring harness connector.

86. Attach the injector wiring harness connector.
  - Secure the 4 wiring harness connectors.
87. Connect the coolant hoses.
  - 2 off
88. Clean the engine control unit.
  - Clean the engine control unit and the plug contacts with compressed air.
89. Install the engine control unit.
  - 2 bolts
    - Tightening torque **9 Nm**
  - Attach and secure the wiring harness connector.  
**Note:** Check for proper seating and good electrical contact.
  - Attach the bridge piece with a new shear bolt.
    - Route the ground cable.
  - 1 bolt
    - Tightening torque **10 Nm**
90. Connect the tank breather valve line.
  - To the intake manifold
91. Insert the oil dipstick guide tube.
  - Use new oil seals.
    - Coat the oil seals with silicone grease (white).
  - Insert the oil dipstick guide tube as far as the stop into the oil pan.
  - Attach the knock sensor wiring harness connector.
92. Attach the oil dipstick guide tube.
  - Tightening torque **9 Nm**
93. Install the exhaust manifold.
  - Use a new gasket.
  - Use new nuts.
    - Tightening torque **12 Nm**
  - Wait for 30 seconds.
    - Tightening torque **12 Nm**
94. Raise the lifting ramp.
95. Connect the tank breather valve wiring harness connector.
96. Attach the front exhaust pipe.
  - Use a new gasket.
  - Tightening torque **16 Nm**
97. Attach the cover for the exhaust system.
  - 14 bolts
98. Attach the lower engine splash shield.
  - 13 bolts
99. Connect the lambda probe wiring harness connector.
  - Route the wiring harness.
  - 5 clips, 1 retaining clip
100. Attach the wheel arch trim on the left and right-hand side.
  - 12 bolts
101. Attach the rear wheels.
102. Lower the lifting ramp.
103. Tighten the rear wheels.

- Tightening torque **90 Nm**
104. Attach the upper heat shield.
    - Attach the engine lifting eye.
      - 1 nut
    - 3 studs
    - Tightening torque **23 Nm**
  105. Install the lower heat shield.
    - Tightening torque **8 Nm**
  106. Attach the cylinder head cover
    - Clean the sealing surfaces.
    - Use new gaskets.
 

**Note:** The sealing lips of the seals (1) must be inserted into the groove on the cylinder head cover.

      - Tightening torque **9 Nm**
    - Attach the ground cable
      - Tightening torque **9 Nm**
    - Attach the engine lifting eyes.
      - 2 bolts, 1 nut
    - Attach the engine breather hose.
    - Attach the fuel line bracket.
      - Tightening torque **8 Nm**
  107. Attach the ignition module.
    - Tightening torque **9 Nm**
    - Attach and secure the wiring harness connector.



L 5706

108. Connect the fuel lines.
  - Insert the fuel lines into the clip.
  - Tightening torque **10 Nm**
109. Fill up with engine oil and check the oil level.
110. Fill up with coolant and correct as necessary – see operation "Cooling System, Fill Up and Bleed."
111. Install the rear engine cover.
  - Check the alignment.
  - 6 bolts, tightening torque **14 Nm**
112. Close the rear engine cover.
113. Connect the battery.
114. Close the bonnet.
115. Reprogram the volatile memories.