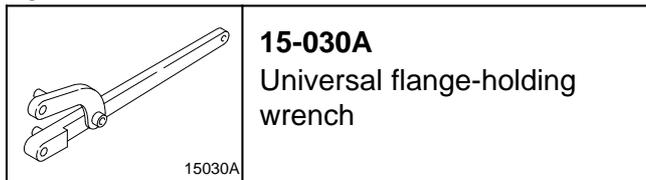


Camshafts – Remove and Install (both) (21 284 0)

Special Tools



Remove

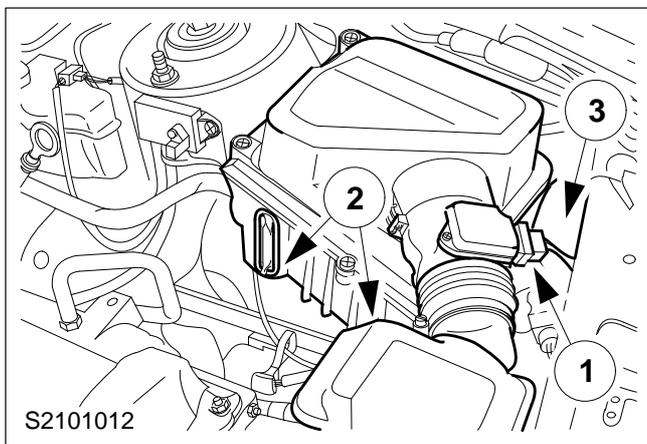
⚠ CAUTION: Disconnect the battery earth lead.

1. Standard preparatory measures:

- Make a note of the radio keycode.
- Make a note of the preset radio stations.
- Detach the battery cover

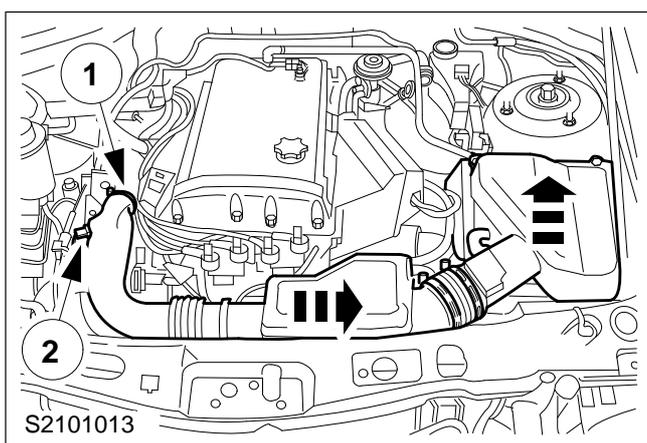
2. Remove the air filter housing with the intake pipe.

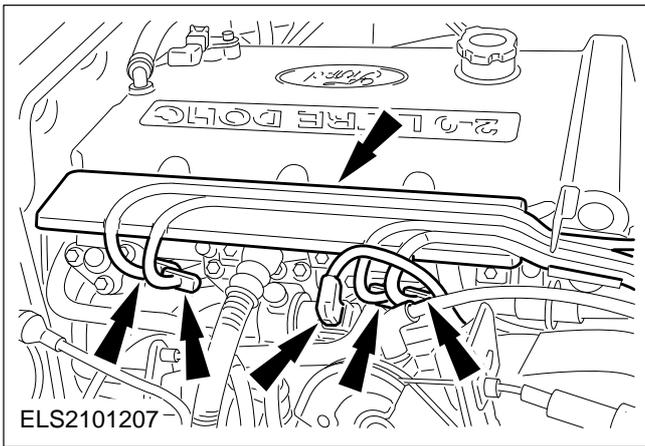
- 1 Disconnect the plug from the mass air flow (MAF) sensor.
- 2 Unclip the rubber mountings.
- 3 Detach the intake connector.



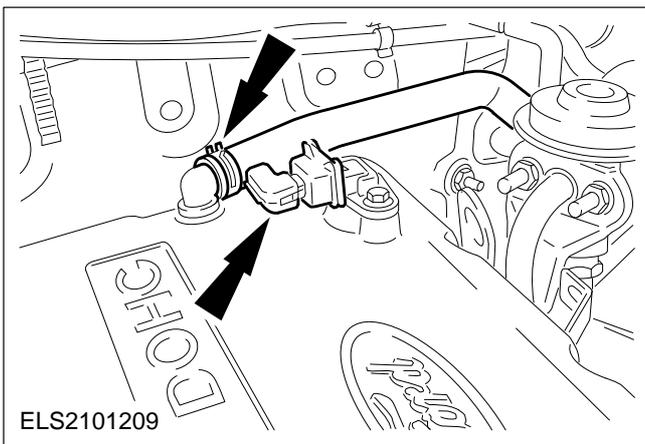
3. Remove the air filter housing with the intake pipe (continued).

- 1 Detach the hose clip.
- 2 Disconnect the multiplug from the intake air temperature sensor (IAT sensor).

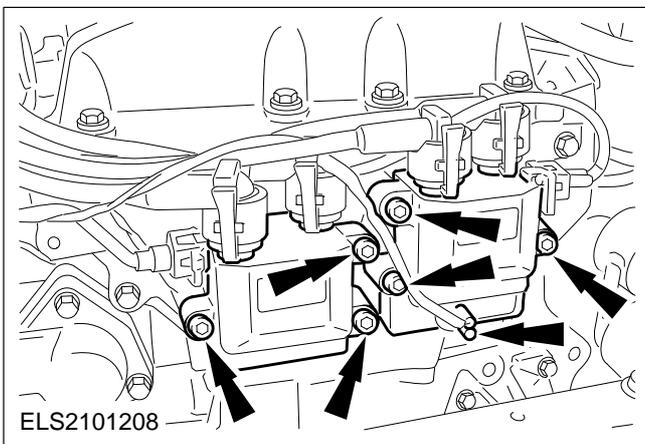




4. Disconnect the plug from the idle air control (IAC) valve.
5. Disconnect the spark plug connectors.
6. Remove the injector wiring rail.

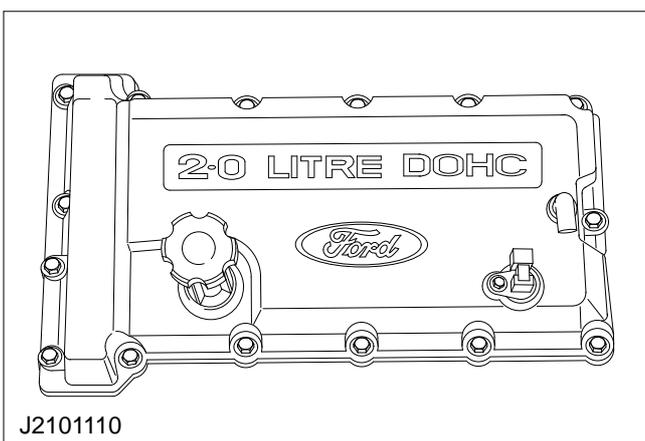


7. Disconnect the plug and the hose.
 - 1 Engine breather hose (PCV).
 - 2 Camshaft position (CMP) sensor plug



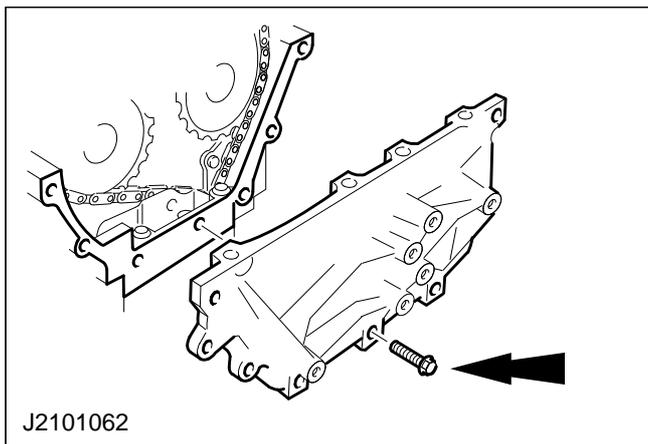
8. Remove the DIS ignition coils and the noise suppression capacitor.

Disconnect the plug from the noise suppression capacitor.



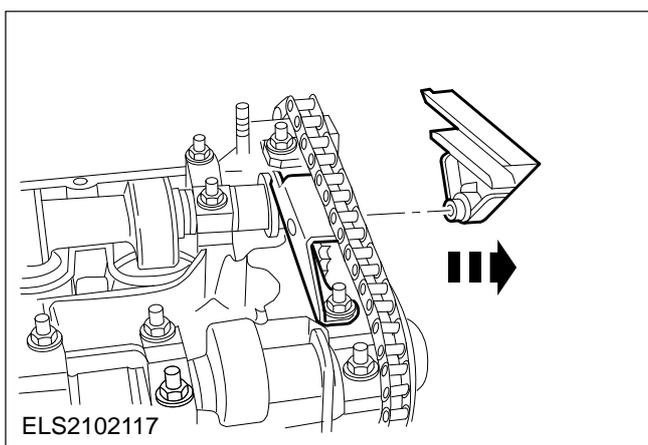
9. Remove the cylinder head cover (11 bolts, four nuts).

Remove the gasket.



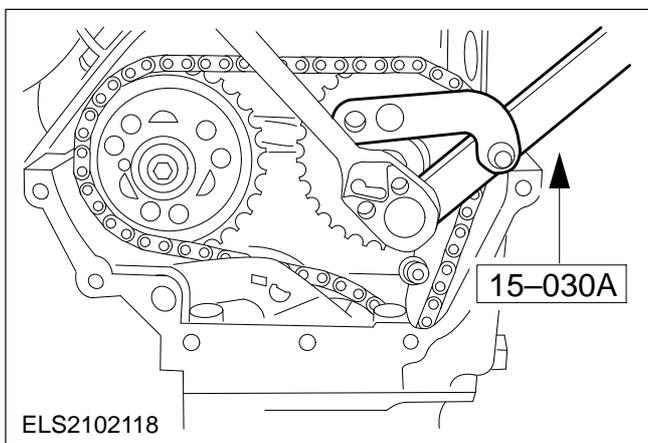
10. Remove the upper timing chain cover (seven bolts).

Remove the gasket.

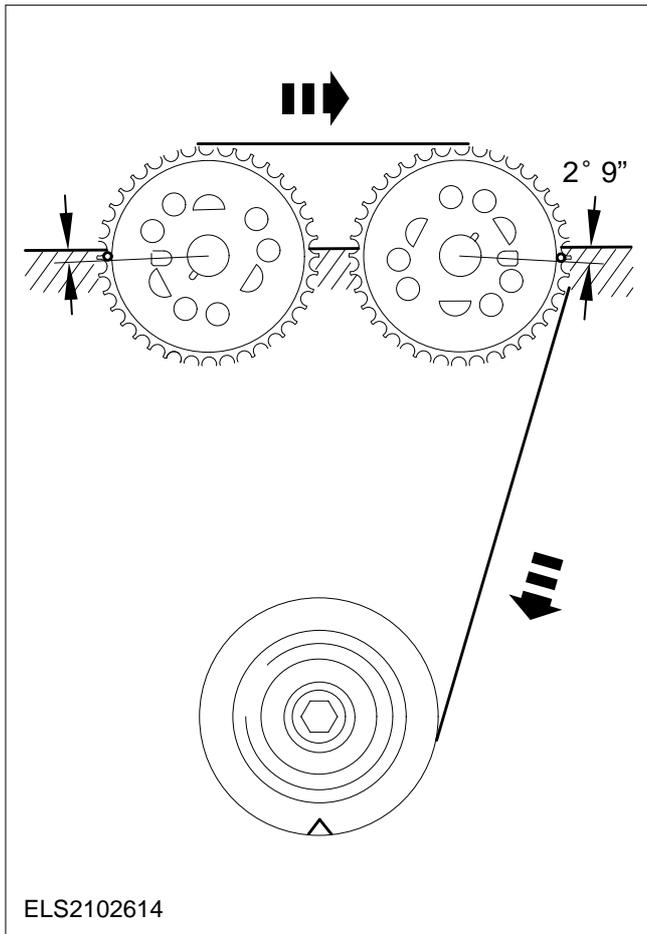


NOTE: Renew the upper chain guide during reassembly.

11. Remove the upper chain guide.

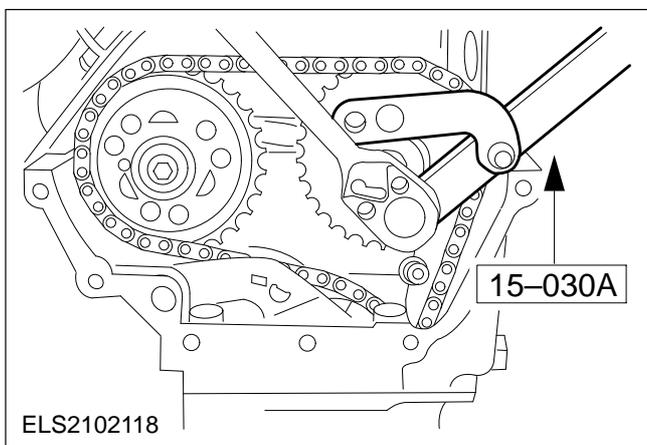


12. Release the camshaft sprockets.

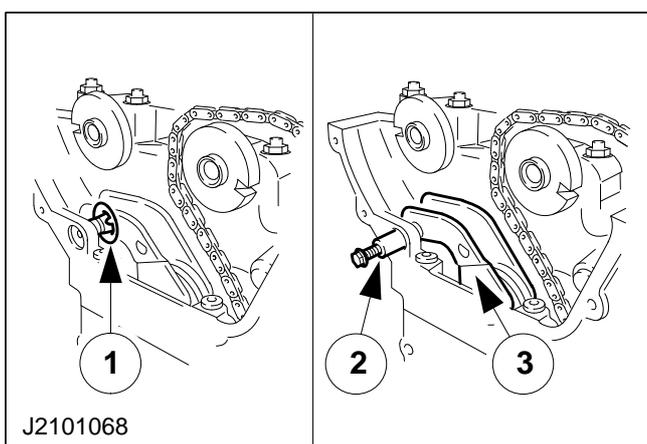


13. Set the camshaft sprockets to the mark.

14. Mark the position of the timing chain and the left and right-hand camshaft sprockets with a scribe.

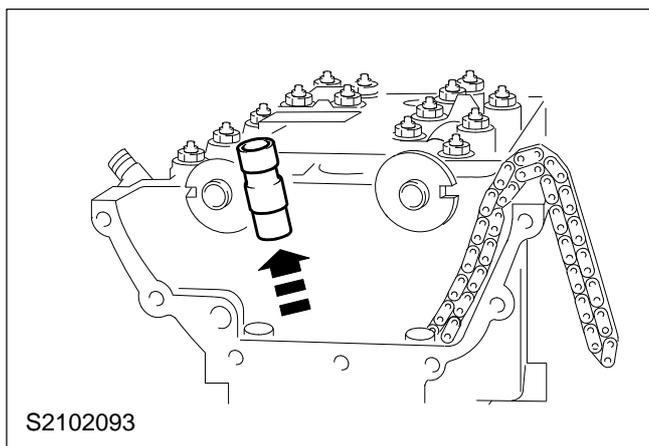


15. Remove the camshaft sprockets with the timing chain.



16. Remove the timing chain tensioner.

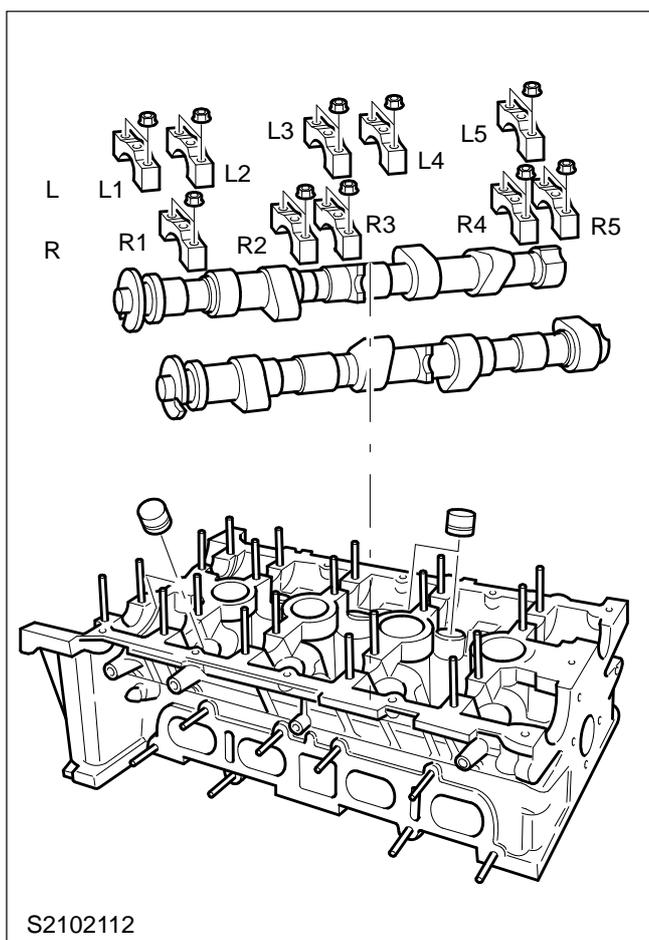
- 1 Remove the retaining ring with a pair of pliers.
- 2 Remove the pivot pin using an M6 bolt.
- 3 Remove the tensioning arm.



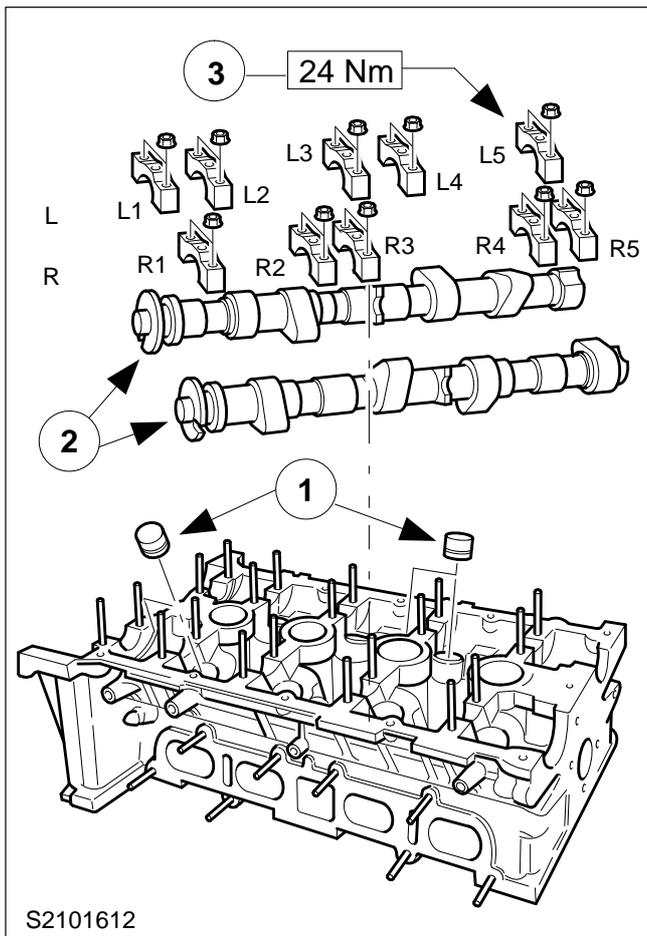
17. Remove the timing chain tensioner (continued).

⚠ CAUTION: Do not re-use the plunger.

- Take out the hydraulic plunger.
- Tie the timing chain up to one side.
- Remove the bracket from the upper chain guide together with the front bearing caps.



18. Remove the camshafts.



Install

19. Install the camshafts.

CAUTION: Before installing the camshafts, turn the crankshaft to approximately 60° BTDC.

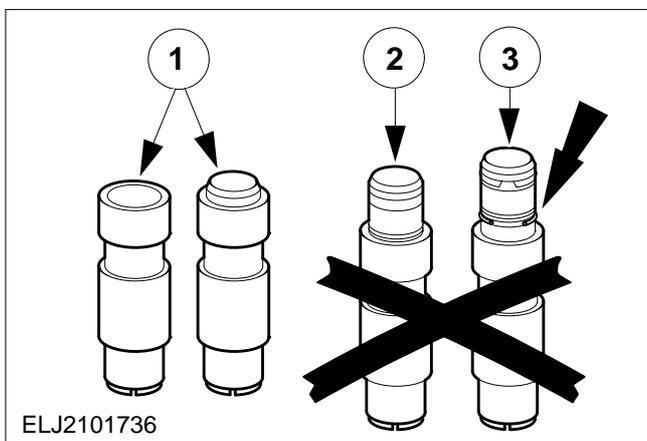
CAUTION: After installing the camshafts do not turn the crankshaft for about 15 minutes.

Coat the bearings with oil.

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

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

2 Install the camshaft bearing caps and make sure that the position markings can be read from the flywheel side.

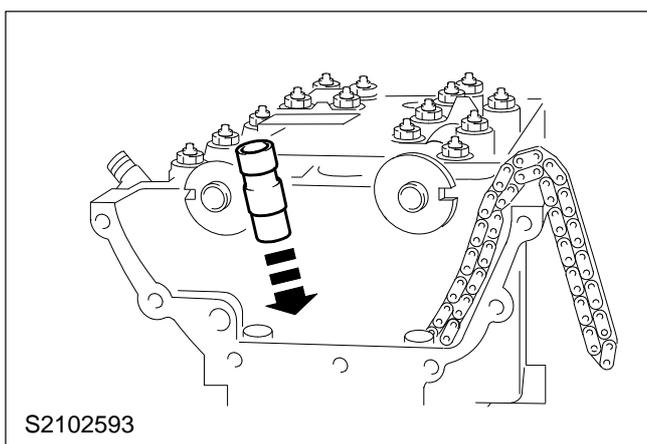


20. Check the new hydraulic plunger for the timing chain tensioner.

1 Plunger latched.

2 Plunger partly released.

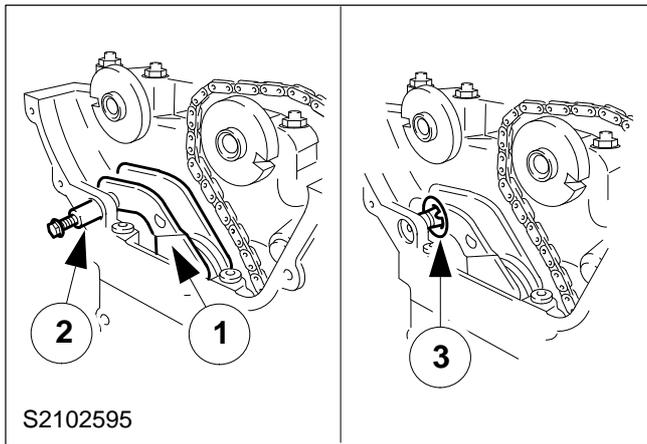
3 Plunger fully released (the detent ring is visible).



CAUTION: Only use a new latched plunger.

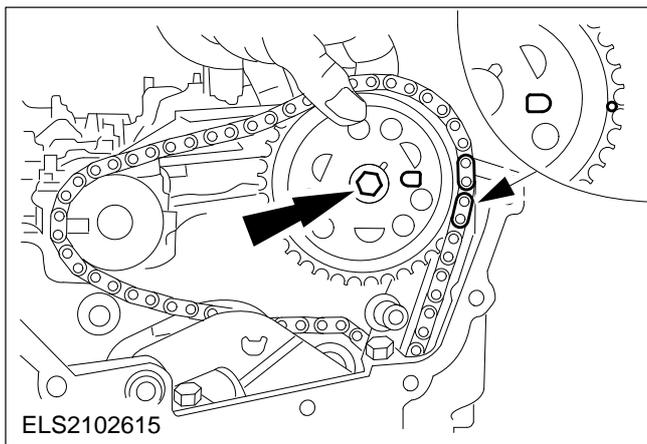
21. Install the timing chain tensioner.

- Fit the hydraulic plunger.
- Attach the bracket to the upper chain guide together with the front bearing caps.



22. Install the timing chain tensioner (continued).

- 1 Insert the tensioning arm.
- 2 Insert the pin.
- 3 Fit the locking ring.



NOTE: The timing chain must be taut on the tensioned run.

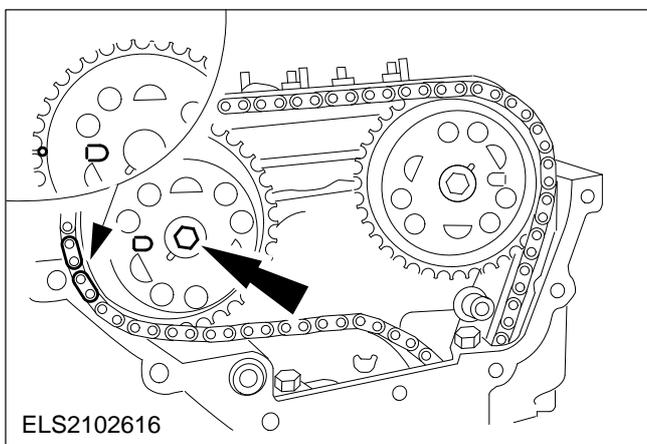
NOTE: The markings on the timing chain.

23. Fit the camshaft sprocket (exhaust side) with the timing chain laid in place.

If necessary rotate the camshaft slightly.

NOTE: Do not tighten the bolt.

Insert the bolt on the exhaust side.



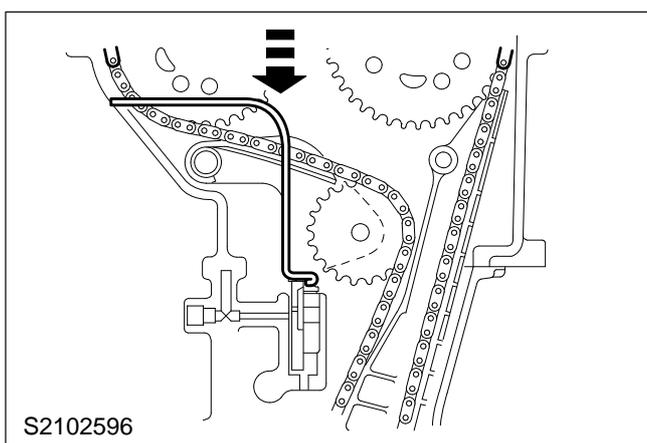
NOTE: It does not matter if the timing chain sags slightly between the sprockets.

NOTE: The markings on the timing chain.

24. Fit the camshaft sprocket (inlet side) with the timing chain laid in place.

NOTE: Do not tighten the bolt.

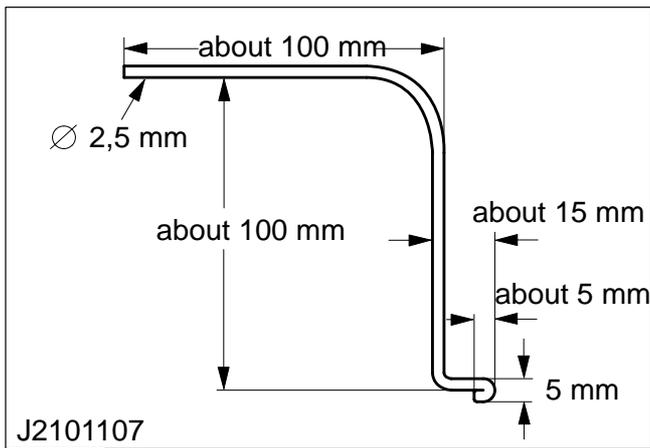
Insert the bolt on the inlet side.



NOTE: If the hydraulic plunger does not reach the tensioning arm, unlatch the plunger with the aid of an auxiliary tool.

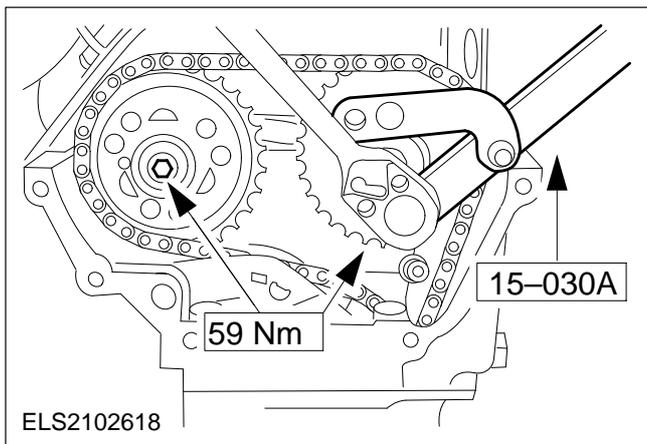
25. Compress the hydraulic plunger.

Press down the tensioning arm by hand and unlatch the hydraulic plunger.

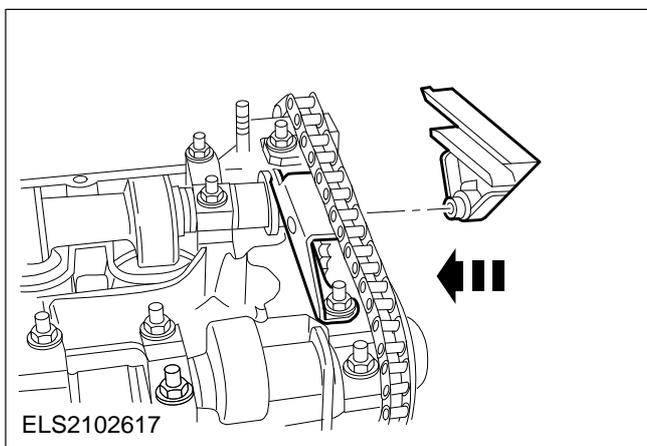


26. Fabricate an auxiliary tool.

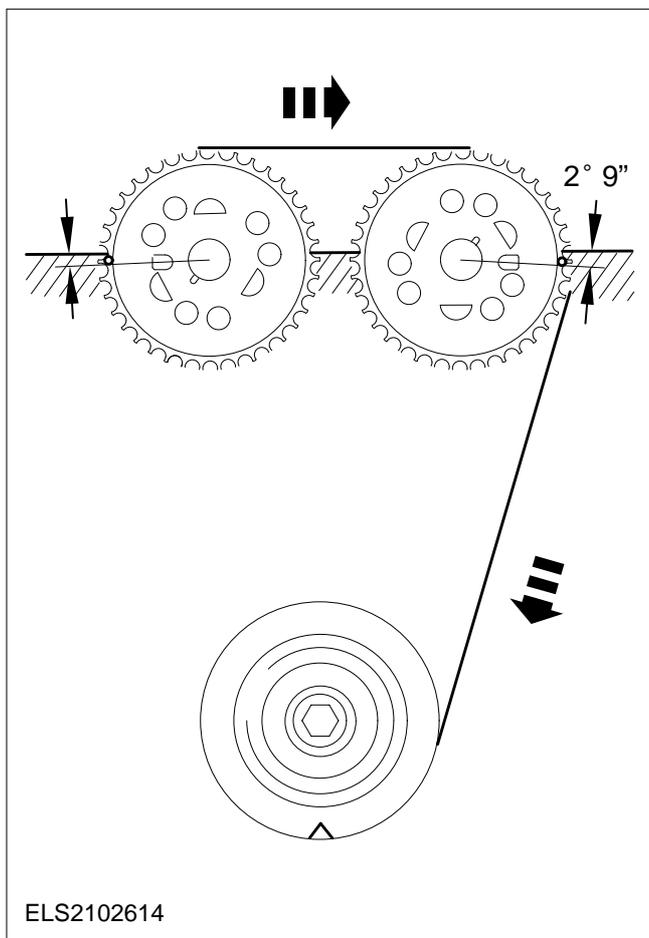
Use a 2,5 mm length of 220 mm welding rod.



27. Tighten the camshaft sprockets.



28. Clip a new upper chain guide in place.

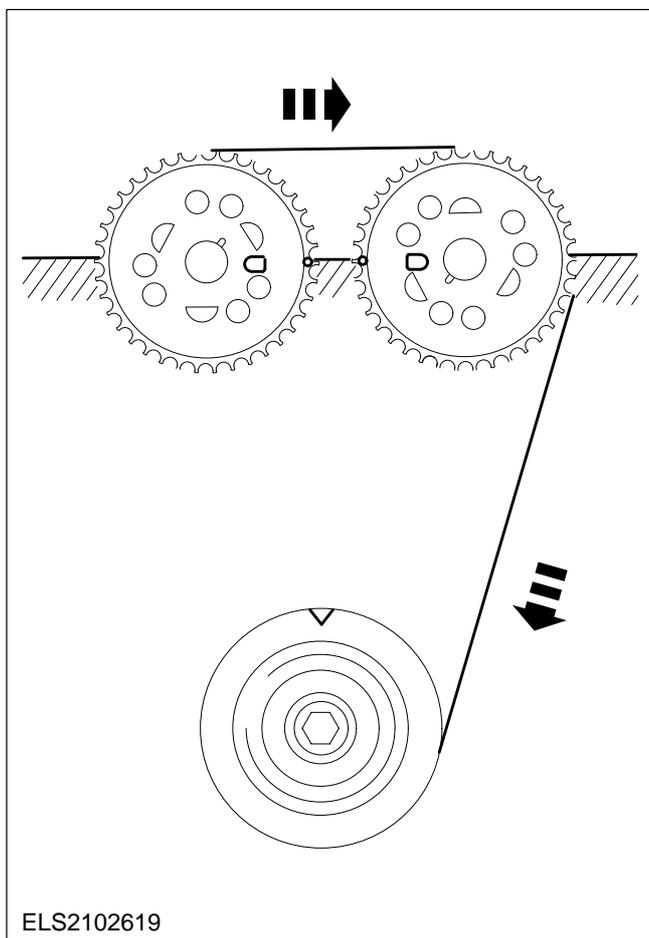


NOTE: If it is necessary to adjust the valve timing (and to loosen the chain) fit a new hydraulic plunger.

29. Set the camshafts and the crankshaft to TDC on cylinder no. 1.

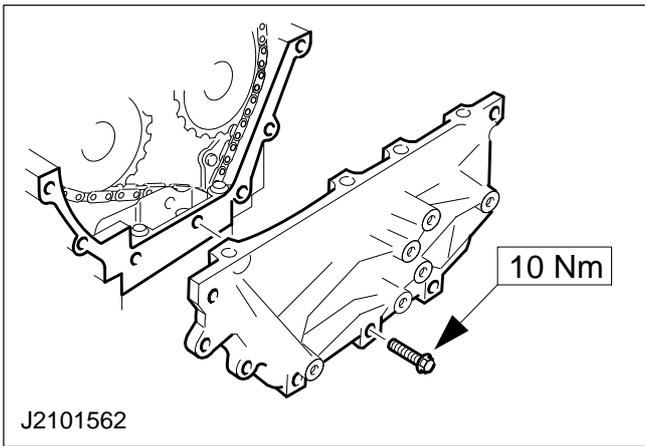
30. Check the valve timing.

Rotate the engine twice in the normal direction of rotation and set it to the timing marks as shown.



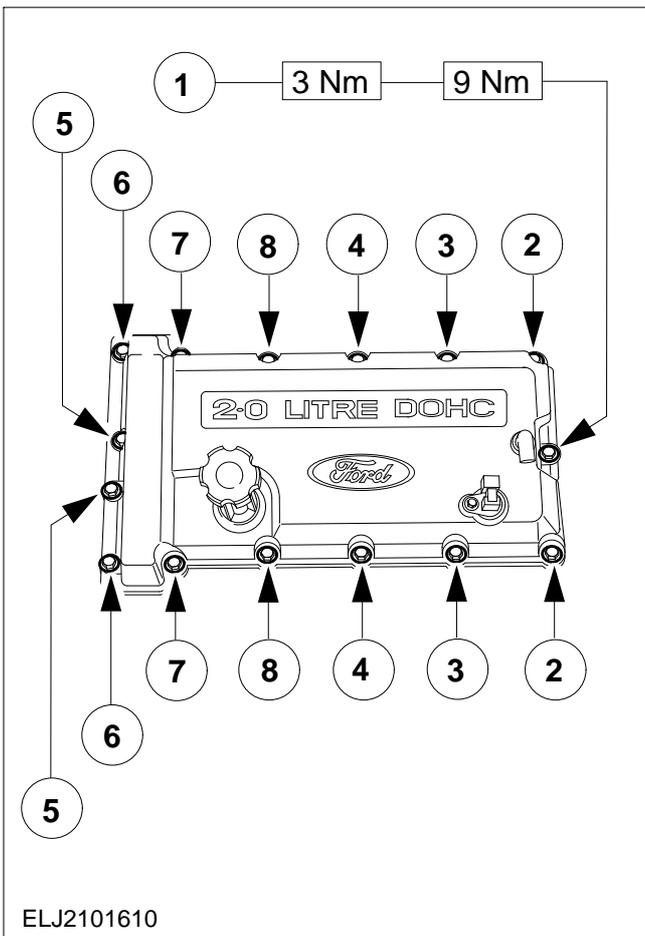
31. Additional check.

- 1 Rotate the engine in normal direction of rotation so that cylinder is at TDC.
- 2 The marks on the camshaft sprockets must face one another exactly level with the upper edge of the cylinder head.



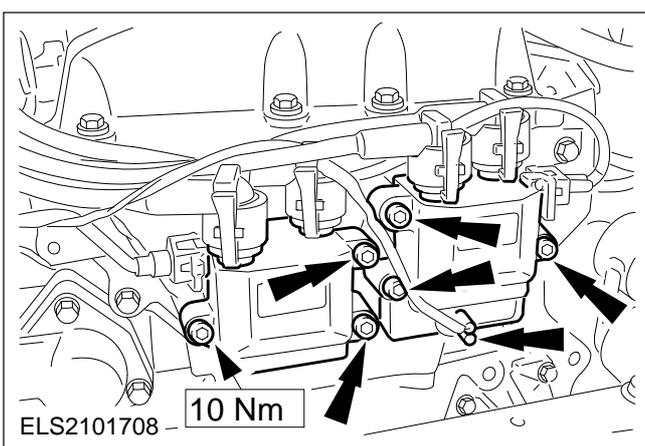
NOTE: The upper edge of the cover must be a maximum of 0,13 mm below the mating face of the cylinder head cover.

32. Fit the upper timing chain cover with a new gasket.



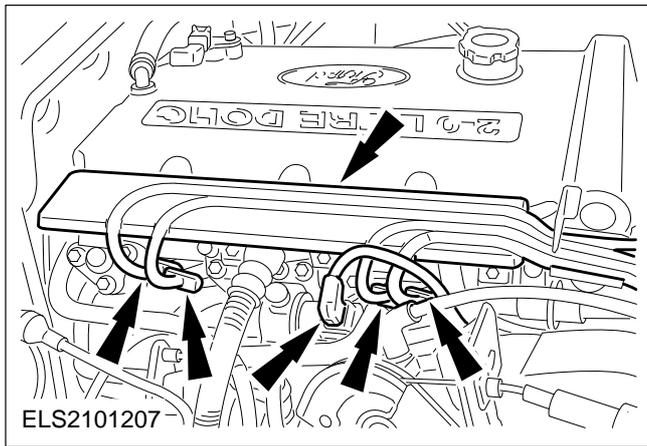
NOTE: Bolt tightening sequence.

33. Fit the cylinder head cover with a new gasket (11 bolts, four nuts) and tighten it in two stages.



34. Fit the DIS ignition coils and the noise suppression capacitor.

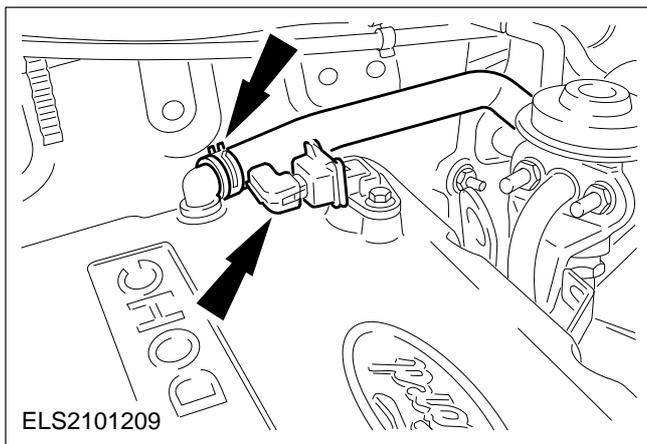
Connect the plug to the noise suppression capacitor.



35. Fit the injector wiring rail.

36. Connect the spark plug connectors.

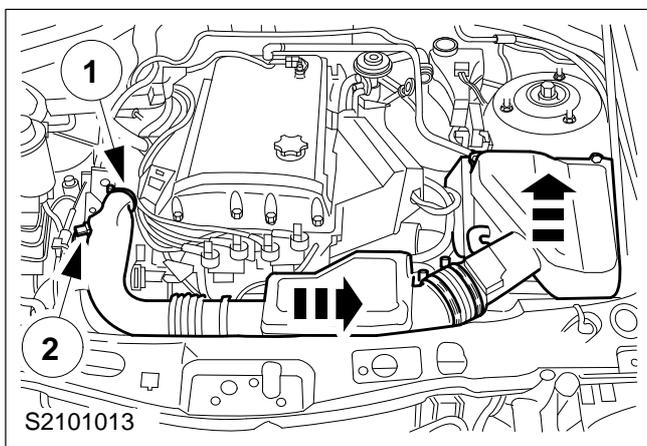
37. Connect the plug to the IAC valve.



38. Connect the plug and the hose.

1 Engine breather hose (PCV).

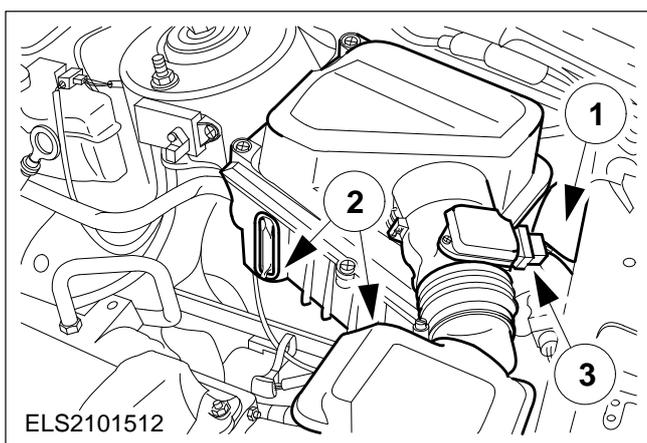
2 CMP sensor plug



39. Fit the air cleaner housing with the intake pipe.

1 Tighten the hose clamp.

2 Connect the plug to the IAT sensor.



40. Fit the air cleaner housing with the intake pipe (continued).

1 Connect the air intake.

2 Hook the rubber retainers in place.

3 Connect the plug to the mass air flow (MAF) sensor.

41. Standard finishing operations.

- Connect the battery earth lead.
- Fit the battery cover.
- Enter the radio keycode.
- Reprogramme the preset radio stations.
- Reset the clock.
- Carry out a road test to enable the PCM to gather data.
- Check the fluid levels and correct as necessary.