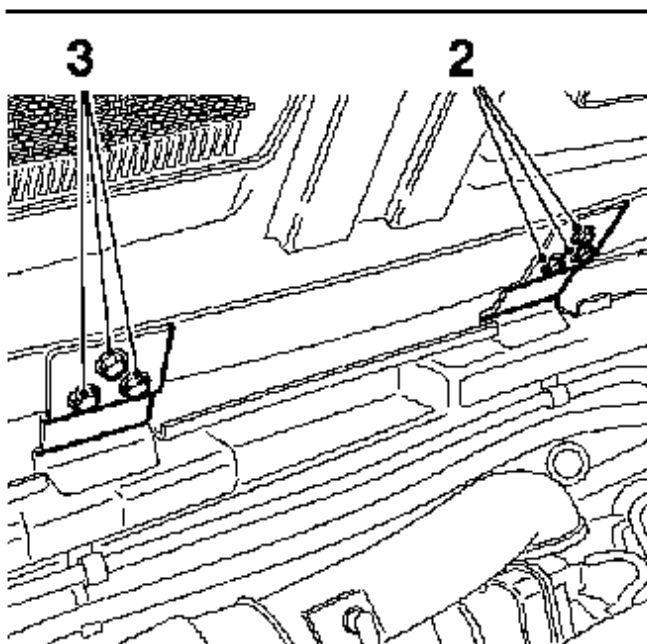
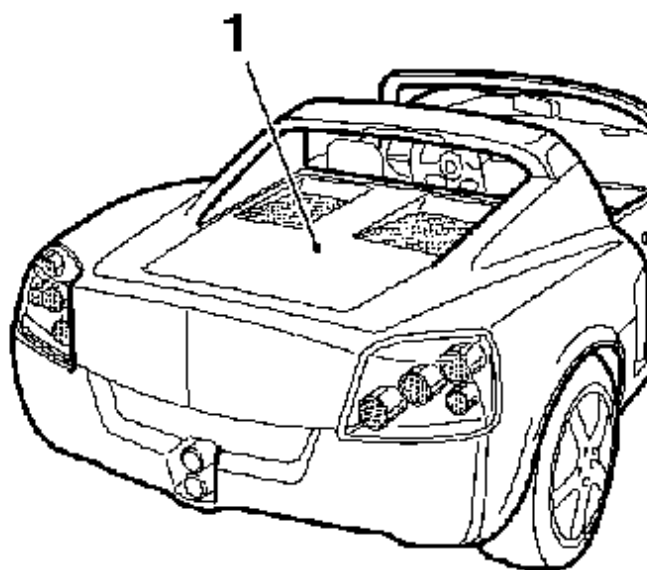


Camshafts, Replace (Z 22 SE)



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)

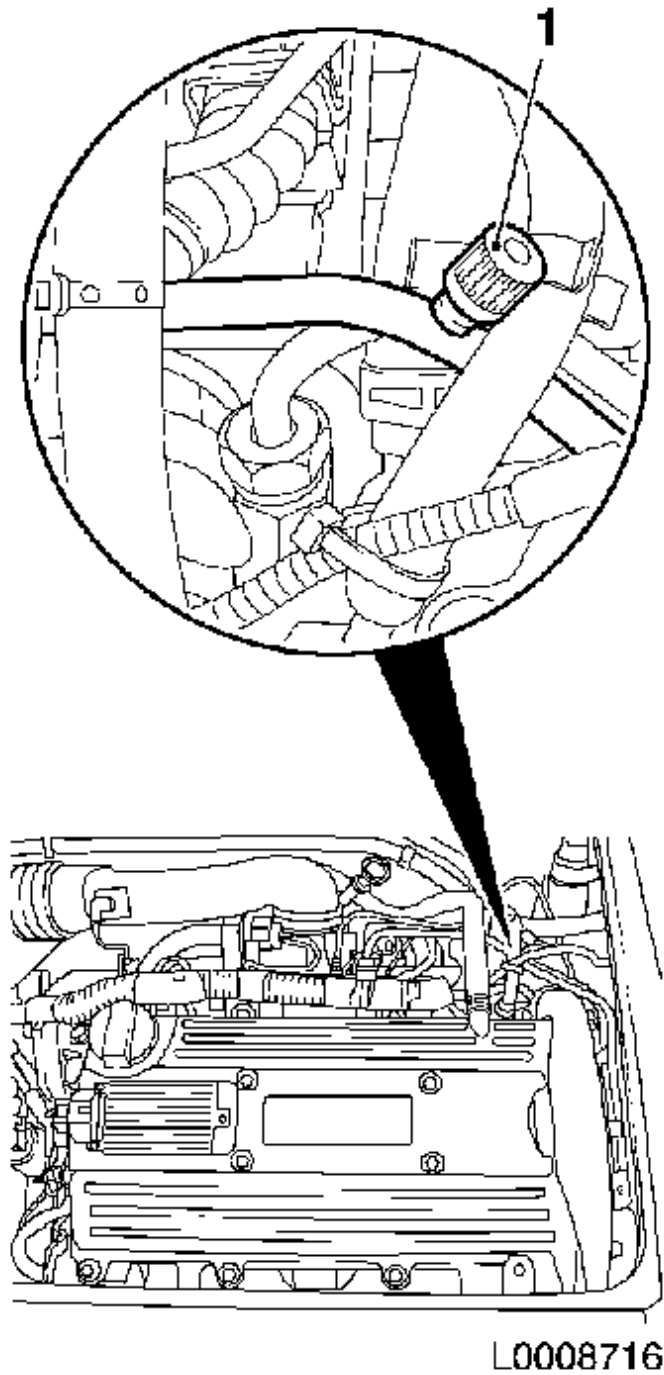


L0008715

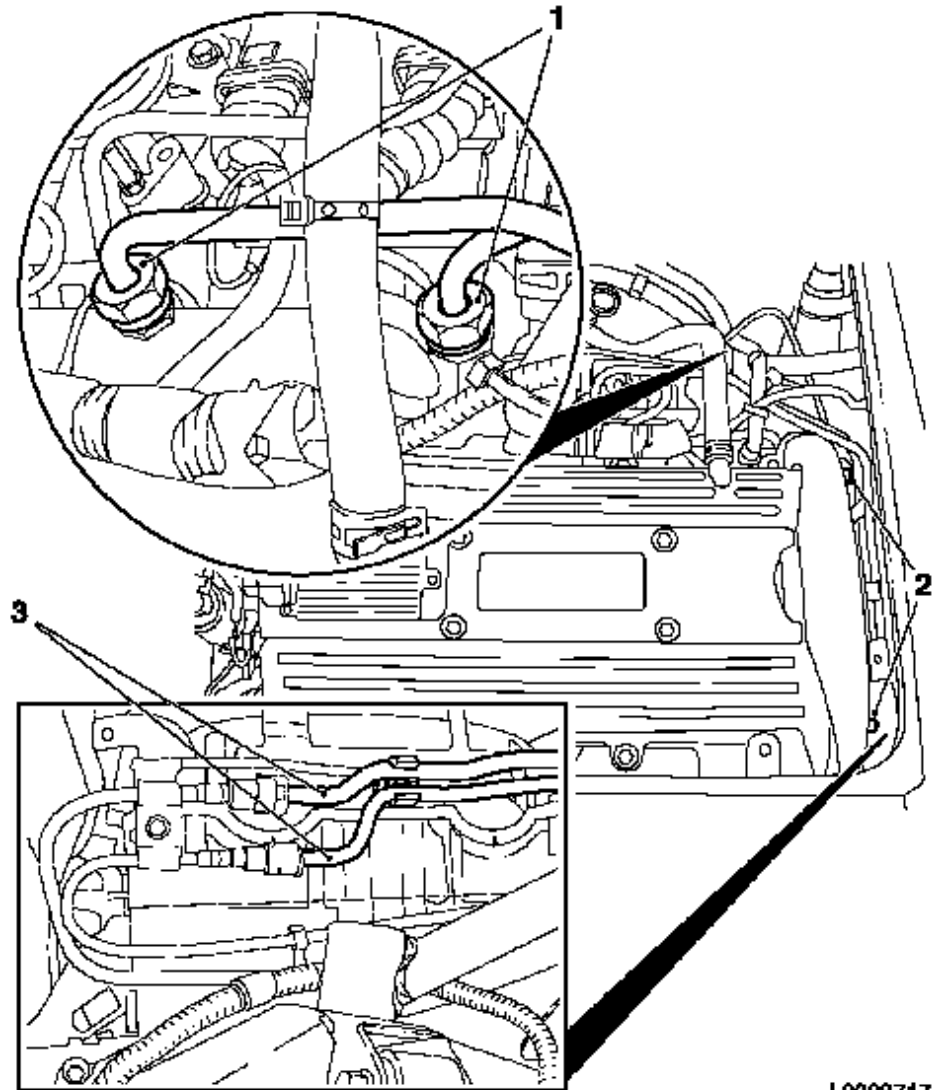
5. Release the fuel pressure.

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.

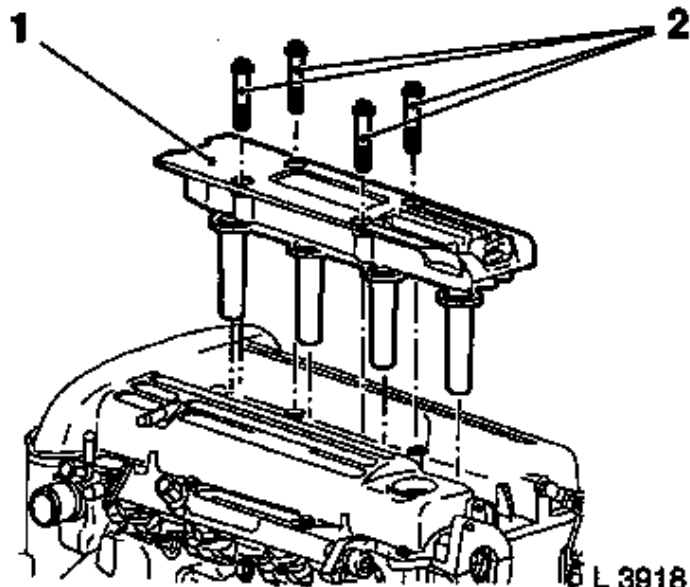


6. Disconnect the fuel lines.
- 2 union nuts (1)
 - 2 bolts (2)
 - Reposition the fuel lines (3) to one side.



L0008717

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

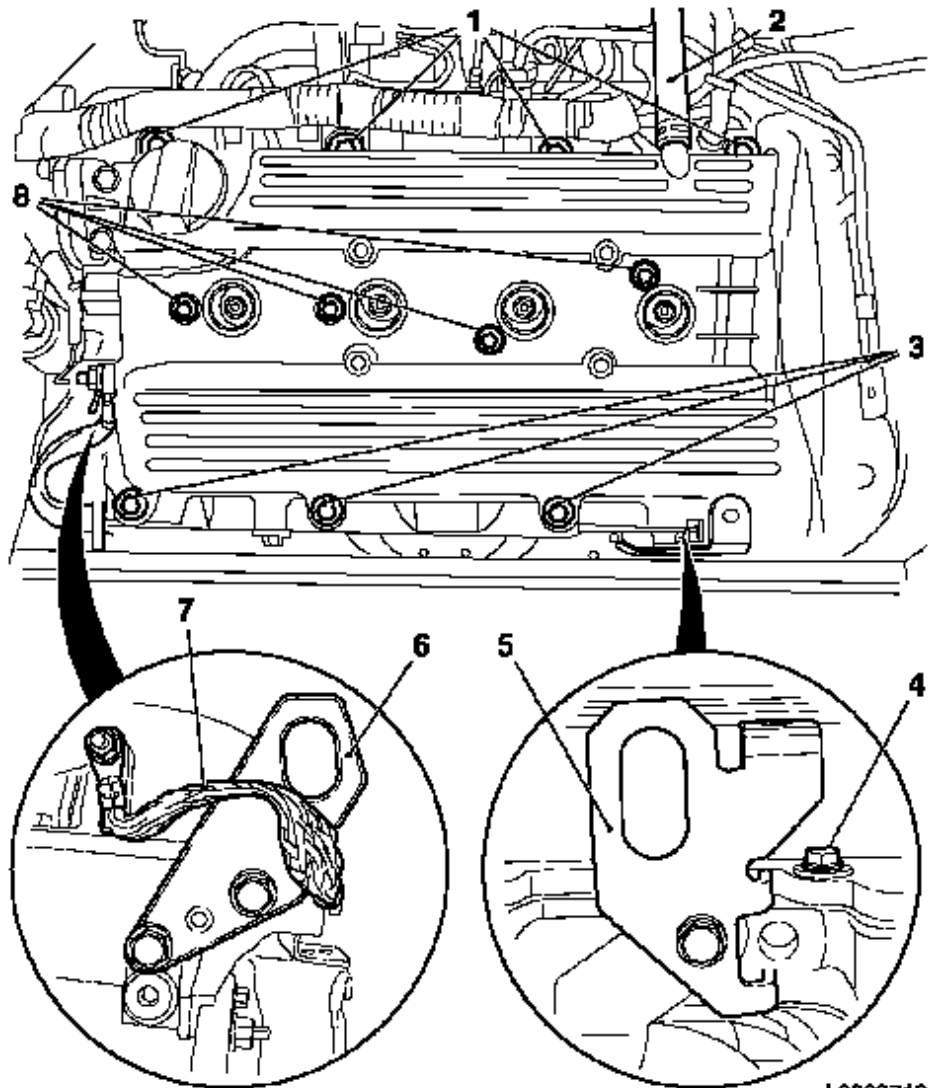


L 3918

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)

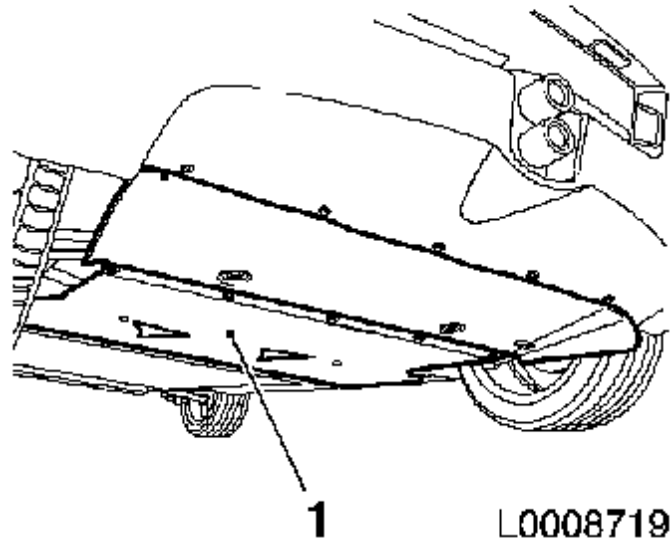
9. Raise the lifting ramp.



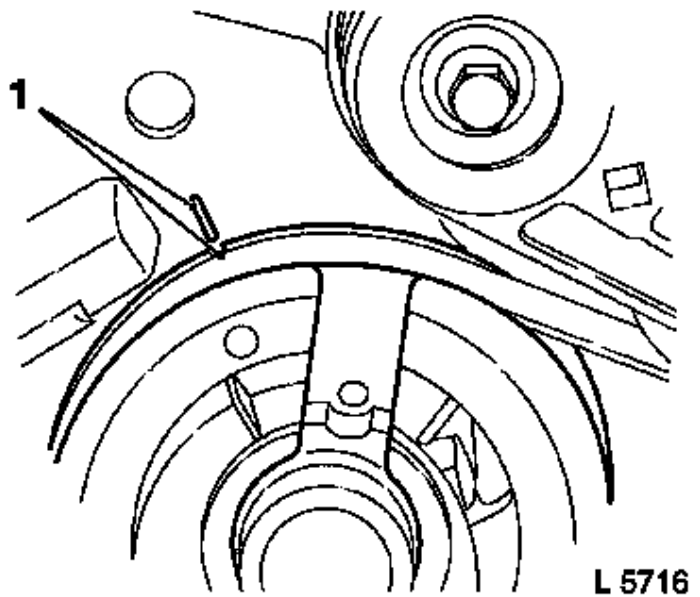
L0008718

10. Remove the lower engine splash shield (4).

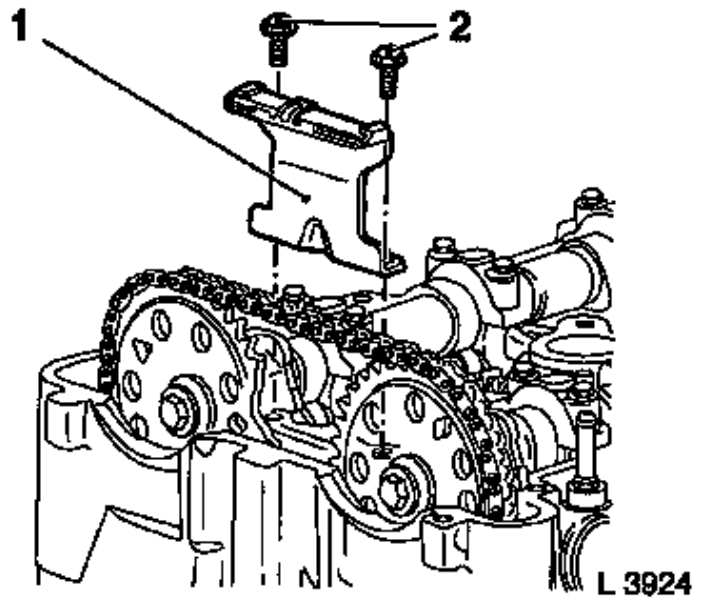
- 13 bolts



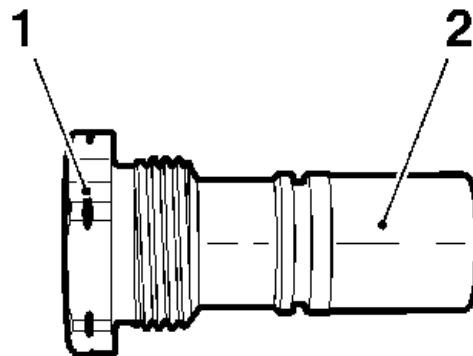
11. Align the crankshaft.
 - Rotate the crankshaft in the normal direction of rotation to TDC on cylinder no. 4 (marking 1).
12. Lower the lifting ramp.



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

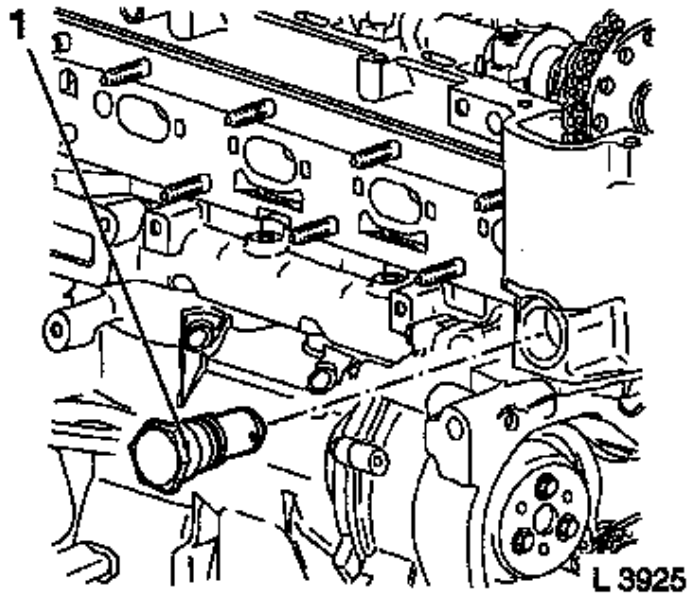


14. Note:
If there is no marking (1) on the camshaft timing chain tensioner (2), then it should be replaced with a new camshaft timing chain tensioner (part number 24 448 509) including a new camshaft timing chain tensioner rail (part number 24 449 448).



L0008542

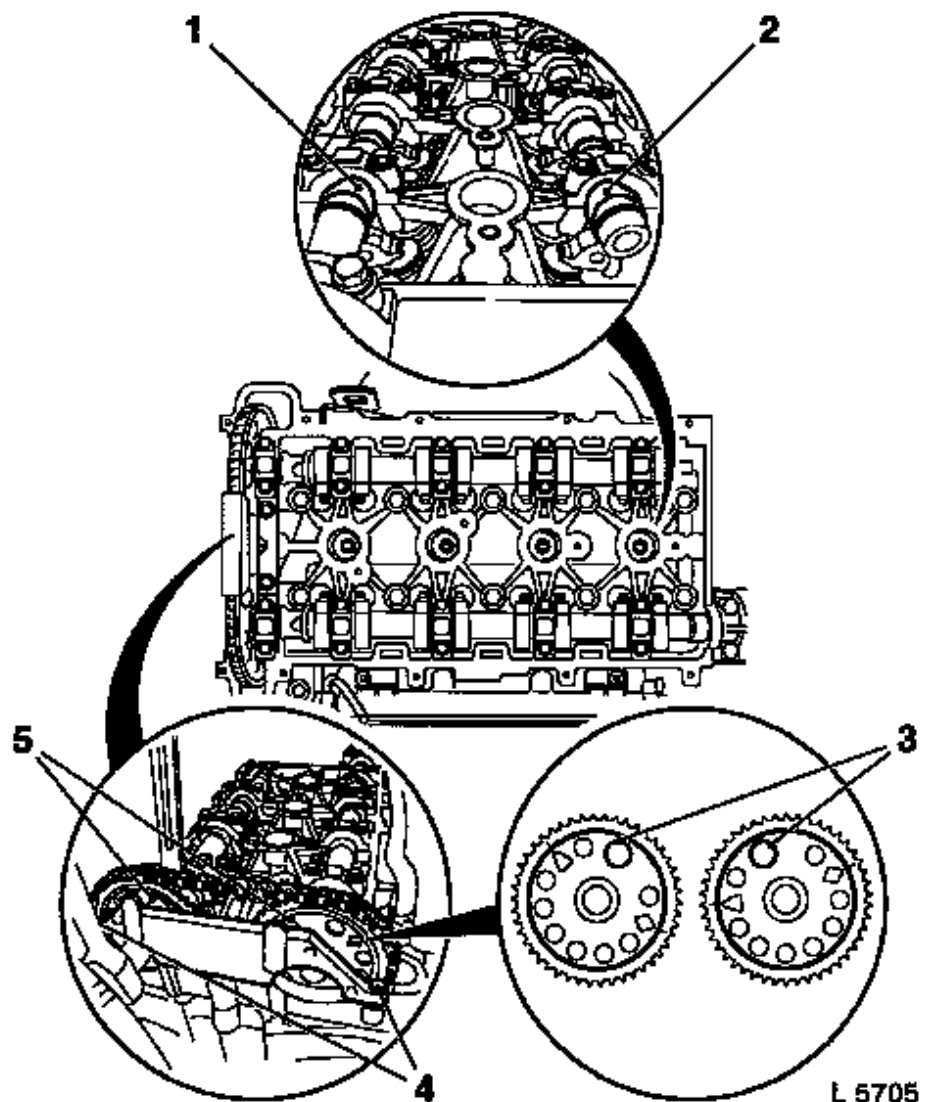
15. Remove the camshaft timing chain tensioner (1).



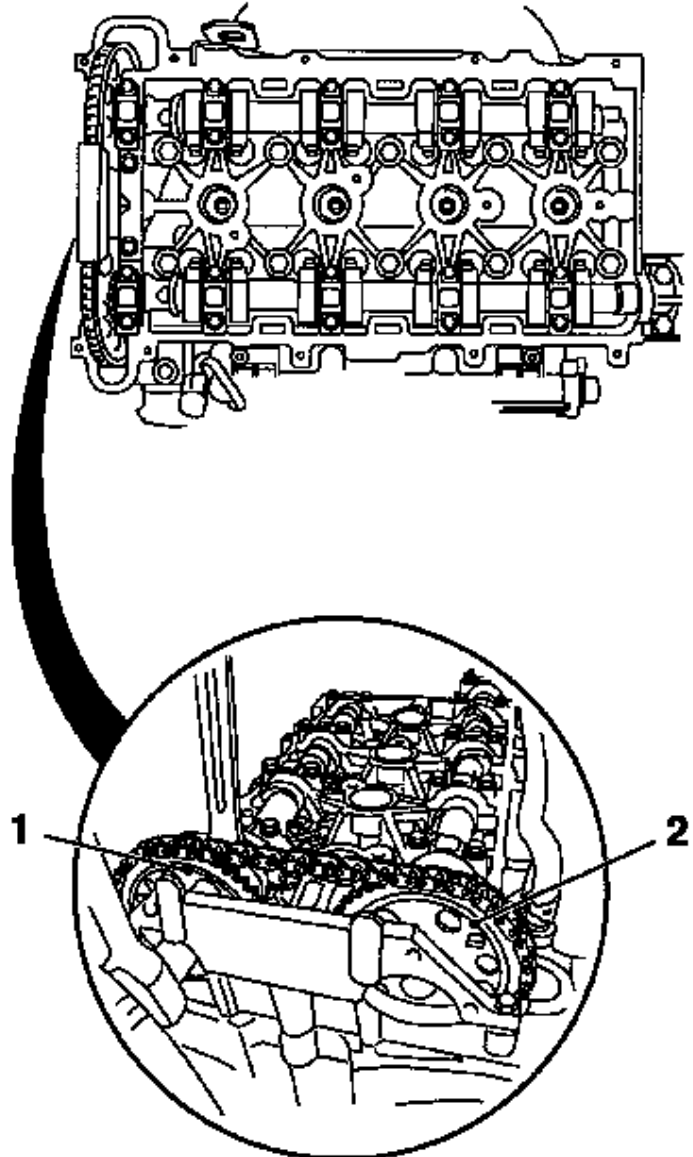
16. Attach **KM-6148**.

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.

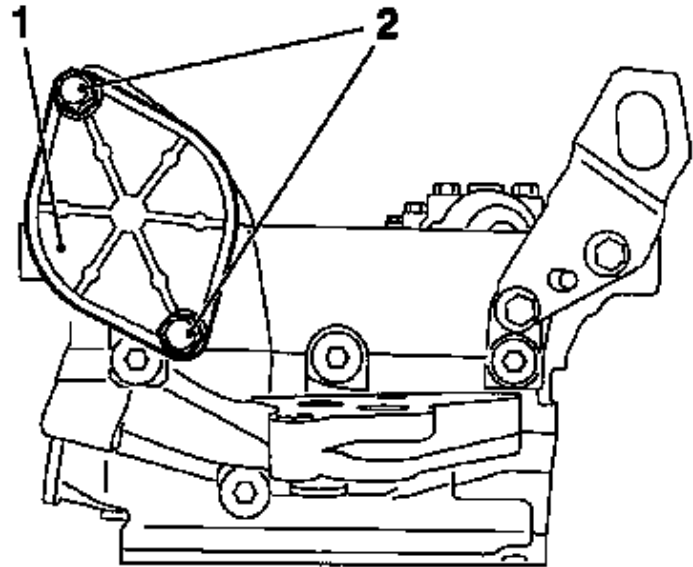


17. Detach the exhaust camshaft sprocket (1).
 - Hold the exhaust camshaft by the hexagon.
 - Pull back the positioning bolt to release.
18. Detach the intake camshaft sprocket (2).
 - Hold the intake camshaft by the hexagon.



L 6072

19. Detach the camshaft connecting flange cover (1).
 - 2 bolts (2)



L 5744

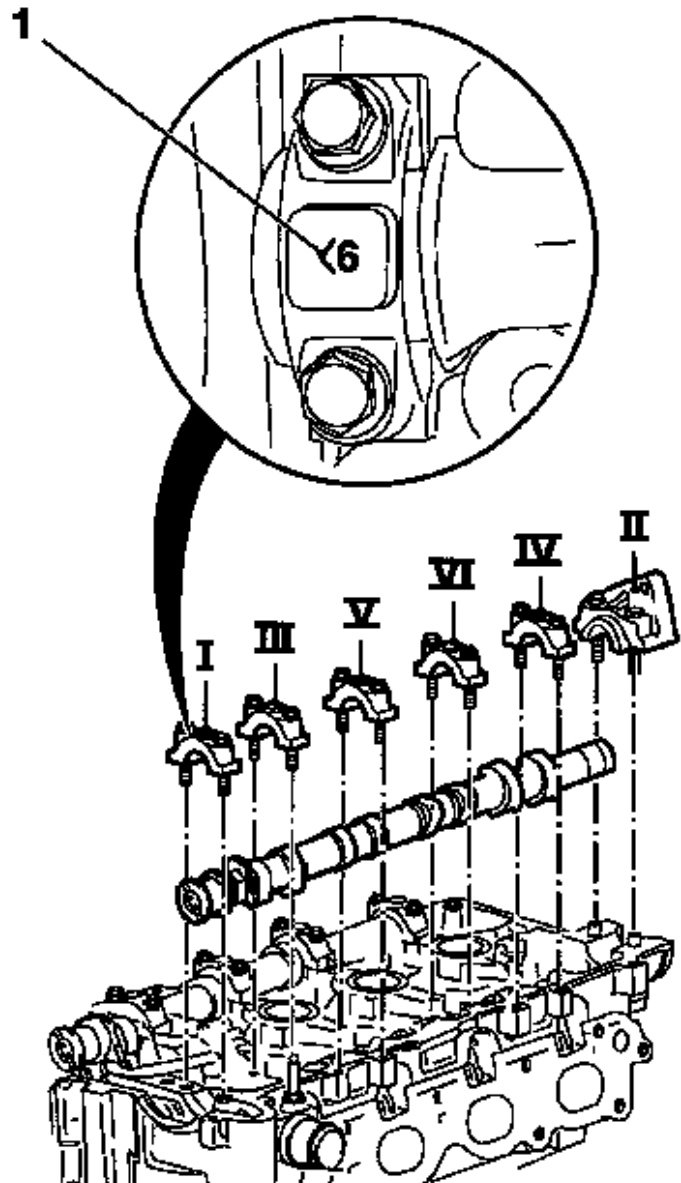
20. Remove the intake camshaft.

Important: Note identification marking (1).

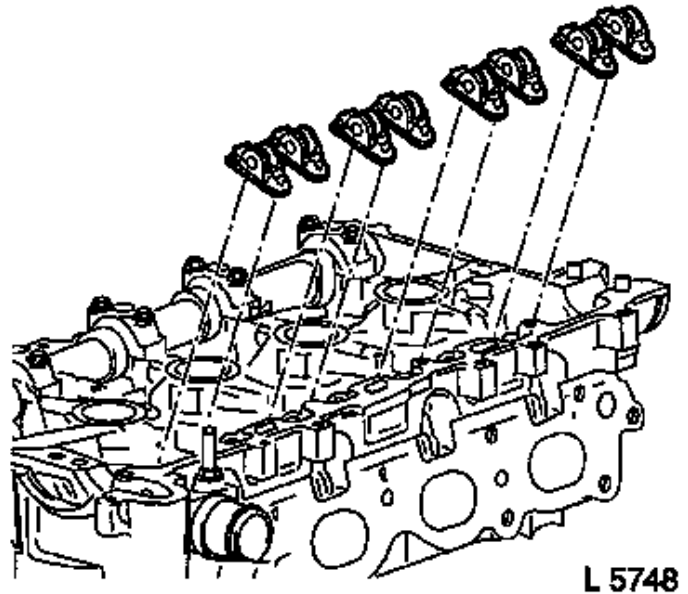
- Remove the camshaft bearing caps.
 - Working in a spiral pattern from the outside towards the middle, release the bolts on the camshaft bearing caps (I to VI) 1/2 to 1 turn at a time.

Note: The camshaft must be released evenly from the bearings.
 - Take out the camshaft.
 - Visually inspect the camshaft and the camshaft bearings for wear.

Note: The cylinder head should be replaced if the camshaft bearings are defective.

**L 5747**

21. Take out the roller cam followers.
- Important:** Note the correct allocation.
- 8 off
- Note:** The roller cam followers must be renewed when installing a new camshaft.



22. Remove the exhaust camshaft.

- Remove the camshaft bearing caps.

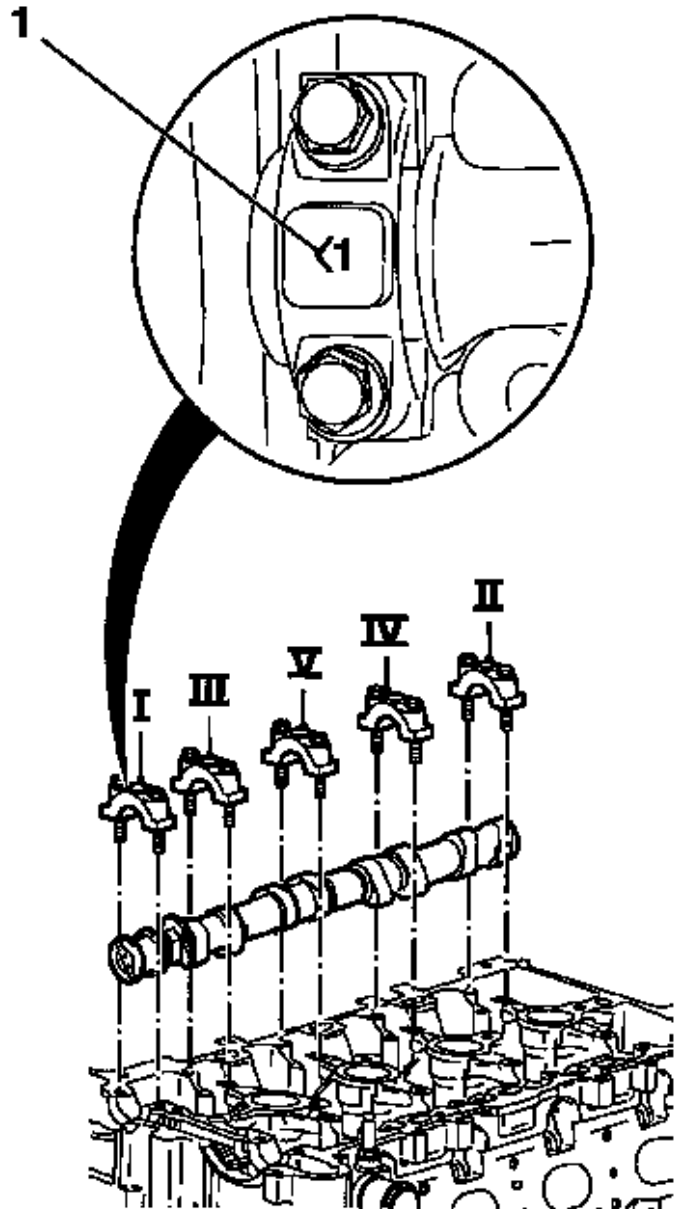
Note: Note identification marking (1).

- Working in a spiral pattern from the outside towards the middle, release the bolts on the camshaft bearing caps (I to V) 1/2 to 1 turn at a time.

Note: The camshaft must be released evenly from the bearings.

- Take out the camshaft.
- Visually inspect the camshaft and the camshaft bearings for wear.

Note: The cylinder head should be replaced if the camshaft bearings are defective.



L 5749

**Install**

23. Install the exhaust camshaft.
- Coat the sliding surfaces with engine oil.
- Important:** Note the identification markings and the correct allocation, arrow (1) points towards the timing chain end.
- Note the identification markings and the correct allocation, arrow (1) points towards the timing chain end.
- Insert the camshaft and the camshaft

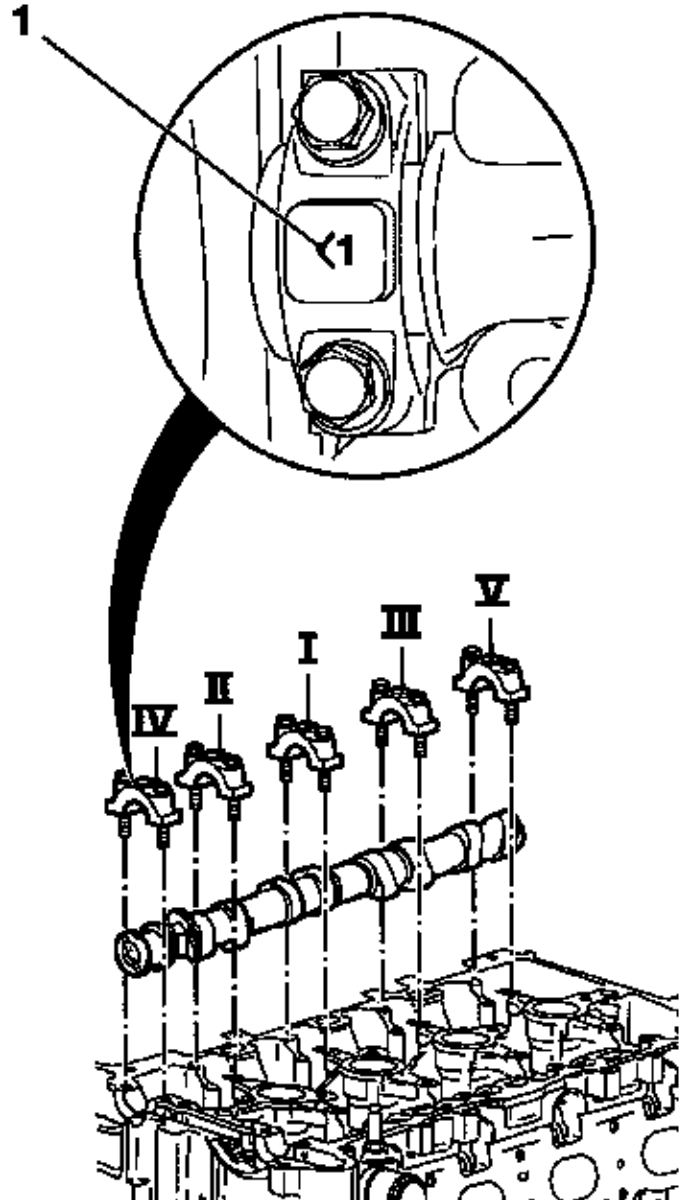
bearings.

- Install the camshaft bearing caps.
- Working in a spiral pattern from the middle towards the outside, tighten the bolts on the camshaft bearing caps (I to V) in stages.
- Tightening torque **9 Nm**

Important: Note the correct allocation.

24. Insert the roller cam followers.

- Coat the sliding surfaces with engine oil.

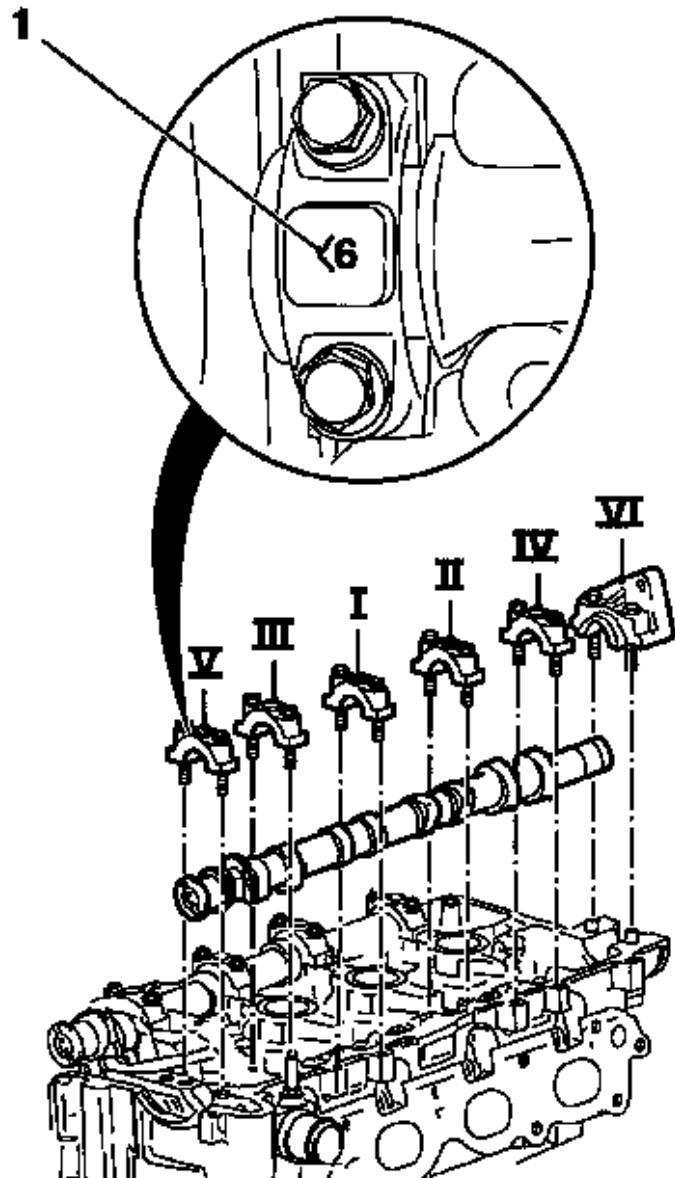


L 5752

25. Install the intake camshaft.

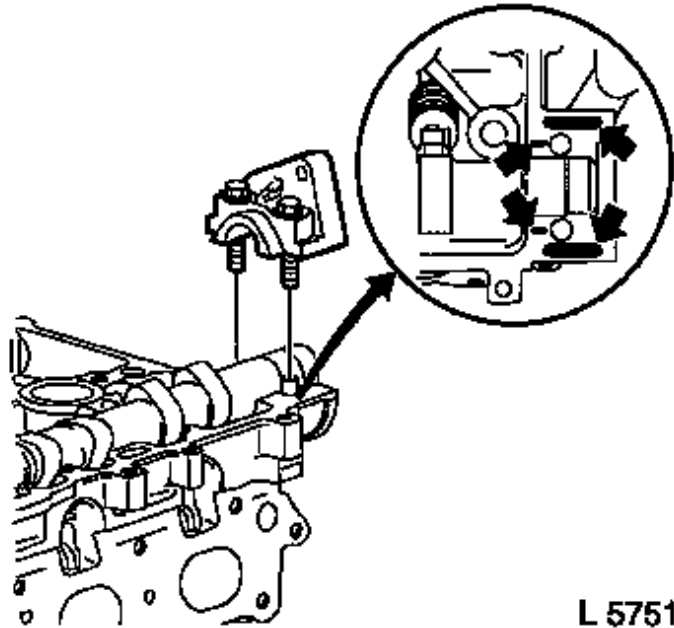
- Clean the sealing surfaces of camshaft bearing cap no.11.
- Coat the sliding surfaces with engine oil.

Note: Note the identification markings and the correct allocation, arrow (1) points towards the timing chain end. Insert the camshaft and the camshaft bearings.



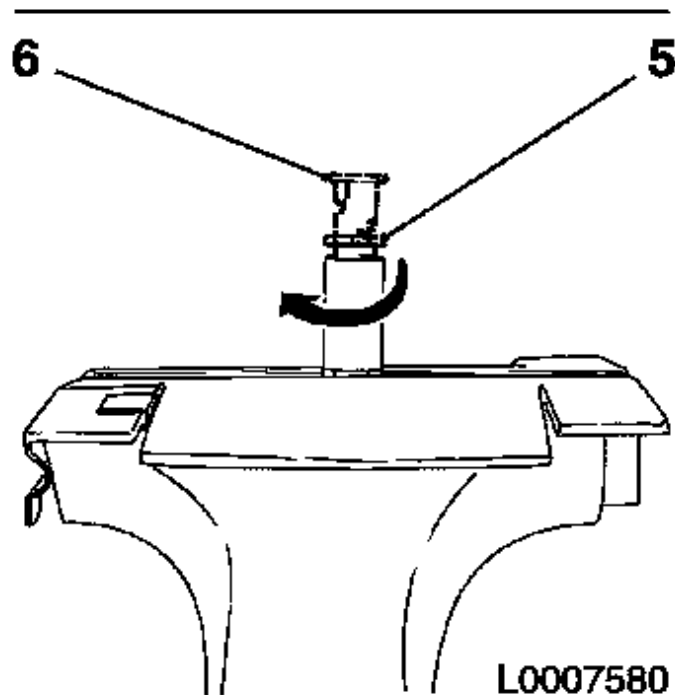
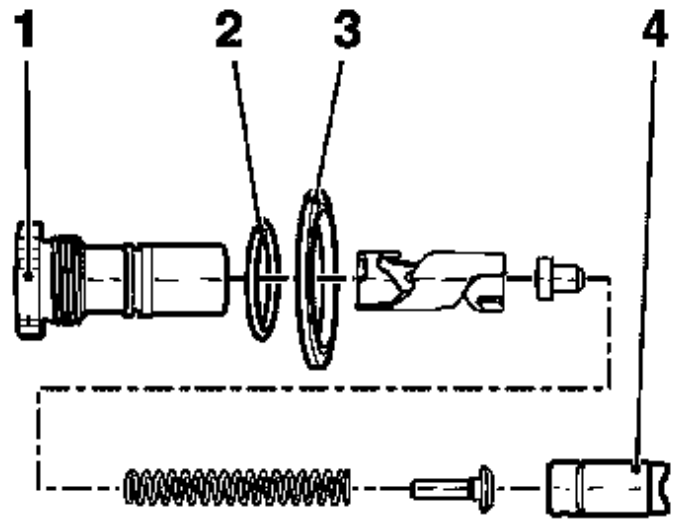
L 5753

26. Install the camshaft bearing caps.
- Coat the sealing surfaces of camshaft bearing cap no. 11 with silicone sealant (grey) (arrows).



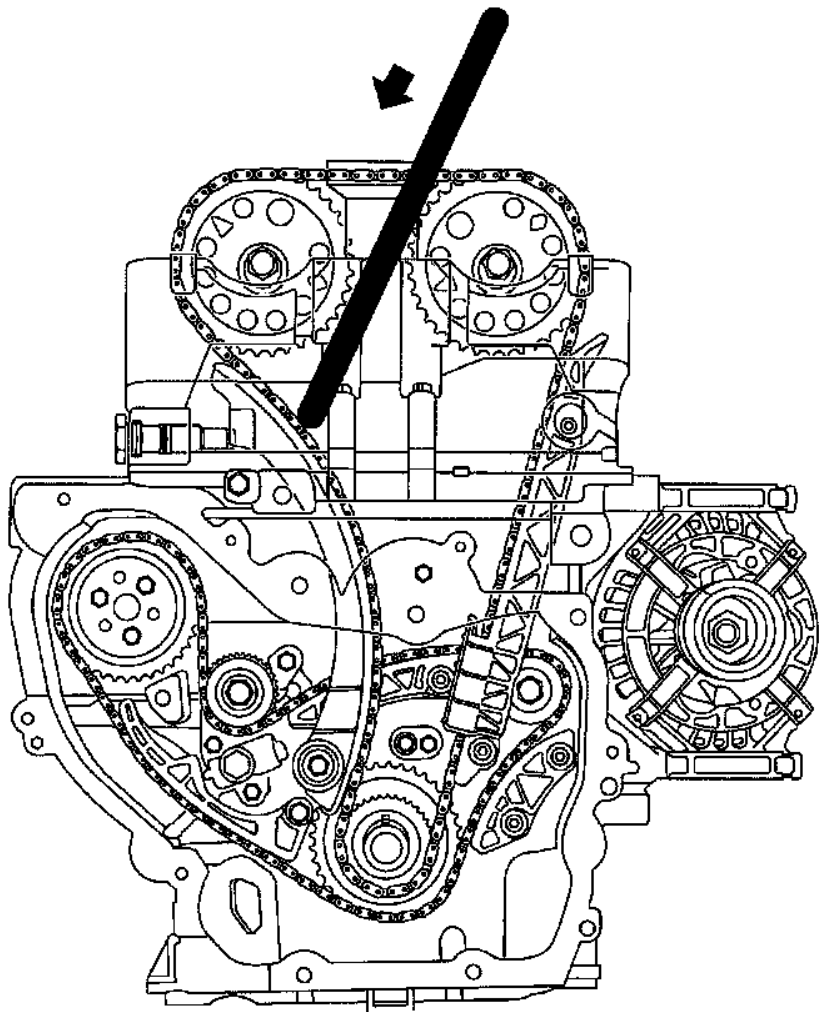
L 5751

27. Attach the camshaft connecting flange cover.
 - Use a new gasket.
 - Tightening torque **23 Nm**
28. Attach the intake camshaft sprocket.
 - Use a new bolt.
 - Hold the intake camshaft by the hexagon.
 - Tightening torque **85 Nm + 30° + 15°**
29. Attach 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.
 - Pull back the positioning bolt to secure the camshaft sprocket.
 - Tightening torque **85 Nm + 30° + 15°**
30. 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**



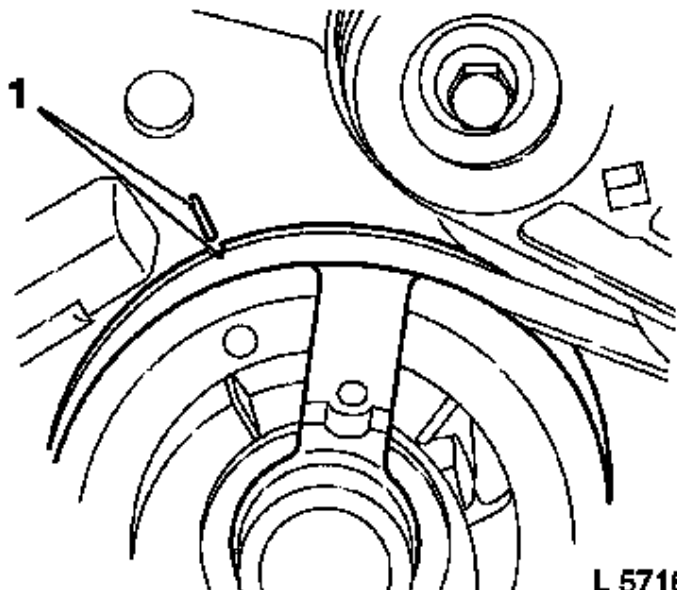
Important: Failure to follow this instruction could cause the camshaft timing chain to jump.

31. 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).
32. Recut the thread.
 - 2 off



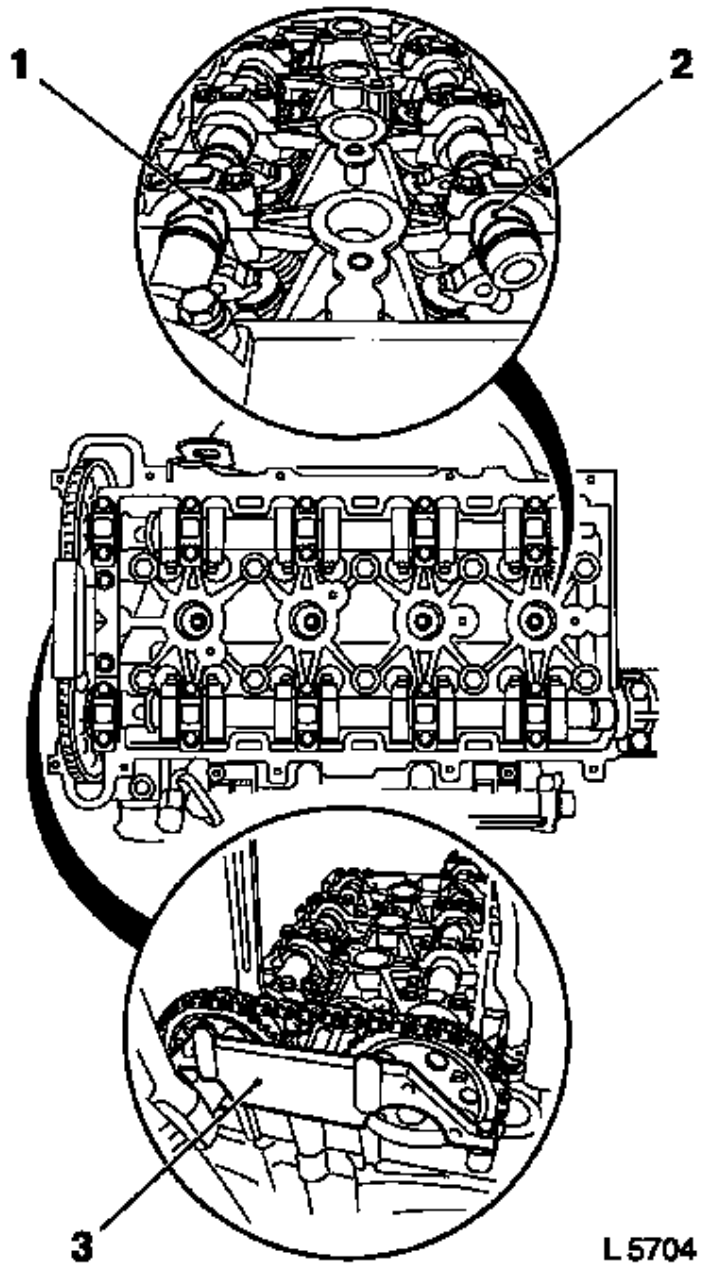
J 0935

33. Install the guide rail.
 - Coat the bolts with thread locking compound (red) and insert them.
 - Tightening torque **8 Nm**
34. Raise the lifting ramp.
35. Rotate the crankshaft **720°**.
 - Rotate the crankshaft in the normal direction of rotation to TDC on cylinder no. 4 (marking 1).



L 5716

36. Note:
In this position the cams (1) and (2) of cylinder no. 4 point upwards, and it must be possible to insert blocking tool **KM-6148** (3).
37. Install the lower engine splash shield
38. Lower the lifting ramp.
39. Detach **KM-6148**.

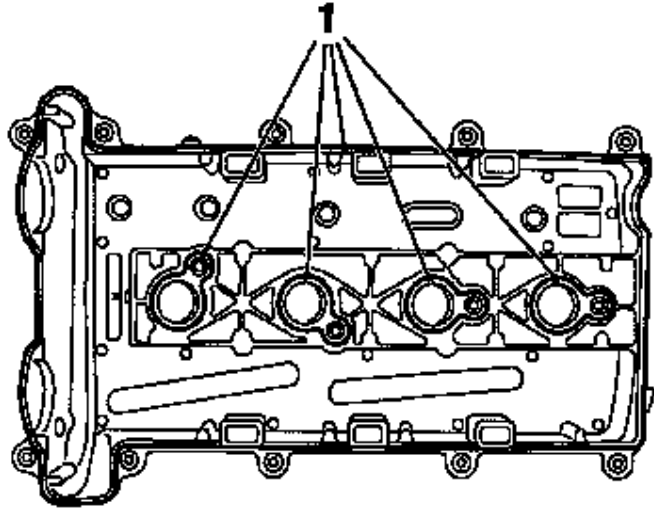


L 5704

40. 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**

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



L 5706

- 42.** Attach 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°**
- 43.** Connect the fuel lines.
- 2 union nuts
 - Tightening torque **10 Nm**
 - 2 bolts
 - Tightening torque **9 Nm**
- 44.** Install the rear engine cover.
- Check the alignment.
 - 6 bolts, tightening torque **14 Nm**
- 45.** Close the rear engine cover.
- 46.** Connect the battery.
- 47.** Close the bonnet.
- 48.** Reprogram the volatile memories.