

Document Title: Engine, description	Function Group: 200	Information Type: Service Information	Date: 2014/6/11
Profile: EXC, EC210B F [GB]			

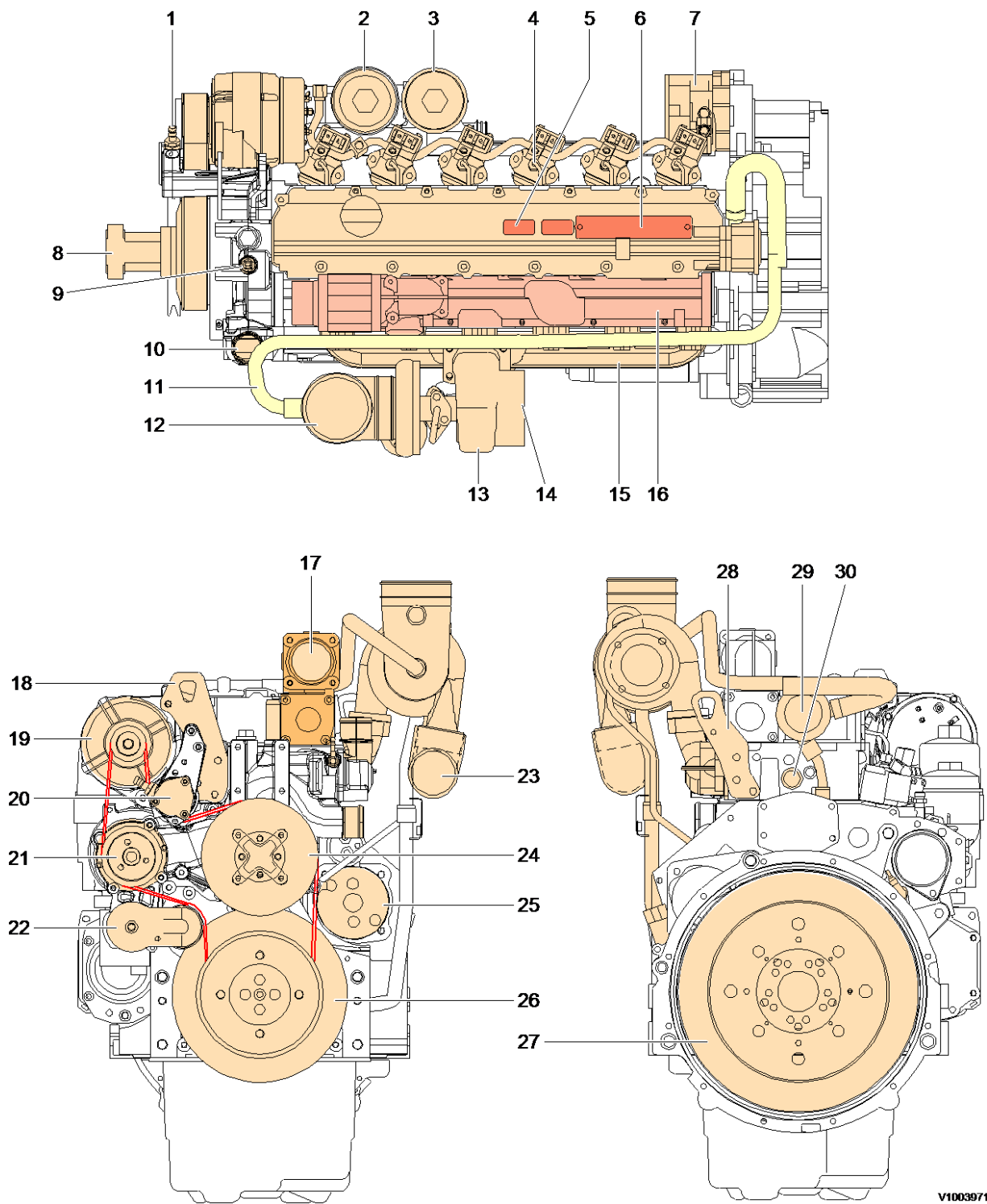
Engine, description

D6D Engine

The engine is a 6-cylinder, 4-stroke, direct injected, turbocharged, aftercooled with a cast iron block and cylinder head. Gears in the engine gear case are hardened helical type for strength and reduced noise, arranged to provide quiet, smooth transmission of power.

The cylinder block and head are designed with internal passages forming galleries for both lubricating oil and coolant.

The fan belt is a poly type V-belt for improved performance and an auto tension adjuster maintains belt tension.



V1003971

Figure 1
Engine, start motor side view

1	Fuel suction port	11	Blow-by gas pipe	21	Coolant pump
2	Engine oil filter	12	Air inlet (from air cleaner)	22	Belt tensioner
3	Old, Fuel filter (0.5 liters)	13	Turbocharger	23	Air outlet (to charge air cooler)
4	Unit injection pump	14	Exhaust gas outlet	24	Fan drive pulley
5	Emission label	15	Exhaust manifold	25	Air conditioner compressor pulley
6	Engine name plate	16	Intake manifold	26	Pulley with vibration damper
7	Power take off device (option)	17	Air inlet (from charge air cooler)	27	Flywheel
8	Fan drive	18	Lifting eye (front)	28	Lifting eye (rear)

9	Coolant make up port	19	Alternator	29	Crankcase breather
10	Coolant outlet (to radiator)	20	Fuel feed pump	30	Coolant temperature sensor port

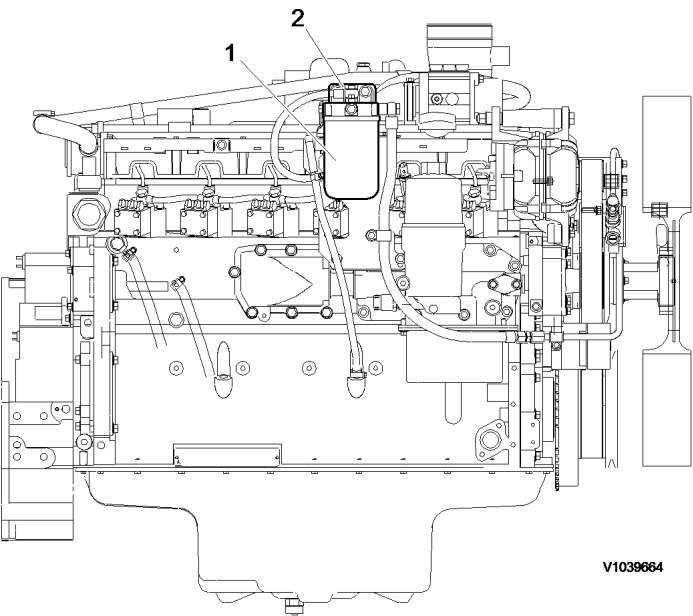
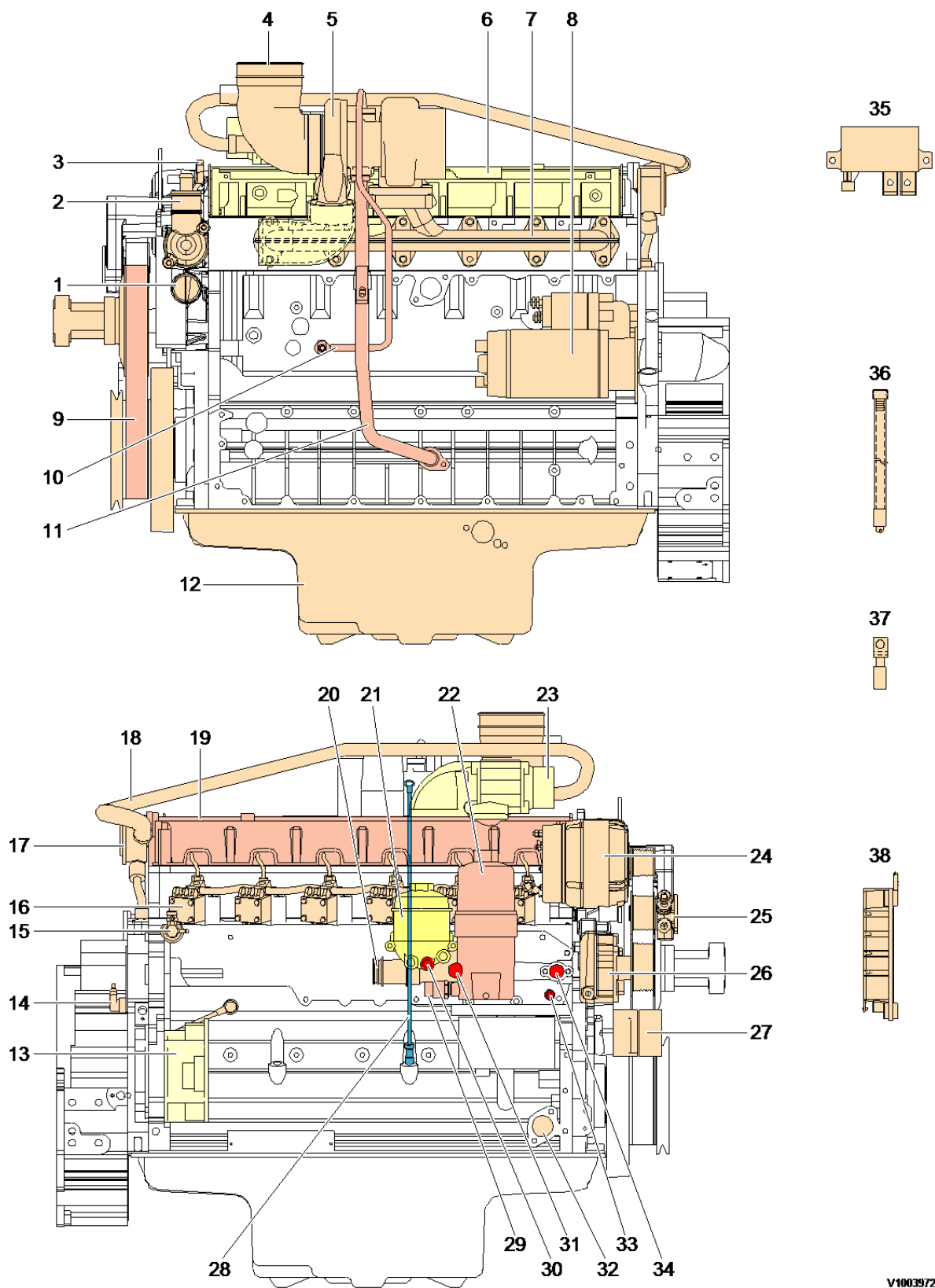


Figure 2
New, Fuel filter

1	Fuel filter (1.0 liters)
2	Bracket

		Serial number		
		Europe	North America	China
Old, Fuel filter	Fuel filter (0.5 liters) and bracket	~ 14467	~ 14317	~ 30840
New, Fuel filter	Fuel filter (1.0 liters) and bracket	14468 ~	14318 ~	30841 ~



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Figure 3
Engine, air heater side view

1	Coolant inlet (from radiator)	14	Engine speed sensor	27	Belt tensioner
2	Coolant outlet (to radiator)	15	Fuel pressure holding valve	28	Engine oil level gauge
3	Coolant make up port	16	Solenoid valve	29	Engine oil pressure sensor
4	Air inlet (from air cleaner)	17	Crankcase breather	30	Fuel suction port

5	Turbocharger	18	Blowby gas pipe	31	Coolant filter return port
6	Intake manifold	19	Valve cover	32	-
7	Exhaust manifold	20	Engine oil cooler	33	Coolant supply to cab heater
8	Starter	21	Fuel filter	34	Coolant heater port
9	Poly-vee belt	22	Engine oil filter	35	Air heater relay
10	Lube oil pipe (supply)	23	Air inlet (from charge air cooler)	36	Oil drain hose
11	Lube oil pipe (return)	24	Alternator	37	Fuel feed pump
12	Engine oil pan	25	Fuel feed pump	38	E-ECU
13	Power take off device	26	Coolant pump		

D6E Engine

The D6E configuration is a four stroke, straight six cylinder, turbocharged, direct injected diesel engine with charge air cooling and wet, replaceable cylinder liners.

The D6E 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.

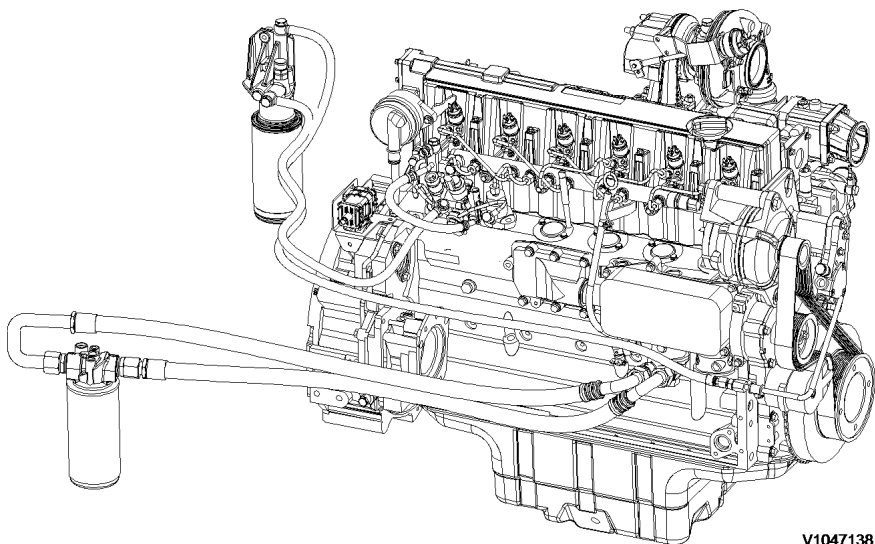


Figure 4
Engine, D6E

Document Title: Engine, identification	Function Group: 200	Information Type: Service Information	Date: 2014/6/11
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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.

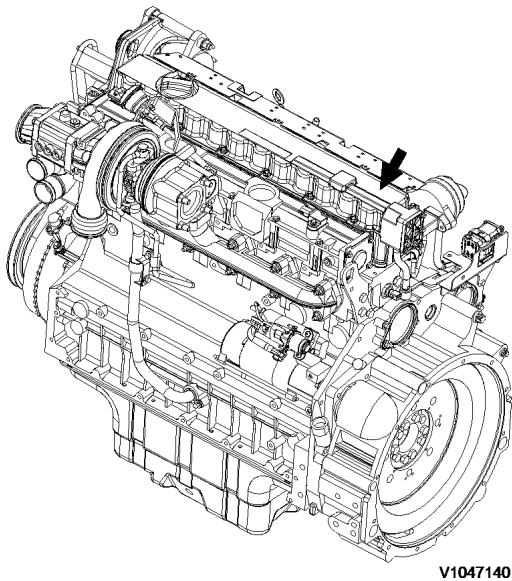


Figure 1
Engine identification, D6E

Document Title: Engine, tightening torques	Function Group: 200	Information Type: Service Information	Date: 2014/6/11
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Engine, tightening torques

NOTICE

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

Engine, tightening torque	
Rocker arm bracket on cylinder head	30 Nm (22.2 lbf ft)
Cylinder head cover (M6) on cylinder head	13 Nm (9.6 lbf ft)
Exhaust return module on cylinder head	Step 1: 10 Nm (7.4 lbf ft) Step 2: 30 Nm (22.2 lbf ft)
Lock nut, valve adjusting screw	20 ±2 Nm (14.8 ±1.5 lbf ft)
Locking screw on cylinder head	34 Nm (25.2 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)
Drain plug on oil pan, M18	55 Nm (40.7 lbf ft)
Crankcase ventilation on cylinder head	21 Nm (15.5 lbf ft)
Return line to return stop valve	30 Nm (22.2 lbf ft)
Return stop valve to crankcase	80 Nm (59.2 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)
Turbocharger on exhaust manifold	42 Nm (31.1 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	22 Nm (16.3 lbf ft)
Holder fuel supply pump on holder	30 Nm (22.2 lbf ft)
V-belt pulley on fuel supply pump	27 Nm (20.0 lbf ft)
High pressure pump on crankcase, M10	Step 1: 10 Nm (7.4 lbf ft) Step 2: 50 Nm (37.0 lbf ft)
Fuel control valve	30 Nm (22.2 lbf ft)
Fuel pipe on high pressure pump	29 Nm (21.5 lbf ft)
Fuel pipe on control block	39 Nm (28.9 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	70 Nm (51.8 lbf ft)
Pipe clips, fuel line fastening	30 Nm (22.2 lbf ft)
Fuel line on control block, fuel filter console and rail	39 Nm (28.9 lbf ft)
Fuel pipe (return) on control block	49 Nm (36.3 lbf ft)
Fuel pipe (return) on cylinder head	29 Nm (21.5 lbf ft)
Fuel line on fuel filter8	39 Nm (28.9 lbf ft)
Fuel filter console/radiator tank on crankcase	30 Nm (22.2 lbf ft)

Fuel pressure sensor on fuel filter console	30 Nm (22.2 lbf ft)
Cover plate on cylinder cover, M6	30 Nm (22.2 lbf ft)

Document Title: Component locations	Function Group: 200	Information Type: Service Information	Date: 2014/6/11
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Component locations

D6E Engine

Component position, engine D6E. The following figures show the position of a number of components on engine D6E.

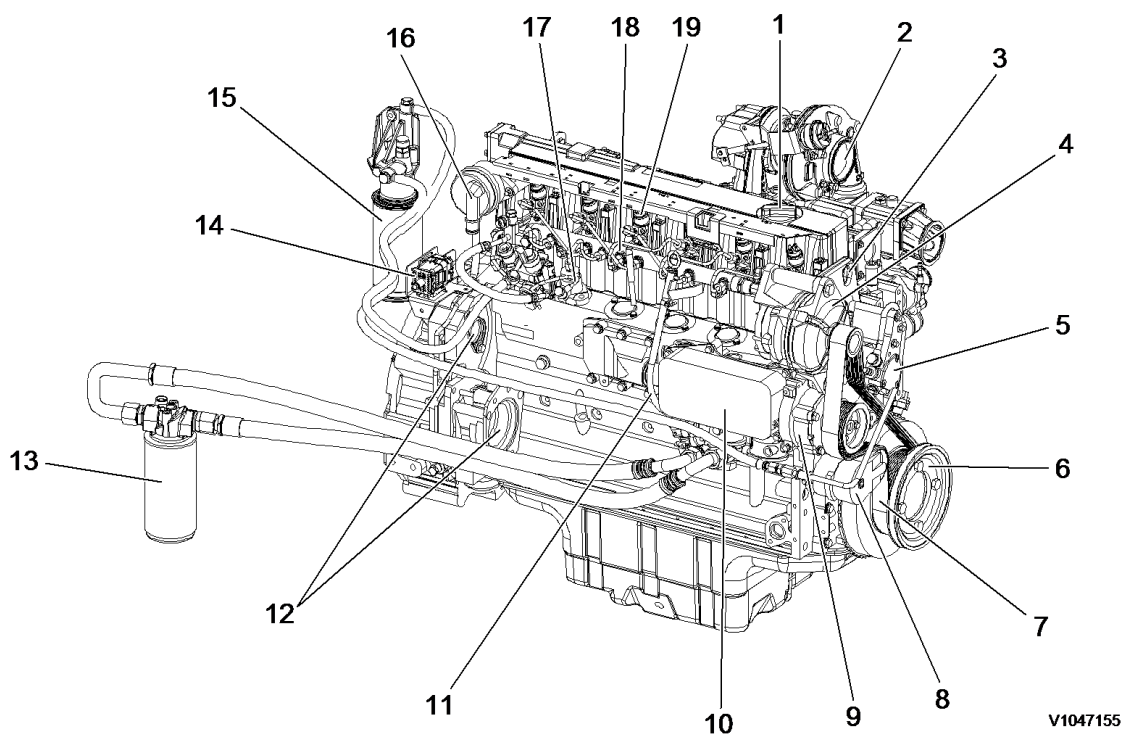
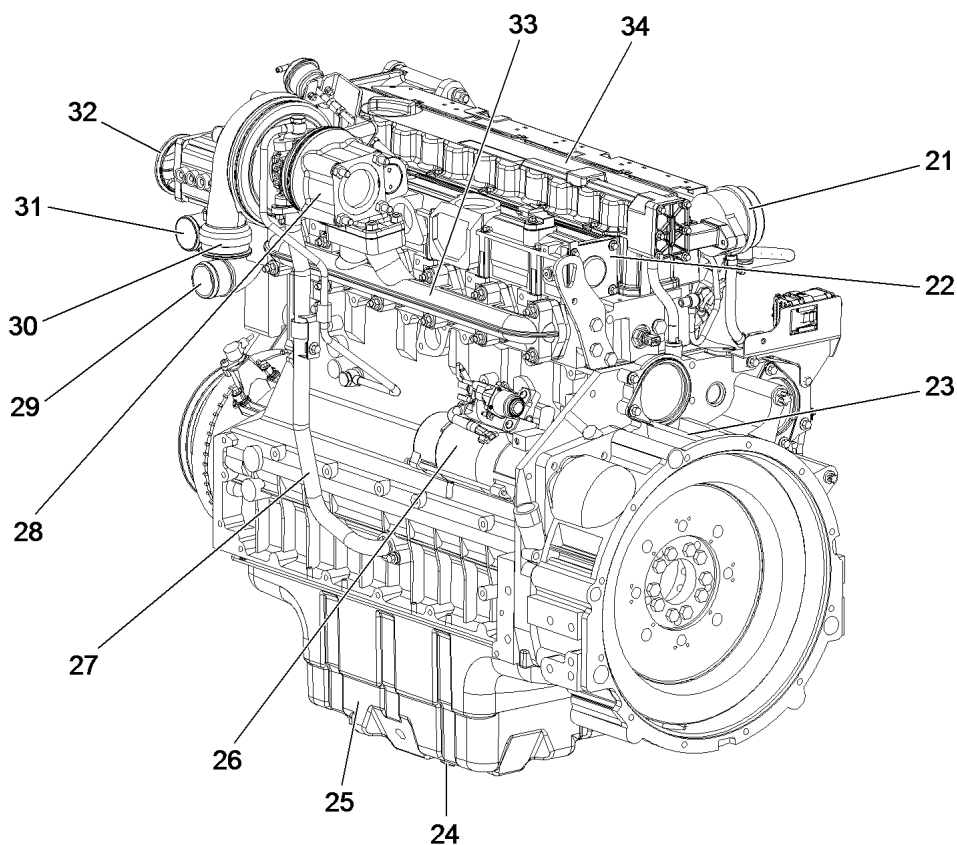


Figure 1
Component locations, front side

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		



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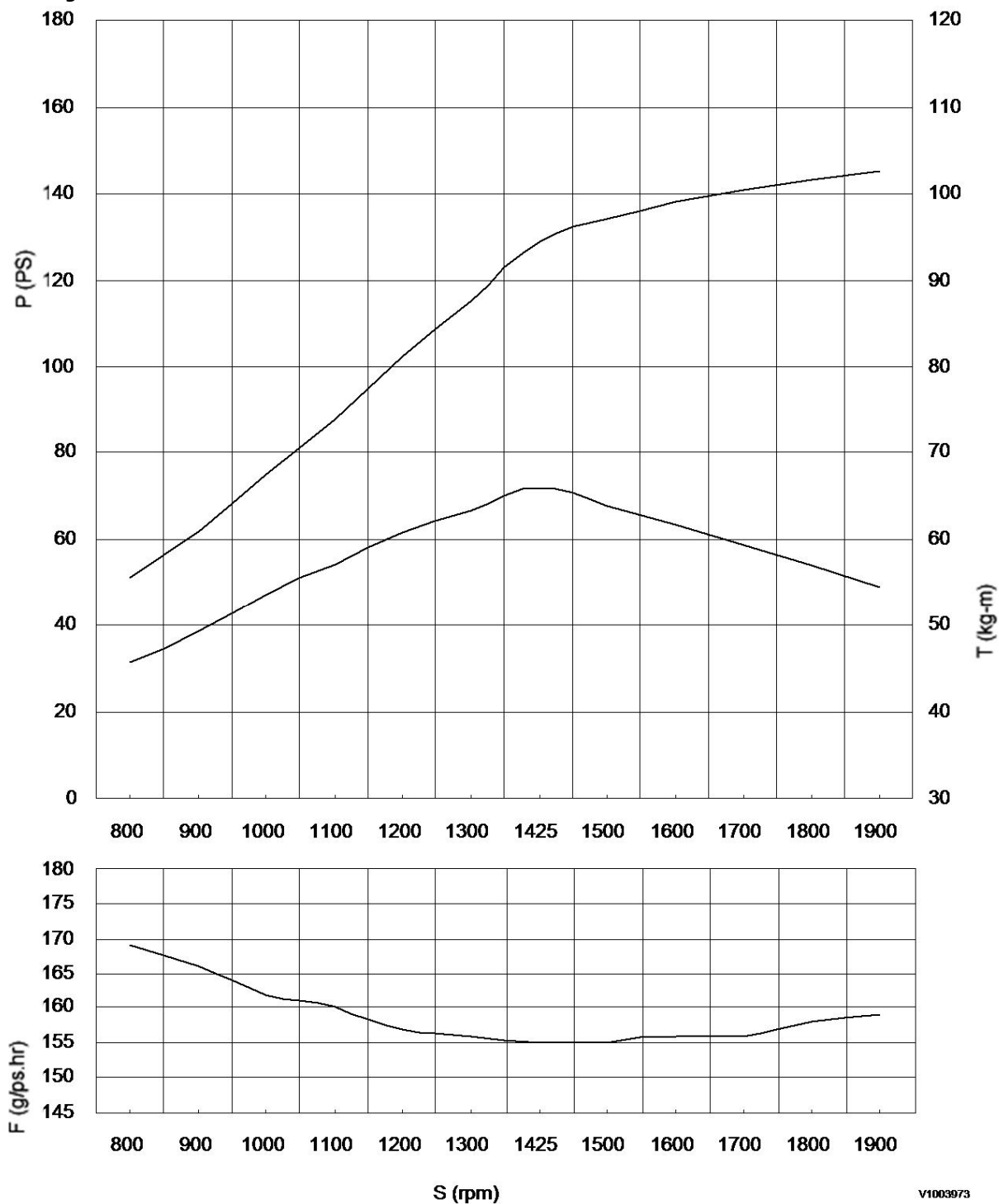
Figure 2
Component locations, flywheel side

21	Crankcase bleeding valve	28	Turbocharger
22	Charge air manifold	29	Coolant inlet
23	Flywheel housing	30	Air outlet (to charge air cooler)
24	Drain plug	31	Coolant outlet
25	Oil pan	32	Air inlet (from charge air cooler)
26	Starter motor	33	Exhaust manifold
27	Oil return line from turbocharger	34	Cylinder rocker arm cover

Document Title: Engine characteristic curve	Function Group: 210	Information Type: Service Information	Date: 2014/6/11
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Engine characteristic curve

D6D Engine



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Figure 1

Engine, characteristic curve

- P Output power
- S Engine speed
- T Torque
- F Fuel consumption

D6E Engine

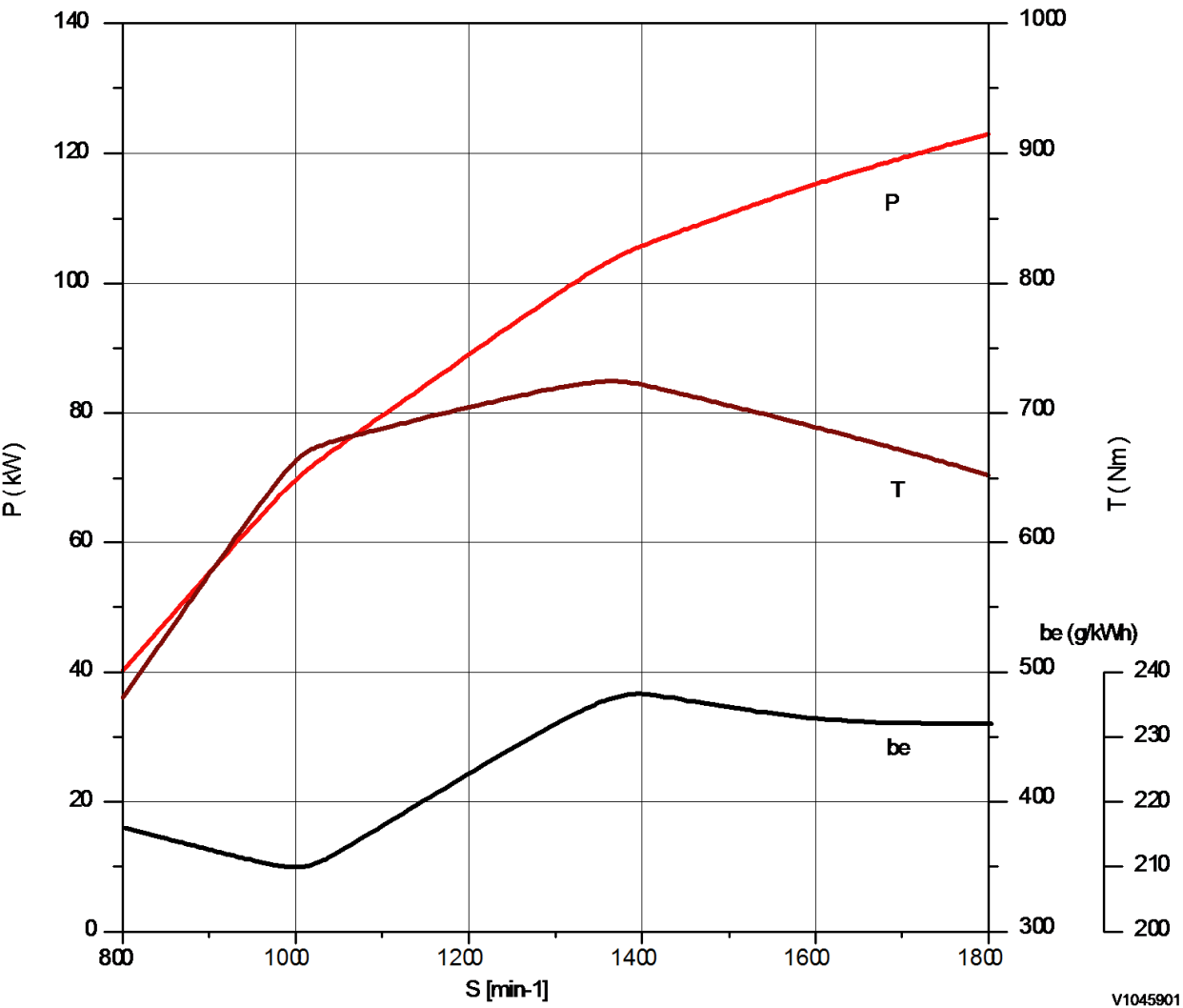


Figure 2
Engine, characteristic curve

P	Output power
S	Engine speed
T	Torque
be	Fuel consumption

Document Title: Basic check, Engine	Function Group: 210	Information Type: Service Information	Date: 2014/6/11
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Basic check, Engine

NOTE!

Certain tests and checks are performed with unlocked safety locking lever. Make sure that the machine cannot operate unexpectedly when the safety locking lever is unlocked.

Purpose of the basic check

The purpose of the basic check is to provide fast and accurate information about the general condition of the engine.

The basic check should be performed and evaluated according to instructions in the PC-tool VCADS Pro.

Tests included in the basic check

The basic check which is divided into the following tests should be performed after **reading out error codes and checking parameters**.

Tests:

1. **Cylinder compression, test**
The purpose of the test is to show if any cylinder has a deviating compression pressure. The test replaces the old pressure check method but does not give any absolute values.
2. **Cylinder balancing, test**
The purpose of the test is to show if there is any deviation in the fuel injection to a cylinder.
3. **Feed pressure, test**
The purpose of the test is to check that the feed pressure is as per specification.
4. **Sensor, test**
The purpose of the test is to check the function of all sensors.

Document Title: Troubleshooting	Function Group: 210	Information Type: Service Information	Date: 2014/6/11
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Troubleshooting

General about troubleshooting

When a malfunction is suspected or has been confirmed, it is important to identify the cause as soon as possible.

The starting point for all troubleshooting is that there is some type of trouble symptom or malfunction.

Malfunctions can be indicated by:

- generation of error codes
- detection of a malfunction symptom.

Troubleshooting work

The first step in troubleshooting is to gather information from the operator concerning the malfunction symptoms, see Electrical and information system, Collection of basic data. Then, attempt to pin-point the cause by checking in a certain order, for more information, see Electrical and information system, troubleshooting strategy.

The different checking steps are:

- Check error codes
- Check parameters
- Perform basic check

Troubleshooting information

The following is included in Electrical and information system and is used when troubleshooting:

1. **Troubleshooting strategy**
Describes troubleshooting work, step by step.
2. **Troubleshooting, assistive devices**
Brief summary of the assistive devices that are available for troubleshooting.
3. **Functional checks and tests, VCADS Pro**
Brief description of VCADS Pro. For a detailed description, see VCADS Pro User's Manual.
4. **Error code information**
Contains information regarding error code design, lists of all error codes and error code information about each error code.
5. **Components, troubleshooting and specifications**
Contains methods and measuring values for troubleshooting of components. Also includes wiring diagrams and certain specifications.
6. **Parameters**
Incorrectly set parameters may cause malfunction symptoms. The parameter list includes all limit and command values for parameters.
7. **Control units, functional description**
Describes the functions of the control units, inputs and outputs as well as communication between the various control units.
8. **Control units, active and passive measuring**
Contains measuring values for active and passive measuring of the ECUs.
9. **Software functions**
Describes the pre-requisite conditions for the control and monitoring functions that are performed by the software in the ECUs.



Our support email:

ebooklibonline@outlook.com