

Document Title: Engine, description	Function Group: 200	Information Type: Service Information	Date: 2015/2/12
Profile: EXC, EC300D LD [GB]			

Engine, description

Engine D8H is a straight six-cylinder, four-stroke, turbocharged diesel engine with direct injection and intercooler. The engine meets governing legislation according to Tier 4 interim for exhaust emissions.

The engine features a Common Rail Fuel System controlled by the Engine Electronic Control Unit (E-ECU). The engine with ACT (Advanced Combustion Technology) features split injection and turbocharger with mechanical wastegate. The Exhaust Aftertreatment System (EATS) is equipped with a Diesel Oxidation Catalyst (DOC) and a Diesel Particulate Filter (DPF) to reduce the particulate content in the exhausts. Cooled Exhaust Gas Recirculation (EGR) reduces NO_x contents and reduces emissions. All electronic functions in the engine are controlled by Volvo's Engine Management System, EMS2.2.

For more information, see:

- [220 Lubrication system, description](#)
- [230 Fuel system, description](#)
- [250 Inlet and exhaust system, description](#)
- [254 Exhaust Aftertreatment System, description](#)
- [255 Turbocharger, description](#)
- [260 Cooling system, description](#)
- [293 Exhaust Gas Recirculation \(EGR\), description](#)

The cylinders are numbered in sequence, starting at the flywheel. Ignition order: 1-5-3-6-2-4. The engine's rotational direction is counter-clockwise, seen from the flywheel side.

Engine identification

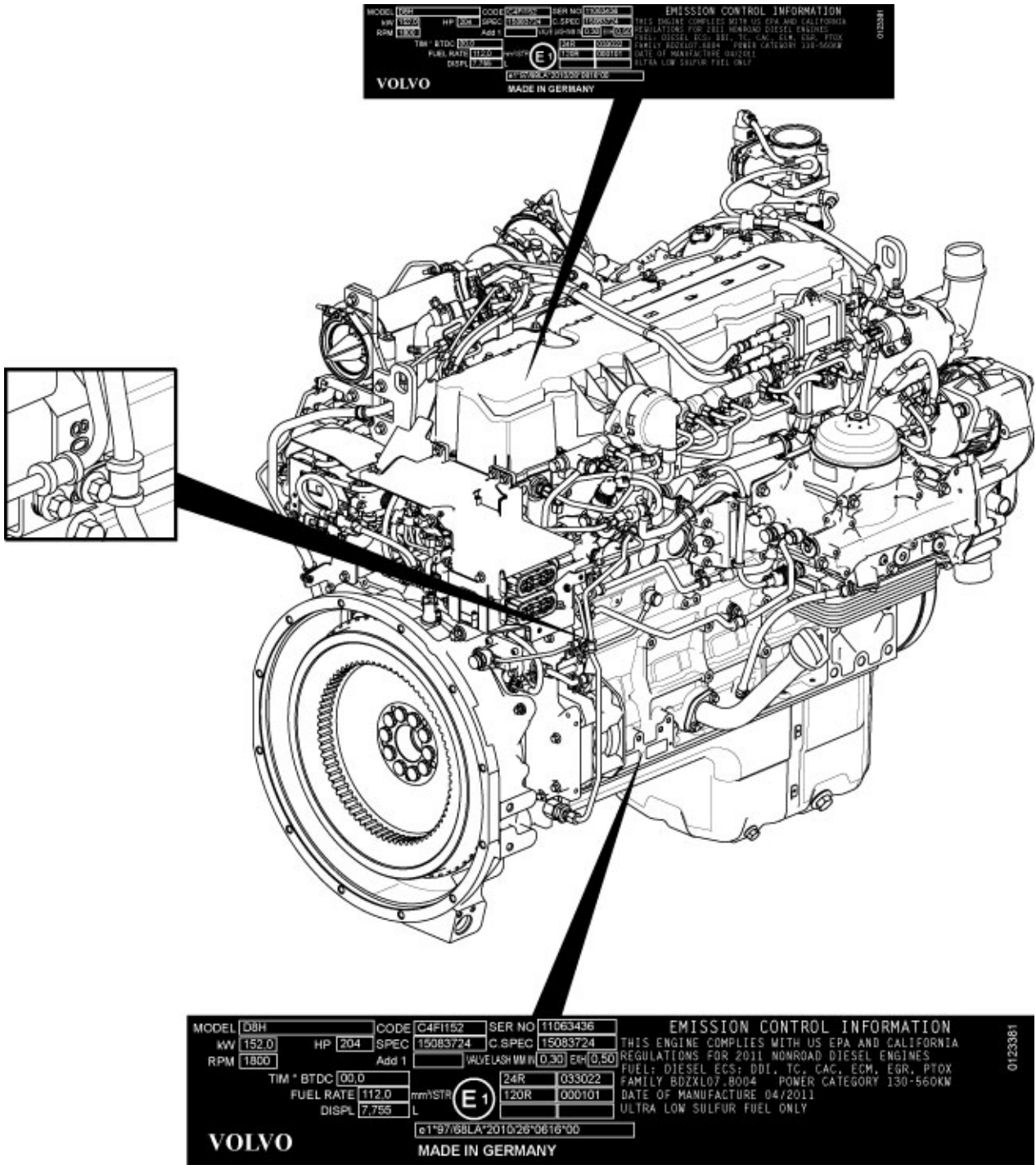


Figure 1
Identification plates

The engine's serial number is stamped on the cylinder block's side. The identification plates on the cylinder block's side and on the valve cover contain model designation, serial number, manufacturing country, recommended fuels, and so on. The identification plates also include emission-related supplementary information. The engine's model designation and serial number must be indicated when ordering spare parts.

Engine protection

The ECU contains functionality designed to protect the engine from damage during extreme operating conditions or from further damage when an essential engine component fails. There are several proactive functions, and different applications have different functions activated. The functions that can be activated are:

- High coolant temperature

- High inlet manifold air pressure
- High inlet manifold air temperature
- High oil temperature
- Low oil pressure
- Low coolant level
- High temperature of cooled EGR exhausts after the EGR-cooler
- High crankcase pressure
- High temperature of EGR actuator
- High soot load
- High differential pressure across Diesel Particulate Filter (DPF)
- High exhaust temperature
- High ECU temperature
- High DPF temperature
- EATS air pump failure

Various protective actions such as warning lights, engine torque reduction, engine speed limitation, and vehicle speed limitation may be taken when the above functions reach dangerous levels that may damage the engine. In order to always allow the operator to move a machine away from an unsafe situation, there is a delay of at least 30 seconds before the protective actions (such as forced idle and forced shutdown) are activated after a Key-ON. If the engine has been forced to shut down or forced to idle due to an active engine protection function, the operator can obtain a 30 second delay by powering down the EMS with a Key-OFF for 7 seconds and then a Key-ON (the EMS is powered down by the Vehicle-ECU (V-ECU) after the ignition key has been in its OFF position for approx. 7 seconds). In addition to the above protective functions, other software functions may request engine protection, such as:

- High Altitude (ensures that high compressor charge-air temperature is never reached)
- Low Coolant Temp
- Crank Sensor Failure
- Gear Ratio
- Regeneration

Warning lights

There are two levels for warning lights, an amber caution light and a red stop light.

- The **amber light** indicates a warning situation
- The **red light** indicates that the vehicle must be stopped.

For more information, see [387 Central warning](#).

Forced Idle

The engine can be forced to idle speed by the engine protection function. Forced idle is active until conditions triggering the problem are back within the normal working range or the EMS is powered down.

Engine shutdown

The engine can be forced to shut down after conditions have reached levels that may cause engine failure and the machine speed is below a specified value.

Machine speed and engine speed limits

The engine protection function can limit the machine's speed and/or the engine's rpm.

Levels of engine protection

Available proactive functions depend not only on the application but also on what level of protection has been activated for the specific machine. Two levels of engine protection are offered; the standard level is Basic protection and the optional level is Extended protection. The general difference between basic and extended engine protection is that no active actions such as forced idle and forced shutdown will be taken in basic engine protection (with the exception of crankcase pressure that can cause shutdown in either setup). Warnings will be given to the operator regardless of engine protection level.

Parameters

- (MCJ) Trimcode CRIN 3.3 injector cylinder 1
- (MCK) Trimcode CRIN 3.3 injector cylinder 2
- (MCL) Trimcode CRIN 3.3 injector cylinder 3
- (MCM) Trimcode CRIN 3.3 injector cylinder 4
- (MCN) Trimcode CRIN 3.3 injector cylinder 5

- (MCO) Trimcode CRIN 3.3 injector cylinder 6
- (FAU) Automatic engine shut off
- (FAV) Automatic engine shut off, time
- (YA) Idle speed, setting

Supplementary information

- [200 Component locations](#)

Function check

- 17030-3 Parameter, programming

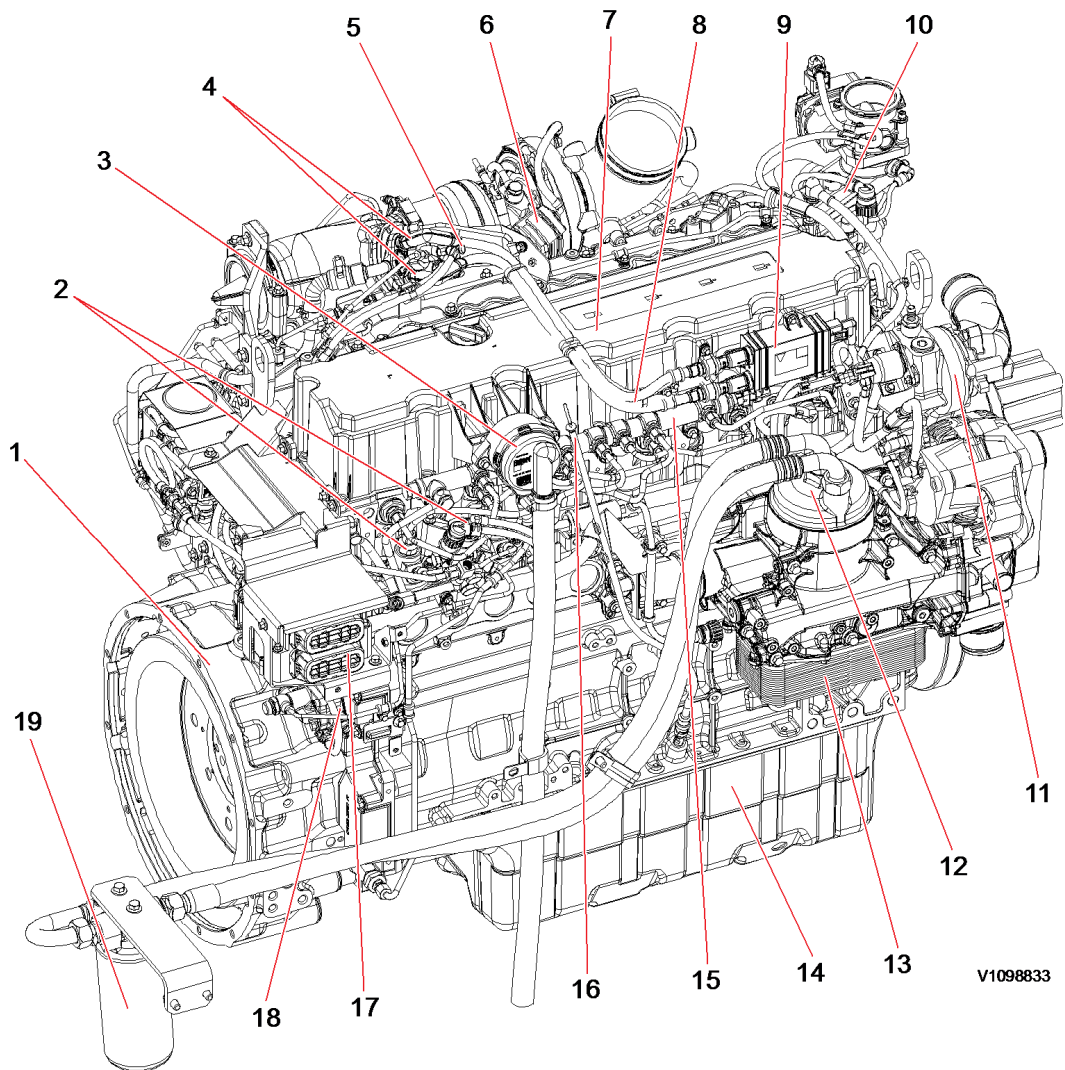
Diagnostics

Detailed information about the following relevant warnings and error codes is available under the diagnostics tab.

Component	Control unit	Message ID
FX1006	MID128	PID98
	MID128	PID175
SE2203	MID128	PID100
SE2302	MID128	PID97
SE2507	MID128	PID105
SE2508	MID128	PID102
SE2516	MID128	PID412
SE2519	MID128	PID81
SE2603	MID128	PID111
SE2606	MID128	PID110
E-ECU temperature	MID128	PPID55
Emergency stop (Engine shutdown)	MID128	PPID235
Soot load	MID128	PPID326

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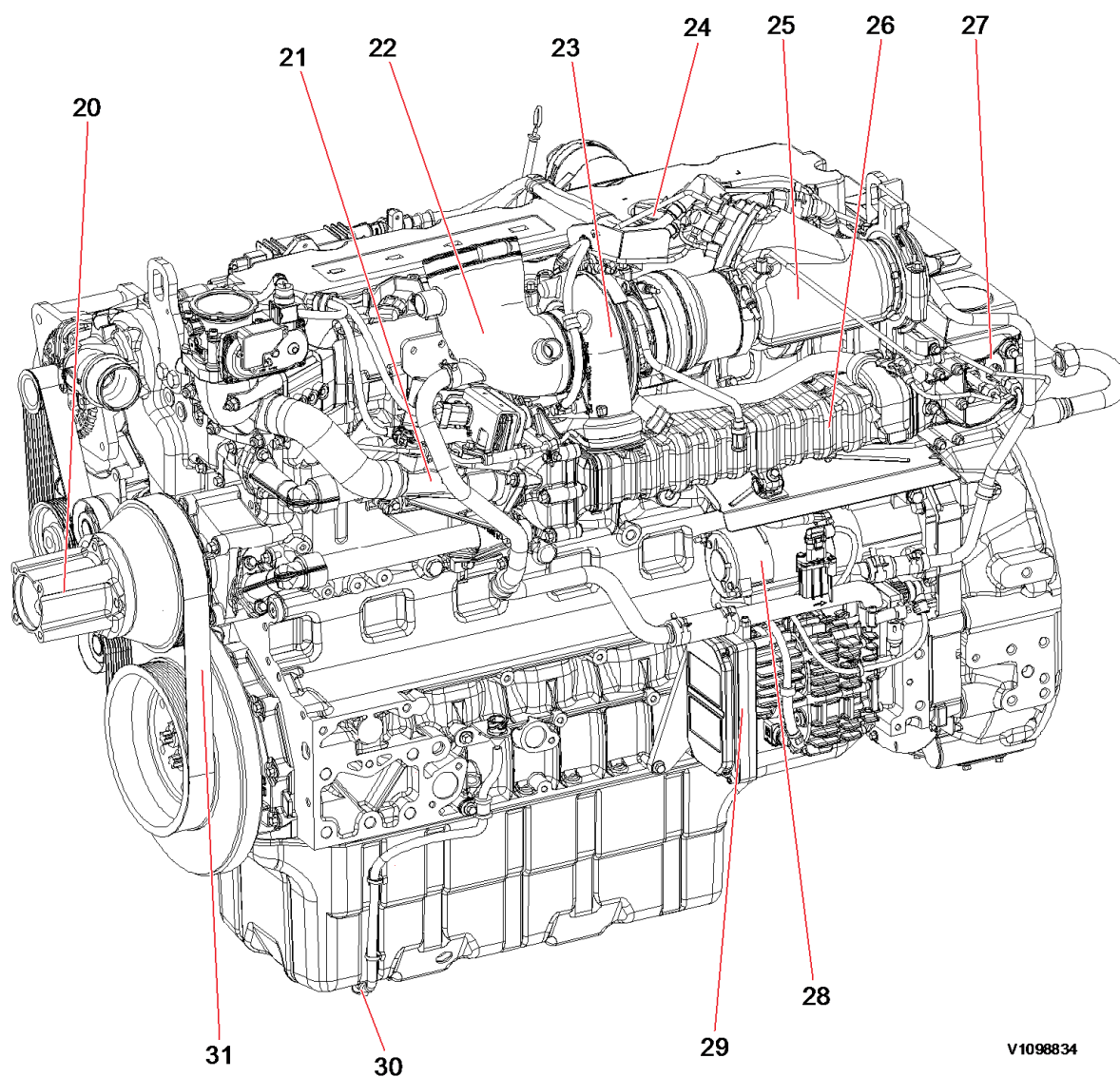
Component locations



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Figure 1
Engine, front side

1	Flywheel housing	11	Thermostat housing
2	High pressure fuel pump	12	Engine oil remote port
3	Crankcase ventilation duct	13	Engine oil cooler
4	Spark plug	14	Oil pan
5	Glow plug	15	Common rail
6	Turbocharger waste-gate	16	Dipstick gauge
7	Valve cover	17	ECU connecting port
8	Spark plug cable	18	Fuel feed pump
9	Spark plug control unit	19	Engine oil filter



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Figure 2
Engine, back side

20	Fan pulley	26	EGR cooler
21	EGR Venturi tube	27	EGR actuator
22	Air intake tube	28	Starter motor
23	Turbocharger	29	Electric air pump
24	Engine oil filling port	30	Engine oil level sensor
25	Partial flowburner	31	Fan belt

Document Title: E-ECU, MID 128, changing non-programmed ECU	Function Group: 200	Information Type: Service Information	Date: 2015/2/12
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E-ECU, MID 128, changing non-programmed ECU

Op nbr 200-068

1. Park the machine in the service position A, see [091 Service positions](#).
2. Turn OFF the battery disconnect switch.
3. Download software to VCADS Pro computer for target machine.
4. Connect the VCADS Pro computer to the machine, and perform the operation '28423-7 MID 128 control unit, programming'.
5. When VCADS Pro 'MID 128 ECU, programming' window appears, follow the instructions for replacing E-ECU.
6. Disconnect the wiring harness connectors from E-ECU and remove 2 screws fixing the clamps.

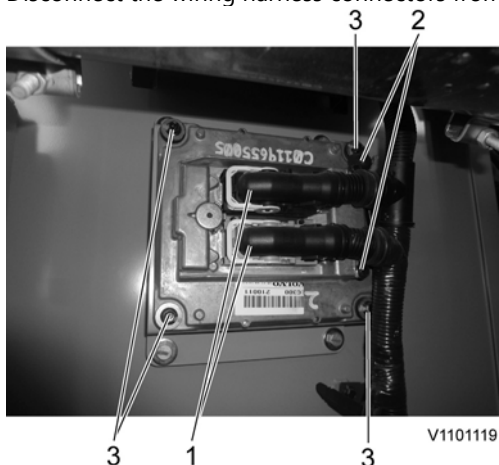


Figure 1

1. Connector
2. Screw
3. Screw

NOTE!

Pull up the locking device to disconnect the connector.

7. Remove 4 screws fixing the E-ECU.
8. Install new E-ECU, and tighten 4 screws.
9. Connect the wiring harness connectors to the E-ECU and tighten 2 screws fixing the clamps.
10. After replacing E-ECU, press OK button of VCADS Pro operation '28423-7 MID 128 control unit, programming'.

Now VCADS Pro starts the programming of software and parameters to the new E-ECU.

NOTE!

If not able to read out the parameters with the program operation, the VCADS Pro operation 25438-8 "Nox sensor, age compensation, reset" has to be performed.

Document Title: E-ECU, MID 128, changing pre-programmed ECU	Function Group: 200	Information Type: Service Information	Date: 2015/2/12
Profile: EXC, EC300D LD [GB]			

E-ECU, MID 128, changing pre-programmed ECU

Op nbr 200-070

1. Park the machine in the service position A, see [091 Service positions](#).
2. Turn OFF the battery disconnect switch.
3. Connect VCADS Pro computer to the machine, and perform the operation '17030-3 Parameter, programming'.
4. Use the function 'save all parameters to job card'.
5. Disconnect the wiring harness connectors from E-ECU and remove 2 screws fixing the clamps.

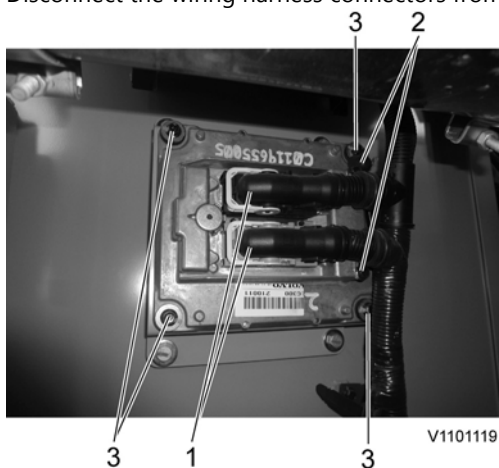


Figure 1

1. Connector
2. Screw
3. Screw

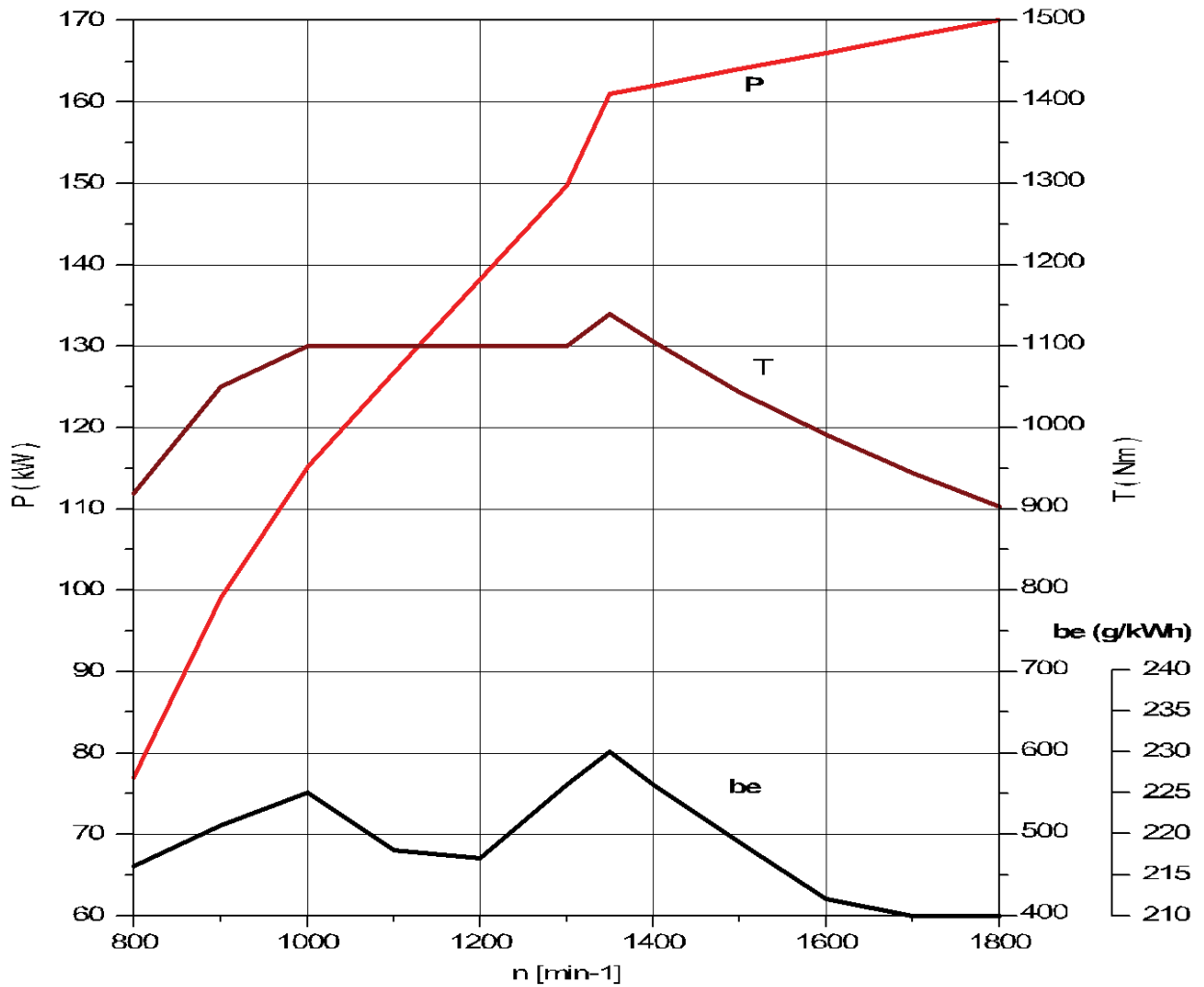
NOTE!

Pull up the locking device to disconnect the connector.

6. Remove 4 screws fixing the E-ECU.
7. Install new E-ECU, and tighten 4 screws fixing the E-ECU.
8. Connect the wiring harness connectors to the E-ECU and tighten 2 screws fixing the clamps.
9. Connect VCADS Pro computer to the machine, and perform the operation 17030-3 Parameter, programming'. Now the customer parameters are changed according to the job card saved at step 2.
10. Perform VCADS Pro operation 25438-8 "Nox sensor, age compensation, reset".

Document Title: Engine characteristic curve	Function Group: 210	Information Type: Service Information	Date: 2015/2/12
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Engine characteristic curve



V1098835

Figure 1
Engine characteristic curve, ISO 14396 Gross power

P	Output power
rpm	Engine speed
T	Torque
be	Fuel consumption

Document Title: Engine, removing	Function Group: 210	Information Type: Service Information	Date: 2015/2/12
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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 DPF hood and the radiator hood.

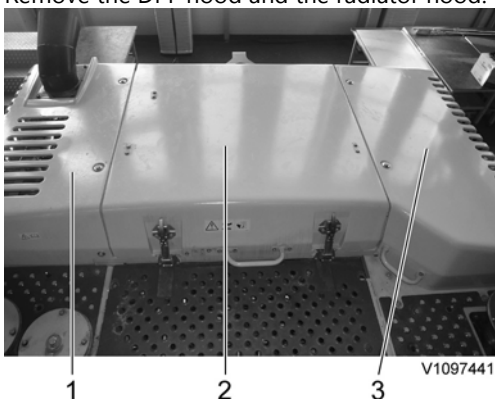


Figure 1

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



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Figure 2

6. Remove the air inlet hose and expansion tank hose.

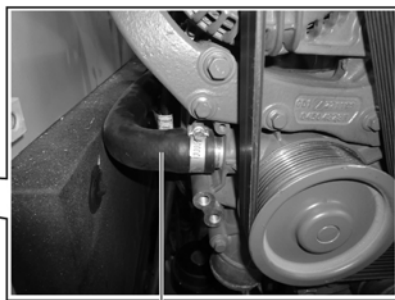
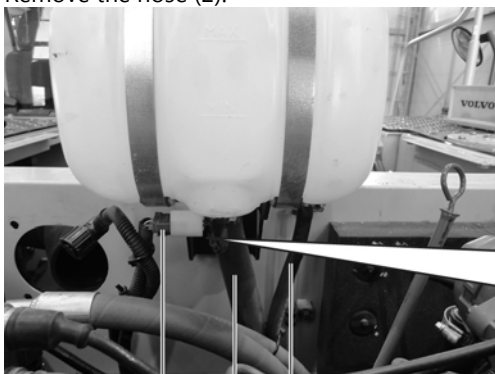


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Figure 3

1. Air inlet hose
2. Expansion tank hose

7. Disconnect wire harness connector and the hose (3) from the expansion tank.
Remove the hose (2).



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Figure 4

1. Wire harness connector
2. Hose

8. Remove the expansion tank with a bracket.

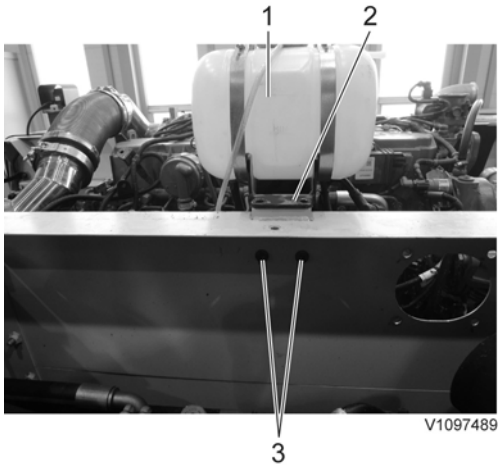


Figure 5

1. Coolant expansion tank
2. Bracket
3. Screw

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

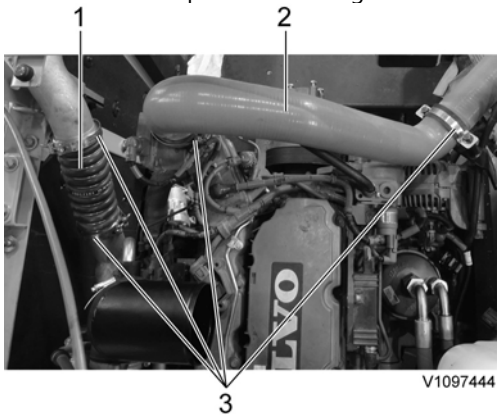


Figure 6

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

10. Remove the radiator under cover and the engine room under covers.



Figure 7

1. Radiator under cover
2. Engine room under cover

11. Remove the clamps and the radiator hoses.



Figure 8

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

12. Remove the cooling fan guard.

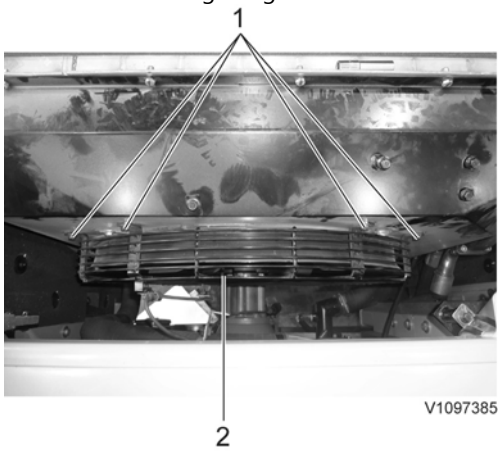


Figure 9

1. Screw
2. Cooling fan guard

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

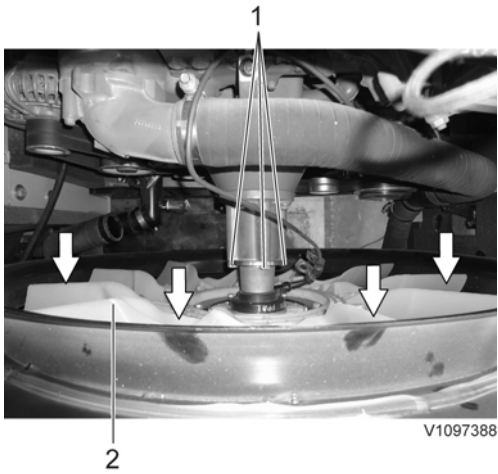


Figure 10

1. Screw
2. Cooling fan

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

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

NOTE!

Ports must be plugged after disassembling hoses.

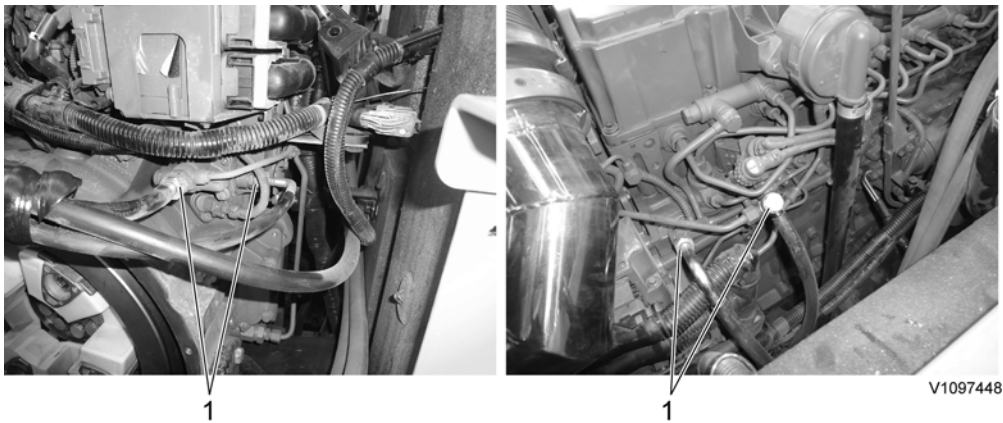


Figure 11

1. Fuel hose

16. Remove the air conditioner compressor belt.



Figure 12

17. Disconnect the wire harness, 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.

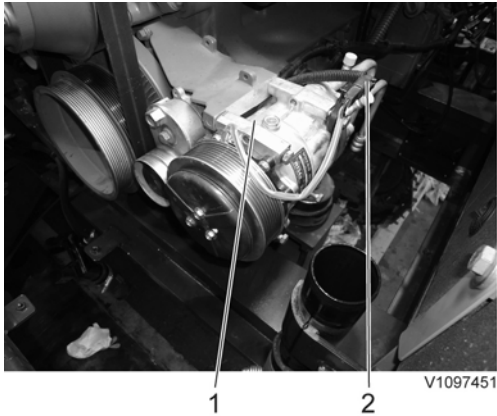


Figure 13

1. Air conditioner compressor
2. Wire harness

18. Disconnect the engine oil remote hoses.



Figure 14

1. Engine oil remote hose

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

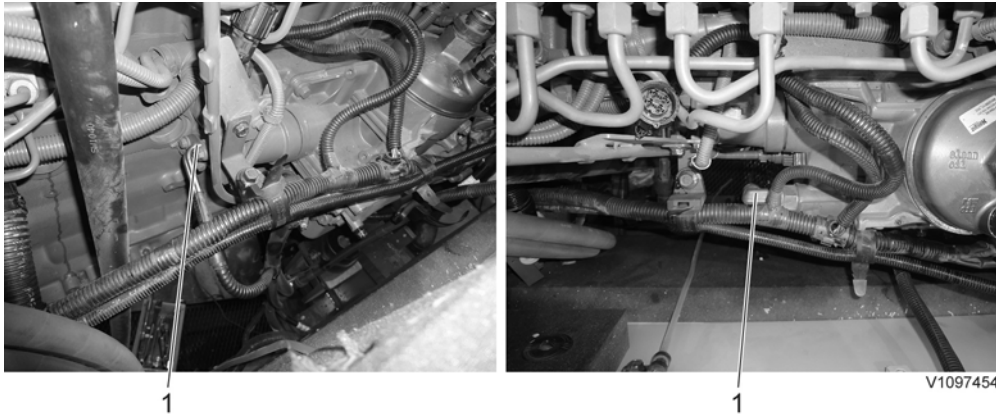


Figure 15

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

20. Remove the clamp

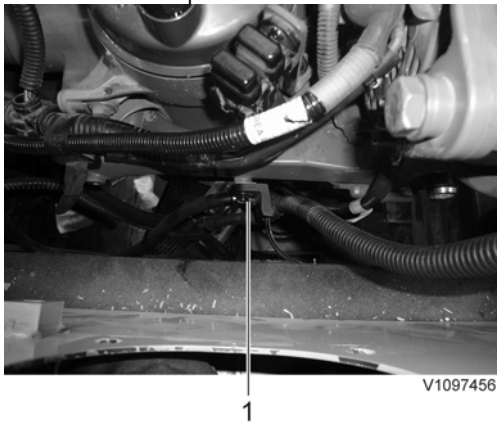


Figure 16

1. Clamp

21. Disconnect the starter motor wire harness.

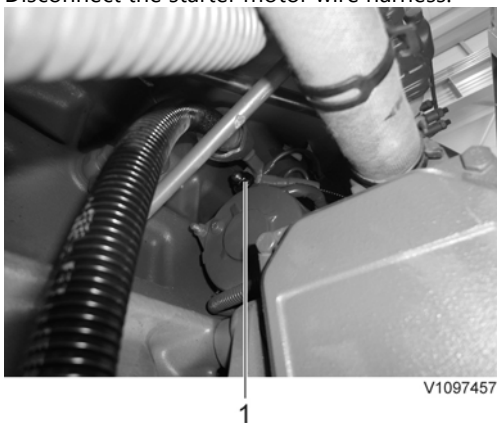


Figure 17

1. Starter motor wire harness

22. Disconnect the engine ground wire.

Thank you very much for reading.

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