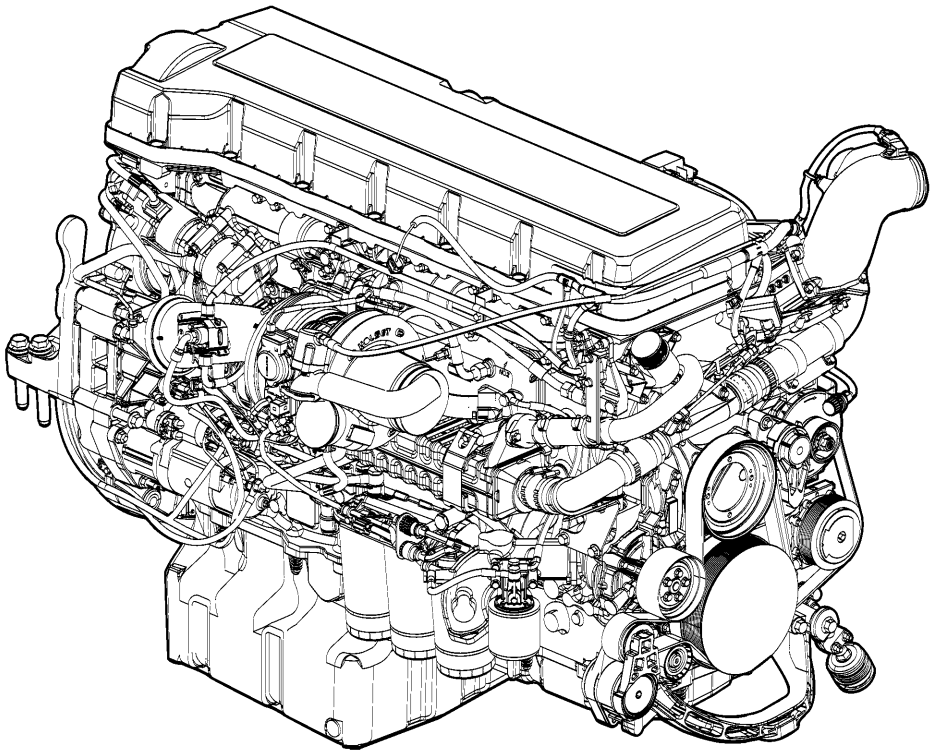
Cylinder Head, Replacement



W2005772

This information covers the procedure for replacing the cylinder head on the Volvo D16F engine.

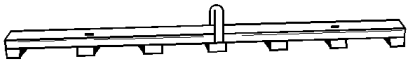
Contents

Note: Information is subject to change without notice.
Illustrations are used for reference only and can differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

Tools

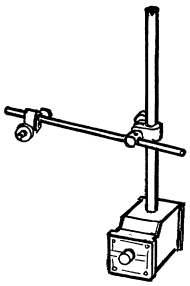
Special Tools

For special tools ordering information, refer to Tool Information, group 08.



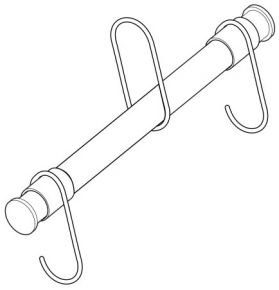
W0001405

85109035
Rocker Assembly Lifting Tool



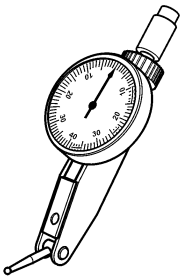
C0000823

9999696
Magnetic Stand



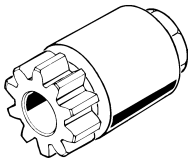
W2005764

85109034
Camshaft Lifting Tool



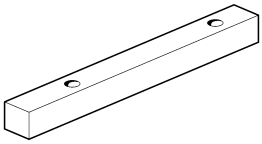
C0001436

9989683
Dial Indicator



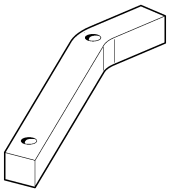
T0012612

88800014
Flywheel Turning Tool



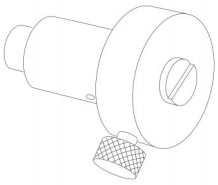
W2005150

85109033A
Timing Cover Clamp Tool



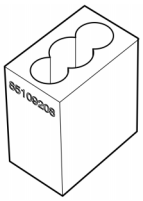
W2005151

85109033B
Timing Cover Clamp Tool



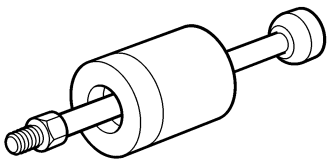
W0002268

88800031
Sensor Depth Gauge



W0002279

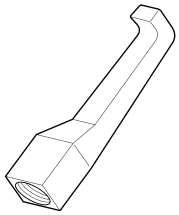
85109208
Bearing Cap Press Tool



9990013

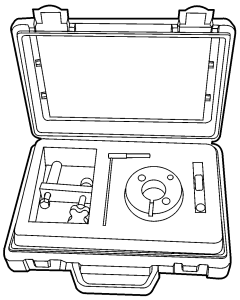
T0010011

9990013
Slide Hammer



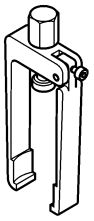
W0002313

85109980
Slide Hammer Adapter



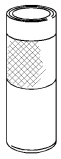
W0001814

J44514B
Camshaft Alignment Tool Kit



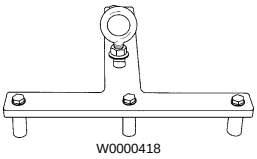
T2018914

9990006
Unit Injector Puller



W0001399

9998249
Unit Injector Protective Sleeve

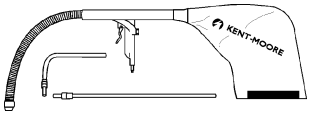


W0000418

85109036
Cylinder Head Lifting Tool

C0000229

9998251
Injector Bore Sealing Plug



W0001587

PT290
Chip Vacuum

C0000223

85109123
Cylinder Liner Press Tool

Service Procedures

2111-03-02-01
Cylinder Head, Replacement

You must read and understand the precautions and guidelines in Service Information, group 20, "General Safety Practices, Engine" before performing this procedure. If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

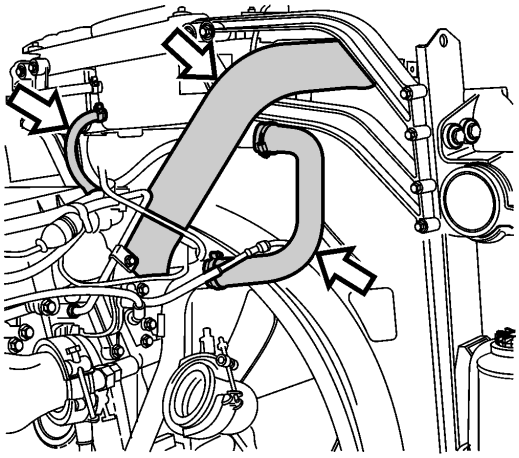
Special tools: 88800014, 85109035, 85109980, 9990013, 85109034, 9990006, 9998249, 9998251, 85109036, 85109123, PT2900, 85109208, J44514B, 9989683, 9999696, 85109033A, 85109033B, 88800031

Removal

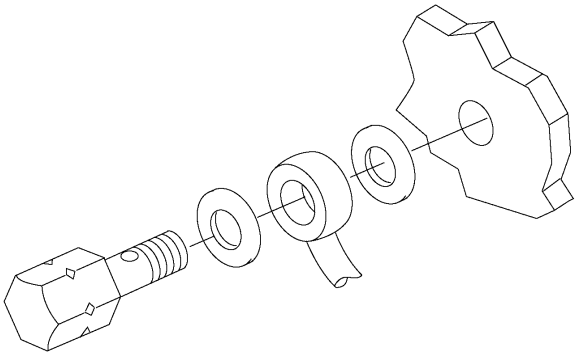
Note: With Intake and Exhaust Removed

1
Clean around the fuel supply line on the fuel filter housing. Loosen the fuel supply line at the filter housing to allow fuel to drain from the cylinder head. Drain the fuel into a suitable container.

2
Remove the upper radiator hose, by-pass hose and static fill hose from the engine and from the radiator and expansion tank.



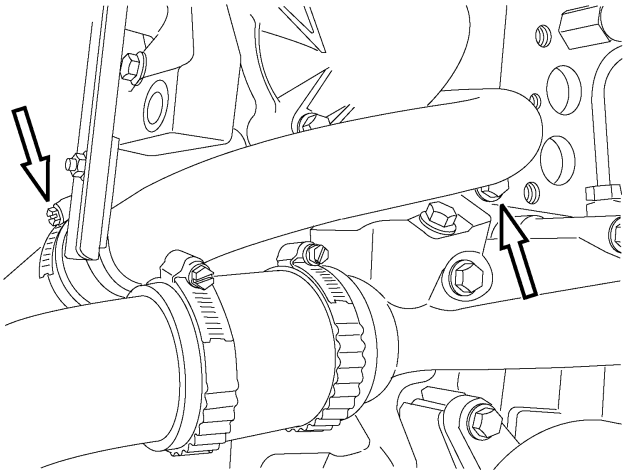
W2004772



W2006147

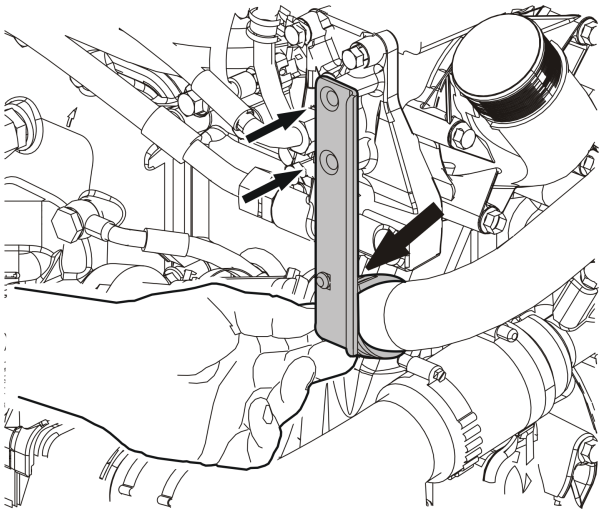
3
Remove the overflow valve, two gaskets and the fuel line. Also remove the fuel line fitting at the left side rear of the cylinder head.

Note: The overflow valve is located on the front of the cylinder head on all Volvo engines.



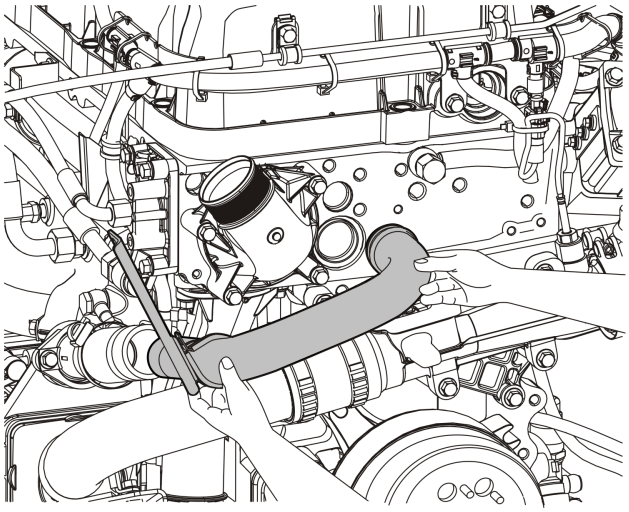
W2006148

4
Remove the EGR cooler coolant pipe bolt and clamp located at the cylinder head. Loosen the coolant pipe hose clamp.



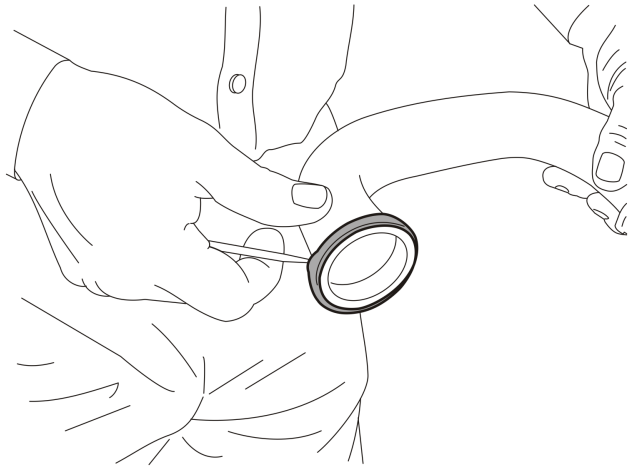
W2005674

5
Remove the fasteners that secure the EGR cooler coolant bracket to the pipe and thermostat housing side cover.



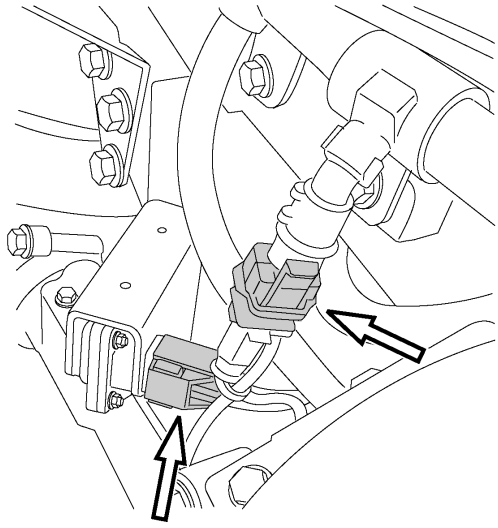
W2005676

6
Remove the EGR cooler coolant pipe from the cylinder head and from the EGR cooler coolant hose.



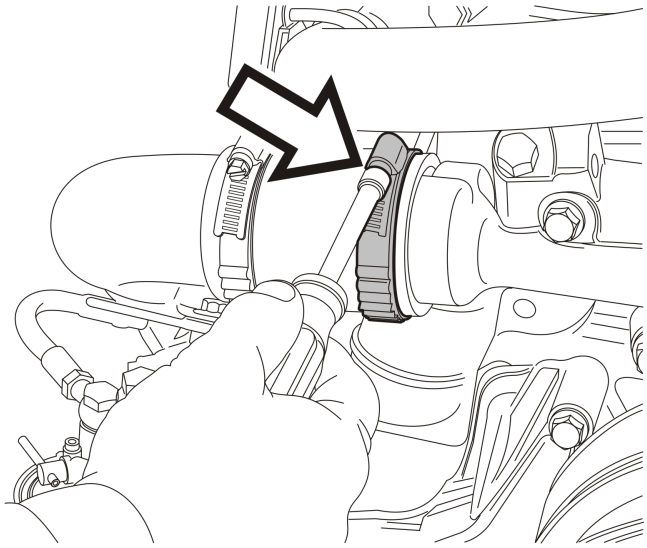
W2005677

7
Replace the O-ring on the EGR cooler coolant pipe at the cylinder head end of the pipe.



W2006050

8
Disconnect the temperature and differential pressure sensor connectors.

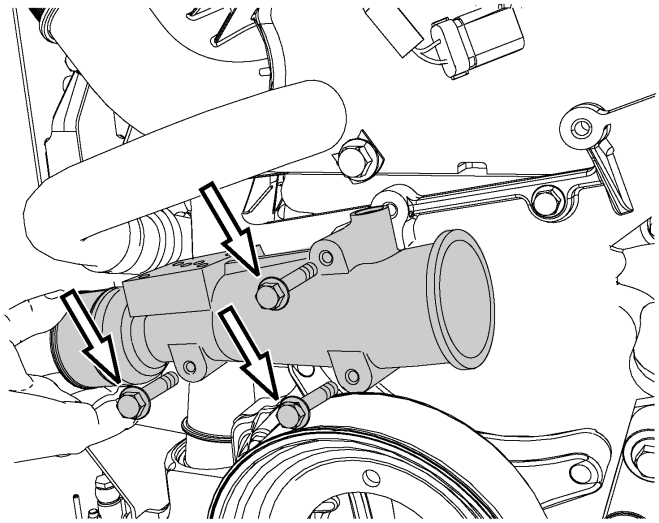


W2005723

9
Loosen the coupling clamps at the venturi inlet.

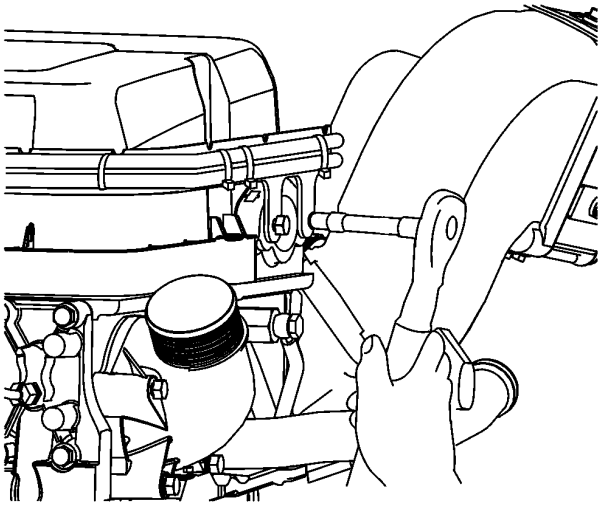
10
Disconnect and remove the differential pressure sensor and the pressure tubes from the venturi tube and bracket.

11
Remove the venturi tube mounting screws and remove the tube.



W2006053

12
Remove the venturi tube bracket from the cylinder block.

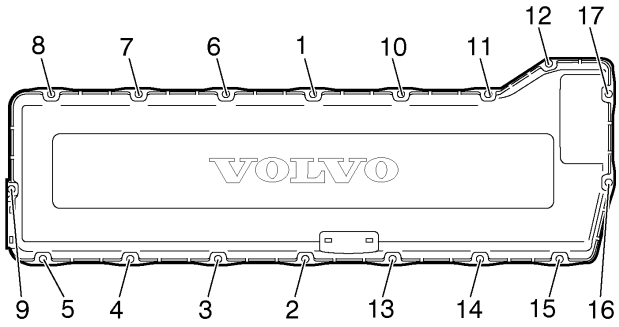


W2004679

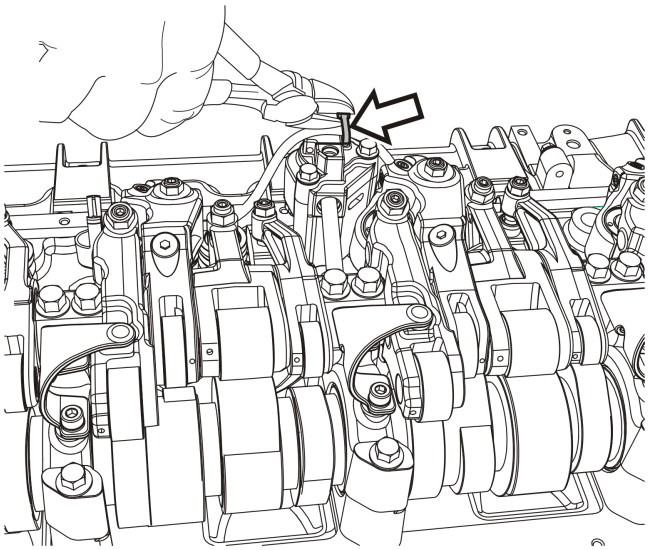
13
Remove the engine wiring harness support bracket from the front of the valve cover. Disconnect the harness connections, cut any tie straps and move the engine wiring harness and support bracket out of the way.

14
Remove the engine cover from inside the cab to gain access to the rear of the engine.

15
Remove the spring-loaded fasteners securing the valve cover and remove the cover.

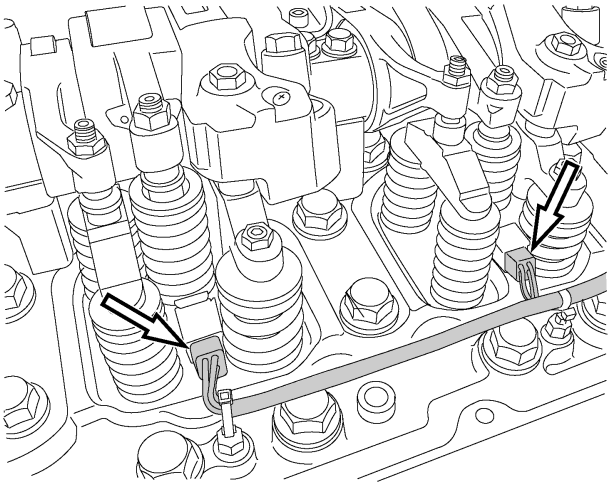


W2005984



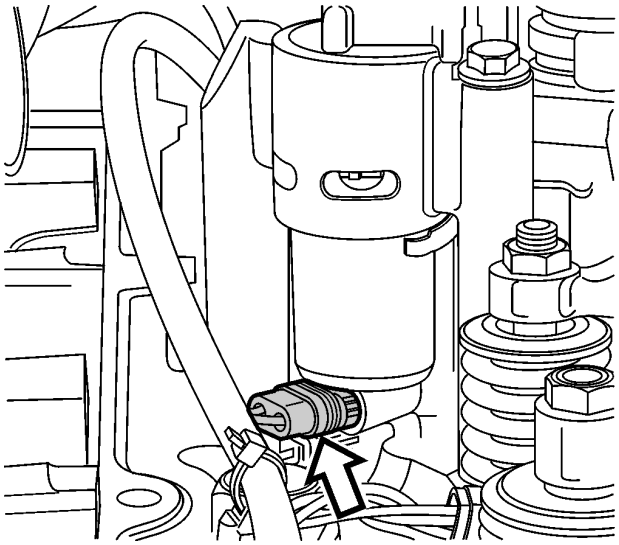
W2005846

16
Cut the tie straps securing the electrical harness to the Volvo Compression Brake (VCB) control valve.



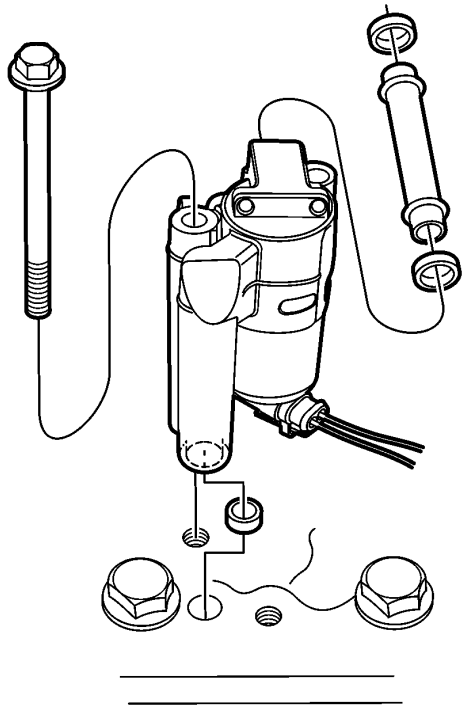
W2006307

17
Unplug the unit injector harness connectors.



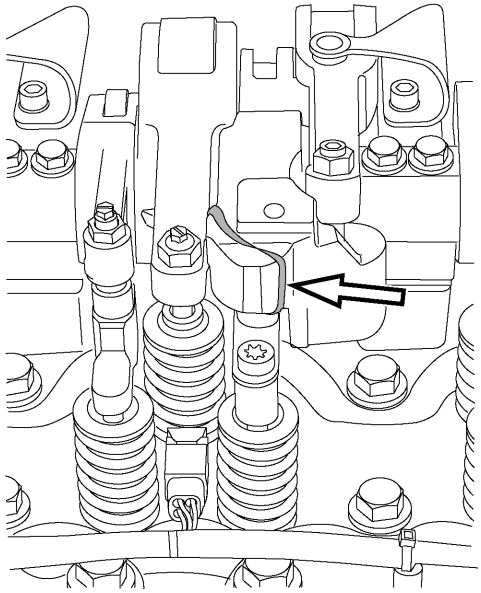
W2004837

18
Clean around the VCB control valve and remove the valve electrical connector.



W2004869

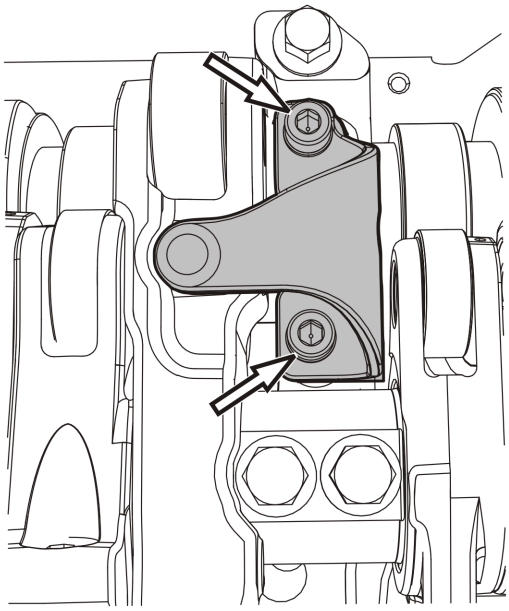
19
Remove the VCB control valve fasteners and remove the valve, oil pipe and valve seal spacer.



W2006172

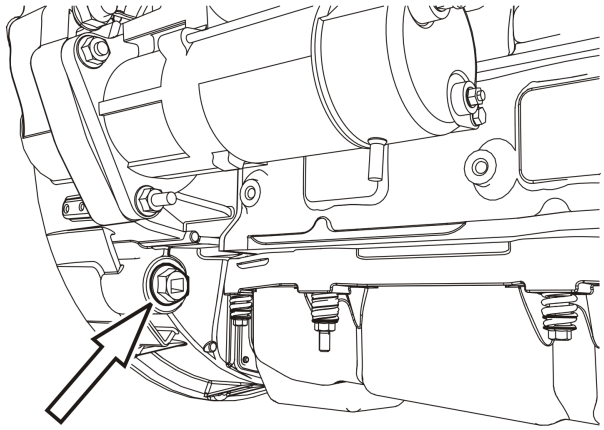
20
To prevent piston damage when removing the rocker arm shaft, secure the pistons in the exhaust rocker arms using elastic bands or tie straps.

Note: Pistons and rocker arms are matched together and should not be mixed.



W2005845

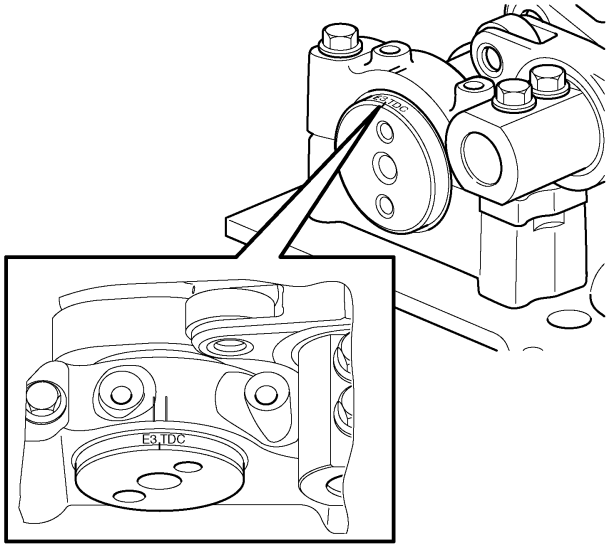
21
Using an Allen wrench, remove the fasteners securing the leaf springs to the VCB rocker arms. Remove the springs.



W0002368

22
Remove the plug from the flywheel housing and install the flywheel turning tool.

88800014



W2006173

23
Using the flywheel turning tool, rotate the engine so that the camshaft is positioned at top dead center (TDC). Align the TDC mark on the camshaft with the timing marks on the No. 1 camshaft bearing cap.

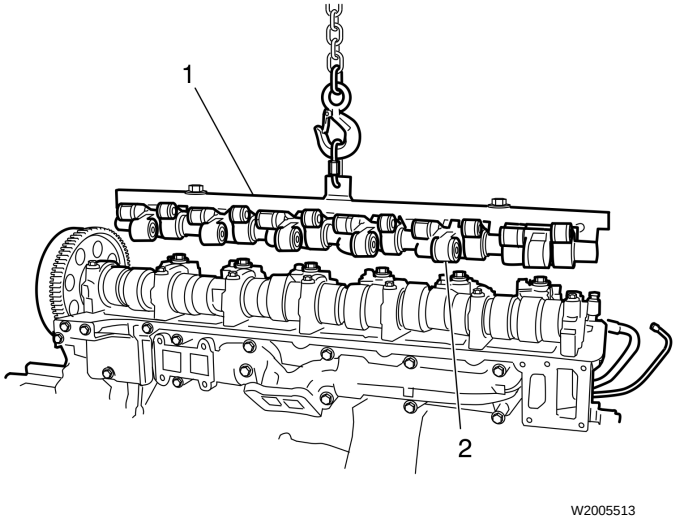
88800014

24
Loosen the jam nuts and back off all rocker arm and unit injector adjusting screws.

25
Loosen the rocker arm shaft mounting fasteners evenly in stages to avoid bending the shaft. Remove the fasteners.

26
Attach the lifting tool to the rocker arm shaft.

85109035



W2005513

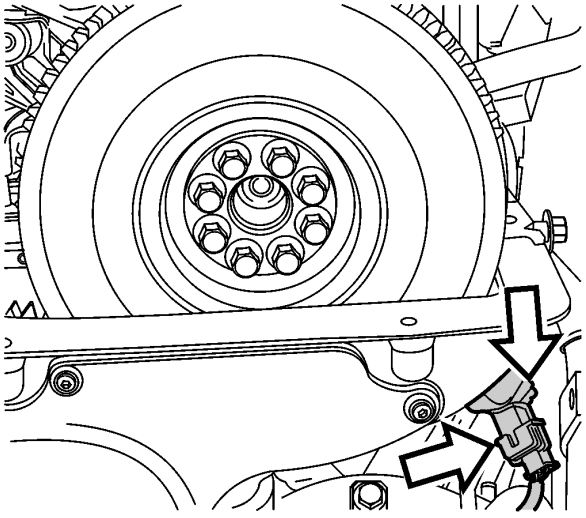
1 Rocker Assembly Lifting Tool
2 Rocker Arm Shaft Assembly

27
With the aid of an assistant, remove the rocker arm shaft assembly using the lifting tool.

85109035

28
Remove the intake and exhaust valve bridges.

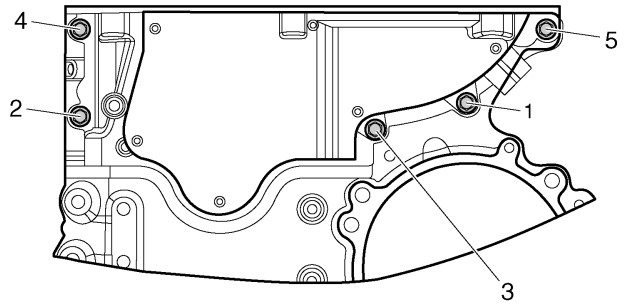
Note: Keep the bridges in order of removal for proper reassembly.



W2005104

29
Disconnect the camshaft position sensor harness connector. Remove the fastener and sensor from the timing gear cover.

30
Remove the timing gear cover fasteners and remove the cover.



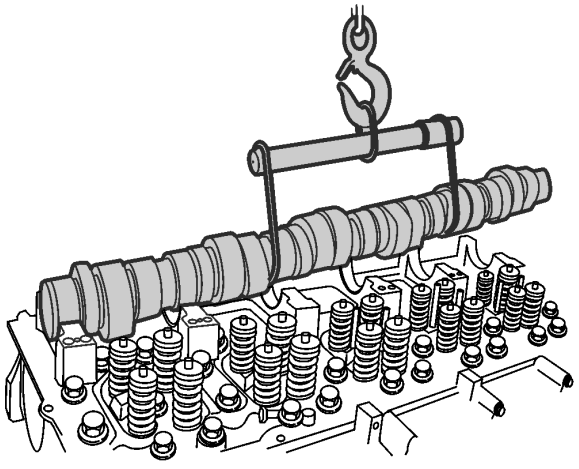
W2006133

31
Remove the vibration damper and camshaft gear from the camshaft.

32
Mark the camshaft bearing caps (if not factory identified) so that they can be reinstalled in their original locations. Remove the camshaft bearing cap fasteners and bearing caps. Use the slide hammer adapter and slide hammer to remove the caps.

85109980, 9990013

33
Attach the camshaft lifting tool to the camshaft and carefully remove the camshaft from the cylinder head.



W2005134

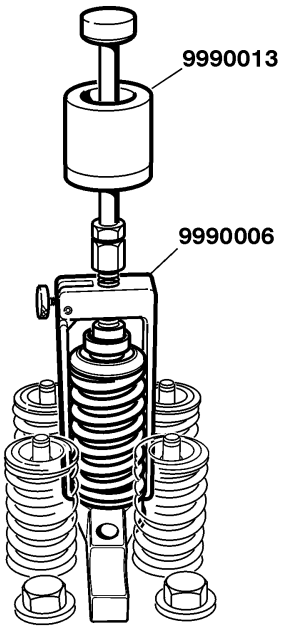
WARNING

The camshaft is heavy. Do not attempt to remove the camshaft without the help of an assistant and the use of a suitable lifting device. Failure to heed this warning can result in personal injury and component damage.

Note: If the camshaft is not being replaced, stand the camshaft on end for storage.

85109034

34
Thoroughly clean around the fuel injectors. Remove the bolt for the hold down clamps on each fuel injector.



T2018395

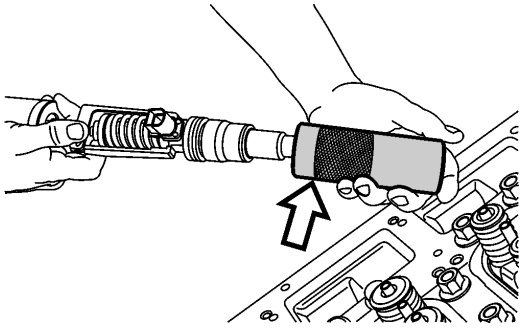
35
Position the fuel injector puller on the injector. Position the puller fork in the groove on the injector and lock the arm using the thumb screw on the side of the tool. Secure the puller by threading the screw toward the inner cup of the injector. Attach a slide hammer to the puller and remove the injector from the cylinder head.

9990013, 9990006

36
If necessary, remove and discard the injector nozzle gasket (flat washer) from the injector tip or copper sleeve bore.

Note: An injector nozzle gasket is used for the seal joint between the injector copper sleeve and the injector, discard the used gasket immediately after the injector is removed. A used gasket must not be reused. When the injector is removed, this gasket may come out attached to the injector or it may remain in the bottom of the injector sleeve.

Note: If the nozzle gasket is attached to the injector, loosen it with gentle prying from a thin flat gasket scrapper blade. If the gasket is in the bottom of the injector sleeve, initially attempt to remove it with a magnet. If this is unsuccessful, use a standard flat blade screwdriver with a long thin shank and narrow width blade to loosen the gasket. Locate the blade in the recess between the outside of the gasket and the injector sleeve. Use the blade to apply force on the outside of the gasket at different locations around the gasket. Continue this until the gasket separates from the sleeve.

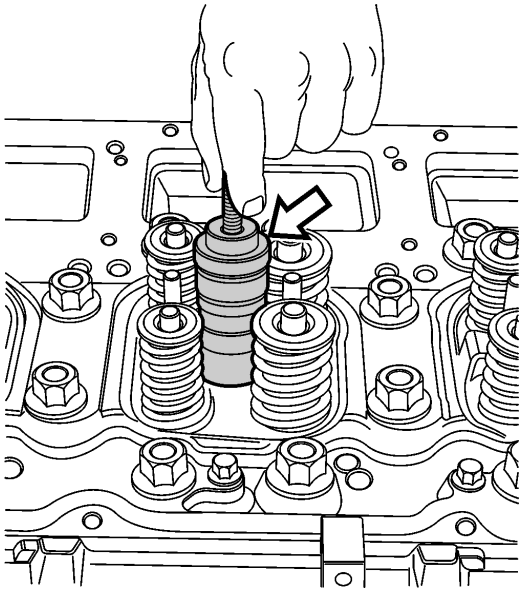


W2005112

37
Separate the hold down clamp from each injector and attach a protective sleeve over each fuel injector as it is removed.

Note: Remove and protect the remaining fuel injectors in the same manner.

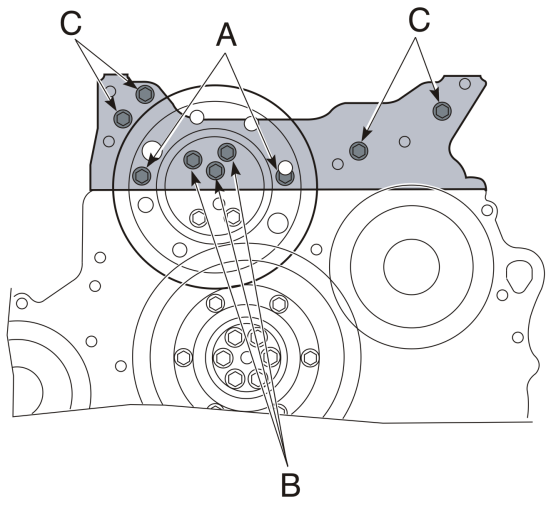
9998249



W2005114

38
For contamination protection, insert fuel injector bore plugs into the cylinder head.

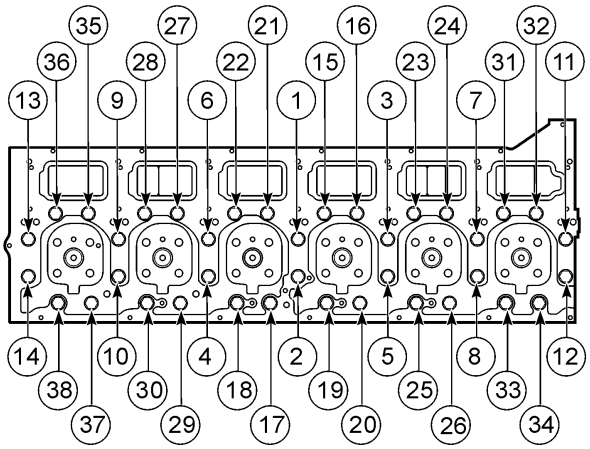
9998251



W2005233

39
Rotate the engine until the two bolts (A) behind the adjustable idler gear are visible. Remove the two bolts (A) one at a time. Remove the upper adjustable timing gear bolts (B). Remove the remaining four timing gear plate bolts (C).

Note: Do not loosen the three lower adjustable timing gear bolts.



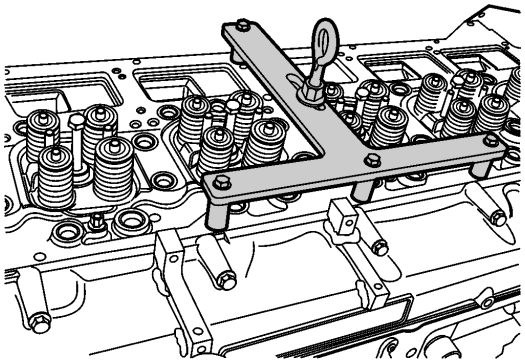
T2020160

40
Remove the cylinder head bolts following the sequence as shown.

41
Wipe off any oil from the low areas under the camshaft to prevent oil getting into the water channels when the cylinder head is removed.

42
Attach the cylinder head lifting tool to the cylinder head.

85109036

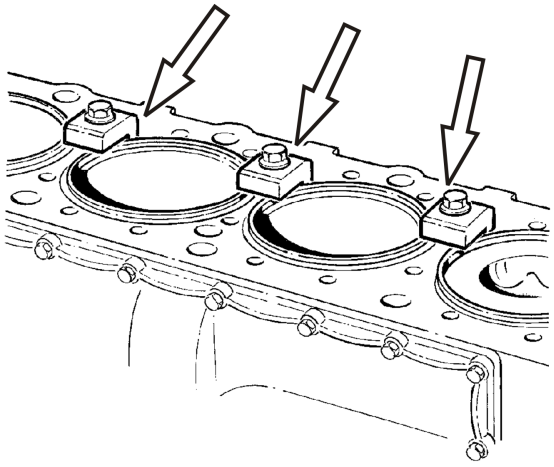


W2005115

43
Carefully lift the cylinder head off the cylinder block using a hoist.

Note: If necessary, use a pry bar at one end of the cylinder head to break the seal to ease removal.

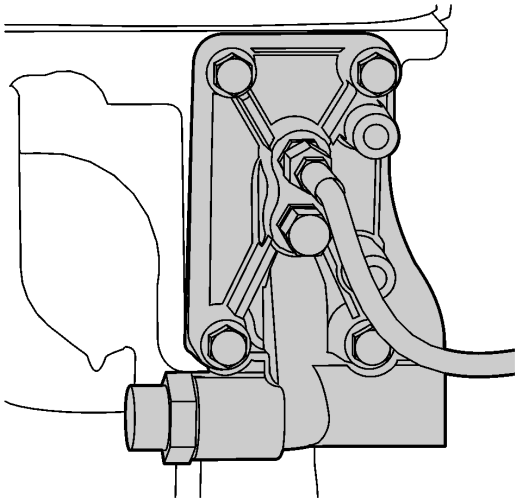
44
Remove the head gasket from the cylinder block surface.



W2005099

45
If needed, secure the cylinder liners with cylinder liner press tools (three required to secure all liners).

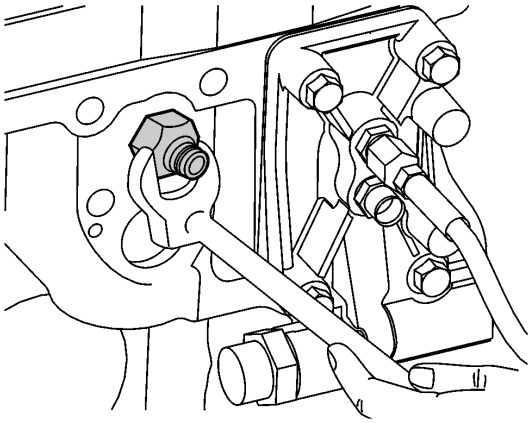
85109123



W2005127

46
Transfer the thermostat side cover (coolant manifold) to the replacement cylinder head.

47
Transfer the thermostat and thermostat cover to the replacement cylinder head.



W2005130

48
Transfer sensors, plugs, fittings and required components to the replacement cylinder head.

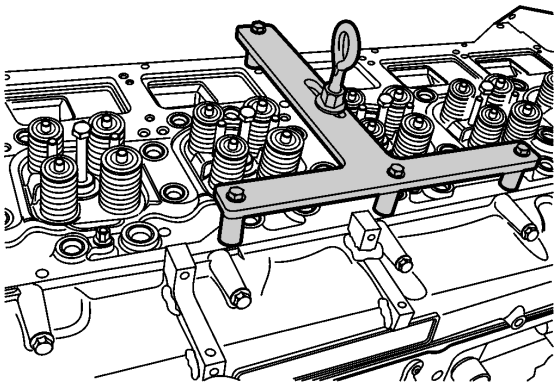
49
Transfer or replace the fuel injector harness retainers.

50
Carefully lower the cylinder head to a safe location with a hoist and remove the cylinder head lifting tool from the cylinder head.

51
Transfer the fuel injector bore plugs to the replacement cylinder head.

9998251

Installation



W2005115

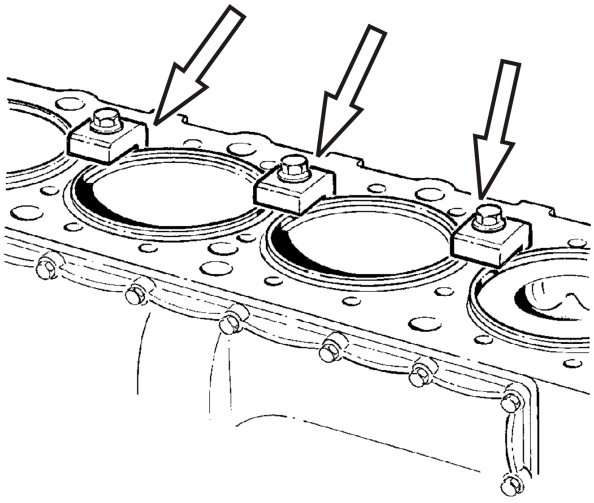
1
Attach the cylinder head lifting tool to the replacement cylinder head.

85109036

2
Clean the cylinder head and cylinder block mating surfaces.

CAUTION

Use only nonabrasive cleaning tools and equipment when cleaning mating or sealing surfaces. The use of high speed abrasive discs, wire wheels, etc., can deform or damage sealing surfaces and cause leaks.

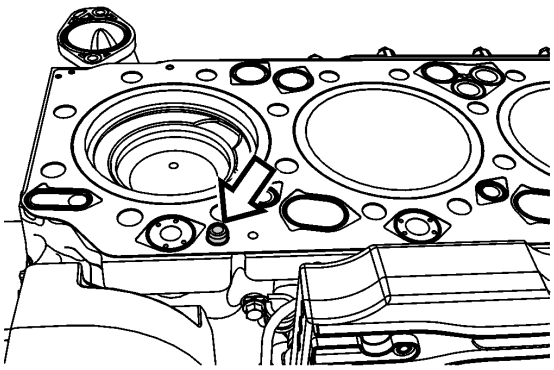


W2005099

3
Make sure that all dirt, oil, coolant and remains of sealant are removed from the cylinder block and cylinder head sealing surfaces. Remove the cylinder liner press tools.

Note: Use the chip vacuum to remove coolant and debris from the cylinder head bolt holes and the surface of the cylinder block.

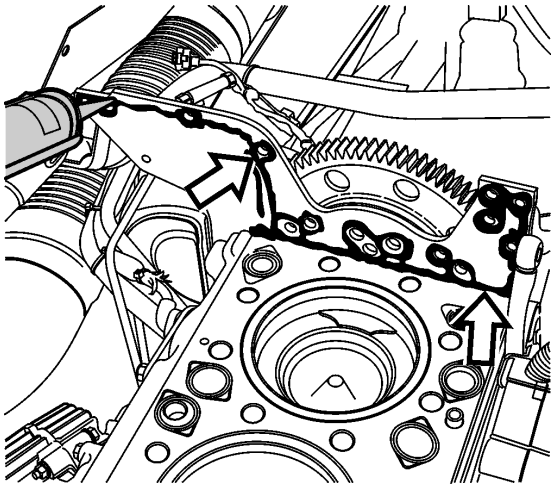
85109123, PT2900



W2005132

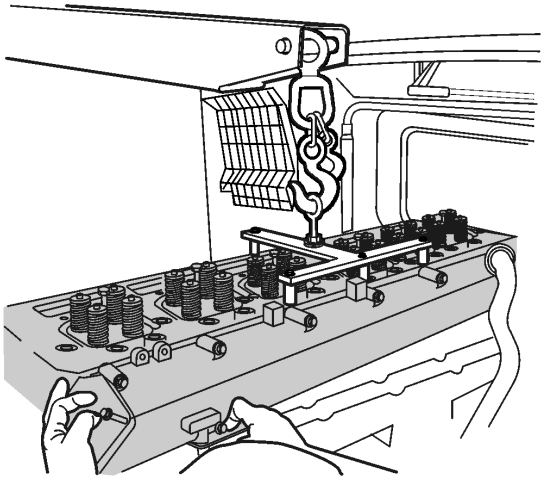
4
Position a new cylinder head gasket on the cylinder block.

Note: Make sure the gasket holes are correctly aligned with the cylinder block holes and that the gasket is over both guide dowels.



W2005133

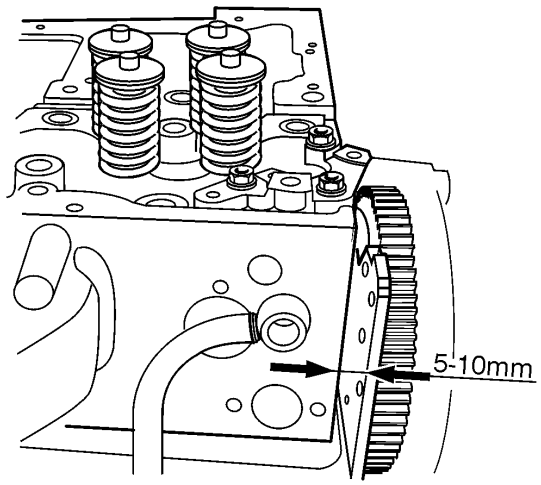
5
Apply a 2 mm (0.079 inch) bead of Volvo sealant on the timing gear plate cylinder head mating surface. Make sure to apply sealant at the bottom corner where the cylinder block and cylinder head meet and around all bolt holes.



W2005117

6
Attach a hoist to the lifting tool. Lower the cylinder head onto the cylinder block until it is resting on the cylinder head gasket and is properly aligned with the guide dowels.

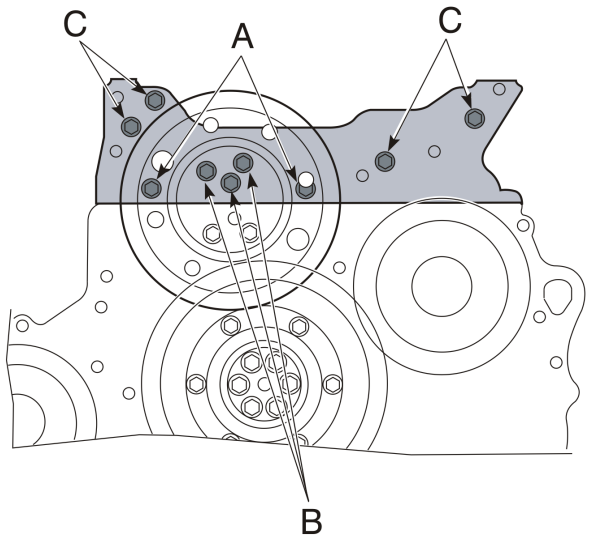
Note: Make sure to lower the cylinder head onto the cylinder block slightly away from the timing gear plate. This is done to avoid smearing the sealant.



T2019472

7
With the cylinder head in place, maintain a distance of approximately 5–10 mm (0.2–0.4 inch) from the timing gear plate.

Note: The cylinder block guide dowels fit in the keyhole shaped guide holes in the cylinder head. The keyholes ensure that the cylinder head aligns with the cylinder block after the cylinder head is drawn tight to the timing gear plate.

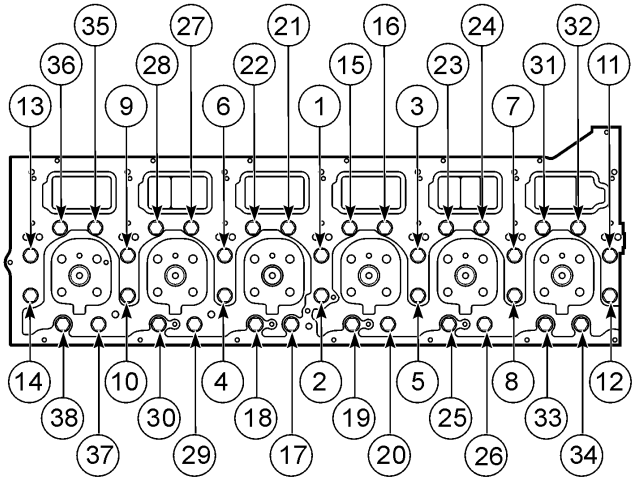


W2005233

8
Install the three adjustable idler gear bolts (B) and the four exposed timing gear plate bolts (C). Tighten the adjustable idler gear bolts (B) to pull the cylinder head against the timing gear plate. Tighten the adjustable idler gear bolts to an initial torque of 85 ± 15 Nm (63 ± 11 ft-lb). Tighten the timing gear plate bolts (C) until snug. Insert and tighten the timing gear plate bolts (A) until snug.

Note: Do not fully tighten the adjustable idler gear bolts at this time. These bolts will be replaced and fully tightened after timing gear adjustment.

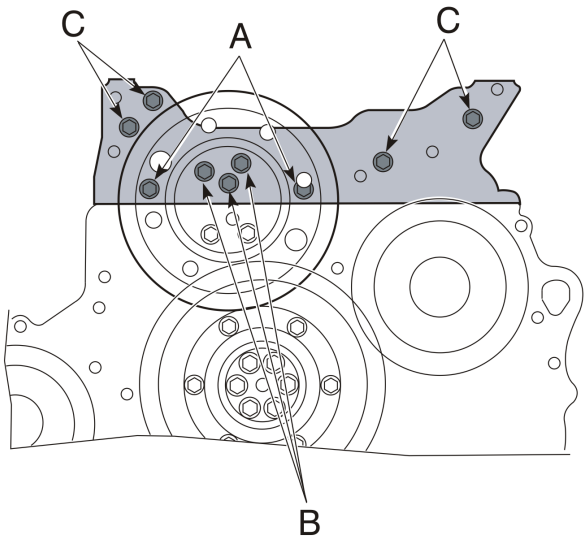
Note: Rotate the engine as needed to align the adjustable idler gear holes with the bolt holes in the timing gear plate.



T2020160

9
Install the cylinder head bolts and tighten in the sequence shown in stages to the initial torque of 100 ± 9 Nm (74 ± 7 ft-lb).

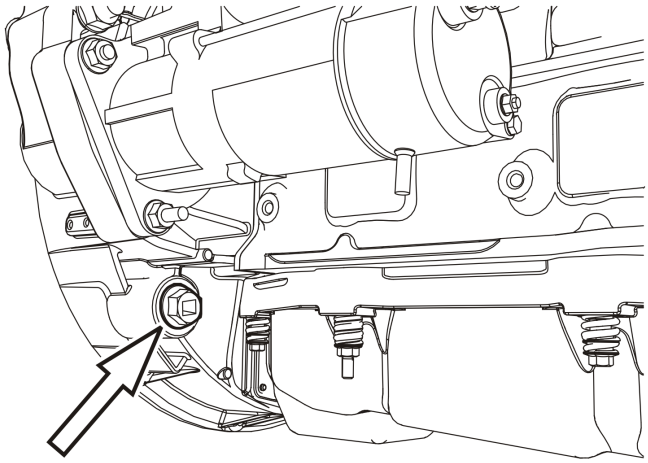
Note: Recheck the bolts to make sure they are all at the initial torque.
Continue tightening the cylinder head bolts in the sequence shown to 90 ± 5 degrees rotation. When finished, tighten the bolts again, another 90 ± 5 degrees rotation in the sequence shown.



W2005233

10
Tighten the timing gear plate bolts (A and C) to 28 ± 4 Nm (21 ± 3 ft-lb).

Note: Rotate the engine as needed to align the idler gear holes with bolts (A) so they can be tightened.

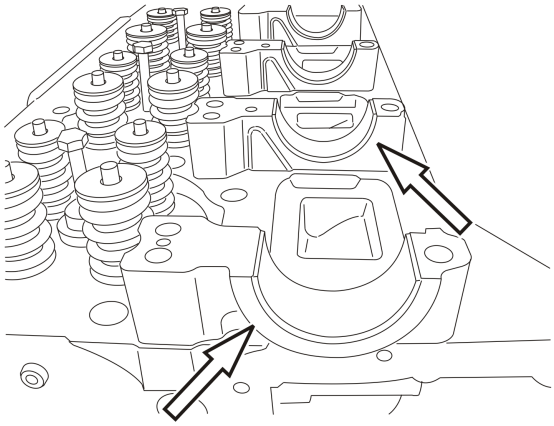


W0002368

11
Rotate the engine until TDC is reached with the flywheel housing pointer aligned with the zero marking on the flywheel.

88800014

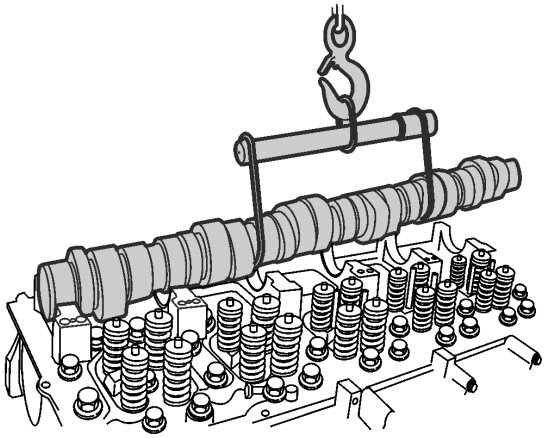
12
If removed, install the camshaft bearing saddles to their original positions. Carefully tap the bearing saddles using a soft-faced hammer until fully seated.



W2005237

13
Install the camshaft lower bearings and lubricate them with clean engine oil. Make sure a camshaft bearing is installed on each bearing saddle.

Note: The bearings at the No. 7 camshaft journal have integral thrust washers.



W2005134

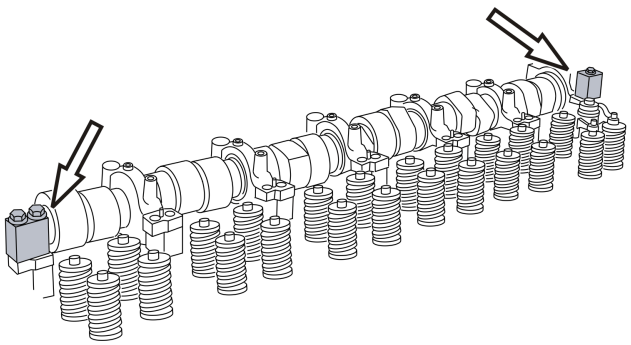
14
Carefully lower the camshaft until resting on the bearing saddles and remove the lifting tool. Rotate the camshaft by hand to make sure the camshaft is not binding in the bearing saddles.

WARNING

The camshaft is heavy. Do not attempt to reinstall the camshaft without the help of an assistant and the use of a suitable lifting device. Failure to heed this warning can result in personal injury and component damage.

85109034

15
Install the camshaft upper bearings into the bearing caps and lubricate with clean engine oil. Install the bearing caps to the respective bearing saddles. Use a soft-faced mallet to seat the bearing caps over the locating dowels. Tightening of the bearing caps is done later when the rocker arm shaft assembly is installed.

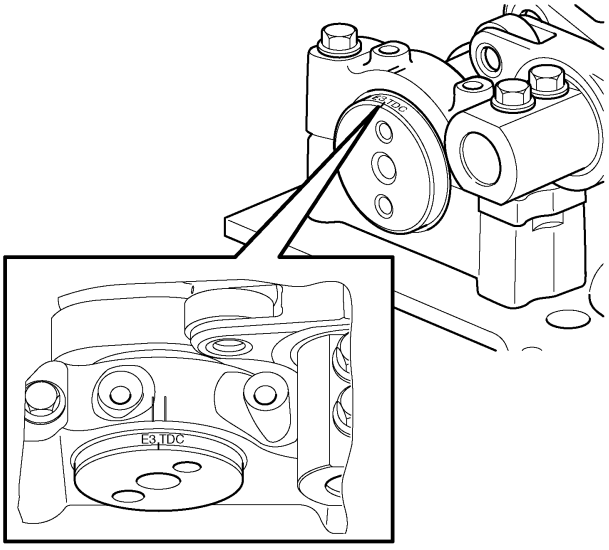


W0002297

16
Install the bearing cap press tools, one at the number 7 bearing cap and one at the number 1 bearing cap.

Note: The press tools are used for adjusting the timing gear backlash when the rocker arm shaft is not installed.

85109208

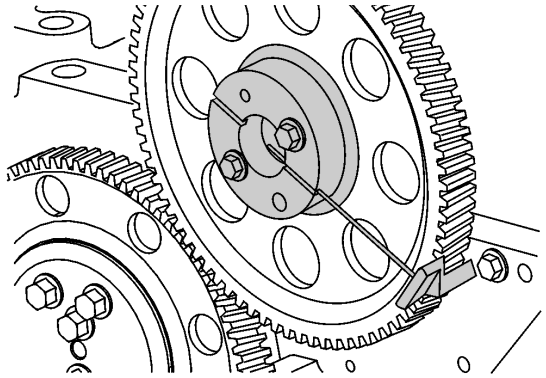


W2006173

17
Make sure the camshaft TDC marking is aligned between the two marks on the camshaft bearing cap.

18
Install the camshaft timing gear without the damper using the camshaft alignment spacer block with two bolts. Tighten the bolts to 45 ± 5 Nm (33 ± 4 ft-lb).

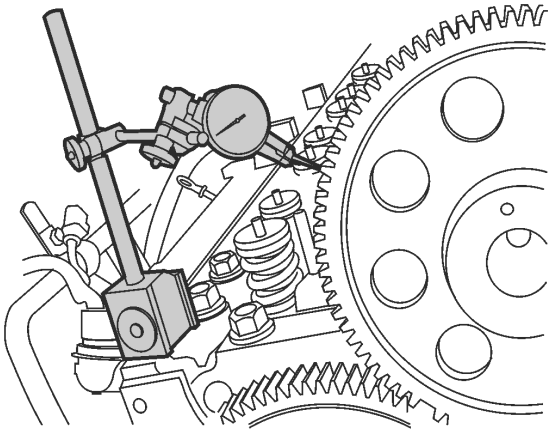
J44514B
45 ± 5 Nm
(33 ± 4 ft-lb)



W2005135

19
Position the camshaft gear so that the reference hole in the timing gear plate is between the marks on the gear. Insert the alignment tool into the reference hole and engage the tool with the camshaft gear teeth and the slot of the clamp tool. Rotate the camshaft until this occurs, then remove the alignment tool.

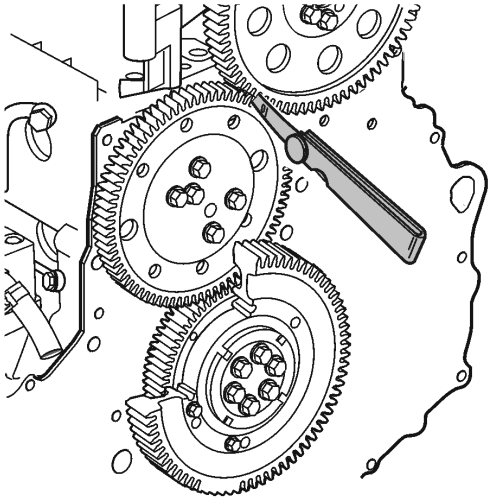
J44514B



W2005136

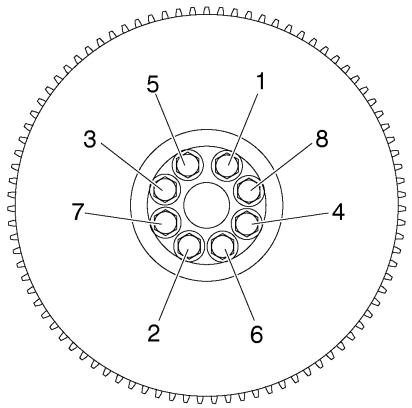
20
Check the backlash between the camshaft timing gear and the adjustable idler gear. Position the dial indicator against a tooth of the camshaft timing gear and rock the gear back and forth while holding the adjustable gear with the clamp from the tool kit. Note the value on the dial indicator and compare with the specification of 0.10 ± 0.05 mm (0.004 ± 0.002 inch).

9989683, 9999696, J44514B



T2019208

21
If the gear backlash must be adjusted, slightly loosen the adjustable idler gear fasteners. Install a 0.1 mm (0.004 inch) feeler gauge on the loaded side of the gear and turn the camshaft in a counterclockwise direction to take up any gear lash. Tighten the adjustable idler gear fasteners.



W2006135

22
If gear backlash adjustment was performed, replace all adjustable idler gear fasteners, one at a time and tighten to 35 ± 4 Nm (26 ± 3 ft-lb), plus 120 ± 5 degrees rotation.

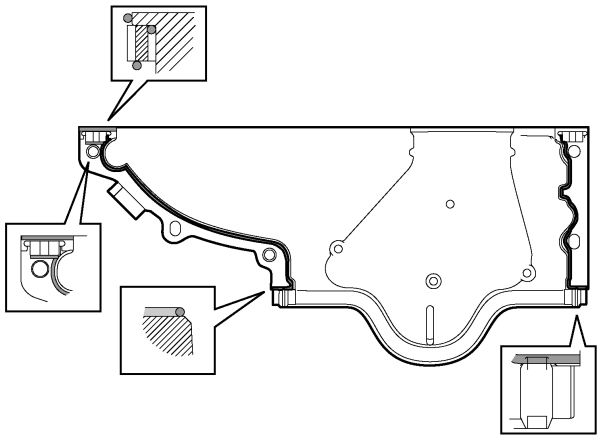
35 ± 4 Nm (26 ± 3 ft-lb)
Plus 120 ± 5 degrees rotation

23
Remove the spacer block from the camshaft timing gear. Install the vibration damper, clamp plate and new bolts. Tighten the bolts to 45 ± 5 Nm (33 ± 4 ft-lb), plus 90 ± 5 degrees rotation.

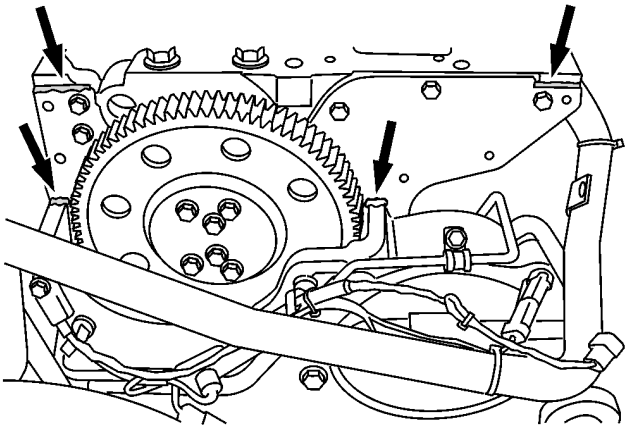
45 ± 5 Nm (33 ± 4 ft-lb)
Plus 90 ± 5 degrees rotation

24
Remove the bearing cap press tools.

25
Replace the timing gear cover seals and gaskets.

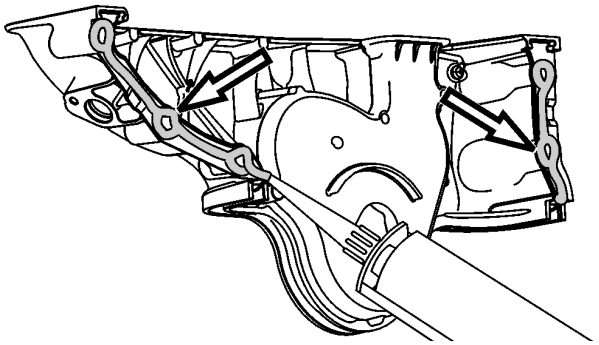


W2006134



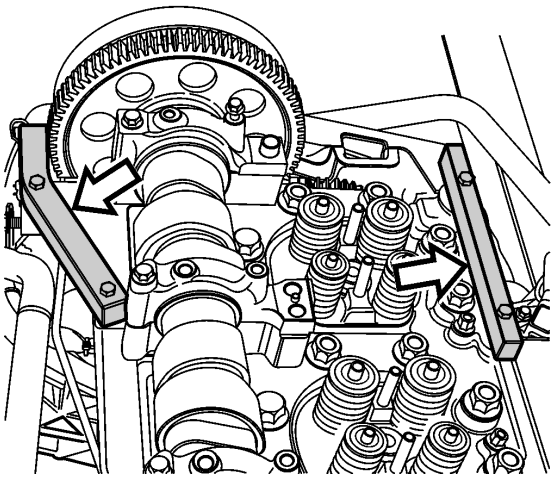
W2005102

26
Apply Volvo sealant in the bottom corners where the timing gear plate and the flywheel housing meet. Apply Volvo sealant to the top of the timing gear plate in the corner next to the cylinder head.



W2005137

27
Apply Volvo sealant to the mating surfaces of the timing gear cover.



W2005138

28
Position the timing gear cover, install the fasteners and loosely tighten. Install the timing cover clamp tools so that the timing gear cover surface becomes flush with the valve cover sealing surface of the cylinder head.

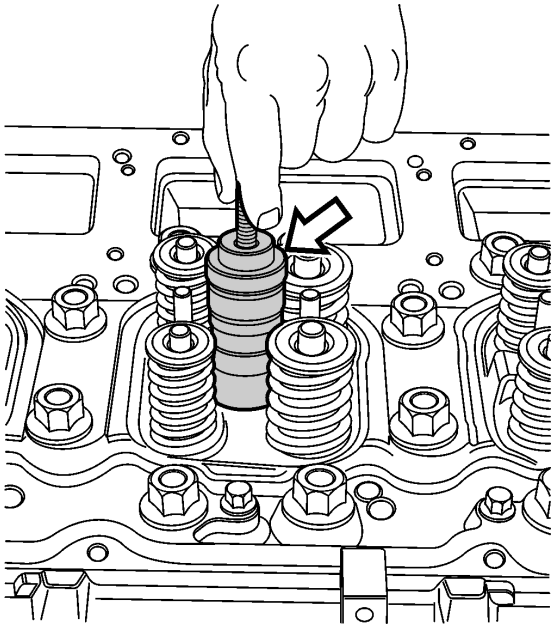
85109033A, 85109033B

29
Tighten all timing gear cover mounting bolts to specification and then remove the clamp tools.

24 ± 4 Nm
(18 ± 3 ft-lb)

30
Remove the fuel injector bore plugs from the cylinder head.

9998251

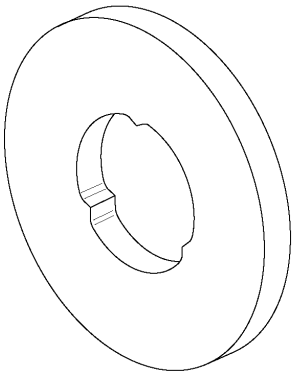


W2005114

31
Preassemble the new injection nozzle gasket (flat washer) to the injector. Three small projections (grippers) on the inside diameter of this gasket keep the gasket in place on the injector. Push the gasket over the injector tip until it is fully seated against the bottom of the injector.

Note: Make sure the gasket is the correct part. The correct gasket is identified by three small projections on the inside diameter and a gray coating over the entire gasket to enhance the ability to seal.

Note: This gasket must be installed dry. Do not use grease or any other material to secure this gasket to the injector.



W2006259

32
Replace the O-rings on the fuel injectors. Lubricate the O-rings. Insert the fuel injectors (with hold down clamps) and center them between the valve springs. Tighten the hold down clamps to 20 ± 5 Nm (15 ± 4 ft-lb), plus 60 ± 5 degrees rotation.

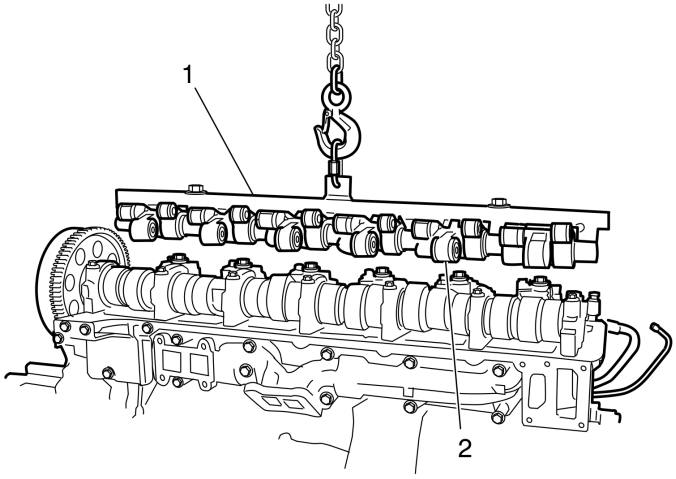
Note: With new fuel injector copper sleeves, tighten the hold down clamps to 20 ± 5 Nm (15 ± 4 ft-lb), plus 180 ± 5 degrees rotation, loosen the hold down clamps and retighten to 20 ± 5 Nm (15 ± 4 ft-lb), plus 60 ± 5 degrees rotation.

33
Oil the valve bridges and camshaft lobes with engine oil. Install the valve bridges over their respective exhaust and intake valves.

34
Using the lifting tool and an assistant, position the rocker arm shaft assembly over the camshaft bearing caps. Install and tighten the rocker arm shaft bolts a little at a time, evenly across the entire shaft so that the shaft does not become distorted, bent or fractured.

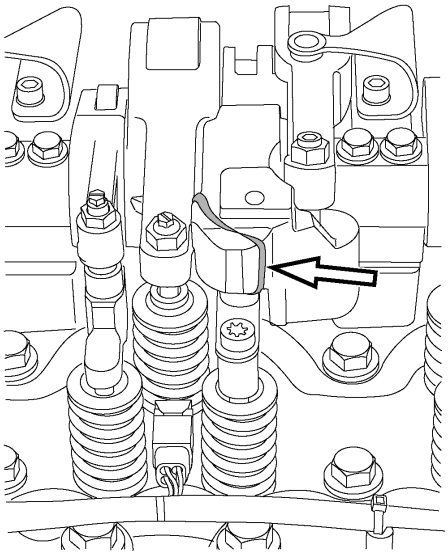
Note: Make sure that the rocker arm shaft is seated properly in the guide dowels of the camshaft bearing caps.

85109035



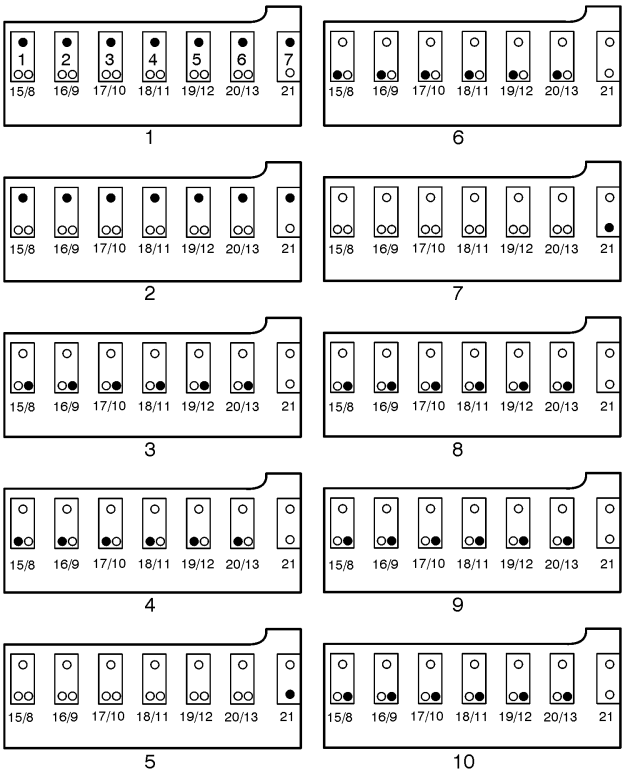
W2005513

1 Rocker Assembly Lifting Tool
2 Rocker Arm Shaft Assembly



W2006172

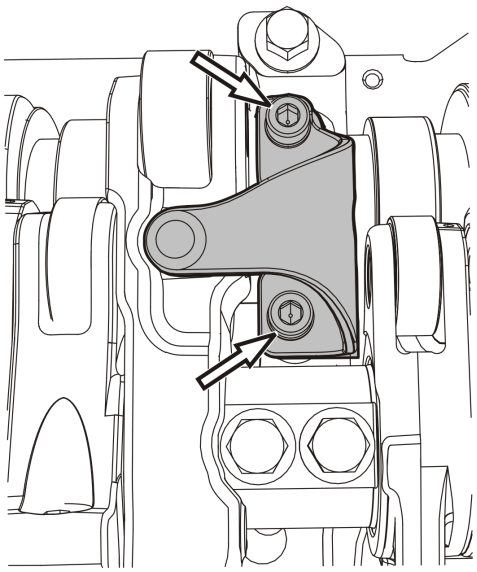
35
On engines equipped with the VCB, remove the elastic bands or tie straps retaining the exhaust rocker arm pistons.



W2005266

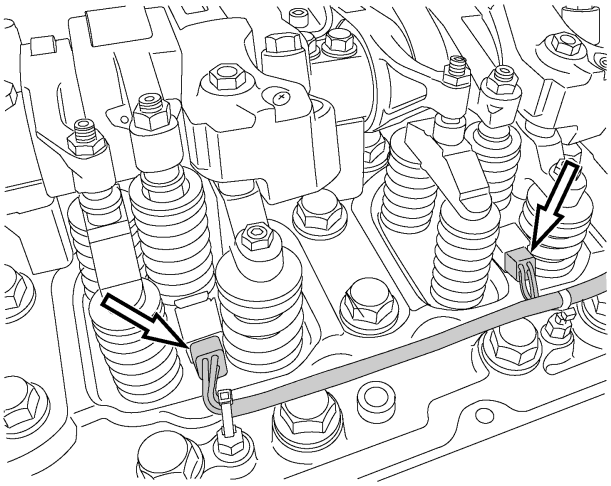
36
Tighten all camshaft bearing cap and rocker arm shaft bolts in the sequence shown, to the following specification to make sure that the rocker arm shaft, camshaft bearing caps and bearing saddles are fully seated:

1 Tighten bolts 1–7 to 15 ± 3 Nm (11 ± 2 ft-lb).
2 Tighten bolts 1–7 to 90 ± 5 degrees rotation.
3 Tighten bolts 8–13 to 100 ± 10 Nm (74 ± 7 ft-lb).
4 Tighten bolts 15–20 to 50 ± 5 Nm (37 ± 4 ft-lb).
5 Tighten bolt 21 to 60 ± 5 Nm (44 ± 4 ft-lb).
6 Tighten bolts 15–20 to 120 ± 5 degrees rotation.
7 Tighten bolt 21 to 100 ± 5 degrees rotation.
8 Loosen bolts 8–13.
9 Tighten bolts 8–13 to 50 ± 5 Nm (37 ± 4 ft-lb).
10 Tighten bolts 8–13 to 120 ± 5 degrees rotation.



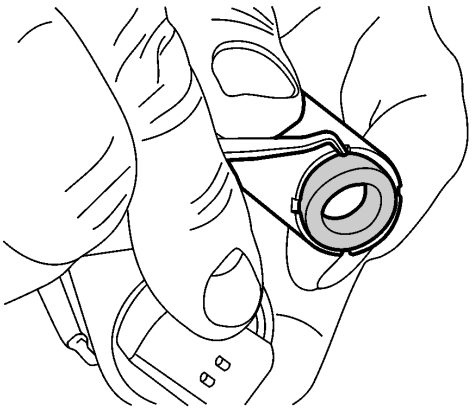
W2005845

37
Install the leaf springs to the VCB rocker arms, insert the fasteners and tighten to secure.



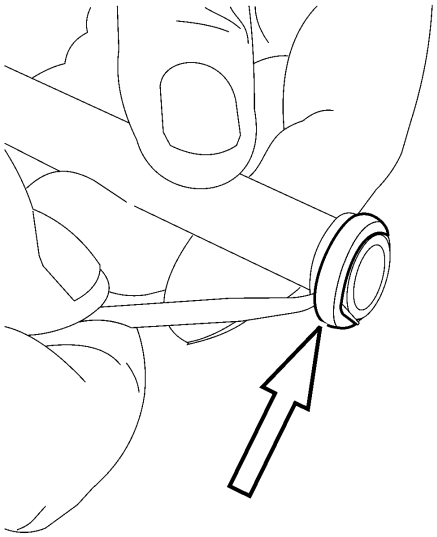
W2006307

38
Install a new O-ring on the fuel injector harness pass-through connector. Route the harness through the hole in the cylinder head. Install the bolt to secure the pass-through connector. Connect the wiring harness connectors to the fuel injectors and secure with tie straps to the harness retainers.



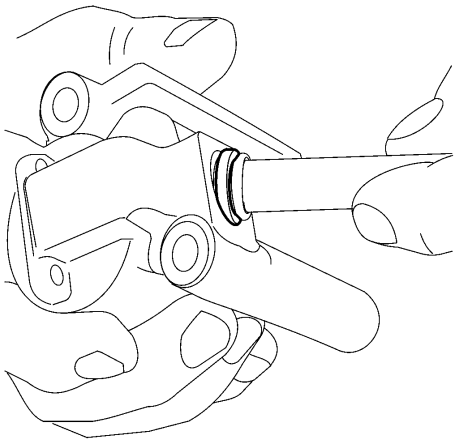
W2004855

39
Replace the O-ring at the bottom of the VCB control valve, if equipped.



W2004853

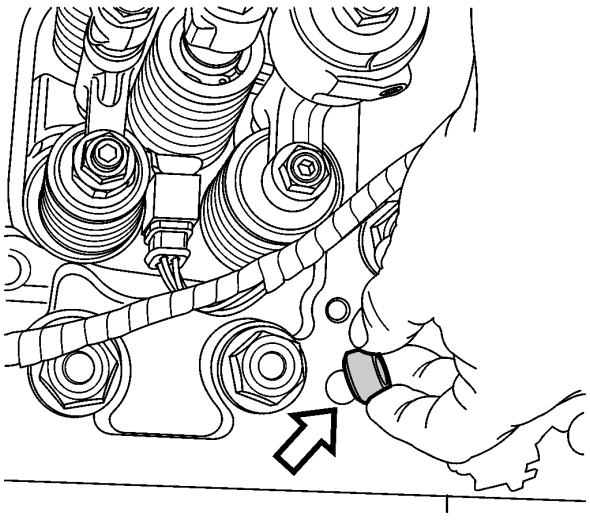
40
Clean the VCB control valve oil pipe and replace the O-rings. Lubricate the pipe hole in the rocker arm shaft and the O-rings on the pipe.



W2004854

41
Insert the oil pipe into the oil hole of the VCB control valve.

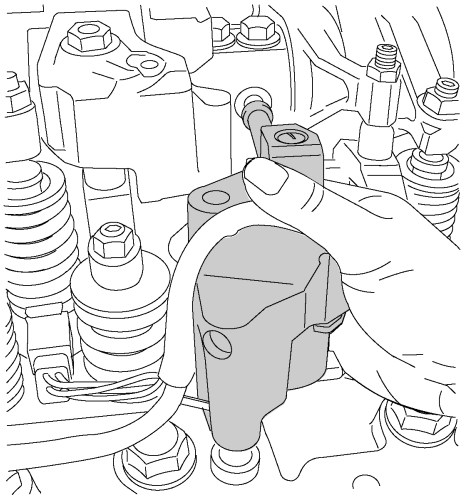
Note: Make sure that the O-ring is seated fully in the valve.



W2004840

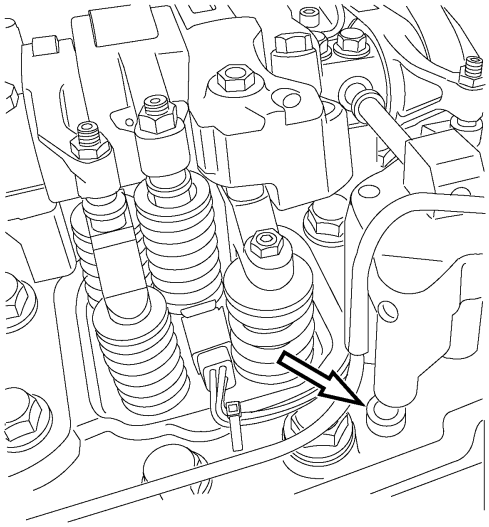
42
Install a new VCB control valve seal spacer onto the cylinder head. Make sure that the seal spacer is correctly seated with the lip of the spacer against the cylinder head.

43
Position the VCB control valve on the cylinder head.

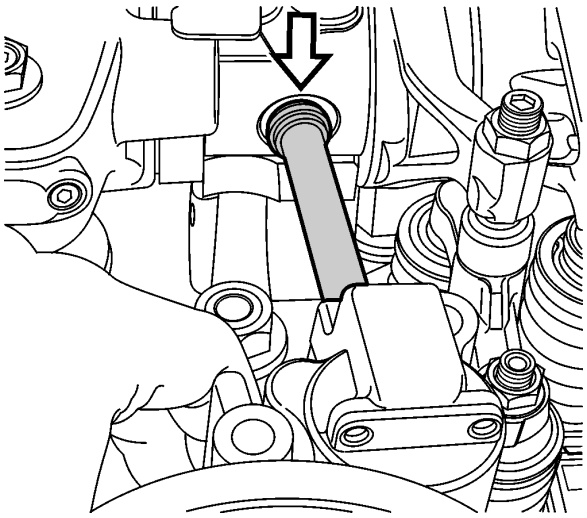


W2006308

44
Align the VCB control valve with the seal spacer.



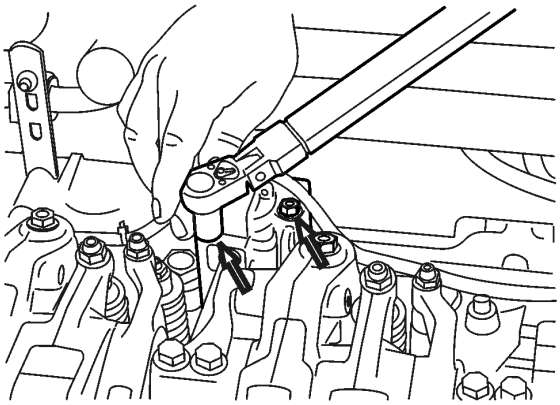
W2006309



W2004857

45
Align the VCB oil pipe and O-ring with the hole in the rocker shaft.

Note: For engines without VCB, an oil flow adapter is used in place of the VCB control valve and is mounted in the same manner.

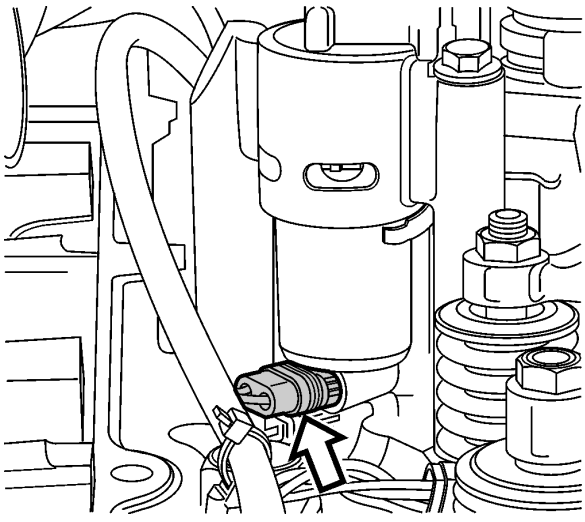


W2004858

46
Install the VCB control valve bolts and tighten to 20 ± 3 Nm (15 ± 2 ft-lb).

Note: Make sure the VCB oil pipe O-ring is fully seated in the valve and rocker arm shaft.

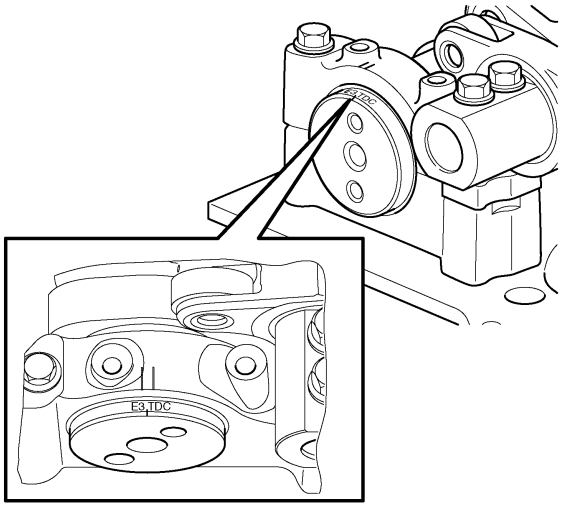
20 ± 3 Nm
(15 ± 2 ft-lb)



W2004837

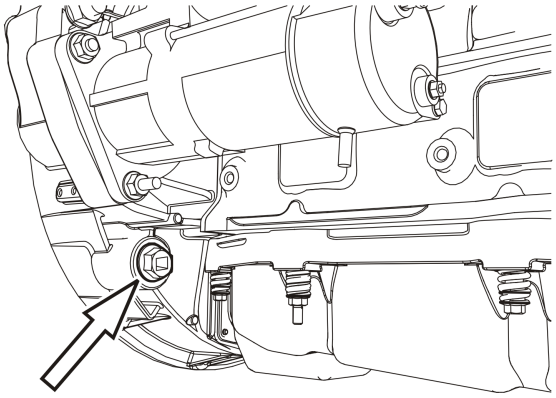
47
Plug in the VCB control valve harness connector.

48
Position the unit injector electrical harness over the VCB control valve and secure with tie straps.



W2006173

49
When adjusting the valves, make sure to start with the camshaft alignment marks between the two lines on the camshaft bearing cap.



W0002368

50
Adjust the inlet valve and exhaust valve clearance, as well as the unit injector preload, following the pattern in the table. Use the flywheel turning tool as needed to rotate the engine.

- **Adjustment Position without VCB:** Positions 1–6 apply to the inlet valves, exhaust valves and unit injectors.
- **Adjustment Position with VCB:** Positions 1–6 apply to the inlet valves and unit injectors. Positions E1–E6 apply to the exhaust valves and VCB rocker arm.

Valve and Unit Injector Adjustment Sequence

Camshaft Position	Unit Injector	Intake and Exhaust	Exhaust (VCB)	VCB
5	X	X		
E6			X	X
3	X	X		
E2			X	X
6	X	X		
E4			X	X
2	X	X		
E1			X	X
4	X	X		
E5			X	X
1	X	X		
E3			X	X

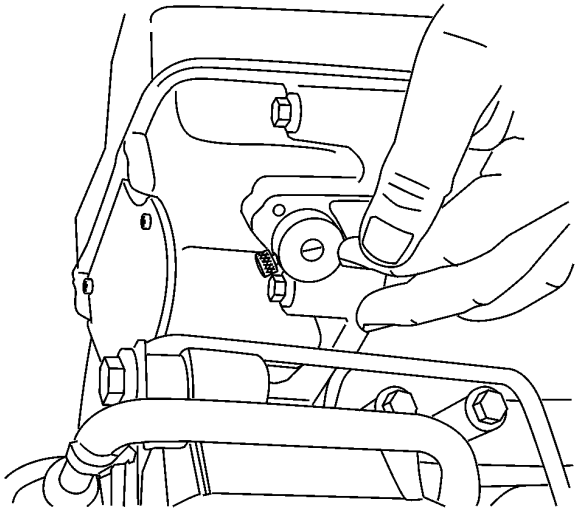
51
Adjust the valve lash and the unit injector preload to the following settings:

- Inlet Valve Clearance: 0.3 mm (0.012 inch).
- Exhaust Valve Clearance: 0.6 mm (0.024 inch).
- Exhaust Valve Clearance, VCB rocker: 4.2 mm (0.165 inch) between roller and camshaft.
- Adjust the unit injector to zero lash plus 4 flats (240 degrees clockwise).

Note: Tighten valve adjustment screw locknuts to specification following each valve adjustment.

For further instructions on adjusting valves and unit injectors, refer to group 21.

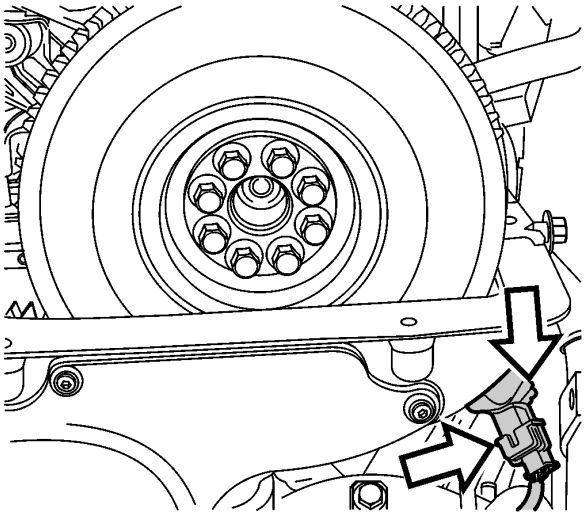
52
Check for proper camshaft position sensor clearance. Use the sensor depth gauge to determine if shims are required for sensor depth. The camshaft position sensor clearance specification is 0.3–1.0 mm (0.011–0.039 inch).


W2005068

1 Rotate the engine until a tab of the camshaft toothed wheel is aligned with the sensor bore.
2 Insert the depth gauge into the sensor bore until the outer part of the gauge is fully seated against the timing gear cover.
3 Loosen the thumb screw of the gauge and push the inner part of the gauge in until it contacts the tab of the toothed wheel.
4 Tighten the thumb screw to secure the inner part of the gauge.
5 Carefully remove the gauge from the camshaft sensor bore and observe the location of steps between the inner and outer portions of the gauge:

- Both steps below the surface of the gauge = no shims required.
- One step below the surface of the gauge = one shim required.
- Both steps above the surface of the gauge = two shims required.

88800031

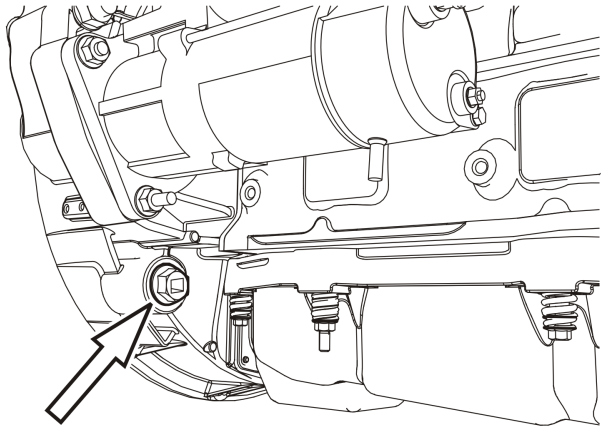


W2005104

53
Install the camshaft position sensor with appropriate shim(s), new O-ring, secure with bolt and plug in harness connector.

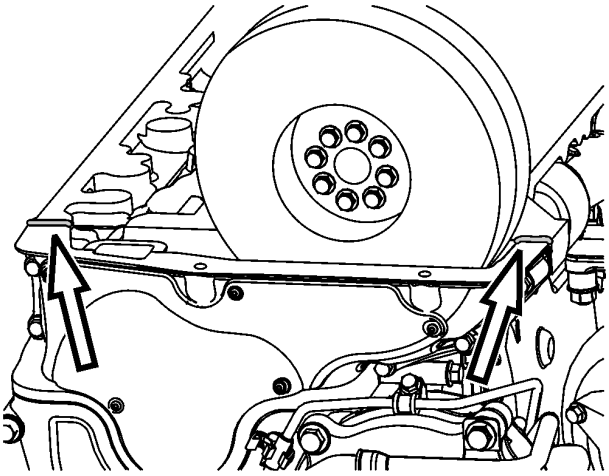
Note: The camshaft position sensor shim part number is 20556179.

54
Remove flywheel turning tool and install the dust plug.



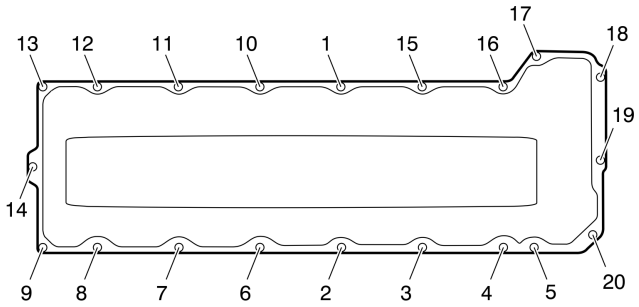
W0002368

55
Carefully inspect the valve cover gasket for damage and replace with a new gasket if necessary. Make sure that the gasket is properly seated and follows the contour of the channel.



W2005157

56
Apply a 2 mm (0.079 inch) bead of Volvo sealant across the parting line between the timing gear cover and the cylinder head. This parting line is on both sides of the cylinder head. Carefully position the valve cover on the cylinder head and make sure that the seal remains properly seated.

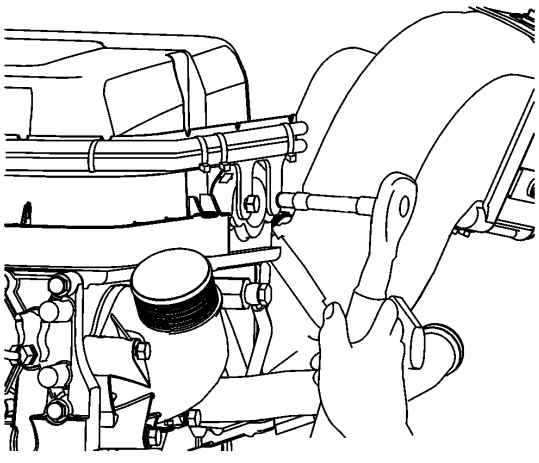


T2022732

57
Install the spring-loaded fasteners in the valve cover. Tighten the valve cover fasteners to 24 ± 4 Nm (18 ± 3 ft-lb) in the sequence shown.

24 ± 4 Nm
(18 ± 3 ft-lb)

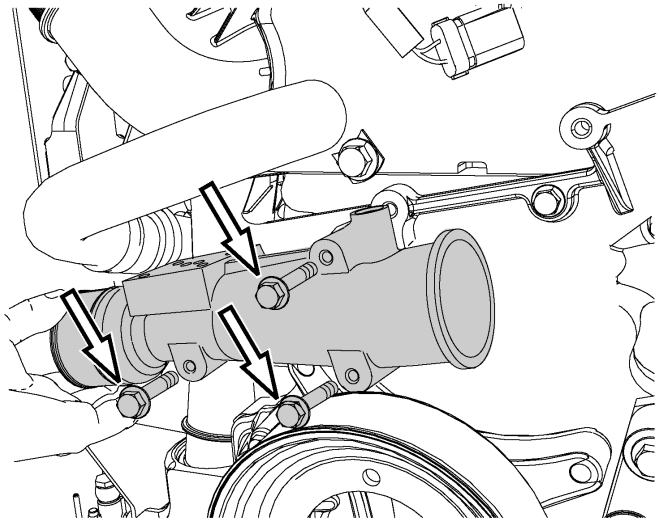
58
Install the engine cover inside the cab.



W2004679

59
Route the engine wiring harness and position the harness support bracket to the valve cover. Install the bracket fasteners and tighten to secure. Install new tie straps to secure the engine wiring harness.

60
Install the venturi tube bracket to the engine block.



W2006053

61
Install a new coupling hose on the venturi inlet and new O-ring in the venturi outlet flange. Position the clamps over the hose and install the venturi and mounting screws.

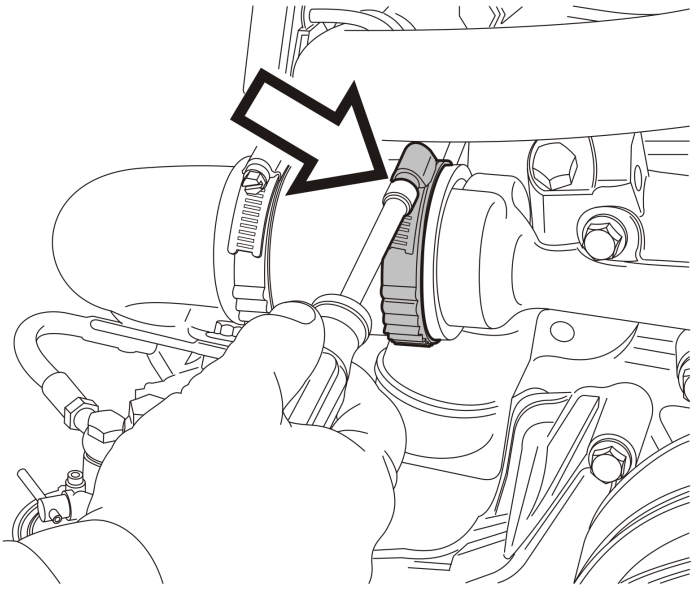
62
Tighten the venturi mounting screws to 24 ± 3 Nm (18 ± 2 ft-lb).

24 ± 3 Nm
(18 ± 2 ft-lb)

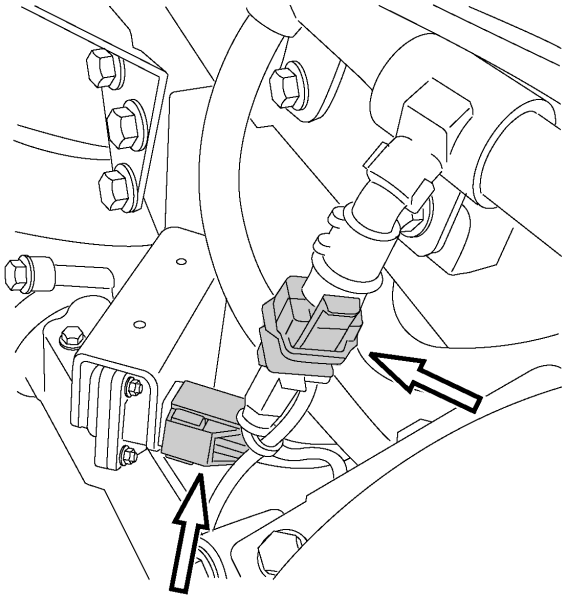
63
Connect and install the differential pressure sensor and the pressure tubes to the venturi tube and bracket.

64
Position the coupling hose clamps at the venturi inlet. Tighten the clamps to 10 ± 1 Nm (90 ± 9 in-lb).

10 ± 1 Nm
(90 ± 9 in-lb)

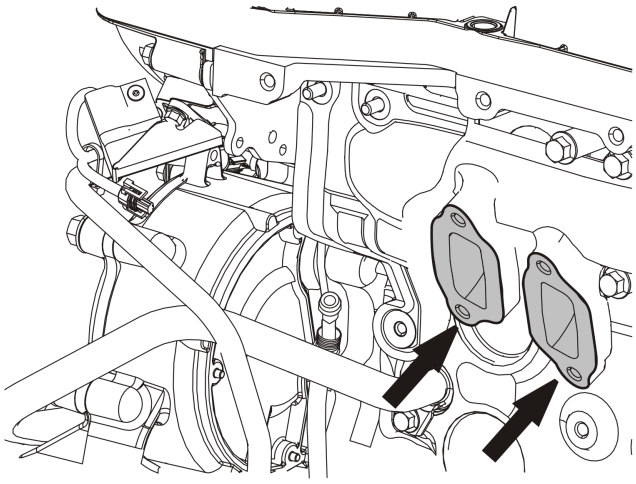


W2005723



W2006050

65
Reconnect the temperature and differential pressure sensor connectors.

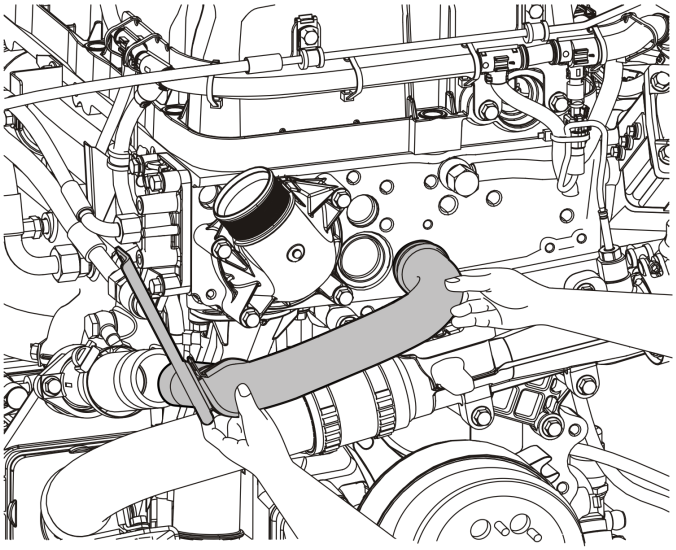


W2005697

66
If the exhaust manifold is being reused, clean the EGR valve mounting surface. If the EGR valve is being reused, clean the valve mounting surface.

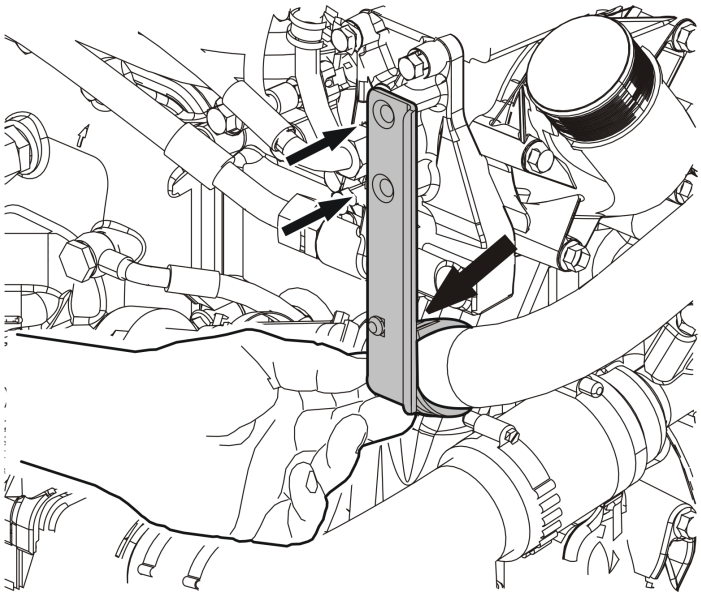
67
Install the EGR cooler coolant hose and secure with a hose clamp.

Note: Inspect EGR cooler coolant hose. Replace the hose if damaged or deteriorated.



W2005676

68
Install the EGR cooler coolant pipe into the cylinder head and into the hose of the EGR cooler. Reposition the hose clamp on the EGR coolant pipe and tighten the clamp to secure. Install the EGR coolant pipe clamp and bolt and tighten to secure.

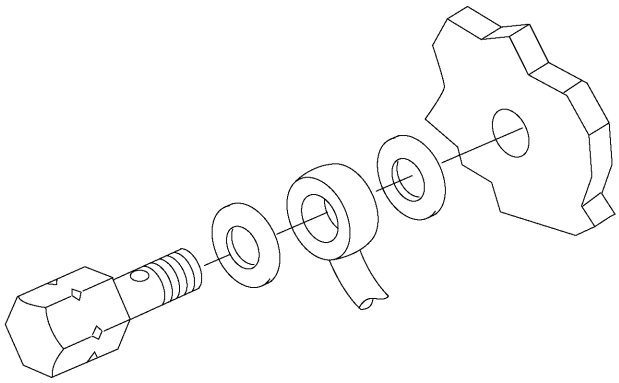


W2005674

69
Position the EGR cooler coolant pipe bracket to the thermostat housing side cover and to the pipe. Install the fasteners and tighten to secure.

70
Install the static fill and bypass hoses to their locations on the engine.

71
Install the upper radiator hose to the thermostat housing and to the radiator. Position the clamps and tighten to secure.



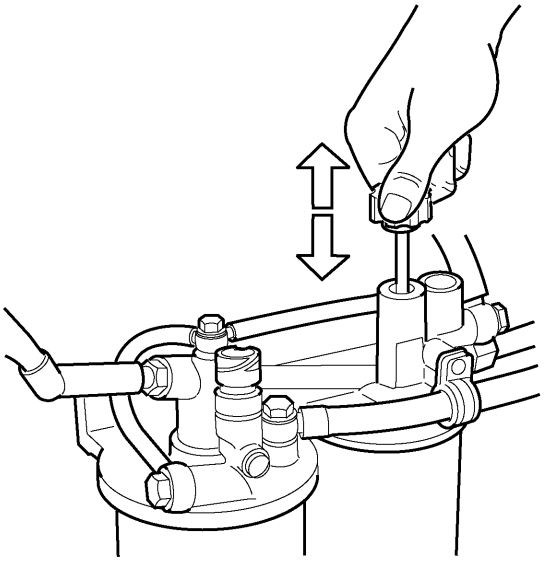
W2006147

72
Install the fuel line, new overflow valve and two new gaskets to the cylinder head. Tighten the overflow valve to 48 ± 5 Nm (35 ± 4 ft-lb).

48 ± 5 Nm
(35 ± 4 ft-lb)

73
Check the engine oil level and replenish as needed with the recommended oil.

74
Prime the fuel system by pumping with the hand pump until resistance is felt.



W2005864

75
Due to the Engine Electronic Control Unit (EECU) self learning capability, it is necessary to reset learned EECU parameters after servicing some engine related components. This allows the EECU to learn the new component's behavior. After servicing is complete, perform the "Learned Data Reset" using the PC tool. This is located in the Function Group 1 menu.