SERVICE MANUAL

JCB T2/3 Elec Engine 6 Cyl

EN - 9806/5600 - ISSUE 4 - 06/2016

This manual contains original instructions, verified by the manufacturer (or their authorized representative).

Foreword

The Operator's Manual

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You and others can be killed or seriously injured if you operate or maintain the machine without first studying the Operator's Manual. You must understand and follow the instructions in the Operator's Manual. If you do not understand anything, ask your employer or JCB dealer to explain it.

Do not operate the machine without an Operator's Manual, or if there is anything on the machine you do not understand.

Treat the Operator's Manual as part of the machine. Keep it clean and in good condition. Replace the Operator's Manual immediately if it is lost, damaged or becomes unreadable.

Contents

Health and Safety

Hot Components

Touching hot surfaces can burn skin. The engine and machine components will be hot after the unit has been running. Allow the engine and components to cool before servicing the unit.

Turning the Engine

Do not try to turn the engine by pulling the fan or fan belt. This could cause injury or premature component failure.

Notice: *The engine and other components could be damaged by high pressure washing systems. Special precautions must be taken if the machine is to be washed using a high pressure system.Make sure that the alternator, starter motor and any other electrical components are shielded and not directly cleaned by the high pressure cleaning system. Do not aim the water jet directly at bearings, oil seals or the engine air induction system.*

WARNING! *To bleed the injectors you must turn the engine. When the engine is turning, there are parts rotating in the engine compartment.Before starting this job make sure that you have no loose clothing (cuffs, ties etc) which could get caught in rotating parts.When the engine is turning, keep clear of rotating parts.*

Notice: *Clean the engine before you start engine maintenance. Obey the correct procedures. Contamination of the fuel system will cause damage and possible failure of the engine.*

Notice: *Do not exceed the correct level of engine oil in the sump. If there is too much engine oil, the excess must be drained to the correct level. An excess of engine oil could cause the engine speed to increase rapidly without control.*

WARNING! *The engine has exposed rotating parts. Switch off the engine before working in the engine compartment. Do not use the machine with the engine cover open.*

WARNING! *Hot oil and engine components can burn you. Make sure the engine is cool before doing this job.Used engine crankcase lubricants contain harmful contaminants. In laboratory tests it was shown that used engine oils can cause skin cancer.*

Notice: *A drive belt that is loose can cause damage to itself and/or other engine parts.*

WARNING! *Do not open the high pressure fuel system with the engine running. Engine operation causes high fuel pressure. High pressure fuel spray can cause serious injury or death.*

CAUTION! *It is illegal to pollute drains, sewers or the ground. Clean up all spilt fluids and/or lubricants.Used fluids and/or lubricants, filters and contaminated materials must be disposed of in accordance with local regulations. Use authorised waste disposal sites.*

Technical Data

Table 5. Basic Engine Data (Dieselmax 672)

Engine Variants	
- EE	(Tier 3) Electronic, Turbocharged with Intercooler and EGR (Exhaust Gas Recirculation)
- EK	(Tier 2) Electronic, Turbocharged with Intercooler
Emission compliance	UN ECE R96, India, China, UN Certification
Rated speed	2000 rpm
Weight (Dry):	
-EE, EK	680 kg (1500 lb)[1]
Number of cylinders	6
Nominal bore size	106 mm (4.173 in)
Stroke	135 mm (5.314 in)
Cylinder arrangement	In line
Combustion Cycle	4-stroke
Firing order	1-5-3-6-2-4
Displacement	7.148 litres
Compression ratio	
- EE, EK	16.9: 1
Engine Compression	
Direction of rotation (viewed from front {crankshaft pulley} end)	Clockwise
Valves	4 per cylinder
Valve clearances measured at the tappet end of the rockers (measured cold):	see note[2]
- Inlet	0.15 to 0.21 mm (0.006 to 0.008 in)
- Exhaust	0.43 to 0.49 mm (0.017 to 0.019 in)
Lubricating oil pressure[3]	1.6 - 6.5 bar (23 - 91lb in2)
Combustion system	Common rail direct Injection
High pressure fuel pump	High pressure with electronically controlled fuel metering

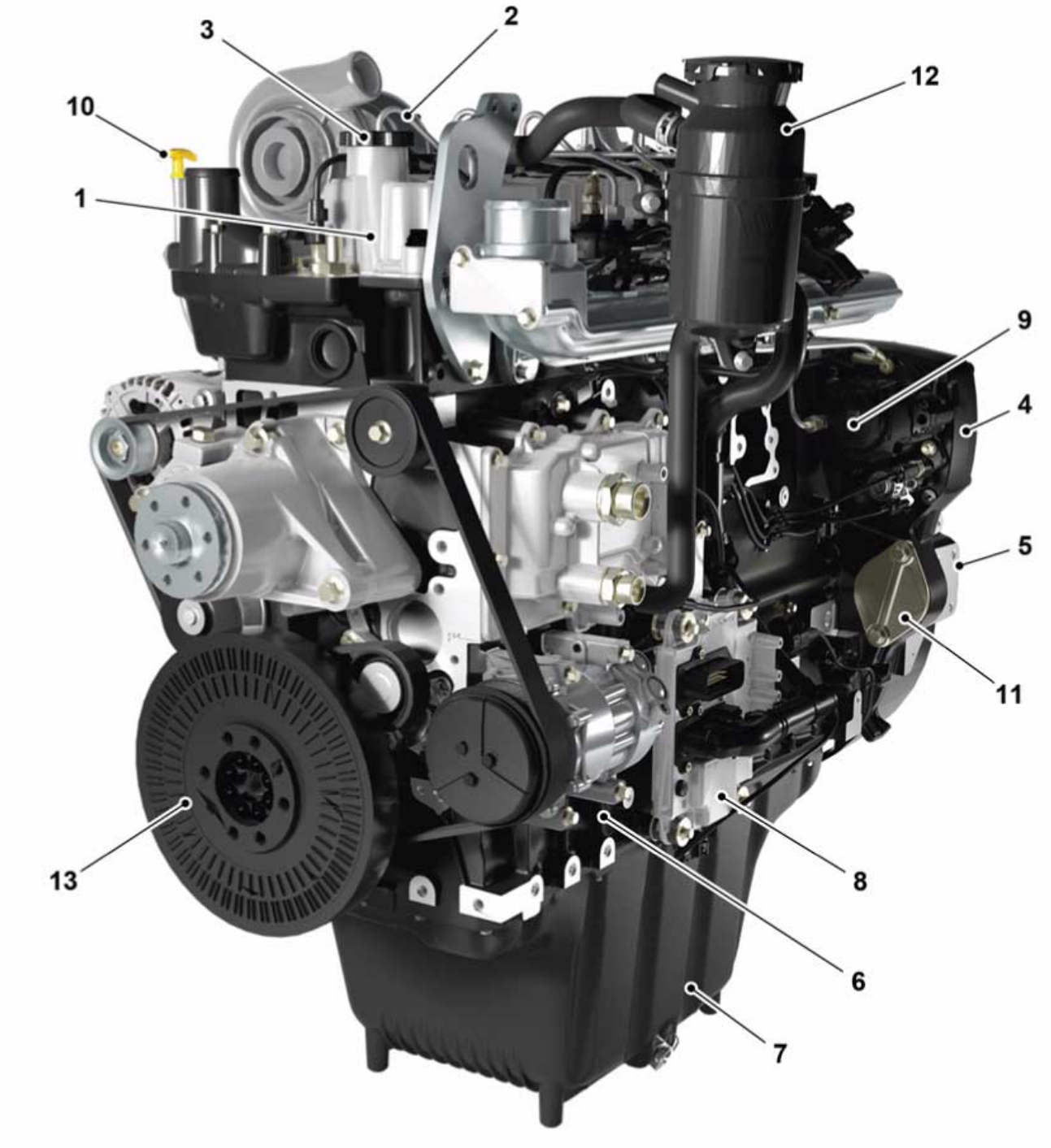
(1) Dry weight. No cooling fan drive.
(2) Compression variance between each cylinder should be no greater than 3.5 bar (50 lb in2).
(3) Dependent on engine temperature and speed.

Component Identification

Tier 2 engine

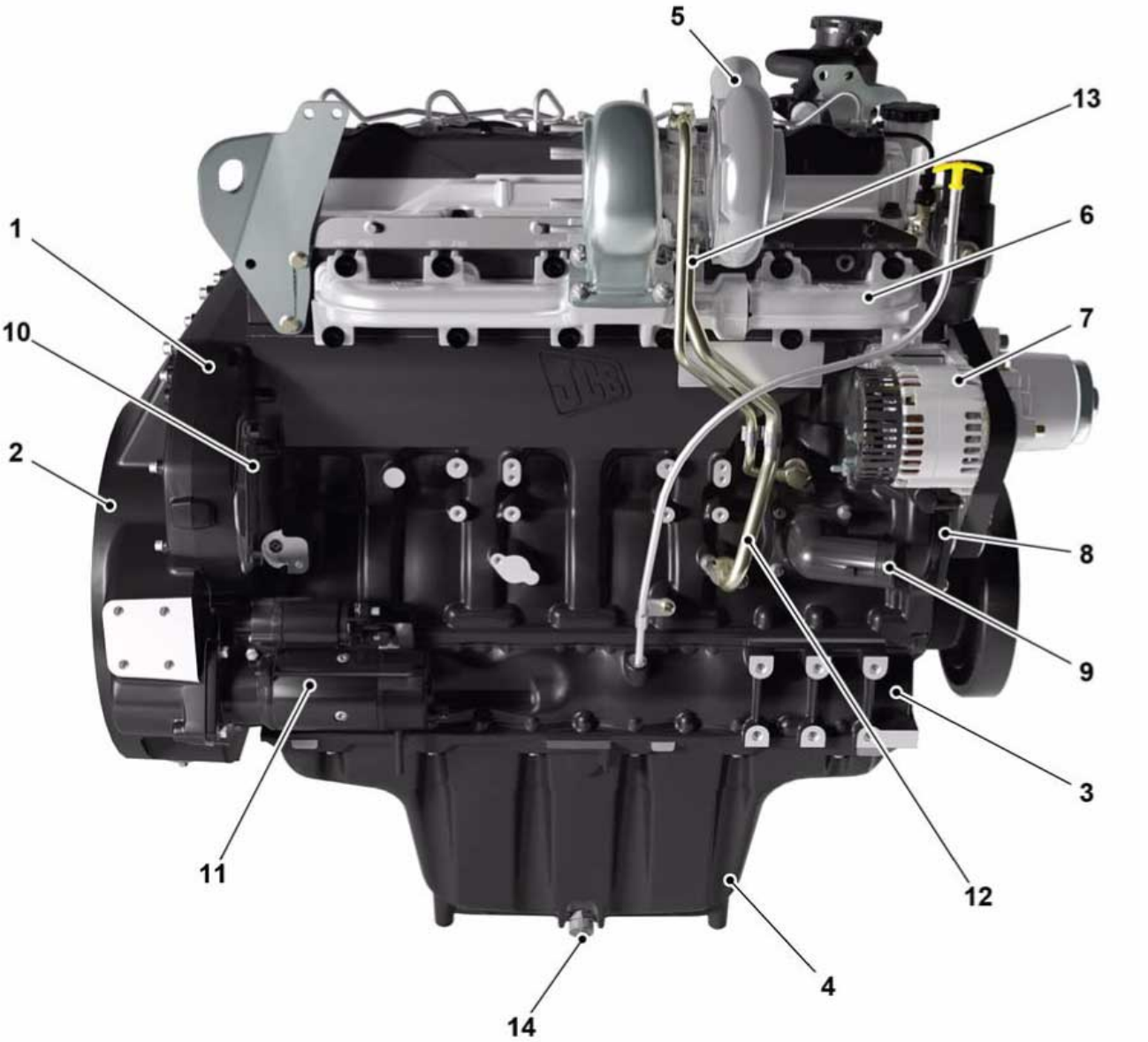
The following identifies the main components of a typical engine assembly visible from the exterior. Some variants may differ in detail.

Figure 6. Left hand Side



1 Rocker cover
2 Fuel injectors and high pressure fuel pipes
3 Lubrication oil filler cap
4 Timing gear case
5 Flywheel housing
6 Bed plate
7 Lubrication oil sump
8 ECM (Engine Control Module)
9 High pressure fuel pump
10 Lubrication oil dipstick
11 Low duty PTO (Power Take-Off) (blanking cover if no device is installed)
12 Crankcase ventilation filter assembly
13 Torsional Vibration Damper

Figure 7. Right hand side

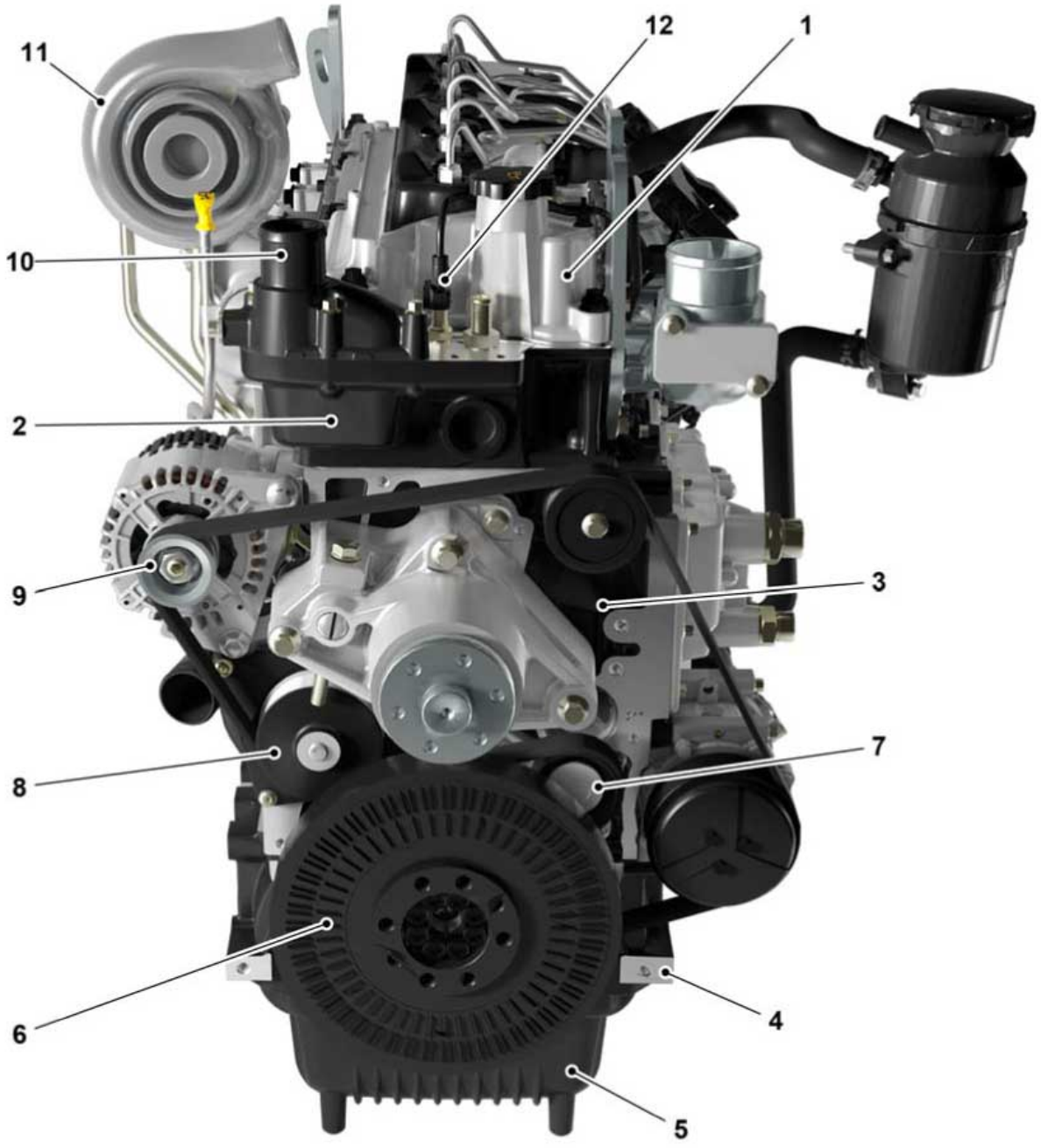


1 Timing gear case
2 Flywheel housing
3 Bedplate
4 Lubrication oil sump
5 Twin scroll turbo
6 Exhaust manifold
7 Alternator
8 Coolant pump housing (crankcase)
9 Coolant inlet/radiator hose connector
10 Heavy duty PTO (blanking cover if no device is installed)
11 Starter motor assembly
12 Turbocharger oil drain line

13 Turbocharger oil feed line

14 Oil drain plug (sump)

Figure 8. Crankshaft pulley (front) end

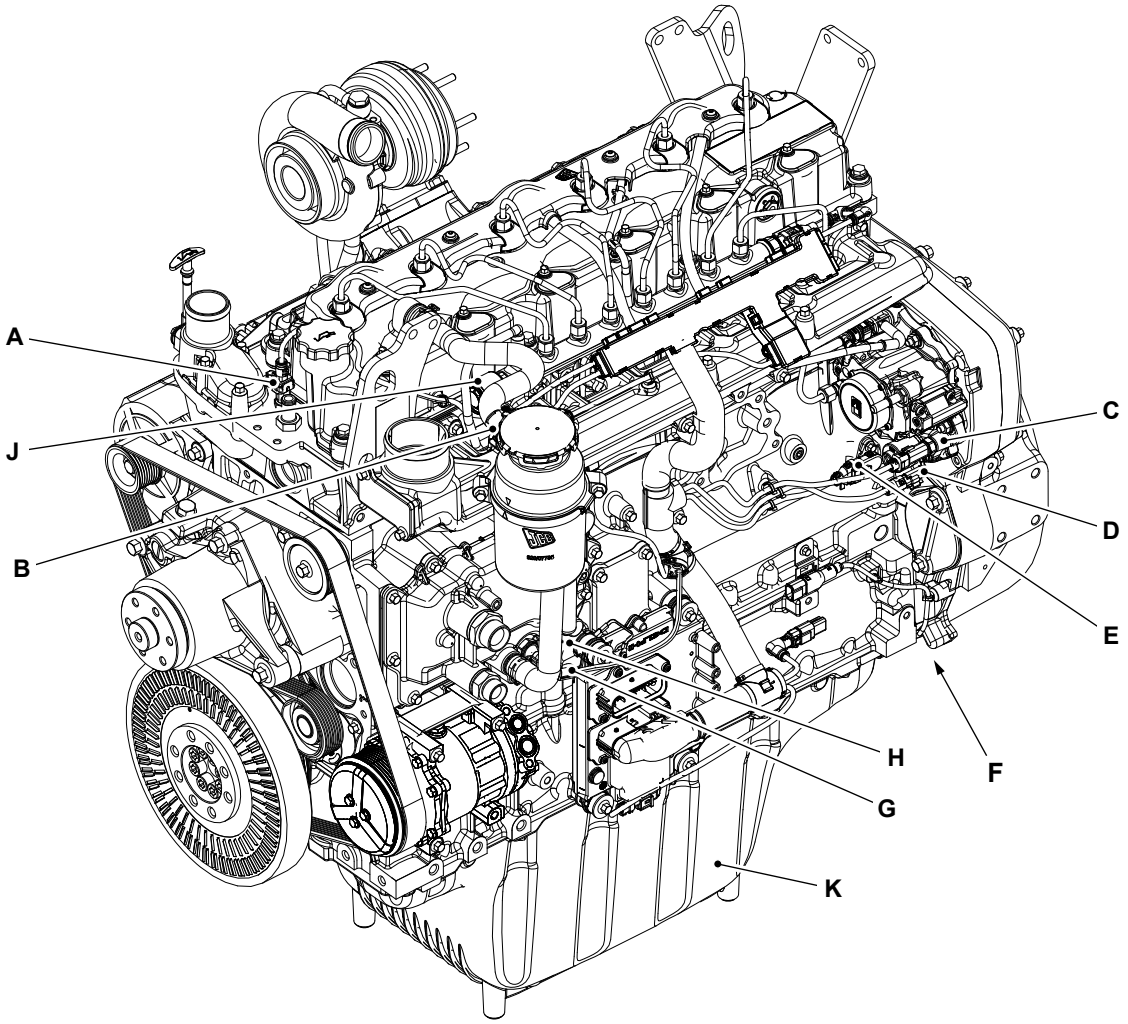


1 Rocker cover
2 Cylinder head
3 Crankcase
4 Bedplate
5 Lubrication oil sump
6 Torsional vibration damper
7 FEAD (Front End Accessory Drive) tensioner
8 Coolant pump and drive pulley assembly
9 Alternator and drive pulley assembly
10 Coolant thermostat housing/radiator hose connector
11 Twin scroll turbo
12 Coolant temperature sensor

Figure 9. Flywheel (rear) end

1 Rocker cover
2 Cylinder head
3 Flywheel
4 High pressure fuel pump drive gear cover
5 Flywheel housing
6 Engine electrical harness
7 Turbocharger

Figure 10. DieselMax 672 Engine Sensors and Actuators

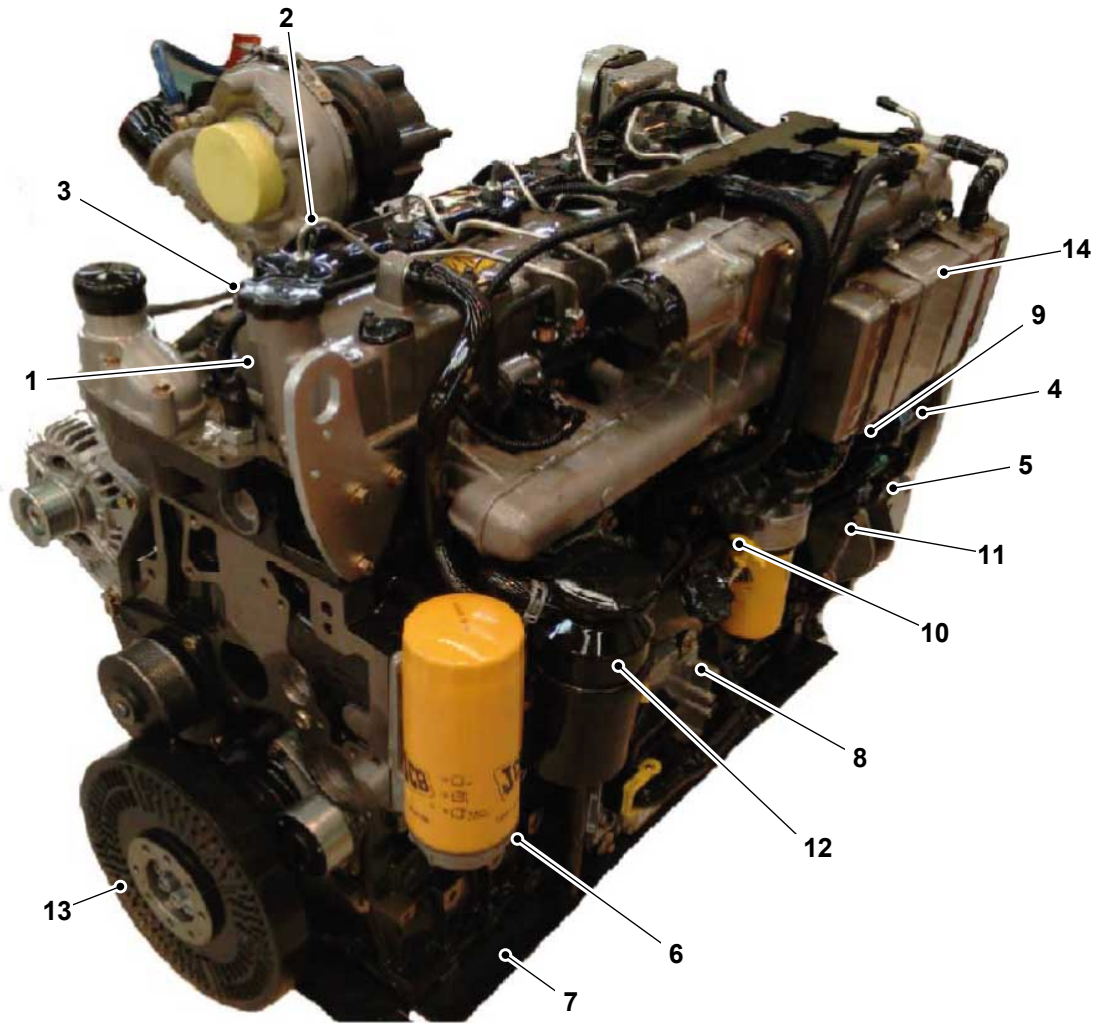


A Coolant temperature sensor
B TMAP (Temperature Manifold Air Pressure)
C Fuel inlet temperature sensor
D IMV (Inlet Metering Valve)
E Camshaft sensor
F Crankshaft sensor
G Oil temperature sensor (if installed)
H Oil pressure sensor
J HPV (High Pressure Valve)
K Oil level switch
L Knock sensor

Tier 3 engine

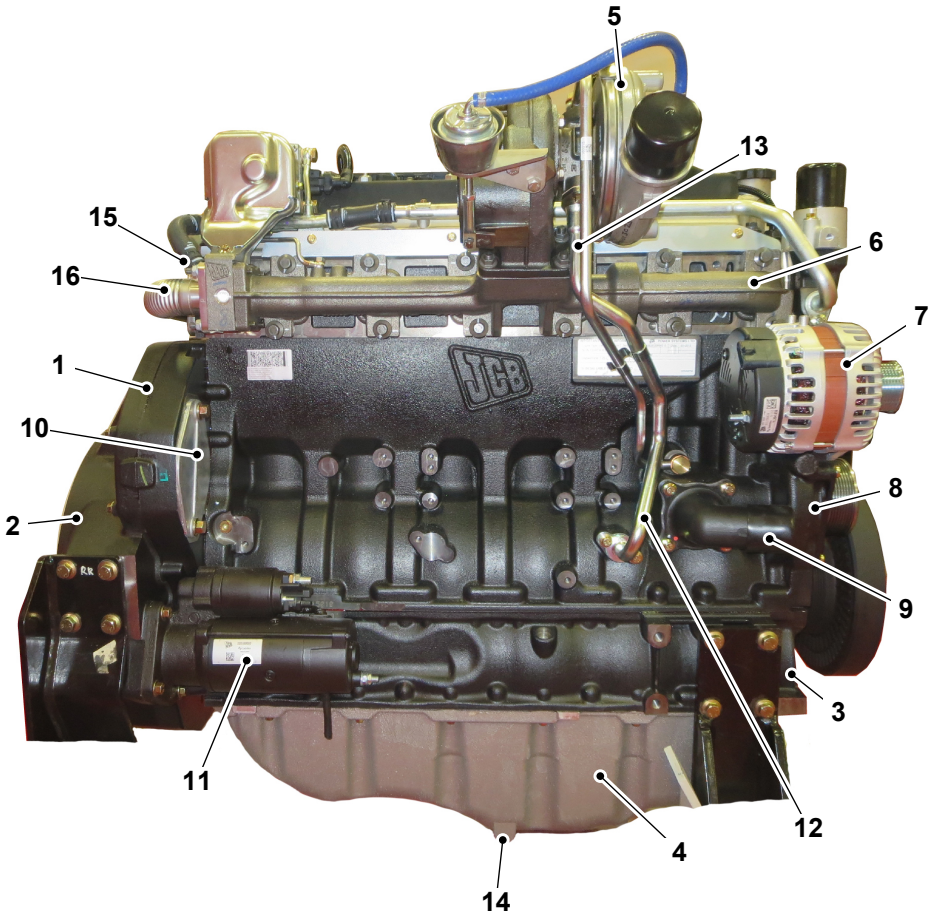
The following identifies the main components of a typical engine assembly visible from the exterior. Some variants may differ in detail.

Figure 11. Left hand Side



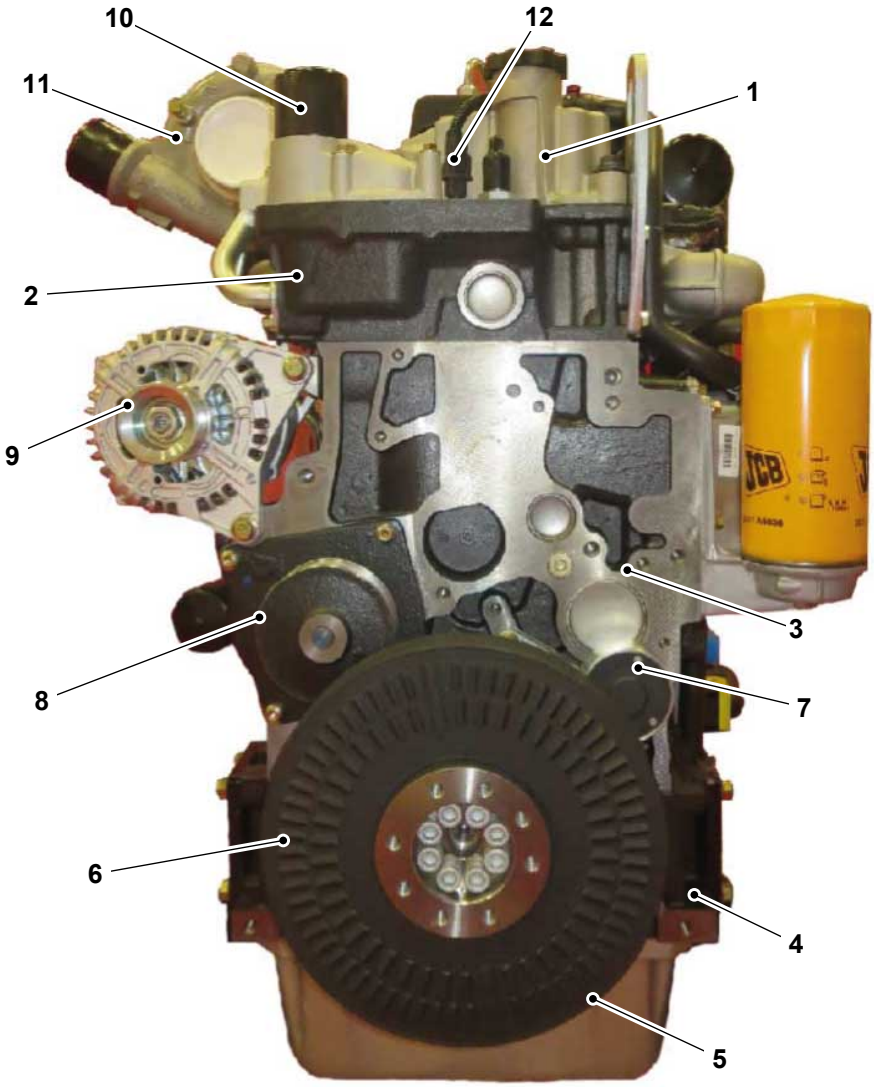
1 Rocker cover
2 Fuel injectors and high pressure fuel pipes
3 Lubrication oil filler cap
4 Timing gear case
5 Flywheel housing
6 Bed plate
7 Lubrication oil sump
8 ECM
9 High pressure fuel pump
10 Lubrication oil dipstick
11 Low duty PTO (blanking cover if no device is installed)
12 Crankcase ventilation filter assembly
13 Torsional Vibration Damper
14 EGR (Exhaust Gas Recirculation) cooler

Figure 12. Right hand side



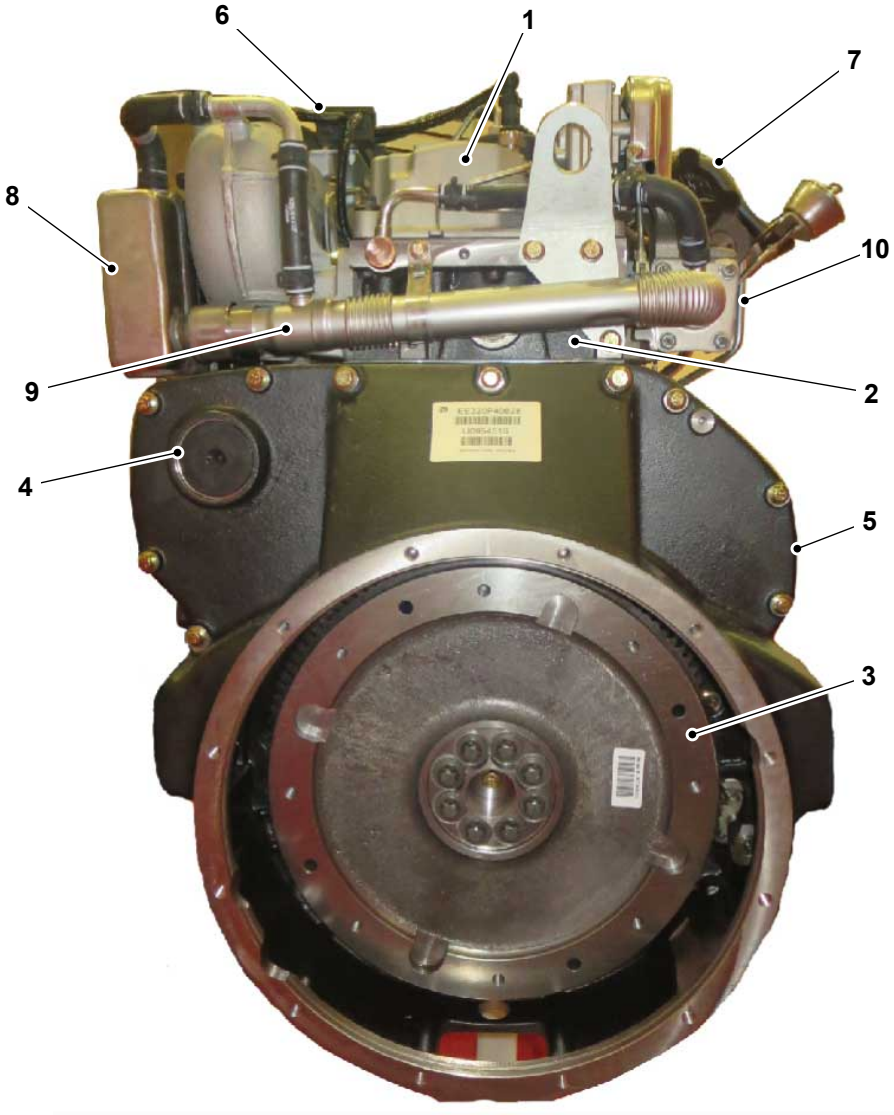
1 Timing gear case
2 Flywheel housing
3 Bedplate
4 Lubrication oil sump
5 Twin scroll turbo
6 Exhaust manifold
7 Alternator
8 Coolant pump housing (crankcase)
9 Coolant inlet/radiator hose connector
10 Heavy duty PTO (blanking cover if no device is installed)
11 Starter motor assembly
12 Turbocharger oil drain line
13 Turbocharger oil feed line
14 Oil drain plug (sump)
15 EGR coolant hose
16 EGR crossover tube

Figure 13. Crankshaft pulley (front) end



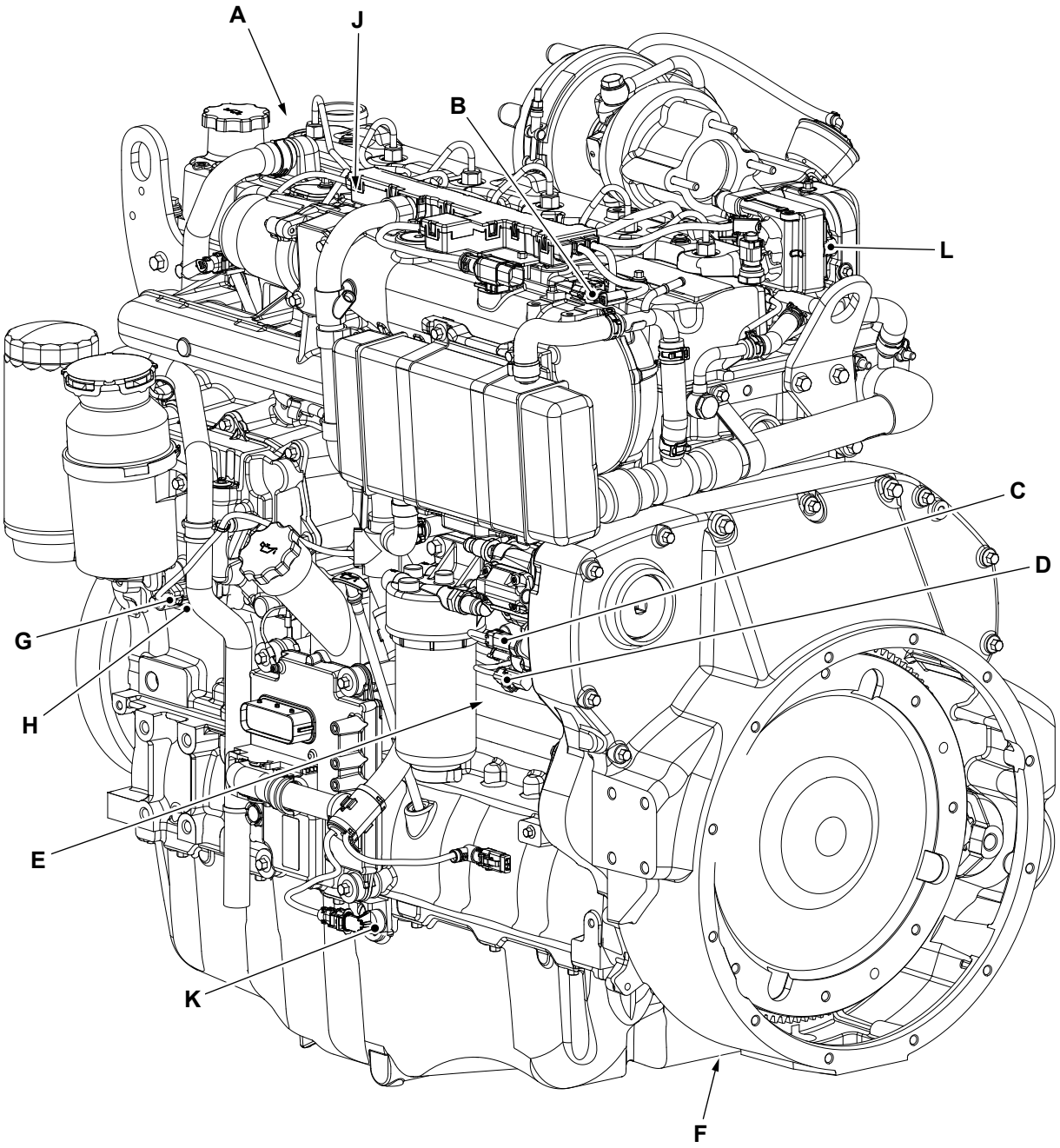
1 Rocker cover
2 Cylinder head
3 Crankcase
4 Bedplate
5 Lubrication oil sump
6 Torsional vibration damper
7 FEAD tensioner
8 Coolant pump and drive pulley assembly
9 Alternator and drive pulley assembly
10 Coolant thermostat housing/radiator hose connector
11 Twin scroll turbo
12 Coolant temperature sensor

Figure 14. Flywheel (rear) end



1 Rocker cover
2 Cylinder head
3 Flywheel
4 High pressure fuel pump drive gear cover
5 Flywheel housing
6 Engine electrical harness
7 Turbocharger
8 EGR cooler
9 EGR crossover tube
10 EGR valve

Figure 15. DieselMax 672 Engine Sensors and Actuators



A Coolant temperature sensor
B TMAP
C Fuel inlet temperature sensor
D IMV
E Camshaft sensor
F Crankshaft sensor
G Oil temperature sensor (if installed)
H Oil pressure sensor
J HPV
K Oil level switch
L EGR valve actuator

Operation

The Four Stroke Cycle

This section describes the cycle sequence, for the 6 cylinders of the diesel engine.

The stages in the four stroke cycle for each cylinder are as follows:

Table 6. The Four Stroke Cycle

Stage number	Piston operation	Valve operation
1	The piston is at the top of its Compression stroke and is about to start its Power stroke.	Inlet and exhaust valves closed.
2	The piston is at the bottom of its Power stroke and is about to start its Exhaust stroke.	Inlet valves closed, exhaust valves about to open.
3	The piston is at the bottom of its Induction stroke and is about to start its Compression stroke.	Exhaust valves closed, inlet valves about to close.
4	The piston is at the top of its Exhaust stroke and is about to start its Induction stroke.	Valve operation exhaust valves about to close, inlet valves about to open.

Firing order

A cylinder is said to be firing, when the fuel/air mixture ignites and the piston is about to start its power stroke.

Four Stroke Cycle

Induction

As the piston travels down the cylinder, it draws filtered air at atmospheric pressure and ambient temperature through an air filter and inlet valves into the cylinder.

Compression

When the piston reaches the bottom of its stroke the inlet valves close. The piston then starts to rise up the cylinder compressing the air trapped in the cylinder. This causes the temperature and pressure of the air to rise. Fuel is injected into the cylinder when the piston is near to top dead centre.

Power

The piston continues to rise after the start of fuel injection causing a further increase in pressure and temperature.

The temperature rises to a point at which the fuel/air mixture ignites. A cylinder is said to be firing, when the fuel/air mixture ignites.

This combustion causes a very rapid rise in both temperature and pressure. The high pressure generated propels the piston downward turning the crankshaft and producing energy.

Exhaust

Once the piston has reached the bottom of its travel, the exhaust valves open and momentum stored in the flywheel forces the piston up the cylinder expelling the exhaust gases.

In a running engine these four phases are continuously repeated. Each stroke is half a revolution of the crankshaft, thus, in one cycle of a four stroke engine, the crankshaft revolves twice.

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