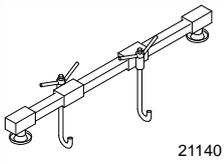
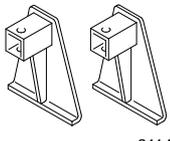
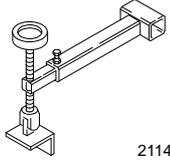
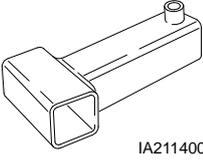
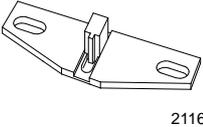


Timing Chain – Renew (21 314 0)

Special Tools

 21140	21-140 Engine support bar
 2114001	21-140-01 Adaptor for 21-140
 2114003	21-140-03 Adaptor for 21-140
 IA2114006	21-140-06 Adaptor for 21-140
 21168	21-168 Crankshaft immobilising tool

Proprietary Tools

Scraper

Workshop Equipment

Transmission jack	
-------------------	--

Materials

Cable ties	
Sealer for sump	ESK-M4G269

Renew

1. General notes.

NOTE: Throughout the whole operation cover the engine openings to make sure that nothing falls into them.

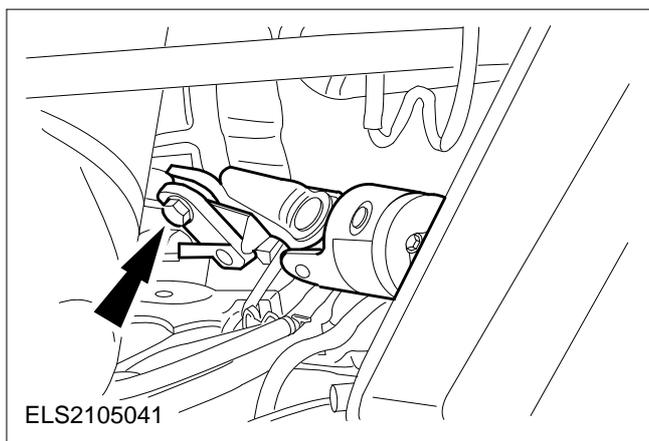
- The position of ancillary components is described looking from the transmission towards the engine.
- The hydraulic lines are not separated.
- When removing components, lay them in the correct order to one side.

2. Standard preparatory measures:

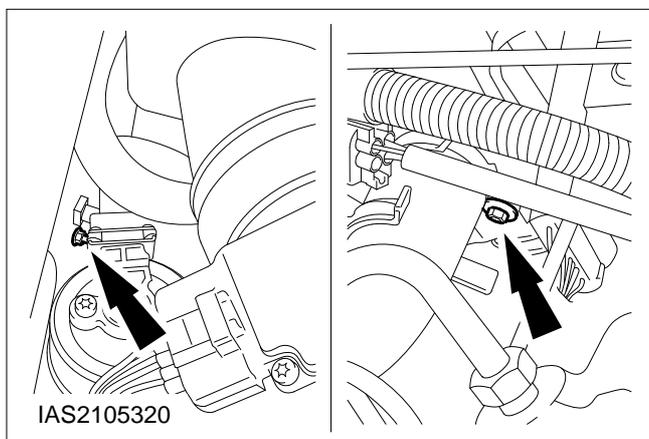
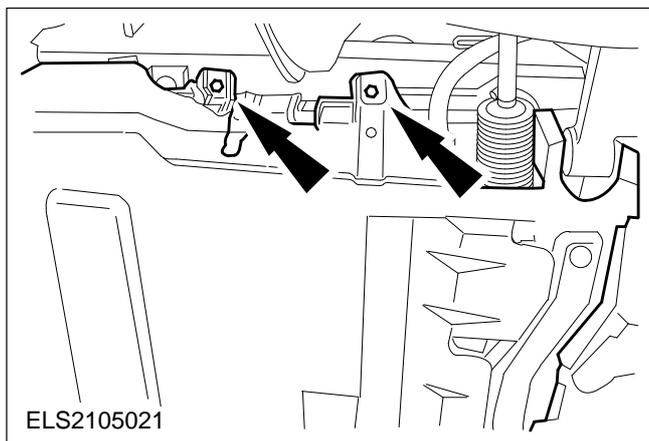
- Lay protective covers over the fenders.
- Make a note of the radio keycode.
- Make a note of the preset radio stations.
- Detach the battery cover.

⚠ CAUTION: Disconnect the battery ground lead.

- If necessary cut the cable ties and renew them on installation.
- Open the coolant expansion tank.

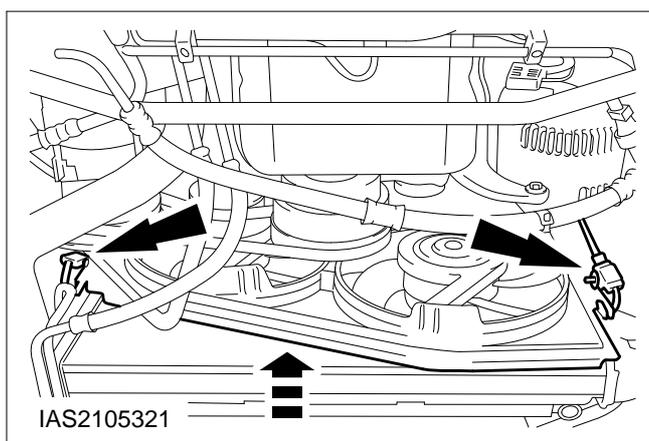
3. Detach the steering intermediate shaft.**4. Remove the nuts from the shroud for the radiator fan.**

Raise the vehicle.

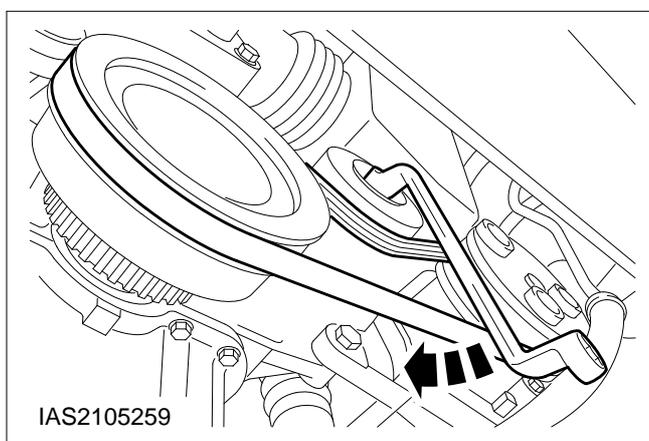
**5. Detach the engine undershield (left-hand side shown).**

6. Drain the engine oil and the coolant.

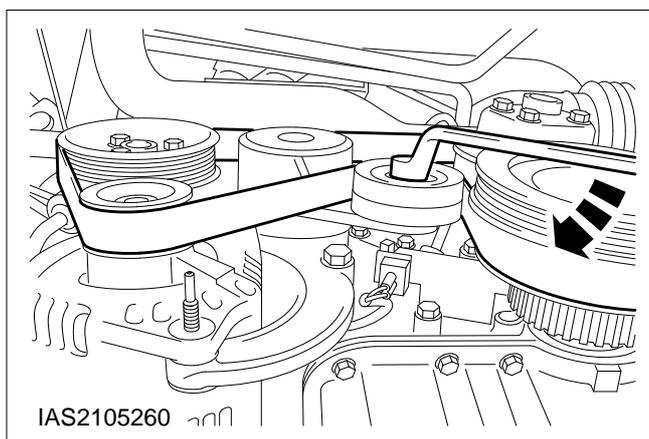
Screw the drain plugs back in with new oil seals.

**7. Remove the radiator fan shroud.**

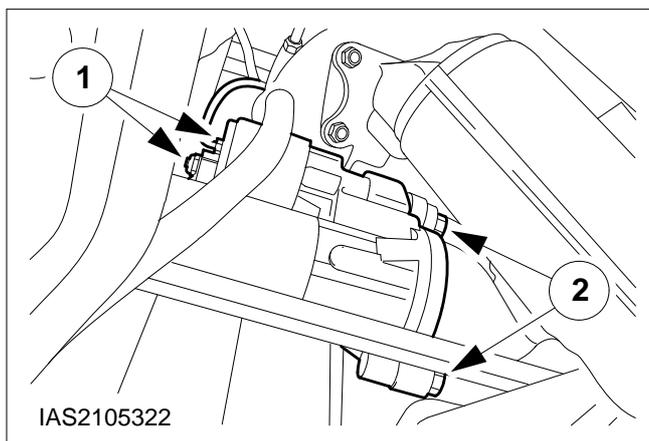
- Disconnect the fan motor plug and detach the wiring from the radiator fan shroud.
- Push the radiator fan shroud upwards out of the grommets and lift it out downwards.

**8. Remove the air conditioning multi-groove belt.**

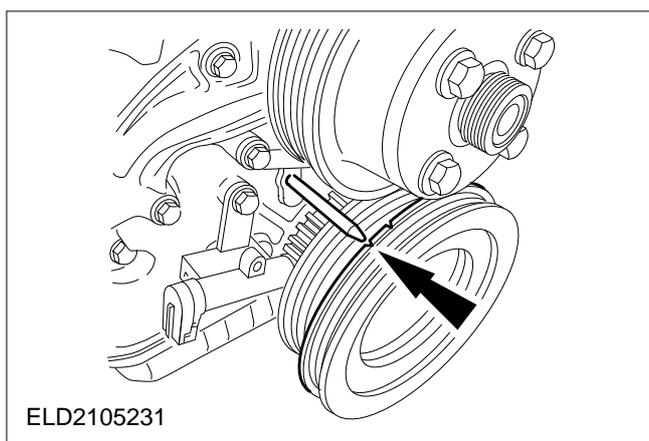
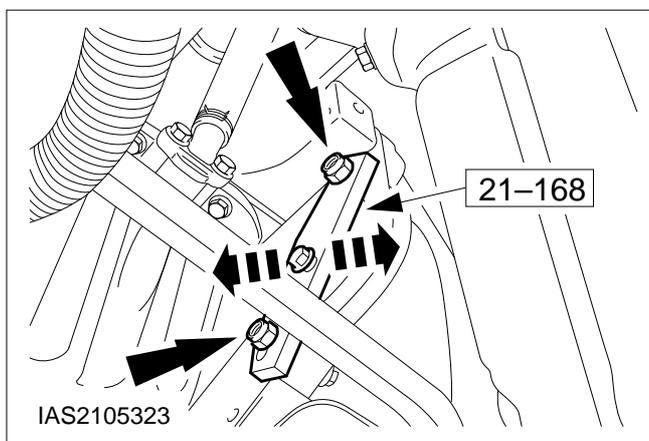
- Take the pressure off the belt by turning the tensioning pulley clockwise.
- Remove the multi-groove belt.

**9. Remove the multi-groove belt for the alternator/power steering pump.**

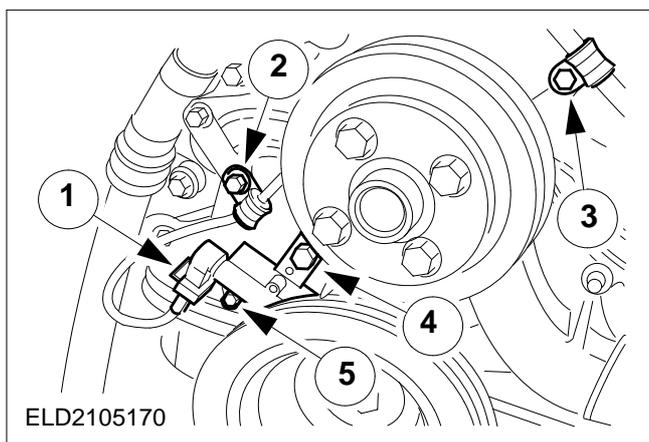
- Take the pressure off the belt by turning the tensioning pulley clockwise.
- Remove the multi-groove belt.

**10. Remove the starter motor.**

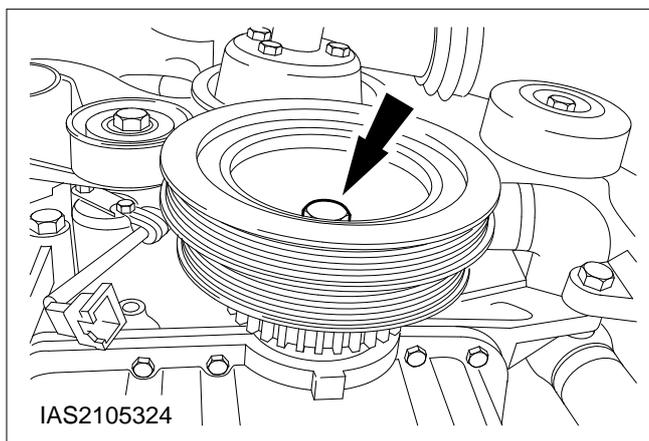
- 1 Disconnect the starter motor.
- 2 Remove the starter motor.

**11. Set the engine to TDC.**

NOTE: The special tool must locate firmly between the flywheel teeth.

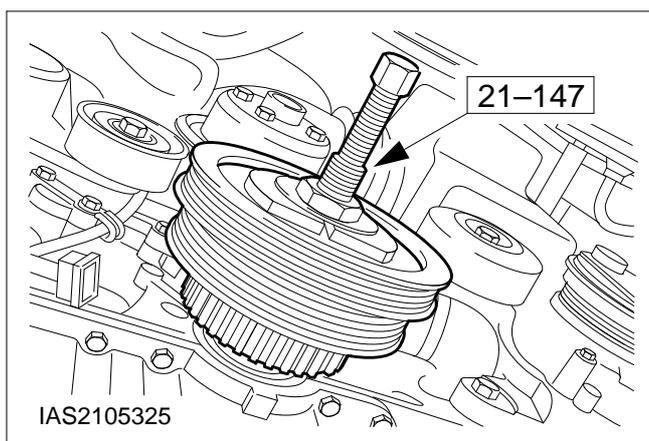
12. Fit the crankshaft locking tool.**13. Remove the crankshaft position (CKP) sensor and the wiring bracket.**

- 1 Crankshaft position (CKP) sensor.
- 2 CKP sensor wiring bracket.
- 3 Camshaft position (CMP) sensor wiring bracket.
- 4 Bracket for the CKP sensor.
- 5 Crankshaft position (CKP) sensor.



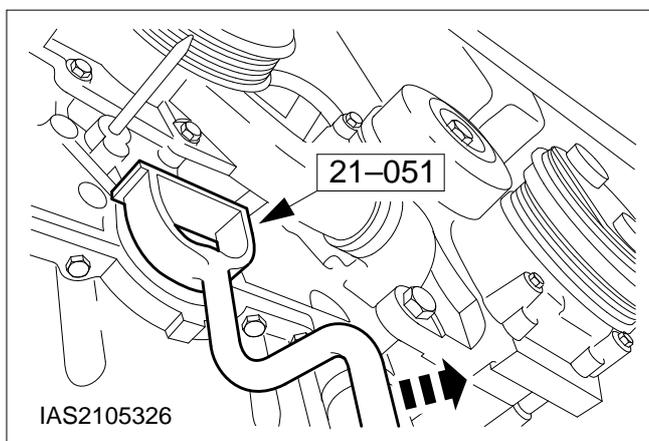
14. Undo the vibration damper bolt about 20 mm.

Undo the crankshaft locking tool (sliding key).



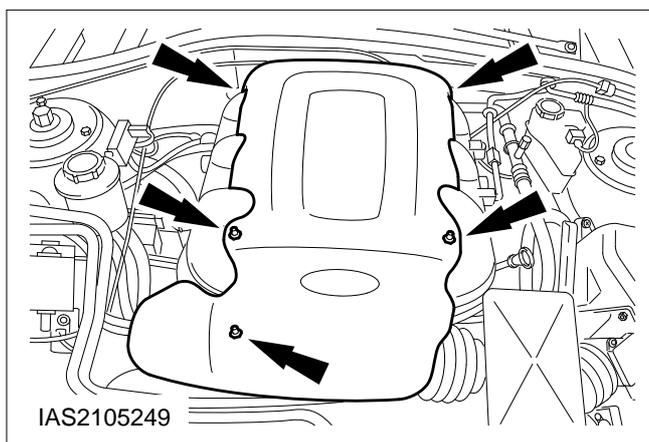
15. Pull off the vibration damper.

- Pull the vibration damper off the crankshaft.
- Remove the puller and unscrew and remove the bolt.
- Remove the vibration damper.

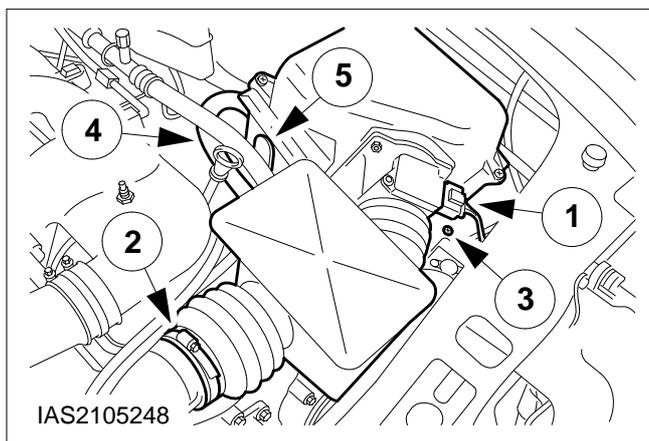


16. Remove the crankshaft front oil seal.

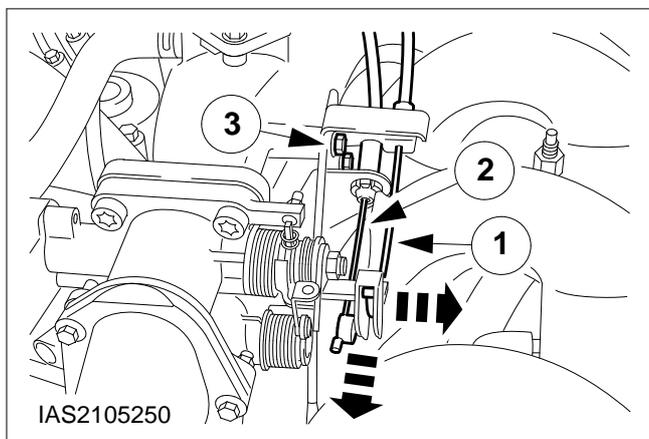
Lower the vehicle.



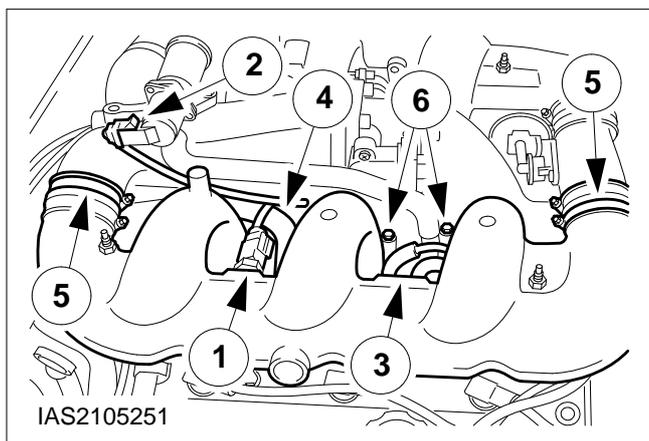
17. Remove the cover from the intake system.

**18. Remove the air cleaner.**

- 1 Remove the MAF sensor plug.
 - 2 Remove the intake hose.
 - 3 Remove the bolt from the intake pipe.
 - 4 Remove the positive crankcase ventilation (PCV) hose.
 - 5 Remove the two rubber retainers.
- Pull the air cleaner off the intake pipe and pull it upwards out of the grommets on the body.

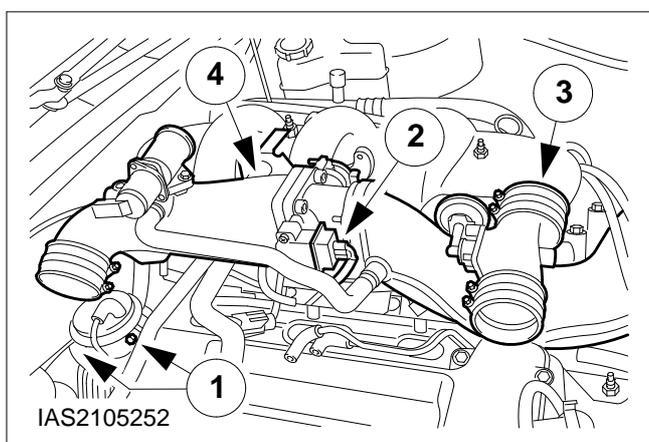
**19. Detach the cables.**

- 1 Unhook the throttle cable and detach it from the bracket.
- 2 Unhook the cable of the speed control system.
- 3 Detach the bracket for the speed control system cable.



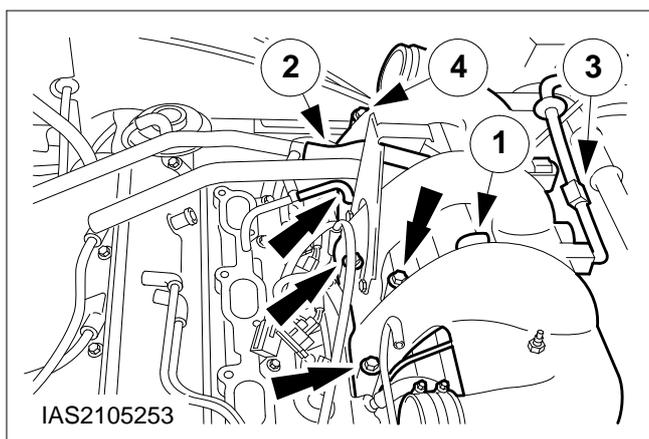
20. Remove the right-hand inlet manifold.

- 1 Disconnect the multiplug from the intake air temperature sensor (IAT sensor).
- 2 Disconnect the plug from the idle air control (IAC) valve.
- 3 Disconnect the two vacuum hoses.
- 4 Remove the PCV hose and the vacuum hose.
- 5 Remove the connecting hoses.
- 6 Remove the bolts and pull the inlet manifold off the intake air plenum chamber (six bolts).



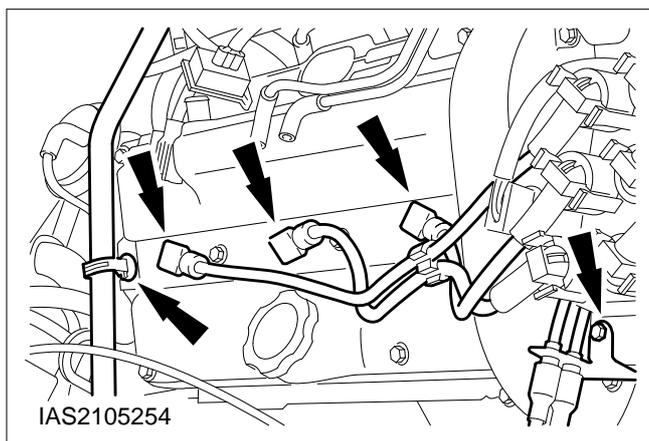
21. Remove the air intake plenum chamber.

- 1 Remove the EGR valve from the air intake plenum chamber (two bolts).
- 2 Disconnect the plug from the throttle position (TP) sensor.
- 3 Remove the variable resonance induction system (VRIS).
- 4 Detach the intake air plenum chamber from the left-hand inlet manifold and lift it out.



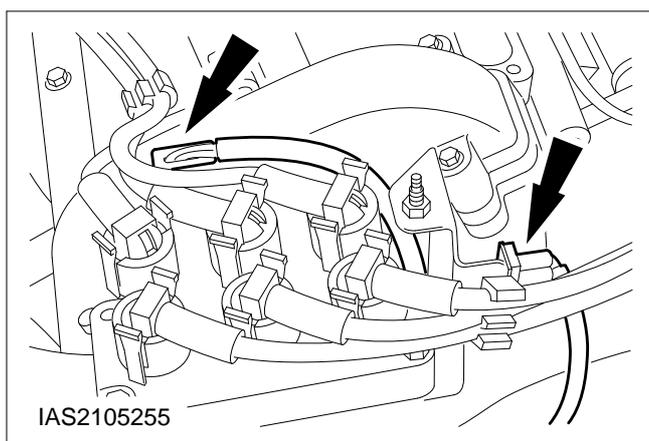
22. Remove the left-hand inlet manifold.

- 1 Disconnect the vacuum hose.
- 2 Disconnect the PCV valve from the cylinder head cover.
- 3 Remove the brake servo vacuum line.
- 4 Remove the six bolts.

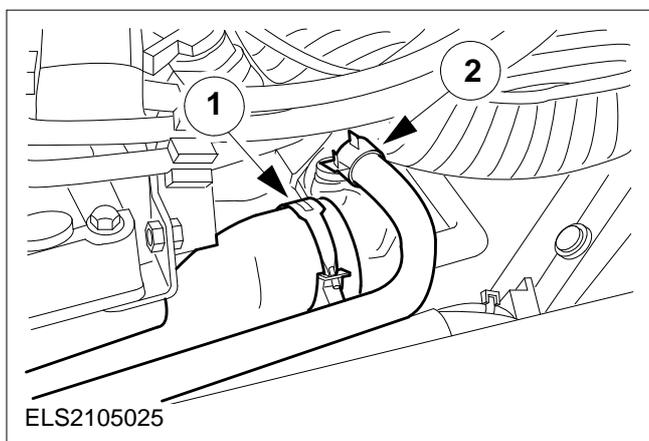


23. Detach the hose and pull off the spark plug connectors.

- Detach the PCV hose from the cylinder head cover and disconnect it.
- Pull off the spark plug connectors (right-hand side shown).
- Detach the bracket for the vacuum lines from the ignition coil.

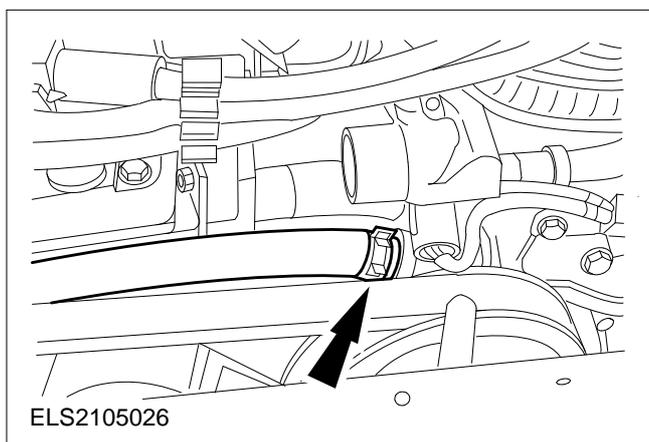


24. Disconnect the plugs.

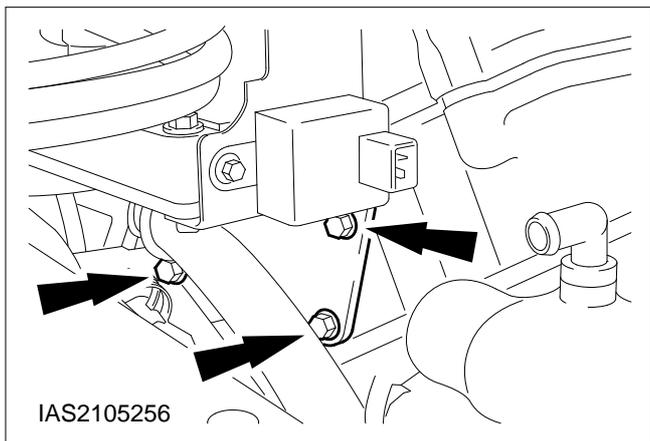


25. Detach the coolant hoses.

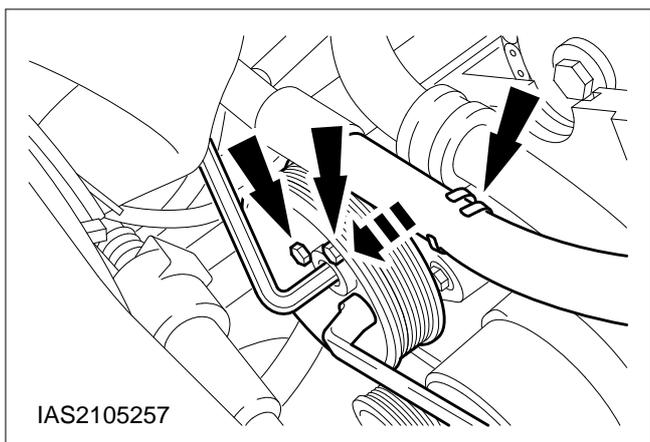
- 1 To the radiator.
- 2 To the expansion tank.



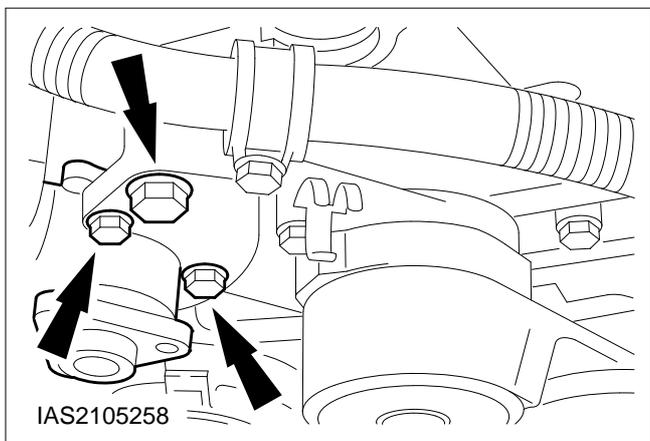
26. Detach the coolant hose from the coolant pump.



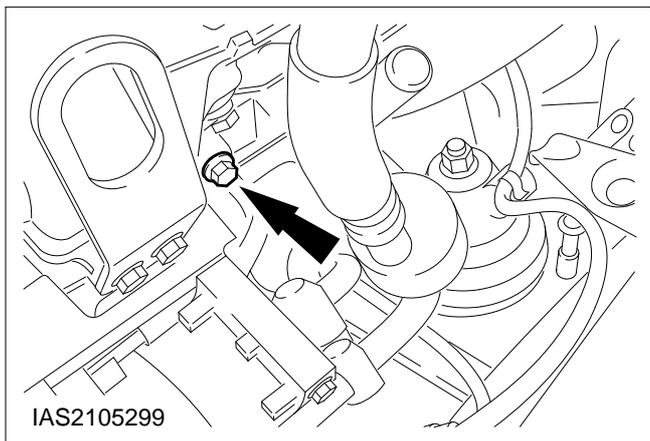
27. Remove the ignition coil.



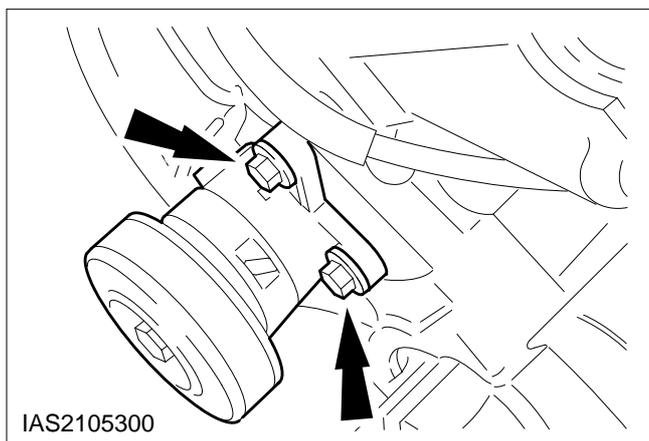
28. Remove the power steering pump pulley.



29. Remove the power steering pump (five bolts) and the upper bolt of the alternator bracket.

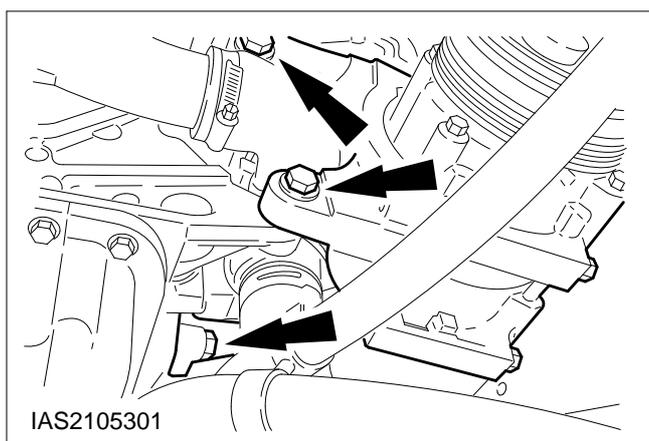


30. Remove the upper bolt from the air conditioning compressor bracket.



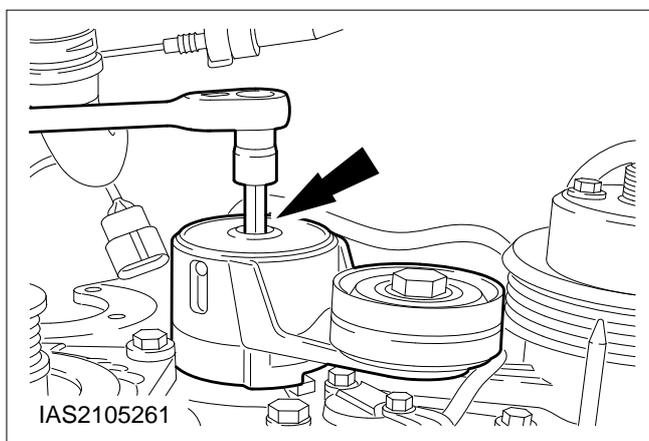
31. Remove the tensioning pulley for the air conditioning compressor.

Raise the vehicle.

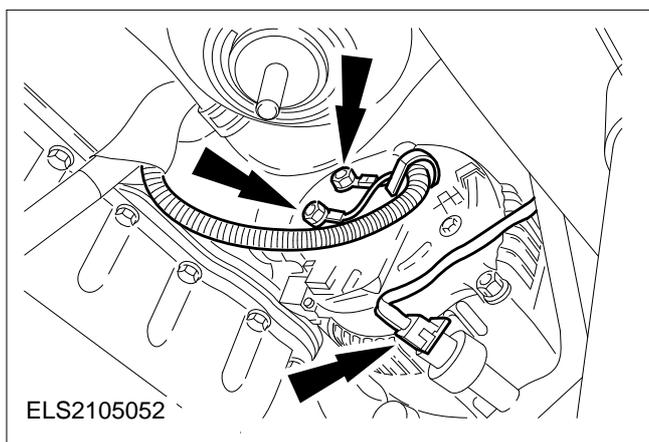


32. Remove the bolts from the air conditioning compressor bracket.

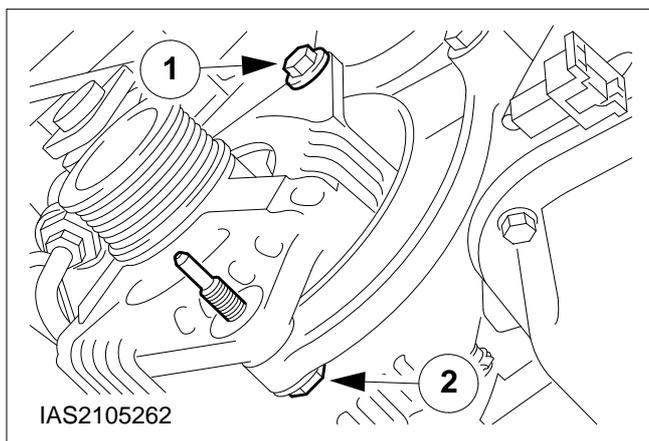
Tie up the air conditioning compressor.



33. Remove the tensioning pulley from the alternator/power steering pump.

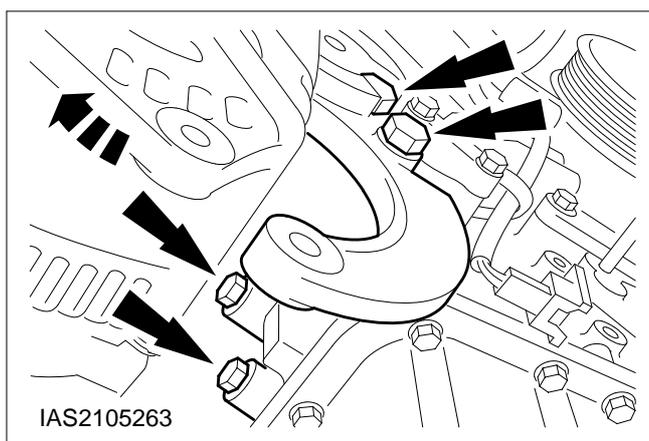


34. Disconnect the alternator and the power steering pressure (PSP) switch plug.



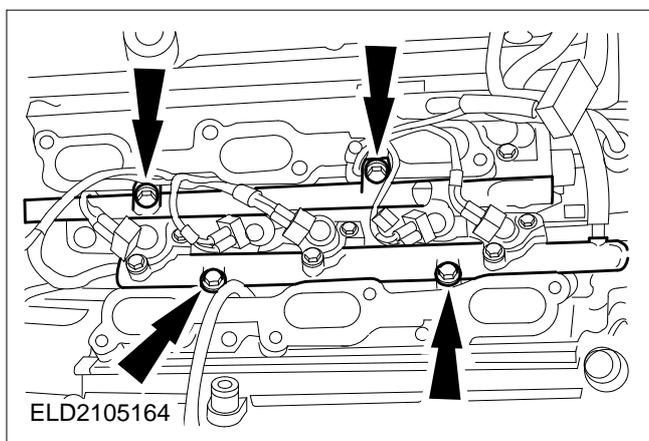
35. Remove the alternator.

- 1 Loosen the upper bolt.
- 2 Remove the lower bolt.



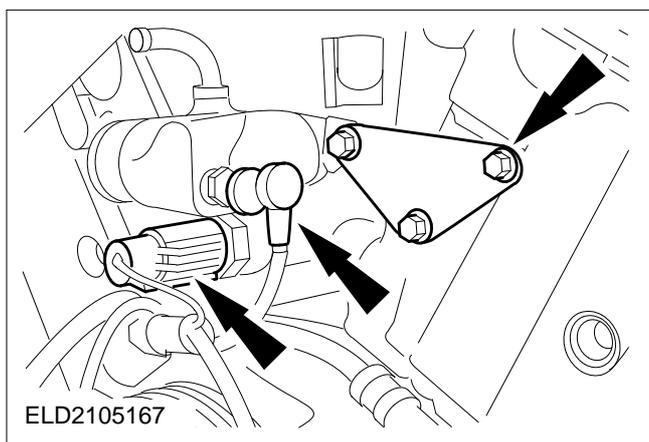
36. Remove the bracket of the alternator/power steering pump.

- Swivel the alternator upwards and remove the bracket.
- Lower the vehicle.



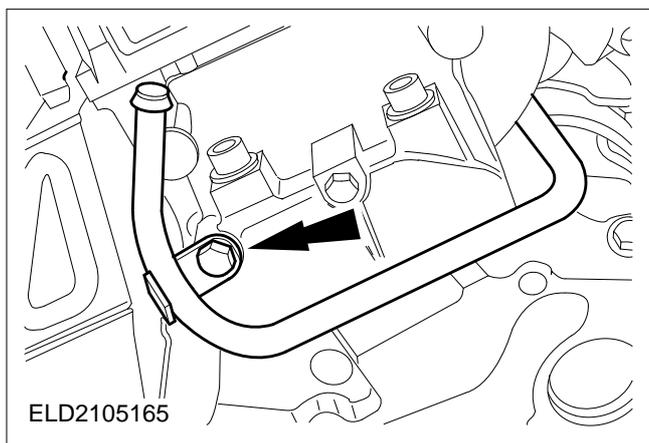
37. Remove the fuel rails.

Disconnect the fuel injection valve plugs.

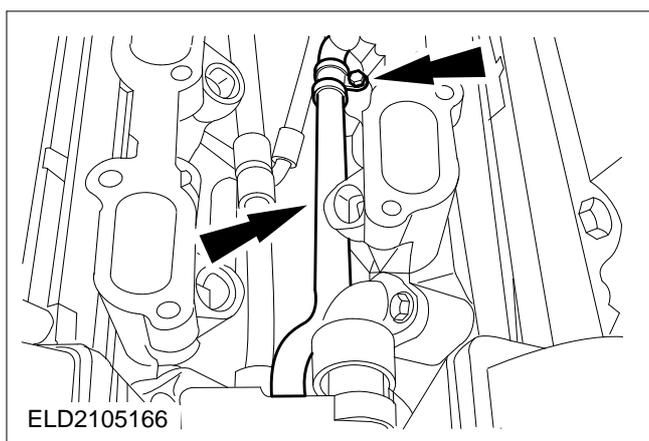


38. Detach the thermostat housing bracket and disconnect the plugs.

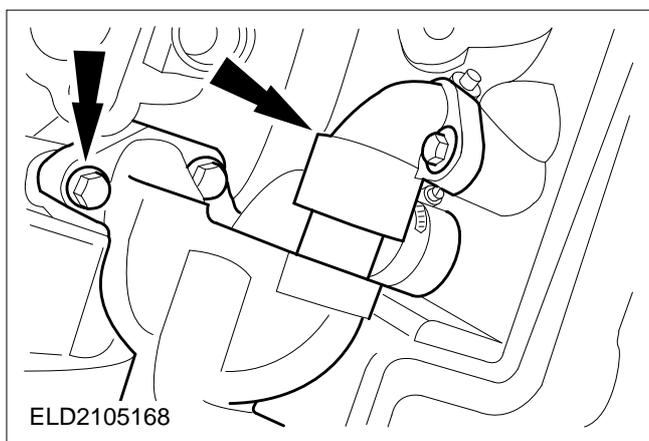
- Thermostat housing bracket.
- Temperature gauge sender unit plug.
- Engine coolant temperature (ECT) sensor plug.



39. Remove the coolant pipe.

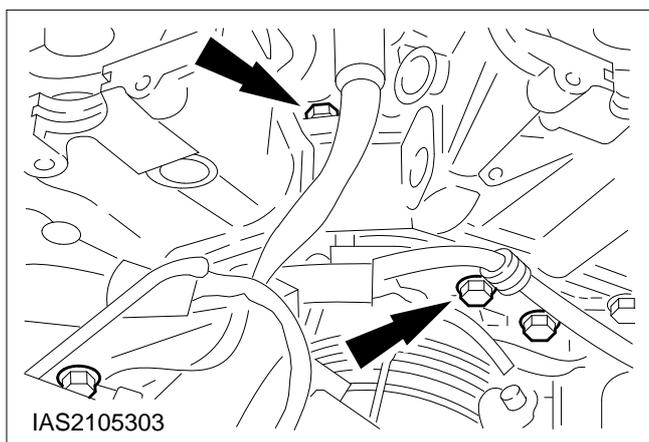


40. Remove the coolant pipe (continued).

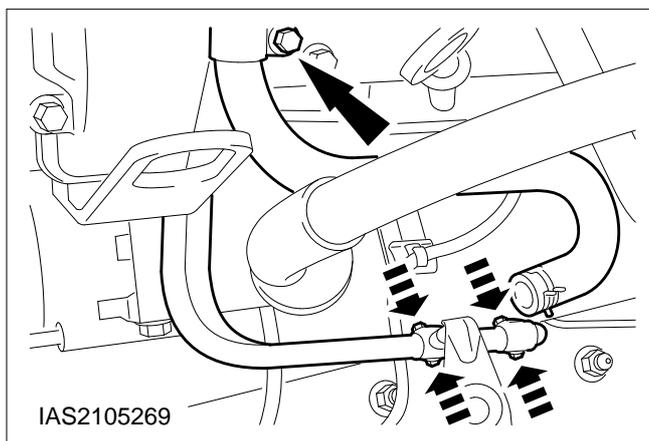


41. Detach the thermostat housing.

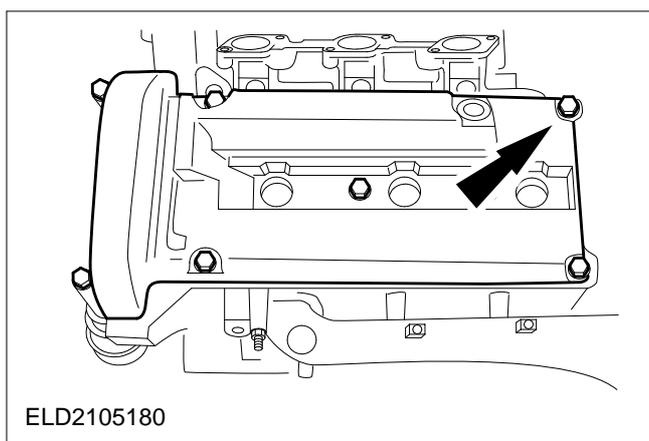
- Remove the thermostat housing bolts.
- Remove the connector.
- Detach the coolant hose and remove the thermostat housing.



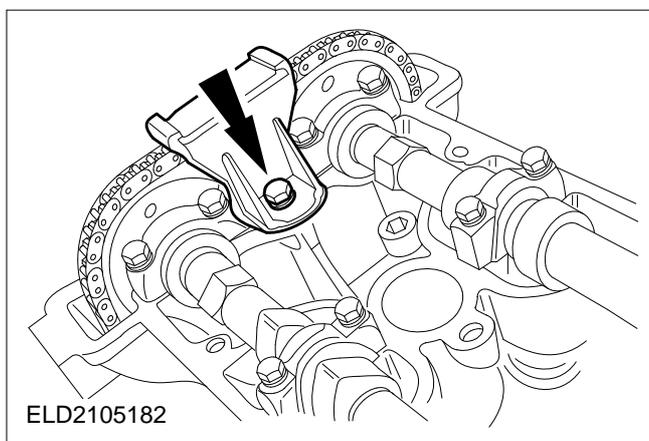
42. Remove the upper bolt from the timing chain housing and remove the wiring loom bracket.



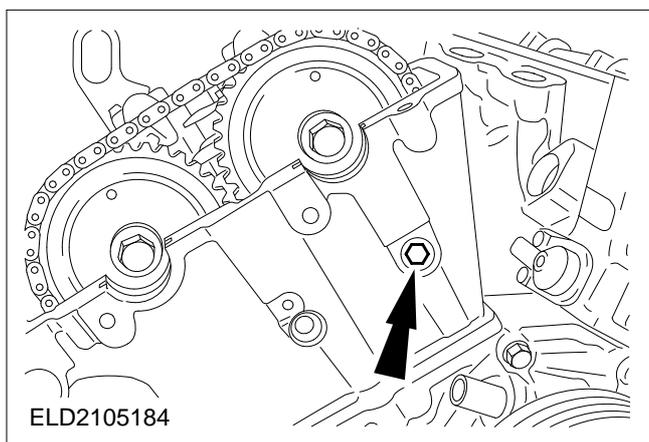
43. Remove the PCV bracket and disconnect the fuel lines.



44. Remove the cylinder head covers (left-hand side shown).

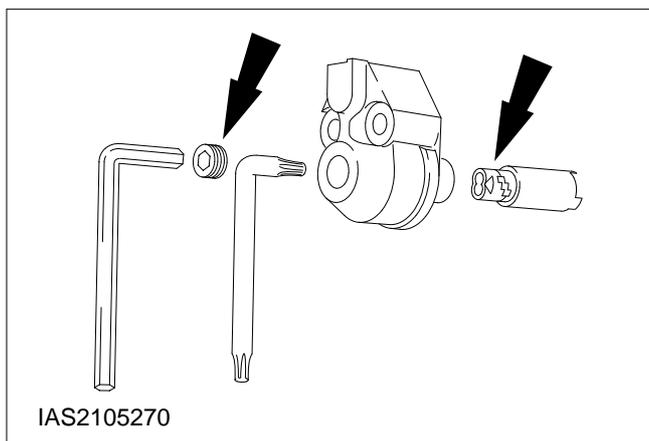


45. Remove the upper chain guides (left-hand side shown).



46. Remove the timing chain guide on the right-hand cylinder head.

- Evenly prise out the blanking plug with a screwdriver.
- Remove the chain guide bolt.



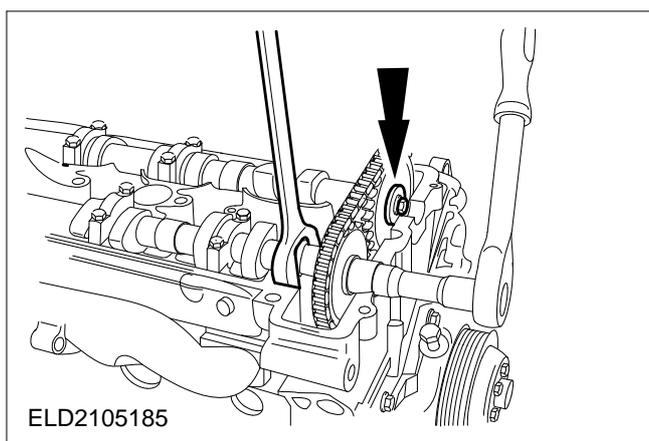
NOTE: The chain tensioner is immobilised once there is an audible click and when it has reached its stop.

47. Slacken the timing chains.

- Remove the blanking plug from the chain tensioner using a 4,5 mm Allen key.

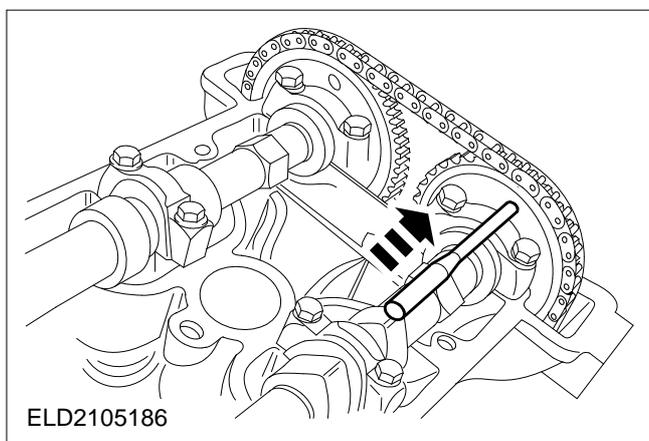
NOTE: Use the TORX T30 angled socket.

- Immobilise the chain tensioner by rotating it clockwise.



NOTE: Undo the camshaft sprocket bolts ten turns.

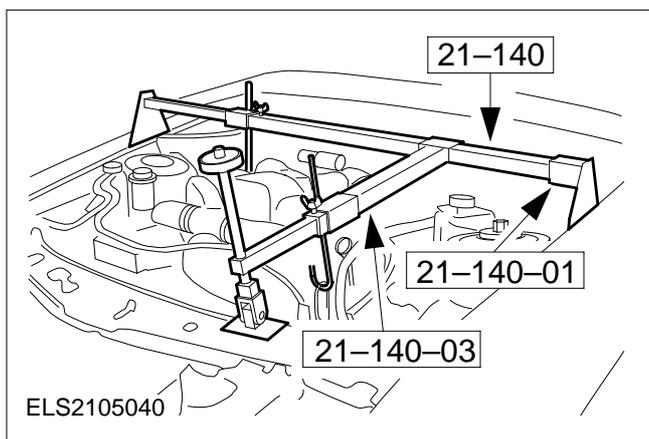
48. Remove the camshaft sprockets.



NOTE: Hold the timing chain to prevent it falling in.

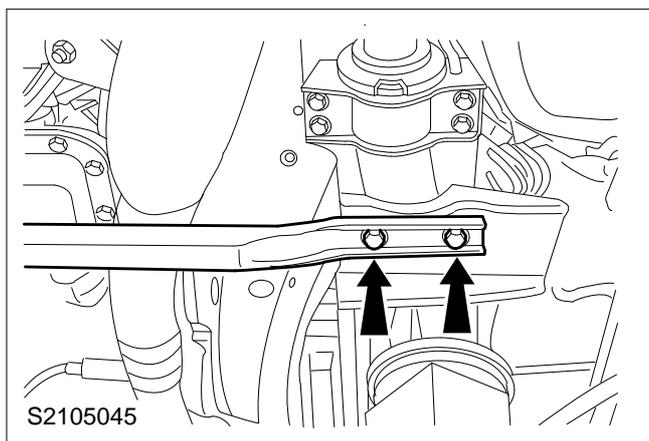
49. Remove the camshaft sprockets (continued).

- Lightly tap on the drive plates to loosen them from the camshaft sprockets.
- Remove the camshaft sprocket bolts.
- Remove the camshaft sprockets, the drive plates and thrust washers and lay them to one side in order.

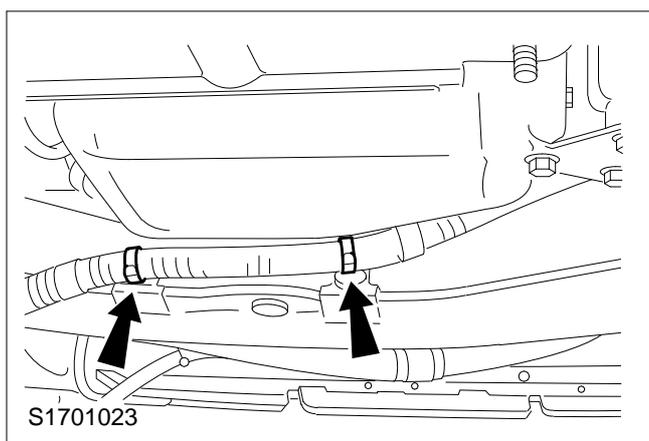


50. Attach the engine support bar.

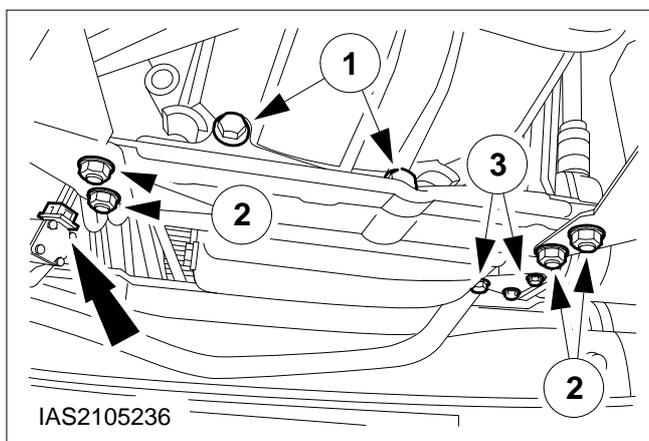
Raise the vehicle.



51. Detach the transverse brace from the front crossmember (left-hand side shown).

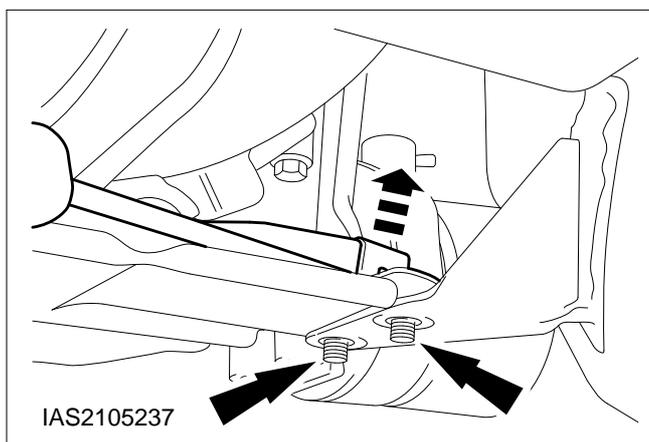


52. Detach the wiring loom from the front crossmember.

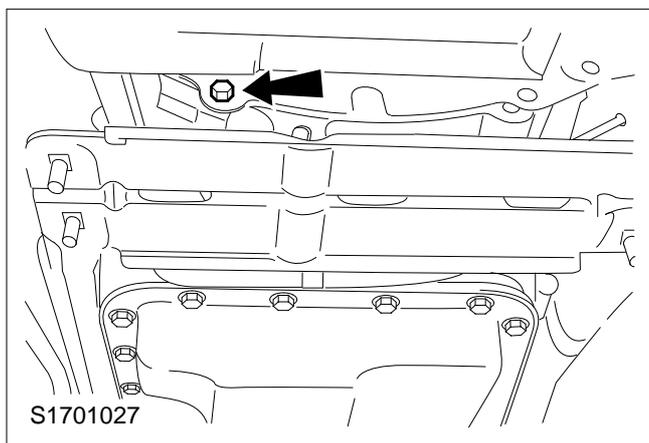


53. Remove the brackets and disconnect the plug.

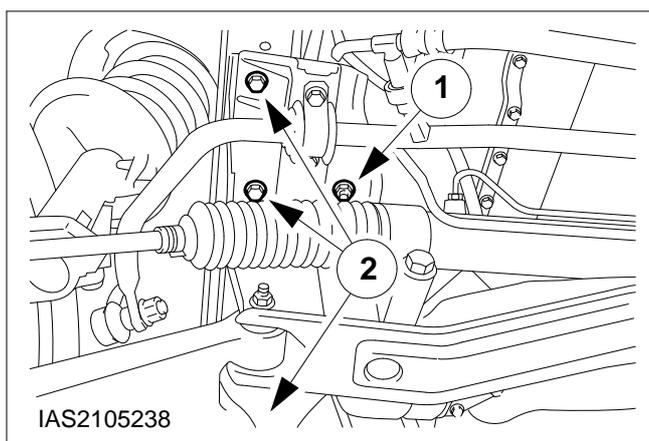
- 1 Catalytic converter bracket from the transmission.
- 2 Catalytic converter bracket from the catalytic converter.
- 3 Bracket for the oil filter connector.
Power steering pressure switch multiplug.



54. Remove the retaining plate for the catalytic converter, remove the bolts and push the retaining plate slightly backwards.

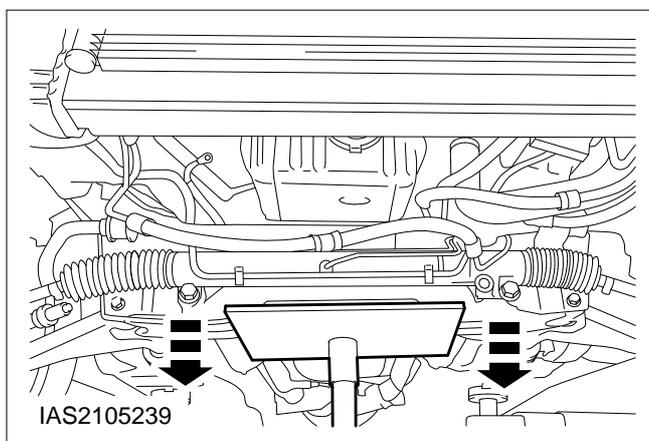


55. Unscrew the adaptor plate bolt.



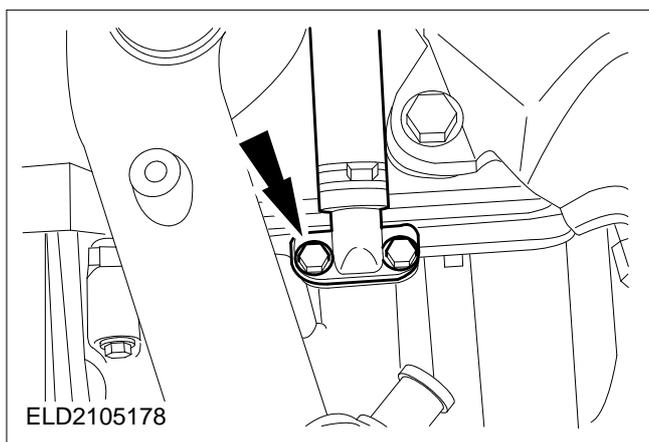
56. Remove the front crossmember.

- 1 Engine mounting bolts.
- 2 Front crossmember bolts.

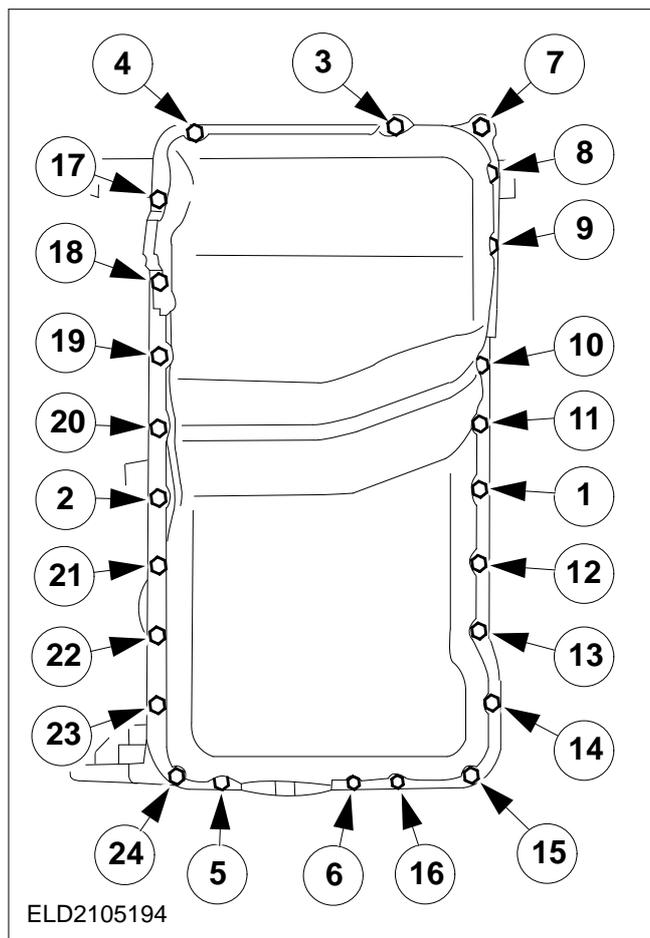


57. Support the front crossmember with a transmission jack.

58. Lower the front crossmember 150 mm with the transmission jack.



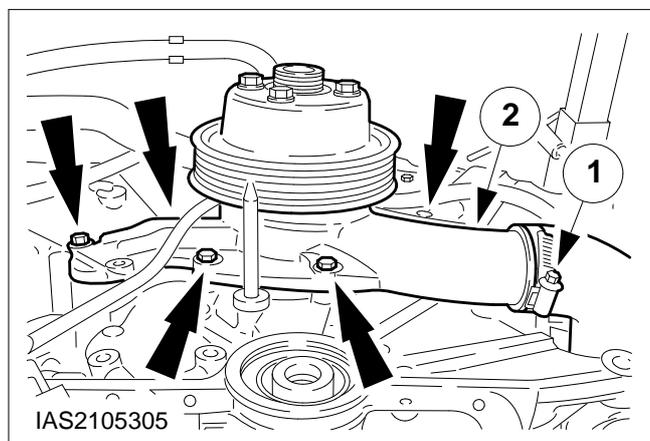
59. Remove the PCV connector (right-hand side shown).



NOTE: Bolt-slackening sequence.

NOTE: The bolts have different lengths.

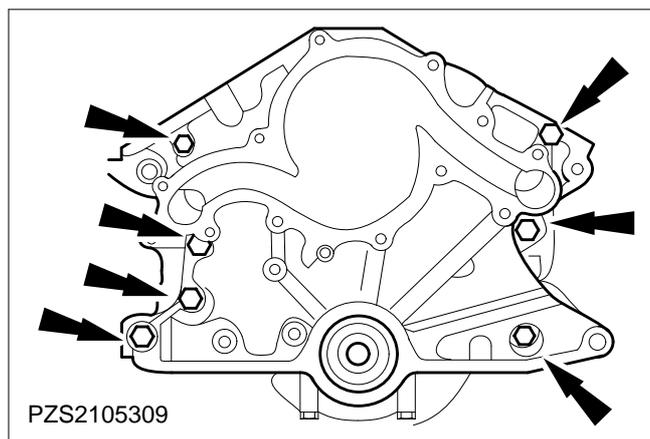
60. Remove the sump.



61. Detach the coolant pump.

1 Coolant hose.

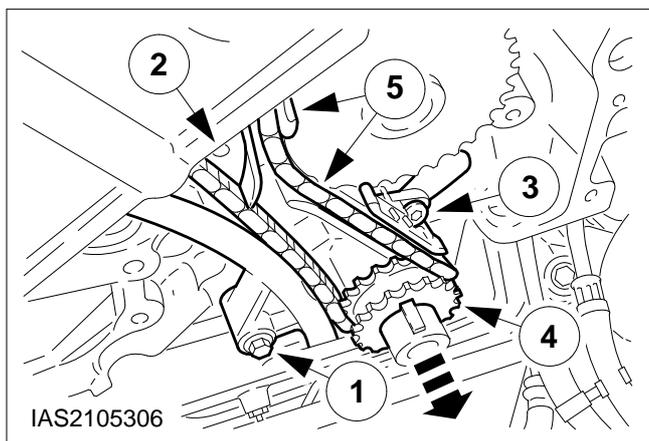
2 Coolant pump (ten bolts).



NOTE: The chain guides may catch.

62. Remove the timing chain housing.

- Remove the lower bolts from the timing chain housing.
- Pull timing chain housing down off the guide pins on the cylinder head and lift it out to the front.

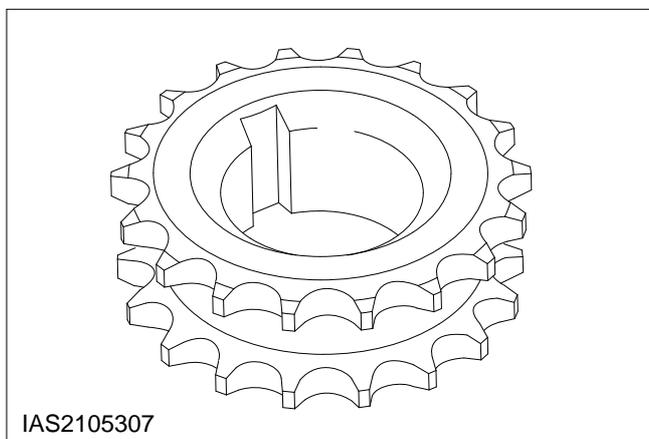
**63. Take out the left-hand timing chain.****64. Remove the right-hand timing chain.**

- 1 Remove the left-hand chain guide.
- 2 Remove the upper chain guide bolt.
- 3 Remove the lower chain guide bolt.
- 4 Pull the timing sprocket off the crankshaft and remove the timing chain.
Take out the lower chain guide.
- 5 Take out the timing chains and chain guides.

65. Preparatory measures before assembly.

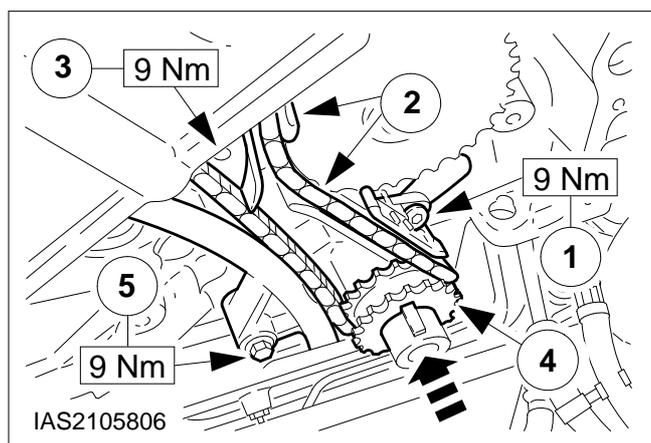
NOTE: Take care not to damage the mating faces.

- Thoroughly clean all mating surfaces with a scraper, check them for damage and renew them as necessary.
- Check any parts that are to be reused for damage, and renew them if necessary.



NOTE: The chamfer points away from the cylinder block.

66. Sprocket must be installed facing the correct way.



67. Coat the mating faces between cylinder head and timing chain housing with sealer (WSK-M4G320-A).

68. Fit the timing chain housing gasket using sealer (WSK-M4G320-A).

69. Fit the right-hand timing chain.

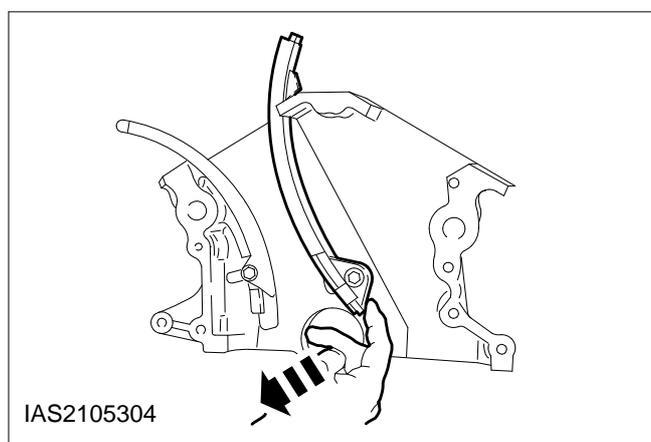
- 1 Attach the lower chain guide.
- 2 Put the timing chain and the upper chain guide in position for installation.
- 3 Screw in the upper chain guide bolt.

NOTE: Correct seating of the Woodruff key in the crankshaft.

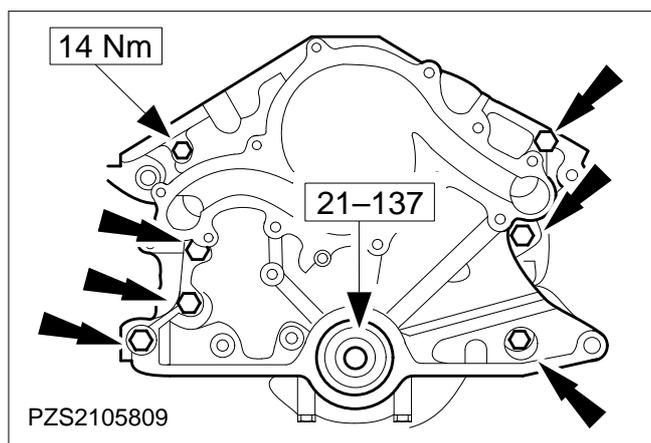
- 4 Lay the timing chain on the sprocket and push the sprocket onto the crankshaft.
- 5 Fit the lower chain guide.

NOTE: Hold the timing chain to prevent it falling in.

70. Lay the left-hand timing chain on the sprocket and guide it through the cylinder head.



71. Fit the chain guide so that it rests against the housing protrusion.



NOTE: The special tool must be free to move.

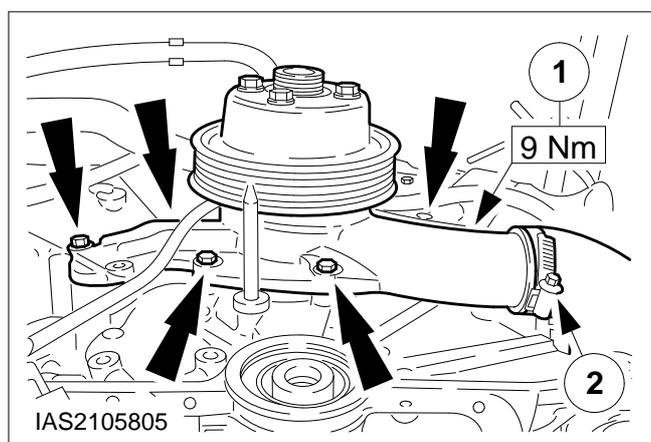
NOTE: Ensure that the timing chain housing seal is correctly seated.

72. Fit the timing chain housing.

- Move the timing chain housing into installation position and push it onto the guide pins on the cylinder head.
- Align the timing chain housing using the special tool.
- Screw in the timing chain housing bolts finger tight.

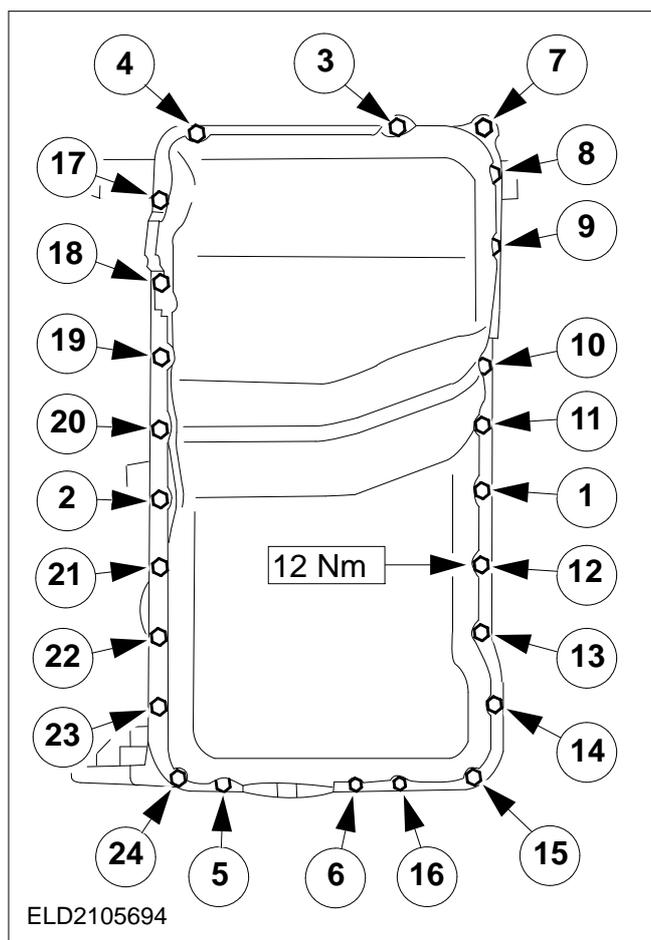
NOTE: Ensure that the timing chain housing and cylinder block mating faces are correctly aligned with each other.

- Tighten the bolts of the timing chain housing.
- Remove the special tool.



73. Fit the coolant pump.

- 1 Fit the coolant pump with a new gasket (ten bolts).
- 2 Fit the coolant hose.



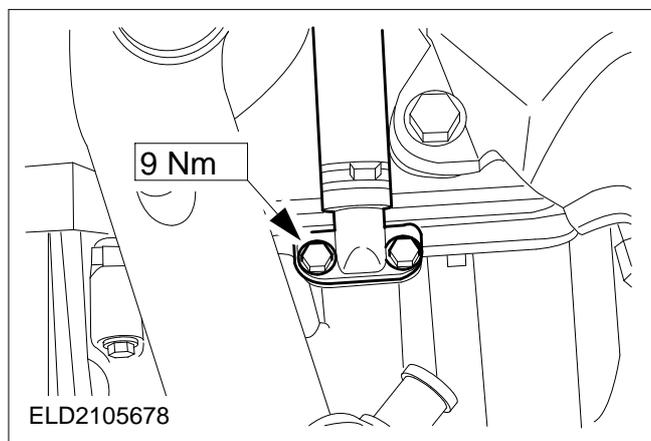
74. Fit the sump gasket.

Coat the ends of the gasket components with sealer (ESK-M4G269).

NOTE: Bolt tightening sequence.

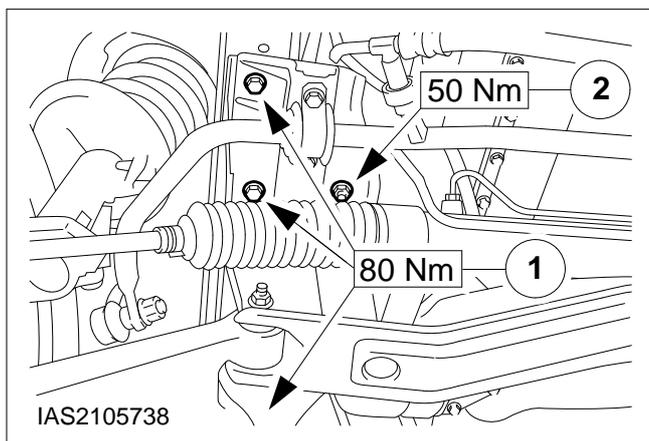
75. Fit the sump.

- Bolts five and six: M6 x 115
- Bolts 23 and 24: M6 x 45
- All other bolts: M6 x 20

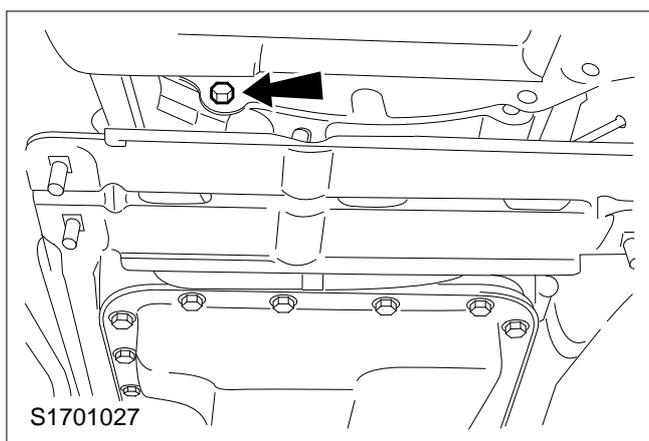
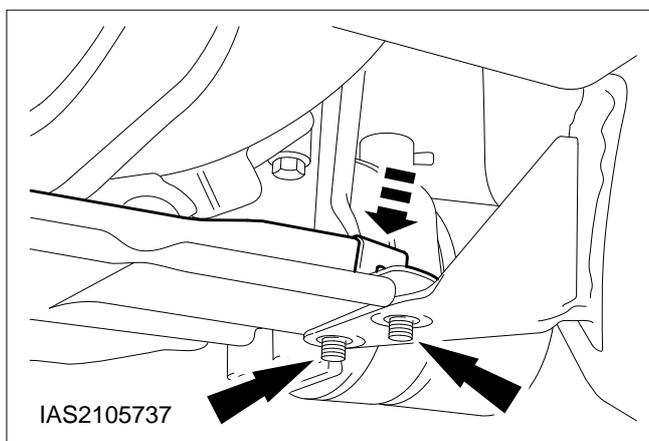
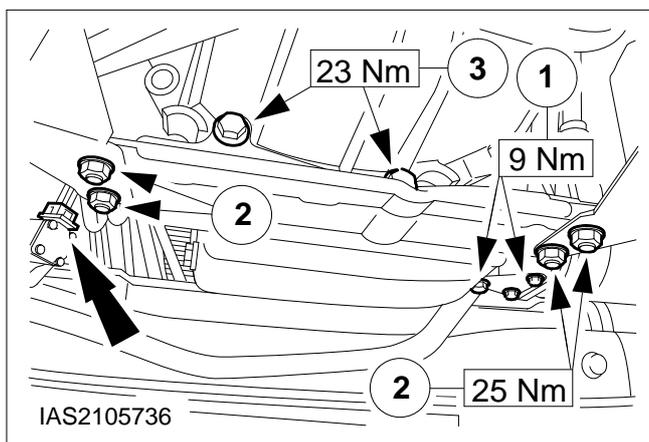


76. Fit the PCV connector (right-hand side shown).

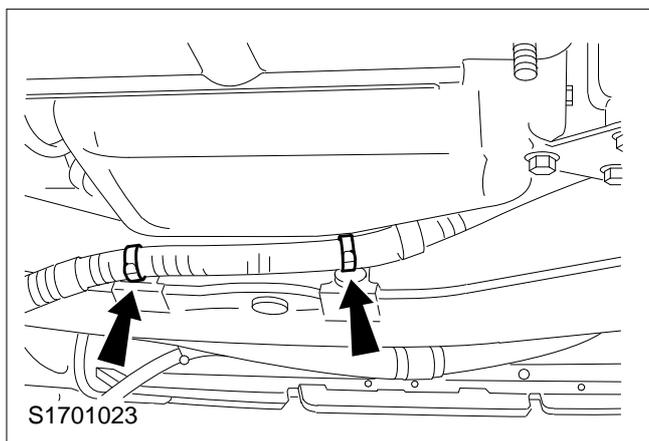
77. Move the front crossmember into installation position using a transmission jack.

**78. Attach the front crossmember.**

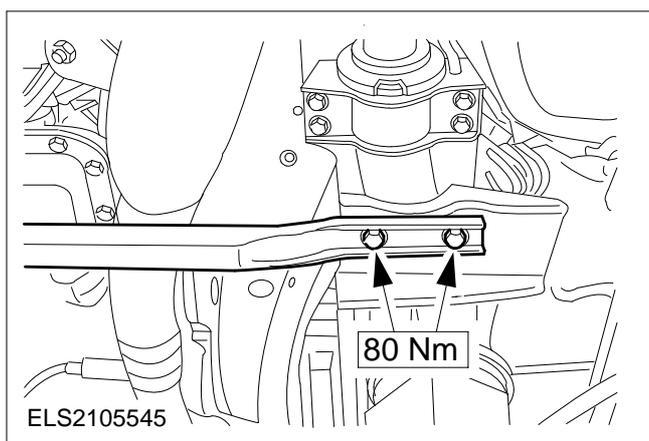
- 1 Bolts for the front crossmember.
- 2 Engine mounting bolts.

**79. Screw in the adapter plate bolt.****80. Insert the bolts in the bracket and push on the retaining plate for the bolts.****81. Fit the brackets and connect the multiplug.**

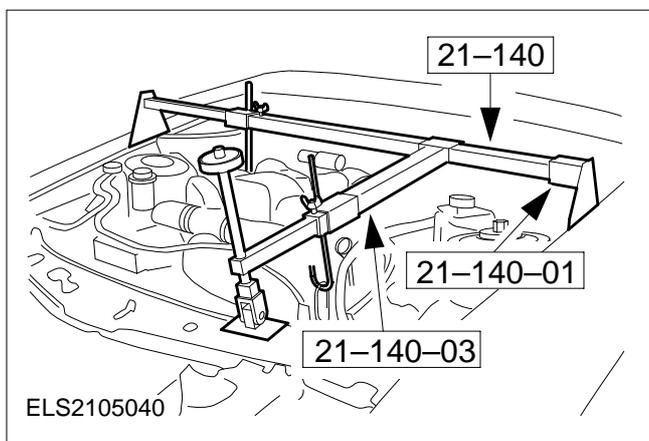
- 1 Bracket for the oil filter connector.
 - 2 Catalytic converter bracket to the catalytic converter.
 - 3 Catalytic converter bracket to the transmission.
- PSP switch multiplug.



82. Attach the wiring loom to the front crossmember.

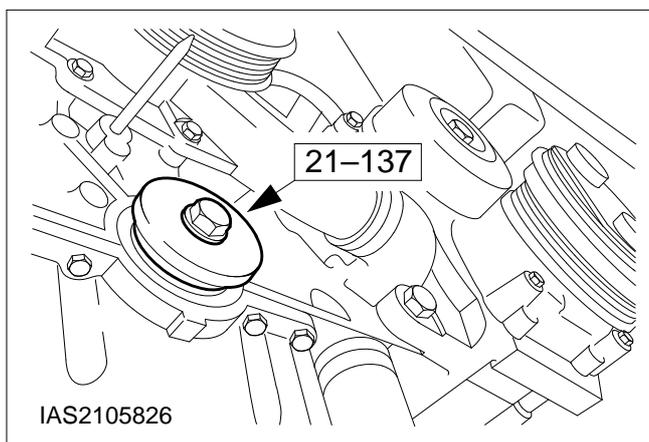


83. Attach the transverse brace to the front crossmember (left-hand side shown).



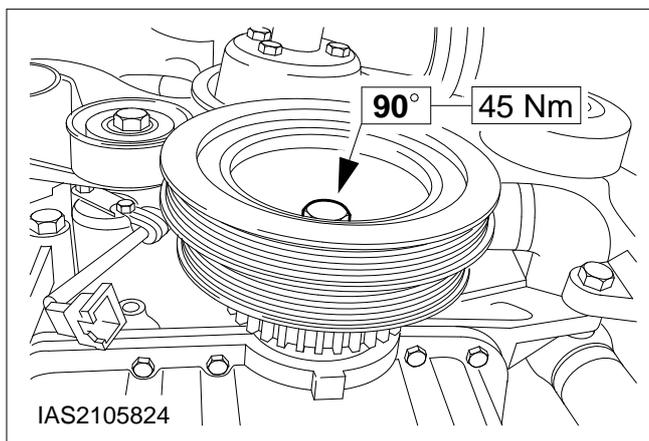
84. Detach the engine support bar.

Lower the vehicle.

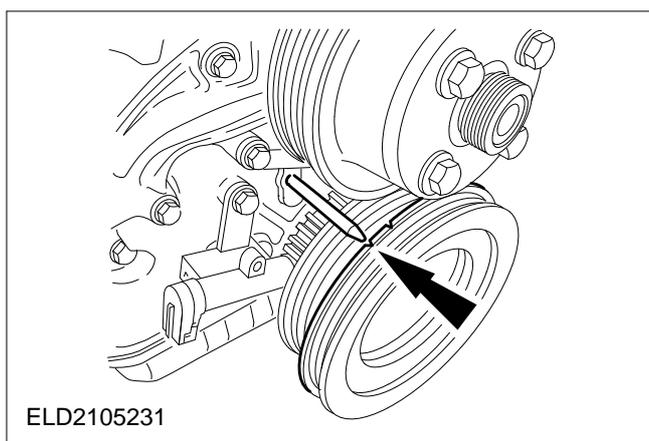


85. Install the crankshaft front oil seal.

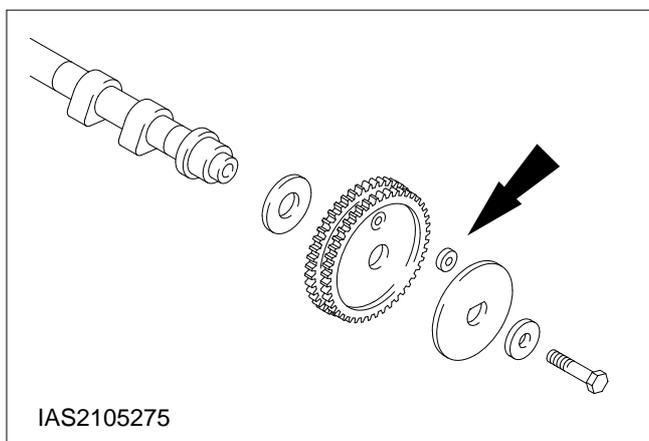
Lock the crankshaft by moving the special tool into position.



86. Screw in the vibration damper bolt.

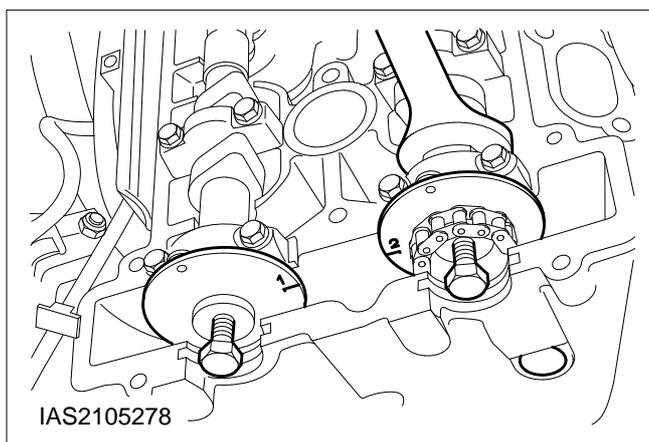


87. Set the engine to TDC.



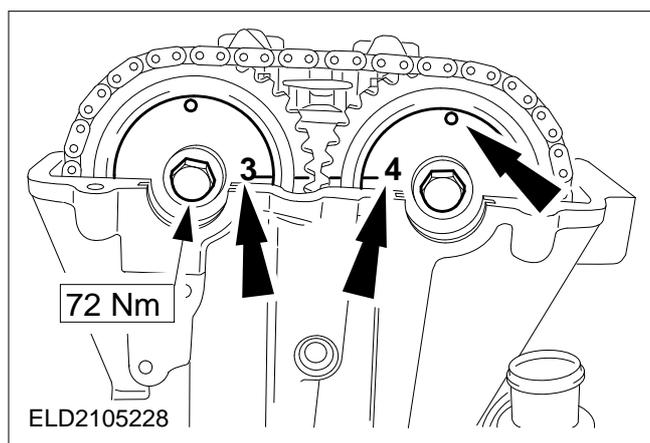
NOTE: The drive plate follower must engage in the bore on the camshaft sprocket.

88. Components attached to the camshaft.



89. Set the camshafts to the timing marks.

- Push on the thrust washers and drive plates, screw in the bolts a few turns.
- Set the camshafts to the timing marks.
- Remove the drive plates.

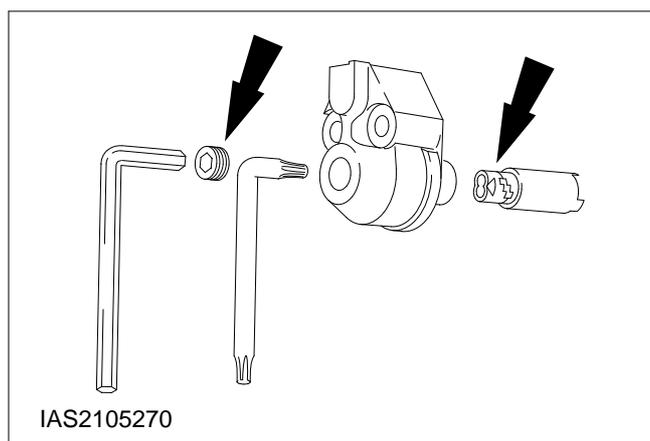


NOTE: Do not rotate the camshafts or the crankshaft.

90. Fit the camshaft sprockets.

NOTE: The timing chain must be tight between the camshaft sprockets.

Pull the timing chain tight on the driving run (the opposite side to the chain tensioner), and working from this side attach the camshaft sprockets (do not yet tighten the bolts).

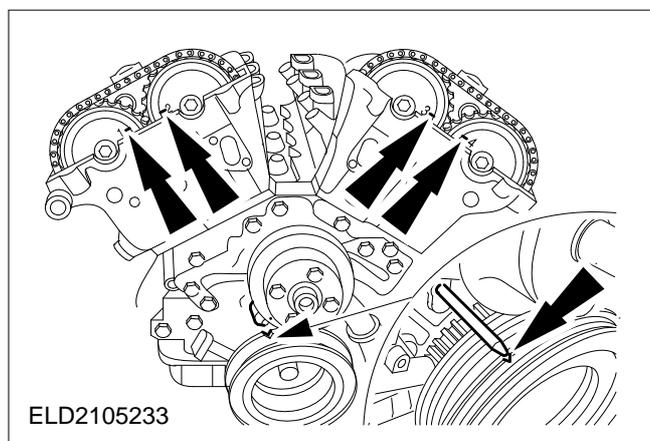


NOTE: The chain tensioner is released once there is an audible click and when it has reached its stop.

91. Tighten the timing chains.

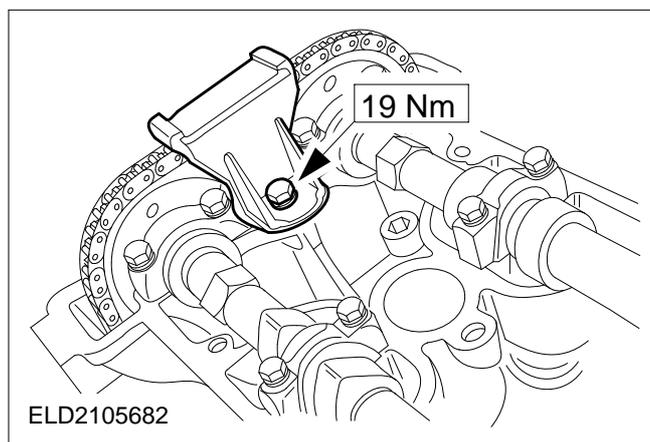
NOTE: Use the TORX T30 angled socket.

- Twist the chain tensioner anti-clockwise to release it.
- Screw the blanking plug (4,5 mm Allen key) into the chain tensioner.

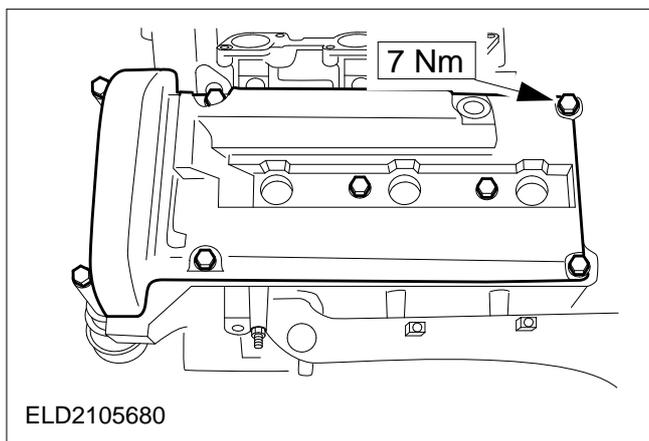


92. Carefully turn the engine through two rotations and check the valve timings.

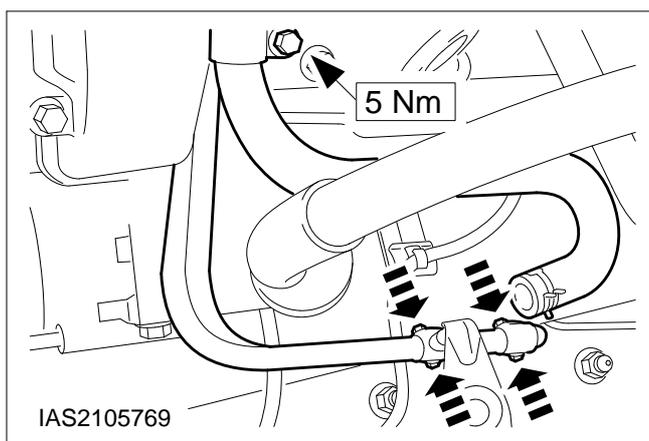
If necessary, follow steps 89. to 92. to correct the valve timings.



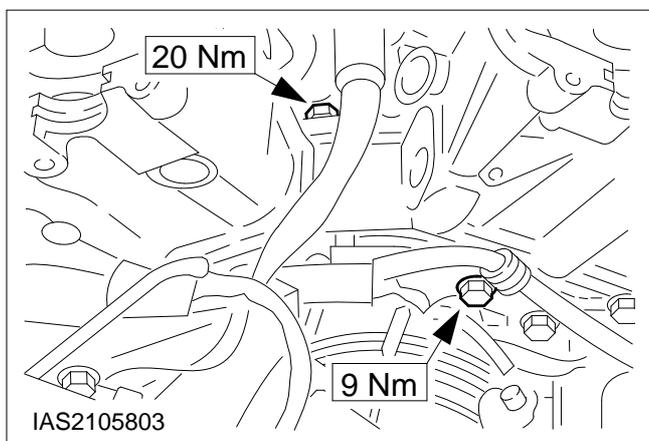
93. Fit the upper chain guides (left-hand side shown).



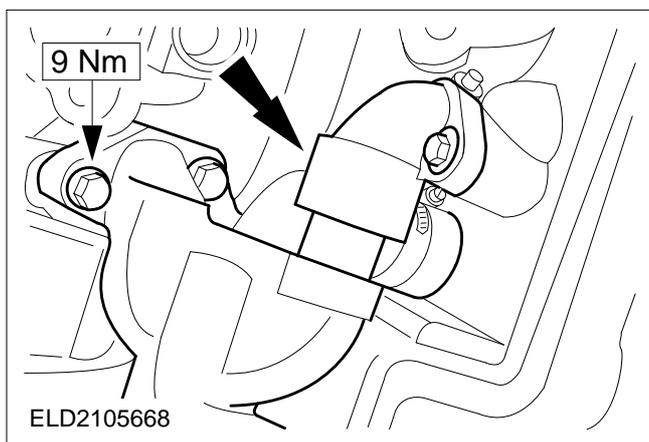
94. Fit the cylinder head covers (left-hand side shown).



95. Attach the PCV bracket to the cylinder head cover and connect the fuel pipes.

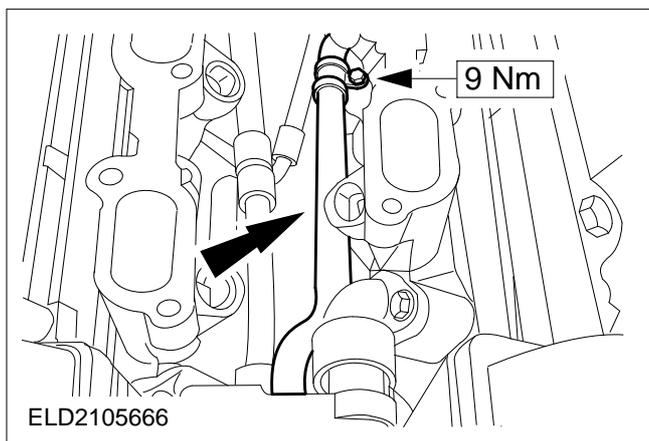


96. Attach the wiring loom bracket and screw in the upper bolt on the timing chain housing.

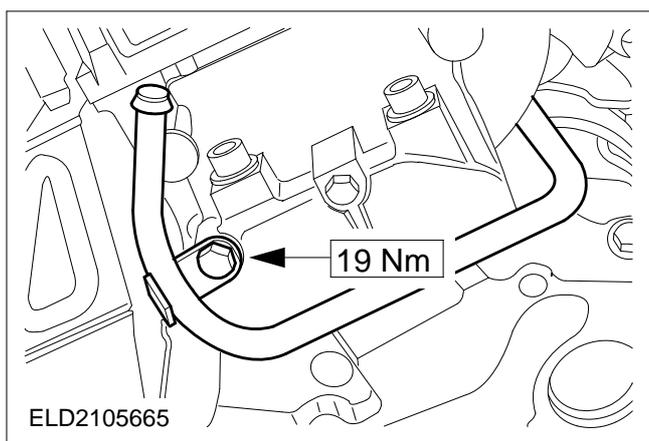


97. Fit the thermostat housing.

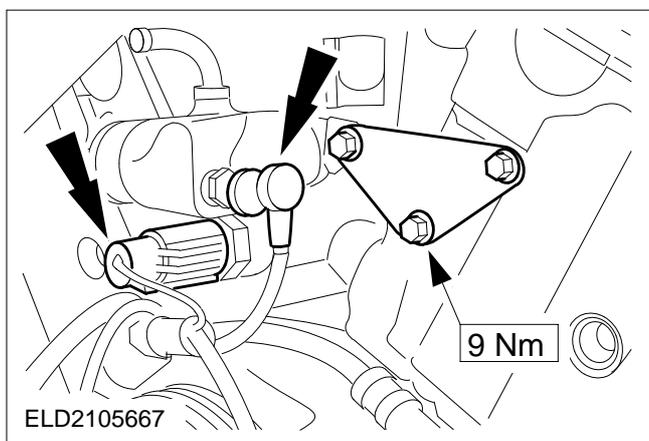
- Guide in the thermostat housing and attach the coolant hose.
- Fit the connector.
- Fit the thermostat housing bolts.



98. Fit the coolant pipe.

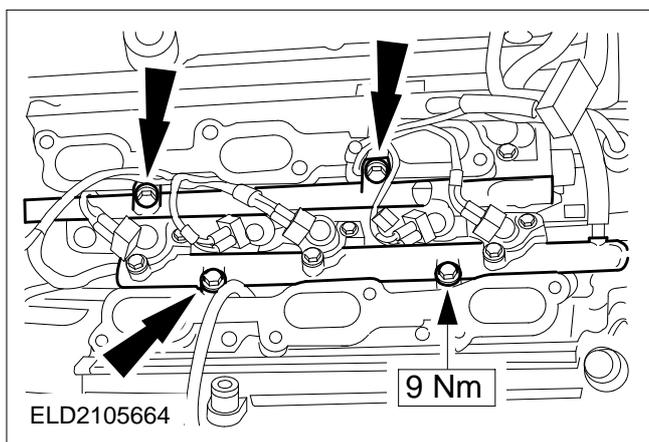


99. Fit the coolant pipe (continued).



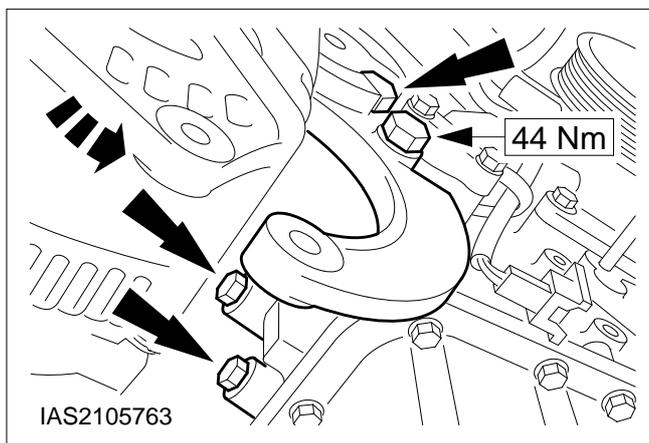
100. Fit the thermostat housing bracket and connect the plugs.

- Thermostat housing bracket
- Temperature gauge sender unit plug.
- Engine coolant temperature (ECT) sensor plug.

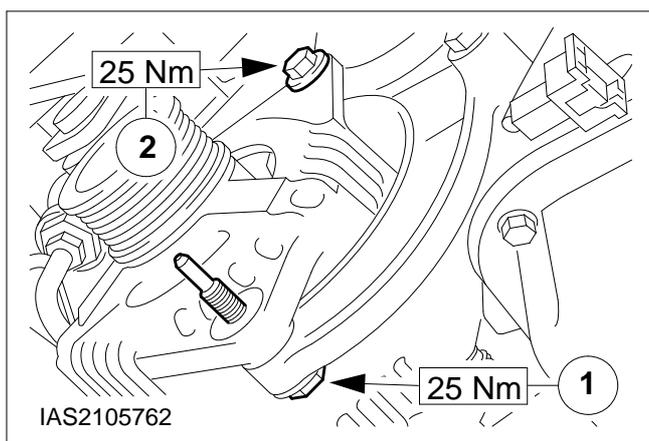


101. Fit the fuel rails.

- Connect the fuel injection valve multiplugs.
- Raise the vehicle.

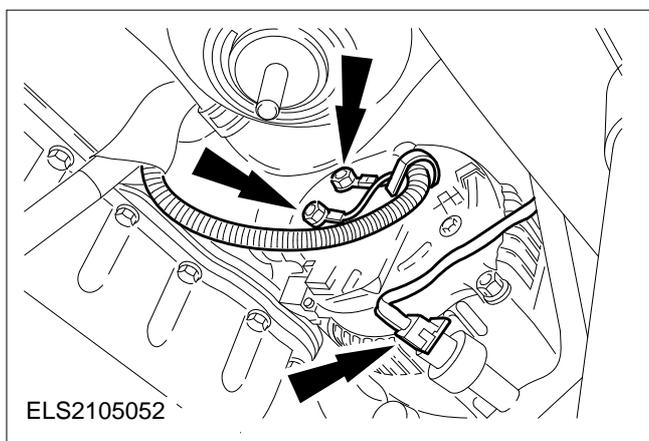


102. Fit the bracket for the alternator/power steering pump.

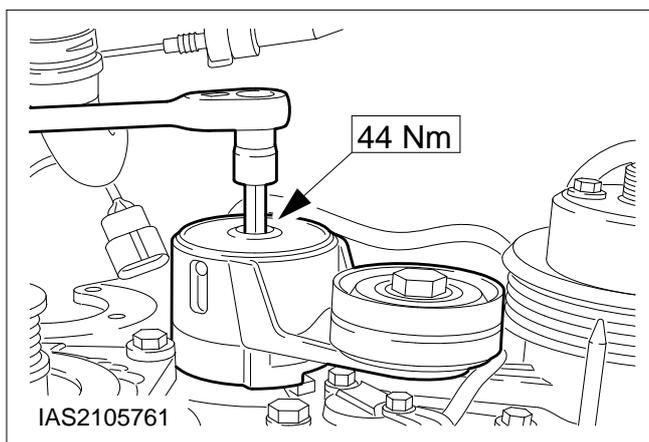


103. Fit the alternator.

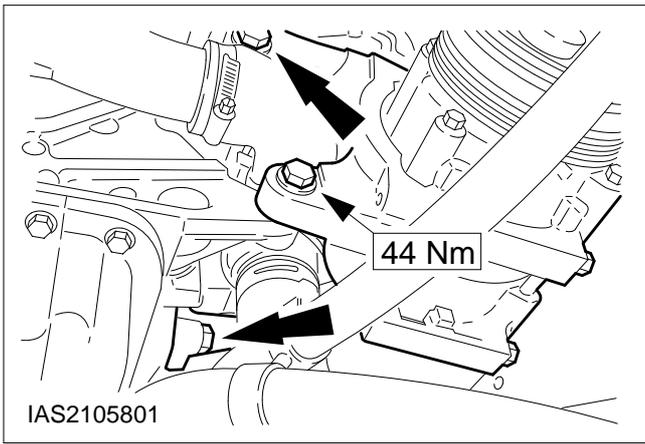
- 1 Screw in and tighten the lower bolt.
- 2 Tighten the upper bolt.



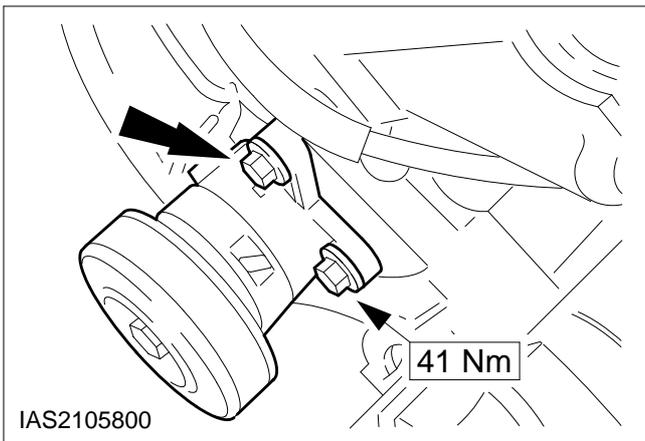
104. Connect the alternator and the PSP switch plug.



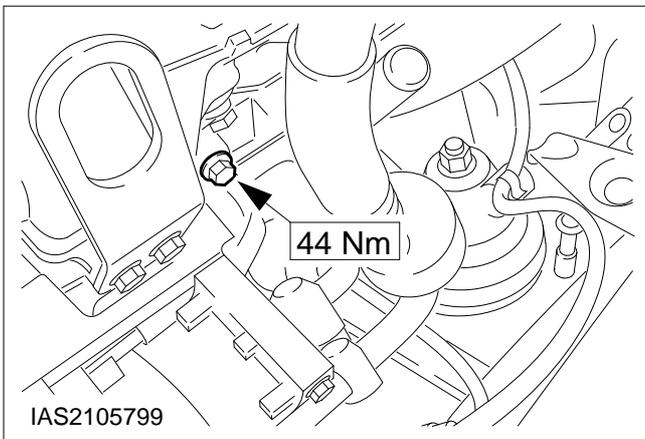
105. Fit the tensioning pulley for the alternator/power steering pump.



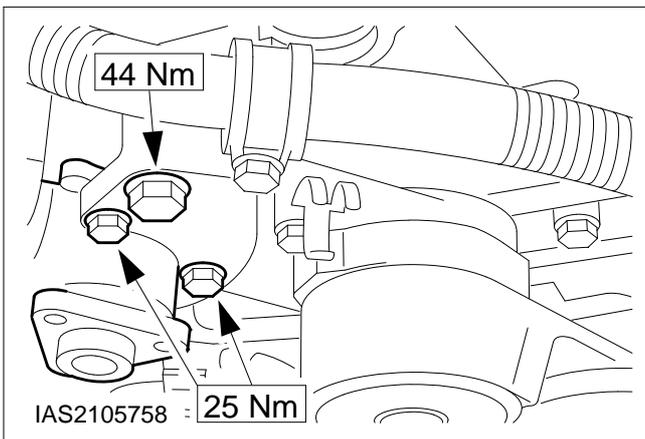
106. Fit the bolts on the bracket for the air conditioning compressor.



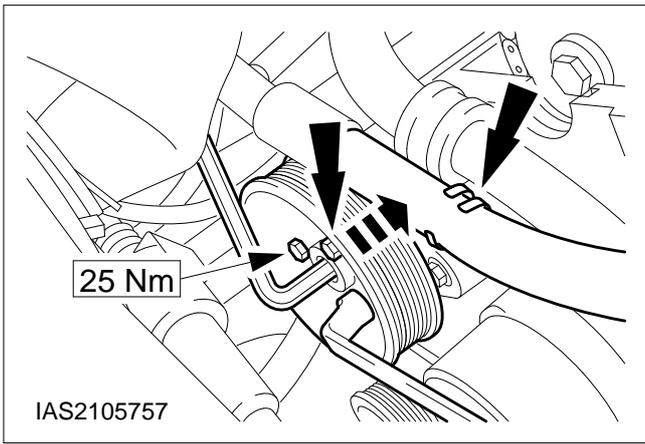
107. Fit the tensioning pulley for the air conditioning compressor.



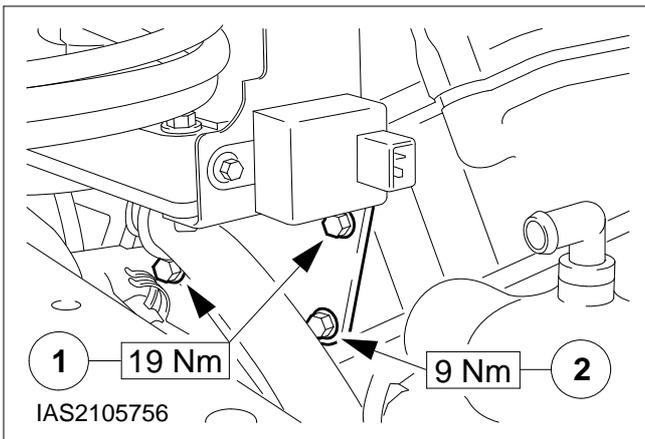
108. Screw in the upper bolt on the bracket for the air conditioning compressor.



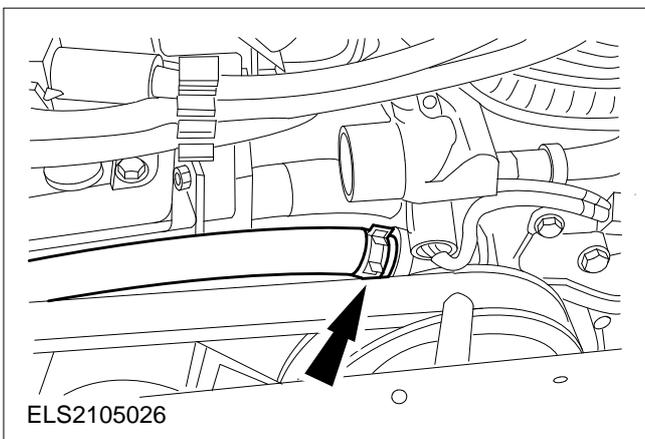
109. Insert the upper bolt of the alternator bracket and fit the power steering pump (five bolts).



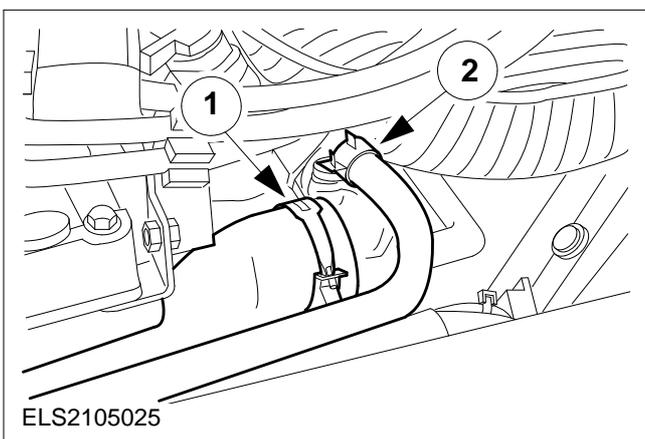
110. Fit the power steering pump pulley.



111. Fit the ignition coil.

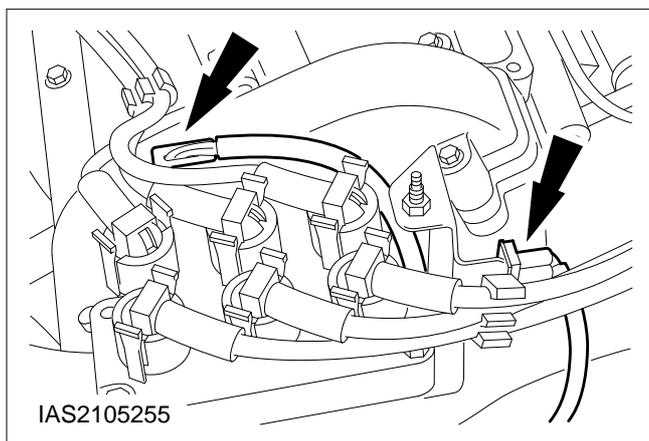
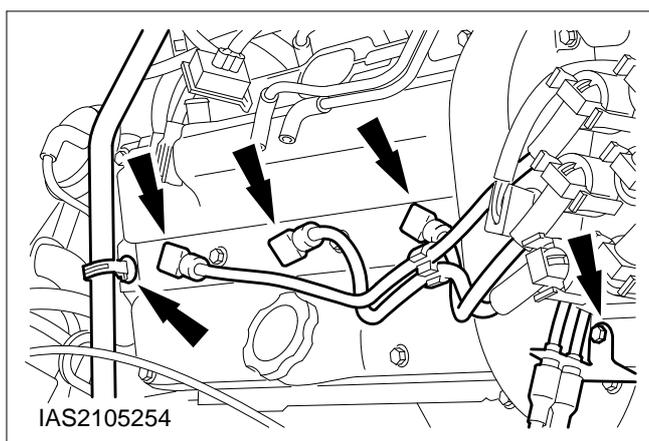


112. Attach the coolant hose to the coolant pump.

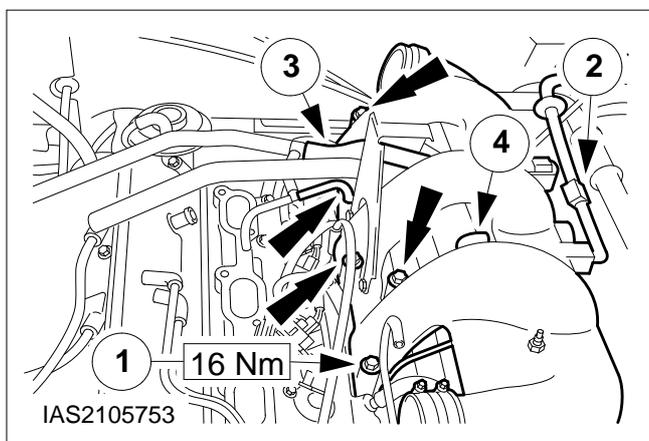


113. Attach the coolant hoses.

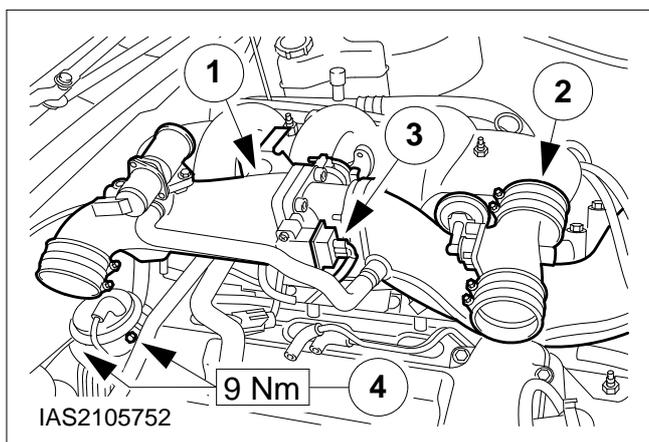
- 1 To the radiator.
- 2 To the expansion tank.

**114. Connect the plugs.****115. Push on the spark plug connectors and attach the vacuum hose.**

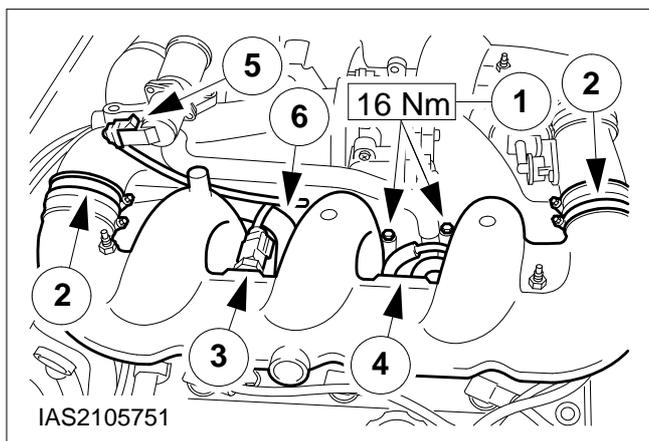
- Attach the PCV hose to the cylinder head cover and connect it.
- Push on the spark plug connectors (right-hand side shown).
- Attach the bracket for the vacuum lines to the ignition coil.

**116. Fit the left-hand exhaust manifold.**

- 1 Fit the six bolts.
- 2 Fit the brake servo vacuum line.
- 3 Insert the PCV valve into the cylinder head cover.
- 4 Connect the vacuum hose.

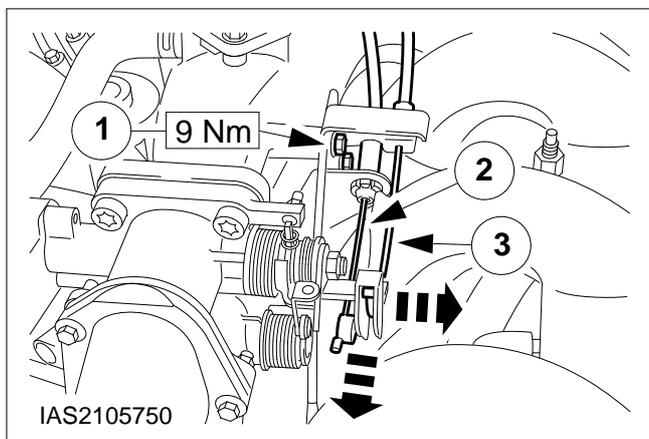
**117. Fit the air intake plenum chamber.**

- 1 Push the air intake plenum chamber onto the left-hand inlet manifold.
- 2 Attach the VRIS.
- 3 Connect the TP sensor plug.
- 4 Attach the EGR valve to the inlet manifold (two bolts).



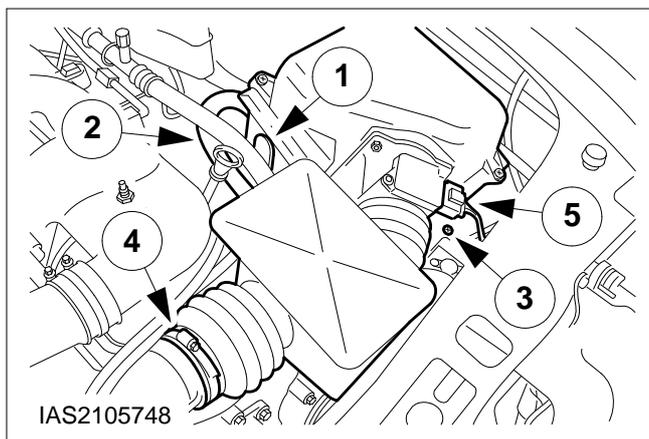
118. Attach the right-hand inlet manifold.

- 1 Push the inlet manifold together with the connecting hoses onto the air intake plenum chamber and fit the six bolts.
- 2 Fit the connecting hoses.
- 3 Connect the IAT sensor multiplug.
- 4 Push on the two vacuum hoses.
- 5 Connect the plug from the idle air control (IAC) valve.
- 6 Push on the PCV hose and the vacuum hose.



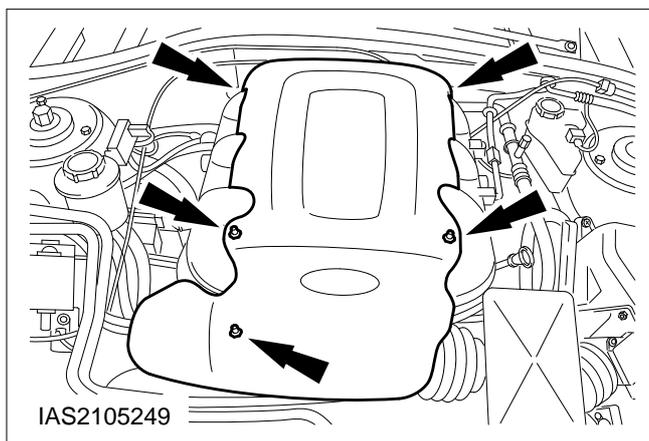
119. Attach the cables.

- 1 Fit the bracket for the speed control system cable.
- 2 Hook the speed control system cable in place.
- 3 Attach the throttle cable to the bracket and hook it in place.

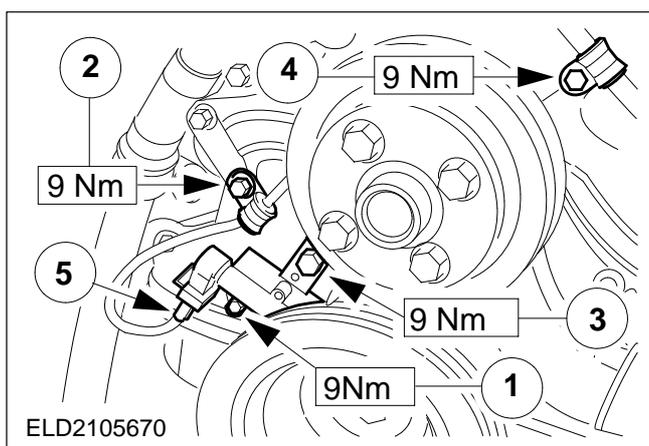


120. Fit the air cleaner.

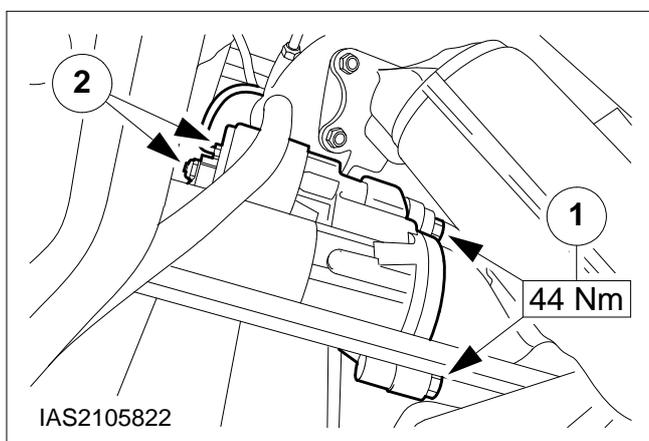
- Push the air cleaner into the grommets on the body and onto the intake pipe.
- 1 Fit the two rubber retainers.
 - 2 Attach the PCV hose.
 - 3 Insert the bolt for the intake pipe.
 - 4 Fit the intake hose.
 - 5 Fit the MAF sensor plug.

**121. Fit the intake system cover.**

Raise the vehicle.

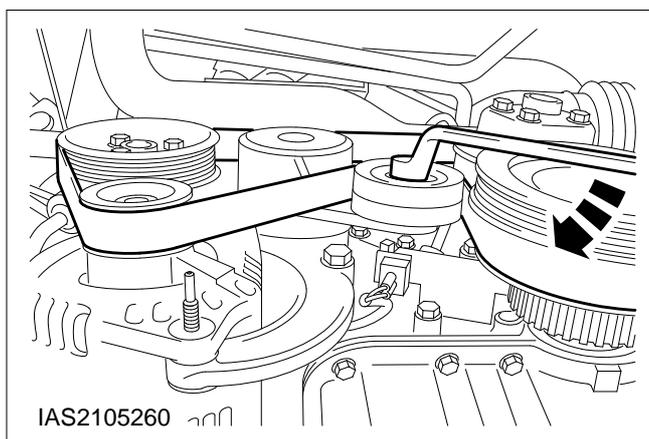
**122. Fit the CKP sensor and the wiring clips.**

- 1 Crankshaft position (CKP) sensor.
- 2 CKP sensor wiring clip.
- 3 Bracket for CKP sensor.
- 4 CMP sensor wiring clip.
- 5 Crankshaft position (CKP) sensor.

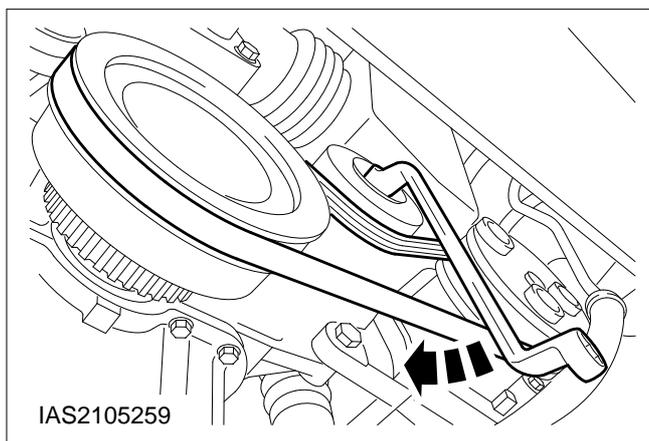
**123. Install the starter motor.**

Fit the crankshaft locking tool.

- 1 Install the starter motor.
- 2 Connect the starter motor wiring.

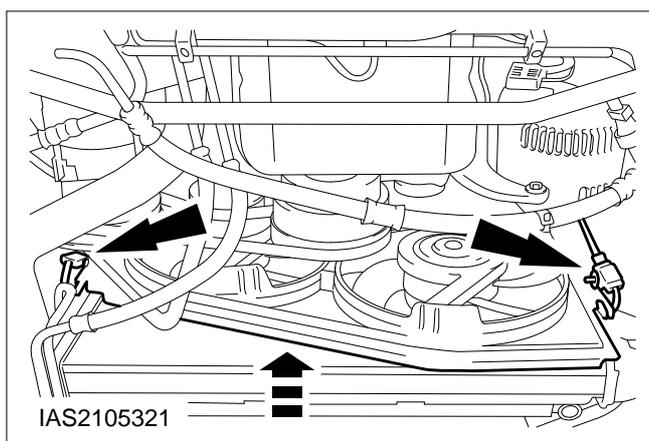
**124. Fit the multi-groove belt for the alternator/power steering pump.**

- Take the pressure off the belt by turning the tensioning pulley clockwise.
- Fit the multi-groove belt.



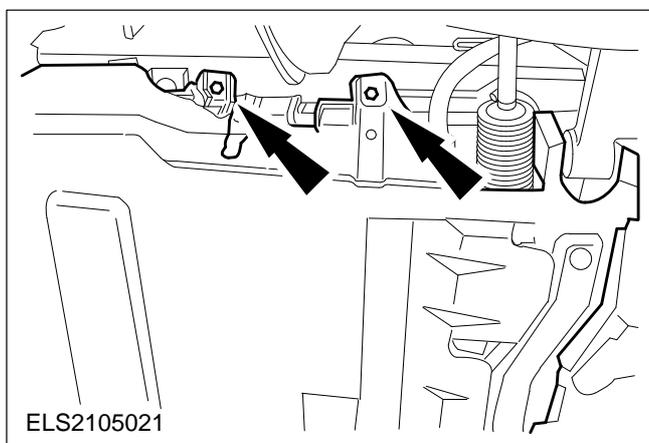
125. Fit the air conditioning multi-groove belt.

- Take the pressure off the belt by turning the tensioning pulley clockwise.
- Fit the multi-groove belt.



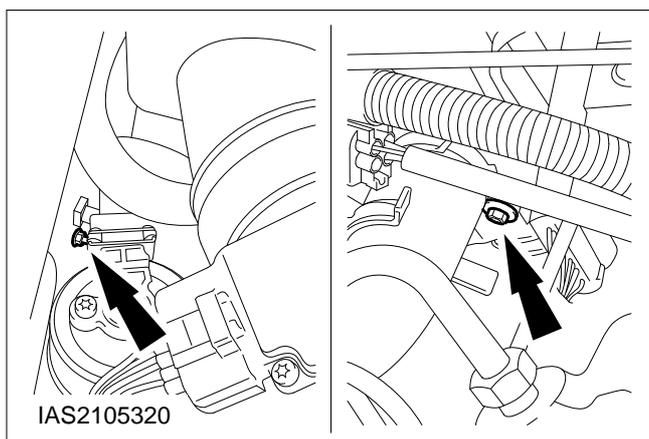
126. Fit the radiator fan shroud.

- Hook the radiator fan shroud into the retaining tabs (four tabs).
- Connect the fan motor plug and attach the wiring to the radiator fan shroud.

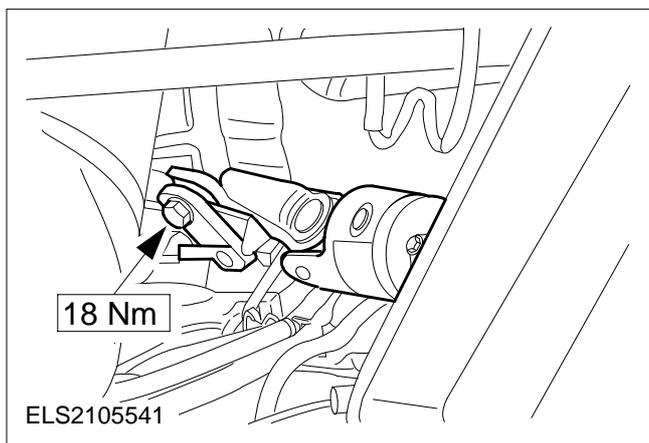


127. Attach the engine undershield (left-hand side shown).

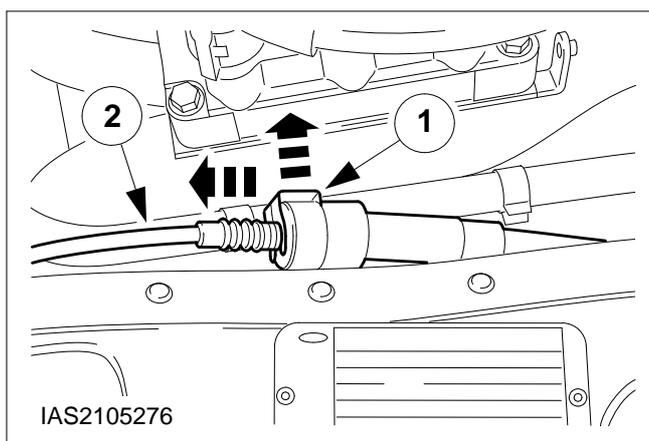
Lower the vehicle.



128. Fit the nuts to the radiator fan shroud.



129. Connect the steering intermediate shaft.



130. Adjust the throttle cable.

- 1 Pull off the clip from the throttle cable.
- 2 Pull the throttle cable out a few notches.
 - Fully depress the accelerator pedal once and push the clip back in place.
 - Check whether the throttle valve opens fully when the accelerator pedal is fully depressed, and repeat the adjustment if necessary.

131. Standard finishing operations.

- Connect the battery ground lead.
- Fit the battery cover.
- Top up the coolant.
- Close the coolant expansion tank.
- Top up the engine oil.
- Check the routing of hoses and wiring and correct them as necessary.
- Remove the protective covers.
- 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.