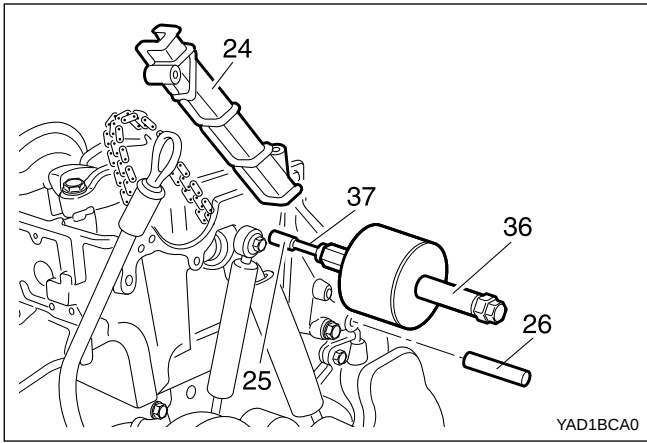
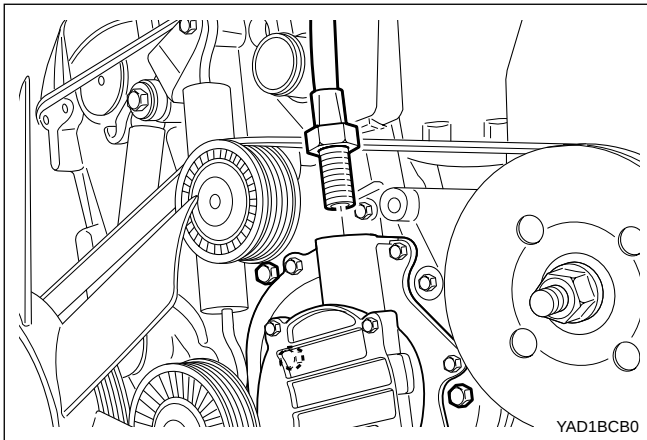
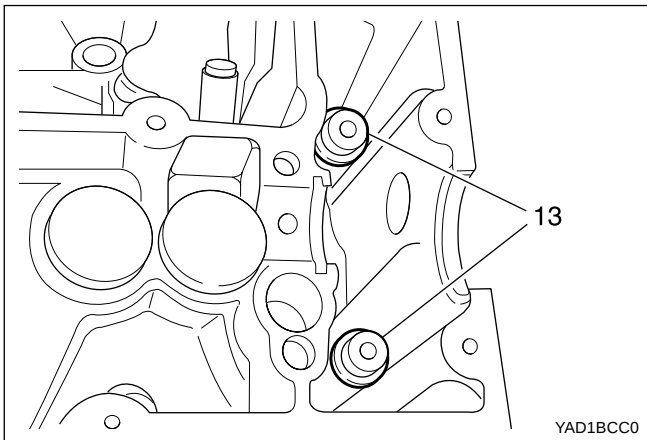




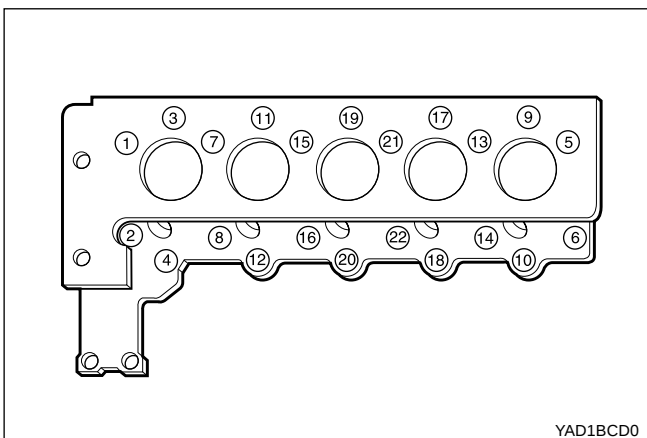
38. Using the sliding hammer 116 589 20 33 00 (36) and the threaded pin 116 589 02 34 00 (37), pull out the sliding rail pins (25, 26) and remove the sliding rail (24).



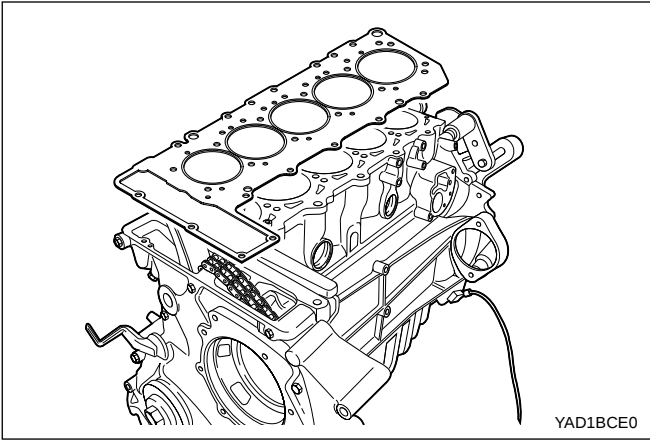
39. Remove the vacuum line from the vacuum pump.
40. Disconnect the vacuum pipe from thermo valve.



41. Remove the socket bolts (13) of the chain box using the T type socket wrench 116 589 03 07 00.

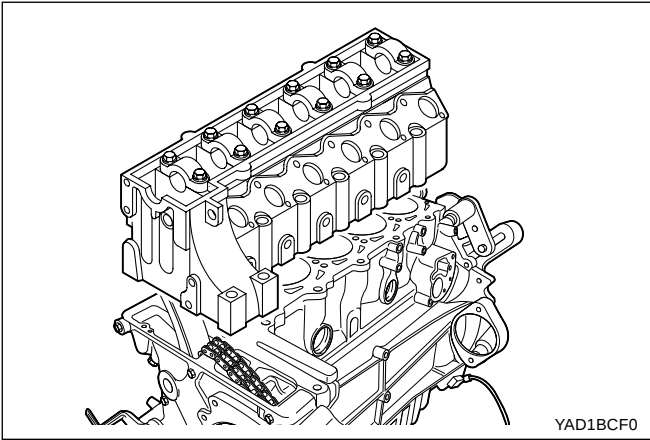


42. Remove the cylinder head bolts in numerical sequence.
43. Remove the cylinder head and gasket.



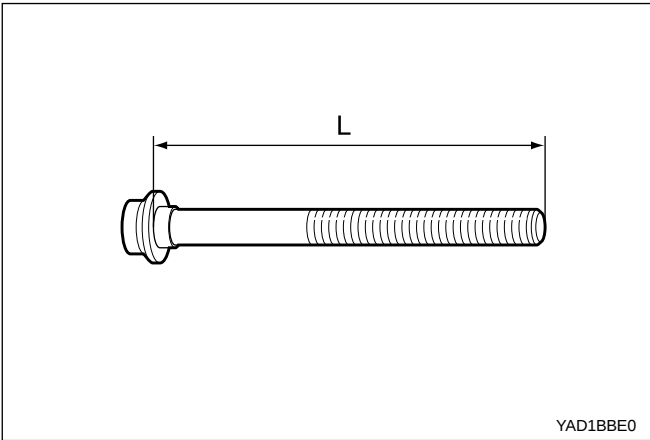
Installation Procedure

- 1. Replace the cylinder head gasket.



- 2. Install the cylinder head onto the crankcase.

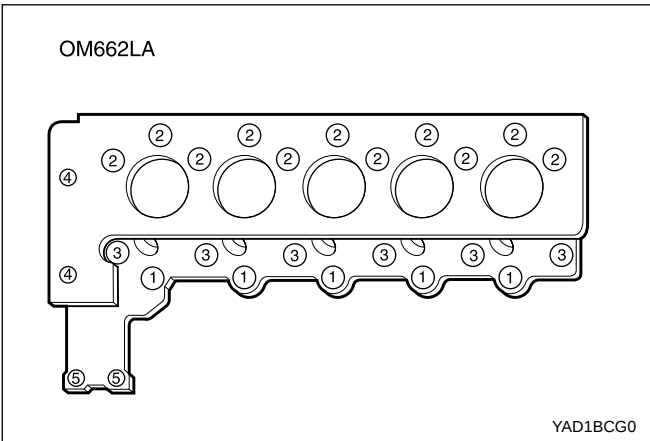
Notice: Align the cylinder head holes with the guide pins.



- 3. Measure the length(L) of cylinder head bolts.

Notice: If the max. length is exceeded, replace the bolts.

Thread Dia.	Length (L) when New	Max. Limit(L)
M10	80 mm	82 mm
M10	102 mm	104 mm
M10	115 mm	117 mm

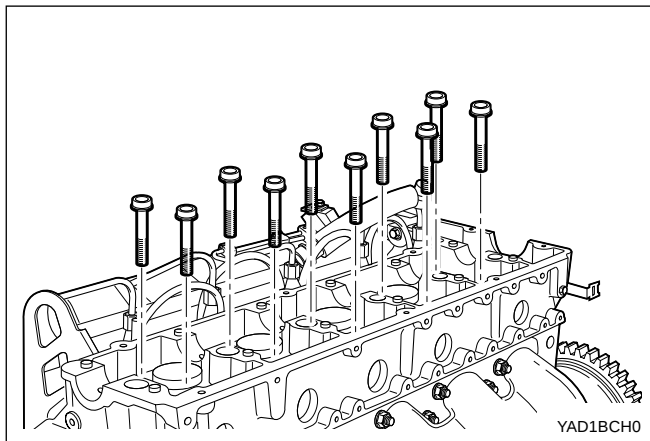


- 4. Coat the head contact surface of bolts and thread with oil and insert them as shown.

- Cylinder head bolts arrangement

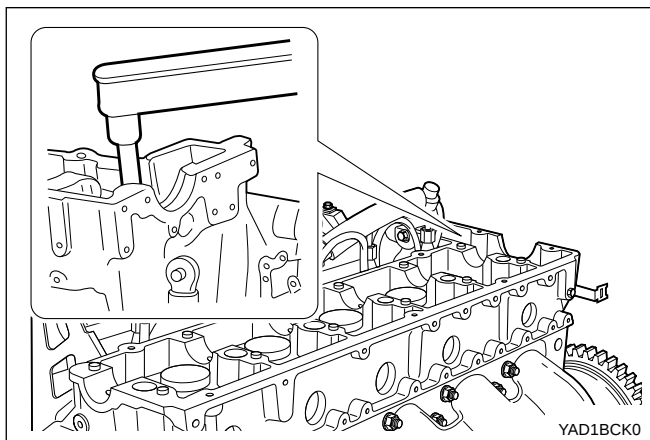
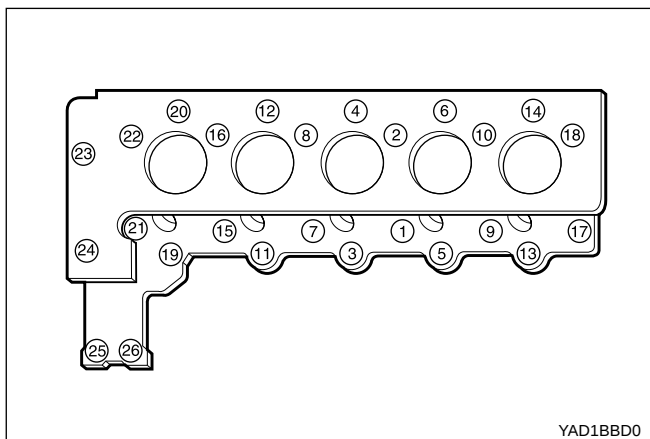
Bore

- 1 M10 × 80
- 2 M10 × 102
- 3 M10 × 115
- 4 M 8 × 50
- 5 M 8 × 80



5. Tighten the cylinder head bolts to specified torque and torque angle.

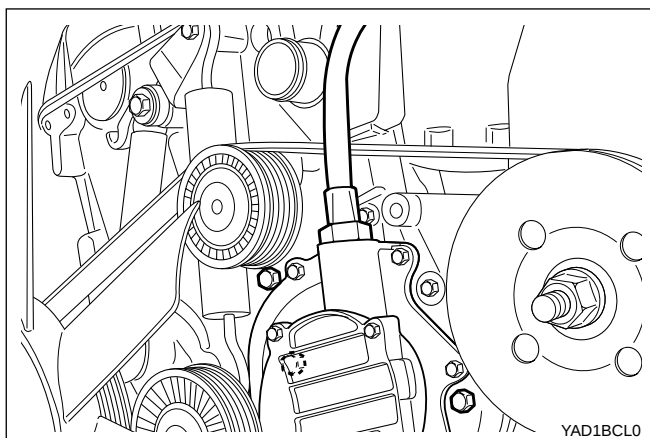
Tightening Torque	1st Step	10 N•m (89 lb-in)
	2nd Step	35 N•m (26 lb-ft)
	Torque Angle	90°
	Wait for	10 minutes
	Torque Angle	90°



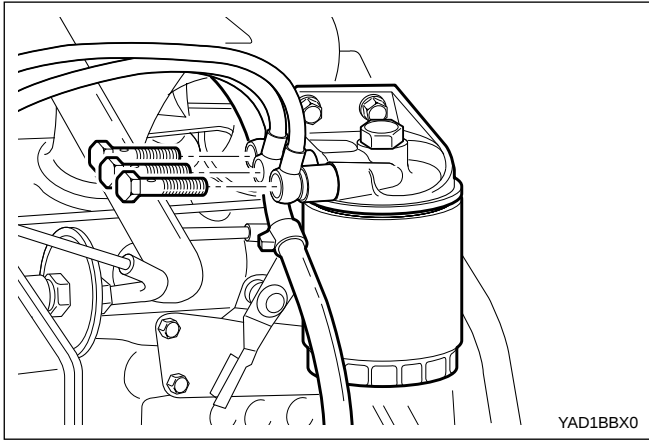
6. Install the socket bolts in the chain box using the T type socket wrench 116 589 03 07 00.

Installation Notice

Tightening Torque	25 N•m (18 lb-ft)
-------------------	-------------------



7. Connect the vacuum pipe to the thermo valve.
8. Connect the vacuum lines to the vacuum pump.

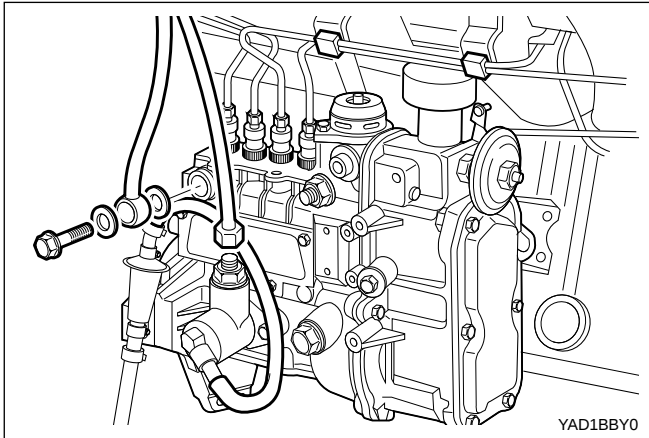


9. Install the fuel filter and connect the pipe.

Installation Notice

Tightening Torque	25 N•m (18 lb-ft)
-------------------	-------------------

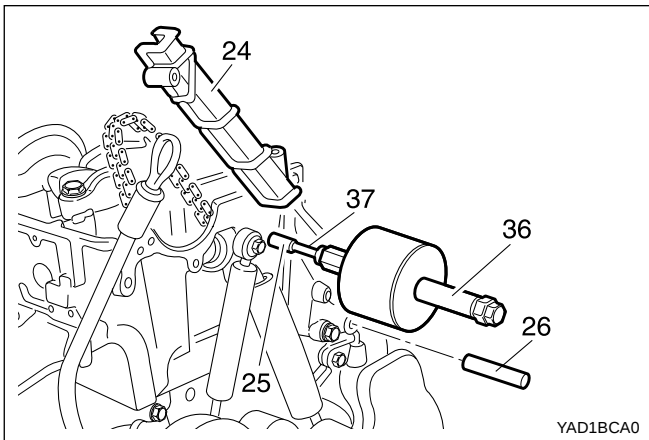
Be careful not to be confused the connections and hoses.



10. Connect the fuel line to the injection pump.

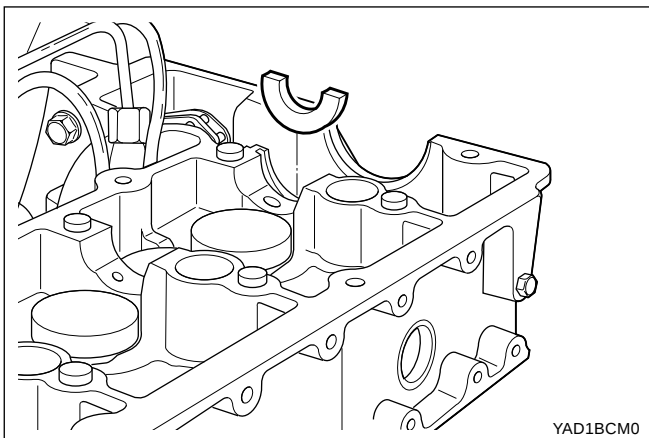
Installation Notice

Tightening Torque	13 N•m (10 lb-ft)
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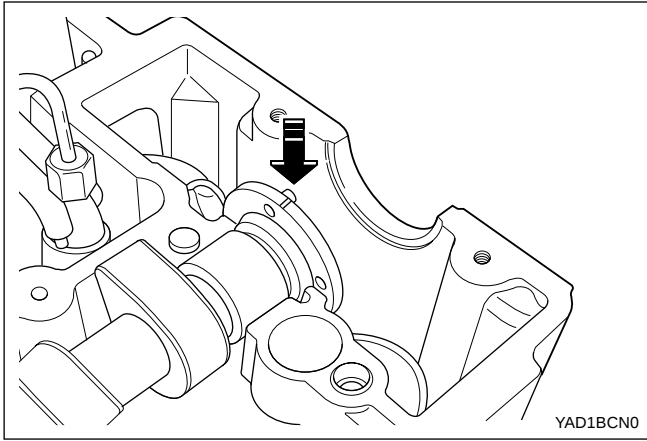


11. Install the sliding rail (24) and insert the sliding rail pins (25, 26) using the sliding hammer 116 589 20 33 00 (36) and threaded pin 116 589 02 34 00 (37).

Notice: Apply sealing compound on the each collar of the sliding rail pins.



12. Insert the locking washer.
13. Inspect the valve tappet and check that the tappet moves smoothly.

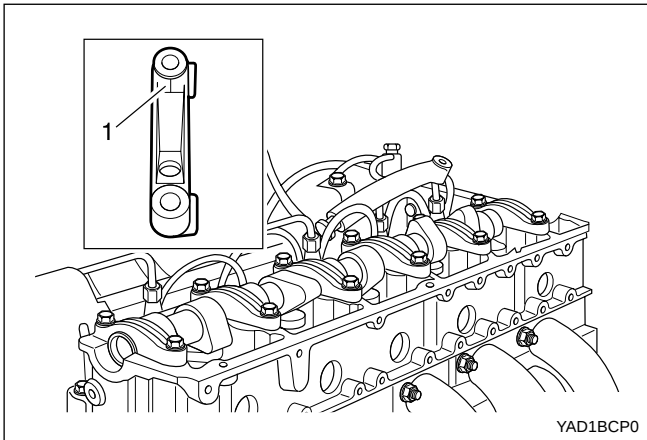


14. Coat the camshaft with oil and install the camshaft on the cylinder head to be TDC mark (arrow) upward.
15. Measure the axial end play of the camshaft.

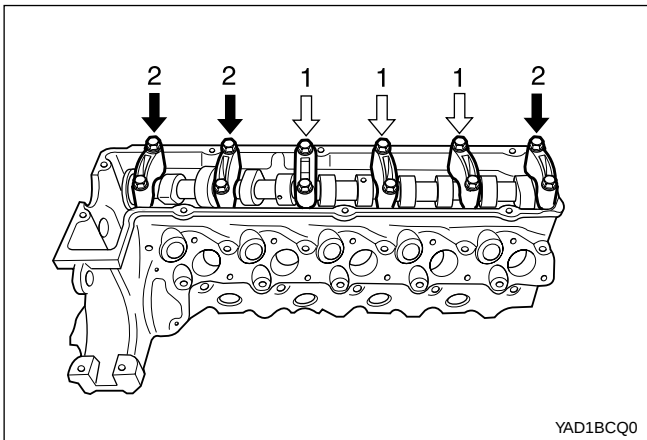
Installation Notice

End Play	0.06 ~ 0.21 mm
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If out of standard, adjust it with the proper thickness of locking washer.



16. Install the bearing caps on the camshaft according to the number on the caps.

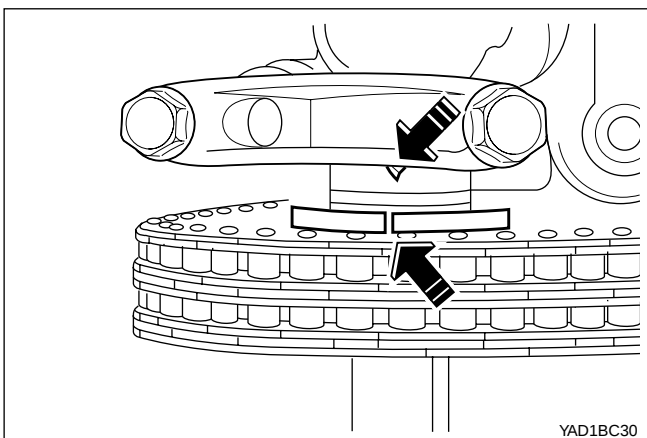


17. Tighten the bearing cap bolts according to the numerical sequence.

Installation Notice

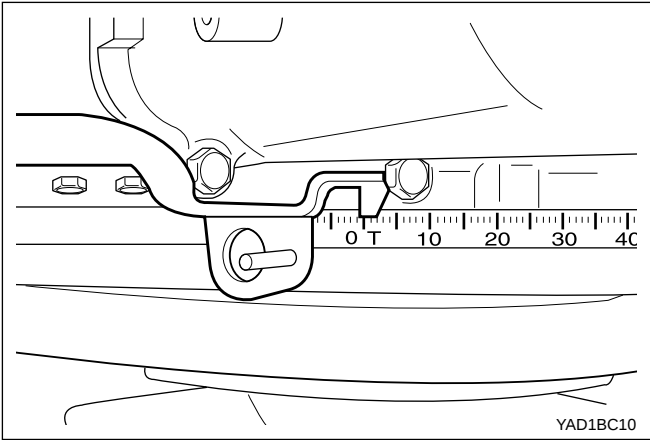
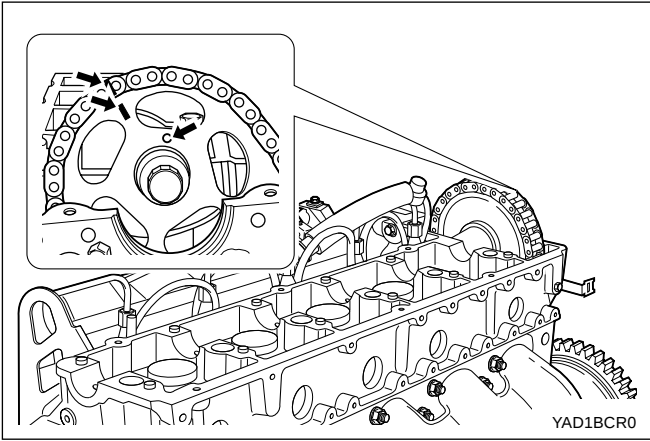
Tightening Torque	25 N•m (18 lb-ft)
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Tighten the No. 1 bolts (light arrow) first and then tighten the No. 2 bolts (dark arrow) stage by stage.

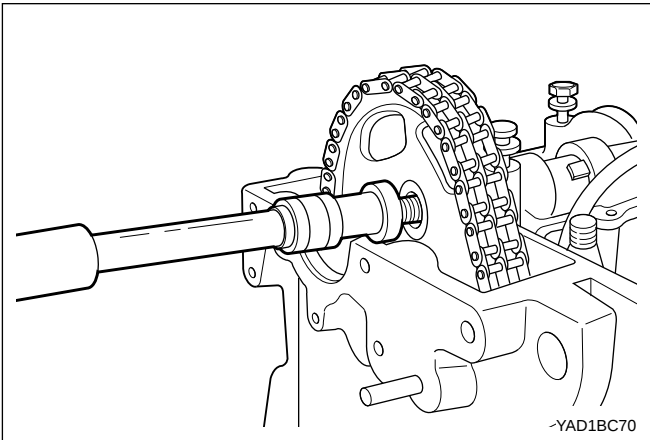


18. Position the camshaft on marking and install the camshaft sprocket.

Notice: Align the alignment marks on the chain and sprocket.



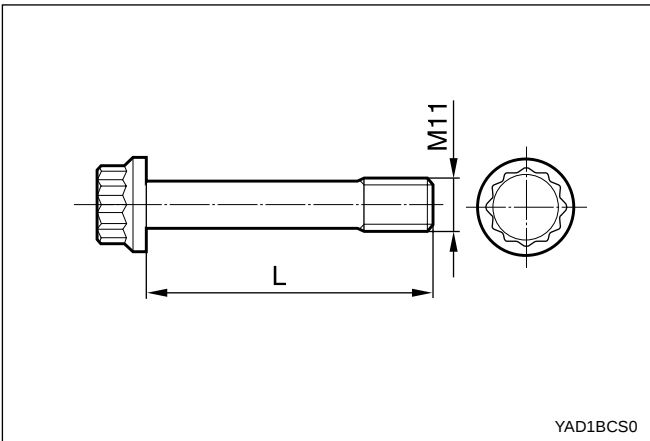
19. Check the TDC position of the crankshaft.



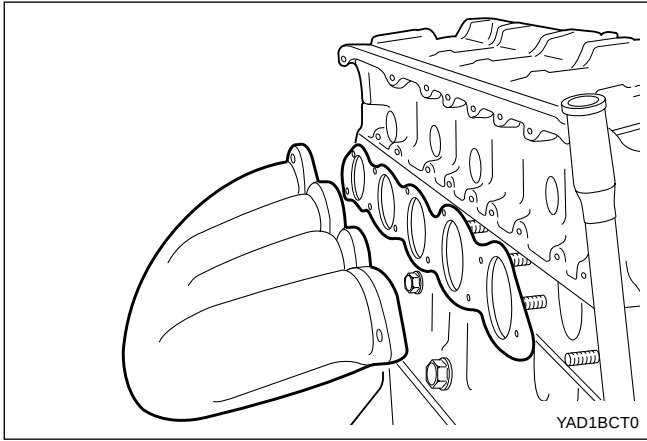
20. Install the camshaft sprocket bolt.

Installation Notice

Tightening Torque	1st Step	25 N•m (18 lb-ft)
	2nd Step	90°



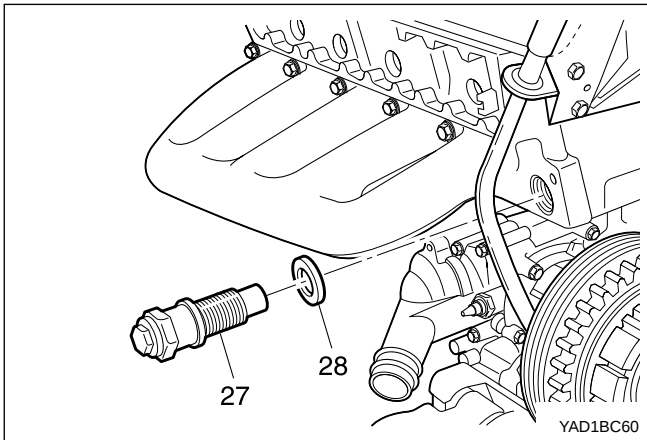
Notice: Measure the max. length 'L' and replace the bolt if it exceeds 53.6 mm.



21. Install the exhaust manifold and gasket.

Installation Notice

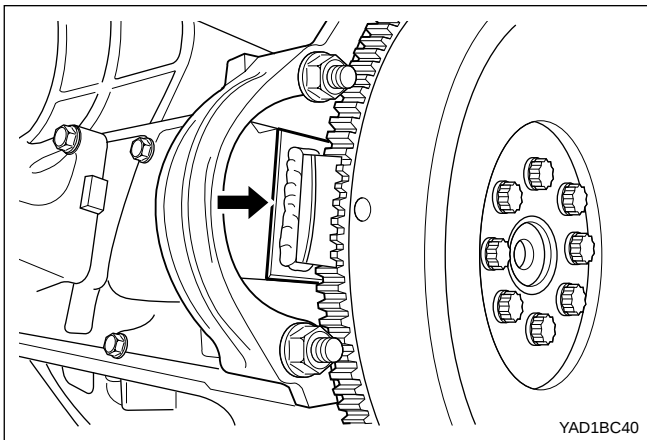
Tightening Torque	25 N•m (18 lb-ft)
-------------------	-------------------



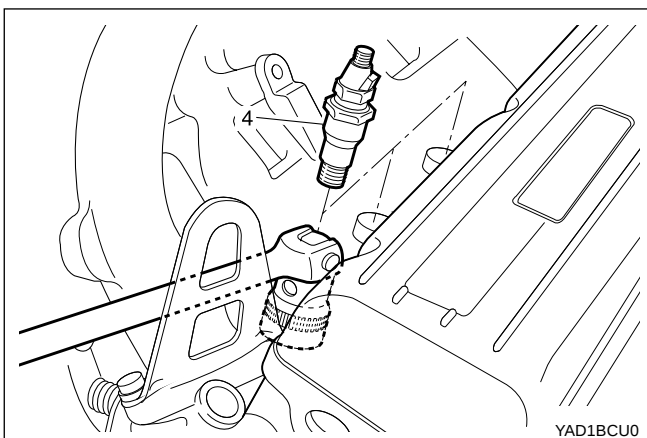
22. Replace the seal and then install the chain tensioner.

Installation Notice

Tightening Torque	80 N•m (59 lb-ft)
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23. Remove the engine lock 602 589 00 40 00.

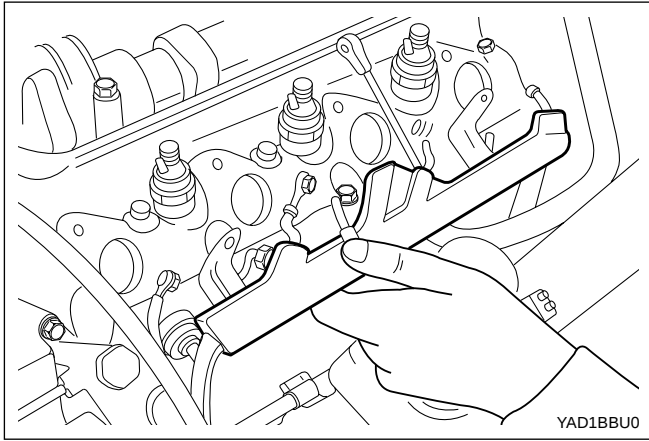


24. Insert the nozzle washer into the hole to face round part downward.

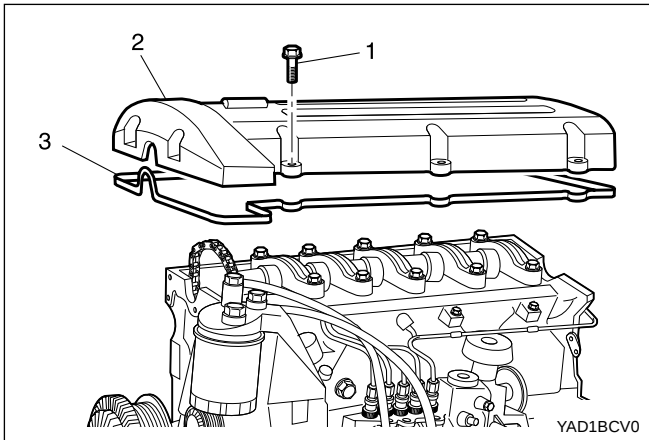
25. Install the fuel injection nozzle.

Installation Notice

Tightening Torque	40 N•m (30 lb-ft)
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26. Connect the fuel hose.
27. Install the cable channel and connect the cables to glow plugs.

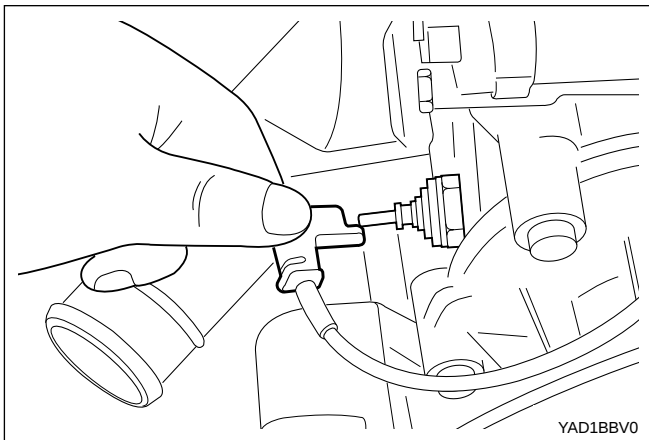


28. Replace the gasket and install the cylinder head cover.

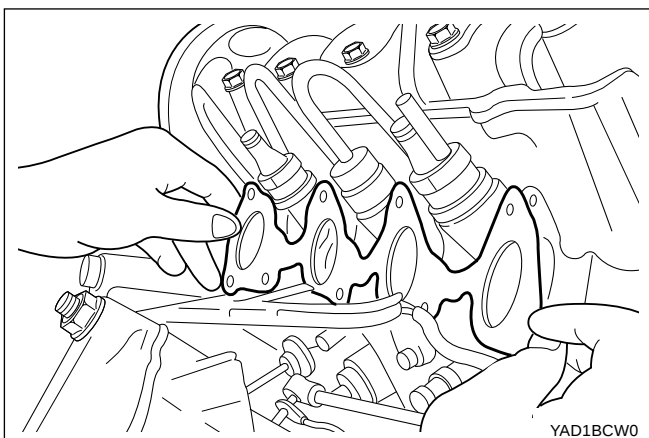
Installation Notice

Tightening Torque	10 N•m (89 lb-in)
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29. Install the blow-by hose.



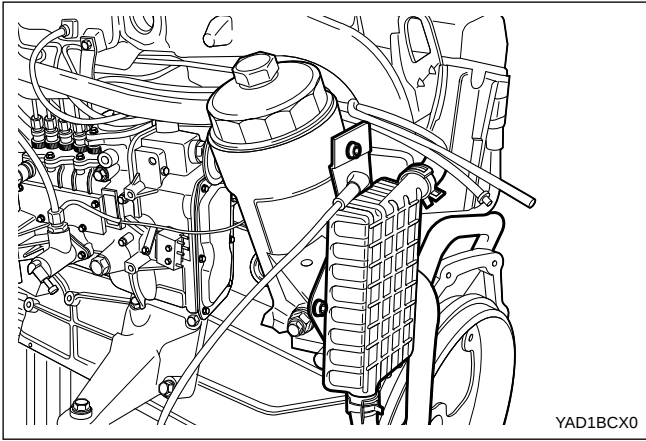
30. Connect the wires to the engine coolant temperature sensor and the glow plug sensor.



31. Replace the intake manifold gasket.
32. Install the intake manifold.

Installation Notice

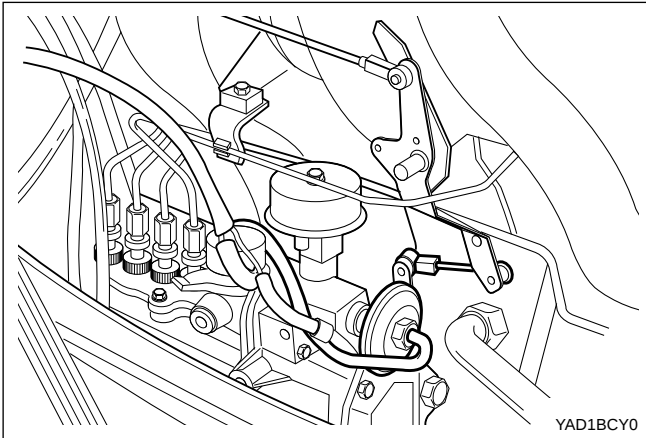
Tightening Torque	25 N•m (18 lb-ft)
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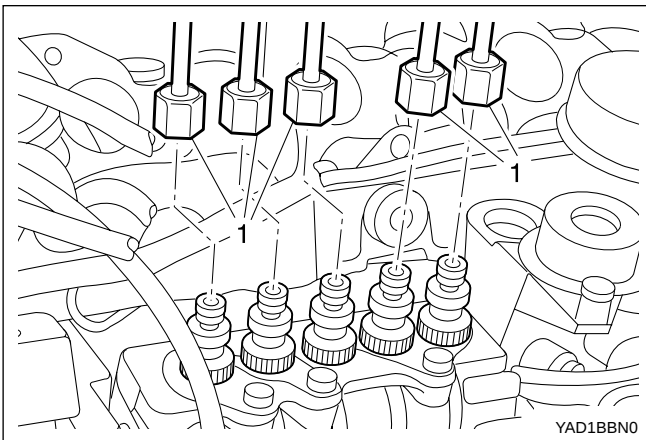
33. Replace the O-ring of heater feed pipe and install it to the cylinder head.

Notice: For installation, clean the hole.

34. Install the bracket of heater feed pipe to the oil filter.



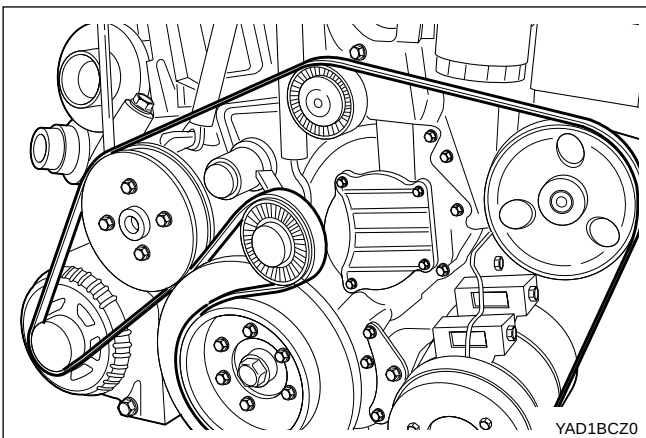
35. Install the fuel pipe and the accelerator control linkage.



36. Connect the fuel lines to the injection nozzles and to the injection pump.

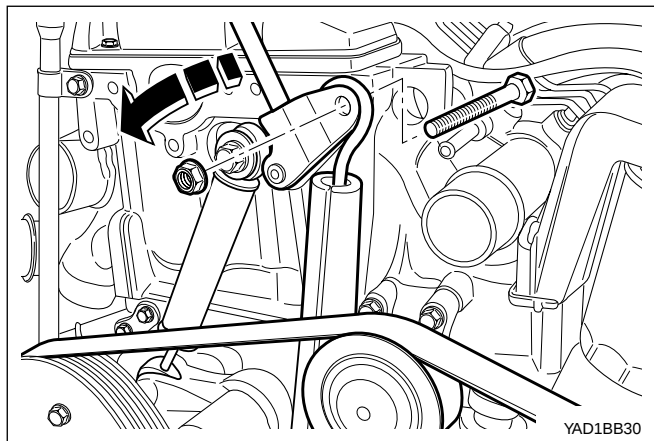
Installation Notice

Tightening Torque	18 N•m (13 lb-ft)
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37. Install the poly V-belt.

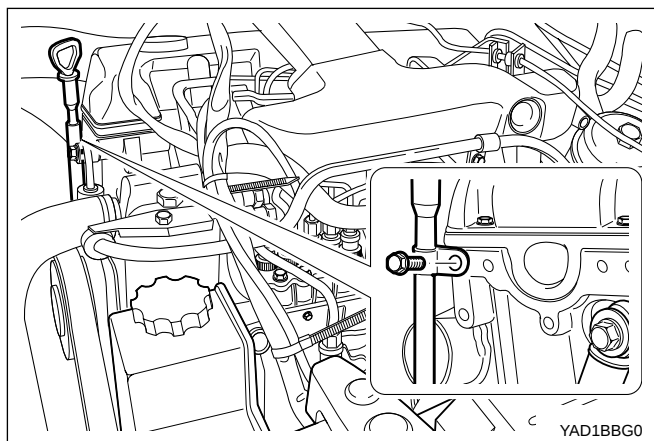
Notice: Be careful not to contaminate the belt.



38. By inserting a rod into the tensioning lever upper hole and pulling the rod, install the bolt and then tighten the nut.

Installation Notice

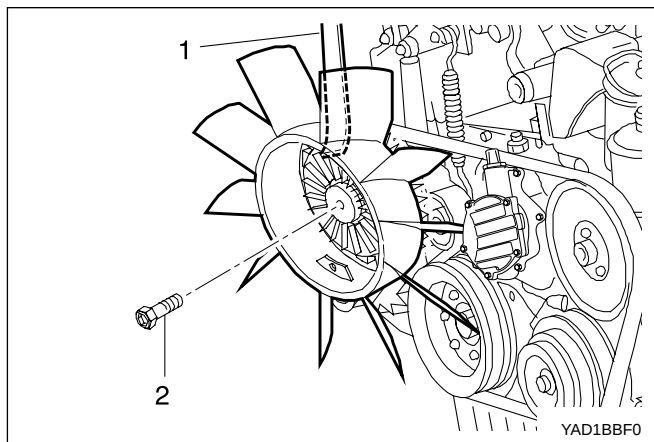
Tightening Torque	21 N•m (15 lb-ft)
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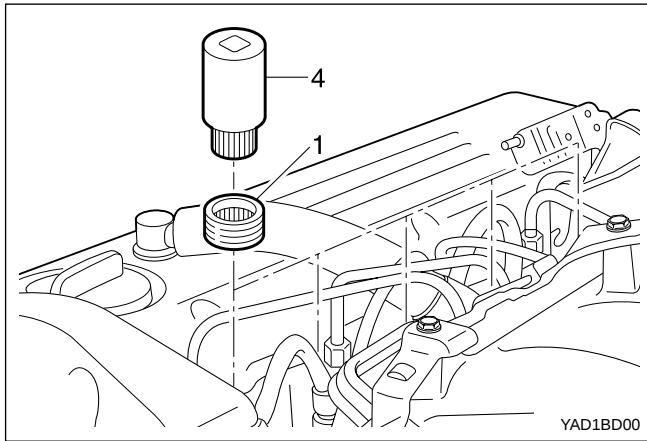
39. Install the oil dipstick tube bracket.

Installation Notice

Tightening Torque	10 N•m (89 lb-in)
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40. Hold the cooling fan with the counter holder 603 589 00 40 00 and tighten the bolt.



PRECHAMBER

Preceding work: Removal of glow plug

Removal of fuel injection nozzle

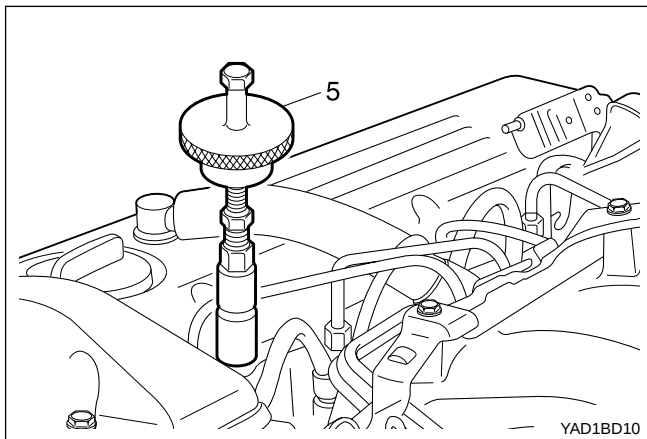
Tools Required

603 589 00 09 00 Serration Wrench

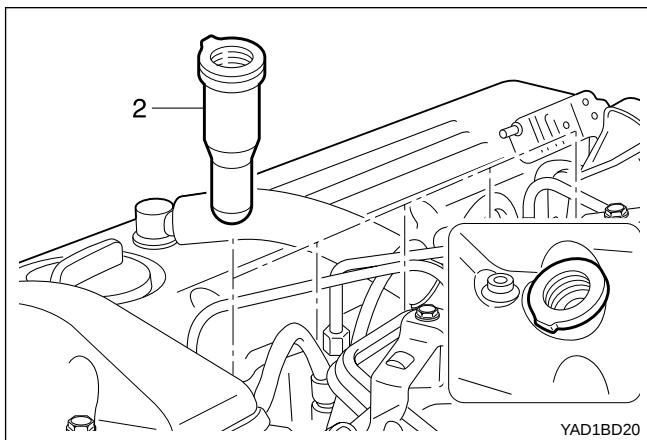
667 589 03 63 00 Sliding Hammer

Removal Procedure

1. Using the serration wrench 603 589 00 09 00 (4), remove the threaded ring (1).

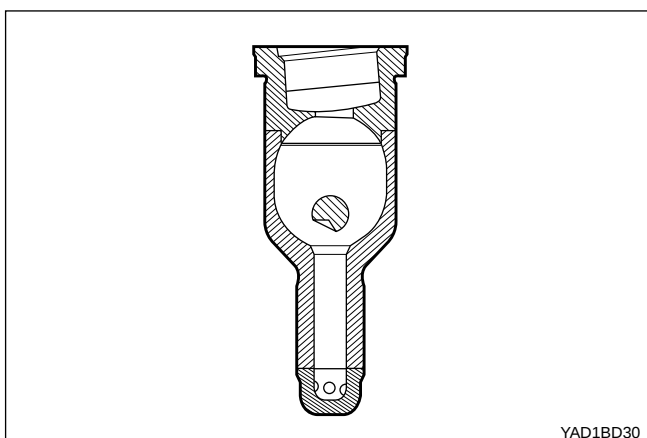


2. Install the sliding hammer 667 589 03 63 00 (5) into the prechamber.



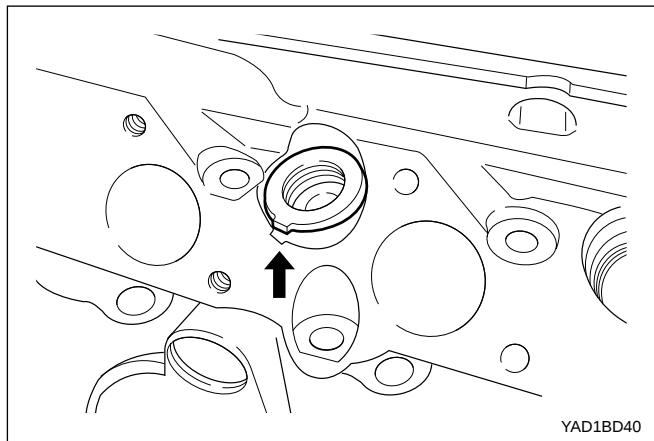
3. Remove the prechamber (2).

Notice: After removing the prechamber, cover over the bores with clean rag.



4. Inspect the prechamber.

Notice: If the prechamber seats in the cylinder head are leaking or if the prechambers are replaced, the sealing surfaces in the cylinder head must be remachined.



Installation Procedure

Notice: In case the prechambers are reused, inspect the prechambers thoroughly, if the ball pin by heat and fire is broken, it can not be used.

1. Clean the sealing surface of the prechamber.
2. Insert the prechamber into the cylinder head at the same time aligning the cam on the collar of the prechambers with the slots in the cylinder head.

Installation Notice

Thickness of Spacer Ring	0.3, 0.6, 1.0 mm
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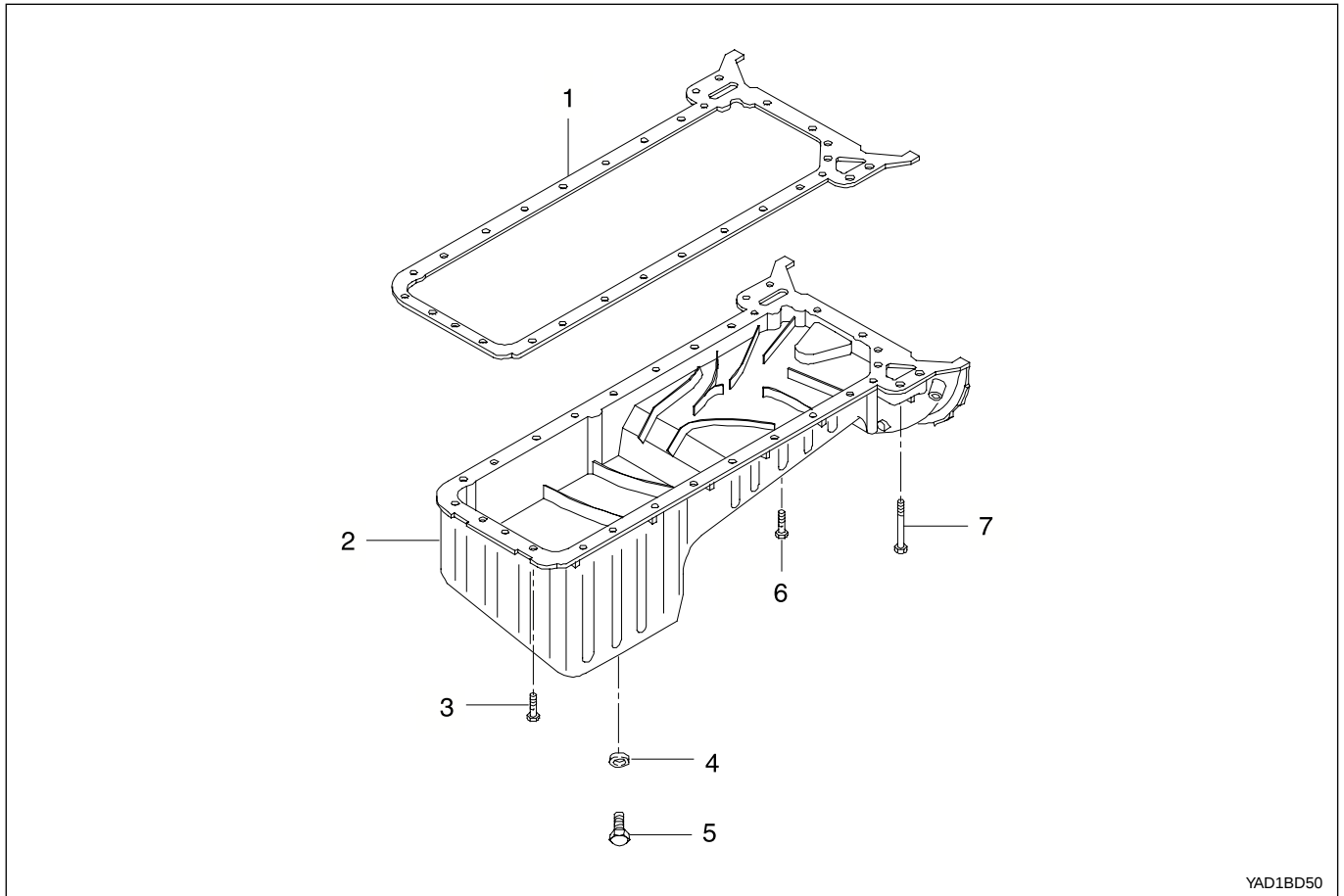
If the spacer rings are fitted to the prechambers, the spacer rings should be replaced with rings of the same thickness.

3. Coat the threaded ring with oil and assemble the ring by using the serration wrench 603 589 00 09 00.

Installation Notice

Tightening Torque	130 N•m (96 lb-ft)
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OIL PAN



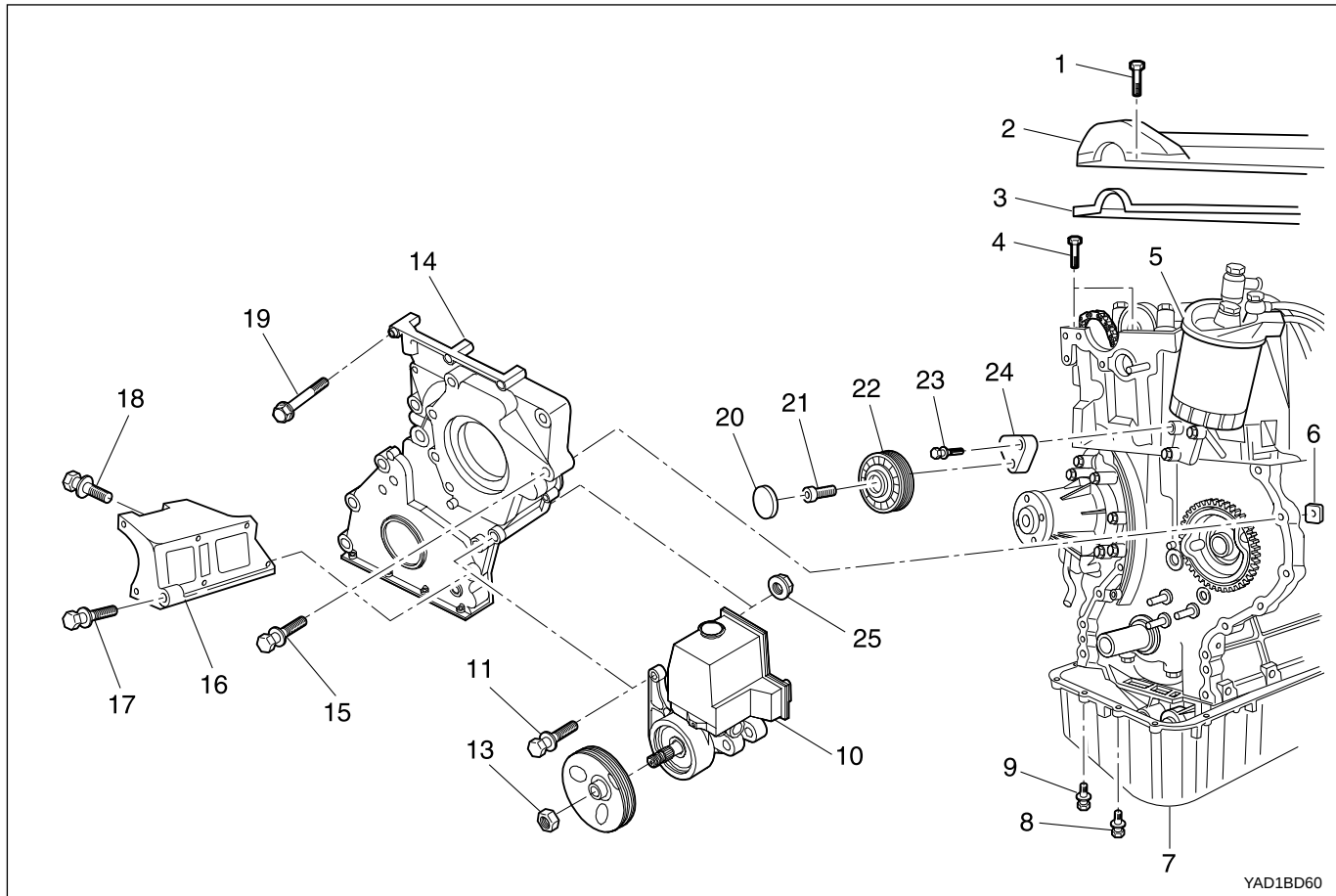
YAD1BD50

1 Gasket.....	Replace	5 Drain Plug	25 N•m (18 lb-ft)
2 Oil Pan		6 Bolt.....	10 N•m (89 lb-in)
3 Bolt.....	10 N•m (89 lb-in)	7 Bolt.....	25 N•m (18 lb-ft)
4 Washer	Replace		

Notice: Replace the washer seal with new one.

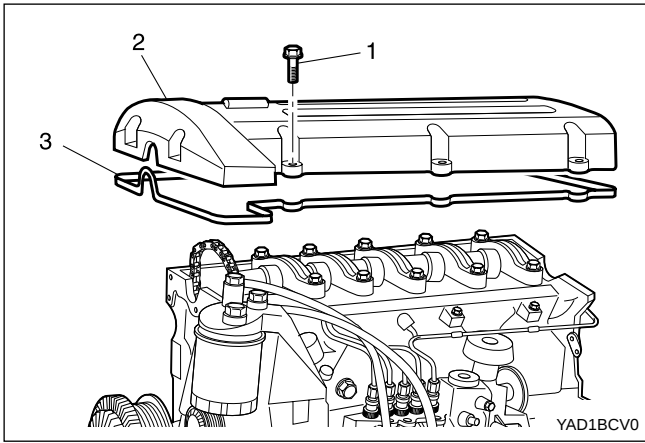
TIMING CASE COVER

Preceding Work : Removal of the cooling fan
 Removal of the V-belt tensioning device
 Removal of the vibration damper and hub
 Removal of the generator



YAD1BD60

1 Bolt.....	10 N•m (89 lb-in)	13 Bolt.....	32 N•m (24 lb-ft)
2 Cylinder Head Cover		14 Timing Case Cover	
3 Gasket.....	Replace	15 Bolt.....	23 N•m (17 lb-ft)
4 Socket Bolt	25 N•m (18 lb-ft)	16 Generator Bracket	
5 Fuel Filter		17 Bolt.....	45 N•m (33 lb-ft)
6 Square Nut		18 Bolt.....	25 N•m (18 lb-ft)
7 Oil Pan		19 Bolt.....	10 N•m (89 lb-in)
8 Socket Bolt	10 N•m (89 lb-in)	20 Closing Cover	
9 Bolt.....	M6 : 10 N•m (89 lb-in) M8 : 23 N•m (17 lb-ft)	21 Socket Bolt	23 N•m (17 lb-ft)
10 Power Steering Pump		22 Guide Pulley	
11 Bolt		23 Bolt.....	9 N•m (80 lb-in)
12 Belt Pulley		24 Guide Pulley Bracket	
		25 Nut	23N•m (17 lb-ft)

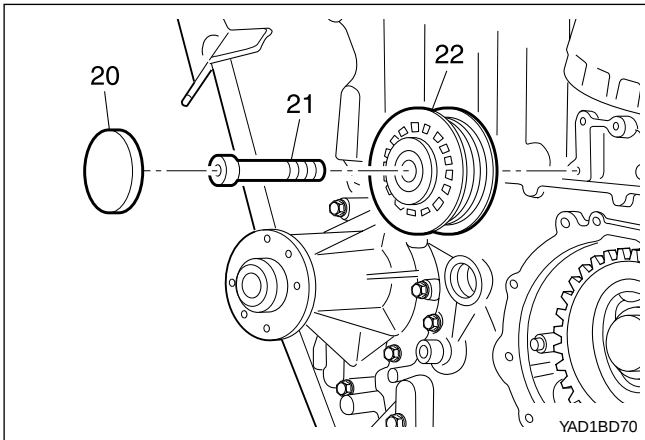


Tools Required

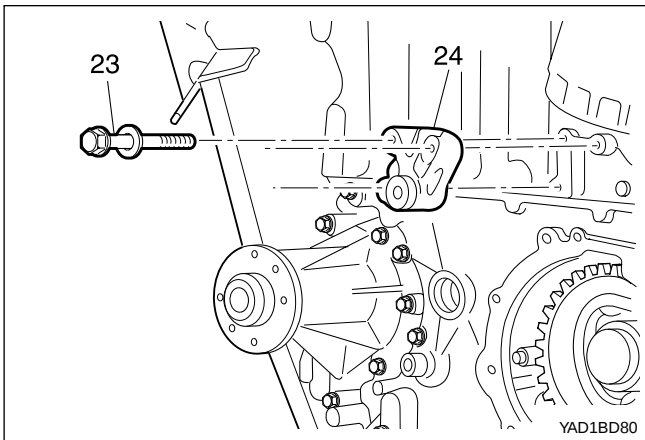
116 589 03 07 00 T Type Socket Wrench

Removal Procedure

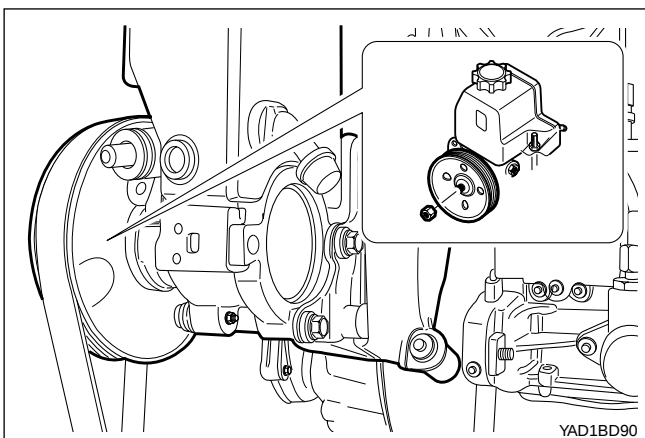
1. Remove the fan clutch and cooling fan belt pulley.
2. Drain the engine oil completely.
3. Remove the crankshaft pulley.
4. Loosen the bolt (1) and then remove the cylinder head cover (2) and gasket.
5. Remove the vacuum pump.



6. Detach the closing cover (20). Remove the bolts (21) and then remove the guide pulley (22).



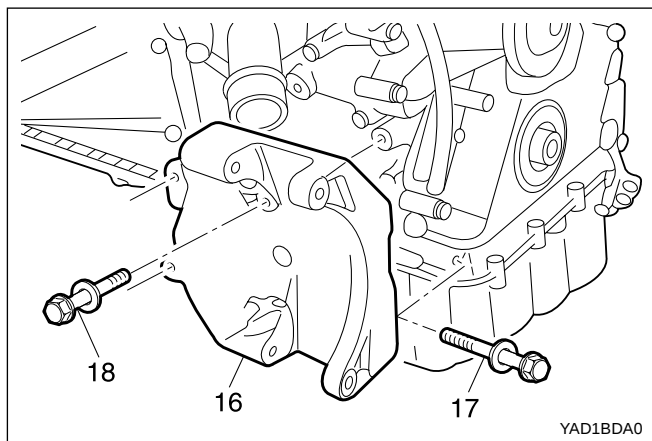
7. Remove the guide pulley bracket (24).



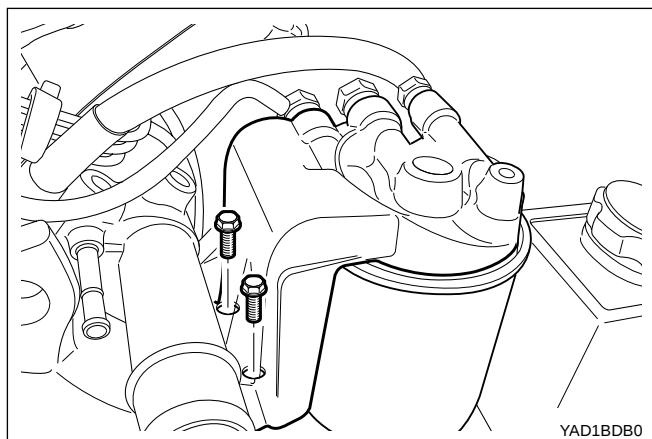
8. Disconnect the pipes of power steering pump and remove the belt pulley.

Notice: Be careful not to lose the key.

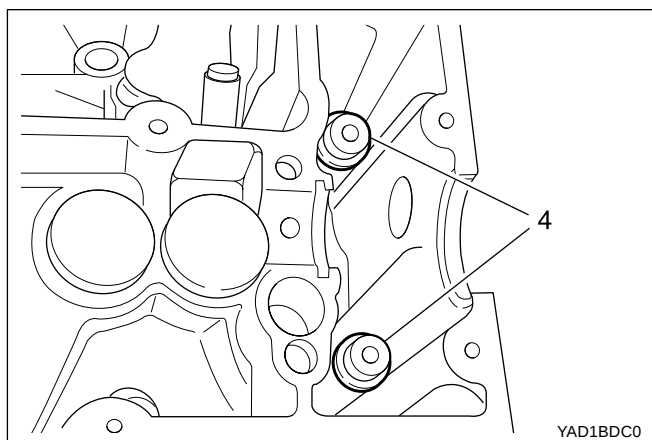
9. Remove the nut and pull out the bolt and then remove the power steering pump.



10. Remove the generator bracket (16).

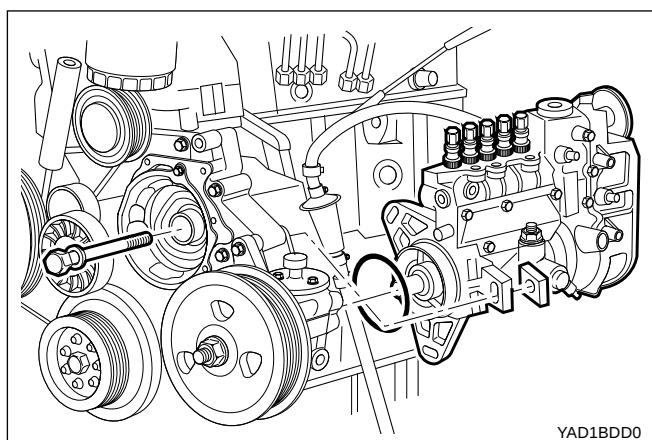


11. Remove the fuel filter.

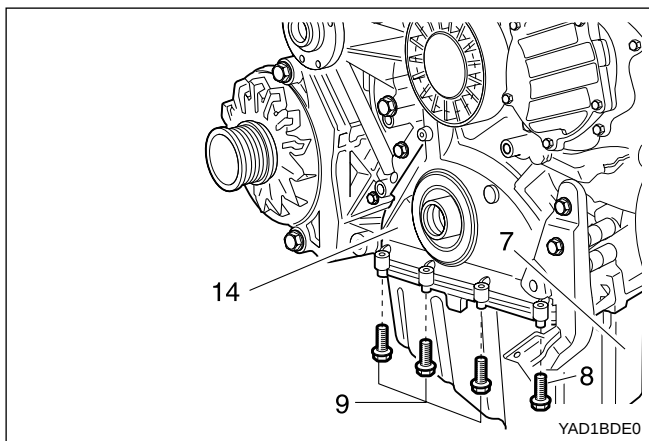


12. Remove the camshaft.

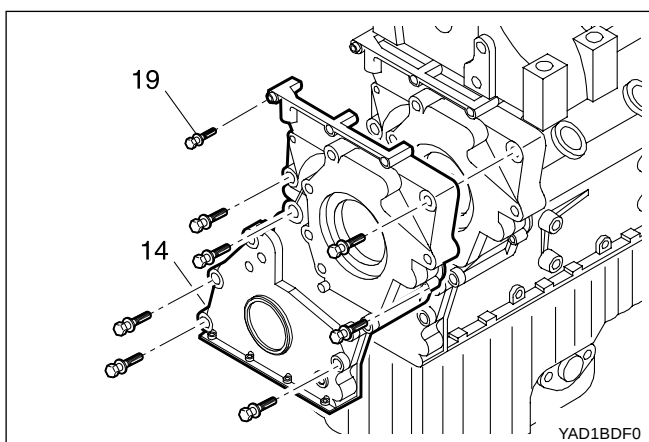
13. Remove the socket bolts (4) in the chain box using the socket wrench 115 589 03 07 00.



14. Remove the injection pump. Refer to *Section 1F3 Diesel Engine Control*.

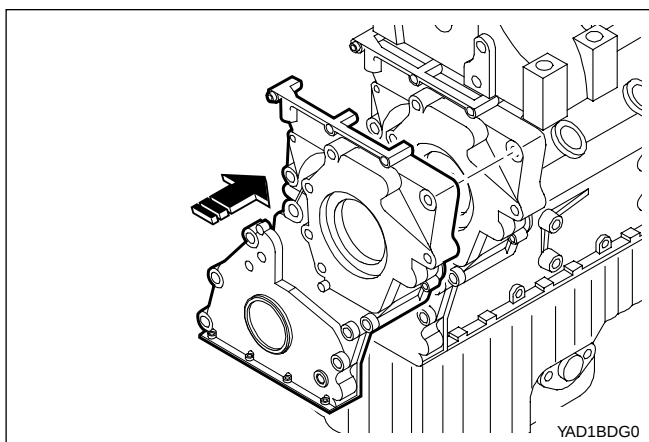


15. Remove the oil pan bolts (8, 9) in the area of the timing case cover (14).
16. Slightly loosen the remaining oil pan bolts.



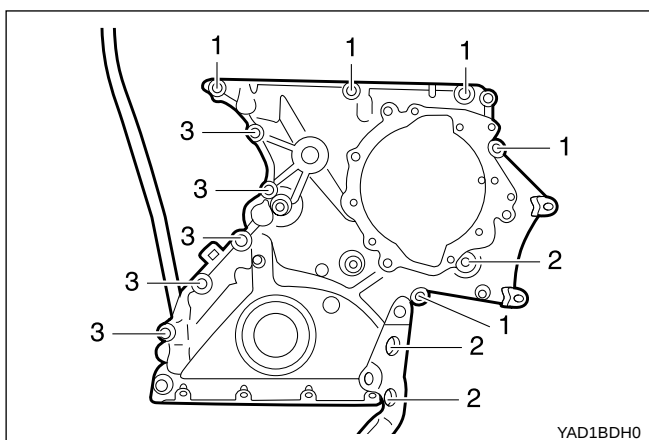
17. Remove the timing case cover (19) bolts and then remove the timing case cover (14).

Notice: Be careful not to damage the cylinder head gasket or oil pan gasket.



Installation Procedure

1. Thoroughly clean the sealing surface and apply sealant.



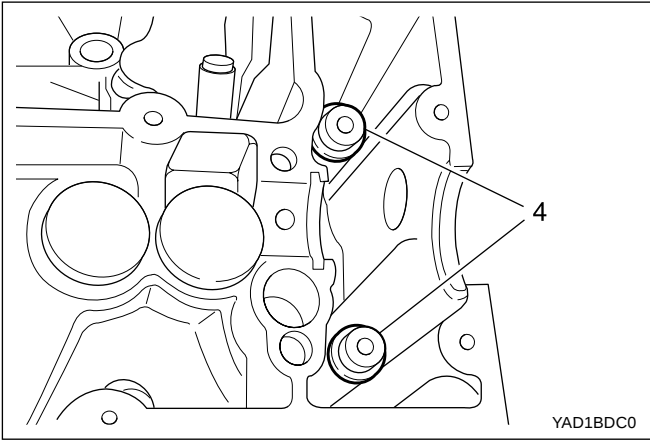
2. Install the timing case cover.

Installation Notice

Tightening Torque	10 N•m (89 lb-in)
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Bolts arrangement

1. M6 x 60
2. M6 x 70
3. M6 x 40



3. Tighten the socket bolts in the chain box.

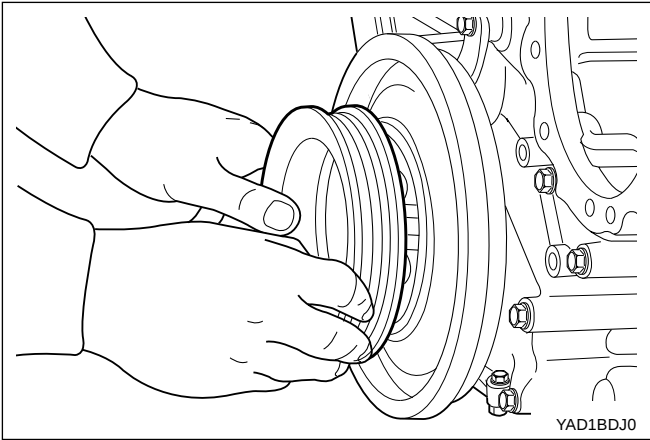
Installation Notice

Tightening Torque	25 N•m (18 lb-ft)
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4. Tighten the oil pan bolts.

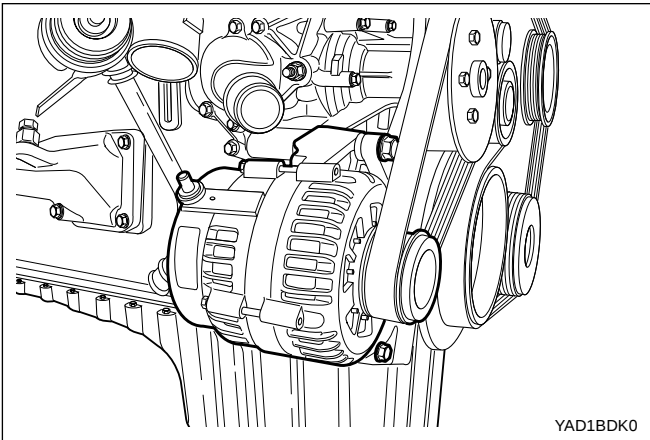
Installation Notice

Tightening Torque	Socket Bolt	10 N•m (89 lb-in)
	M6 Bolt	10 N•m (89 lb-in)
	M8 Bolt	25 N•m (18 lb-ft)



5. Install the flange, vibration damper and crankshaft belt pulley.

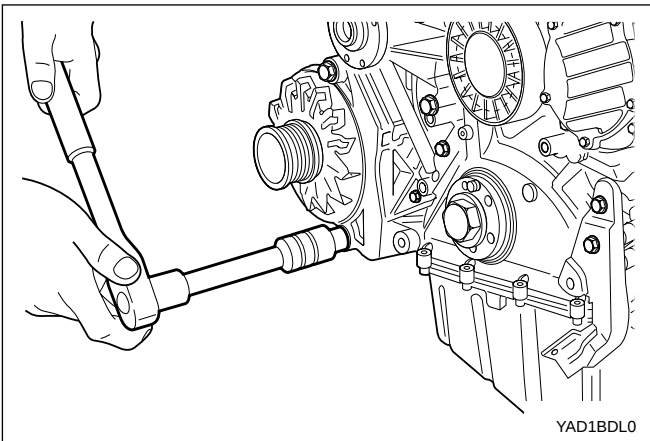
Notice: Replace front radial seal if necessary.



6. Install the generator bracket.

Installation Notice

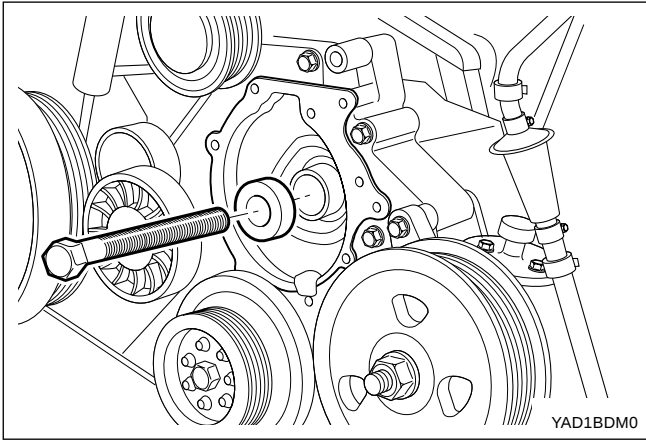
Tightening Torque	Front	25 N•m (18 lb-ft)
	Side	25 N•m (18 lb-ft)



7. Install the generator.

Installation Notice

Tightening Torque	Upper	25 N•m (18 lb-ft)
	Lower	45 N•m (33 lb-ft)



8. Install the cylinder head cover.

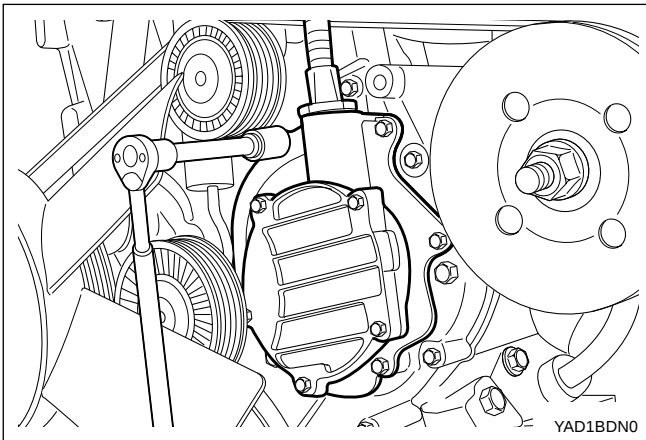
Installation Notice

Tightening Torque	10 N•m (89 lb-in)
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9. Tighten the injection pump mounting bolts.

Installation Notice

Tightening Torque	23 N•m (17 lb-ft)
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10. Install the fuel filter.

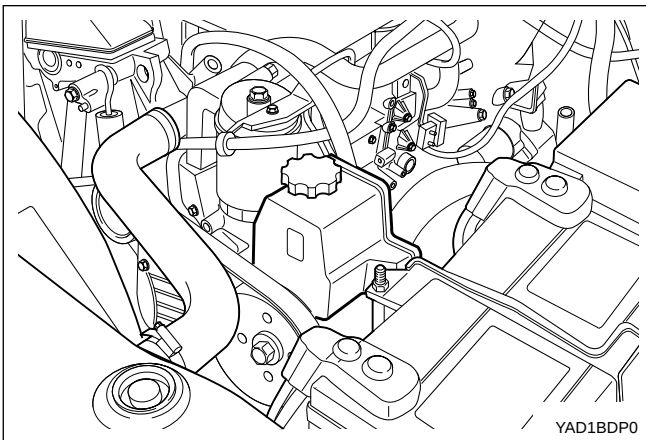
Installation Notice

Tightening Torque	25 N•m (18 lb-ft)
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11. Install the vacuum pump.

Installation Notice

Tightening Torque	10 N•m (89 lb-in)
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12. Install the power steering pump.

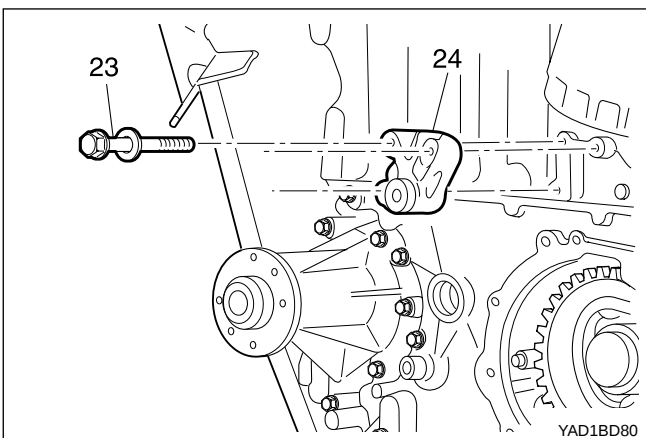
Installation Notice

Tightening Torque	23 N•m (17 lb-ft)
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13. Install the power steering pump pulley.

Installation Notice

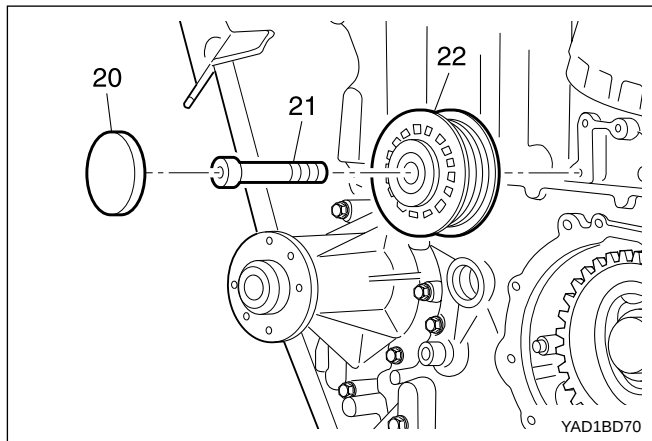
Tightening Torque	32 N•m (24 lb-ft)
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14. Install the guide pulley bracket.

Installation Notice

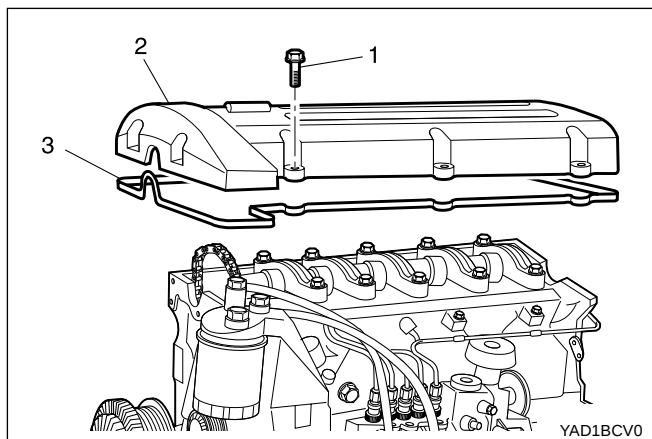
Tightening Torque	9 N•m (80 lb-in)
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15. Install the guide pulley (22) and fit the closing cover (20).

Installation Notice

Tightening Torque	23 N•m (17 lb-ft)
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16. Replace the gasket (3) and install the cylinder head cover (2).

Installation Notice

Tightening Torque	10 N•m (89 lb-in)
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17. Install the cooling fan belt pulley and fan clutch.
18. Install the belt tensioning device and then install the belt.
19. Install the cooling fan.
20. Fill the engine oil and check oil leaks by running the engine.