Section 1

General Information

Service Manual - VM RANGE - TIER II

Section 1 - General Information

Section 2 - Care and Safety

Section 3 - Maintenance

Section B - Body and Framework

Section C - Electrics

Section E - Hydraulics

Section H - Steering

Section K - Engine

Section L - Vibration



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Introduction

About this Manual

Machine Model and Serial Number

This manual provides information for the following model(s) in the JCB machine range:

- VM46D/PD from SN 1800000
- VM75D/PD from SN 1800000
- VM 115D/PD from SN 1800000
- VM 115H from SN 1800000
- VM 132D/PD from SN 1800000
- VM 146D/PD from SN 1800000
- VM 166D/PD from SN 1800000
- VM 200D/PD from SN 1800000

Using the Service Manual

T11-004

This publication is designed for the benefit of JCB Distributor Service Engineers who are receiving, or have received, training by JCB Technical Training Department.

These personnel should have a sound knowledge of workshop practice, safety procedures, and general techniques associated with the maintenance and repair of hydraulic earthmoving equipment.

The illustrations in this publication are for guidance only. Where the machines differ, the text and/or the illustration will specify.

General warnings in Section 2 are repeated throughout the manual, as well as specific warnings. Read all safety statements regularly, so you do not forget them.

Renewal of oil seals, gaskets, etc., and any component showing obvious signs of wear or damage is expected as a matter of course. It is expected that components will be cleaned and lubricated where appropriate, and that any opened hose or pipe connections will be blanked to prevent excessive loss of hydraulic fluid and ingress of dirt.

Where a torque setting is given as a single figure it may be varied by plus or minus 3%. Torque figures indicated are for dry threads, hence for lubricated threads may be reduced by one third.

The manufacturer's policy is one of continuous improvement. The right to change the specification of the machine without notice is reserved. No responsibility will be accepted for discrepancies which may occur between specifications of the machine and the descriptions contained in this publication.

Finally, please remember above all else safety must come first!

Section Numbering

T11-005

The manual is compiled in sections, the first three are numbered and contain information as follows:

1 General Information - includes torque settings and service tools.

2 Care and Safety - includes warnings and cautions pertinent to aspects of workshop procedures etc.

3 Maintenance - includes service schedules and recommended lubricants for all the machine.

The remaining sections are alphabetically coded and deal with Dismantling, Overhaul etc. of specific components, for example:

A Attachments

B Body and Framework, etc.

Section contents, technical data, circuit descriptions, operation descriptions etc. are inserted at the beginning of each alphabetically coded section.

Left Side, Right Side

In this manual, 'left' **A** and 'right' **B** mean your left and right when you are seated correctly in the machine.

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Torque Settings

Zinc Plated Fasteners and Dacromet Fasteners

T11-002

Introduction

Some external fasteners on JCB machines are manufactured using an improved type of corrosion resistant finish. This type of finish is called Dacromet and replaces the original Zinc and Yellow Plating used on earlier machines.

The two types of fasteners can be readily identified by colour and part number suffix. ⇒ ***Table 1. Fastener Types (1-19)***.

Table 1. Fastener Types

Fastener Type	Colour	Part No. Suffix
Zinc and Yellow	Golden finish	'Z' (e.g. 1315/3712Z)
Dacromet	Mottled silver finish	'D' (e.g. 1315/3712D)

Note: *As the Dacromet fasteners have a lower torque setting than the Zinc and Yellow fasteners, the torque figures used must be relevant to the type of fastener.*

Note: *A Dacromet bolt should not be used in conjunction with a Zinc or Yellow plated nut, as this could change the torque characteristics of the torque setting further. For the same reason, a Dacromet nut should not be used with a Zinc or Yellow plated bolt.*

Note: *All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.*

Note: *Dacromet bolts, due to their high corrosion resistance are used in areas where rust could occur. Dacromet bolts are only used for external applications. They are not used in applications such as gearbox or engine joint seams or internal applications.*

Bolts and Screws

Use the following torque setting tables only where no torque setting is specified in the text.

Note: *Dacromet fasteners are lubricated as part of the plating process, do not lubricate.*

Torque settings are given for the following conditions:

Condition 1

- Un-lubricated fasteners
- Zinc fasteners
- Yellow plated fasteners

Condition 2

- Zinc flake (Dacromet) fasteners
- Lubricated zinc and yellow plated fasteners
- Where there is a natural lubrication. For example, cast iron components

Verbus Ripp Bolts

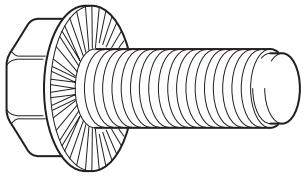


Fig 1.

Torque settings for these bolts are determined by the application. Refer to the relevant procedure for the required settings.

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Safety Notices

Important Information

T1-042

The Operator Manual

⚠ WARNING

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

INT-1-4-2

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

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

Safety Warnings



This safety alert system identifies important safety messages in this manual. When you see this symbol, be alert, your safety is involved, carefuly read the message that follows, and inform other operators.

In this publication and on the machine, there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

⚠ DANGER

Denotes an extreme hazard exists. If proper precautions are not taken, it is highly probable that the operator (or others) could be killed or seriously injured.

INT-1-2-1

⚠ WARNING

Denotes a hazard exists. If proper precautions are not taken, the operator (or others) could be killed or seriously injured.

INT-1-2-2

⚠ CAUTION

Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator (or others) and possible damage to the machine.

INT-1-2-3

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Service Schedules

Introduction

T3-036-2

A badly maintained machine is a danger to the operator and the people working around him. Make sure that the regular maintenance and lubrication jobs listed in the service schedules are done to keep the machine in a safe and efficient working condition.

⚠ WARNING

Maintenance must be done only by suitably qualified and competent persons.

Before doing any maintenance make sure the machine is safe, it should be correctly parked on level ground.

To prevent anyone starting the engine, remove the starter key. Disconnect the battery when you are not using electrical power. If you do not take these precautions you could be killed or injured.

8-3-1-1

Apart from the daily jobs, the schedules are based on machine running hours. Keep a regular check on the hourmeter readings to correctly gauge service intervals. Do not use a machine which is due for a service. Make sure any defects found during the regular maintenance checks are rectified immediately.

Calander Equivelents

Every 10 Hours = Daily

Every 50 Hours = Weekly

Every 100 Hours = Monthly

Every 250 Hours = Three Months

Every 500 Hours = Six Months

Every 1000 Hours = Yearly

Every 2000 Hours = 2 Years

Every 6000 Hours = 6 Years

Every 8000 Hours = 8 Years

Note: *Services should be carried out at either the hourly interval or calendar interval, whichever occurs first.*

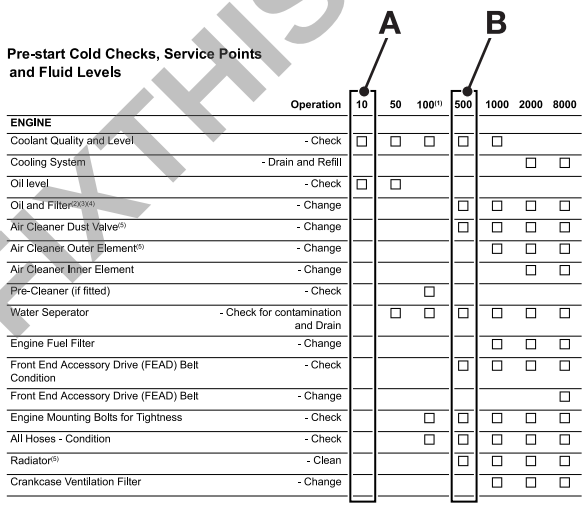
Important: *The intervals given in the schedules must not be exceeded. If the machine is operated under severe conditions (high temperature, dust, water, etc.), shorten the intervals.*

How to Use the Service Schedules

T3-012_3

In the example shown, **A** shows all service requirements to be carried out every 10 hours and **B** shows the requirements to be carried out every 500 hours.

Important: *Services should be carried out at either the hourly interval or calendar interval, whichever occurs first. Refer to* ***Calendar Equivalents****.*



795390-1

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Fluids, Lubricants and Capacities

Table 2. VM46, VM75

ITEM	CAPACITY Litres (Gal)	FLUID/LUBRICANT	INTERNATIONAL SPECIFICATION
Fuel Tank		Diesel Oil	⇨ *Fuel (3-20)*
VM 46	180 (47.5)		
VM 75	230 (60.8)		
Engine (Oil)			
VM 46, VM75	8 (2.1)	JCB Engine Oil EP	SAE 10W/40, API-CH4/SJ
Engine (Coolant)		JCB High Performance (HP) Antifreeze/JCB HD Flushing fluid ⇨ *Coolant Mixtures (3-19)*.	ASTM D3306-74
VM46, VM 75	14 (3.7)		
Rear Axle		JCB Gear Oil LS Plus	API-GL-5
Housing	6,6 (1.7)		
Hubs (x2)	0,8 (0.17) each		
Drum drive gearbox	1,3 (0.3)	JCB V-Tronic	CLP 220 DIN 51517
Hydraulic Tank(1)		- Normal JCB Hydraulic fluid	HLP 46 DIN 51524
		- Tropics JCB Hydraulic fluid	HLP 68 DIN 51524
VM 46	60 (15.9)		
VM 75	80 (17.6)		
Vibration System		JCB V-Tronic	CLP 150 DIN 51517
VM 46	2,5 (0.7)		
VM 75	3 (0.8)		

(1) This is nominal tank capacity. The total hydraulic system capacity depends on the equipment being used. Fill with all cylinders closed. Watch level sight glass when filling.

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Service Procedures

Cab Structure

Direct Glazing

TB-002_5

The following procedures explain how to correctly remove and install panes of glass that are directly bonded to the cab frame apertures. When carrying out the procedures, relevant safety precautions must be taken.

1 Always wear safety glasses during both removal and replacement.

2 Use protective gloves - heavy duty leather gauntlet type gloves when cutting out the broken glass; 'non-slip' type gloves when handling/moving panes of glass; surgical type gloves when using the polyurethane adhesives.

3 Wear protective overalls.

4 Do not smoke - the activators and primers used in the procedures are highly flammable.

5 Do not attempt to handle or move panes of glass unless you are using glass lifters.

Several special tools are required to successfully complete the removal and replacement procedures. Reference is made to the tools in the text. The majority of these tools can be obtained locally and the remainder from JCB Service (see ***Service Tools***).

The work must only be carried out in a dry, frost free environment. A protective canopy may be required or the machine/frame must be moved to a sheltered area. In damp or wet conditions, hinged doors and window frames can be removed from the machine and taken to a more suitable (dry) environment.

Glass should not be replaced at temperatures below 5°C (41°F).

⚠ WARNING

Laminated glass must be handled with extra care to prevent breakage. Wherever possible, store and handle it in a vertical attitude. When placing or lifting the glass in a horizontal attitude it must be supported over its whole area, not just at the edges.

BF-1-8_1

Removing the Broken Glass and Old Sealant

⚠ WARNING

Always wear safety glasses when removing or installing screen glass. Never use a power operated knife when removing the sealant around a toughened glass screen. The action of the knife could cause particles of glass to be thrown with sufficient force to cause serious injury, even when safety glasses are being worn. Use only hand operated tools when working with toughened glass.

BF-2-3_1

1 Position the machine on level ground and apply the park brake. Stop the engine. Put protective covers over the cab seat and control pedestals.

2 If a laminated pane breaks it will stay in one piece even though the glass is cracked. A toughened pane will shatter and fall apart. The method of removal of the glass depends upon which type it is.

a Laminated glass - leave installed until the old sealant has been cut away, after which it will be possible to lift the broken screen away from its frame housing in one piece.

b Toughened glass - remove as much of the shattered glass as possible prior to cutting out the old sealant.

3 Cut out the old sealant, leaving approximately 1 to 2 mm on the cab frame. There are several tools and techniques for doing this:

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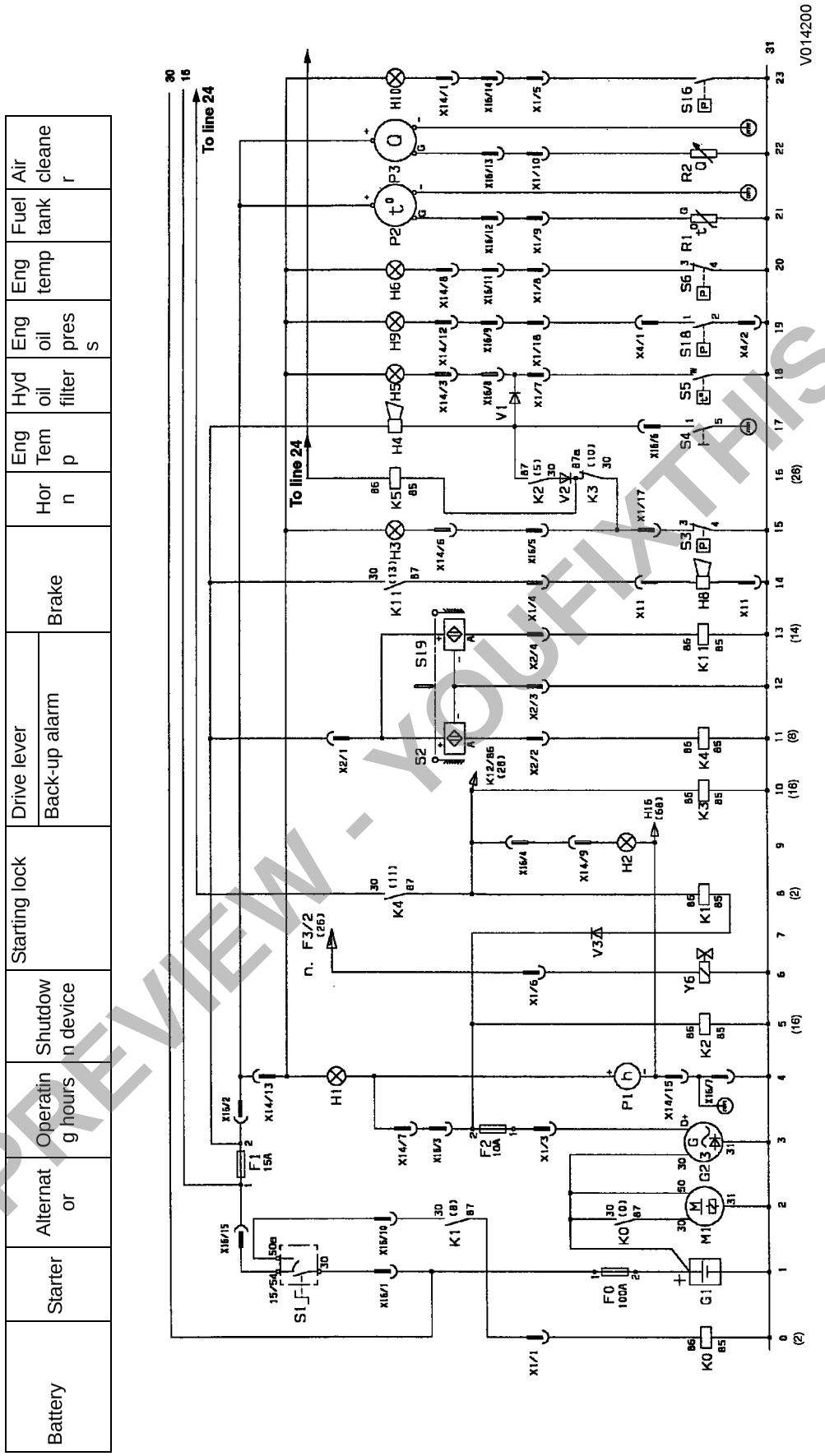


Fig 4. 7211/80502-A

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Component Location

The hydraulic component locations are shown in ⇒ *Fig 8. (E-10)* and are detailed in ⇒ *Table 7. Hydraulic components (E-11)*.

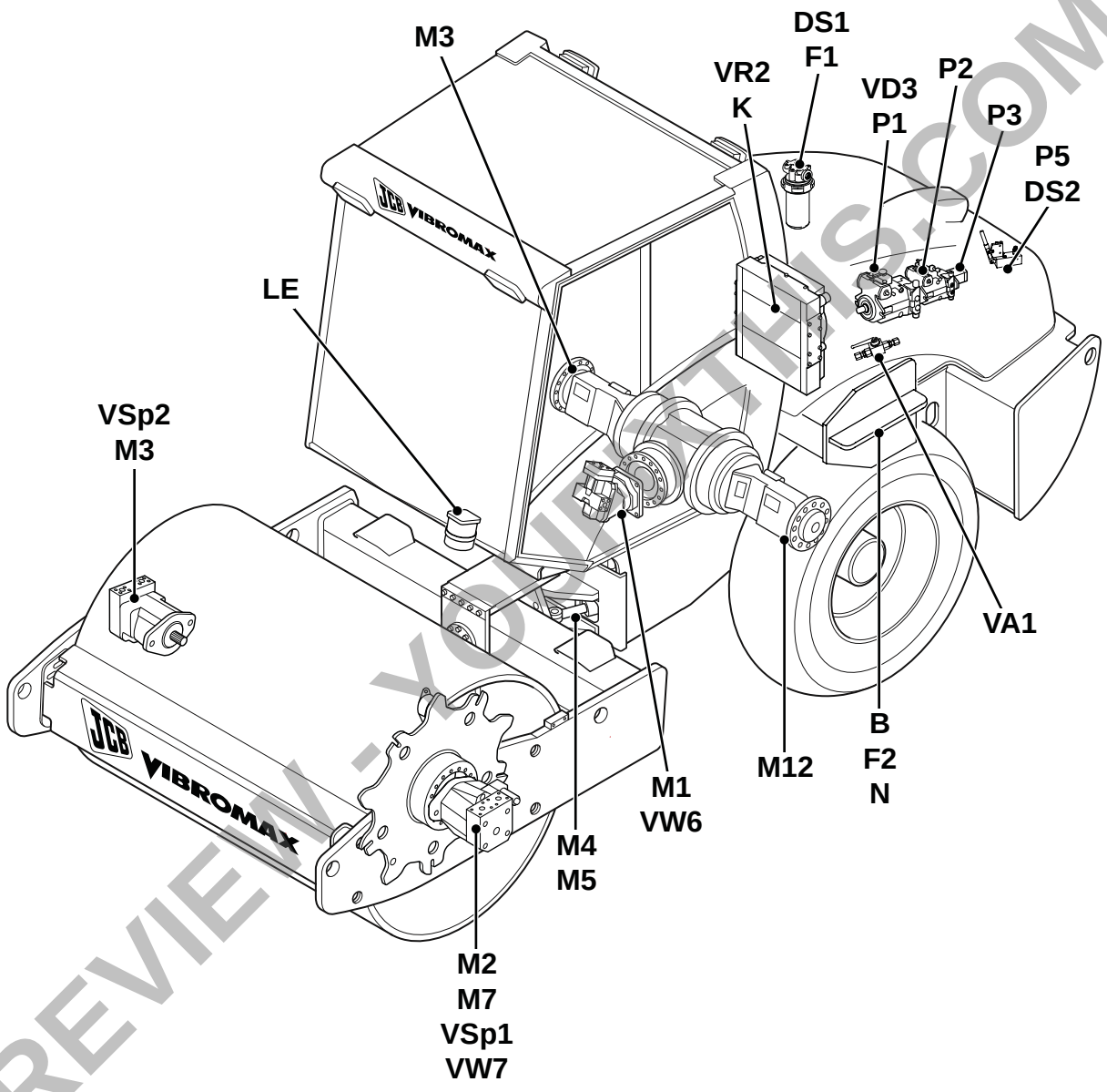


Fig 8.

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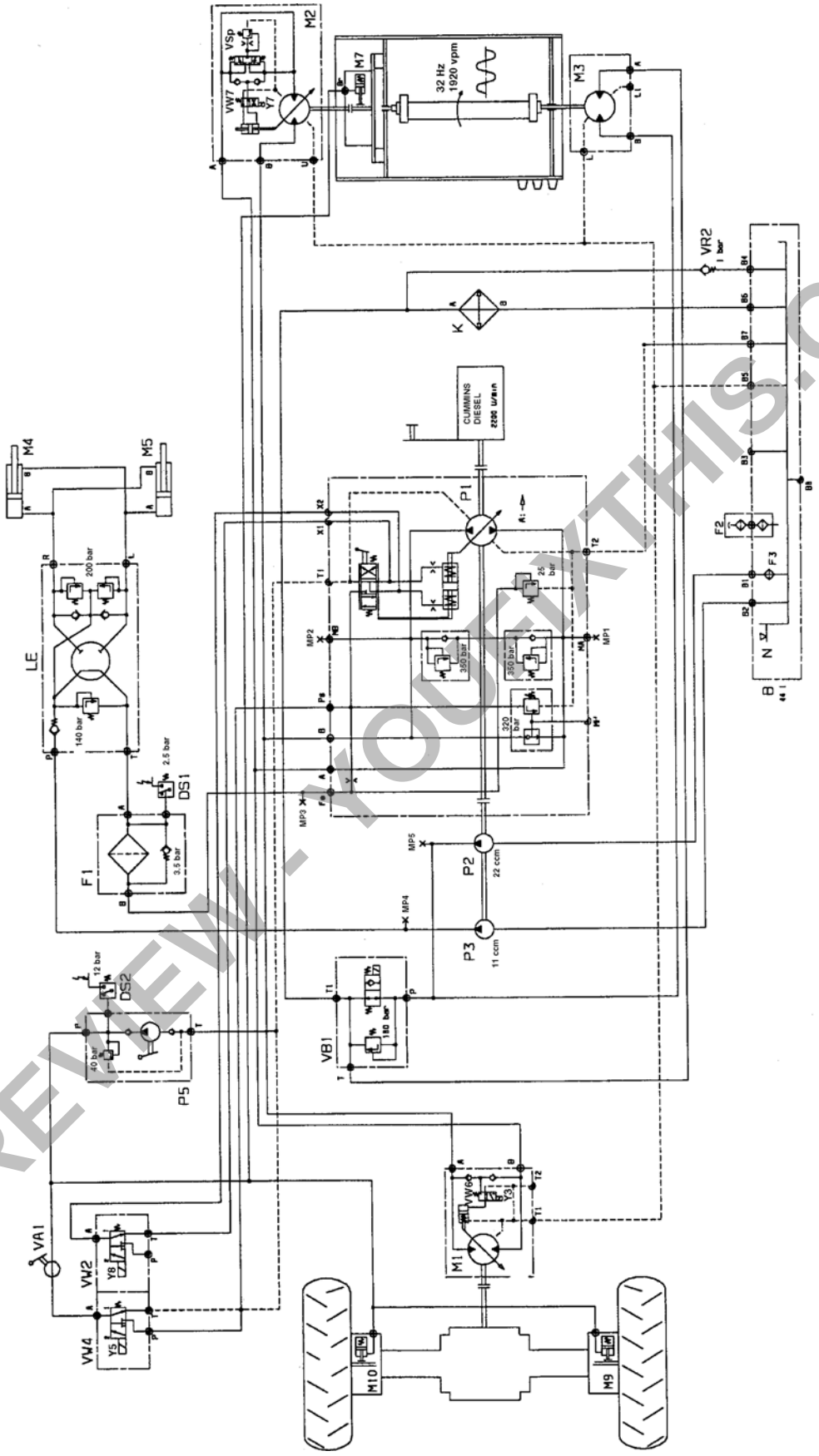


Fig 1.

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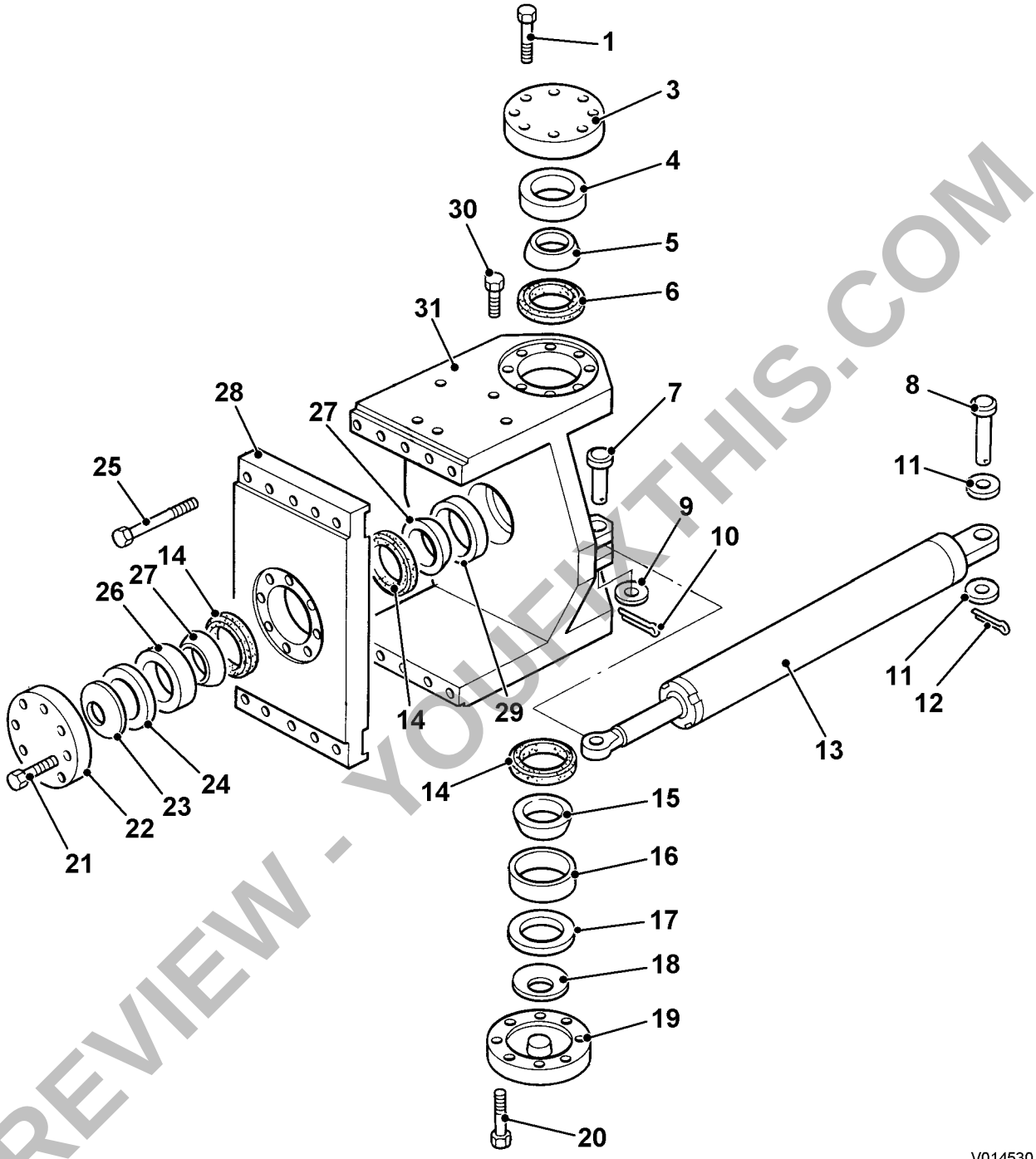


Fig 1.

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`Blink' Codes

Machines fitted with a cold start heater incorporate an electronic control unit (ECU). The ECU has the facility to detect faults with the cold start heater electrical system. These faults are indicated using the cold start indicator light **2A** in the instrument panel. The blink code sequence consists of the light being switched ON for approximately one second followed by a number of flashes (the code). The sequence is repeated until the fault is cleared.

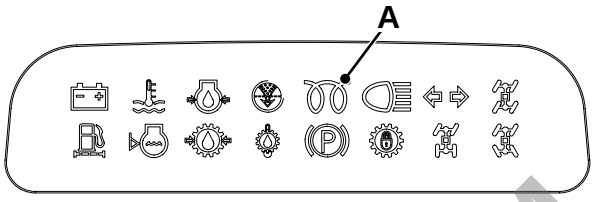
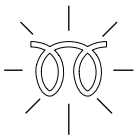


Fig 2.

Blink Code	Cause	Action
		
1 flash	Temperature sensor or circuit fault (open circuit).	Check temperature sensor (infinite resistance) related harness wires and connectors.
2 flashes	Temperature sensor or circuit fault (short circuit).	Check temperature sensor (no resistance) related harness wires and connectors.
3 flashes	Heater Relay fault.	Check related relay and related harness wires and connectors.
4 flashes	Heater Relay output fault (open or short circuit).	Check related relay and related harness wires and connectors.

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Vibration System Hydraulic Fault Diagnosis Tables

Refer to ***Section E, Hydraulics,*** for further vibrator hydraulic system information.

Table 1. Engine stalls when vibrator engaged

Probable Cause	Action
Engine is cold and hydraulic oil is cold	Allow engine to warm up before using vibrator
Poor engine performance	Check engine performance

Table 2. Vibrator does not rotate / reduced vibrator performance

Probable Cause	Action
Engine is cold and hydraulic oil is cold	Allow engine to warm up before using vibrator
Engine speed low	Adjust to correct rpm setting
Poor engine performance	Check engine performance
Oil level low or oil is contaminated	Fill reservoir to correct level or change oil
Air trapped in hydraulic system	Purge hydraulic system
Inlet leak	Check all external lines and connections to pump inlet
Inlet strainer clogged	Clean Inlet strainer
Suspected internal damage to hydraulic system	Check pump by performing a flow test
Excessive loading on vibrator drive system	Remove cause of excessive loading.
Control linkage bent, loose or out of adjustment	Repair, adjust or replace linkage
Associated pipework or hoses leaking, damaged, trapped or kinked	Inspect and renew as required
Pressure relief valve out of adjustment or defective	Renew pressure relief valve (Non adjustable)

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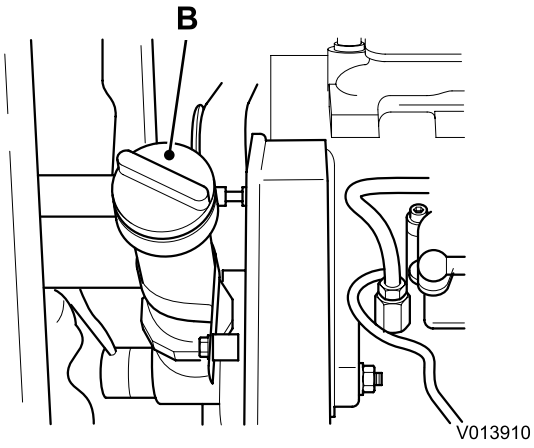


Fig 27. VM132 - VM200

VM115

1 Place a container of suitable size under drain plug **E** ⇒ *Fig 28. (3-43)* to catch the oil. Loosen and remove the filter housing drain plug **E** and its `O' ring **J**. Let the oil fully drain, then clean and refit the drain plug with a new 'O' ring.

2 Unscrew the filter canister **F**, use a chain wrench if necessary.

3 Clean the seal face of the filter head **G**.

4 Fit the new filter **F**:

a Smear the seal on the new filter canister with clean engine oil.

b Screw the filter on until it just contacts the filter head.

c Turn the filter at least a further 3/4 of a turn.

5 Fill the engine crankcase through the filler point **B** with the recommended oil to the MAX mark on the dipstick **A**. Wipe off any spilt oil, refit the filler cap and make sure it is secure.

6 Operate the engine until the oil pressure low warning light has extinguished. Check for oil leakage. Stop the engine and when the oil has cooled, check the oil level again, and if necessary top up with clean engine oil.

7 Close the engine cover.

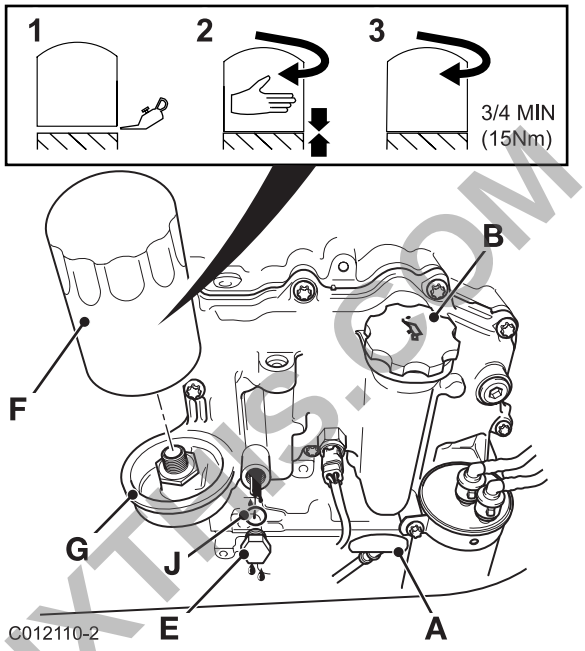


Fig 28. VM115

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Harness Data

Drawings and Interconnections

Plug Connectors

The plug connectors are given in ⇨ *Table 1. (C-40)*.

Table 1.

Plug	Description
X1	Operator's platform
X2	Drive lever
X3	On-board auxiliary socket
X4	Hydraulic filter
X5	Cab
X6	Cab
X7	Front lighting system
X8	Rear lighting system
X9	Front working lights
X10	Compaction meter
X11	Reverse alarm
X12	Cab air conditioning
X13	Drum high speed travel
X14	Instrument panel gauge cluster
X15	Travel speed control
X16	Steering column
X17	Steering column
X18	Steering column
X19	Turn indicator switch
X20	Front windscreen wiper
X21	Emergency off
X22	Plug connector fan heating / air conditioning
X23	Plug connector compressor air conditioning
X24	Plug connector condenser air conditioning
X25	Plug connector dryer
X26	Plug connector condenser
X27	Plug connector time relay

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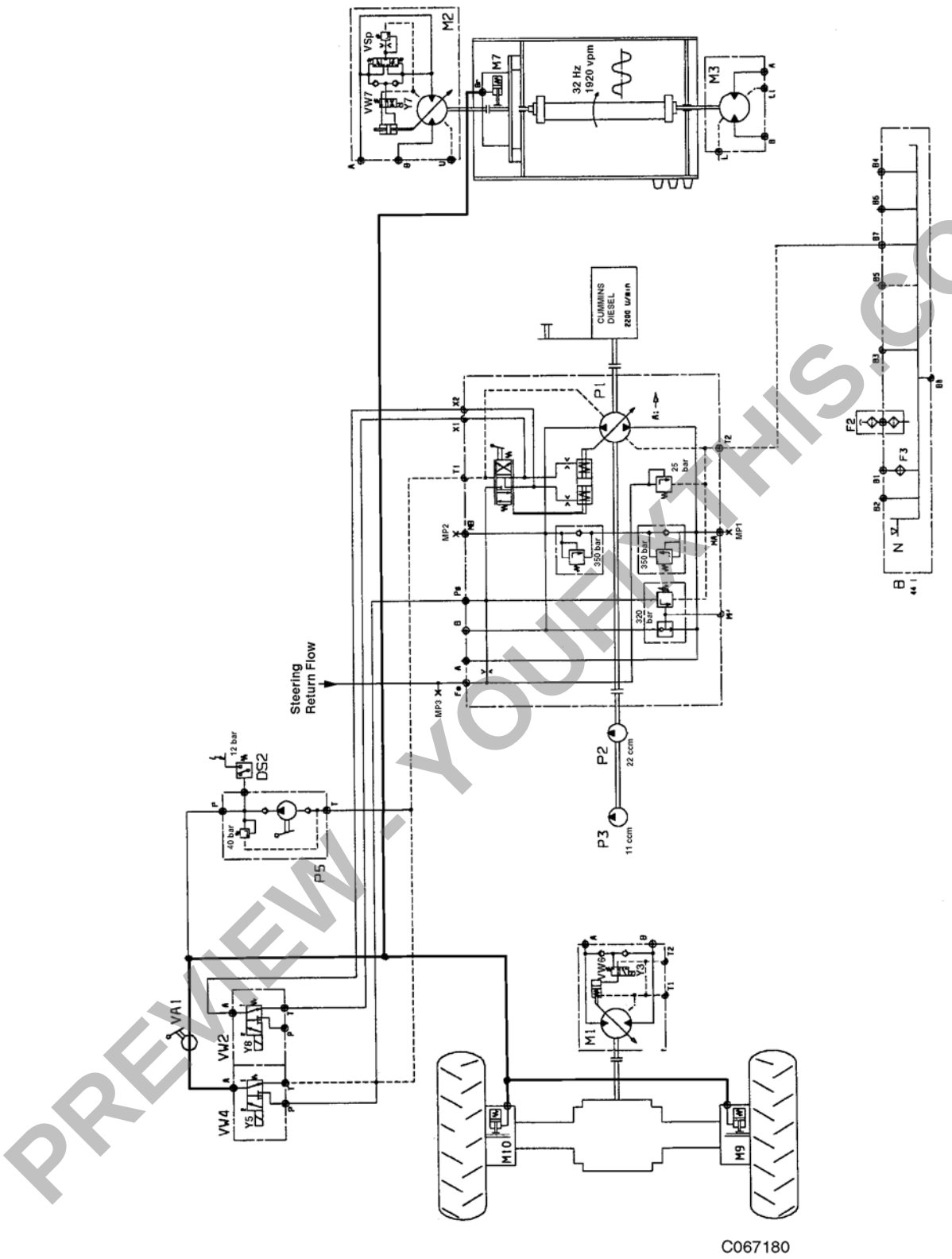


Fig 12.

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