

Document Title: Engine, description	Function Group: 200	Information Type: Service Information	Date: 2014/7/4 0
Profile: EXC, EW140C [GB]			

Engine, description

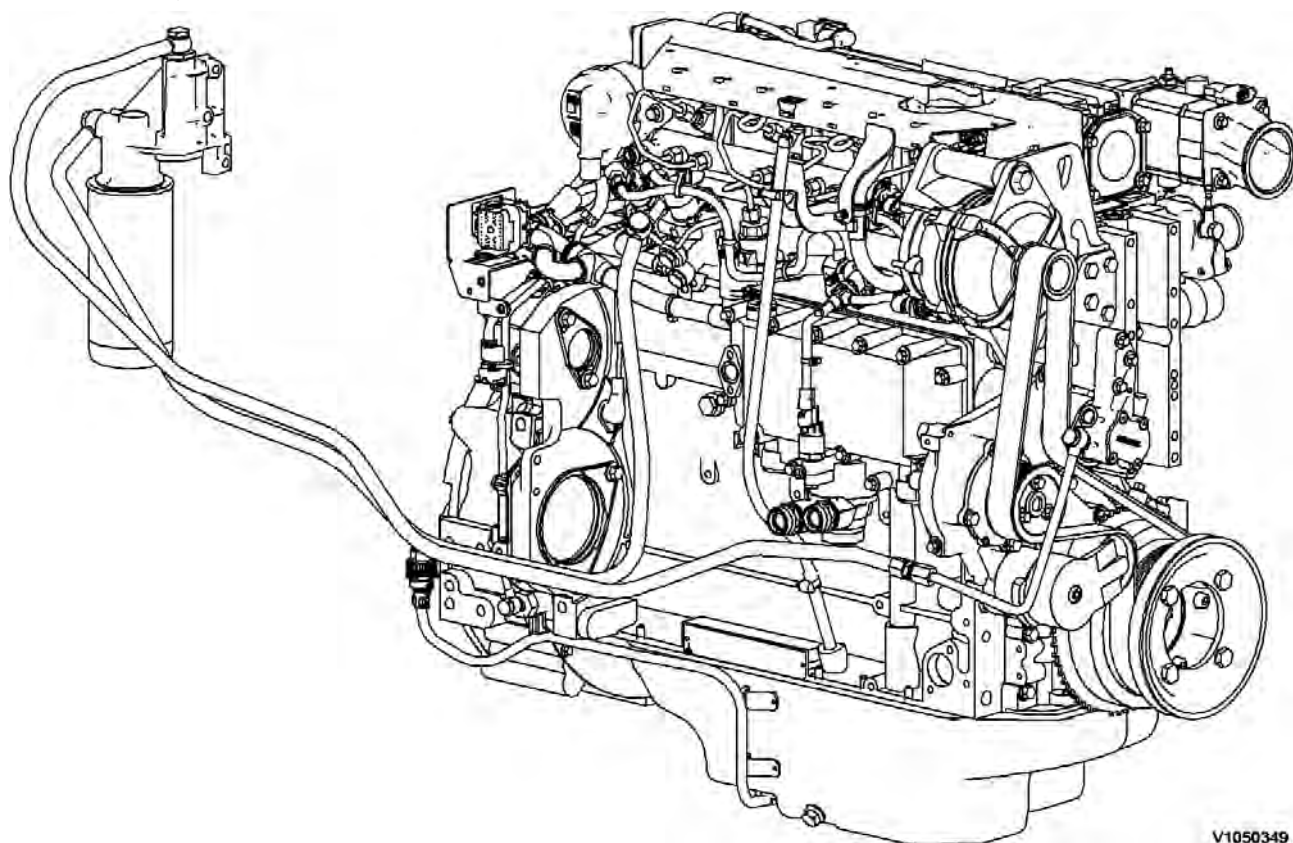
D5E - tier 3 compliant

The D5E configuration is a four stroke, straight four cylinder, turbocharged, direct injected diesel engine with charge air cooling and wet, replaceable cylinder liners.

The D5E engine uses a Common Rail Fuel System controlled by the engine electronic control (E-ECU) software.

Electronically controlled IEGR (Internal Exhaust Gas Recirculation) reduces NO_x formation and lowers emissions without the need for exhaust after treatment. Volvo's latest engine management system, E-ECU is used to control all engine electronic functions.

The cylinders are numbered consecutively beginning at the flywheel end. Engine rotational direction is counterclockwise as seen from the flywheel end.



V1050349

Figure 1
Engine, D5E

Document Title: Engine, identification	Function Group: 200	Information Type: Service Information	Date: 2014/7/4 0
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Engine, identification

Identification plate

The engine model, serial number and performance data are stamped on an identification plate which is attached on the cylinder head cover. The engine model designation and serial number must be indicated when ordering spare parts.

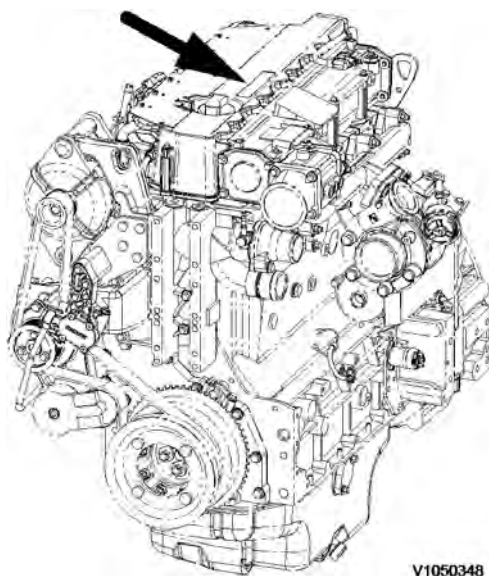
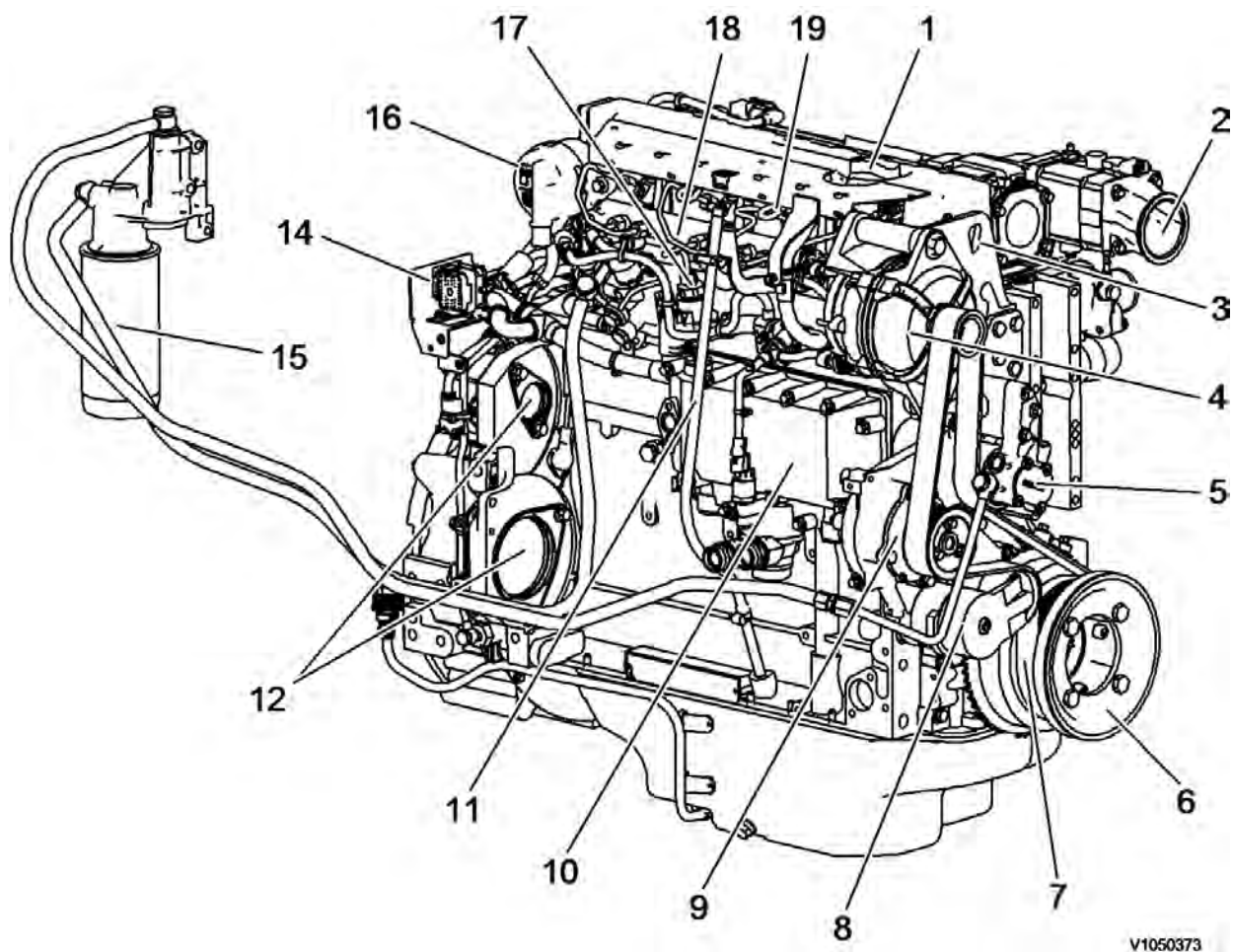


Figure 1
Engine identification

Document Title: Component locations	Function Group: 200	Information Type: Service Information	Date: 2014/7/4 0
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Component locations

The following figures show the position of a number of components on engine D5E.



V1050373

Figure 1
Component locations, front side

1	Engine oil filler	11	Oil dipstick
2	Air inlet	12	Power take off
3	Transport eye	13	Engine oil filter
4	Alternator	14	Connection to E-ECU
5	Fuel feed pump	15	Fuel filter
6	V-rib belt drive on crankshaft	16	Crankcase bleeding valve
7	V-rib belt	17	High pressure fuel pump
8	Automatic belt tensioner	18	Common rail
9	Coolant pump	19	Injector
10	Engine oil cooler		

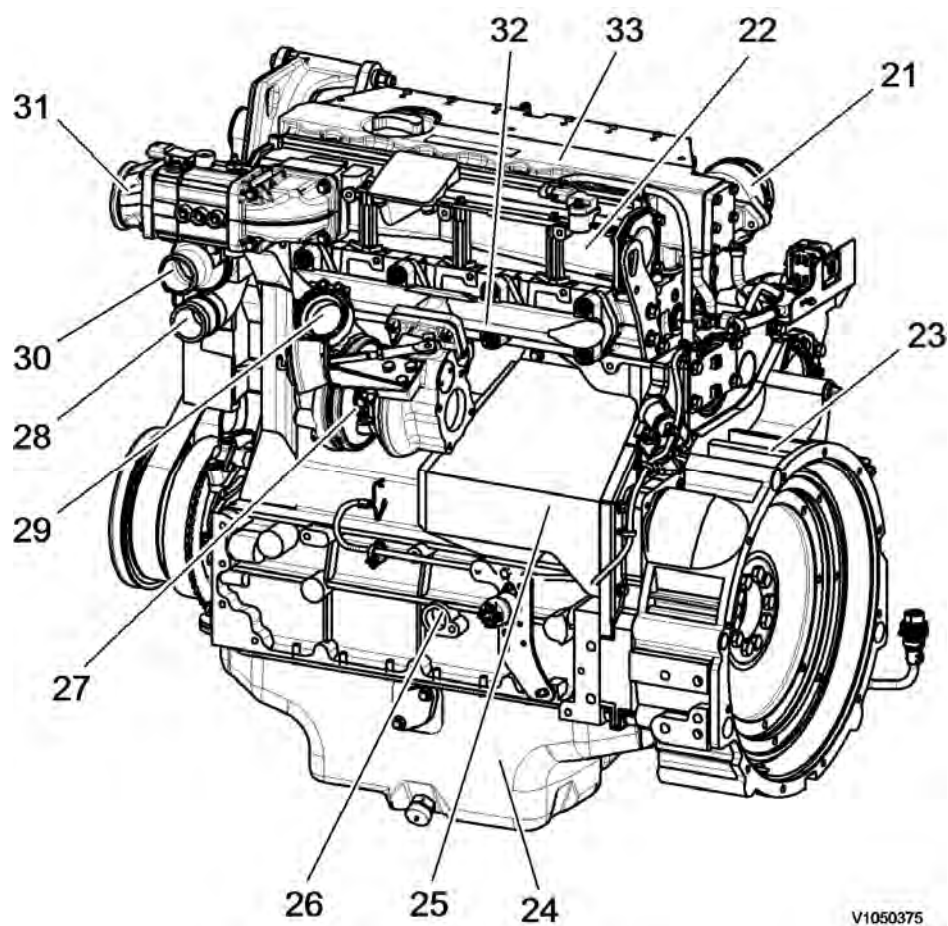


Figure 2
Component locations, flywheel side

21	Crankcase bleeding valve	28	Coolant inlet
22	Charge air manifold	29	Air outlet (to charge air cooler)
23	Flywheel housing	30	Coolant outlet
24	Oil pan	31	Air inlet (from charge air cooler)
25	Starter motor	32	Exhaust manifold
26	Oil return line from turbocharger	33	Cylinder rocker arm cover
27	Turbocharger		

Document Title: Engine, tightening torques	Function Group: 200	Information Type: Service Information	Date: 2014/7/4 0
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Engine, tightening torques

NOTICE

Regarding bolted joints which are not listed here, see “Volvo standard tightening torques”

Engine mounting, tightening torque	
Flywheel case – hydraulic pump flange	60 Nm (44 lbf ft)
Flywheel – hydraulic pump coupling hub (M10 x 35)	46 Nm (34 lbf ft)
Engine mounting bracket – engine member (M12 x 40) NOTE! Apply Loctite 275 to the threaded area of the screw.	115 Nm (85 lbf ft)
Engine mounting bracket – engine member (M16 x 50) NOTE! Apply Loctite 275 to the threaded area of the screw.	295 Nm (218 lbf ft)
Engine mount, rubber pads – engine mounting bracket	690 Nm (611 lbf ft)

Engine, tightening torque	
Cylinder head on crankcase	Step 1: 50 Nm (37 lbf ft) Step 2: 130 Nm (96.2 lbf ft) +90°
Rocker arm bracket on cylinder head	30 Nm (22.2 lbf ft)
Lock nut valve clearance adjusting screw	20 Nm (14.8 lbf ft)
Cylinder head cover on cylinder head	13 Nm (9.6 lbf ft)
Exhaust return module on cylinder head	30 Nm (22.2 lbf ft)
Lock nut adjusting screw on exhaust return module	20 Nm (14.8 lbf ft)
Solenoid valve on cylinder head	24 Nm (17.8 lbf ft)
Front cover on crankcase	Step 1: 3 Nm (2.2 lbf ft) Step 2: 21 Nm (15.5 lbf ft)
Oil sump on crankcase	30 Nm (22.2 lbf ft)
Quick coupler for draining	55 Nm (40.7 lbf ft)
Crankcase ventilation on cylinder head cover	20 Nm (14.8 lbf ft)
Flywheel housing to crankcase (M16 x 140)	Step 1: 99 Nm (73.3 lbf ft) Step 2: 243 Nm (179.8 lbf ft)
Flywheel housing to crankcase (M12 x 150)	99 Nm (73.3 lbf ft)
Cover plate to flywheel housing	9 Nm (6.7 lbf ft)
Gear case on crankcase (M8 x 55)	20 Nm (14.8 lbf ft)
Gear case on crankcase (M8 x 55)	20 Nm (14.8 lbf ft)
Gear case on crankcase (M16 x 6)	70 Nm (51.8 lbf ft)
Impulse transmitter (crankshaft) on holder on front cover	9 Nm (6.7 lbf ft)
Impulse transmitter (camshaft) on gearcase	9 Nm (6.7 lbf ft)
Impulse transmitter holder on front cover	20 Nm (14.8 lbf ft)
Tooth lock washer on V-belt pulley	60 Nm (44.4 lbf ft)
Exhaust manifold on cylinder head	25 Nm (18.5 lbf ft)

Turbocharger on exhaust pipe	40 Nm (30 lbf ft)
Charge air line on cylinder head	11 Nm (8.1 lbf ft)
Charge air manifold on charge air pipe	30 Nm (22.2 lbf ft)
Clamping shoe injector on cylinder head	16 Nm (11.8 lbf ft)
Injection lines on rail and injector, high pressure line on high-pressure pump	25 Nm (18.5 lbf ft)
Fuel supply pump on holder	20 Nm (14.8 lbf ft)
High pressure pump on crankcase	Step 1: 10 Nm (7.4 lbf ft) Step 2: 50 Nm (37.0 lbf ft)
Fuel control valve on crankcase	30 Nm (22.2 lbf ft)
Fuel pipe on high pressure pump	26 Nm (19.2 lbf ft)
Rail on cylinder head	30 Nm (22.2 lbf ft)
Pressure relief valve on rail	100 Nm (74.0 lbf ft)
Rail pressure sensor on rail	40 Nm (29.6 lbf ft)
Fuel supply pipe on control block	49 Nm (36.3 lbf ft)
Fuel return pipe on rail	39 Nm (28.9 lbf ft)
Fuel return pipe on control block	49 Nm (36.3 lbf ft)
Fuel return pipe on cylinder head	29 Nm (21.5 lbf ft)
Fuel pressure sensor	30 Nm (22.2 lbf ft)
Oil suction intake pipe	22 Nm (16.3 lbf ft)
Lubrication oil line on turbocharger	39 Nm (28.9 lbf ft)
Lubrication oil return pipe on turbocharger	20 Nm (14.8 lbf ft)
Oil return pipe on crankcase	20 Nm (14.8 lbf ft)
Oil cooler housing on crankcase	Step 1: 3 Nm (2.2 lbf ft) Step 2: 30 Nm (22.2 lbf ft)
Oil cooler on oil cooler housing	Step 1: 80 Nm (59.2 lbf ft) Step 2: 160 Nm (118.4 lbf ft)
Locking screw on oil cooler housing	80 Nm (59.2 lbf ft)
Lubrication oil pressure switch on oil cooler housing	30 Nm (22.2 lbf ft)
Coolant thermostat housing on cylinder head	30 Nm (22.2 lbf ft)
Outlet nozzle on coolant thermostat housing	30 Nm (22.2 lbf ft)
Coolant pump on fan console	30 Nm (22.2 lbf ft)
V-belt pulley on coolant pump	30 Nm (22.2 lbf ft)
V-belt pulley on V-belt pulley	30 Nm (22.2 lbf ft)
Coolant temperature sensor on cylinder head	22 Nm (16.3 lbf ft)
Oil level sensor on oil pan	110 Nm (81.4 lbf ft)

Document Title: Engine, replacing	Function Group: 210	Information Type: Service Information	Date: 2014/7/4 0
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Engine, replacing

Op nbr 210-076

[9998547 Lifting tool](#)

WARNING

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

WARNING

Hot oil and hot engine coolant can cause severe burns!

WARNING

The parts are heavy. Take appropriate safety cautions when handling them.

1. **Engine removal**

Park the machine in service position B, see [091 Service positions](#).

2. Remove the counterweight, see [716 Counterweight, removing](#).

3. Remove engine hood (1).

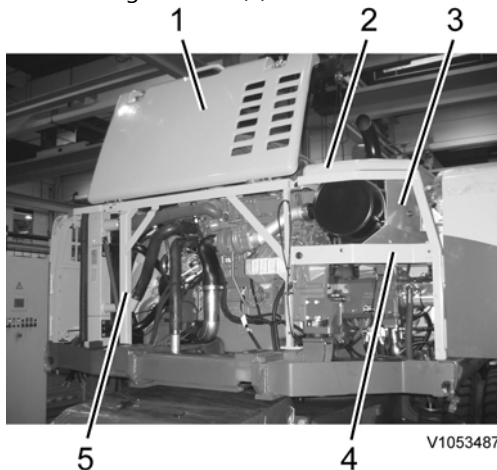


Figure 1
Rear side frame, removal

4. Remove silencer hood (2).

5. Remove silencer undercover (3).

6. Remove right side door frame with door (4).

7. Remove rear side frame (5).

8. Drain the hydraulic oil, see [173 Maintenance service, every 4000 hours](#).
9. Drain the engine coolant, see [173 Maintenance service, every 6000 hours](#).
10. Remove the coolant expansion tank, see [261 Expansion tank, replacing](#).
11. Disconnect charge air hoses (2 and 3), coolant hoses (4 and 6) and air inlet hose (5) from cooling unit (1) side.

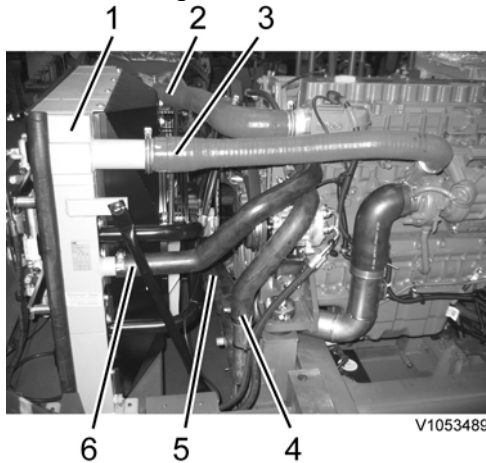


Figure 2
Cooling unit, disconnection

12. **NOTICE**
Refrigerant under pressure. Do not disconnect any hoses or connections on the air conditioning, thereby involuntarily releasing refrigerant.

Loosen belt tension adjusting nuts (2 and 3) and screw (1).

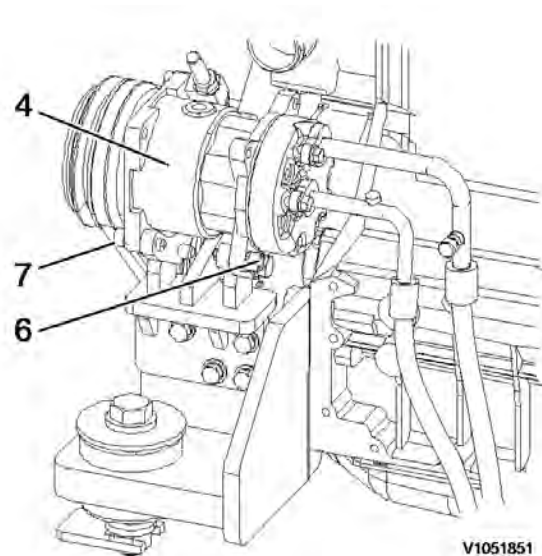
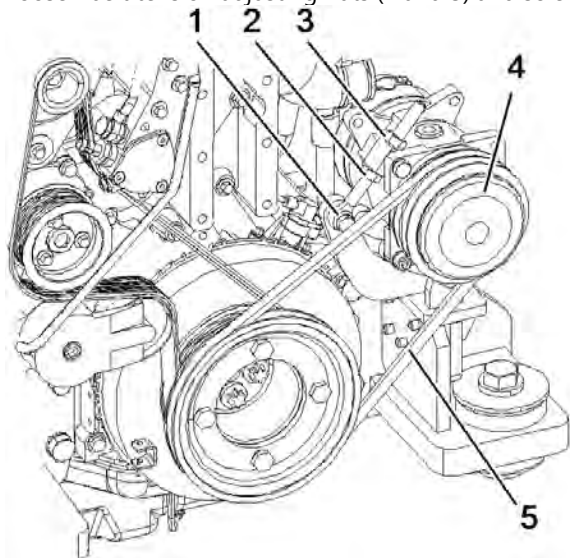


Figure 3
Air conditioner compressor

13. Remove air conditioner compressor belt (5).
14. Undo screws (6 and 7), and disconnect air conditioner compressor (4) from the engine.
15. Unplug connector (1) for E-ECU and wire harness connector (5).

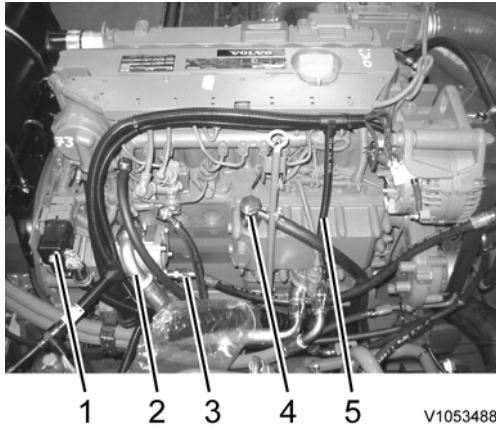


Figure 4
Engine connections

16. Disconnect hydraulic hoses (2 and 3) from the cooling fan pump. Plug open connections.
17. Disconnect coolant hose (4) from the engine oil cooler. Plug open connections.
18. Disconnect fuel supply line (1) and return line (2). Plug open connections.

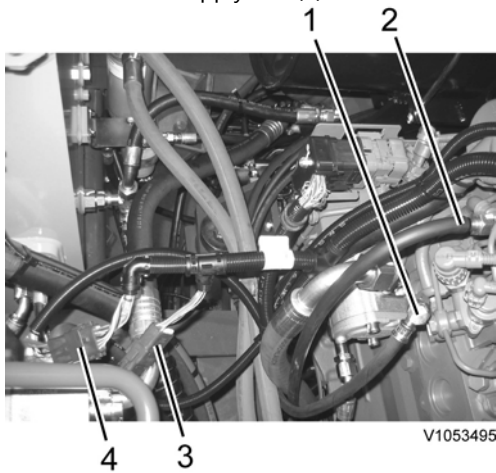


Figure 5
Fuel line connections

19. Disconnect wire harness connectors (3 and 4).
20. Disconnect air preheating cable (1), starter motor cable (2) and ground cable (3) from the engine.

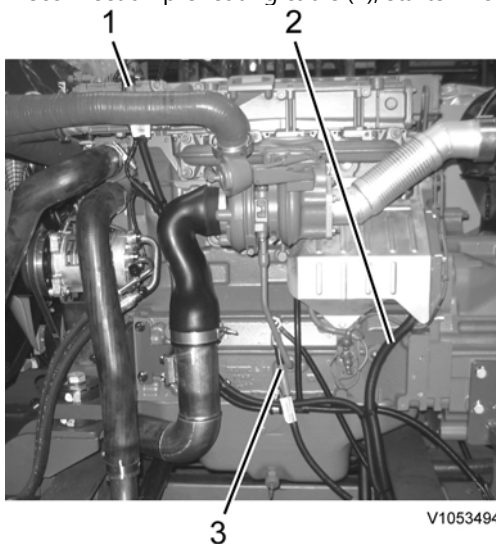


Figure 6
Engine wire harness

21. Disconnect wire harness connector (1) and hydraulic hoses (2, 3, 4, 7, 8 and 9) from the hydraulic pump. Plug open connections.

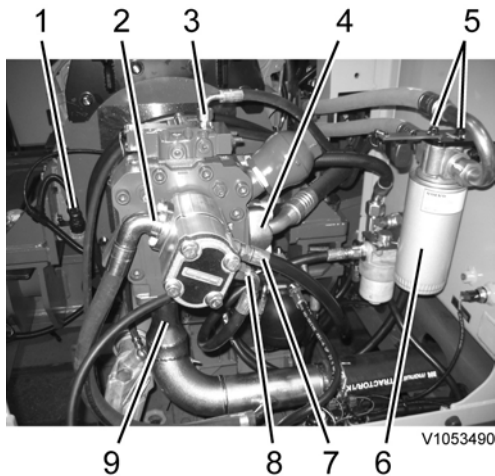


Figure 7
Pump connections

22. Loosen screws (5), and attach engine oil filter (6) to the hydraulic pump.
23. Remove the engine mounting screws, see [218 Engine mounting](#).
24. Connect the lifting device **9998547** to the engine lifting eyes. Adjust the lifting device to the correct angle.
Take up the slack in the lifting device.



Figure 8
Engine, removal



The parts are heavy. Take appropriate safety cautions when handling them.

25. Lift away the engine from the machine, and put it onto a suitable workbench.
Weight approx. **600 kg (1323 lbs)**.
26. **Engine installation**
Move charge air hoses (1 and 2), coolant hoses (7 and 8) and air inlet hose (6) to new engine.

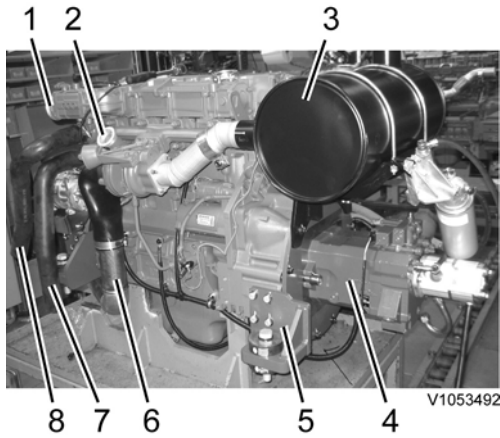


Figure 9
Engine components moving

27. Remove silencer including the turbocharger flexible tune and the silencer bracket from the old engine. see [252 Silencer, replacing](#), [252 Exhaust pipe, flexible tube, replacing](#).
28. Move hydraulic pump (4) including the pump coupling to new engine, see [913 Pump, removal](#), [913 Pump, installation](#), [442 Pump coupling, removing](#), [442 Pump coupling, installing](#).
29. Move engine mounting brackets (5) at 4 places to new engine, see [218 Engine mounting](#).
30. Move cooling fan pump (1) to new engine, see [911 Cooling fan pump, removal](#), [911 Cooling fan pump, installation](#).

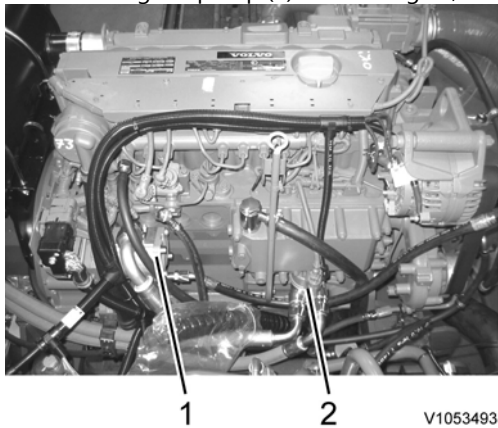


Figure 10
Cooling fan pump, moving

31. Move engine oil filter connection (2) to new engine.
32. Connect the lifting device **9998547** to the engine lifting eyes. Adjust the lifting device to the correct angle.
Take up the slack in the lifting device.



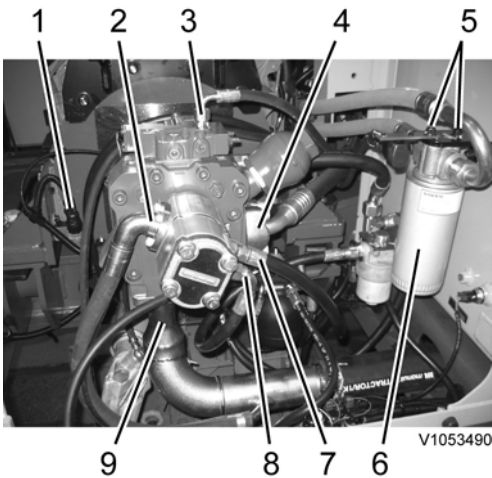
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Figure 11
Engine, installation



The parts are heavy. Take appropriate safety cautions when handling them.

33. Put the engine onto the machine carefully.
Weight approx. **600 kg (1323 lbs)**.
34. Tighten the engine mounting screws, see [218 Engine mounting](#).
35. Connect wire harness connector (1) and hydraulic hoses (2, 3, 4, 7, 8 and 9) to the hydraulic pump, see [913 Pump, installation](#).



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Figure 12
Pump connections

36. Install engine oil filter (6) to the hydraulic tank.
37. Plug in connector (1) for E-ECU and wire harness connector (5).

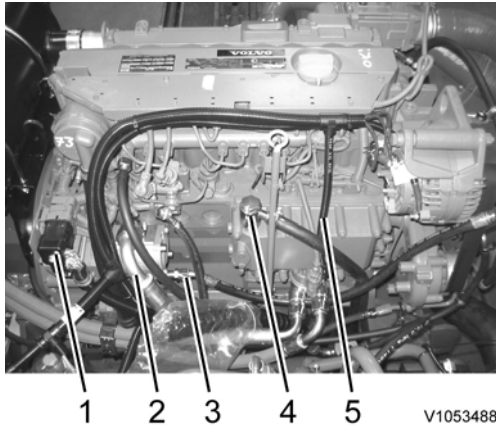


Figure 13
Engine connections

38. Connect hydraulic hoses (2 and 3) to the cooling fan pump, see [911 Cooling fan pump, installation](#).
39. Connect coolant hose (4) to the engine oil cooler.
40. Connect fuel supply line (1) and return line (2).

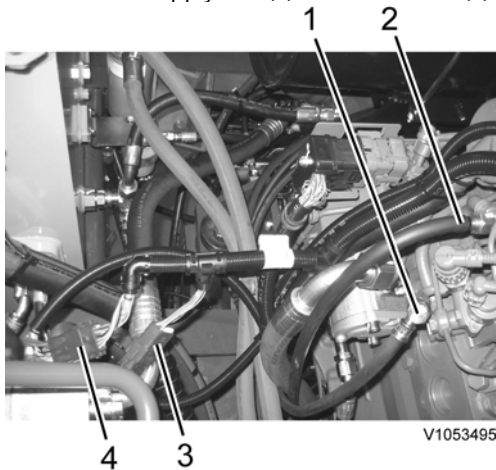


Figure 14
Fuel line connections

41. Connect wire harness connectors (3 and 4).
42. Connect air preheating cable (1), starter motor cable (2) and ground cable (3) to the engine.

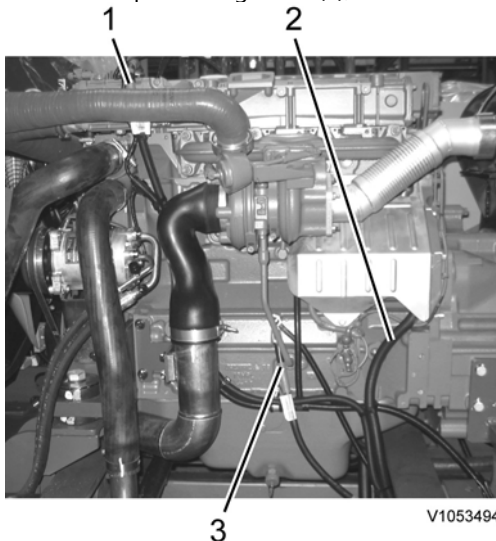


Figure 15
Engine wire harness

43. Install the air conditioner compressor including the belt, see [874 Compressor, replacing incl draining and filling](#).
44. Connect charge air hoses (2 and 3), coolant hoses (4 and 6) and air inlet hose (5) to cooling unit (1) side.

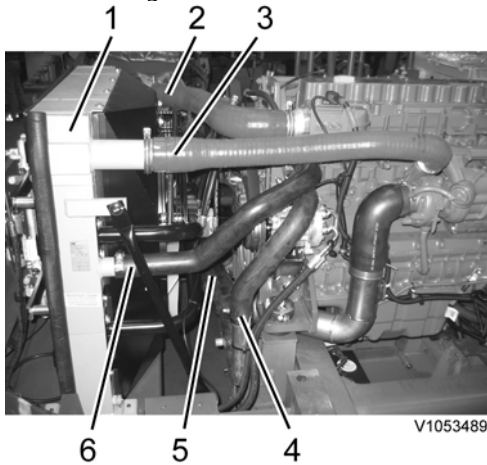


Figure 16
Cooling unit connections

45. Install rear side frame (5).

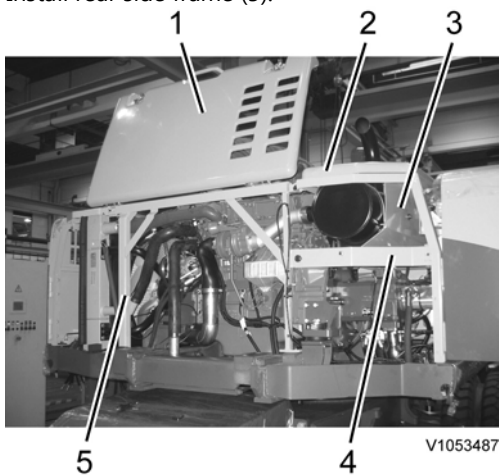


Figure 17
Rear side frame, installation

46. Install right side door frame with door (4).
47. Install silencer undercover (3).
48. Install silencer hood (2).
49. Install engine hood (1).
50. Install the coolant expansion tank and fill the coolant, see [261 Expansion tank, replacing](#).
51. Fill the hydraulic oil, see [173 Maintenance service, every 4000 hours](#).
52. Fill the engine oil, see [173 Maintenance service, every 4000 hours](#).
53. Bleed the fuel system, see [233 Fuel system, bleeding](#).



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