• Perkins POWER SERVICE

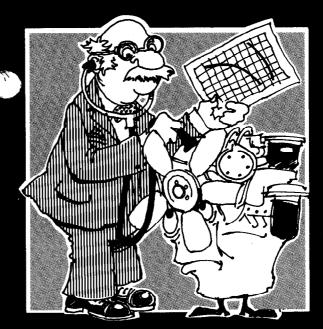
Fault Finding Guide for Diesel Engines

Perkins POWER SERVICE



All information in this guide is substantially correct at the time of printing but may be altered subsequently by the Company.







Perkins Engines Limited, Peterborough PE1 5NA, England

Fault Finding Guide for Diesel Engines

PERKINS COMPANIES

AUSTRALIA

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FRANCE

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GERMANY Perkins Motoren G.m.b.H., 8752 Kleinostheim, Postfach 1180, Germany. Telephone: 06027 5010, Telex: 4188869.

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Cables: 'Perkoil' Peterborough.

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Telephone: (031) 927364. Telex: 380658 Perkit I.
Cables: 'Perkoil' Portichetto.

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U.S.A. Perkins Engines Inc., P.O. Box 697, Wayne, Michigan 48184, U.S.A. Telephone: 313 595 9600. Telex: 23-4002.

Cables: Perkeng Wane.

In addition to the above, there are Perkins distributors in most countries. Perkins Engines Ltd., Peterborough or one of the above companies can given details.

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INTRODUCTION

This Fault Finding Guide should assist in the identifying of the probable cause of the problems which can occur. Having identified the problem, a remedy can be applied.

The relevant Workshop Manual should be consulted for any required detail.

The fuel injection equipment fitted to diesel engines is manufactured to extremely tight tolerances and cannot tolerate the ingress of any dirt particles. Therefore, if the fuel injection equipment, such as the lift pump, the fuel injection pump or the atomisers are suspect, then the equipment should be removed from the engine to the specialised fuel injection equipment workshop for testing and repair, or new replacement components fitted.

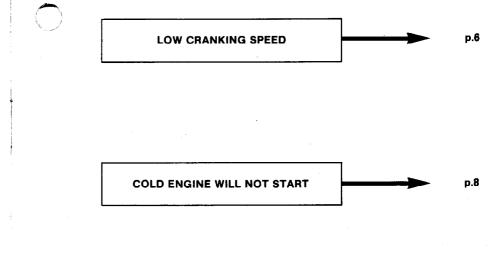
WARNING

Removal of the seals, or the breaking of the seals, on fuel injection pumps, will render any warranty claim on an engine, null and void.

Before commencing any work on a Perkins engine, ensure that you understand what the complaint is. For example, if the user complains that the engine is knocking, can **you** hear the knock which is being complained about.

If it becomes necessary to use new parts, ensure that the parts you use are genuine Perkins Parts. Your authorised Perkins parts counter will supply the proper part against the Perkins engine serial number.

STARTING PROBLEMS

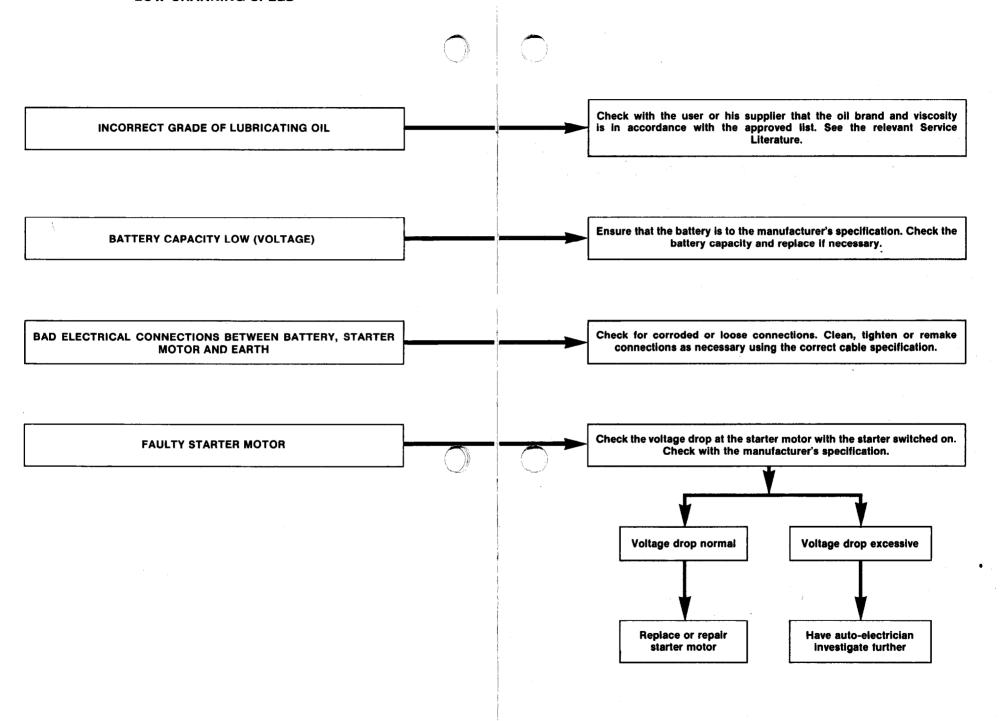








LOW CRANKING SPEED



COLD ENGINE WILL NOT START

Refer to the Perkins handbook, check that the book being used is relevant to INCORRECT USE OF COLD STARTING EQUIPMENT the engine type with the problem. Check the continuity of the electrical circuit in the cold starting equipment **FAULTY COLD STARTING EQUIPMENT** by an indicated voltage at the heater terminals when switched on. The CAV "Thermostart" is fitted to many types of Perkins engines and with the air cleaner or hose removed from the induction manifold, the functioning of the unit can usually be seen. When the unit is switched to the "heat" or "H" position, the "Thermostart" should glow and as the fuel valve in the unit opens, a flame should appear. If not, then there is either no fuel available, or the "Thermostart" is faulty. Glow plugs can also be found fitted in Perkins engines. When 12 volt glow plugs are first switched on, there is an initial current of about 40 amperes settling to about 10 amperes after about 10 seconds, with a terminal voltage of 11-12 volts. Some in-line fuel injection pumps are fitted with an excess fuel device. Check that the remote controls are operating satisfactorily. If "Start Pilot" aids are used, ensure the equipment is used strictly according to the manufacturers instructions. Never attempt to use heaters in conjunction with ether type starting aids. Where necessary, check the specification of the fuel with the supplier, **INCORRECT GRADE OF FUEL** against the relevant Service Literature.

See sections
"LOW CRANKING SPEEDS" on page 6
"ENGINE IS DIFFICULT TO START" on page 10
"ENGINE WILL NOT START" on page 14

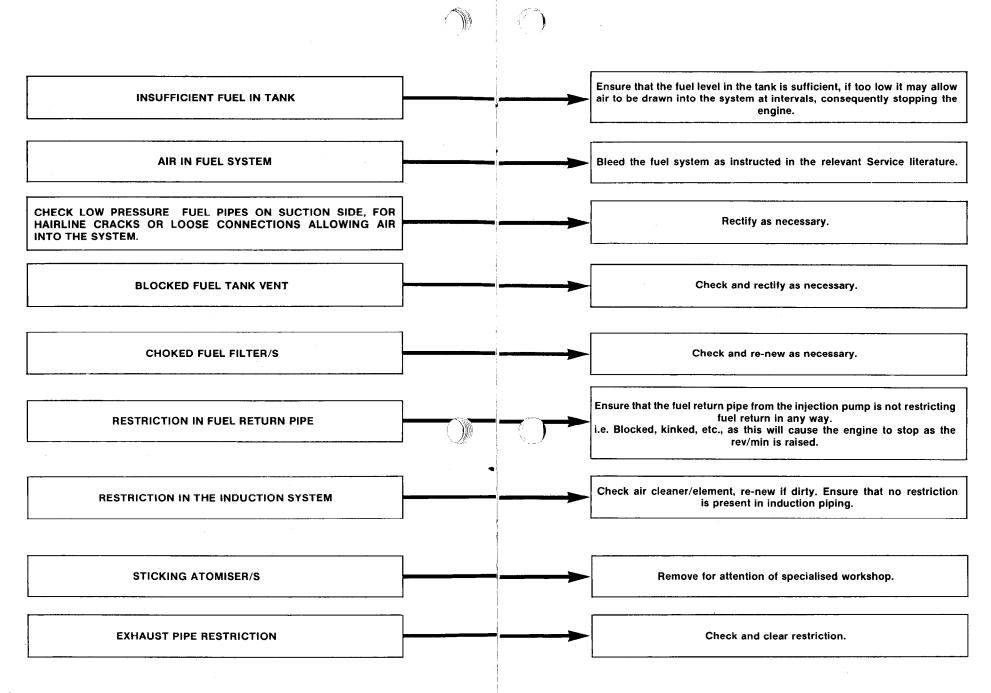
ENGINE IS DIFFICULT TO START

Assuming that the problems LOW CRANKING SPEED

10

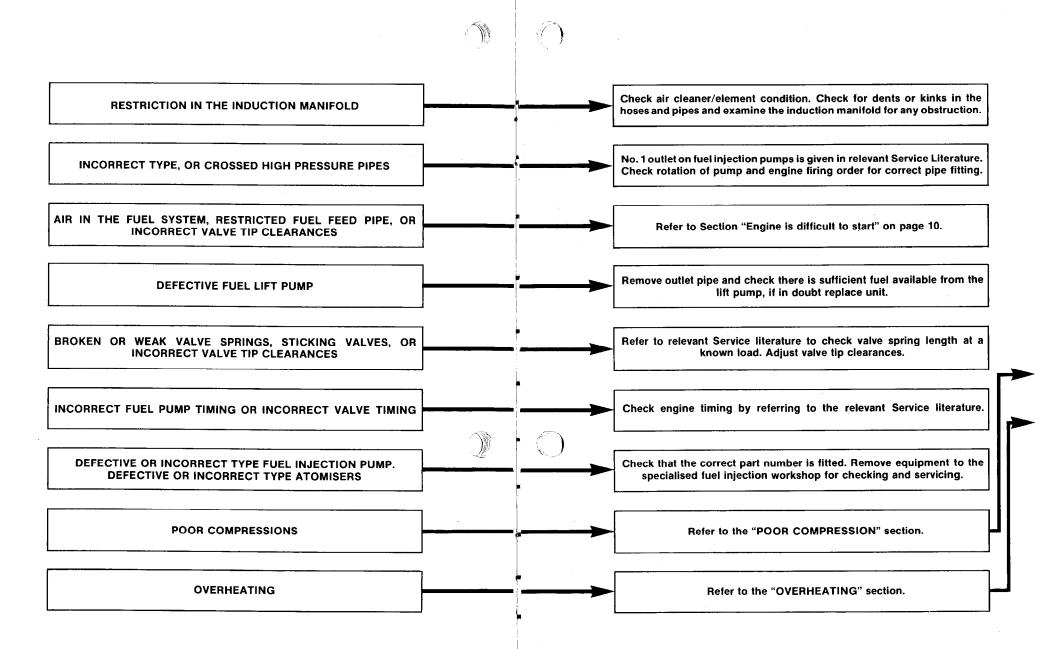
and **COLD ENGINE WILL NOT START** have been resolved, proceed as follows: Bleed the system of air as in the relevant service literature. AIR IN THE FUEL SYSTEM RESTRICTED FUEL FEED PIPE Trace and rectify restriction or blockage. OR **BLOCKED VENT IN THE FUEL TANK** Renew fuel filter element(s). **CHOKED FUEL FILTERS** Check lift pump operation, if insufficient fuel is flowing, repair or replace fuel lift pump. **DEFECTIVE FUEL LIFT PUMP** Check, as in the "POOR Compression" section. POOR COMPRESSIONS Adjust valve tip clearance according to the relevant manual. Inspect STICKING VALVES valves, guides, springs and rocker assembly for wear. OR **INCORRECT VALVE TIP CLEARANCE** Check all aspects of valve and fuel pump timing according to the **INCORRECT FUEL PUMP TIMING** relevant manual. OR **INCORRECT VALVE TIMIMG** Examine the complete exhaust system, checking for dents or kinks in the pipes, check for broken mufflers. **EXHAUST PIPE RESTRICTION** Check that the correct part number is fitted. Replace or service all the atomisers. **DEFECTIVE OR INCORRECT ATOMISERS** Remove pump for attention by specialised workshop or fit replacement **DEFECTIVE FUEL INJECTION PUMP**

ENGINE STARTS AND STOPS

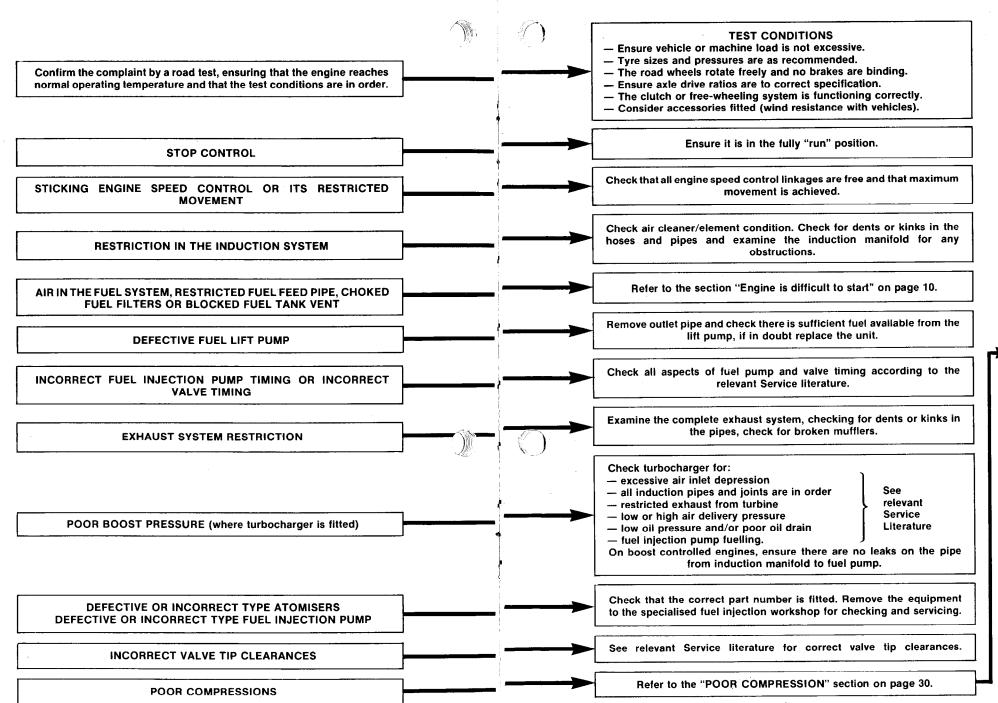


ENGINE WILL NOT START Ensure that there is sufficient fuel in the tank. INSUFFICIENT FUEL IN TANK Ensure that the engine stop control operation is functioning, and is in the run position. **FAULTY STOP CONTROL OPERATION** See Sections: LOW CRANKING SPEED page 6 COLD ENGINE DOES NOT START page 8 ENGINE IS DIFFICULT TO START page 10 Ensure items in these sections are in order. Check by removing the fuel injection pump inspection plate (see relevant Service Literature), turn the engine and check that the inside of the pump is rotating. If not, remove it and check the quill (drive) shaft of the pump, the drive (timing) gears and/or the auxiliary fuel injection pump drive arrangement. **BROKEN FUEL INJECTION PUMP DRIVE**

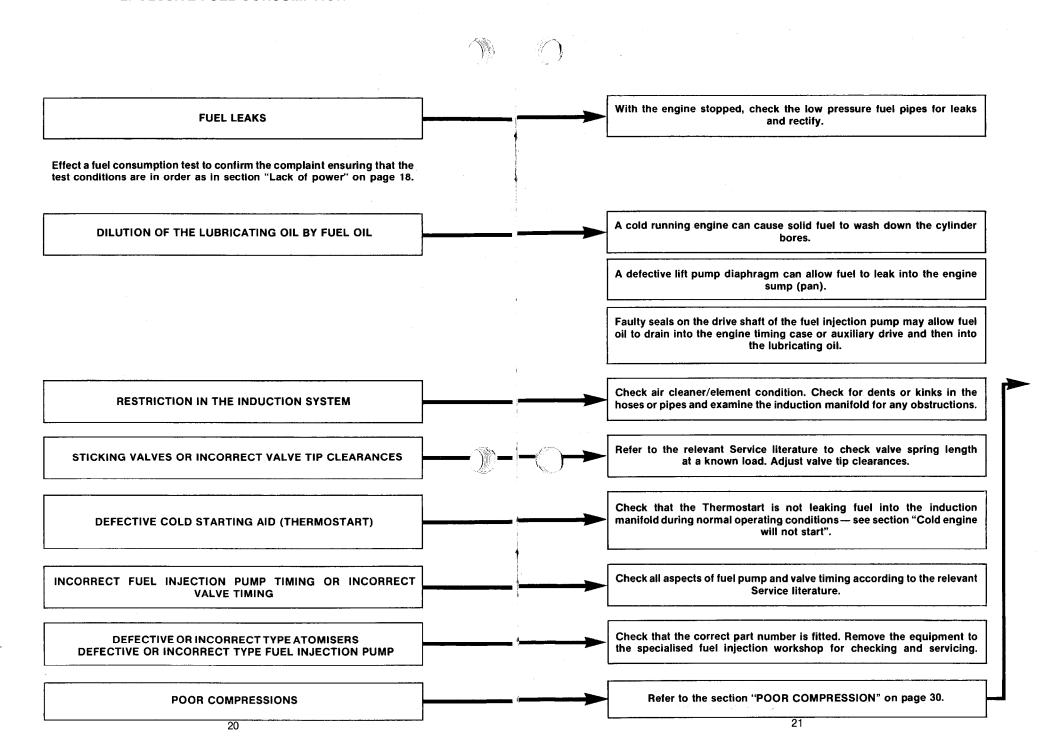
ENGINE MISFIRES



LACK OF POWER



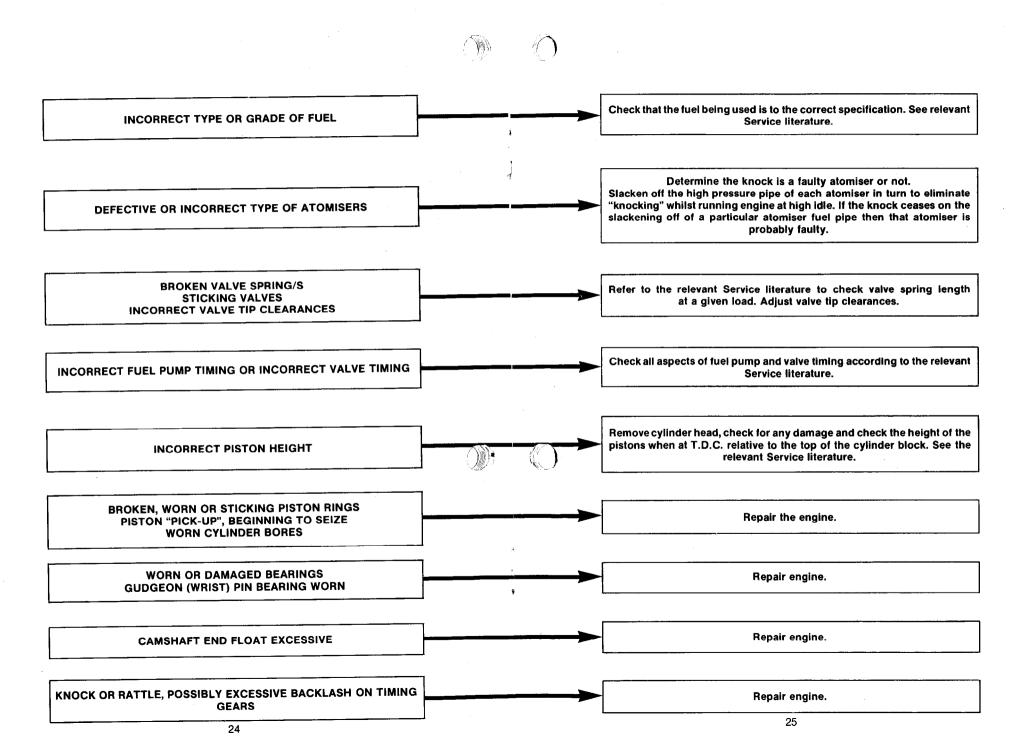
EXCESSIVE FUEL CONSUMPTION



BLACK EXHAUST

Confirm the complaint by a road test, ensuring that the engine reaches normal operating temperature and that the test conditions are in order as in the section "Lack of power" on page 18. Check air cleaner/element condition. Check for dents or kinks in the **RESTRICTION IN THE INDUCTION MANIFOLD** hoses or pipes and examine the induction manifold for any obstructions. Check turbocharger for: POOR BOOST PRESSURE (Where turbocharger is fitted) - excessive air inlet depression all induction pipes and joints are in order. low air delivery pressure. - restricted exhaust from turbine. - fuel injection pump fuelling. - low oil pressure and/or poor oil drain. See relevant Service literature. Examine the complete exhaust system checking for dents or kinks in the **EXHAUST SYSTEM RESTRICTION** pipes, check for broken mufflers. Check that the "Thermostart" is not leaking fuel into the induction **DEFECTIVE "THERMOSTART" (COLD STARTING AID)** manifold during normal operating conditions. **DEFECTIVE OR INCORRECT ATOMISERS** Check that the correct part number is fitted. Remove the equipment to the specialised fuel injection workshop for checking and servicing. **DEFECTIVE OR INCORRECT FUEL INJECTION PUMP** Check all aspects of fuel pump and valve timing according to the INCORRECT FUEL INJECTION PUMP TIMING OR **INCORRECT VALVE TIMING** relevant Service literature. **INCORRECT VALVE TIP CLEARANCES** Adjust valve tip clearances according to the relevant Service literature. Refer to the section "POOR COMPRESSION" on page 30. **POOR COMPRESSIONS**

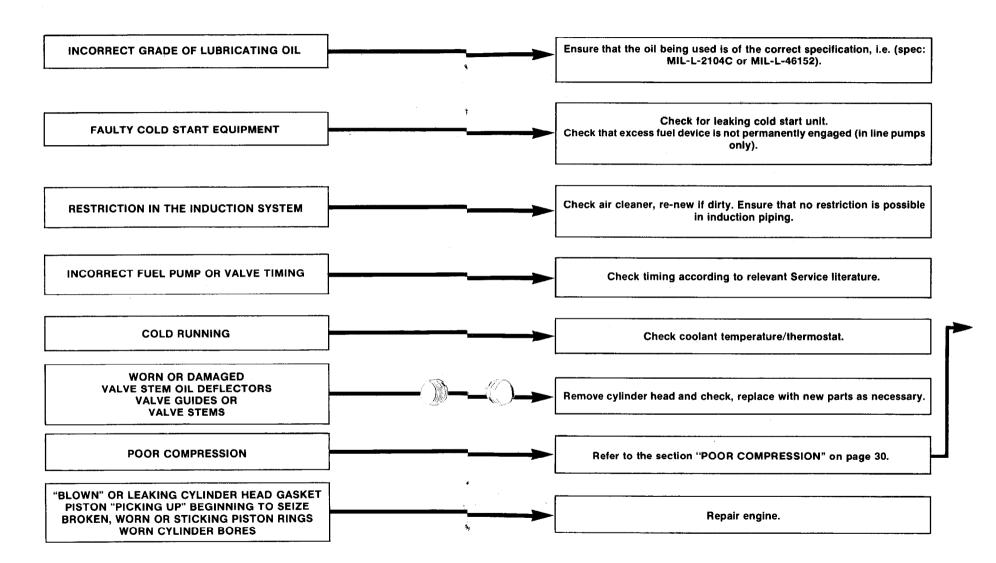
ENGINE KNOCKING

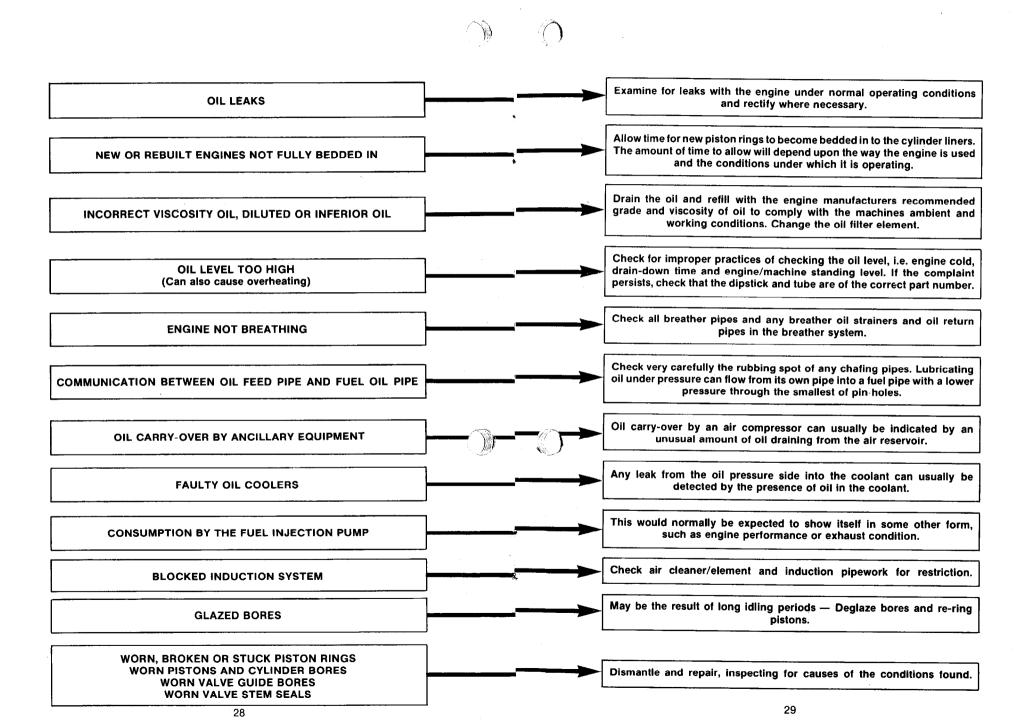


BLUE/WHITE EXHAUST

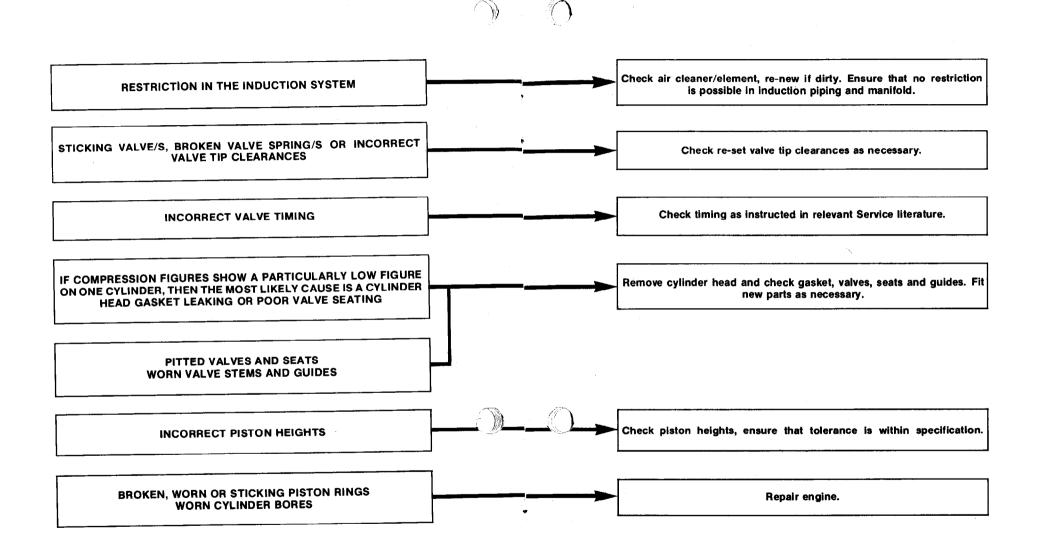
NOTE
CONFIRM COMPLAINT BY ROAD TEST, ENSURING ENGINE
REACHES NORMAL OPERATING TEMPERATURE







POOR COMPRESSION

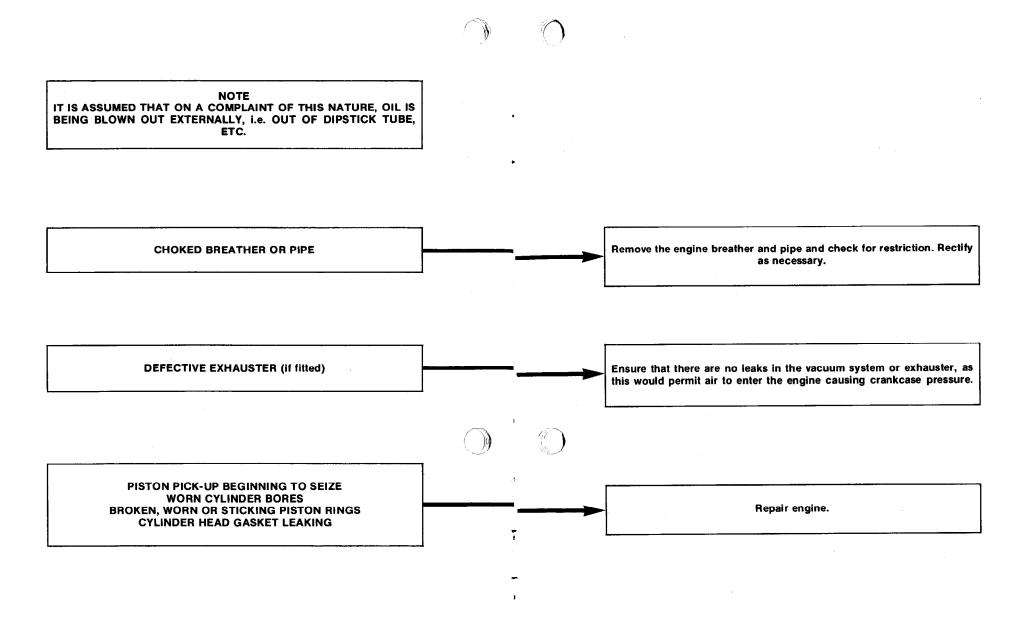


OVERHEATING

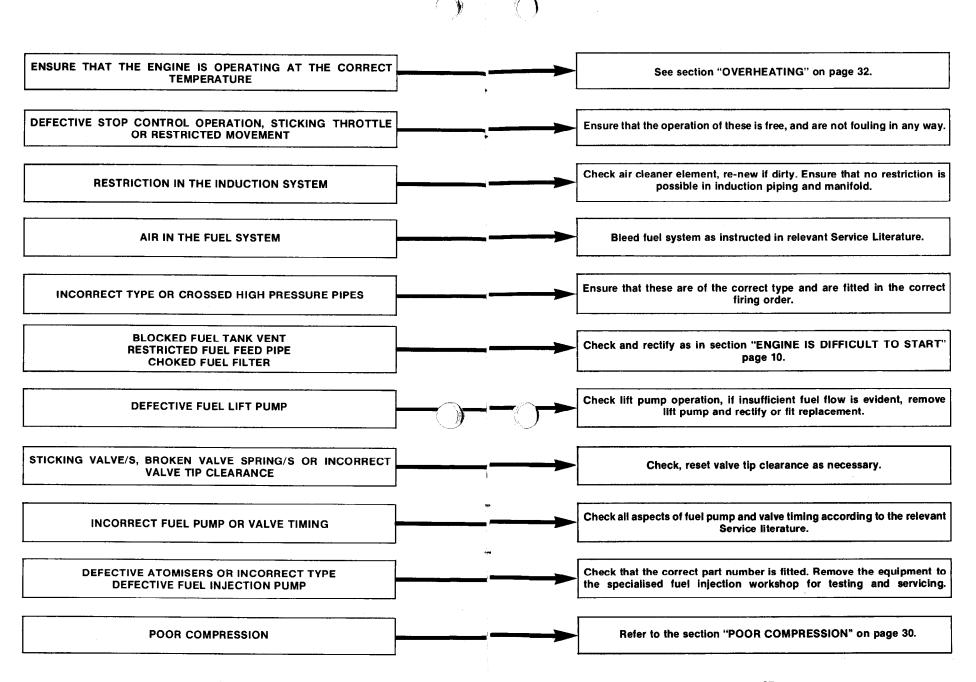
32

Check that the machine or vehicle is not being overloaded. Check that any temperature gauge fitted to the machine is not faulty, by removing the radiator pressure cap, run the engine until coolant warms up and using a thermometer in the radiator compare its reading to that of the gauge fitted to the machine. With engine cold check the level of the coolant. Check for leaks. **COOLANT LEVEL TOO LOW** Check for improper practices of checking the oil level. Level engine/ LUBRICATING OIL LEVEL TOO HIGH machine and allow drain-down time. Check there is about %in (10mm) depression on the longest run of the belt(s) by normal hand pressure. With radiator cap removed and the thermostat removed, check there is **LOOSE FAN BELT** a swirl of coolant in the header tank. With remote tanks, remove the **DEFECTIVE WATER PUMP** thermostat from a cold engine, momentarily start the engine when coolant should be pushed out by the water pump, from the thermostat housing. Back-flush the cooling system with pressurised water. Remove all hoses for inspection. Check the radiator and pressure cap part number and CHOKED, DEFECTIVE OR INCORRECT RADIATOR, HOSES OR its operation with the manufacturers spec. Ensure the air flow through PRESSURE CAP the radiator is not impeded. Check that the thermostat opens at the correct temperature and it is **FAULTY THERMOSTAT** the correct part number. Check air cleaner/element condition. Check for dents or kinks in the RESTRICTION IN THE INDUCTION MANIFOLD hoses or pipes and examine the induction manifold for any obstruction. Check that the thermostart is not leaking fuel into the induction manifold DEFECTIVE THERMOSTART under normal operating conditions. Examine the complete exhaust system for dents or kinks in the pipes **EXHAUST SYSTEM RESTRICTION** and check for any damage to the mufflers. This can sometimes be detected by bubbles in coolant and by comparing CYLINDER HEAD GASKET LEAKING OR CRACKED CYLINDER HEAD cylinder pressures. Remove cylinder head for inspection or replacement. INCORRECT FUEL INJECTION PUMP TIMING OR Check all aspects of fuel pump and valve timing according to the relevant INCORRECT VALVE TIMING Service literature. Check for correct part number and arrange for testing in specialised DEFECTIVE OR INCORRECT TYPE ATOMISERS OR FUEL PUMP workshop. PISTON PICK-UP BEGINNING TO SEIZE Repair engine.

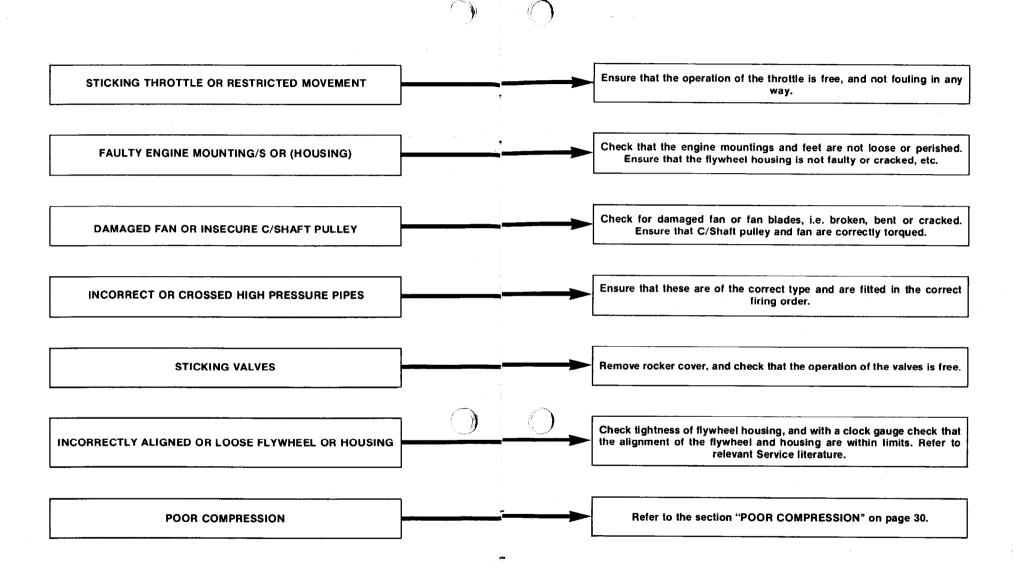
EXCESSIVE CRANKCASE PRESSURE

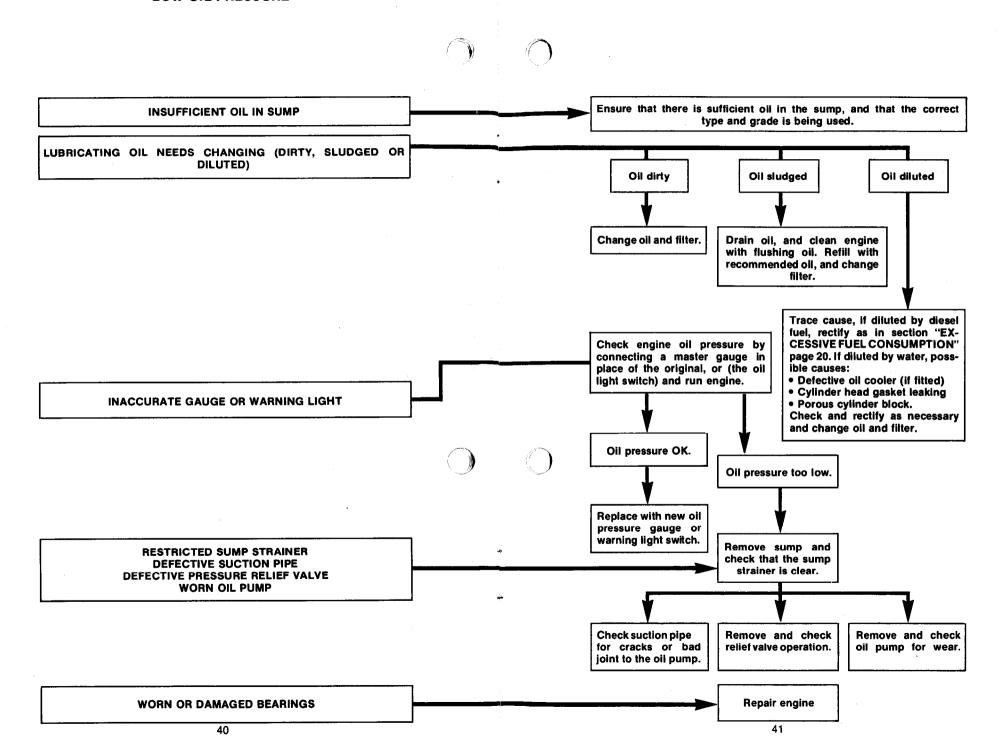


ERRATIC RUNNING

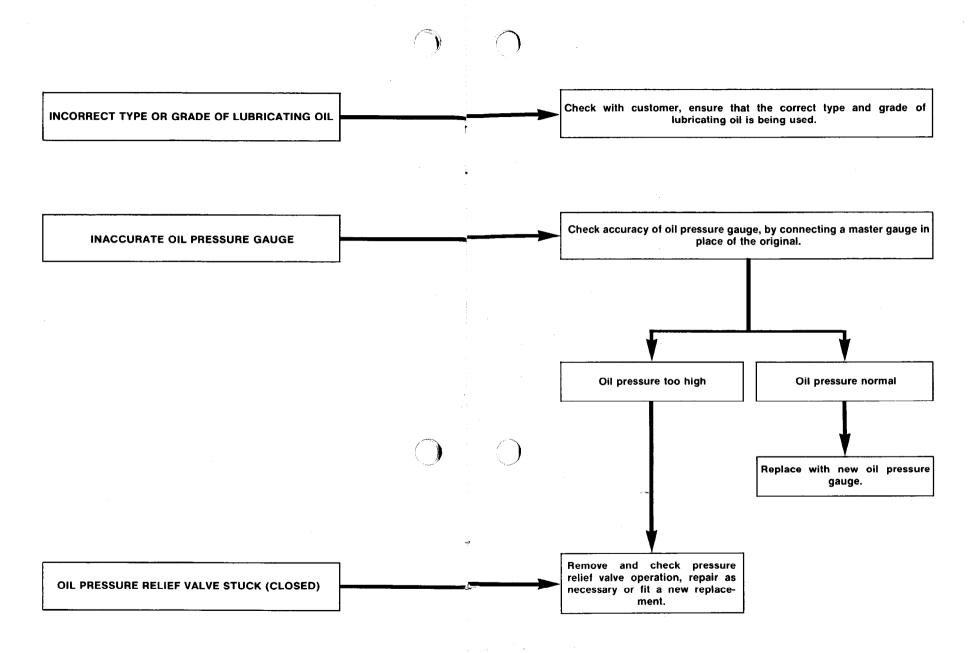


VIBRATION





HIGH OIL PRESSURE



EXAMPLES OF SERVICES ASSISTANCE

Service

If any problems occur with your engine or the components fitted to it, your Perkins distributor can make the necessary repairs and will ensure that only the correct parts are fitted and that the work is done correctly.

Certain components can be supplied by your Perkins distributor through the Perkins Power Exchange system. These will enable you to reduce the cost of some repairs.

Extended warranty

The engine warranty period can be extended to two years. For details get in contact with your nearest Perkins distributor.

Service literature

Workshop manuals and other service publications are available from your Perkins distributor at a nominal cost.

Training

Local training on correct engine operation, overhaul and service is available at some Perkins distributors. If special training is needed, your Perkins distributor can give details of how to get this at the Product Education Department, Peterborough, or other main centres.