Service Manual

VMT160 VMT260 Tier 2 and Tier 4

Section 1 - General Information

Section 2 - Care and Safety

Section 3 - Maintenance

Section C - Electrics

Section E - Hydraulics

Section H - Steering

Section K - Engine

Section L - Vibration



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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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Pre-start Cold Checks, Service Points and Fluid Levels

	Operation	First 10	First 50	250	500	1000	2000
ENGINE							
Coolant level and quality	Check	☐	☐	☐	☐	☐	☐
Coolant system	Drain/Refill						☐
Air filter	Change				☐	☐	☐
Air filter dust valve	Clean	☐	☐	☐	☐	☐	☐
Oil level	Check	☐	☐	☐	☐	☐	☐
Oil and filter	Change		☐	☐	☐	☐	☐
Drive belt condition/tension	Check		☐	☐	☐	☐	☐
Engine mounting bolts for tightness	Check			☐	☐	☐	☐
Fuel filter	Change				☐	☐	☐
Fuel tank and filler	Drain/Clean				☐	☐	☐
All hoses - condition	Check	☐	☐	☐	☐	☐	☐
Valve clearance	Check/Adjust						☐
DRUMS							
Vibration system oil	Check				☐	☐	☐
Vibration system oil(1)	Change						☐
Rubber pads	Check		☐	☐	☐	☐	☐
HYDRAULICS							
Fluid level	Check	☐	☐	☐	☐	☐	☐
Fluid and filter	Change						☐
Hydraulic tank and filler	Clean						☐
ELECTRICS							
Battery	Clean			☐	☐	☐	☐
Battery electrolyte level	Check			☐	☐	☐	☐
BODY AND FRAMEWORK							
ROPS structure mounting bolts	Check				☐	☐	☐
Visual check of lifting points (welds and steelwork)	Check	☐	☐	☐	☐	☐	☐
Visual check of articulation Joint and Lock (welds, pivot points, pivot pins and steelwork)	Check	☐	☐	☐	☐	☐	☐

(1) Change at the first 500 hours and then every 2000 hours thereafter

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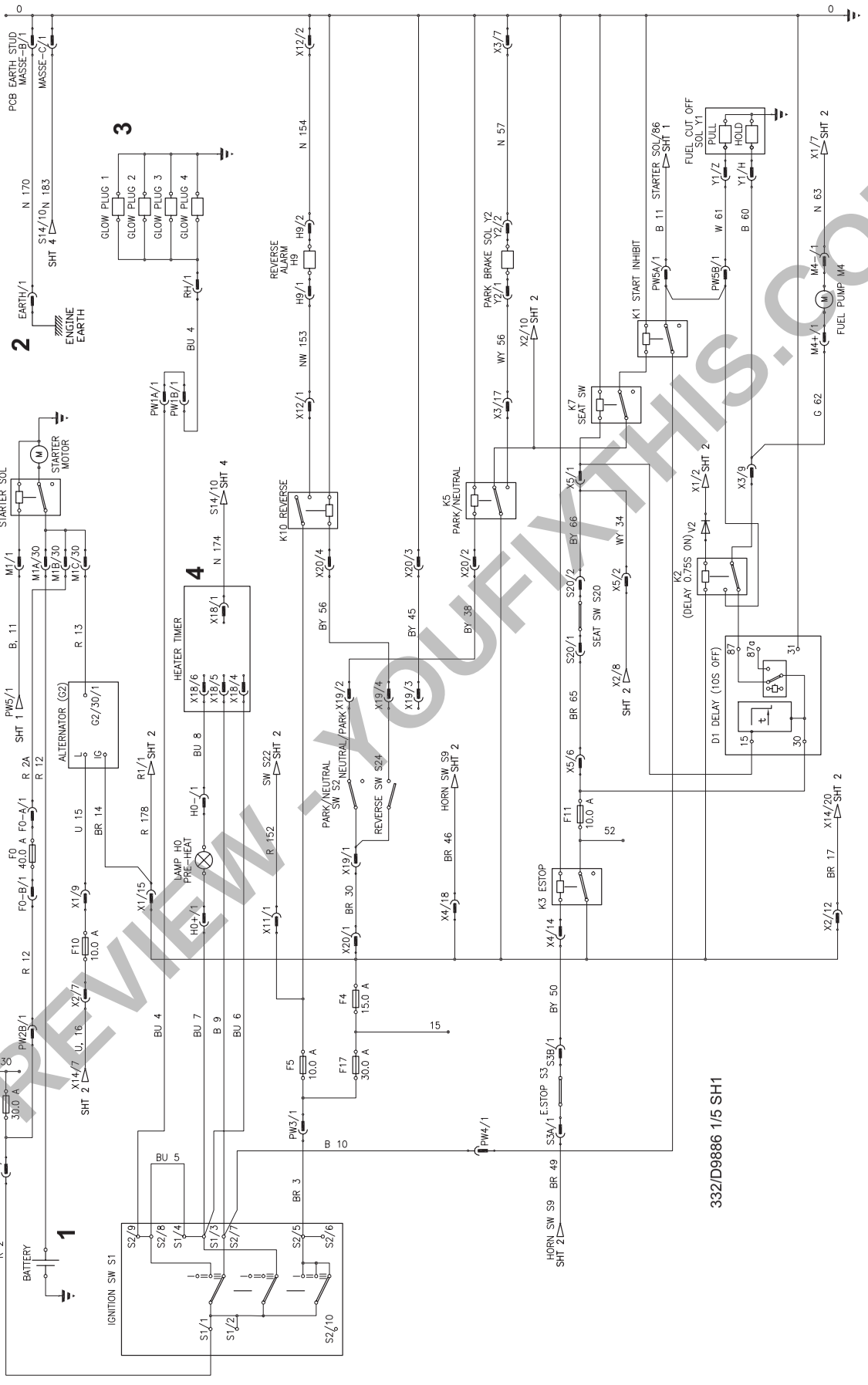


Fig 1. 332/D9886-2 (Sheet 1 of 5)

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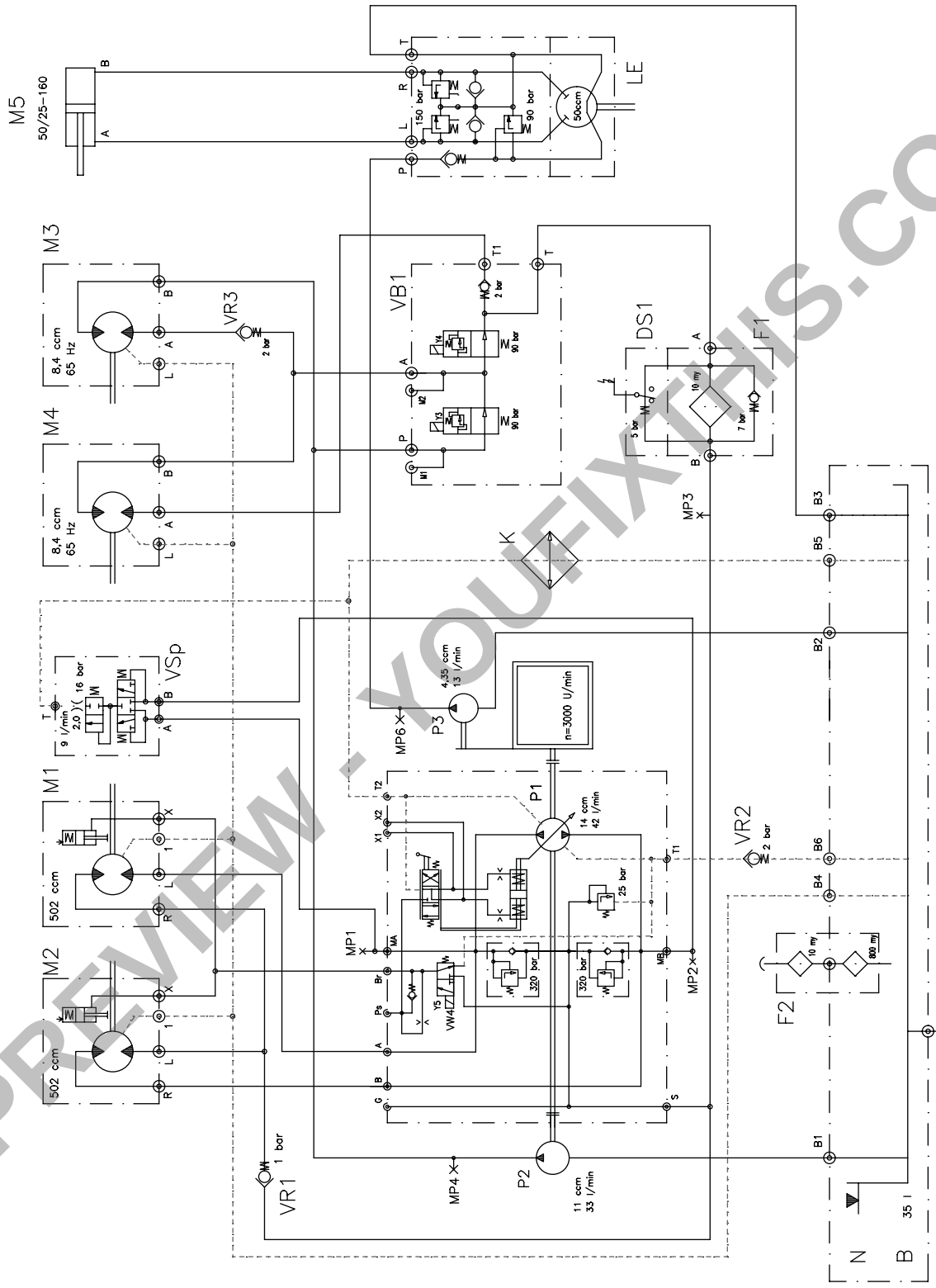


Fig 1. VMT160 With Rexroth Drive Pump - Hydraulic Schematic Diagram 7141/71001-B

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Removal and Replacement

Kubota Engines

Removal

The engine and pump assembly must be removed as one unit.

⚠ WARNING

Hot oil and engine components can burn you. Make sure the engine is cool before doing this job.

Used engine crankcase lubricants contain harmful contaminants. In laboratory tests it was shown that used engine oils can cause skin cancer.

8-3-1-4

Note: *The following procedures are for a typical engine and hydraulic pump assembly installation. There will be some procedural differences dependant on the machine variant. Before attempting to remove the engine and hydraulic pump assembly, ensure that all the necessary components have either been removed, or safely disconnected.*

All Machines

1 Park vehicle correctly on firm level ground and stop the engine. Chock both sides of both rollers. ***See section Operators Handbook, Stopping and Parking The Machine.***

2 Engage the articulation lock.

3 Vent the hydraulic system. ***See section E, Service Procedures - Venting hydraulic system.***

4 Open engine cover.

5 Disconnect the battery negative lead first and then the positive lead. Remove the battery connection to starter motor. ***See Section 3 - Electrical System***.

6 Disconnect the earth strap to the engine.

7 Remove the cooling pack. See ***Cooling Pack, Removal and Replacement***.

8 Disconnect the air intake hose form the inlet manifold. Remove the air cleaner assembly. Make sure that debris cannot enter the engine or the air filter system.

9 Disconnect the fuel system and cap all hoses and connections.

10 Undo the exhaust downpipe from the exhaust manifold connection

11 Disconnect the electrical cable at the cold start grid heater (if fitted).

12 Disconnect the throttle cable at the fuel injection pump.

13 Disconnect and plug the hydraulic connections to the steering pump.

14 Disconnect and plug all hydraulic connections to hydraulic pump assembly.

15 Unclip the necessary harnesses and hoses from the engine and tie them to one side. Cap all connections.

16 Fit the engine lifting brackets onto the cylinder head. The brackets are handed, be sure to identify and locate them correctly. Tighten the lifting bracket bolts are to the correct torque.

17 Attach suitable lifting equipment to the engine lifting brackets. Take the weight of the engine and pump assembly on the hoist.

18 Loosen and remove the engine and hydraulic pump mountings on both sides.

⚠ DANGER

Do not stand underneath a raised load. Stand clear and to one side until the load has been safely lowered. Make sure that the area is clear of other people before lowering the load. If you do not follow these precautions you or others could be killed or seriously injured.

2-3-5-4

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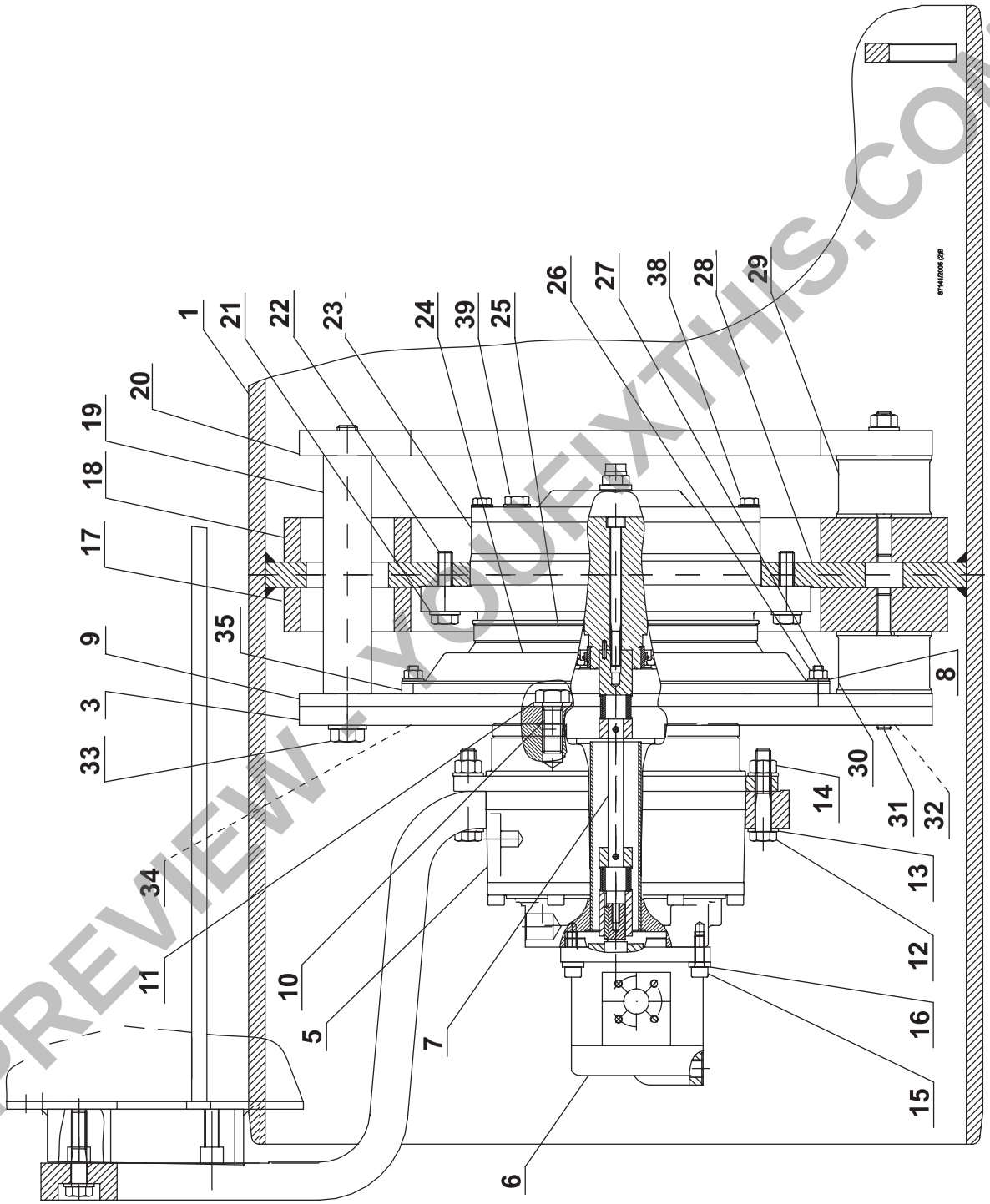


Fig 1.

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Zinc Plated Fasteners and Dacromet Fasteners

Table 2. Torque Settings - UNF Grade 'S' Fasteners

Bolt Size		Hexagon (A/F)	Condition 1			Condition 2		
in.	mm	in.	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft
1/4	6.3	7/16	11.2	1.1	8.3	10.0	1.0	7.4
5/16	7.9	1/2	22.3	2.3	16.4	20.0	2.0	14.7
3/8	9.5	9/16	40.0	4.1	29.5	36.0	3.7	26.5
7/16	11.1	5/8	64.0	6.5	47.2	57.0	5.8	42.0
1/2	12.7	3/4	98.00	10.0	72.3	88.0	9.0	64.9
9/16	14.3	13/16	140.0	14.3	103.2	126.0	12.8	92.9
5/8	15.9	15/16	196.0	20.0	144.6	177.0	18.0	130.5
3/4	19.0	1 1/8	343.0	35.0	253.0	309.0	31.5	227.9
7/8	22.2	1 15/16	547.0	55.8	403.4	492.0	50.2	362.9
1	25.4	1 1/2	814.0	83.0	600.4	732.0	74.6	539.9
1 1/8	31.7	1 7/8	1181.0	120.4	871.1	1063.0	108.4	784.0
1 1/4	38.1	2 1/4	1646.0	167.8	1214.0	1481.0	151.0	1092.3

Table 3. Torque Settings - Metric Grade 8.8 Fasteners

Bolt Size		Hexagon (A/F)	Condition 1			Condition 2		
ISO Metric Thread	mm	mm	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft
M5	5	8	5.8	0.6	4.3	5.2	0.5	3.8
M6	6	10	9.9	1.0	7.3	9.0	0.9	6.6
M8	8	13	24.0	2.4	17.7	22.0	2.2	16.2
M10	10	17	47.0	4.8	34.7	43.0	4.4	31.7
M12	12	19	83.0	8.5	61.2	74.0	7.5	54.6
M16	16	24	205.0	20.9	151.2	184.0	18.8	135.7
M20	20	30	400.0	40.8	295.0	360.0	36.7	265.5
M24	24	36	690.0	70.4	508.9	621.0	63.3	458.0
M30	30	46	1372.0	139.9	1011.9	1235.0	125.9	910.9
M36	36	55	2399.0	244.6	1769.4	2159.0	220.0	1592.4

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Hydraulic Propulsion System Fault Diagnosis Tables

Table 1. No travel drive

Probable Cause	Action
Control linkage bent, loose or out of adjustment	Repair, adjust or replace linkage
Oil level low or oil is contaminated	Check for leaks, fill reservoir to proper level or change oil
Pump drive coupling broken	Replace drive coupling
Inlet leak	Check all external lines and connections to pump inlet
Associated pipework or hoses leaking, damaged, trapped or kinked	Inspect and renew as required
Auxiliary relief valve out of adjustment or defective	Renew pressure relief Valve (Non adjustable)
Suction strainer blocked (if fitted)	Clean or renew suction strainer. Drain the tank and refill with clean oil of the correct grade
Insufficient pump output flow because of failure of the swashplate control mechanism	Examine the pump and replace as required.

Table 2. Unit lacks power

Probable Cause	Action
Engine and hydraulic oil cold	Allow engine and hydraulic oil to warm
Engine speed low	Adjust to correct rpm setting
Poor engine performance	Check engine performance
Control linkage bent, loose or out of adjustment	Repair, adjust or replace linkage
Oil level low or oil is contaminated	Check for leaks, fill reservoir to proper level or change oil
Excessive loading	End the cause of excessive loading
Air trapped in hydraulic system	Purge hydraulic system
Inlet leak	Check all external lines and connections to pump inlet
Inlet filter clogged (if fitted)	Replace inlet filter
Suspected internal damage	Check pump by performing a flow test
Defective flushing valve	Check operation of flushing valve
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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WARNING

Entering/Leaving

Entering or leaving the cab or canopy must only be made where steps and handrails are provided. Always face the machine when entering and leaving. Make sure the step(s), handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, use the handrails.

INT-2-1-7_1

WARNING

Hillsides

Operating the machine on hillsides can be dangerous if proper precautions are not taken. Ground conditions can be changed by rain, snow, ice etc. Check the site carefully. Operate at a suitable slow speed on hillsides.

15-1-1-1

WARNING

Hill sides

Operating on hillsides can be dangerous, especially moving across a slope. If the slope is too steep, your machine could roll over.

15-1-1-2

Maintenance Safety

WARNING

Communications

Bad communications can cause accidents. If two or more people are working on the machine, make sure each is aware of what the others are doing. Before starting the engine make sure the others are clear of the danger areas; examples of danger areas are: the rotating blades and belt on the engine, the attachments and linkages, and anywhere beneath or behind the machine. People can be killed or injured if these precautions are not taken.

INT-3-1-5

WARNING

Repairs

If your machine does not function correctly in any way, get it repaired straight away. Neglect of necessary repairs could result in an accident or affect your health. Do not try to do repairs or any other type of maintenance work you do not understand. To avoid injury and/or damage get the work done by a specialist engineer.

GEN-1-5_2

WARNING

Metal Splinters

You can be injured by flying metal splinters when driving metal pins in or out. Use a soft faced hammer or copper pin to remove and fit metal pins. Always wear safety glasses.

INT-3-1-3_2

WARNING

Electrical Circuits

Understand the electrical circuit before connecting or disconnecting an electrical component. A wrong connection can cause injury and/or damage.

INT-3-1-4

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Relay Identification - Tier 4

Table 7.

Relay	Circuit
K1	Neutral position monitoring
K2	Delay Timer 0.75S
K3	Emergency OFF switch
K4	Drive Engaged
K5	Drive lever neutral position
K6	Stepping relay, Manual vibration
K7	Seat monitoring
K8	Pressure sprinkling
K9	Flasher
K10	Reversing horn
K11	Not used in this application
K12	Brake lights
K13	Ign Relay 1
K14	KSG Relay 1
K15	KSG Relay 2
K16	Brake lights

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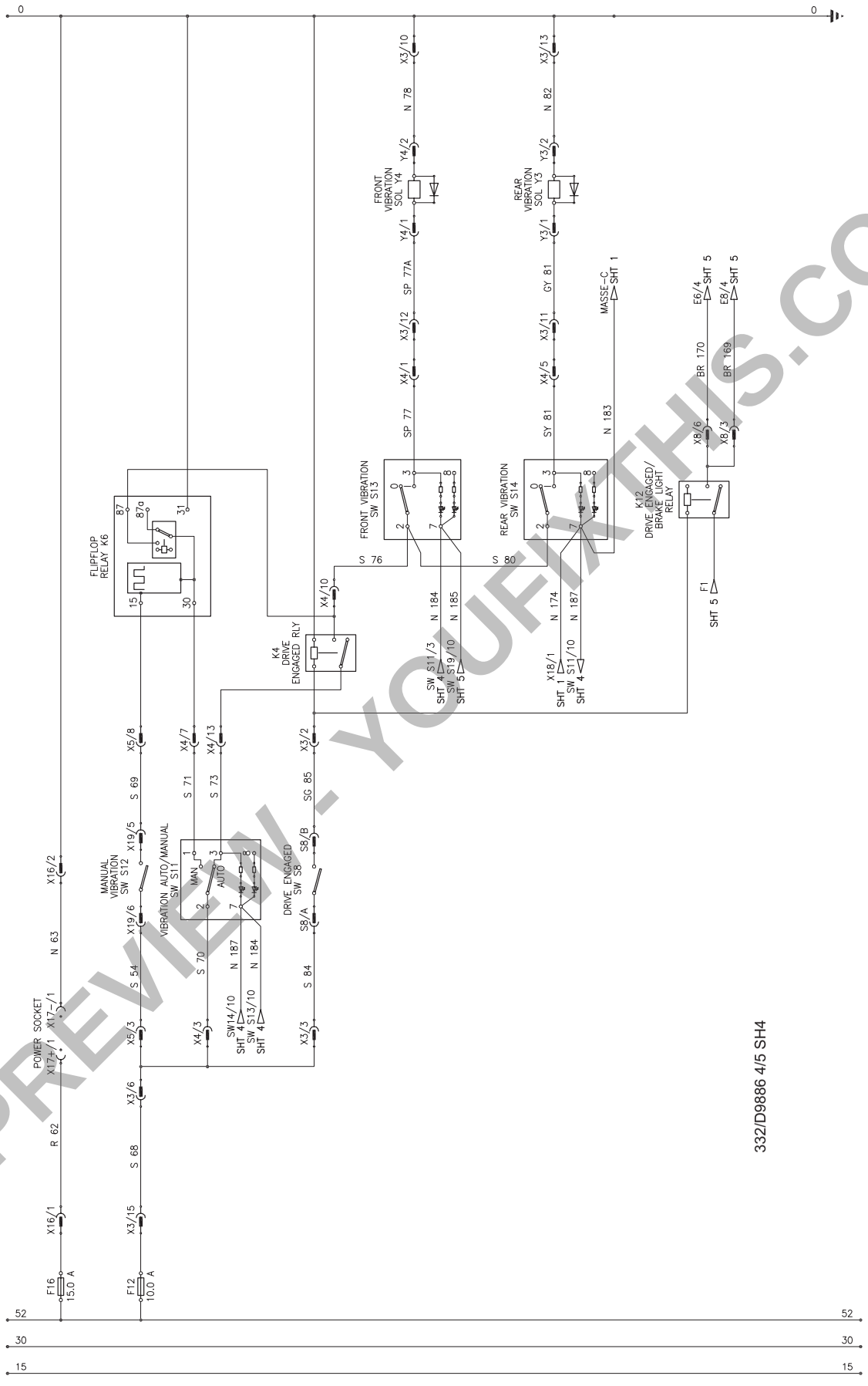


Fig 4. W332/D9886-2 (Sheet 4 of 5)

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b If the reading between terminal **11-D** and earth is below 8.0V, connect the voltmeter between terminal **11-E** and earth. An increase in the reading to 8.0V indicates either a faulty start relay or a fault in the feed from the transmission selector switch to the relay solenoid. Check also the solenoid earth connection.

If the reading between **11-E** and earth is less than 8.0V, the fault must be in either the starter switch or in the wiring between the solenoid, starter switch, and the start relay.

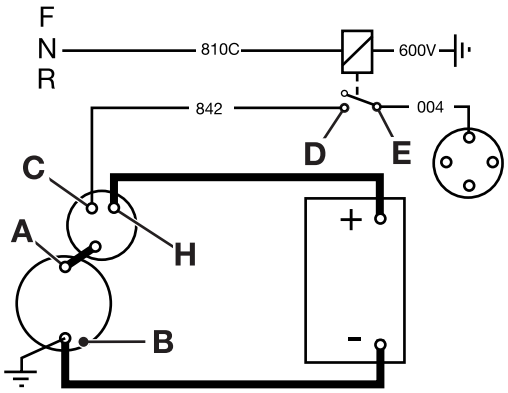


Fig 11.

4 Connect the voltmeter between battery negative and starter earth connection **12-B**. The reading in the 'start' position should be practically zero, maximum permissible reading 0.25V.

If the reading is above 0.25V, a high resistance in the earth lead or connections is indicated.

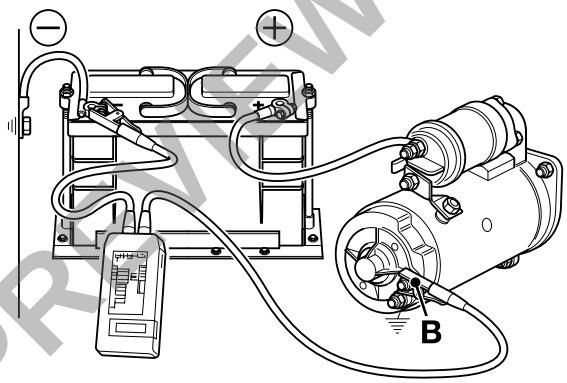


Fig 12.

5 Connect the voltmeter between battery positive and the starter main terminal **13-A**. With the starter switch 'off', the voltmeter should indicate battery voltage, but it should fall to practically zero when the switch is turned to the 'on' position, maximum permissible reading 0.25V.

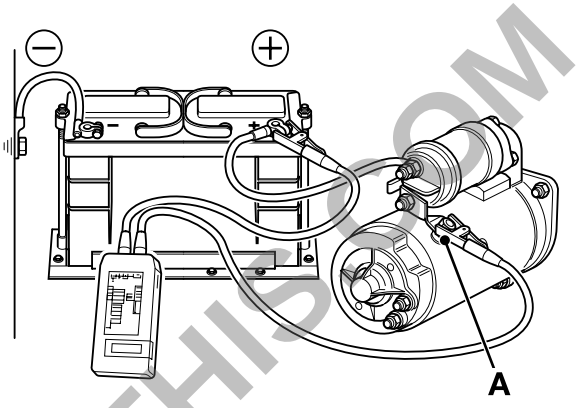


Fig 13.

If the reading is above 0.25V, a high resistance is present in the insulated lead or in the solenoid. Connect the voltmeter between the battery positive and solenoid connection **14-H**. If the voltmeter now reads zero with the switch closed, the fault is in the solenoid.

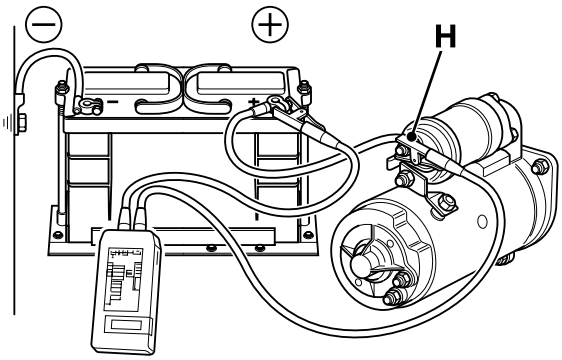


Fig 14.

6 Finally refit the engine stop fuse.

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Fig 29.

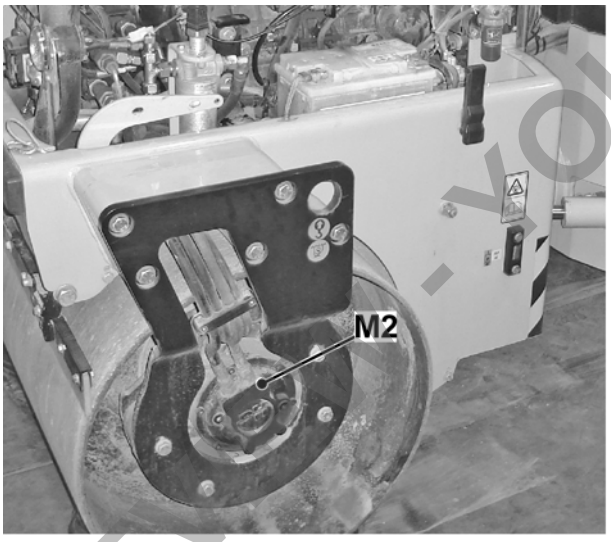


Fig 30.

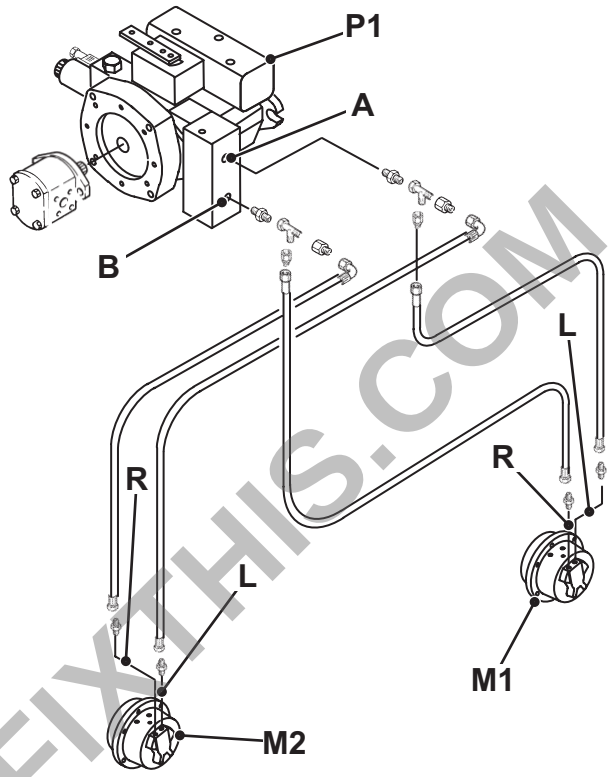


Fig 31.

Flow from the pump **P1** exits from ports **A** or **B** depending on direction of travel. It passes through hoses and enters the hydraulic motors **M1** and **M2**. Return flow to the pump **P1** is via port **A** or **B** depending on direction of travel.

Because the pump spool is a proportional spool, shifting the drive lever effects stepless variable changing of the flow rate to the hydraulic motors (speed change). Acceleration, deceleration and reversal of the driving direction is effected smoothly and without jolting.

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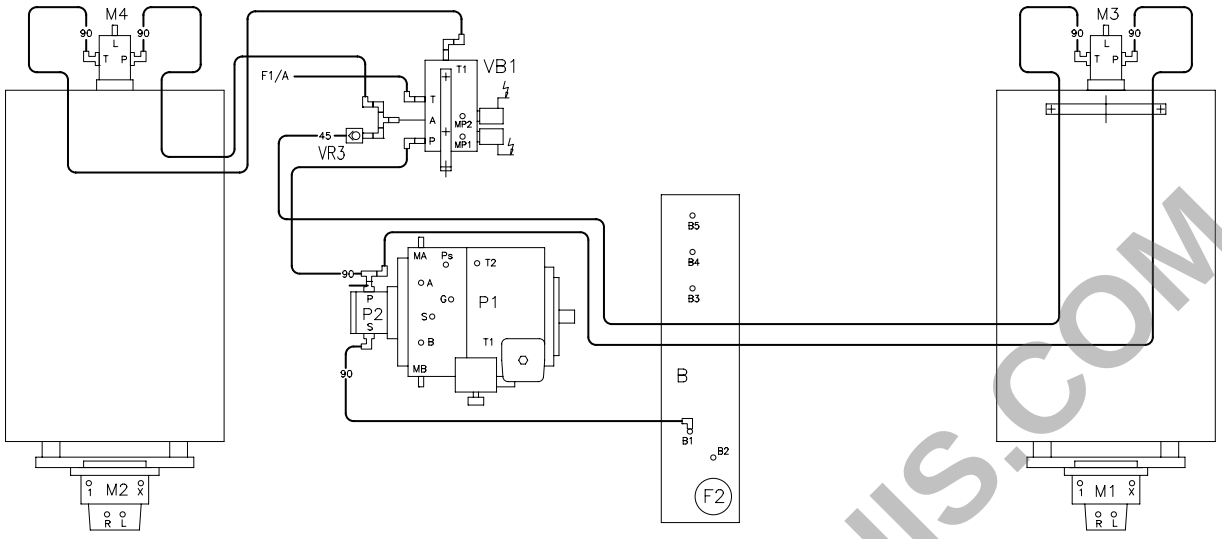


Fig 18. Hose and Pipework -Vibration - 8717070200-1

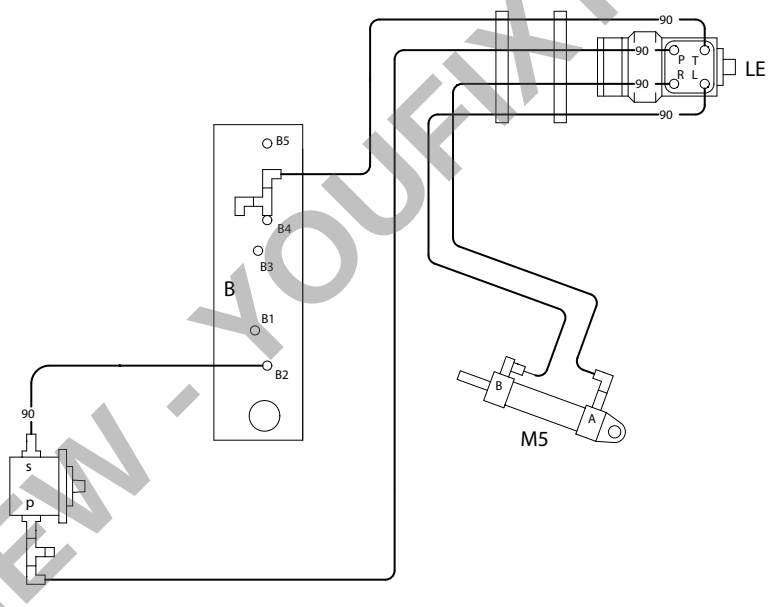


Fig 19. Hose and Pipework - Steering - 8717070300-A

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