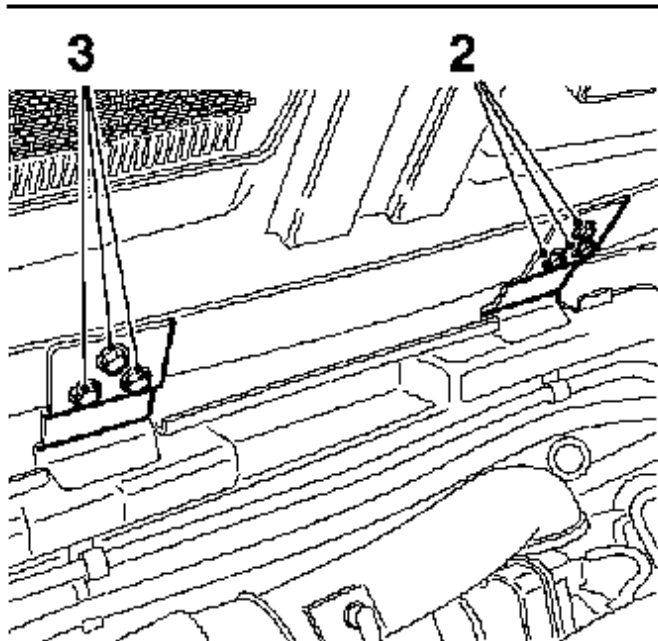
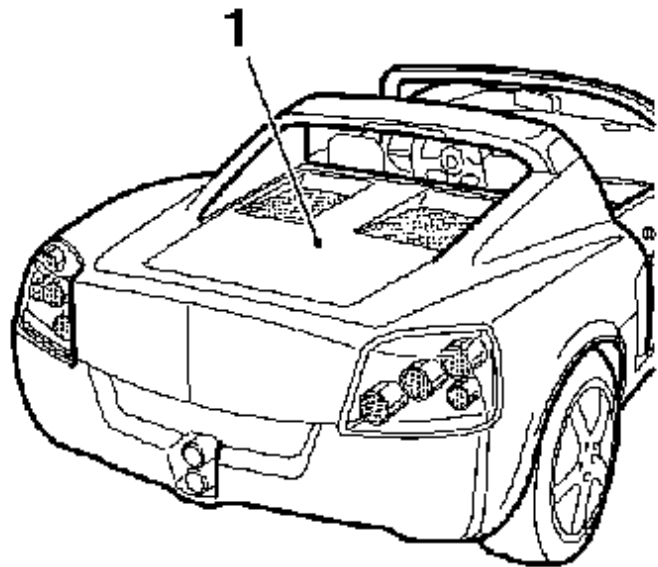


Valve Timing, Adjust (Z 22 SE)



Remove

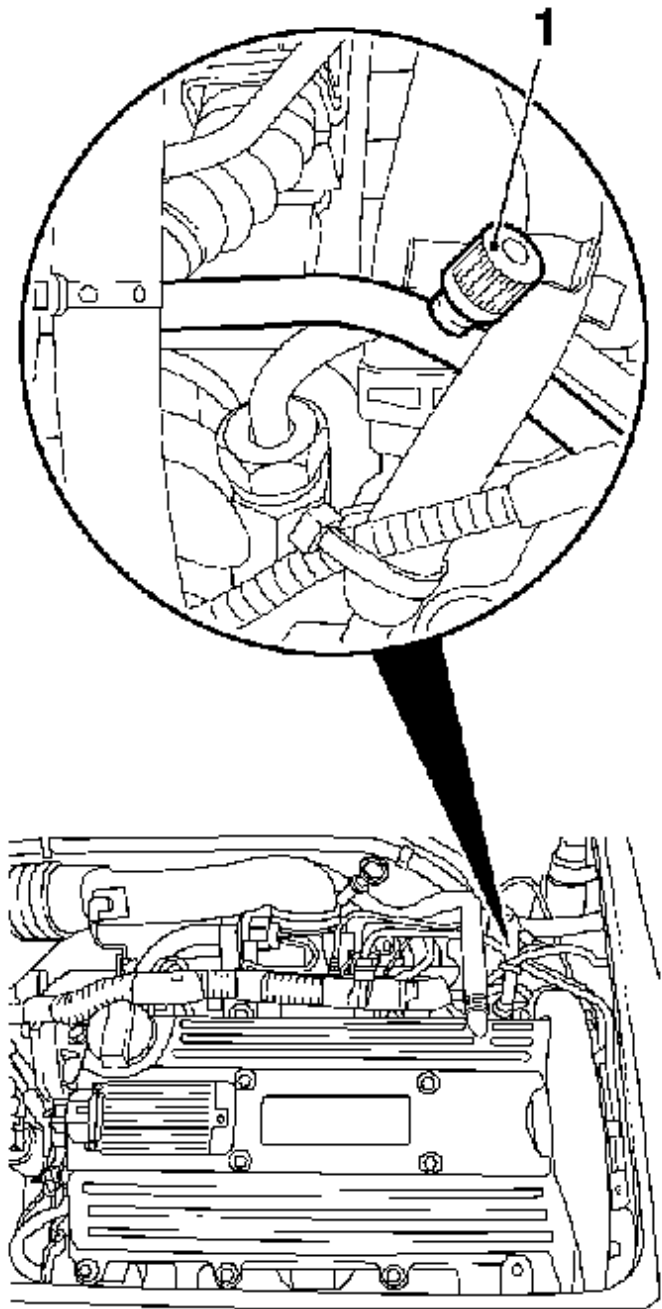
1. Open the bonnet.
2. Disconnect the battery.
3. Open the engine cover (1).
4. Detach the engine cover.
 - 6 bolts (2) and (3)



L0008715

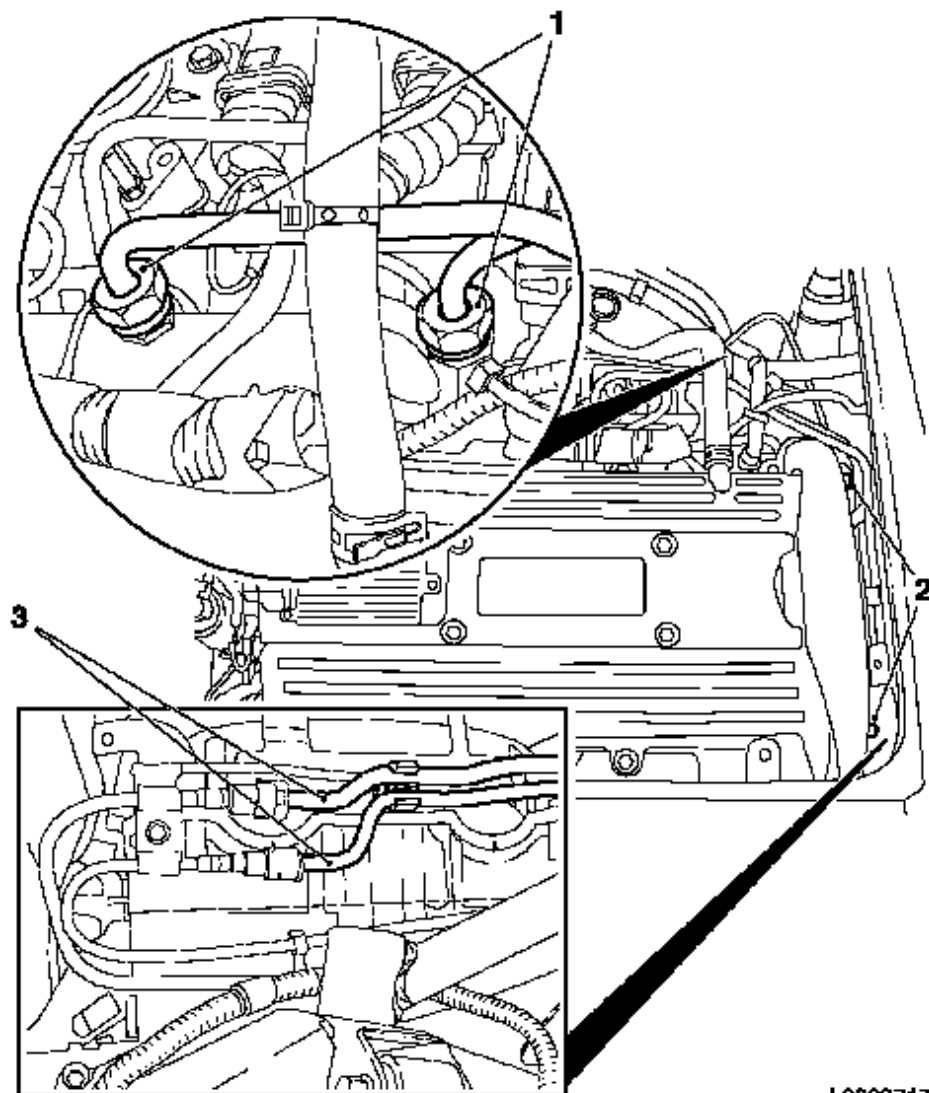
5. Release the fuel pressure.
6. Warning:
 - Fuel may escape – observe the safety regulations and relevant national legislation.
 - Release the fuel pressure with the pressure tester **KM-J-34730-91** via test connection (1).

- Collect any escaping fuel in a suitable container.



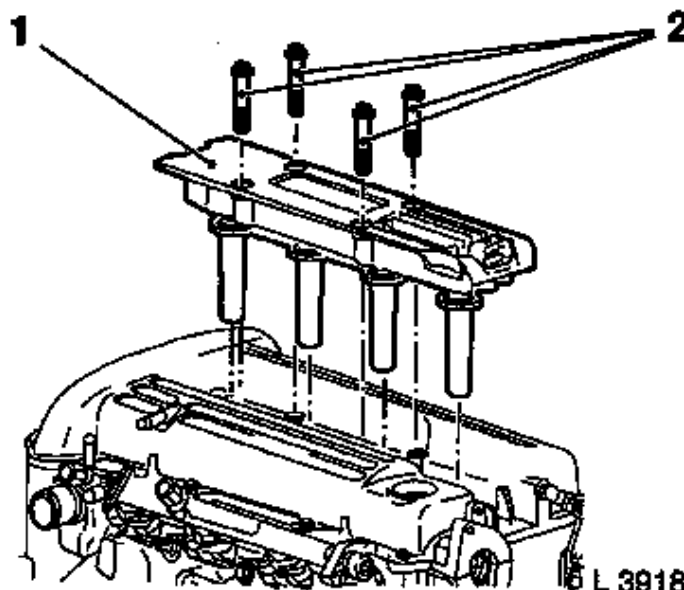
L0008716

7. Disconnect the fuel lines (3).
 - 2 union nuts (1)
 - Fuel line bracket
 - 2 bolts (2)
 - Reposition the fuel lines with the fuel line bracket to one side.



L0008717

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

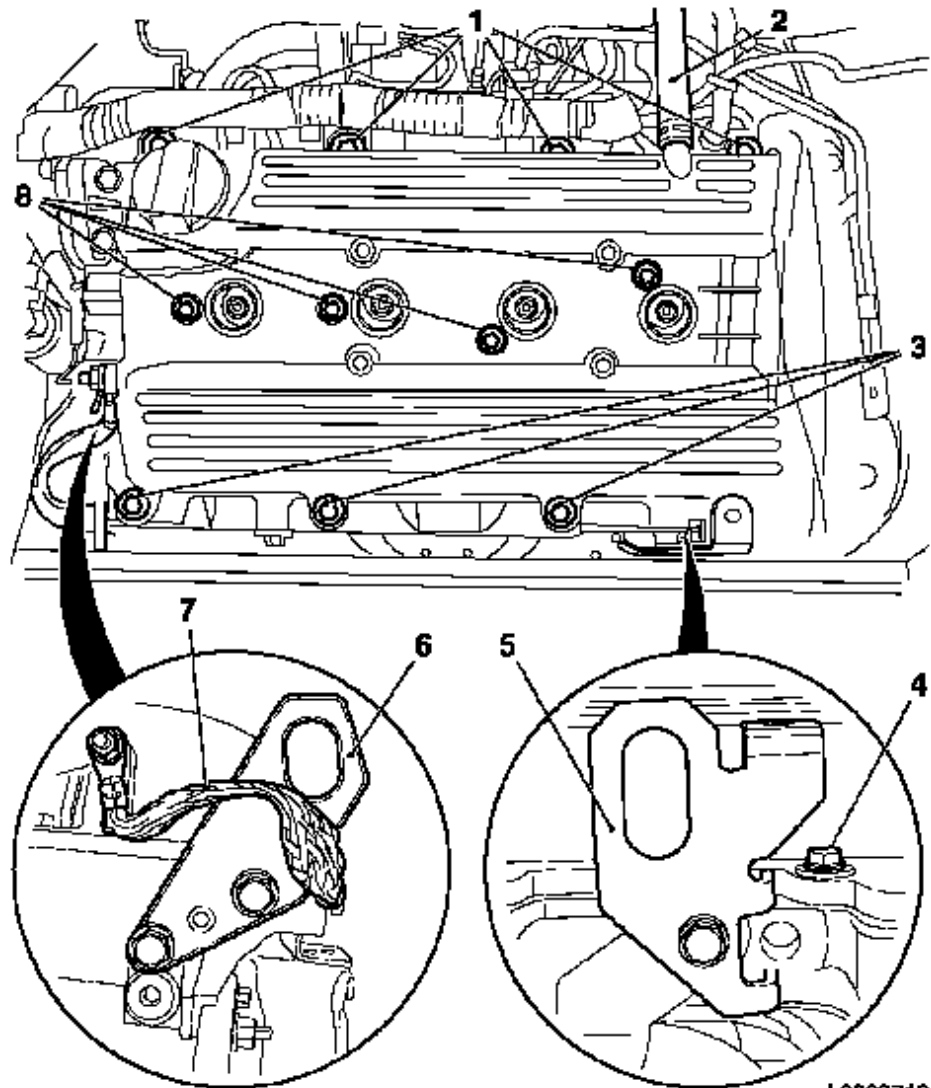


L 3918

9. 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)

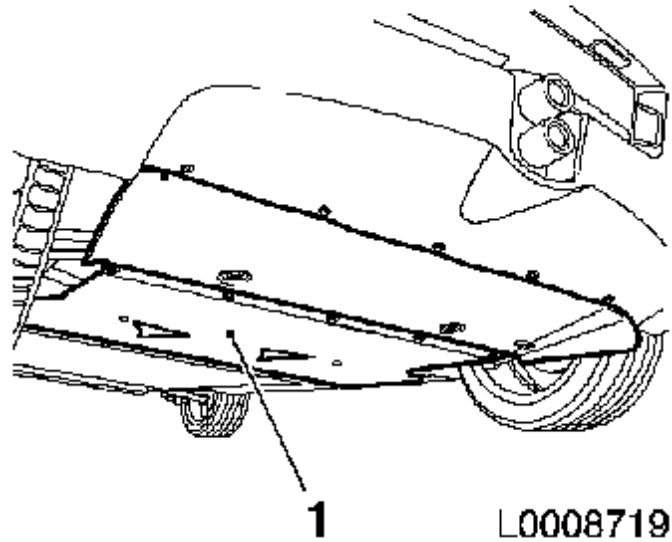
10. Raise the lifting ramp.



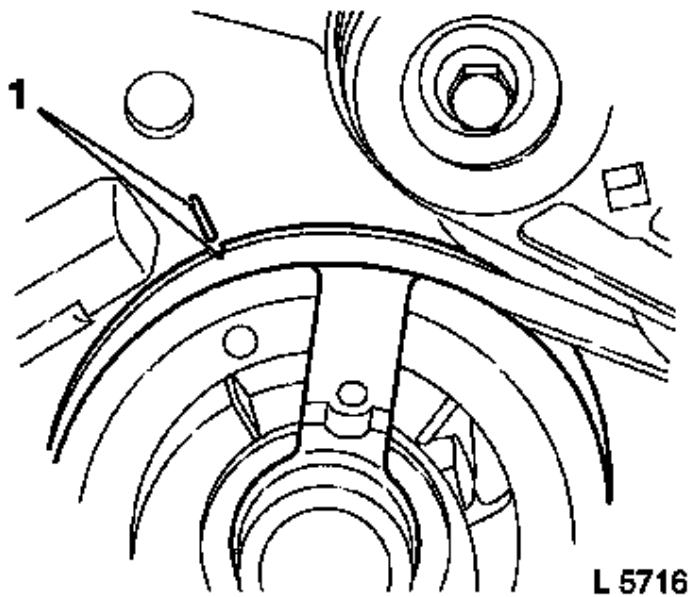
L0008718

11. Remove the lower engine splash shield (1).

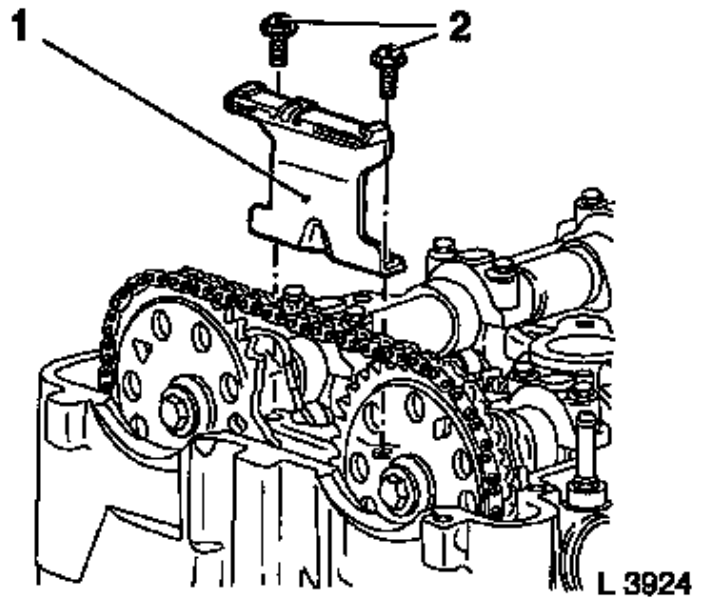
- 13 bolts



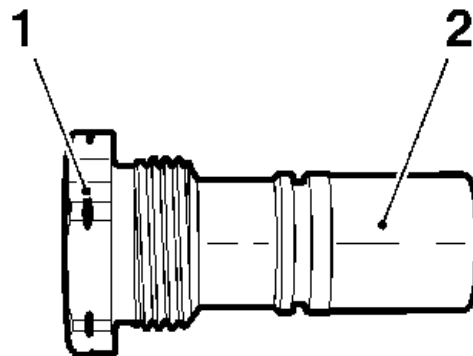
12. Align the crankshaft.
 - Rotate the crankshaft in the normal direction of rotation to TDC on cylinder no. 4 (marking 1).
13. Lower the lifting ramp.



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

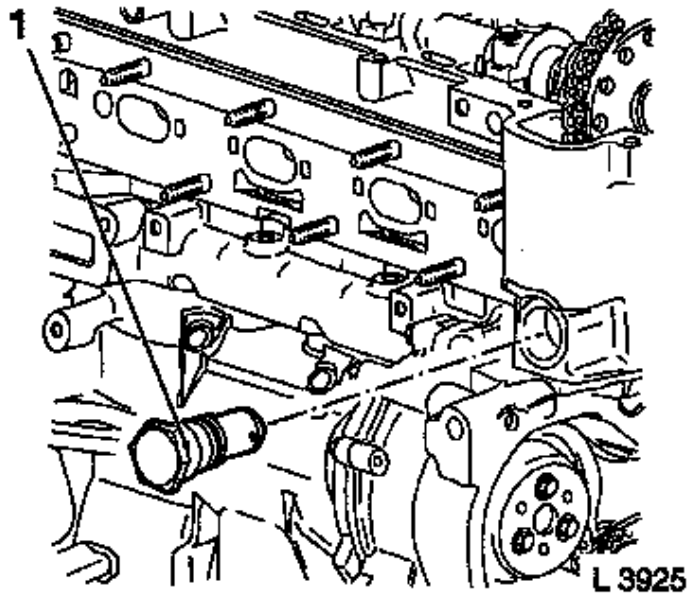


15. Note:
If there is no marking (1) on the camshaft timing chain tensioner (2), then it should be replaced with a new camshaft timing chain tensioner (part number 24 448 509) including a new camshaft timing chain tensioner rail (part number 24 449 448).

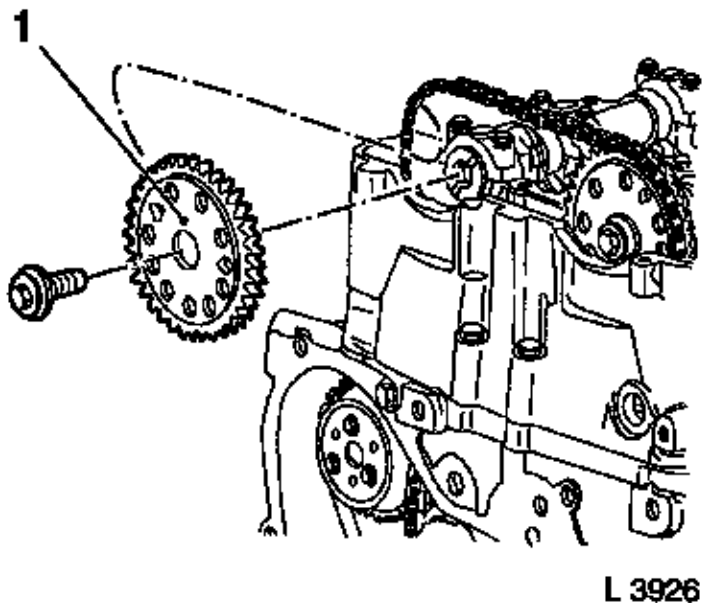


L0008542

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



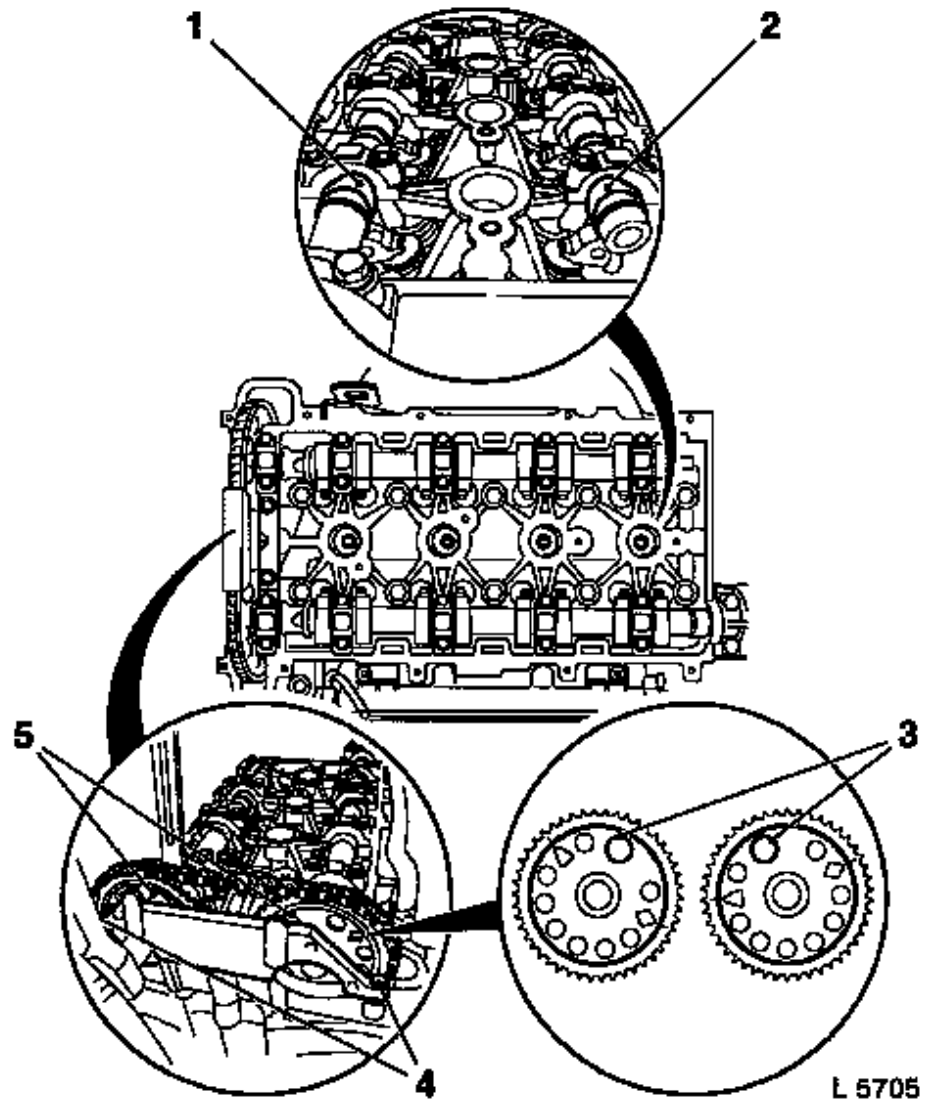
17. Remove the exhaust camshaft sprocket (1).
- Hold the exhaust camshaft by the hexagon.



Adjust

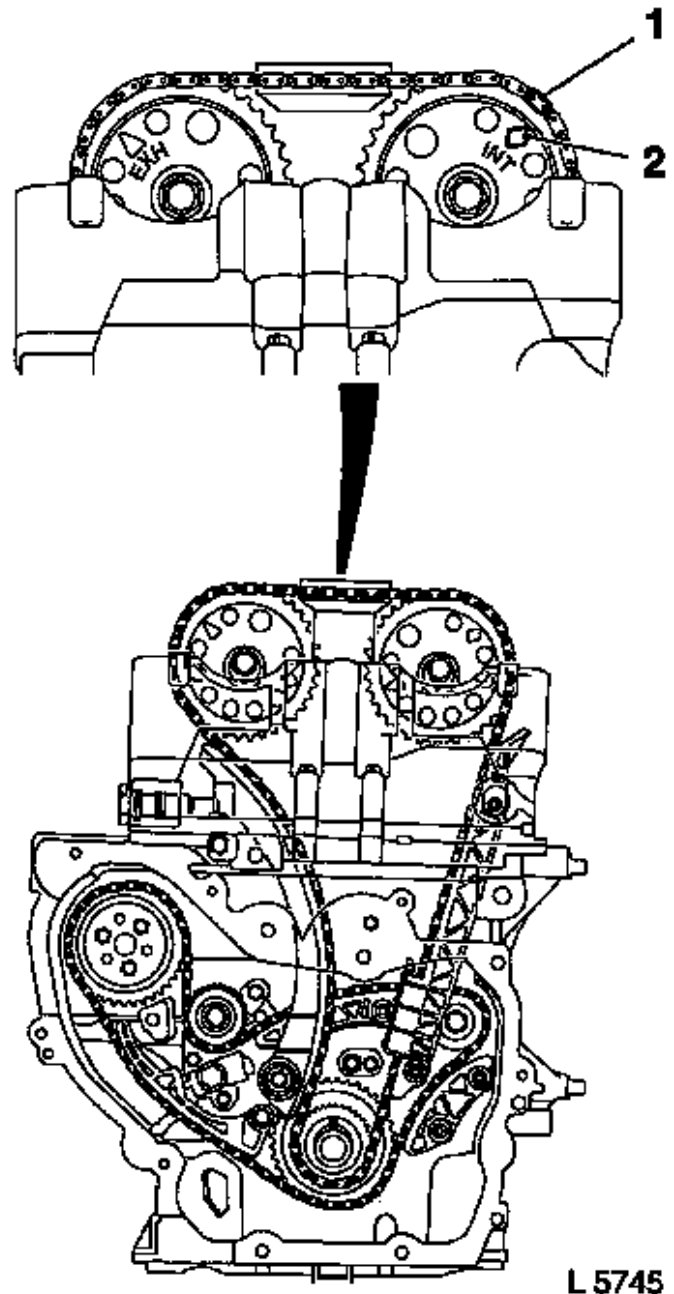
18. Attach **KM-6148**.
19. Note:
- In this position the cams (1) and (2) of cylinder no. 4 point upwards.
 - Attach **KM-6148** with the enclosed bolts (4).

- Slide the positioning bolt (5) into the designated bore (3) on the camshaft sprocket.



L 5705

20. Fit the camshaft timing chain.
21. Important:
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. It must be possible to insert blocking tool **KM-6148**.
22. Feed the camshaft timing chain by hand through the timing case.
 - Chain link (copper colour) (1) to INT marking (2) on the intake camshaft sprocket
 - Secure the camshaft timing chain with cable ties to the intake camshaft sprocket.



23. Detach **KM-6148**.

24. Install the exhaust camshaft sprocket.

Note: Check that the TDC reference points line up.

- Chain link (1) to EXH marking (2) on the exhaust camshaft sprocket
- Rotate the exhaust camshaft by the hexagon until the exhaust camshaft sprocket is seated in the guide.
- Use a new bolt.
- Hold the camshaft by the hexagon.
 - Tightening torque **85 Nm + 30° + 15°**

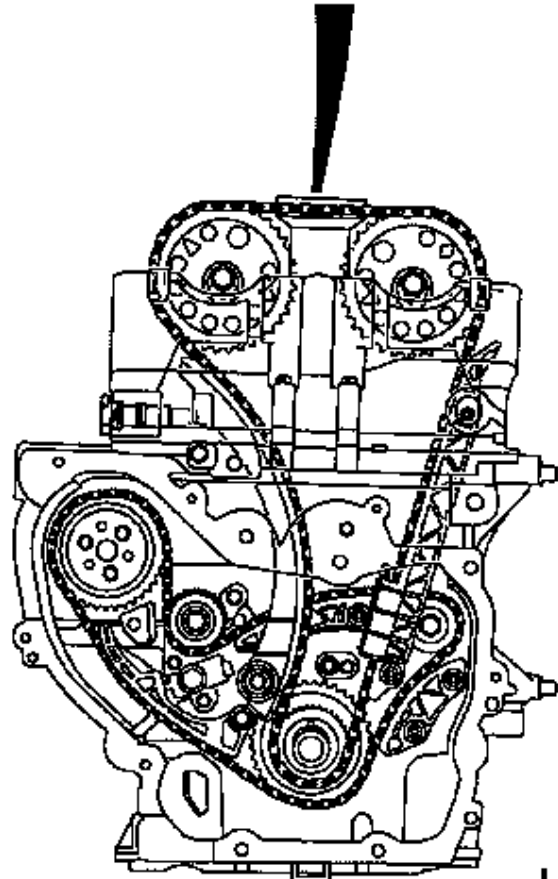
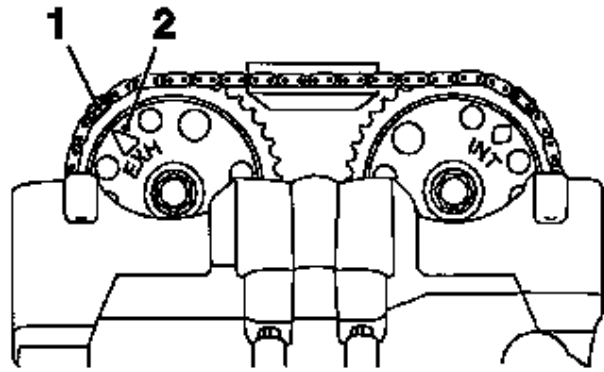
- Detach the cable ties from the intake camshaft sprocket.

25. Recut the thread.

- 2 off

26. Install the guide rail.

- Coat the bolts with thread locking compound (red) and insert them.
 - Tightening torque **8 Nm**

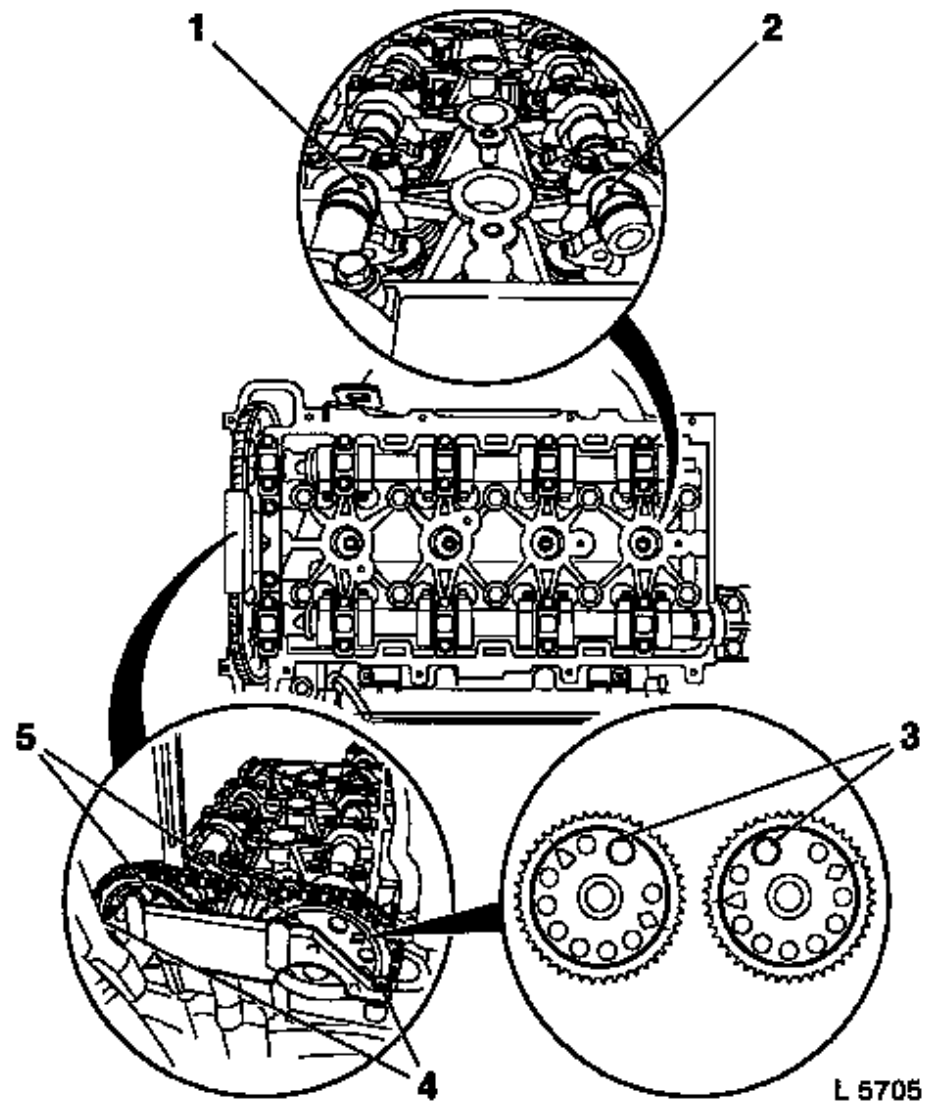


L 5715

27. Attach **KM-6148**.

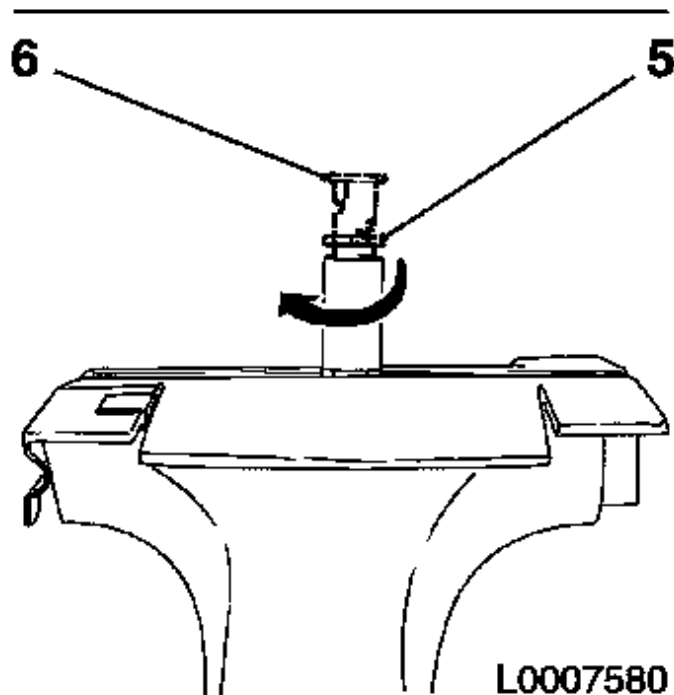
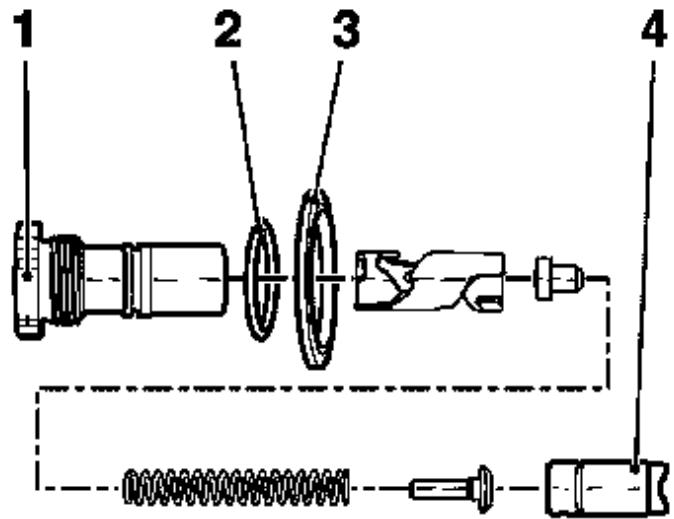
Note: In this position the cams (1) and (2) of cylinder no. 4 point upwards.

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



- 28.** 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**

- 29.** Detach **KM-6148**.



L0007580

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

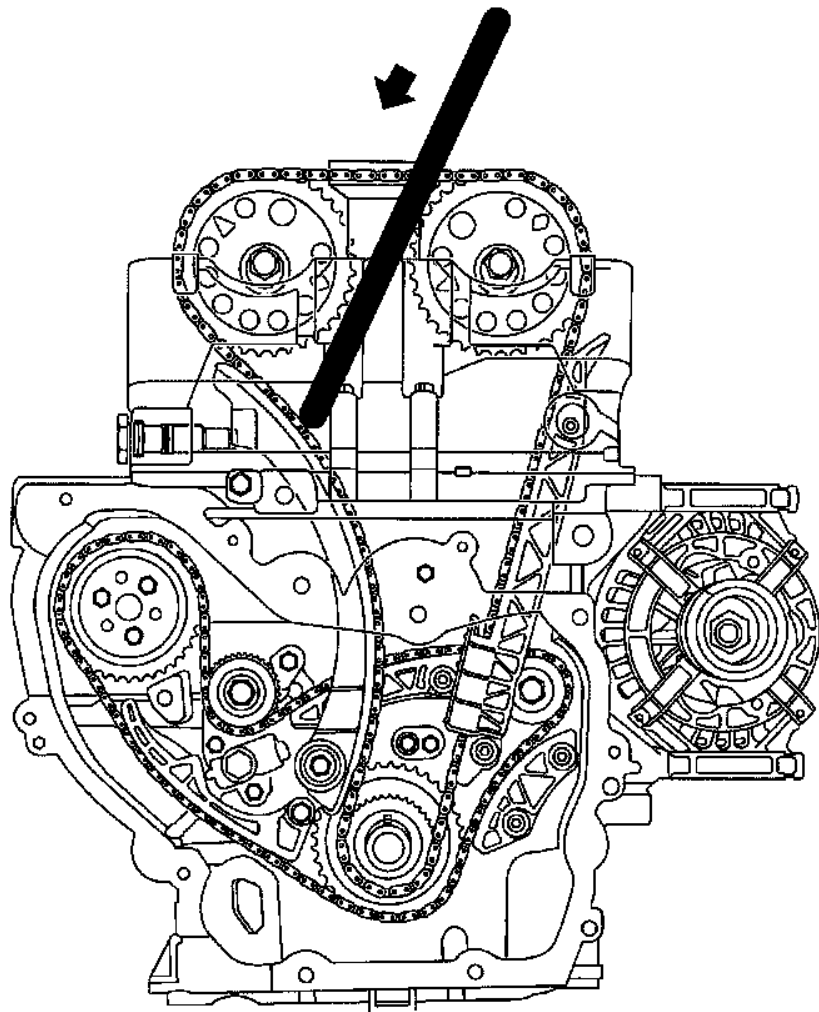
30.

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

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

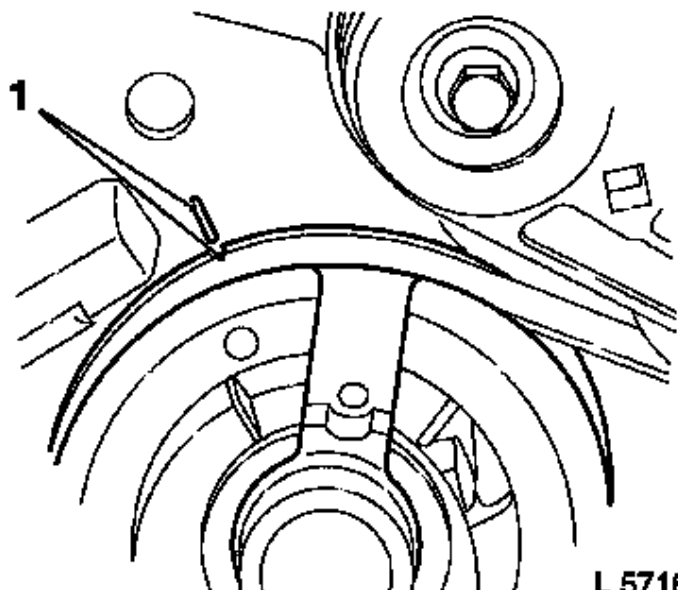
coloured chain links, refit the camshaft timing chain. Once the crankshaft has been rotated another turn they will no longer line up.

31. Raise the lifting ramp.



J 0935

32. Rotate the crankshaft 720° .
- Rotate the crankshaft in the normal direction of rotation to TDC on cylinder no. 4 (marking 1).
33. Install the lower engine splash shield
34. Lower the lifting ramp.



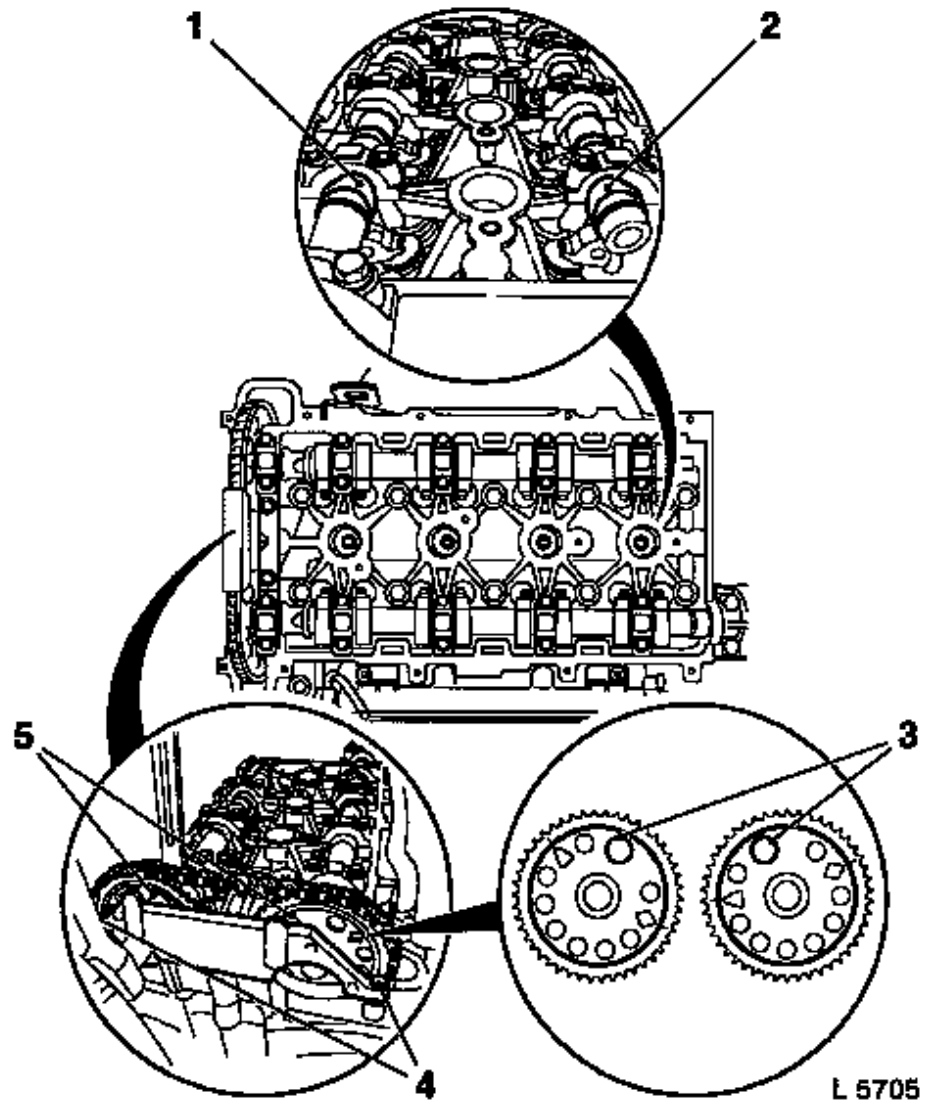
L 5716

35. 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.

36. Detach **KM-6148**.



L 5705

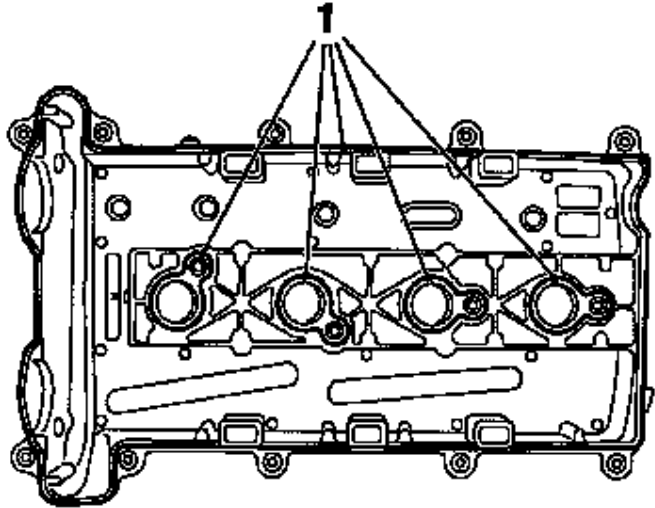


Install

37. 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**

- 38.** Attach the ignition module.
- Tightening torque **9 Nm**
 - Attach and secure the wiring harness connector.



L 5706

- 39.** Connect the fuel lines.
- 2 union nuts
 - Tightening torque **10 Nm**
 - Fuel line bracket
 - 2 bolts
 - Tightening torque **9 Nm**
- 40.** Install the engine cover.
- Check the alignment.
 - 6 bolts, tightening torque **14 Nm**
- 41.** Close the engine cover.
- 42.** Connect the battery.
- 43.** Close the bonnet.
- 44.** Reprogram the volatile memories.