

Document Title: Engine, removing	Function Group: 210	Information Type: Service Information	Date: 2015/2/28
Profile: EXC, EC160D L [GB]			

Engine, removing

Op nbr 210-070

WARNING

Risk of burns - stop the diesel engine and allow it to cool down before starting any work.

WARNING

Removal of residual pressure from the circuit must be done prior to any maintenance.

NOTE!

Cable ties and clamps that secure hoses and electrical wiring must be removed and then replaced when installing components.

NOTE!

Disconnected hoses, lines and connections must be plugged. Oil that drains from hoses, lines and connections should be collected in a container.

1. Place the machine in the service position B. See [091 Service positions](#)
2. Turn off the battery disconnect switch.
3. Drain the coolant in a collection container. See [261 Coolant changing](#).
4. Remove the muffler (DPF) hood and the radiator hood.

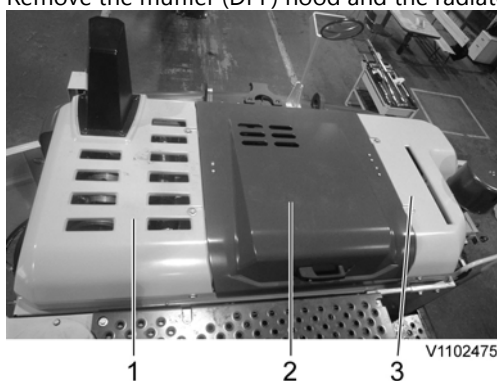


Figure 1

1. Muffler (DPF) hood
 2. Engine hood
 3. Radiator hood
5. Remove the engine room cowl frame with the engine hood using a lifting device.

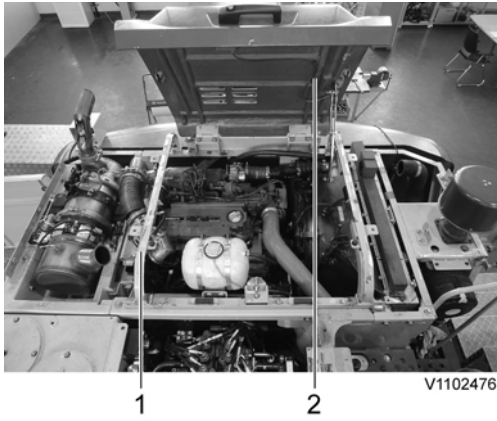


Figure 2

1. Engine room cowl frame
2. Engine hood

6. Remove the clamps, air inlet hose and disconnect the air pump hose.

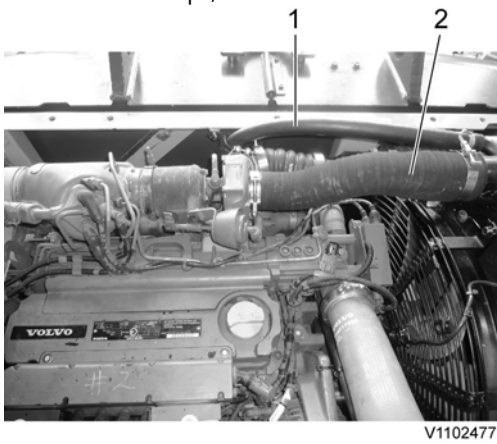


Figure 3

1. Air pump hose
2. Air inlet hose

7. Remove the clamps and the charge air cooler tubes.

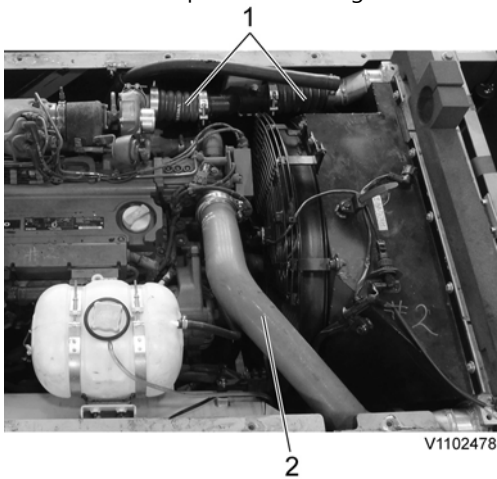


Figure 4

1. Charge air cooler tube (Outlet)
2. Charge air cooler tube (Inlet)

8. Remove the clamp and disconnect the exhaust pipe.

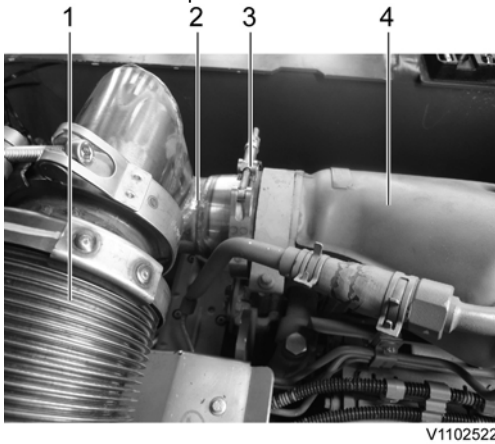


Figure 5

1. Exhaust flexible tube
2. Exhaust pipe
3. Clamp
4. Burner

9. Remove the engine room under covers.

10. Disconnect the hose and remove the clamps on the expansion tank

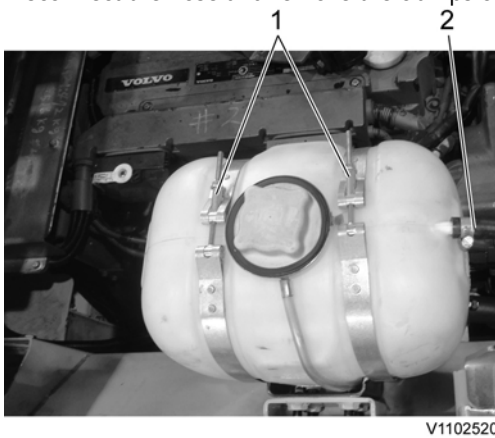


Figure 6

1. Clamp
2. Hose

11. Disconnect wire harness connector and the hoses.
Remove the expansion tank

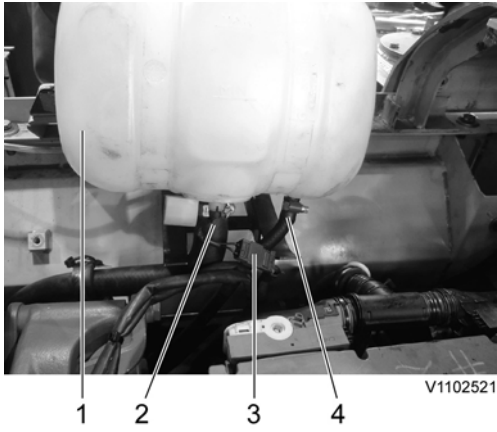


Figure 7

1. Expansion tank
2. Hose
3. Wire harness connector
4. Hose

12. Remove the clamps and disconnect the radiator hoses.

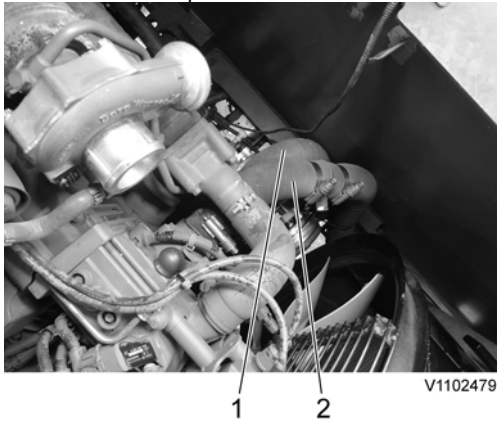


Figure 8

1. Radiator hose (Outlet)
2. Radiator hose (Inlet)

13. Remove the clamps and disconnect the connector.

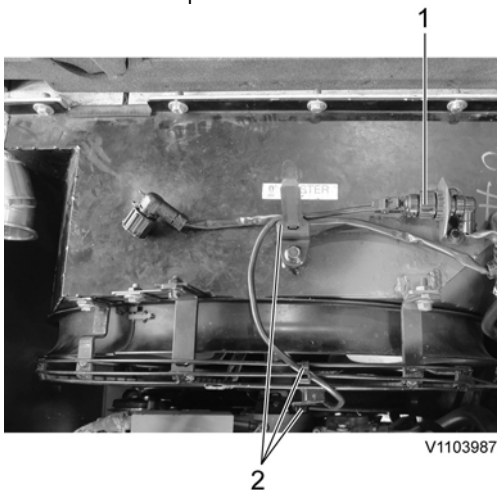


Figure 9

1. Connector
2. Clamp

14. Remove the cooling fan guard.

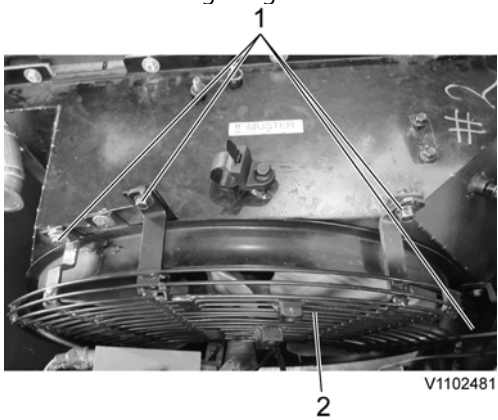


Figure 10

1. Screw
2. Cooling fan guard

15. Remove the mounting screws and lay down the cooling fan inside the radiator shroud safely.

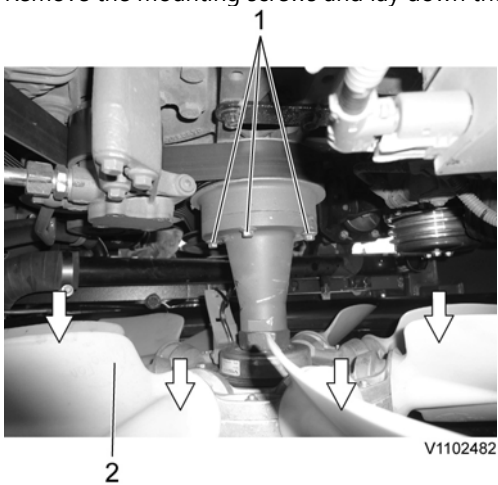
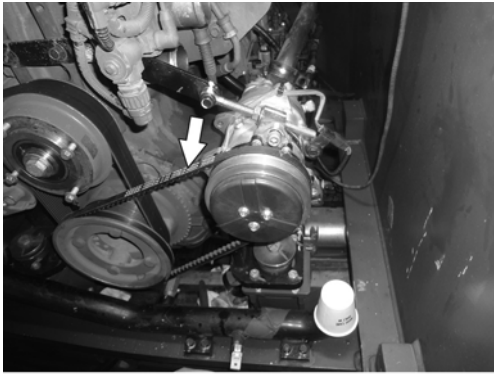


Figure 11

1. Screw
2. Cooling fan

16. Remove the main pump. See [913 Hydraulic pump, replacing](#)

17. Remove the air conditioner compressor belt.



V1102485

Figure 12

18. Disconnect the wire harness connector, remove the compressor and lay it down on the frame.



Do not disconnect or loosen connections for the air conditioning unit (AC). Risk of gas leakage.



V1102486

Figure 13

1. Air conditioner compressor
2. Wire harness connector

19. Disconnect the engine oil remote hoses.



V1102487

Figure 14

1. Engine oil remote hose

20. Disconnect the engine block heater wire-harness and the cab heater hose.

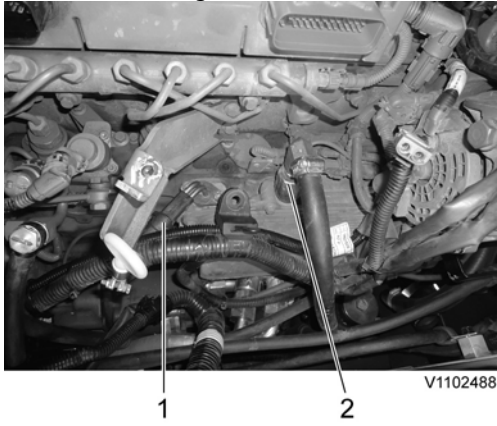


Figure 15

1. Engine block heater wire-harness (optional)
2. Cab heater hose (supply)

21. Disconnect the starter motor wire harness.

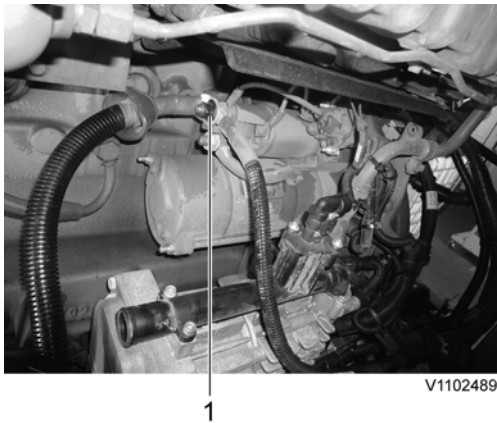


Figure 16

1. Starter motor wire harness

22. Disconnect the wire harness connectors.

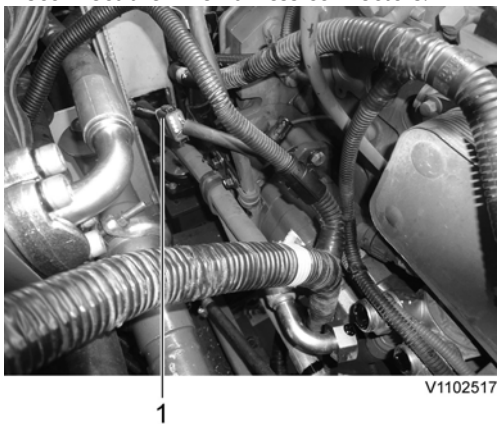


Figure 17

1. Connector

23. Disconnect the junction box connector.

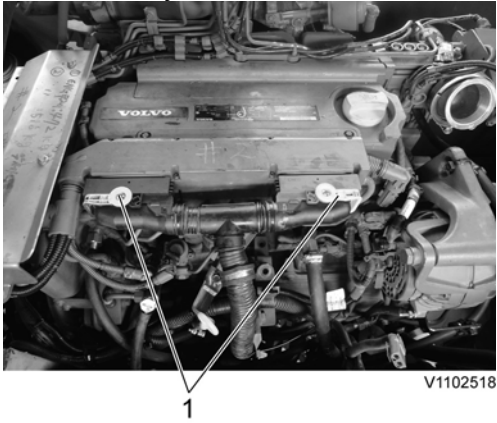


Figure 18

1. Junction box connector

24. Disconnect the fuel line hoses (4 pcs).

NOTE!

Ports must be plugged after disassembling hoses.

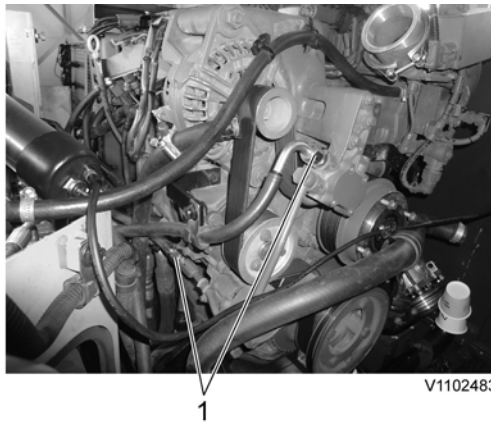
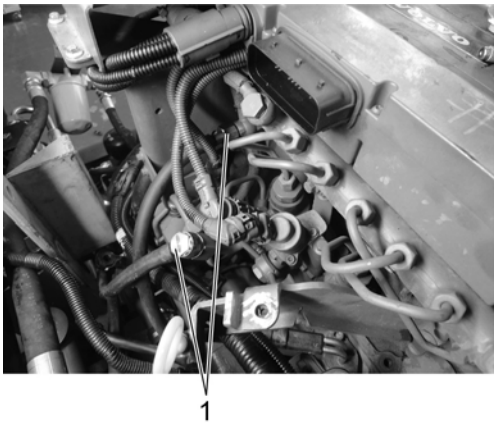


Figure 19

1. Fuel hose

25. Remove the four mounting screws.

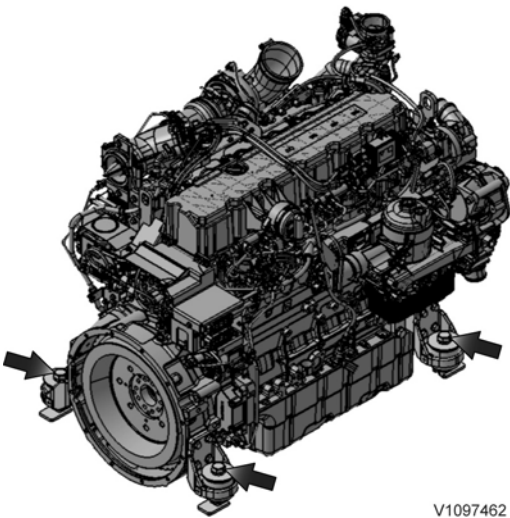
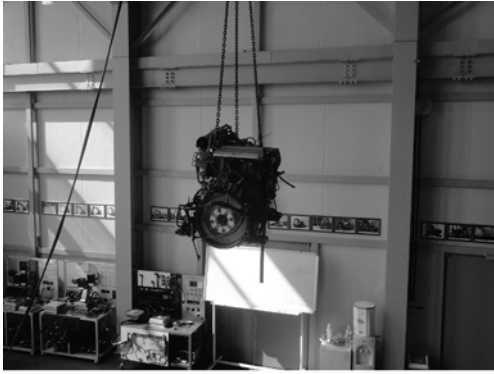


Figure 20

26. Lift the engine just a little using a lifting device, and after confirming safety around, lift it up and out slowly to the work stand.



V1102519

Figure 21

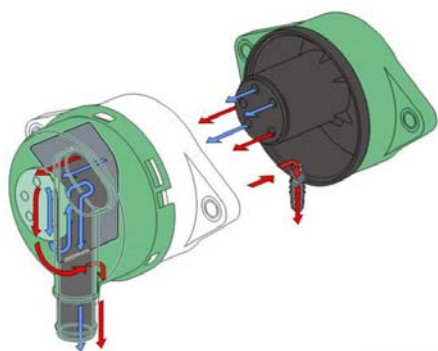
Document Title: Crankcase ventilation, description	Function Group: 212	Information Type: Service Information	Date: 2015/2/28
Profile: EXC, EC160D L [GB]			

Crankcase ventilation, description

Since some of the combustion pressure enters the crankcase after passing by the pistons and piston rings (blow-by), the crankcase must be ventilated.

The purpose of the crankcase ventilation is to balance the pressure in the crankcase in order to avoid damage to engine components and to prevent oil mist formation and oil leakage into the ambient air.

The crankcase ventilation consists of a housing containing a filter, with connections to the oil sump and ventilation piping.



V1101894

Figure 1
Crankcase ventilation housing

Air containing oil particles comes from the crankcase via the cylinder head into the crankcase ventilator. The air (blue arrows) passes through the filter, while oil particles (red arrows) are caught and led back to the oil sump via a return pipe.

Supplementary information

- [200 Engine description](#)
- [200 Component locations](#)

Document Title: Valves, adjusting	Function Group: 214	Information Type: Service Information	Date: 2015/2/28
Profile: EXC, EC160D L [GB]			

Valves, adjusting

Op nbr 214-012

[885812 Timing tool](#)

[9998681 Rotation tool](#)

! WARNING

Risk of burns - stop the diesel engine and allow it to cool down before starting any work.

NOTICE

Never adjust the valves with the engine running as the valves may strike the piston and cause serious damage.

NOTICE

Always cover open air connections with a plastic bag and rubber bands. Gravel, dust and other particles in these connections may result in engine failure!

1. Place the machine in service position B. See [091 Service positions](#)
2. Open the engine hood.
3. Remove the heating guard



V1102523

Figure 1

4. Remove the screws and put aside the crankcase ventilation duct from the engine.

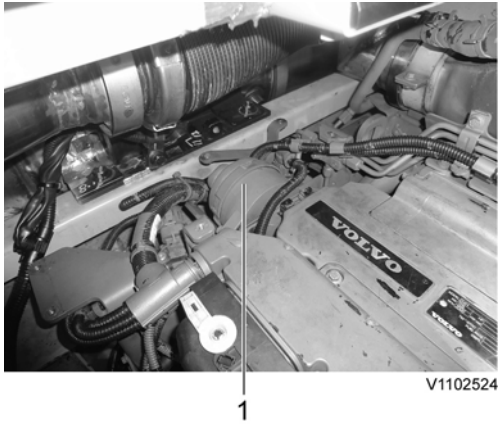


Figure 2

1. Crankcase ventilation duct

5. Disconnect the wire-harness connectors

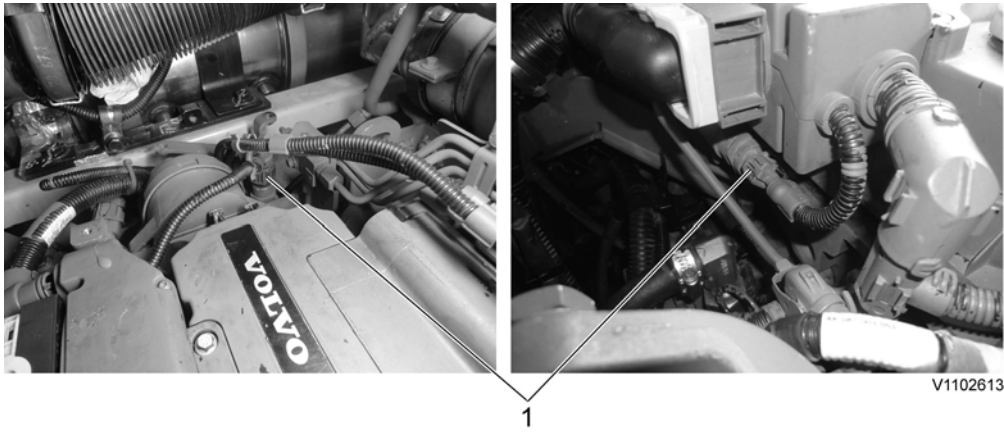


Figure 3

1. Connector

6. Disconnect the junction box connector and pull apart the cover plates

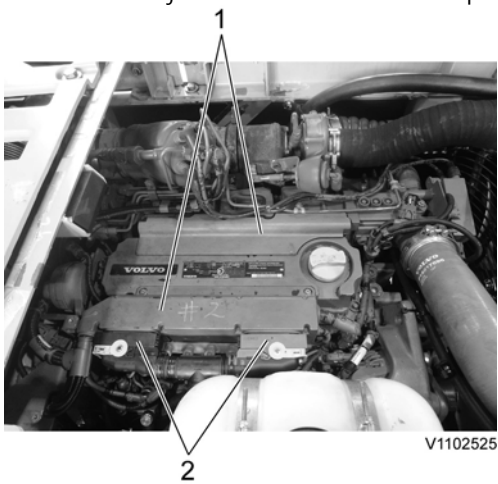


Figure 4

1. Cover plate
2. Junction box connector

7. Disconnect the connector.

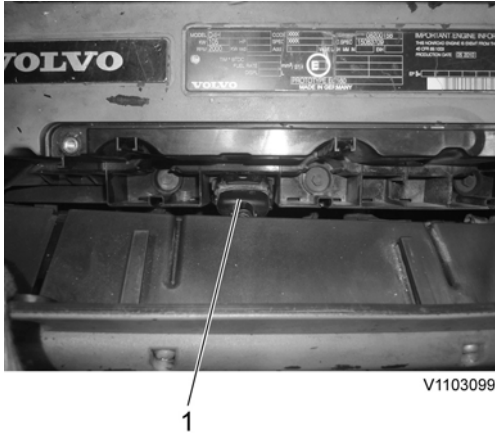


Figure 5

1. Connector

NOTICE

Clean round the valve cover, intercooler and turbo to avoid oil residue and the like from getting into the engine while work is in progress.

8. Remove the valve cover.

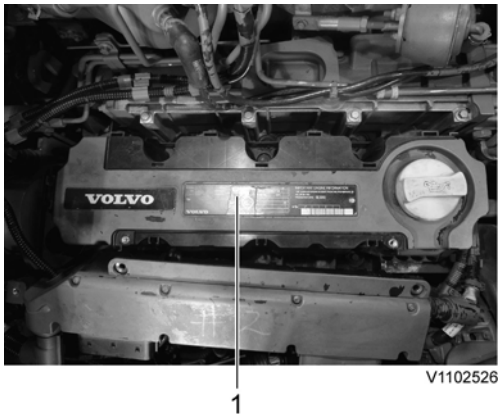


Figure 6

1. Valve cover
9. Open the side door on the right side of the machine.
10. Remove screws and put away the cover between the engine room and the pump room.



V1111164

Figure 7

1. Cover plate

11. Remove the gear cover.



V1111208

Figure 8

1. Gear cover

12. Install the engine rotating tool.

NOTE!

The teeth of the rotation tool must mesh fully with the teeth of the flywheel gear.



V1111209

Figure 9

1. 9998681 Rotation tool

13. Setting engine to valve overlap

Turn the engine using the rotation tool until the valve overlap of cylinder 1 is reached.

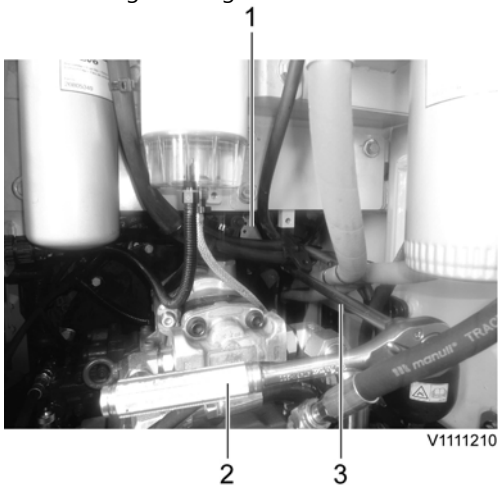


Figure 10

1. 9998681 Rotation tool
2. Handle
3. Extension bar

14. Crank the engine, clockwise, to a position where the valves on the cylinder number 1 (closest to the flywheel side) overlap.

Overlapping means that the exhaust valve is about to open and the inlet valve is about to close. In this position is should not be possible to rotate any of the push rods by hands for the cylinder in question.

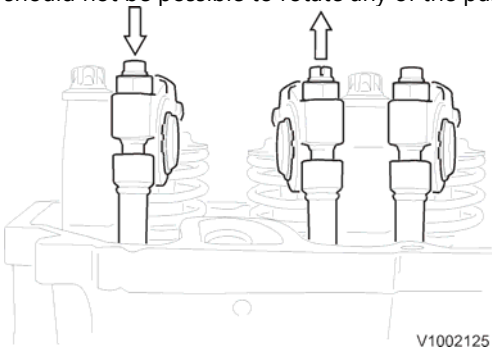


Figure 11
Overlapping

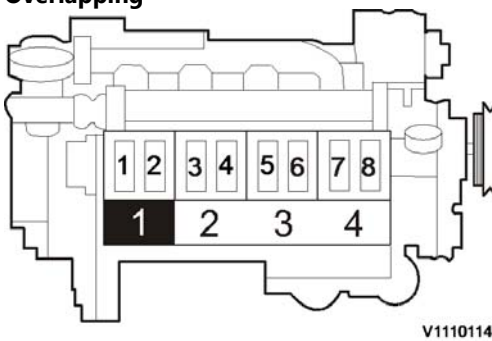


Figure 12

- 1, 3, 5, 7 are exhaust valves
2, 4, 6, 8 are inlet valves

15. Adjust the valve clearance for each cylinder according to the black markings in the figure. Procedure for adjusting:

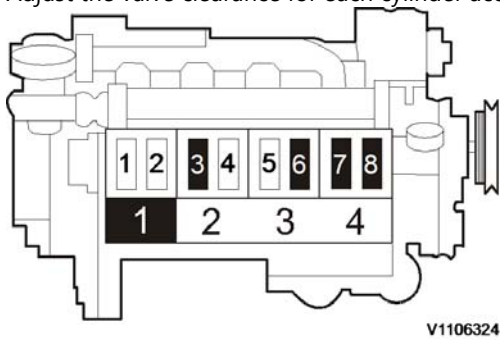


Figure 13
Setting schematic overlap cylinder 1 (located on the flywheel side)

1. Loosen the adjusting screw's lock bolt on the rocker arm.

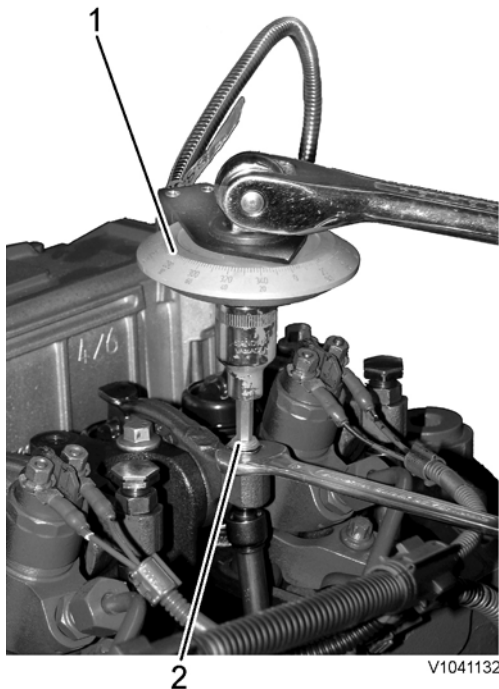


Figure 14

1. 885812 Timing tool
 2. Adjusting screw
2. Install the protractor on the adjusting screw.
 3. Turn the adjusting screw until zero clearance is obtained between rocker arm and valve. Reset the protractor to zero.
 4. Turn the adjusting screw counterclockwise 75° for inlet valve and 120° for exhaust valve.
 5. Hold the adjusting screw and tighten the lock nut at the same time. Tightening torque: see [210 Engine, tighten torques](#)
16. Rotate the crankshaft another full turn until the valves for cylinder 4 overlap. Adjust the valve clearance for each cylinder according to the black markings in the figure.

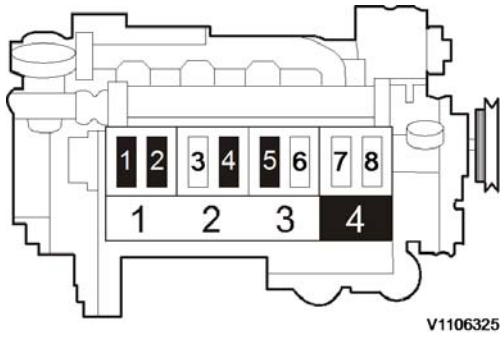


Figure 15
Setting schematic overlap cylinder 4

Assembly

17. For assembly, reverse disassembly procedure.

NOTE!

Do not reuse the O-rings and gasket.

18. After the completion of the work, start the engine and check for leaks and operating condition.

Document Title: Oil level sensor, changing	Function Group: 217	Information Type: Service Information	Date: 2015/2/28
Profile: EXC, EC160D L [GB]			

Oil level sensor, changing

Op nbr 217-005



Risk of burns - stop the diesel engine and allow it to cool down before starting any work.

NOTE!

Cable ties and clamps that secure hoses and electrical wiring must be removed and then replaced when installing.

1. Place the machine in the service position B. See [091 Service positions](#)
2. Turn the battery disconnect switch to off position.
3. Remove the engine room under covers.

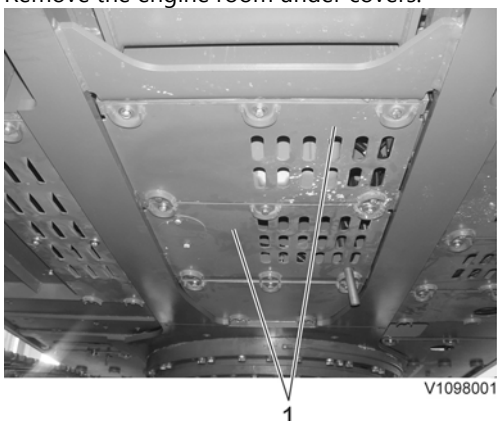


Figure 1

1. Engine room under cover
4. Open the oil drain valve cap and install the engine oil drain hose and then allow the oil to drain from the engine into a suitable collection container.



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