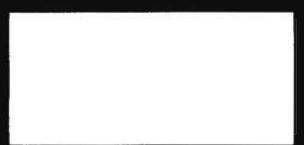
# Perkins

**Fault Finding Guide for Diesel Engines** 

# **Perkins** SERVICE



**Perkins** 

All allomation in this quide 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**

Perkins Engines Australia Pty. Ltd., P.O. Box 156, Dendenong 3175, Victoria, Australia. Telephone: 792 0431. Telex: 30816. Cables: 'Perkoli' Melbourne.

### FRANCE

Moteurs Perkins S.A., 9-11 Ave. Michelet, Boite Postale 69, 93402 Saint Ouen, Cedex, France. Telephone: 257 14 90, Talex: 'Perkoil' 642924.

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

### **GREAT BRITAIN**

Perkins Engines Limited, Peterborough, PE1 5NA, England. Telephone: Peterborough 67474. Telex: 32501. Cablee: 'Perkoil' Peterborough.

ITALY
Motori Perkins S.p.A.,
Vis Gonzia II, P.O. Box 12,
22070 Portichetto-Luisego (Como), Italy,
Telephone: (031) 827364, Telex: 380658 Perkit I. Cables: 'Perkoil' Portichetto.

### **JAPAN**

Parkins Engines K.K., 8th Floor, Reinarzeka Building, 14-2 Akasaka, I-chome, Minato-ku, Tokyo 107, Japan. Telephone: (03) 586 7377. Telex: J2424823 Perkoil J.

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 ere Perkina distributors in most countries. Perkins Engines Ltd., Peterborough or one of the above companies can given details.

### CONTENTS

INTRODUCTION	age 4
STARTING PROBLEMS	5
Low cranking speed	6
— Cold engine will not start	8
— Engine is difficult to start	10
— Engine starts and stops	12
Engine will not start cold or hot	14
ENGINE MISFIRES	16
LACK OF POWER	18
EXCESSIVE FUEL CONSUMPTION	20
BLACK EXHAUST	22
ENGINE KNOCKING	
BLUE/WHITE EXHAUST	26
EXCESSIVE LUBRICATING OIL CONSUMPTION	28
POOR COMPRESSION	
OVERHEATING	32
EXCESSIVE CRANKCASE PRESSURE	
ERRATIC RUNNING	36
VIBRATION	38
LOW OIL PRESSURE	40
HIGH OIL PRESSURE	42
EXAMPLES OF SERVICE ASSISTANCE	44

### 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.

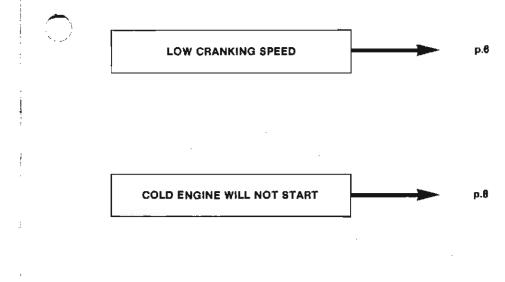
### WARNING

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



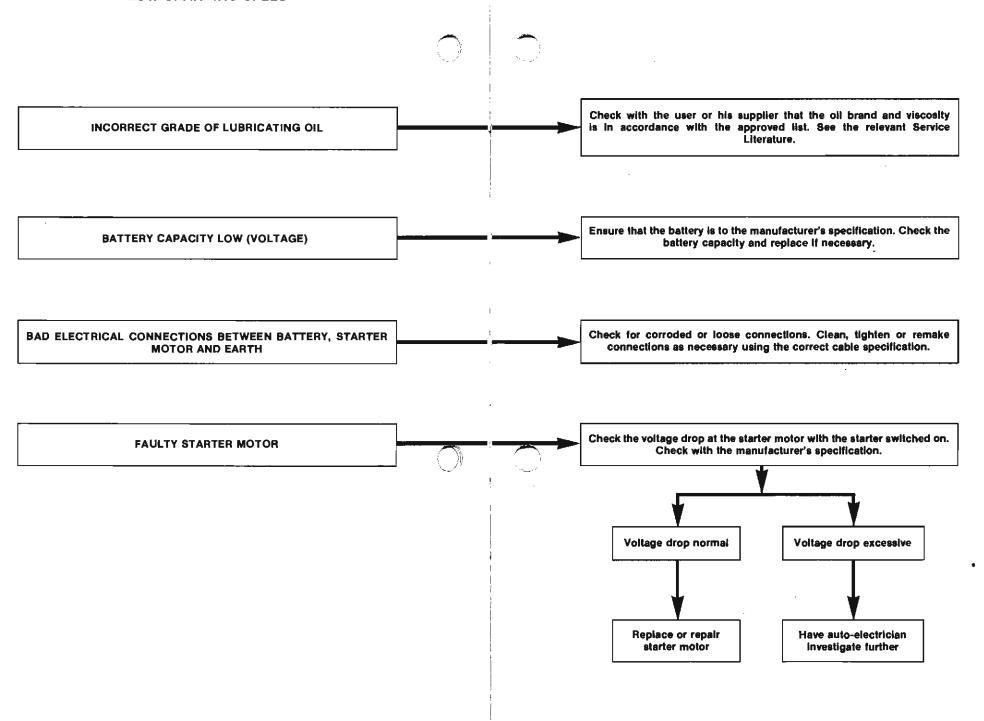






### **LOW CRANKING SPEED**

6



.

### 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 litted 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,

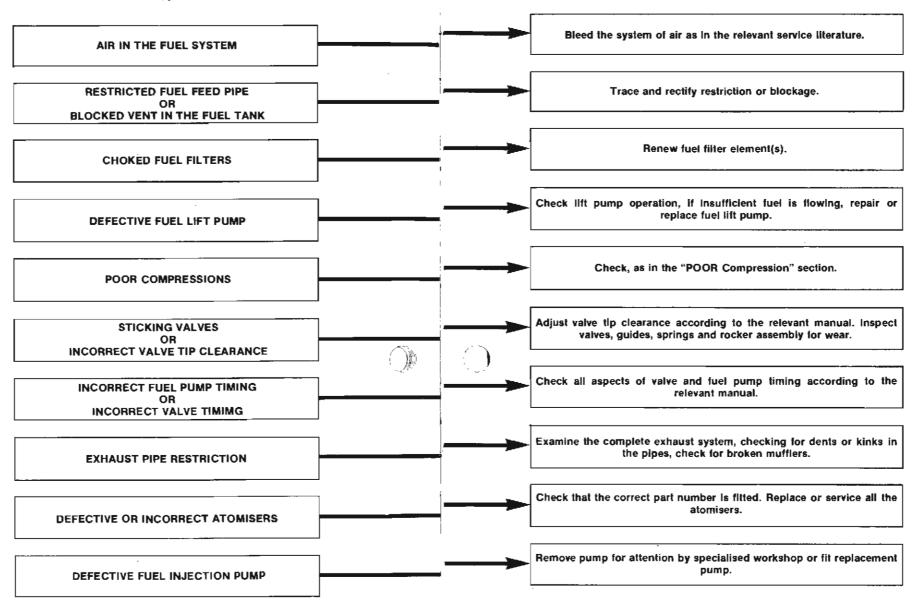
See sections
"LOW CRANKING SPEEDS" on page 6
"ENGINE IS DIFFICULT TO START" on page 10
"ENGINE WILL NOT START" on page 14

against the relevant Service Literature.

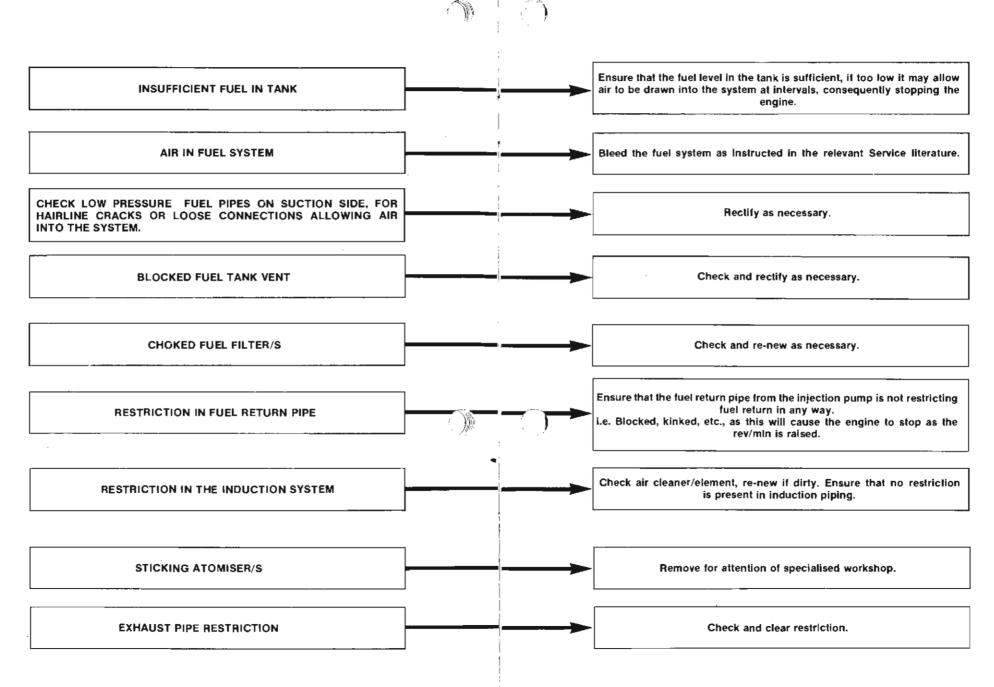
INCORRECT GRADE OF FUEL

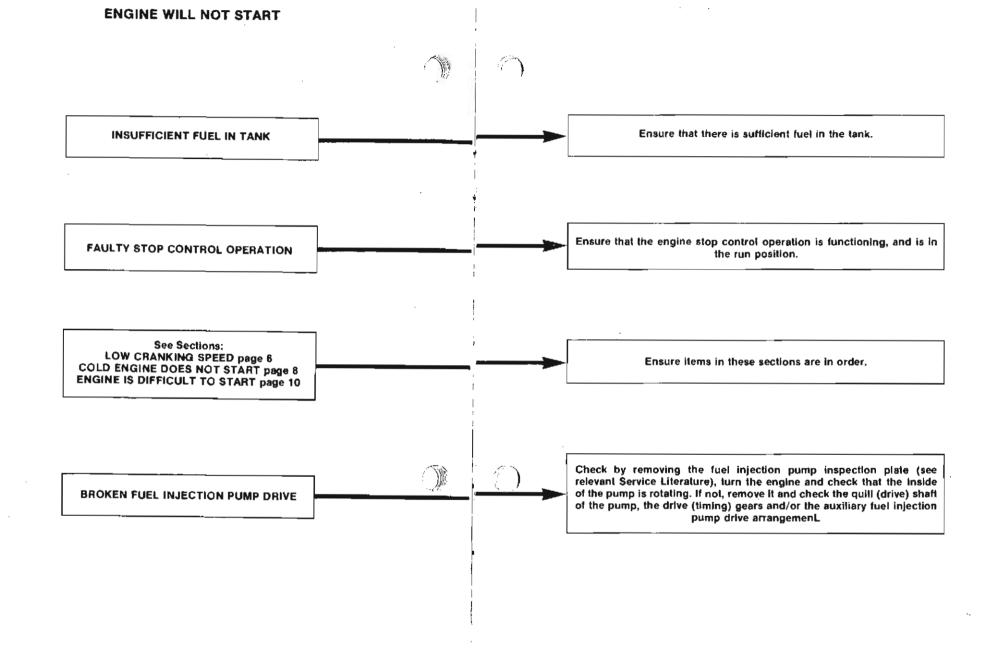
### Assuming that the problems LOW CRANKING SPEED and

COLD ENGINE WILL NOT START have been resolved, proceed as follows:

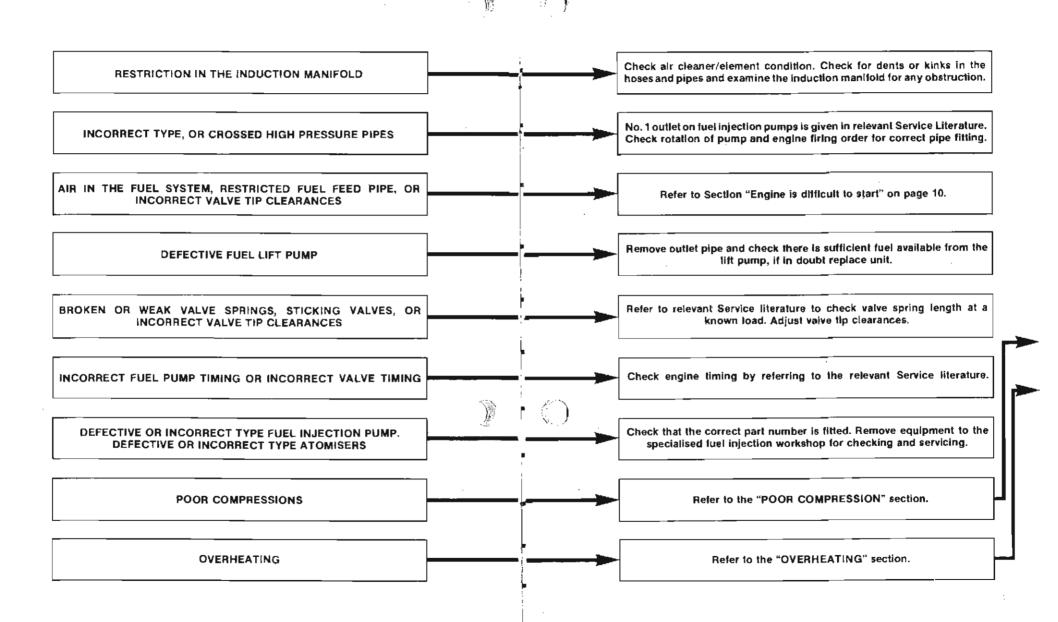


### **ENGINE STARTS AND STOPS**

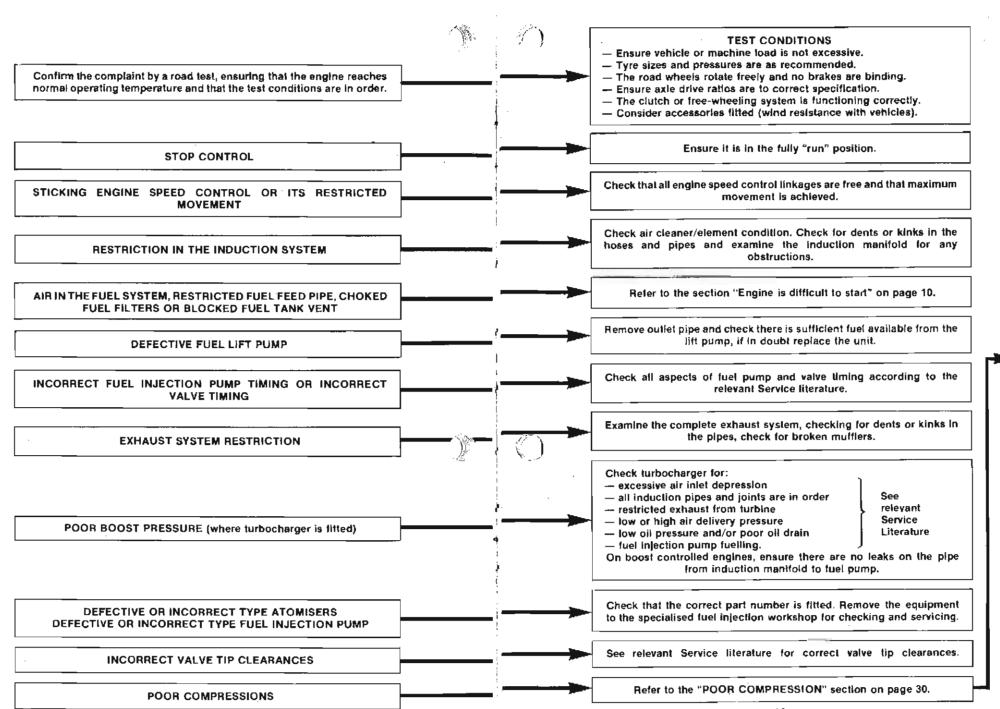




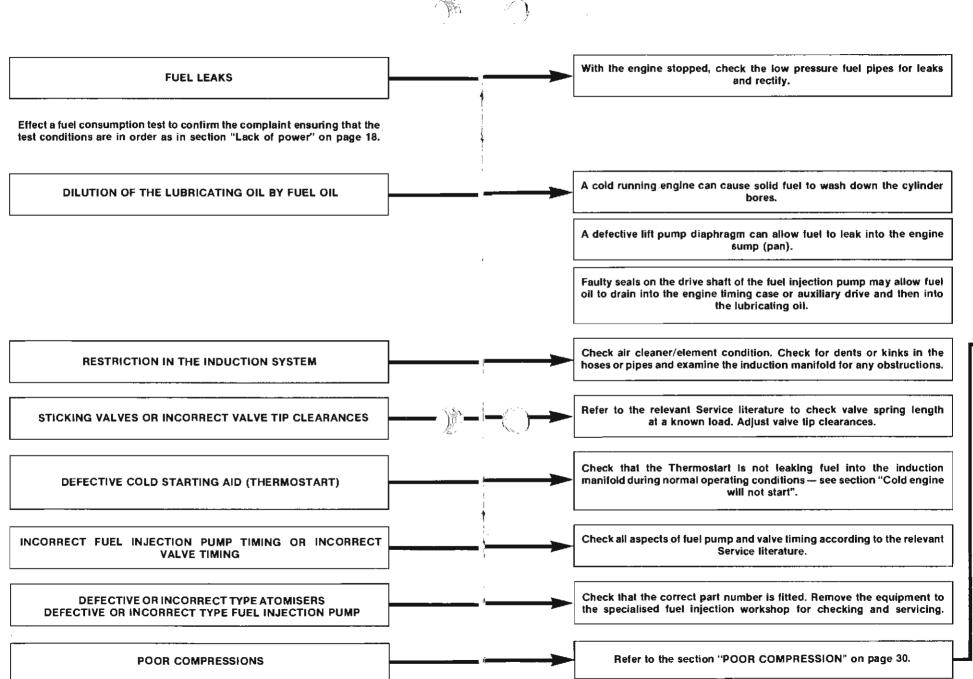
### **ENGINE MISFIRES**



### LACK OF POWER



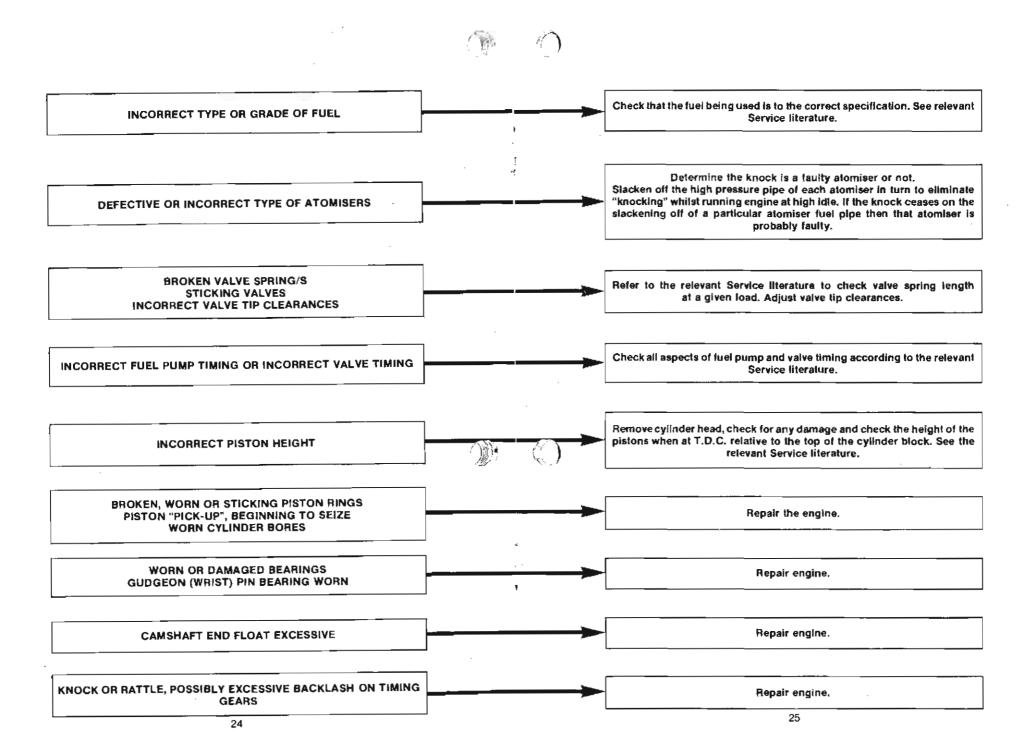
### **EXCESSIVE FUEL CONSUMPTION**



### **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 piges and joints are in order. - low air delivery pressure. - restricted exhaust from turbine. - fuel injection pump tuelling. - 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 INCORRECT FUEL INJECTION PUMP TIMING OR Check all aspects of fuel pump and valve timing according to the INCORRECT VALVE TIMING relevant Service literature. Adjust valve tip clearances according to the relevant Service literature. **INCORRECT VALVE TIP CLEARANCES** POOR COMPRESSIONS Refer to the section "POOR COMPRESSION" on page 30.

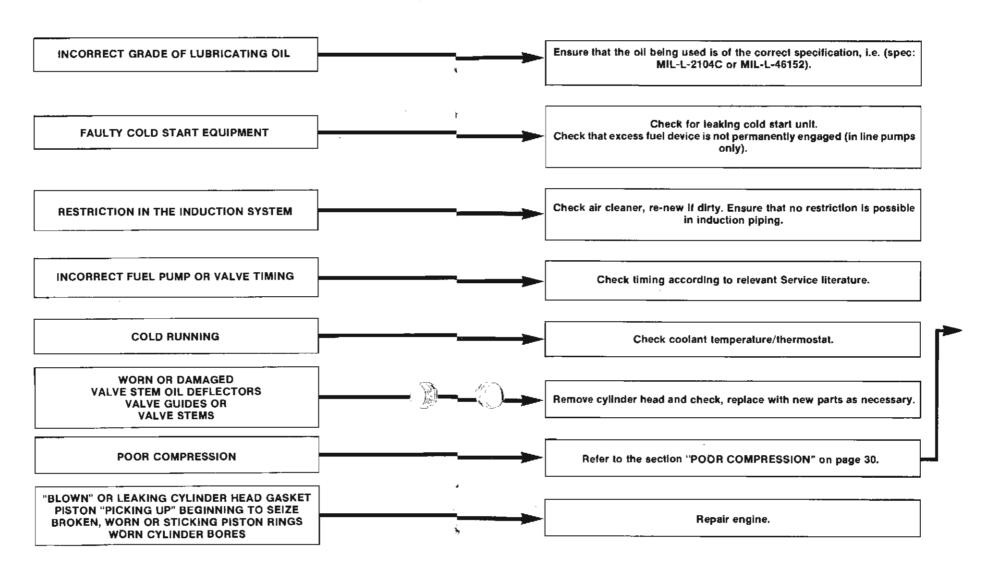
### **ENGINE KNOCKING**

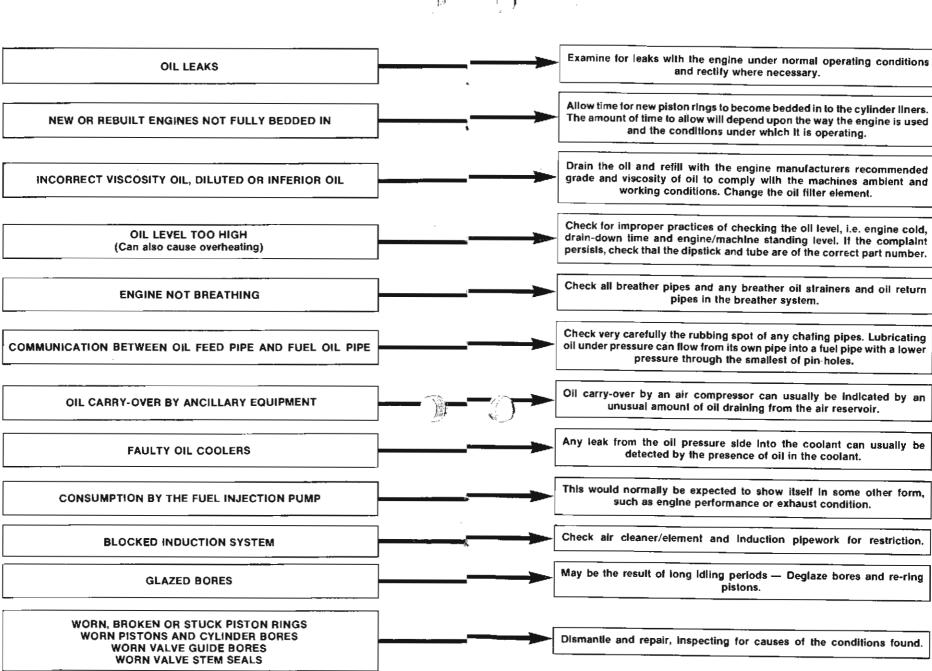


### **BLUE/WHITE EXHAUST**

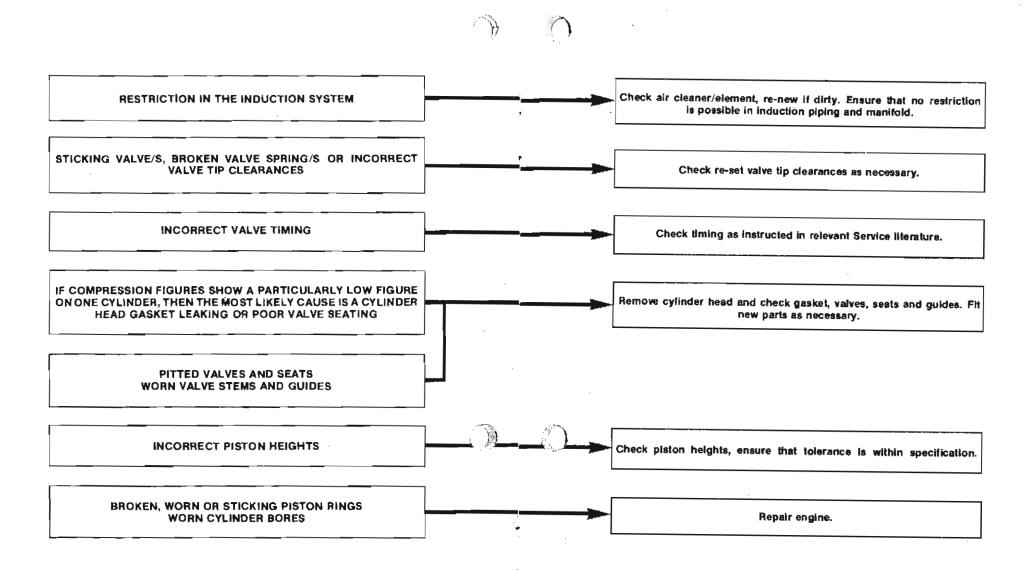
NOTE
CONFIRM COMPLAINT BY ROAD TEST, ENSURING ENGINE
REACHES NORMAL OPERATING TEMPERATURE







# **POOR COMPRESSION**



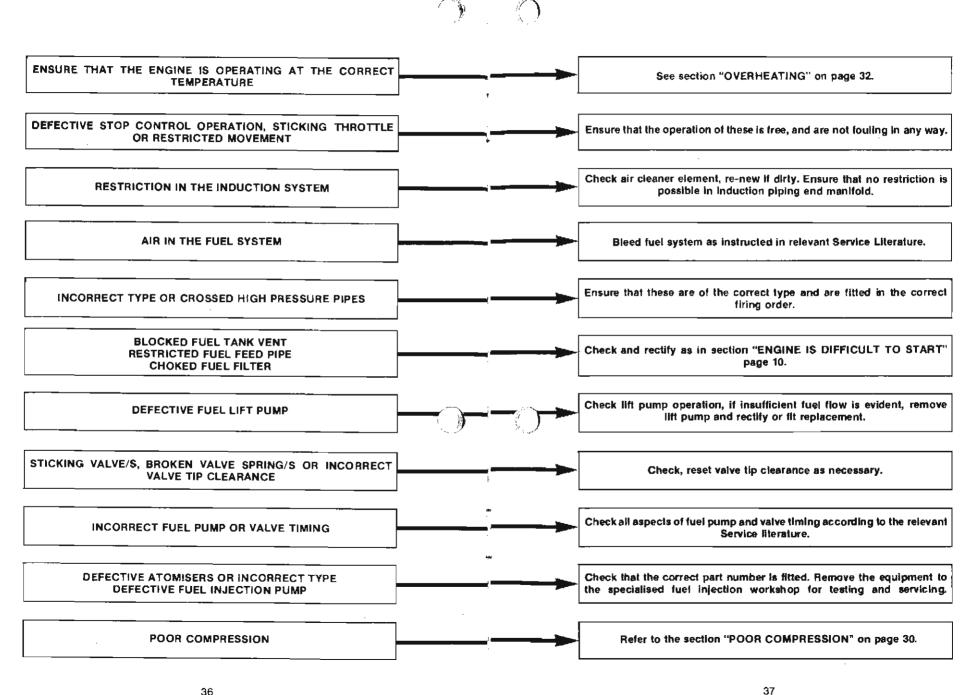
### OVERHEATING

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 thermostal 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 hoses or pipes and examine the induction manifold for any RESTRICTION IN THE INDUCTION MANIFOLD 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. Check all aspects of fuel pump and valve timing according to the relevant INCORRECT FUEL INJECTION PUMP TIMING OR Service literature. INCORRECT VALVE TIMING Check for correct part number and arrange for testing in specialised DEFECTIVE OR INCORRECT TYPE ATOMISERS OR FUEL PUMP workshop. Repair engine. PISTON PICK-UP BEGINNING TO SEIZE

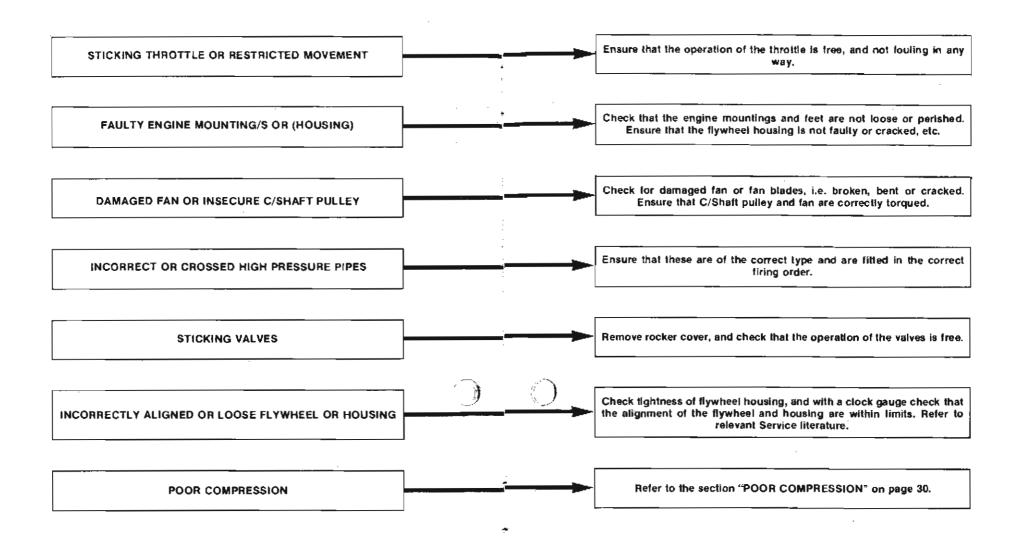
### **EXCESSIVE CRANKCASE PRESSURE**

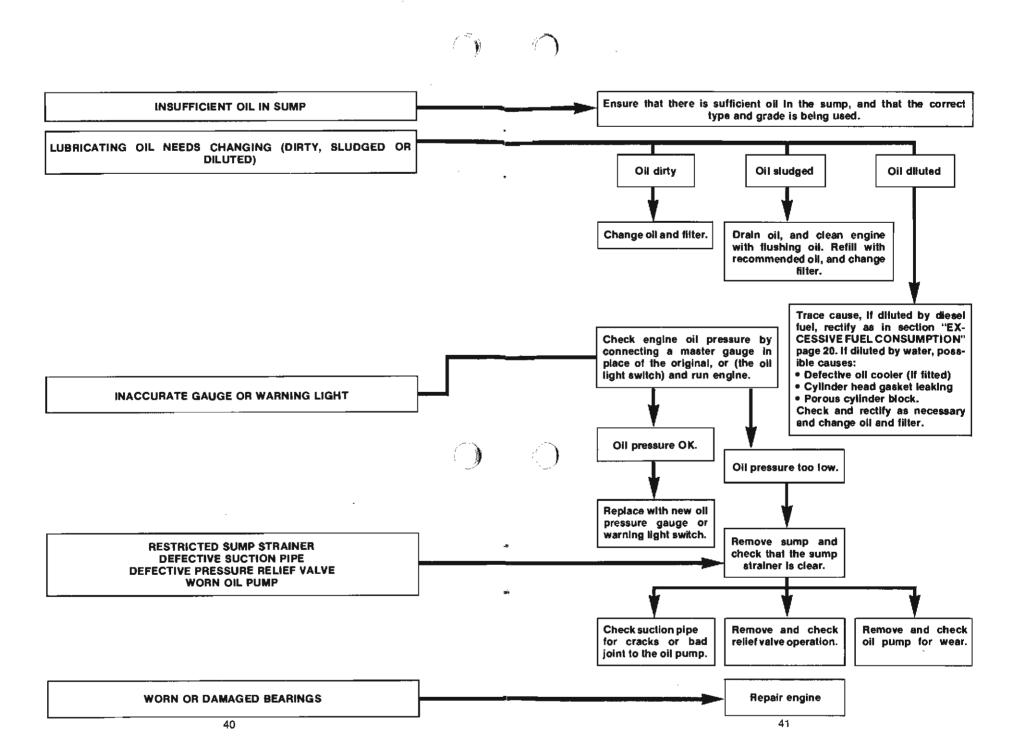
NOTE IT IS ASSUMED THAT ON A COMPLAINT OF THIS NATURE, OIL IS BEING BLOWN OUT EXTERNALLY, i.e. OUT OF DIPSTICK TUBE, ETC. Remove the engine breather and pipe and check for restriction. Rectify **CHOKED BREATHER OR PIPE** as necessary. Ensure that there are no leaks in the vacuum system or exhauster, as this would permit air to enter the engine causing crankcase pressure. DEFECTIVE EXHAUSTER (If fitted) PISTON PICK-UP BEGINNING TO SEIZE WORN CYLINDER BORES **BROKEN, WORN OR STICKING PISTON RINGS** Repair engine. **CYLINDER HEAD GASKET LEAKING** 

### **ERRATIC RUNNING**

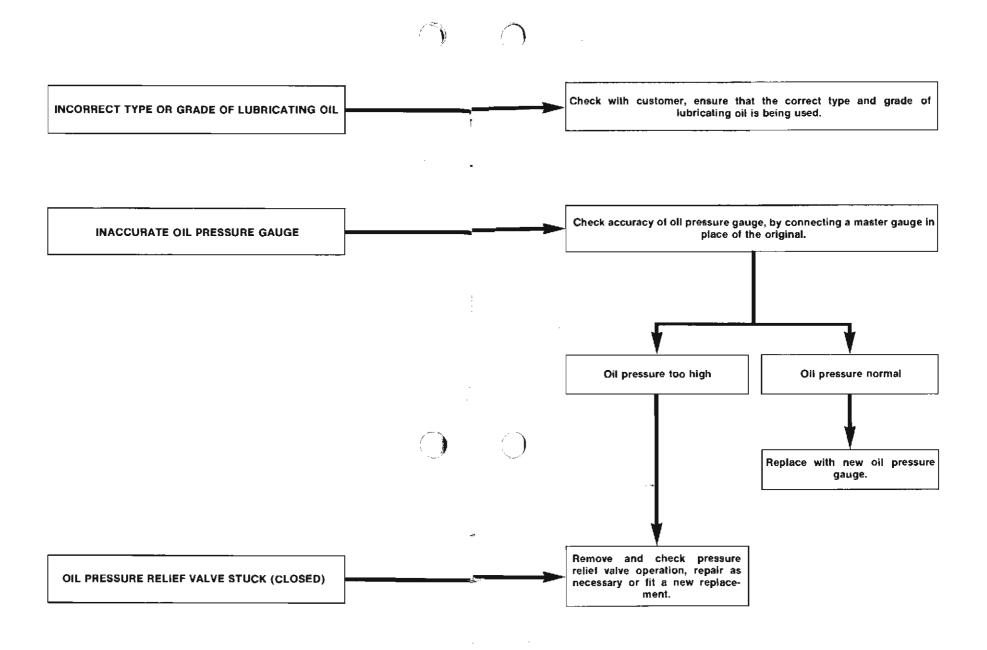


# **VIBRATION**





# **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.