Service Schedules

Introduction

T3-036_3

⚠ 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

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.

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. When there is no hourmeter fitted, use the calendar equivalents to determine the service intervals. Refer to ***Calendar Equivalents***. Do not use a machine which is due for a service. Make sure any defects found during the regular maintenance checks are rectified immediately.

How to Use the Service Schedules

T3-012_4

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****.*

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.*

Pre-start Cold Checks, Service Points and Fluid Levels

	Operation	A: 10	50	100[1]	B: 500	1000	2000	8000
ENGINE								
Coolant Quality and Level	- Check	□	□	□	□	□		
Cooling System	- Drain and Refill						□	□
Oil level	- Check	□	□					
Oil and Filter[2][3][4]	- Change				□	□	□	□
Air Cleaner Dust Valve[5]	- Change				□	□	□	□
Air Cleaner Outer Element[5]	- Change					□	□	□
Air Cleaner Inner Element	- Change						□	□
Pre-Cleaner (if fitted)	- Check			□				
Water Seperator	- Check for contamination and Drain		□	□	□	□	□	□
Engine Fuel Filter	- Change					□	□	□
Front End Accessory Drive (FEAD) Belt Condition	- Check				□	□	□	□
Front End Accessory Drive (FEAD) Belt	- Change							□
Engine Mounting Bolts for Tightness	- Check			□	□	□	□	□
All Hoses - Condition	- Check			□	□	□	□	□
Radiator[5]	- Clean				□	□	□	□
Crankcase Ventilation Filter	- Change					□	□	□

795390-1

Calendar Equivalents

Every 10 Hours = Daily

Every 50 Hours = Weekly

Every 250 Hours = Three Months

Every 500 Hours = Six Months

Every 1000 Hours = Yearly

Every 2000 Hours = 2 Years

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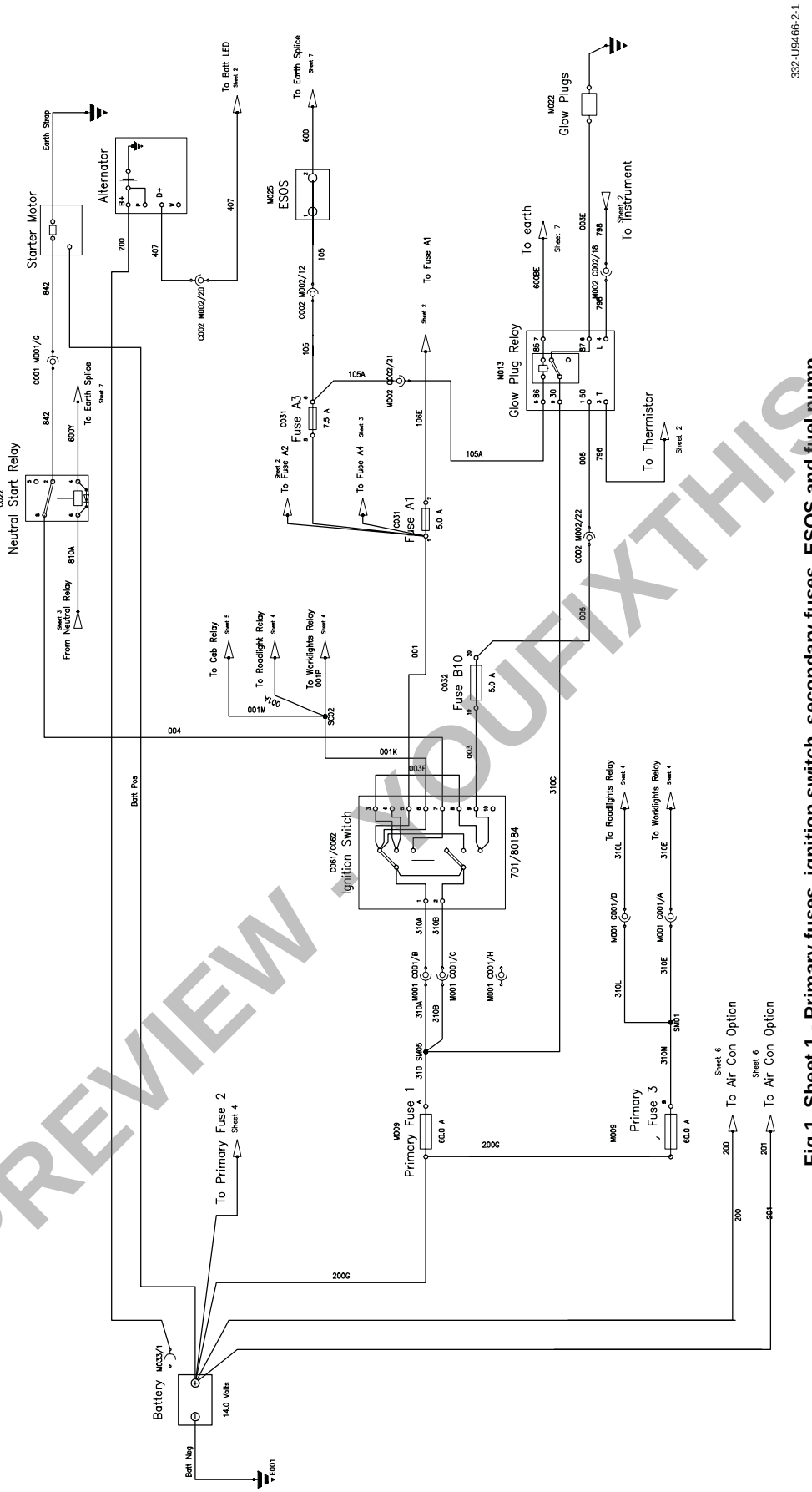


Fig 1. Sheet 1 - Primary fuses, ignition switch, secondary fuses, ESOS and fuel pump

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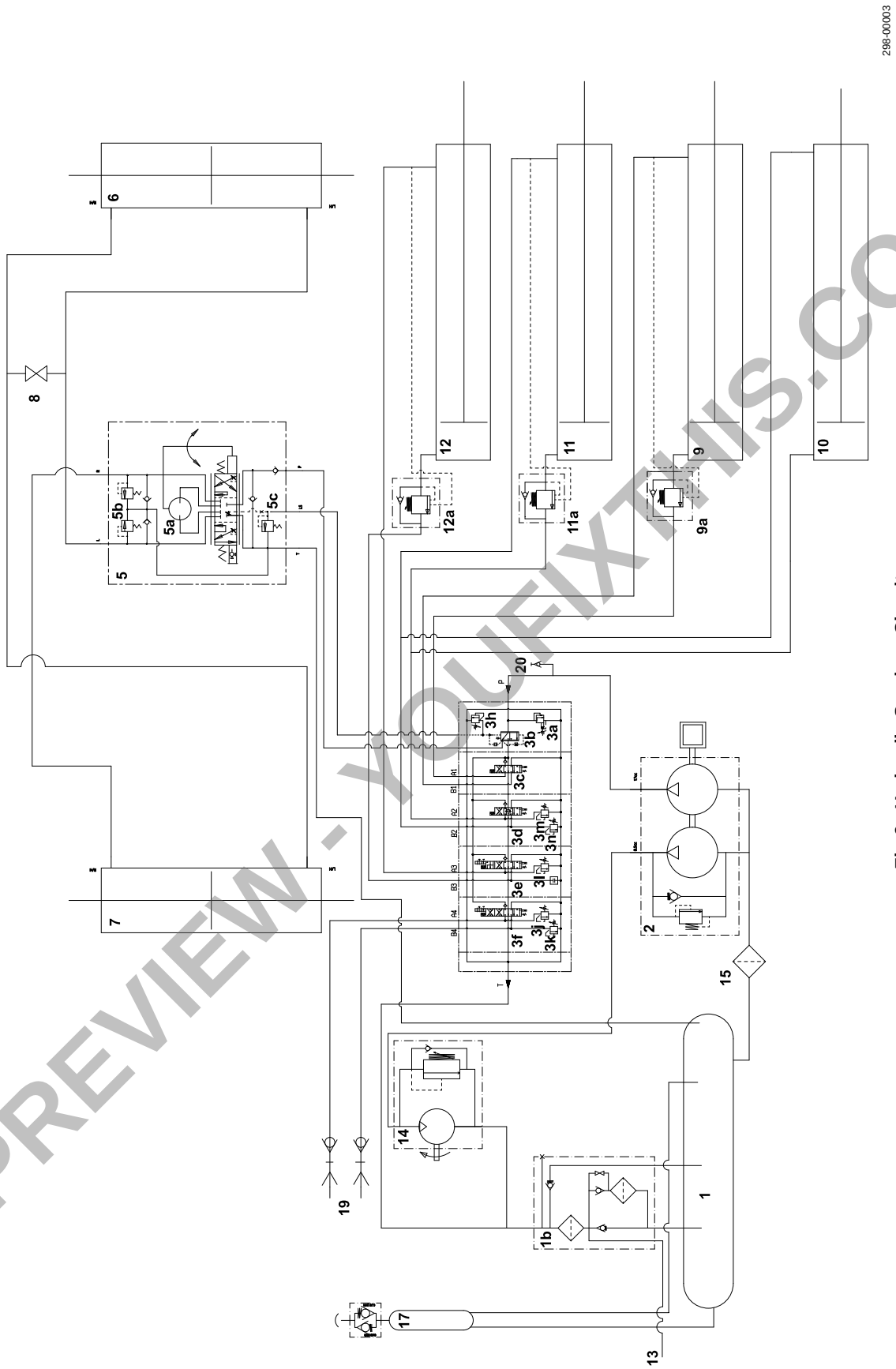


Fig 9. Hydraulic Services Circuit

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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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Moving a Disabled Machine

Important: *This procedure should only be carried out be a qualified engineer. If you have any queries concerning this procedure, consult your local JCB Distributor.*

⚠ CAUTION

The transmission will be damaged, if the machine is moved unless the transmission pump is prepared for towing.

4-2-5-6

⚠ CAUTION

Recovery Hitch

The counterweight is fitted with a recovery hitch which must not be used for towing.

2-1-1-11_2

⚠ CAUTION

Towing a machine too far or too fast can damage the transmission. Do not tow the machine further than one mile. Use a trailer for greater distances. When towing do not travel faster than 6 mph (10 km/h).

Use a rigid draw-bar. If a towing chain must be used, then use two towing vehicles. One towing vehicle should be coupled to the front of the disabled machine. The other towing vehicle should be coupled to the rear of the disabled machine, to provide braking power.

The towing vehicle(s) must have enough pulling and braking power to move and stop the machine.

2-2-7-34-1

1 Using suitable lifting equipment, remove any payload from the machine.

2 Attach a rigid tow bar between a suitable connection point on the machine and the towing vehicle.

3 Place blocks both sides of each wheel on the disabled machine.

Important: *If the machine is to be towed the transmission bypass valve must be adjusted as shown below. The machine should only be towed the minimum distance required to load it onto a transporter. The transporter should be positioned as close as possible to the machine.*

4 Open the bypass valve, as follows:

a Remove the operators seat base to get access to the transmission pump. Refer to ***Maintenance, Operators Seat Base***.

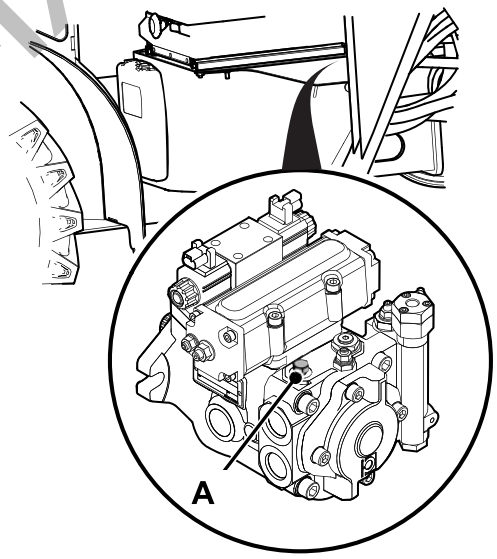
b Unscrew plug **A** by three full turns.

5 Remove the wheel chocks from each wheel and tow the machine to a place of repair at a maximum speed of 6 mph (10 kph). Tow the machine the minimum distance necessary (maximum one mile). When towing is complete, place chocks both sides of each wheel.

6 Tighten the plug **A** to close the bypass valve.

7 Remove the tow bar and wheel blocks.

8 Replace the operator seat base.



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Fig 11.

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Fault Finding

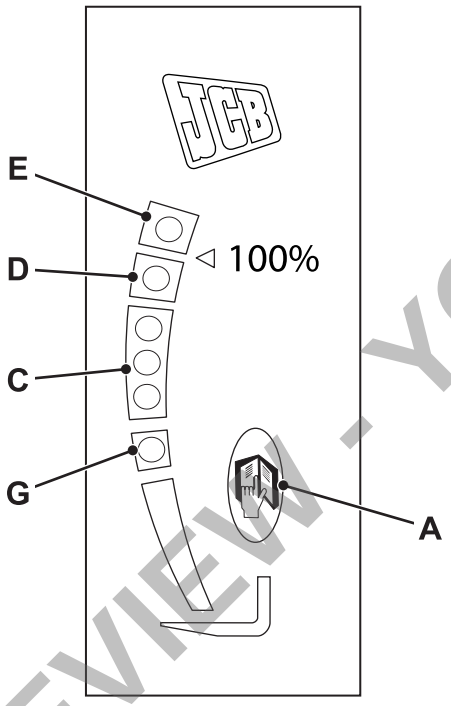
Load Moment Indicator (LMI)

Fault Codes

When the system detects a fault, the audible alarm will sound and various combinations of LEDs on the display box will illuminate to indicate a fault code for approximately 10 seconds.

Note that the audible alarm and fault code cancel after 10 seconds, all the LEDs on the display box will then flash continuously as long as the fault remains. To show the fault code for a further 10 seconds, press and release button **A**.

When the fault clears, the display will return to normal.



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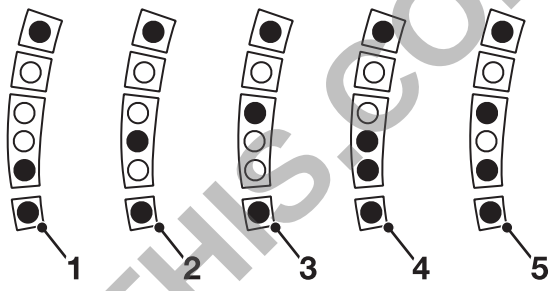
Fig 7. Typical Indicator Display Box

⚠ WARNING

If the Load Moment Indicator is faulty, contact your JCB Distributor. Do not try to repair it yourself.

12-2-1-1

Important: *A new display box will not be calibrated. Always calibrate the system when fitting a new display box.*



766940

Fig 8. System Fault Codes

Fault Code	Description
1	⇨ *Table 1. Transducer signal fault (B-16)*
2	⇨ *Table 2. Calibration out of range (B-16)*
3	⇨ *Table 3. Calibration required (B-16)*
4	⇨ *Table 4. Indicator display box faulty (B-16)*
5	⇨ *Table 5. Low battery voltage (B-16)*

If any fault codes are displayed, turn the Ignition key switch to OFF and then ON again. If the fault does not clear, ⇨ *Diagnostic Tests (B-19)*.

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Technical Data

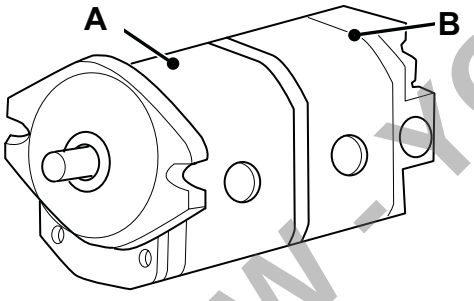
Specifications

Fan Motor

Displacement	8.4cc
Relief Valve Pressure	62 bar (900 lbf/in²)
Direction Of Rotation	Clockwise
Fan Coupling	Viscous

Main Service Pump - Deutz Engine

Type	Double gear pump		
Direction of Rotation	Clockwise		
Displacement	**cc/rev**	**cu in/rev**	
Hydraulic Services Section **A**	17	1.03	
Fan supply Section **B**	8.5	0.51	
	bar	**kg/cm²**	**lb/in²**
System Pressure	230 bar	234.5	3335

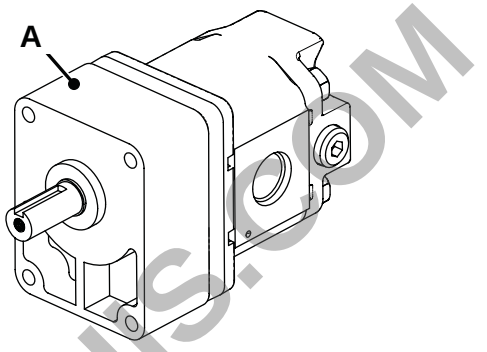


C090460

Fig 1.

Main Service Pump - Lombardini Engine

Type	External gear pump		
Direction of Rotation	Clockwise		
Displacement	**cc/rev**	**cu in/rev**	
Hydraulic Services Section **A**	17	1.03	
	bar	**kg/cm²**	**lb/in²**
System Pressure	230 bar	234.5	3335



333-S5519

Fig 2.

Hydraulic Tank	**Litres (Gal)**
Capacity	38 (8.35)

Filter

Filter Type	Suction return filter
Filtration Size	12-16 micron
Relief Valve Setting	10 bar (10.1 kgf/cm², 145 lbf/in²)
Suction Strainer	135 micron

Table 1. Hydraulic Cycle Times

Service	**Time (seconds)**
Boom Raise	7.3
Boom Lower	5.4
Extend	5.8
Retract	3.7

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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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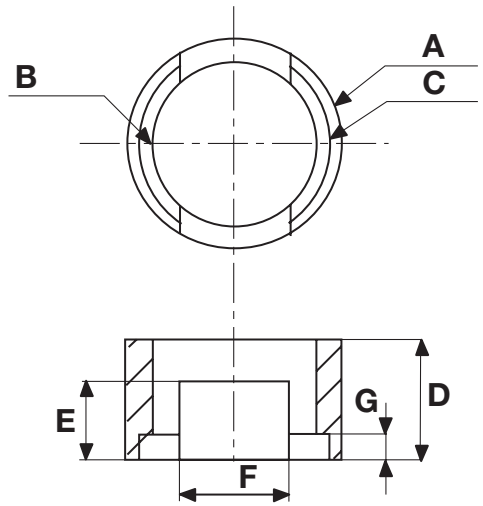


Fig 67. Tool to install the bearing support circlip

Motor	Dimension	Size	
Front (MSE-05)		**mm**	**inches**
	A	120	4.72
	B	100	3.94
	C	105	4.13
	D	72	2.83
	E	58	2.28
	F	60	2.36
	G	15	.59
Rear (MSE-02)		**mm**	**inches**
	A	70	2.75
	B	55	2.16
	C	0	0
	D	100	3.94
	E	30	1.18
	F	50	1.97
	G	0	0

Section H - Steering

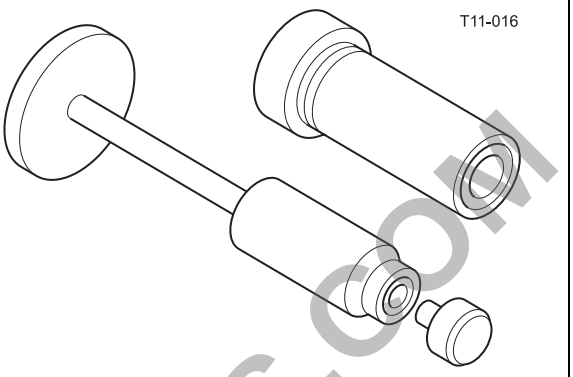


Fig 68. 892/00180 - Seal Fitting Tool

Seal Fitting Tool for fitting 'O' ring and back-up ring to Danfoss Orbitrol Unit.
892/00181 - Replacement Plastic Boss

Section K - Engine

For details of engine service tools refer to:

– Publication No. 9806/4020 (Tier 3 Engine Service Manual)

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Functional Test and Final Inspection

	Operation	10	50	100[1]	500	1000	2000
ENGINE							
Idle Speed[2]	Check/Adjust			☐	☐	☐	☐
Maximum No Load Speed[2]	Check			☐	☐	☐	☐
Throttle System and Control Cable[2]	Check/Adjust			☐	☐	☐	☐
Exhaust System - Security	Check			☐	☐	☐	☐
Air Inlet System - Security	Check			☐	☐	☐	☐
Engine - Excessive Vibration/Noise	Check			☐	☐	☐	☐
TRANSMISSION, AXLES AND STEERING							
Transmission - Operation	Check	☐	☐	☐	☐	☐	☐
Steering - Operation/Phasing	Check	☐	☐	☐	☐	☐	☐
Forward/Reverse/Speed Range - Operation	Check	☐	☐	☐	☐	☐	☐
BRAKES							
Foot Brake - Operation	Check	☐	☐	☐	☐	☐	☐
Park Brake	Check/Adjust	☐	☐	☐	☐	☐	☐
HYDRAULICS							
All Services - Operation	Check	☐	☐	☐	☐	☐	☐
Piston Rods Chrome	Check			☐	☐	☐	☐
Boom Extension	Check				☐	☐	☐
Parallel Lift/Lower	Check				☐	☐	☐
Hose Burst Protection Valves (if fitted)	Check				☐	☐	☐
MRV Pressure[2]	Check/Adjust					☐	☐
ARV Pressure[2]	Check/Adjust					☐	☐
Steering MRV Pressure[2]	Check/Adjust					☐	☐
ELECTRICS							
Gauges and Warning Lights	Check	☐	☐	☐	☐	☐	☐
Front Wiper Motor (if fitted)	Check	☐	☐	☐	☐	☐	☐
Cab Switches	Check	☐	☐	☐	☐	☐	☐
Horn	Check	☐	☐	☐	☐	☐	☐
Heater (if fitted)	Check	☐	☐	☐	☐	☐	☐
Reverse Alarm (if fitted)	Check	☐	☐	☐	☐	☐	☐

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Checking the Brake Shoe Condition

1 Make the machine safe with the boom lowered. ⇨ *How to Make the Machine Safe (Boom Lowered) (3-19)*

2 Remove the front roadwheels. ⇨ *Changing A Wheel (3-98)*

3 Turn the steering to get access to the inspection holes on the rear of each brake drum.

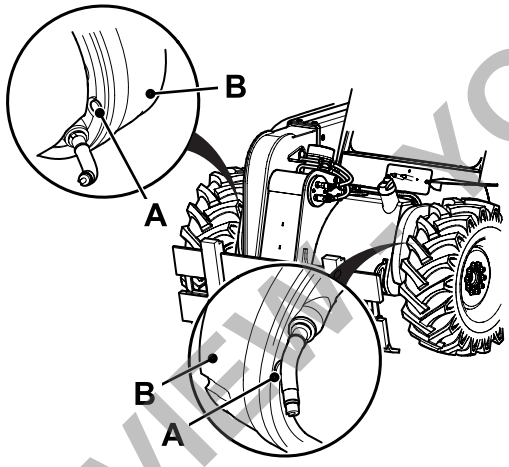
Note: *There are inspection holes on each wheel hub. Do a check of the shoes through each hole.*

4 Remove the dust plug **A** from the inspection hole in the drum **B** and note the thickness of the brake shoe lining.

5 If the brake shoe thickness is below 3 mm (0.12 in) the brake shoes must be replaced.

6 Replace the dust plugs **A**.

7 Replace the front roadwheels. ⇨ *Changing A Wheel (3-98)*



C091090

Fig 33.

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Specialist

If there is still air in the system after the ***Bleeding the Fuel System Procedure*** is completed:

Disconnect the high pressure fuel line **A**.

Disassemble the fuel injection pump **B**. Remove the:

1 Delivery union

2 Spacer

3 Spring

4 Gasket

5 Delivery valve

6 Gasket (if fitted)

Do not remove the bolts from the pump flange **7**.

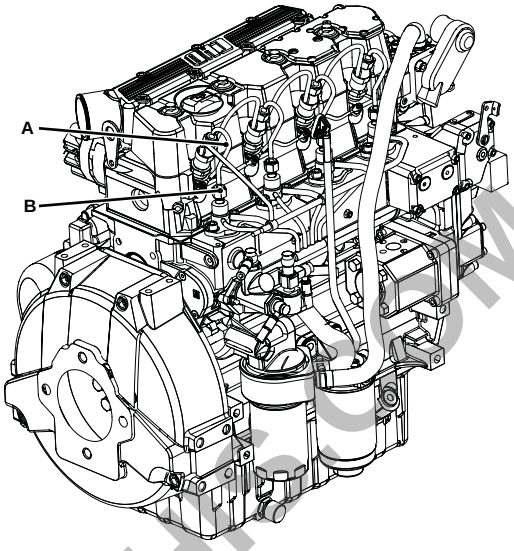
Note: *Make sure all the components are kept with the correct pump in a very clean area.*

Crank the engine until air is removed from the system.

Assemble the fuel injection pump.

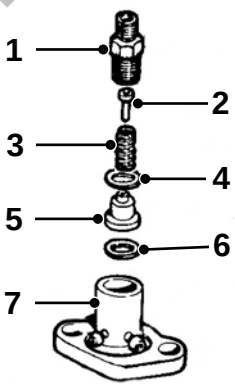
Crank the engine again until a good flow is emitted from the injection pumps.

Replace the high pressure fuel line.



T058430-9

Fig 72.



C090020-C3

Fig 73.

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and the two pin connector **E** that was connected to the transducer.

Continuity Test: Switch the multimeter to the Ohms scale and measure the electrical resistance between:

- Test point TP3 and pin 2 of connector **E**.

- Test point TP5 and pin 1 of connector **E**.

Expected reading: Less than 3 ohms.

Short Circuit Test: Measure the electrical resistance between:

- Test points TP1 and TP5

- Test points TP3 and TP5

- Test points TP1 and TP3

Expected reading: Open Circuit.

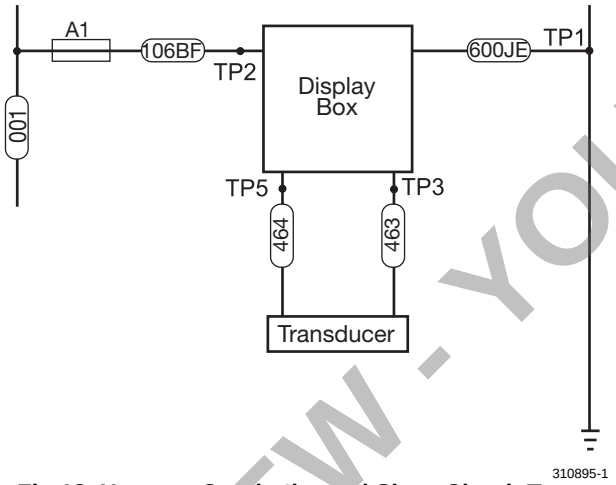


Fig 18. Harness Continuity and Short Circuit Tests

If the test box is not available, disconnect the display box harness from the machine wiring harness, turn OFF the ignition switch and using a multimeter check for continuity or short circuits in the harness wiring between the display box and transducer electrical connectors.

4 If the expected readings are not obtained, check for damaged wiring and faulty connections.

If the expected readings are obtained, but the expected voltage reading from ***Transducer Output Test (V3)*** is not achieved, test the transducer output with the transducer removed from the axle. ***⇨ Transducer Output Test (V4) - with Transducer Removed from the Axle (B-24)***

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5 Install the adjustment tool onto the adjustment plate **G**.

6 Using the adjustment tool turn the adjustment plate **G** which transmits the motion to the bush **E** through the dowels **F**.

7 Inspect the carriage/attachment alignment.

If the alignment is incorrect repeat steps 5, 6 and 7.

Note: *If the adjustment plate is at its limits and the carriage/attachment still requires adjustment flip the adjuster plate **G**.*

Important: *de-grease the bolts before securing the adjuster plate. Contamination on the threads of the bolts will result in a poor adhesive bond, and could allow the bolts to become loose and the carriage to come out of adjustment*

8 Coat the bolts **K** with JCB Retainer (High Strength). Secure adjustment plate **G** in place with washers **L** and **J**, boss **H** and bolts **K**.

Table 30. Torque Settings

Item	Nm	kgf m	lbf ft
K			

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Manual Control Levers

Component Identification

Table 1. Control Levers

Item	Function
A	Joystick: Boom (Lift and Lower) Carriage (Crowd and Dump)
B	Control lever, Boom (Extend and Retract)
C	Control lever, Auxiliary controls

Table 2. Control Rod Assemblies

Item	Function
1	Boom (Extend and Retract)
2	Carriage (Crowd and Dump)
3	Boom (Lift and Lower)
4	Auxiliary controls

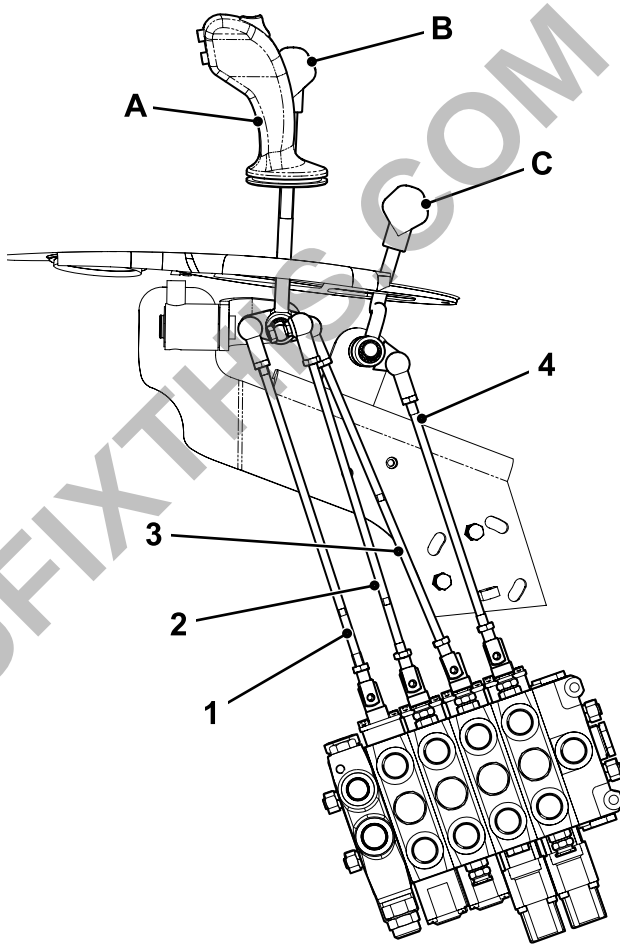


Fig 1.

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Hydraulic Schematics - LLMI

Sheet 1 is shown with out the LLMC components, refer to sheet 2.

1 Hydraulic tank
- a Oil filter, main services circuit
- b Oil return filter

2 Main services pump

3 Main services valve block
- a Main relief valve
- b Steer priority valve
- c Extension spool
- d Tilt spool
- e Lift spool
- f Auxiliary 1 spool
- g Steer circuit relief valve
- h Priority steer
- j Steer LS

4 Air blast oil cooler

5 Steering orbital unit
- a Steer valve
- b Shock valves
- c Relief valve

6 Rear power track rod
- a Right hand
- b Left hand

7 Front power track rod
- a Right hand
- b Left hand

8 Steering set up ball valve

9 Boom extension ram

9A Hose burst check valve

10 Tilt compensation ram

11 Tilt ram

11A Hose burst check valve

12 Lift ram

12A Hose burst check valve

13 Transmission pump
- a Directional control solenoid valve
- b Inching valve
- c Charge pump
- d Axial piston transmission pump

14 Fan motor 8.4cc
- a Inlet
- b Outlet
- c Drain

15 135 micron strainer

16 Brake master cylinder

17 Porting block

18 Speed selection solenoid

19 Auxiliary QRC connectors
- a Male
- b Female

20 Minimass test point adapter

21 Return filter

22 Minimass test point adapter - set to 37 bar

23 Wheel motor front right

24 Wheel motor front left

25 Wheel motor rear right

26 Wheel motor rear left

27 Hydraulic breather

27a Hydraulic breather reservoir

28 T-piece (333/S0728)

29 Minimass test point adapter on P2 and P4

30 Adjustable pressure relief valve, set to get the test pressure

31 LLMC

32 Adjustable pressure relief valve, set to get the test pressure

33 Test point adapter, set to 37 bar

34 5 bar check valve

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12 Remove the nuts and bolts **G** from the engine mounting bracket **K**.

13 Remove the engine mounting bracket **K** through the gap in the battery tray area.

14 Support the pump **C**.

15 Working in the battery tray area, remove the pump securing bolts **B**.

16 Working in the operator seat area, pull the pump **C** until the spline **A** is free from the engine coupling.

17 Remove the pump from the machine

Replacement

Replacement is the opposite of the removal procedure.

During the replacement procedure do this work also:

– Torque tighten the bolts to the correct torque figure.

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Table 1. Pedal travel excessive.

Possible Cause	Action
Air in hydraulic system.	Check fluid reservoir level. Check for fluid and air leaks, rectify as required.
Leak in hydraulic system.	Check for fluid loss at master cylinder and wheel cylinders, all pipes and fittings for loose connections. Rectify as required.
Brake shoes worn.	Renew brake shoes - BOTH sides.

Table 2. Pedal hard to operate.

Possible Cause	Action
Tightness at pedal pivot.	Inspect pedal pivot. Free-off and lubricate.
Fluid contamination and seal damage.	Flush system and renew all hydraulic seals.
Misaligned push rod or pedal.	Check and rectify as required.
Kinked or crushed brake pipes.	Check and renew brake pipework.

Table 3. Poor braking.

Possible Cause	Action
Brake shoes worn beyond limits or distorted.	Renew brake shoes - BOTH sides.
Master cylinder fault.	Replace master cylinder.
Wheel cylinder fault.	Dismantle drum brakes and inspect wheel cylinder for signs of seizure/damage.

Table 4. Brakes not releasing.

Possible Cause	Action
Brake pedal spring fault.	Fit a new spring.
Master cylinder fault (plunger stuck in bore).	Replace master cylinder.
Brake pedal free travel incorrect.	Adjust pedal free travel.
Fluid contamination and seal damage.	Flush system and renew hydraulic seals.
Kinked or crushed brake pipes.	Check and renew pipes as required.

Table 5. Excessive brake noise in operation.

Possible Cause	Action
Brake shoe friction linings and drum surface in poor condition.	Check for distortion, surface pitting and roughness of friction linings and drum surface.
Brake shoes worn beyond limits.	Renew brake shoes - BOTH sides.

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Possible Cause	Action
Priority valve not operating correctly.	– Check if the priority valve is sticking (contamination) rectify as required. – Check the load sense line from the steer unit to the priority valve for signs of leaking or poor connection.
Mechanical failure.	Check for damaged axle components, such as rams, track rods, linkages etc.
Steer column splined shaft not fully engaged in steer valve.	Check shaft engagement.

Table 4. 4WS Phasing Fault Diagnosis

Action		Yes	No
1	Does steering go out of phase in less than four hours of continuous use?	Go to 2.	Ensure system is rephased after four hours of continuous use (see Operator's Handbook).
2	Bleed steering system to remove air. OK now?	Done	Go to 3
3	Check for contamination in the hydraulic system which can cause one of the already detailed problems. Is the system contaminated?	Filter the hydraulic system	It is likely that one of the preceding tests was not conclusive. Go to 1.

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Engine Sensors and Switches

Engine Oil Pressure Switch

⚠ CAUTION

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

2-3-3-2

⚠ WARNING

Beware of the hot exhaust system even with the engine stopped.

ENG-4-3

⚠ WARNING

Make sure the engine cannot be started. Disconnect the battery before doing this job.

2-3-3-5

⚠ WARNING

The engine has exposed rotating parts. Switch OFF the engine before working in the engine compartment. Do not use the machine with the engine cover open.

5-2-6-5

Removal

1 Make the machine safe with the boom lowered. Refer to ***Section 3 - Routine Maintenance***.

2 Open the engine cover. Refer to ***Section 3 - Routine Maintenance***.

3 Disconnect the Battery. Refer to ***Section 3 - Routine Maintenance***.

4 Disconnect the electrical connector **B** from the oil pressure switch **A**.

5 Position receptacle below the oil pressure switch.

6 Remove the oil pressure switch **A** from the engine.

Replacement

Replacement is the opposite of the removal procedure.

During the replacement procedure do this work also:

– Tighten the oil pressure switch to the correct torque setting. ⇨ ***Table 1. Torque Settings (K-21)***

– Do a check of the engine oil level. Refer to ***Section 3 - Routine Maintenance***.

Table 1. Torque Settings

Item	Nm	Engine
A	27	Deutz
A	35	Kohler

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