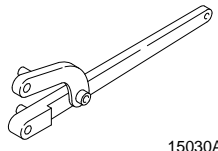
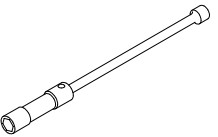


Camshafts – Remove and Install (21 284 0)

Special Tools

	15-030A Universal flange-holding wrench
	21-202 Socket, spark plugs

Proprietary Tools

Brass drift

Materials

Lubricant (Never-Seeze)	ESE-M1244-A
Bolt M6 X 60	

Remove

1. Standard preparatory measures:

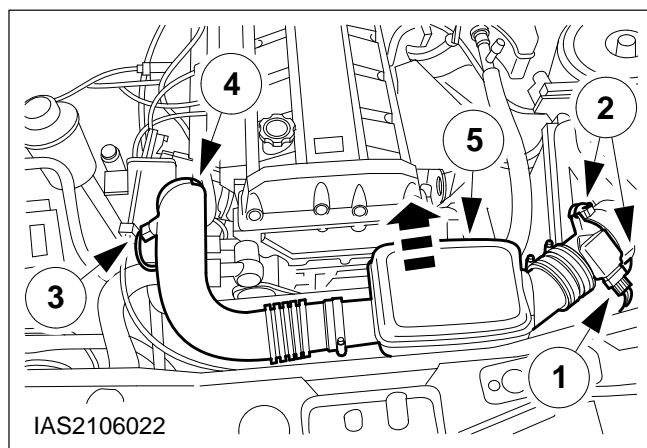
- Make a note of the radio keycode.
- Remove the battery cover.

⚠ CAUTION: After making a note, disconnect the battery earth lead.

- Make a note of the preset radio stations.

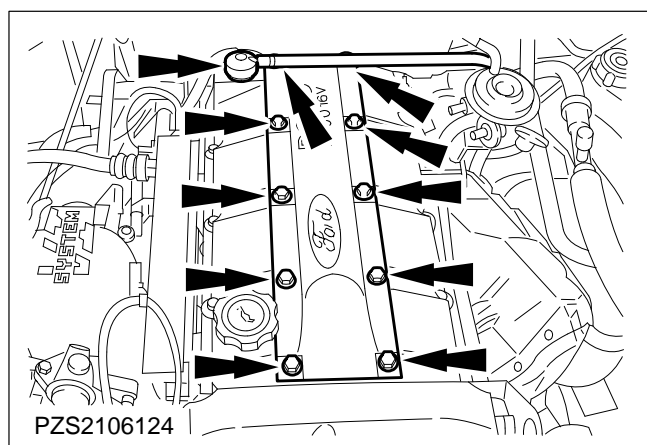
2. Remove the air intake pipe.

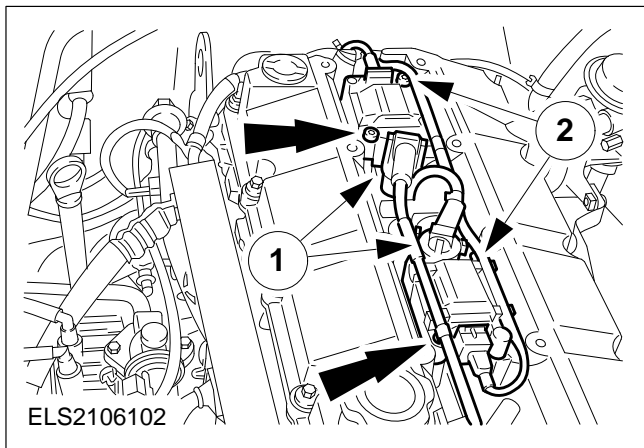
- 1 Disconnect the multiplug from the intake air temperature sensor (IAT sensor).
- 2 Detach the air intake pipe from the air cleaner housing (two clips).
- 3 Disconnect the mass air flow (MAF) sensor plug.
- 4 Detach the air intake pipe.
- 5 Lift the resonator (push-fit) and remove the air intake pipe complete.



3. Disconnect the valve with the crankcase breather hose and unclip it.

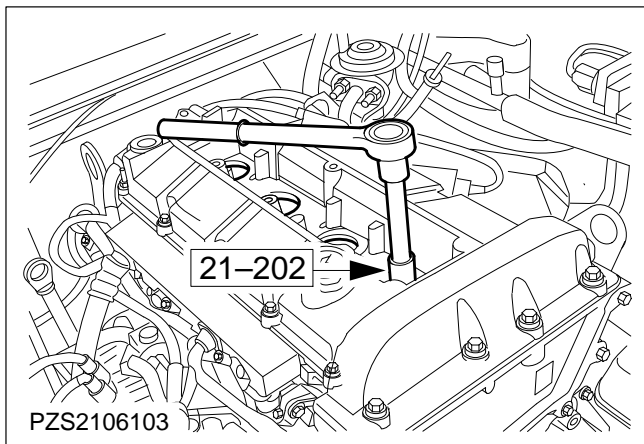
4. Remove the ignition coil cover.



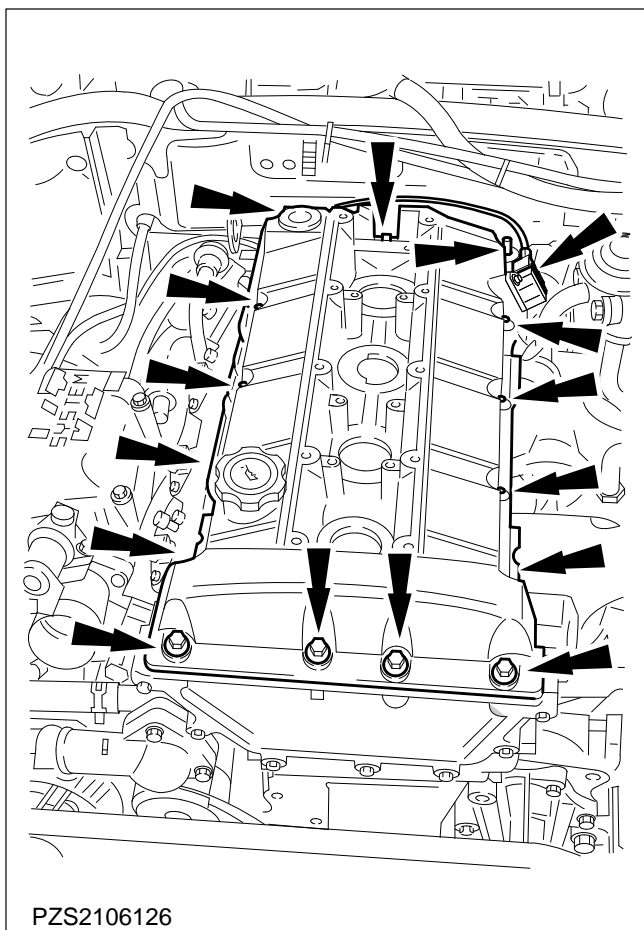


5. Disconnect the spark plug connectors and remove the ignition coils.

- 1 Spark plug connectors
- 2 Ignition coils.



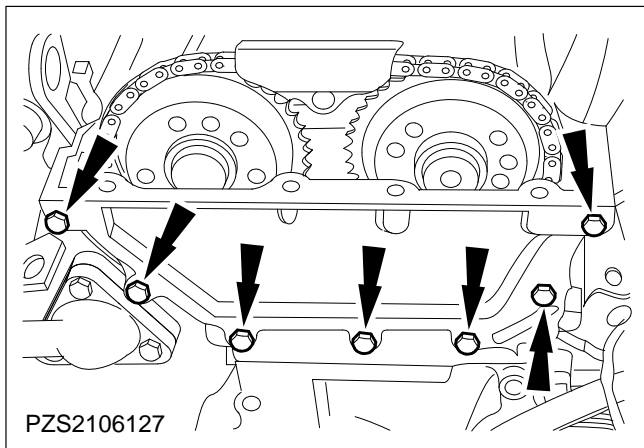
6. Remove the spark plugs.



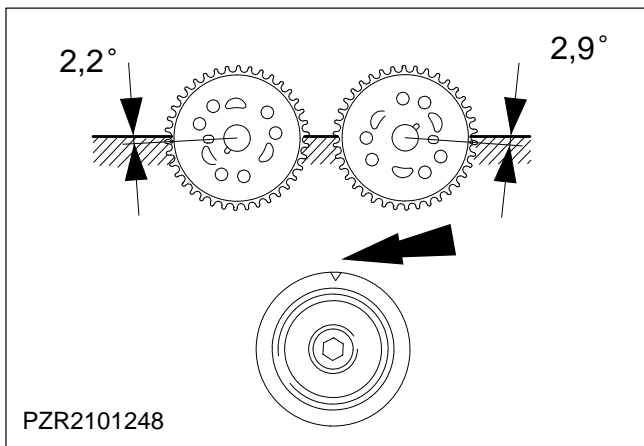
7. Disconnect the cam shaft position sensor (CMP sensor) plug.

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

Remove the gasket.

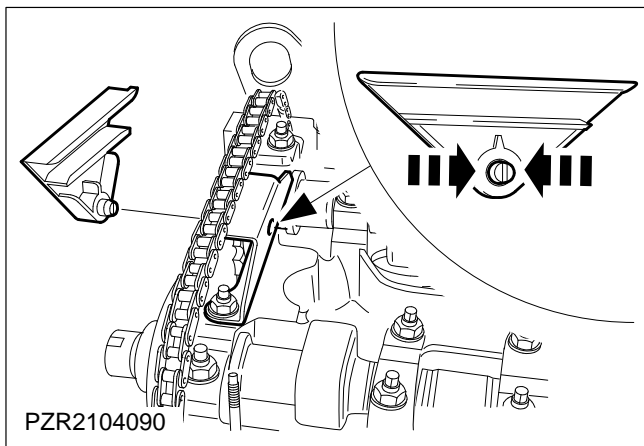


9. Remove the upper timing chain cover.

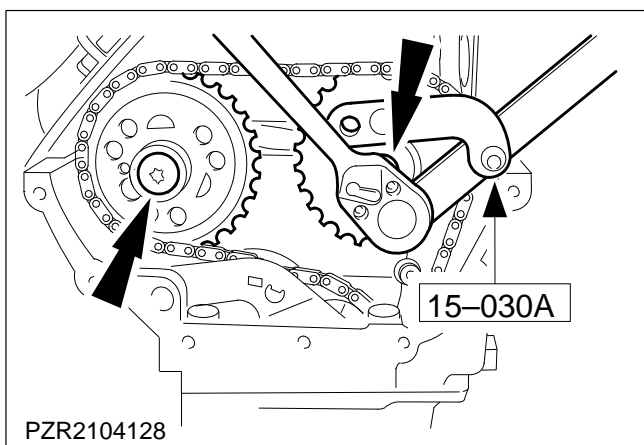


10. Set the crankshaft to the TDC position.

The marking on the crankshaft pulley/vibration damper should lie vertically uppermost.

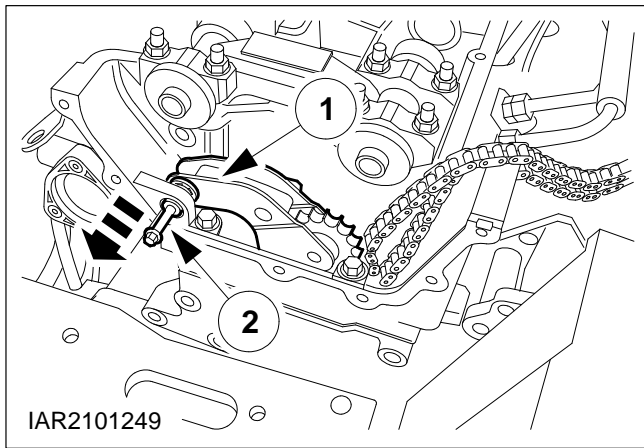


11. Remove the chain guide at the top.



NOTE: Counter hold them to stop them from turning.

12. Remove the camshaft sprockets.

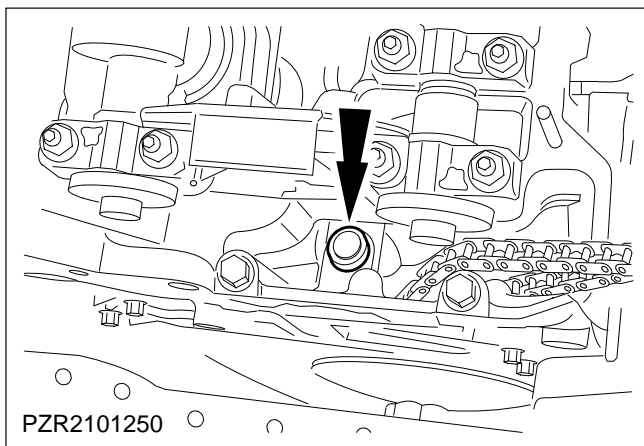


CAUTION: Secure the lock washer to prevent it from dropping down.

NOTE: Secure the timing chain.

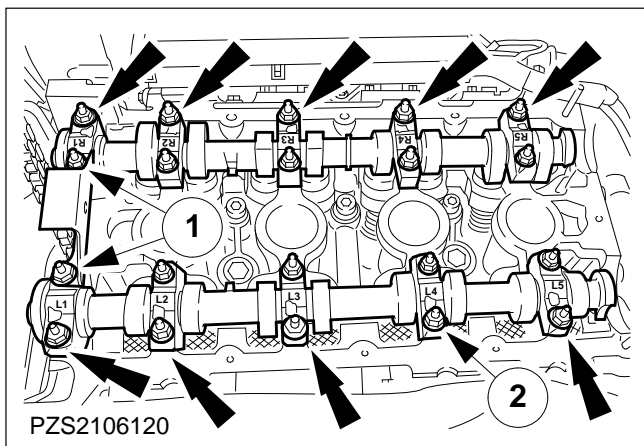
13. Remove the chain tensioner.

- 1 Remove the lock washer.
- 2 Extract the chain tensioner pivot bolt using an M6 x 60 bolt.



CAUTION: Do not re-use the chain tensioner hydraulic plunger.

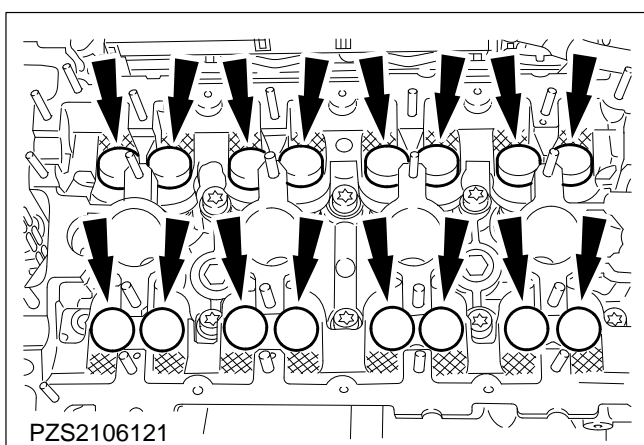
14. Withdraw the chain tensioner hydraulic plunger.



NOTE: Remove the bearing caps and cam shafts in order.

15. Remove the camshafts.

- 1 Remove the bracket of the timing chain guide.
- 2 Remove the camshaft bearing caps.
Remove the camshafts.



16. Remove the hydraulic tappets.

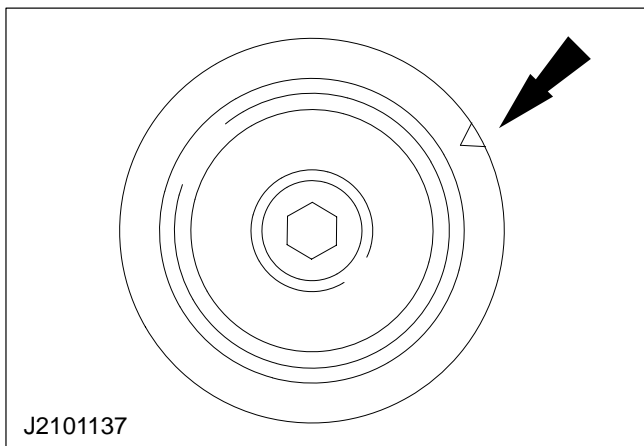
Install

NOTE: Renew seals, circlips and self-locking nuts.

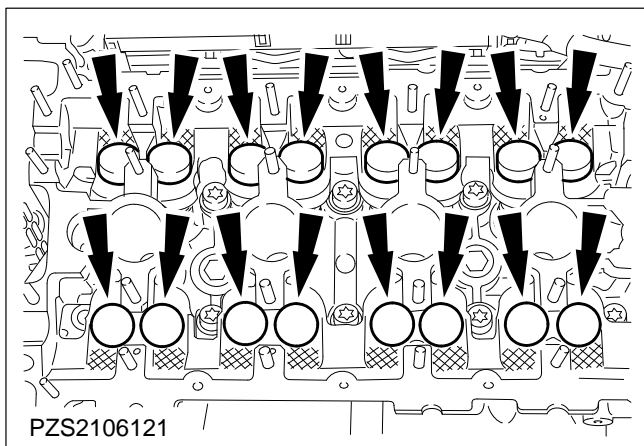
17. Thoroughly clean all mating faces and re-usable components and check them for damage.

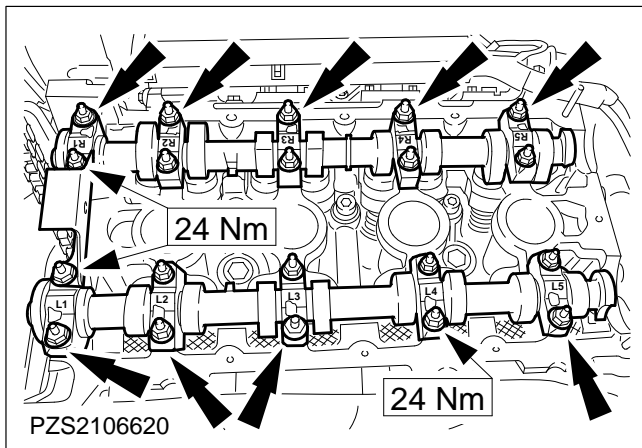
18. Set the piston of cylinder no. 1 to 25 mm before the TDC position.

Position of the crankshaft belt pulley/
vibration damper.



19. Lubricate the new hydraulic tappets with engine oil and install them.





CAUTION: After tightening the camshafts, do not turn the crankshaft for a quarter of an hour.

20. Install the camshafts.

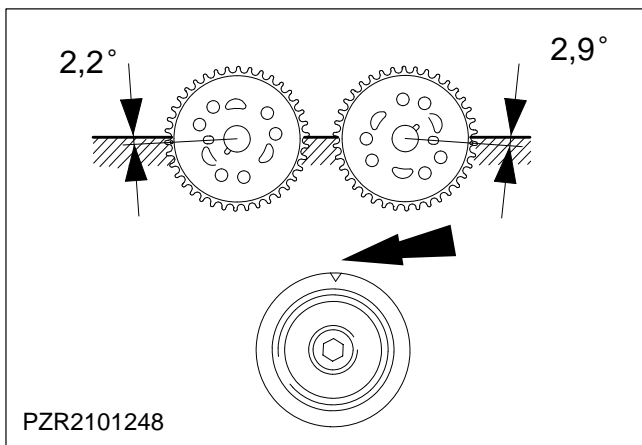
Lubricate the bearing points with engine oil.

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

Lubricate the camshafts with engine oil and fit them so that none of the cams is at full lift.

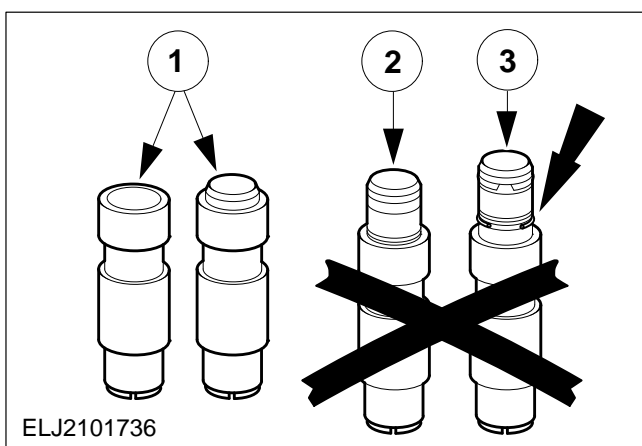
NOTE: Install the timing chain guide bracket with the camshaft front bearing caps.

Install the camshaft bearing caps. The position markings are legible from the rear.



21. Set the camshafts and the crankshaft to the TDC position of cylinder no. 1.

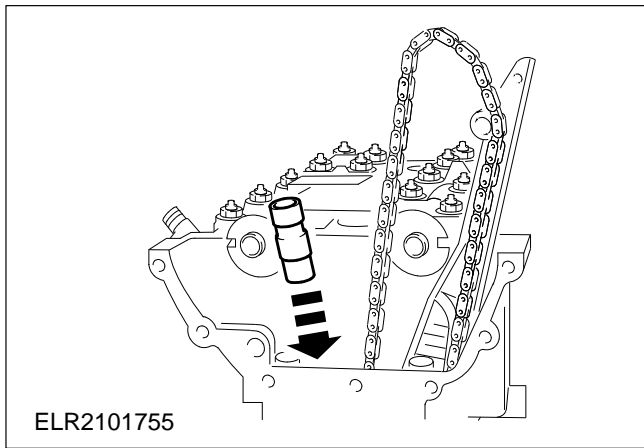
The marking on the crankshaft pulley/vibration damper should lie vertically uppermost.



CAUTION: A fully or partially released chain tensioner plunger (whether new or used) must not be fitted.

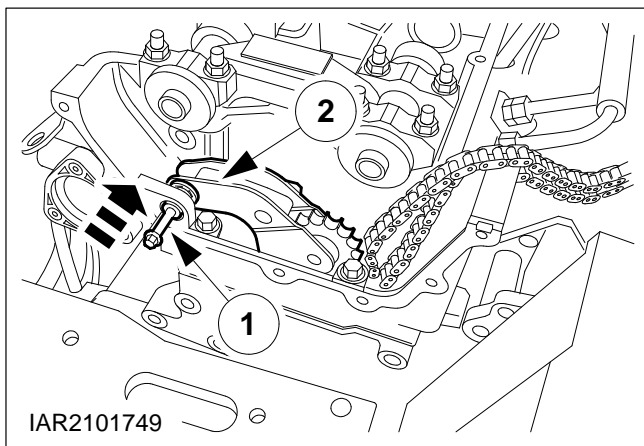
22. Check the new chain tensioner plunger.

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



CAUTION: Only use a new and latched chain tensioner plunger.

23. Install the chain tensioner plunger.



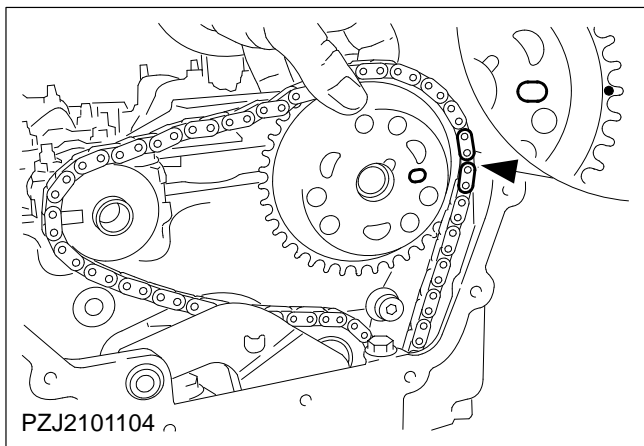
CAUTION: Secure the lock washer to prevent it from dropping down.

24. Install the timing chain tensioner.

1 Insert the pivot bolt using the M6 x 60 bolt.

2 Fit the lock washer.

Unscrew the M6 x 60 bolt.



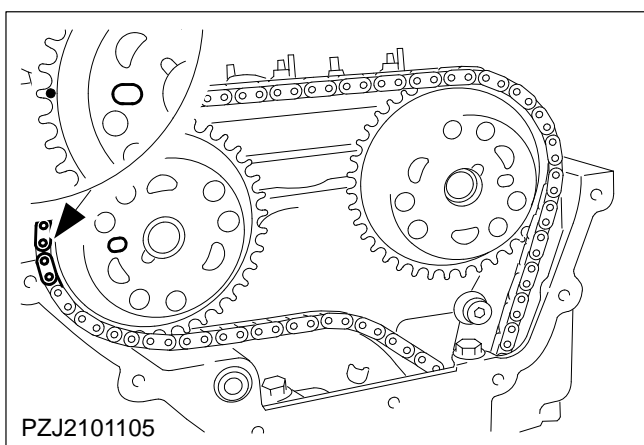
NOTE: The timing chain must be taut on the long side.

CAUTION: The camshaft sprockets must engage into the camshaft groove.

NOTE: The copper chain links must line up with the markings on the sprockets.

25. Fit the camshaft sprocket with the timing chain (in the TDC position).

If necessary, turn the camshaft slightly.

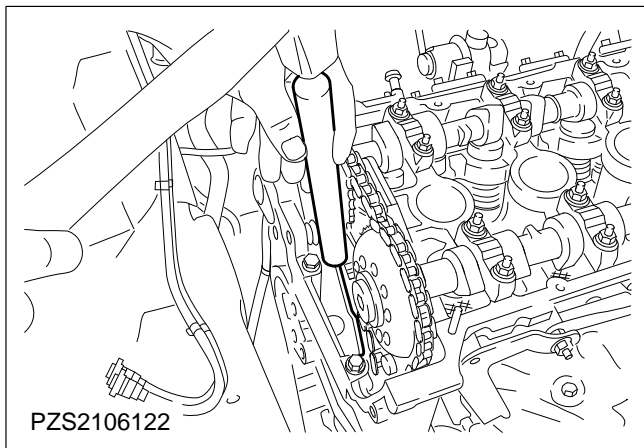


NOTE: The timing chain may sag slightly between the camshaft sprockets.

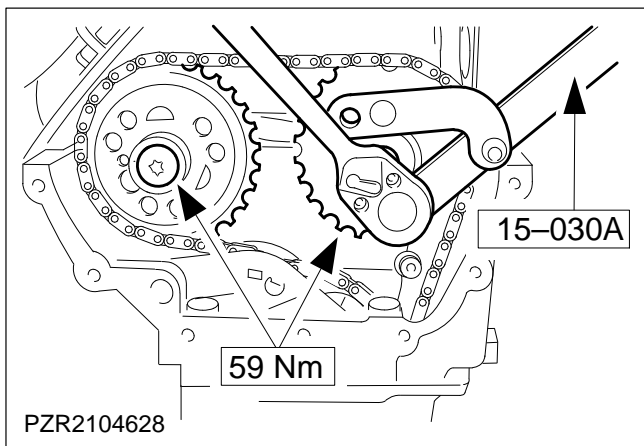
NOTE: The copper chain links must line up with the markings on the sprockets.

26. Fit the camshaft sprocket with the timing chain (in the TDC position).

27. Screw in the bolts of the camshaft sprockets finger tight.

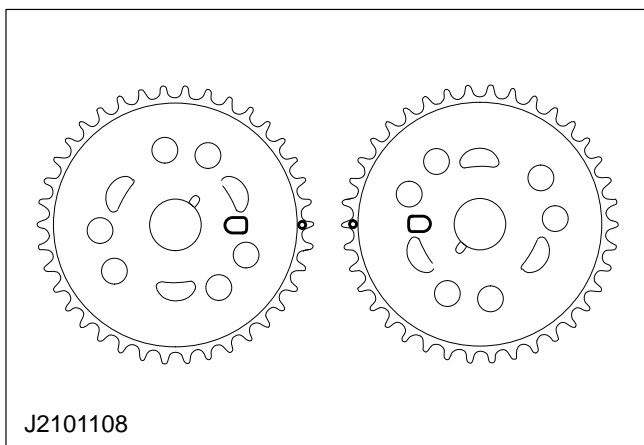


28. Release the chain tensioner plunger with a light tap on the chain tensioner with the brass drift.



NOTE: Hold them in position.

29. Tighten the camshaft sprocket bolts.

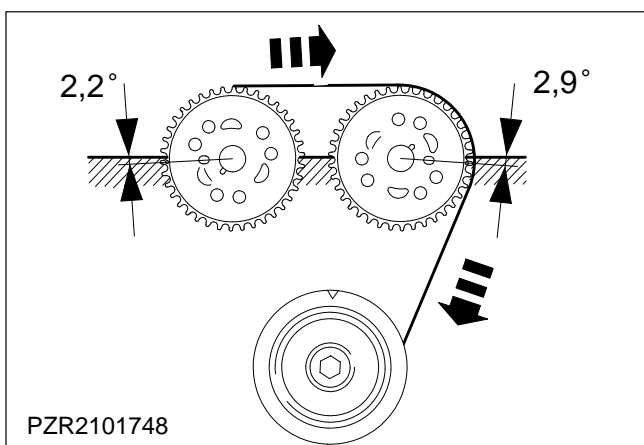


30. Set the crankshaft to the TDC position of cylinder no. 2.

NOTE: If it is necessary to correct the valve timings, i.e. release the timing chain, a new chain tensioner plunger must be fitted as described in sub-operation 22., 23. and 28.

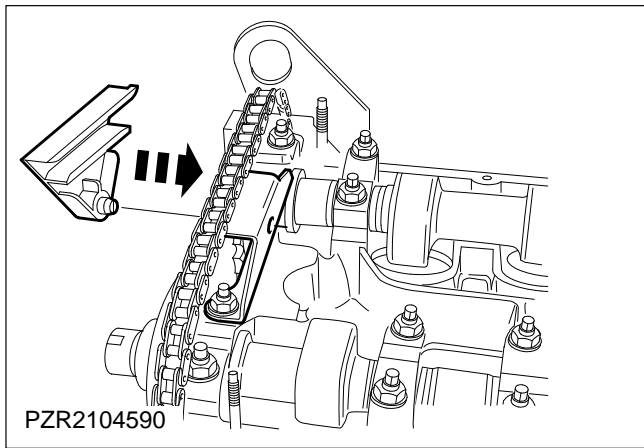
31. Check the valve timing.

The markings on the camshaft sprockets must be opposite one another on the level of the top edge of the cylinder head.

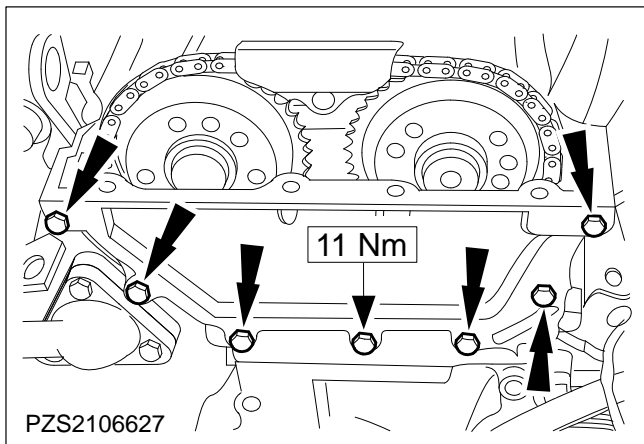


32. Check the valve timing (continued).

Turn the crankshaft one more revolution in the normal running direction and set it to the marking.



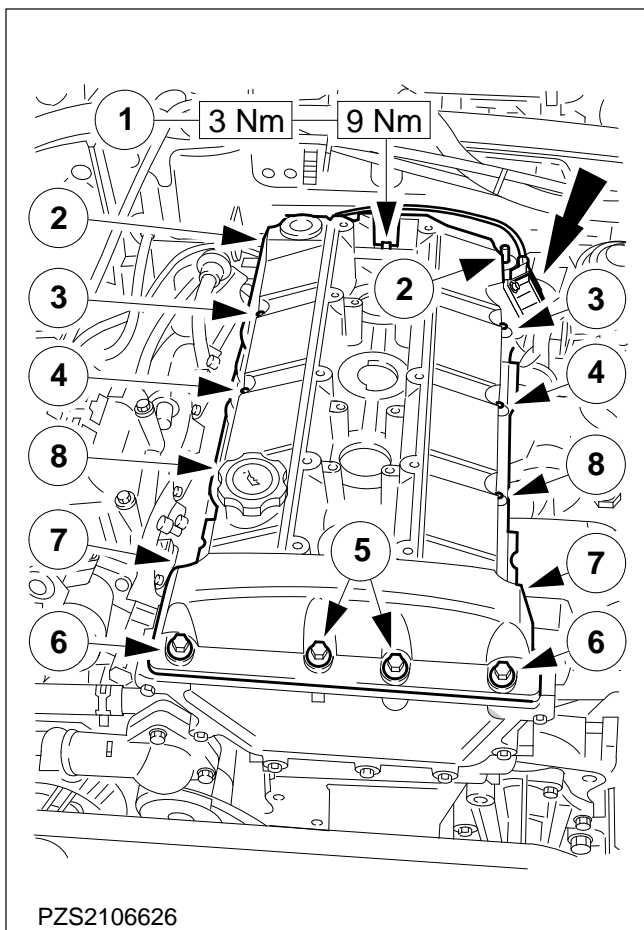
33. Install a new chain guide at the top.



NOTE: Use a new gasket.

NOTE: Align the top edge of the upper cover with the cylinder head mating face (the maximum misalignment downwards is 0,13 mm).

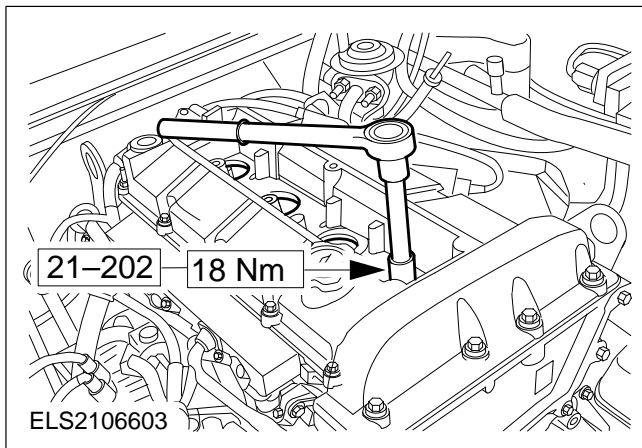
34. Fit the upper timing chain cover.



NOTE: Bolt-tightening sequence.

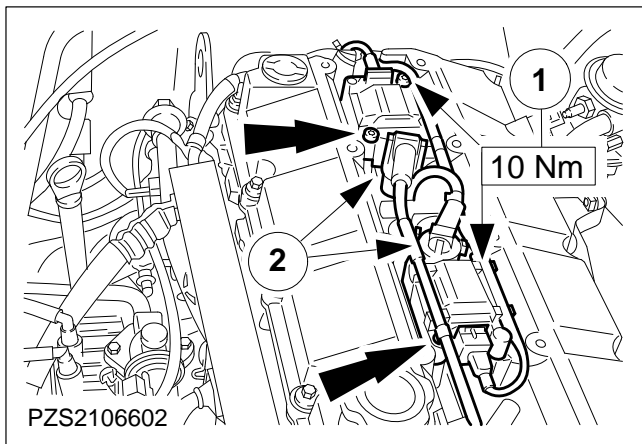
35. Install the cylinder head cover using a new gasket (eleven bolts, four nuts).

36. Connect the CMP sensor plug.



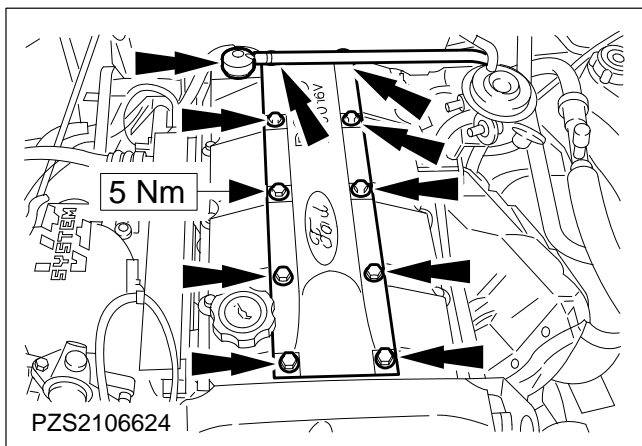
NOTE: Apply lubricant (ESE-M1244-A) to the spark plug threads.

37. Install the spark plugs.



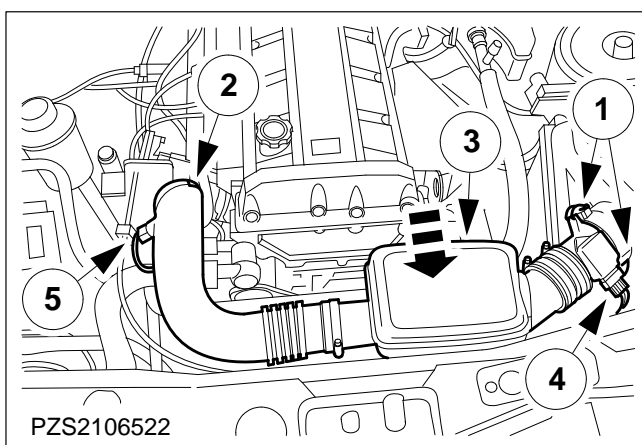
38. Install the ignition coils and connect the spark plug connectors.

- 1 DIS ignition coils
- 2 Spark plug connectors



39. Install the ignition coil cover.

40. Connect the valve with the crankcase breather hose and clip it into place.



41. Fit the air intake pipe.

- 1 Attach the air intake pipe to the air cleaner housing (two clips).
- 2 Fit the air intake pipe.
- 3 Move the resonator into the installation position (push-fit).
- 4 Connect the IAT sensor plug.
- 5 Connect the MAF sensor plug.

42. Standard finishing operations.

- Check the fluid levels and rectify as necessary.
- Fix the wiring and hoses in place with cable ties.
- Check the engine and cooling system for leaks.
- Enter the radio keycode.
- Reprogramme the preset radio stations.
- Reset the clock.
- Carry out a road test to enable the PC module (EEC V) to collect data.