Perkins

Perkins Phaser and 1000 Series

Models AA to AH and YA to YE

WORKSHOP MANUAL

Phaser 4 and 6 cylinder diesel engines for automotive applications

1000 Series 4 and 6 cylinder diesel engines for agricultural and industrial applications

Publication TPD 1312E, Issue 2.
© Proprietary information of Perkins Engines Company Limited, all rights reserved.
The information is correct at the time of print.
Published in February 2002 by Technical Publications.
Perkins Engines Company Limited, Peterborough PE1 5NA, England.

MidWestTech | JCB Perkins Phaser & 1000 Series, AA to AH and YA to YE Diesel Engine S... Order the manual at mid-west-tech.com >

Contents

1 General information

Introduction ... 1

Engine views ... 2

Engine identification ... 3

Safety precautions ... 5

Asbestos joints ... 6

Viton seals ... 7

Engine lift equipment ... 8

POWERPART consumable products ... 9

2 Specifications

Data and dimensions ... 28

Thread sealant ... 57

Recommended torque settings ... 58

Compression test data ... 61

MidWestTech | JCB Perkins Phaser & 1000 Series, AA to AH and YA to YE Diesel Engi... Order the manual at mid-west-tech.com >

3 Cylinder head assembly

General description ... 63

Rocker cover

Operation 3-1 To remove ... 64
Operation 3-2 To fit ... 65

Rocker assembly

Operation 3-3 To remove and to fit ... 66
Operation 3-4 To dismantle and to assemble ... 67
Operation 3-5 To inspect and to correct ... 68

Valve tip clearances

Operation 3-6 To check and to adjust (four cylinder engines) ... 69
Operation 3-7 To check and to adjust (six cylinder engines) ... 70

Valve springs

Operation 3-8 To change the valve springs (with cylinder head fitted) ... 71

Cylinder head assembly

Operation 3-9 To remove ... 73
Operation 3-10 To fit ... 75

Valves and valve springs

Operation 3-11 To remove ... 78
Operation 3-12 To fit ... 79
Operation 3-13 To inspect and to correct ... 80

Valve guides

Operation 3-14 To inspect ... 81
Operation 3-15 To remove ... 82
Operation 3-16 To fit ... 83

Cylinder head

Operation 3-17 To inspect and to correct ... 84
Operation 3-18 To correct a valve seat with a valve seat cutter ... 85
Operation 3-19 To fit valve seat inserts ... 86

MidWestTech | JCB Perkins Phaser & 1000 Series, AA to AH and YA to YE Diesel Engi... Order the manual at mid-west-tech.com >

4 Piston and connecting rod assemblies

General description ... 87

Big end bearing

Operation 4-1 To remove ... 89
Operation 4-2 To fit ... 90
Operation 4-3 To inspect ... 90

Piston and connecting rod

Operation 4-4 To remove ... 91
Operation 4-5 To fit ... 92
Operation 4-6 To check the piston height above the cylinder block ... 94
Operation 4-7 To check piston height grade of a "Fastram" piston ... 95

Piston rings ... 96

Operation 4-8 To remove and to fit ... 97

Piston and connecting rod assembly

Operation 4-9 To dismantle and to assemble ... 98

Piston and piston rings

Operation 4-10 To inspect ... 99

Connecting rod

Operation 4-11 To inspect ... 100

Small end bush

Operation 4-12 To remove and to fit ... 100

Piston cooling jets

Operation 4-13 To remove and to fit ... 101
Operation 4-14 To check the jet alignment ... 102

5 Crankshaft assembly

General description ... 103

Crankshaft pulley

Operation 5-1 To remove and to fit (four cylinder engines) ... 105

Crankshaft pulley and damper

Operation 5-2 To remove (six cylinder engines) ... 106
Operation 5-3 To fit (six cylinder engines) ... 107
Operation 5-4 To inspect ... 108

MidWestTech | JCB Perkins Phaser & 1000 Series, AA to AH and YA to YE Diesel Engi... Order the manual at mid-west-tech.com >

Connecting rod

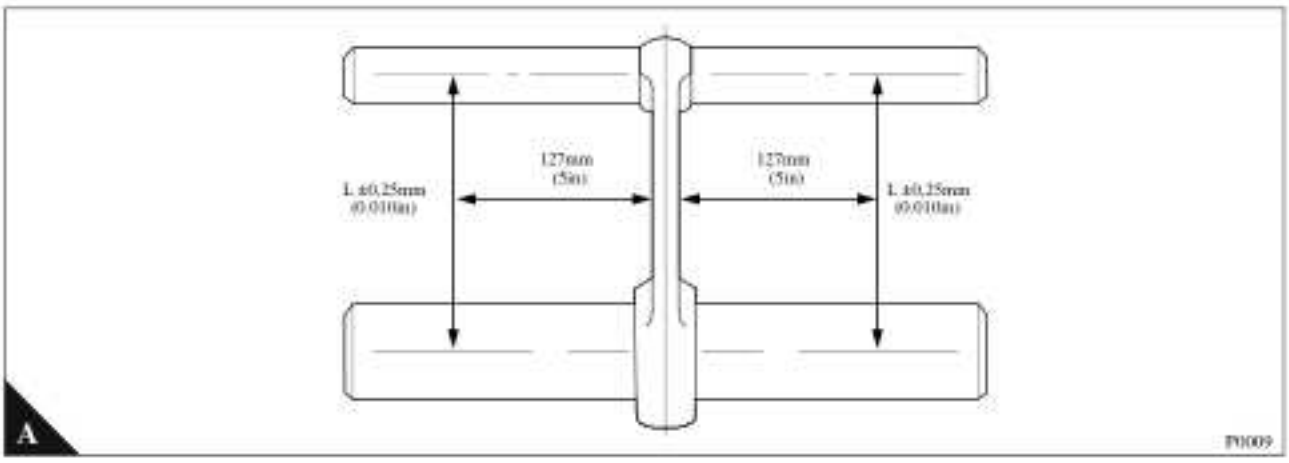
To inspect — Operation 4-11

1 Check the connecting rod for distortion (A).

Note: The large and small end bores must be square and parallel with each other within the limits of +/- 0,25 mm (0.010 in) measured 127 mm (5.0 in) each side of the connecting rod axis on a test mandrel. With the small end bush fitted, the limits are reduced to +/- 0,06 mm (0.0025 in).

2 Check the small end bush for wear or for other damage and renew it, if necessary.

3 Check the fit of the gudgeon pin in the small end bush and check the gudgeon pin for wear. Refer to the relevant Data and dimensions for "Gudgeon pins and small end bushes" on page 35.



Small end bush

To remove and to fit — Operation 4-12

1 Press out the old bush with a suitable adaptor.

2 Clean the connecting rod bore and remove any sharp edges.

3 Press in the new bush. Ensure that the lubrication hole in the bush is on the same side as, and is aligned with, the hole in the top of the connecting rod.

4 Ream the bush to get the correct clearance between the gudgeon pin and the bush. Refer to the relevant Data and dimensions for "Gudgeon pins and small end bushes" on page 35.

Note: On turbocharged engines the small end is wedge shaped. After the small end bush has been fitted, machine the bush to the shape of the small end and remove any sharp edges.

MidWestTech | JCB Perkins Phaser & 1000 Series, AA to AH and YA to YE Diesel Engi... Order the manual at mid-west-tech.com >

Possible causes

1 Element of the air filter dirty
2 Restricted crankcase breather
3 Element of the air filter not fitted, or not sealing correctly. Loose connection to turbocharger.
4 Internal distortion or restriction in pipe from air filter to turbocharger.
5 Damaged/restricted crossover pipe, turbocharger to induction manifold.
6 Restriction between air filter and turbocharger.
7 Restriction in exhaust system.
8 Turbocharger loose or clamps/setscrews loose.
9 Induction manifold has cracks, is loose, or has flange distortion.
10 Exhaust manifold has cracks, is loose, or has flange distortion.
11 Restricted exhaust system.
12 Delay of lubricating oil to turbocharger at engine start.
13 Insufficient lubrication.
14 Dirty lubricating oil.
15 Incorrect lubricating oil.
16 Restricted lubricating oil supply pipe.
17 Restricted lubricating oil drain pipe.
18 Turbine housing damaged or restricted.
19 Leakage from turbocharger seals.
20 Worn turbocharger bearings.
21 Excessive dirt in compressor housing.
22 Excessive carbon behind turbine rotor.
23 Engine speed raised too rapidly at initial start.
24 Insufficient engine idle period.
25 Faulty fuel injection pump.
26 Worn or damaged atomisers.
27 Valves burned.
28 Worn piston rings.
29 Lubricating oil leakage from supply pipe.
30 Excessive preservation fluid (on initial engine start).
31 Excessive engine idle period.
32 Restriction in turbocharger bearing housing.
33 Restriction in lubricating oil filter.
34 Wet type air cleaner: restricted, dirty element, viscosity of oil to low/high.
35 Waste-gate actuator faulty or damaged.
36 Waste-gate valve not free.
37 Engine stopped too soon from high load.
38 Insufficient lubricating oil.
39 Fuel leakage from fuelled starting aid.
40 Crack in backplate of compressor.

MidWestTech | JCB Perkins Phaser & 1000 Series, AA to AH and YA to YE Diesel Engi... Order the manual at mid-west-tech.com >

Cold start advance unit

Some Lucas/Delphi, Bosch and Stanadyne rotary fuel injection pumps have a cold start advance unit that holds the timing of the pump in an advanced position when the engine is cold.

Caution: *It is important that the electrical connections to the sender unit are connected correctly. Failure of the starting aid to operate correctly could result in damage to the engine as the timing will be fully advanced for normal operation.*

The sender unit, for engines fitted with belt driven coolant pumps, is on the top of the thermostat housing. The sender unit, for engines fitted with gear driven coolant pumps, is on the rear of the timing case on the left side of the engine.

As the engine warms, the sender unit energises to retard the pump timing to the correct timing for normal operation of the Lucas/Delphi and Bosch fuel injection pumps. The sender unit for the Stanadyne cold start unit de-energises to retard the pump timing to the correct timing for normal operation.

Note: The wiring diagrams on the following page show the sender unit (component 3) position when the engine is cold.

To ensure that the engine conforms to the emissions legislation, it is important that the electrical connections of the engine cold start advance unit are fitted correctly before the engine is operated.

Caution: *Damage to the engine will occur if the engine is load tested at more than 80% of full load with the cold start device disconnected.*

Continued

MidWestTech | JCB Perkins Phaser & 1000 Series, AA to AH and YA to YE Diesel Engi... Order the manual at mid-west-tech.com >