

# Shop Manual

# Perkins 1000 Series Diesel Engine

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## General information

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## Introduction

This workshop manual has been designed to provide assistance in the service and overhaul of Perkins Phaser and 1000 Series engines.

Most of the general information which is included in the relevant User's Handbook (sections 1 to 9) has not been repeated in this workshop manual and the two publications should be used together.

Where the information applies only to certain engine types, this is indicated in the text.

The details of some operations will be different according to the type of fuel injection pump which is fitted. The pump type can be found by reference to the manufacturer's identification plate on the pump but, generally, the type of pump fitted is as shown below.

- Bosch EPVE      Vehicle and truck applications
- CAV DPA        Naturally aspirated engines in industrial and agricultural applications
- CAV DPS        Turbocharged engines in industrial and agricultural applications

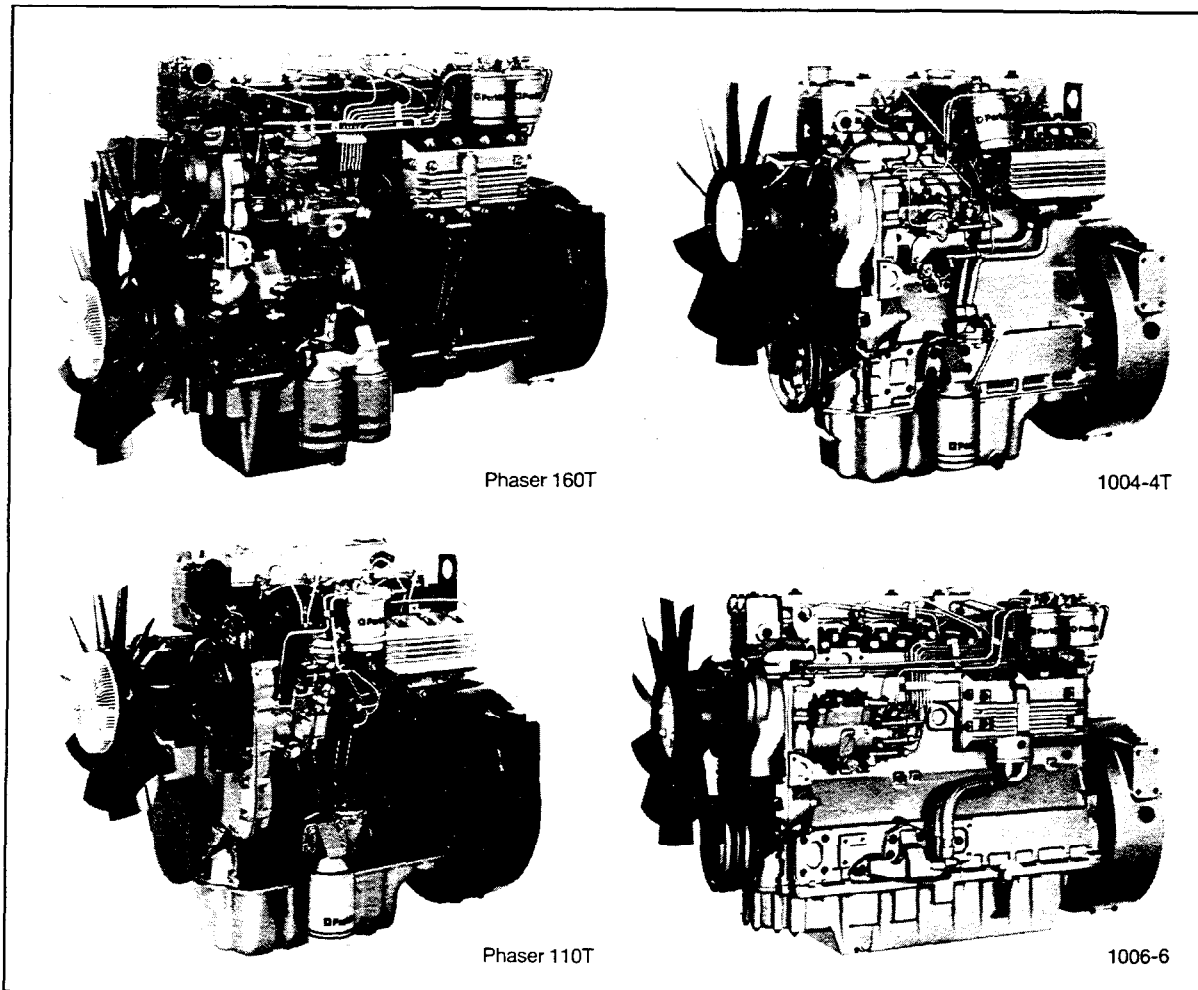
When reference is made to the "left" or "right" side of the engine, this is as seen from the flywheel end of the engine.

Special tools have been made available and a list of these is given in section 25. Reference to the relevant special tools is also made at the beginning of each operation.

**Read and remember the "Safety precautions". They are given for your protection and must be used at all times.**



**A hazard symbol in the text indicates that there is a danger of personal injury if certain operations are not done correctly.**



## Engine identification

The Perkins Phaser and 1000 Series engines have been designed for specific applications, as shown below.

Phaser for vehicle and truck applications

1000 Series for agricultural and industrial applications

Each series consists of both four and six cylinder engines, each of which will have four basic engine types - naturally aspirated, compensated, turbocharged and turbocharged/intercooled.

There are different models in each series.

Phaser engines are named according to their approximate power output, for example:

Phaser 90 - four cylinder engine rated at 87 bhp

Phaser 180Ti - six cylinder engine rated at 180 bhp

1000 Series engines are identified by a system of numbers and letters, for example:

1006-6TW - six cylinder engine of six litres

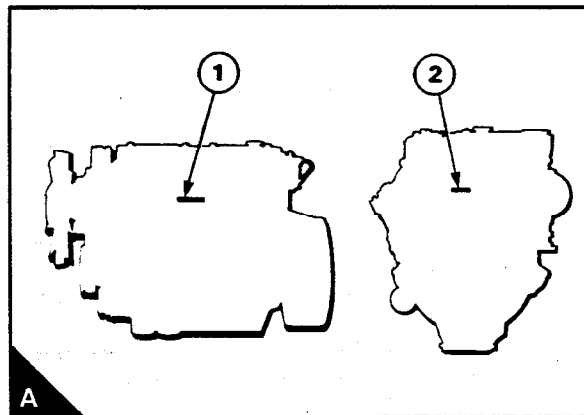
Further information about the engine number system can be found in the relevant user's handbook.

In this workshop manual, the different engine types are indicated by their code letters. These are the first two letters of the engine number as indicated below:

Code letters	Engine type
AA	Four cylinder, naturally aspirated
AB	Four cylinder, turbocharged
AC	Four cylinder, compensated
AD	Four cylinder, turbocharged/intercooled.
YA	Six cylinder, naturally aspirated
YB	Six cylinder, turbocharged
YC	Six cylinder, compensated
YD	Six cylinder, turbocharged/intercooled.

The engine number is stamped on a label which is fastened to the left side (A1), or rear (A2), of the cylinder block. An example of an engine number is AB30126U510256N.

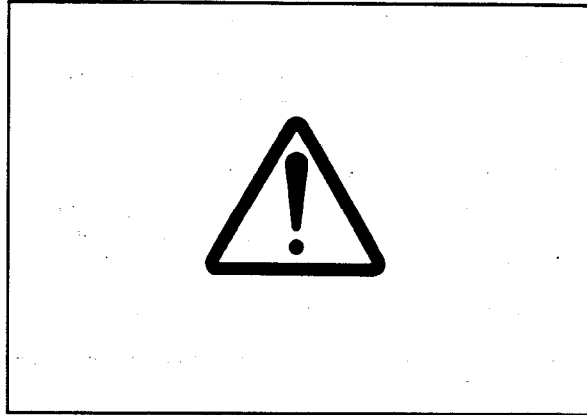
If you need parts, service or information for your engine, you must give the complete engine number to your Perkins distributor.



## Safety precautions

**These safety precautions are important.** You must refer also to the local regulations in the country of use.

- Only use these engines in the type of application for which they have been designed.
- Do not change the specification of the engine.
- Do not smoke when you put fuel in the tank.
- Clean away fuel which has been spilt. Material which has been contaminated by fuel must be moved to a safe place.
- Do not put fuel in the tank while the engine runs (unless it is absolutely necessary).
- Do not clean, add lubricating oil, or adjust the engine while it runs (unless you have had the correct training; even then extreme caution must be used to prevent injury).
- Do not make adjustments that you do not understand.
- Ensure that the engine does not run in a location where it can cause a concentration of toxic emissions.
- Other persons must be kept at a safe distance while the engine or equipment is in operation.
- Do not permit loose clothing or long hair near moving parts.
- Keep away from moving parts during engine operation.  
**Attention:** The fan cannot be seen clearly while the engine runs.
- Do not operate the engine if a safety guard has been removed.
- Do not remove the filler cap of the cooling system while the engine is hot and while the coolant is under pressure, because dangerous hot coolant can be discharged.
- Do not use salt water or any other coolant which can cause corrosion in the closed circuit of the cooling system.
- Do not allow sparks or fire near the batteries (especially when the batteries are on charge) because the gases from the electrolyte are highly flammable. The battery fluid is dangerous to the skin and especially to the eyes.
- Disconnect the battery terminals before a repair is made to the electrical system.
- Only one person must control the engine.
- Ensure that the engine is operated only from the control panel or from the operator's position.
- If your skin comes into contact with high-pressure fuel, obtain medical assistance immediately.
- Diesel fuel can damage the skin of certain persons. Protect your hands with gloves or a special solution to protect the skin.
- Do not move mobile equipment if the brakes are not in good condition.
- Ensure that the control lever of the transmission drive is in the "out-of-drive" position before the engine is started.
- Read and use the instructions relevant to asbestos joints which are given on the next page.
- Fit only genuine Perkins parts.



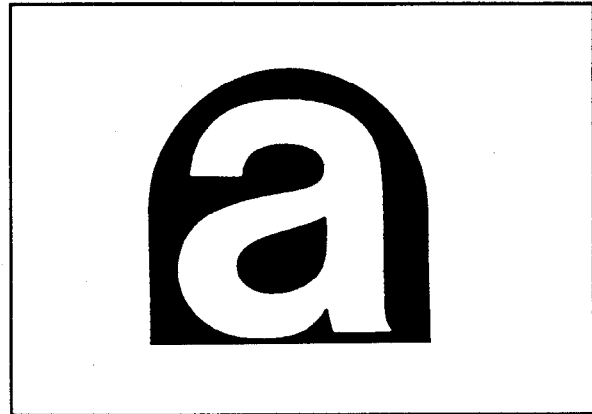
## Asbestos joints

Some joints and gaskets contain compressed asbestos fibres in a rubber compound or in a metal outer cover. The "white" asbestos (Chrysotile) which is used is a safer type of asbestos and the risk of damage to health is extremely small.

The risk of asbestos from joints occurs at their edges or if a joint is damaged when a component is removed or if a joint is removed by abrasion.

To ensure that the risk is kept to a minimum, the procedures given below must be applied when an engine which has asbestos joints is dismantled or assembled.

- Work in an area with good ventilation.
- Do not smoke.
- Use a hand scraper to remove the joints - do not use a rotary wire brush.
- Ensure that the joint to be removed is wet with oil or water to contain loose particles.
- Spray all asbestos debris with water and put it in a closed container which can be sealed for safe disposal.



## Basic engine data

Number of cylinders:	
- AA, AB, AC, AD ... ..	4
- YA, YB, YC, YD ... ..	6
Cylinder arrangement ... ..	In-line
Cycle ... ..	Four stroke
Induction system:	
- AA, YA ... ..	Naturally aspirated
- AB, YB ... ..	Turbocharged
- AC, YC ... ..	Altitude compensated
- AD, YD ... ..	Turbocharged/intercooled
Combustion system ... ..	Direct injection
Nominal bore ... ..	100 mm (3.937 in)
Stroke ... ..	127 mm (5.000 in)
Compression ratio:	
- AA, AC, YA, YC ... ..	16.5:1
- AB, AD, YB, YD ... ..	16.0:1
Cubic capacity:	
- AA, AB, AC, AD ... ..	4 litres (243 in <sup>3</sup> )
- YA, YB, YC, YD ... ..	6 litres (365 in <sup>3</sup> )
Firing order	
- AA, AB, AC, AD ... ..	1, 3, 4, 2
- YA, YB, YC, YD ... ..	1, 5, 3, 6, 2, 4
Valve tip clearance (cold):	
- Inlet ... ..	0,20 mm (0.008 in)
- Exhaust ... ..	0,45 mm (0.018 in)
Lubricating oil pressure (minimum at maximum engine speed and normal engine temperature):	
- AA, AC, YA, YC ... ..	207kN/m <sup>2</sup> (30lbf/in <sup>2</sup> ) 2,1kgf/cm <sup>2</sup>
- AB, AD, YB, YD ... ..	280kN/m <sup>2</sup> (40lbf/in <sup>2</sup> ) 2,8kgf/cm <sup>2</sup>
Direction of rotation ... ..	Clockwise from the front



## Weight table

## 1000 SERIES COMPONENT WEIGHTS

	Unit: kg
Cylinder block assembly	64.00
Rear end oil seal housing assembly	0.40
Timing case	4.15
Timing case cover	1.63
Crankshaft	47.00
Piston assembly	1.85
Conecting rod assembly	2.11
Cylinder head	59.00
Gear, Idler	2.76
Gear, camshaft	1.88
Camshaft	5.00
Lub oil pump assembly	2.89
Gear, fuel pump	1.86
Fuel pump	6.00
Injector	0.27
Flywheel housing	30.00
Flywheel	48.00
Starter motor	19.75
Fan drive housing	4.03
Pulley, fan drive	3.64
Sump	49.00
Cylinder head cover	3.03
Lub oil filter head	1.10
Lub oil cooler assy	1.91
Crank pulley	10.16
Pulley extension/fan adapter	4.94
Water pump assembly	6.75
Alternator	5.10
Induction manifold	3.31
Turbocharger	8.04
Induction elbow	0.78
Exhaust manifold	6.35
Fuel filter assembly	0.85
Front mount adapters	3.16

**Recommended torque tensions**

**11B**

Cylinder head assembly	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Pistons and connecting rod assemblies	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Crankshaft assembly	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Timing case and drive assembly	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Aspiration system	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Lubrication system	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Fuel system	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Cooling system	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.02
Flywheel and housing	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.03
Electrical equipment	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.03
Auxiliary equipment	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	11B.03