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Safety Check List

P11-1010_3

Safety - Yours and Others

INT-1-3-1_3

All machinery can be hazardous. When a machine is correctly operated and properly maintained, it is a safe machine to work with. But when it is carelessly operated or poorly maintained it can become a danger to you (the operator) and others.

In this manual and on the machine you will find warning messages. Read and understand them. They tell you of potential hazards and how to avoid them. If you do not fully understand the warning messages, ask your employer or JCB distributor to explain them.

But safety is not just a matter of responding to the warnings. All the time you are working on or with the machine you must be thinking what hazards there might be and how to avoid them.

Do not work with the machine until you are sure that you can control it.

Do not start any job until you are sure that you and those around you will be safe.

If you are unsure of anything, about the machine or the job, ask someone who knows. Do not assume anything.

Remember

BE CAREFUL
BE ALERT
BE SAFE

General Safety

T1-043

⚠ WARNING

To operate the machine safely you must know the machine and have the skill to use it. You must abide by all relevant laws, health and safety regulations that apply to the country you are operating in. The Operator Manual instructs you on the machine, its controls and its safe operation; it is not a training manual. If you are a new operator, get yourself trained in the skills of using a machine before trying to work with it. If you don't, you will not do your job well, and you will be a danger to yourself and others.

INT-1-4-1

⚠ WARNING

Care and Alertness

All the time you are working with or on the machine, take care and stay alert. Always be careful. Always be alert for hazards.

INT-1-3-5

⚠ WARNING

Clothing

You can be injured if you do not wear the proper clothing. Loose clothing can get caught in the machinery. Wear protective clothing to suit the job. Examples of protective clothing are: a hard hat, safety shoes, safety glasses, a well fitting overall, ear-protectors and industrial gloves. Keep cuffs fastened. Do not wear a necktie or scarf. Keep long hair restrained. Remove rings, watches and personal jewellery.

INT-1-3-6_2

⚠ WARNING

Alcohol and Drugs

It is extremely dangerous to operate machinery when under the influence of alcohol or drugs. Do not consume alcoholic drinks or take drugs before or while operating the machine or attachments. Be aware of medicines which can cause drowsiness.

INT-1-3-9_2

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Pre Start Cold Checks, Service Points and Fluid Levels

	Operation	10	50	500	1000	2000
ENGINE						
Oil level	- Check	☐	☐	☐	☐	☐
Oil and Filter	- Change			☐	☐	☐
Air Cleaner Element (Dusty Conditions only)	- Change			☐	☐	☐
Air Cleaner Outer Element	- Change				☐	☐
Air Cleaner Hose Security	- Check and Adjust		☐	☐	☐	☐
Air Filter Dust Valve	- Check and Clean			☐	☐	☐
Fuel Injectors(1)	- Clean and Test					☐
Coolant Quality/Level	- Check	☐	☐	☐	☐	☐
Coolant	- Change					☐
Fuel Lift Pump	- Clean			☐	☐	☐
Fuel Sedimenter	- Drain and Clean		☐	☐	☐	☐
Fuel Filter/Sedimenter Element	- Change			☐	☐	☐
Primary Fuel Filter	- Check			☐	☐	☐
Fuel Pre Filter (Tier 3 Machine only)	- Check			☐	☐	☐
Fan Belt Tension/Condition	- Check and Adjust		☐	☐	☐	☐
Valve Clearances(1)	- Check and Adjust				☐	☐
Cylinder Head Bolts for Tightness	- Check and Adjust			☐	☐	☐
Engine Mounting Bolts for Tightness	- Check and Adjust			☐	☐	☐
Exhaust System Security	- Check and Adjust			☐	☐	☐
Radiator	- Clean and Check	☐	☐	☐	☐	☐
TRANSMISSION						
Security of Mounting Bolts and Nuts						
- Track Wheel Motor to Undercarriage Bolts	- Check			☐	☐	☐
- Drive Sprocket Bolts	- Check			☐	☐	☐
- Slew Gearbox Bolts	- Check				☐	☐
Track Gearbox Oil	- Change			☐	☐	☐
HYDRAULICS						
Oil Level	- Check	☐	☐	☐	☐	☐
Oil	Change					☐

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Fluids, Lubricants and Capacities

Table 1.

Item	Capacity Litres (Gal)	Fluid / Lubricant	International Specification
Fuel Tank	23.5 (5.2)	Diesel Oil	
Engine (Oil)	4.0 (0.9)	JCB 10W/30 Multigrade above -15°C (above 5°F)	MIL-L-46152, API CC/SF
		5W/20 -15°C to -25°C (5°F to 13°F)	API CC/SE (recommended)
Engine Coolant Canopy Cab	 4.5 (1.0) 5.0 (1.1)	JCB High Performance Antifreeze and Inhibitor/Water. ⇨ *Coolant Mixtures (3-12)*.	ASTM D3306-74
Track Gearbox (each)	0.3 (0.07)	JCB SAE 30 Engine Oil (Not Multigrade)	API CD/SF, MIL-L-46152, MIL-L-2104D
Track Idler Wheels	0.025 (0.006)	JCB HD90 Gear oil	API-GL-5, MIL-L-2105D
Track Rollers (bottom)	0.025 (0.006)	JCB HD90 Gear Oil	API-GL-5, MIL-L-2105D
Hydraulic System	30 (6.6)	JCB Special Hydraulic Fluid Up to 30°C (86°F) JCB Hydraulic Fluid 46 Over 30°C (86°F)	
Slew Ring Bearings		JCB MPL Grease	Lithium based no 2 consistency
Slew Ring Gear Teeth		JCB Slew Pinion Grease	
All Other Grease		JCB MPL Grease	Lithium based no 2 consistency

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Prepare the Machine for Maintenance

Introduction

P11-3001

⚠ WARNING

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

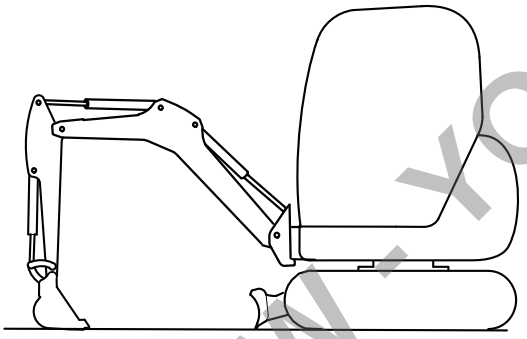
Before doing any maintenance make sure the machine is safe, it should be correctly parked on level ground.

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

Make the machine safe before you start a maintenance procedure.

Unless a maintenance procedure instructs you differently, you must lower the Excavator. Refer to ***How to Make the Machine Safe (Excavator Lowered)***.



717260-4

Fig 2.

How to Make the Machine Safe (Excavator Lowered)

Important: *Unless a maintenance procedure instructs you differently, you must lower the Excavator.*

1 Park the machine on level, solid ground.

If necessary, refer to ***Stopping and Parking the Machine*** in the Operator Manual.

2 Lower the dozer.

3 Lower the excavator so the attachment is flat on the ground.

4 Stop the engine and remove the starter key.

5 Disconnect the battery to prevent accidental operation of the engine.

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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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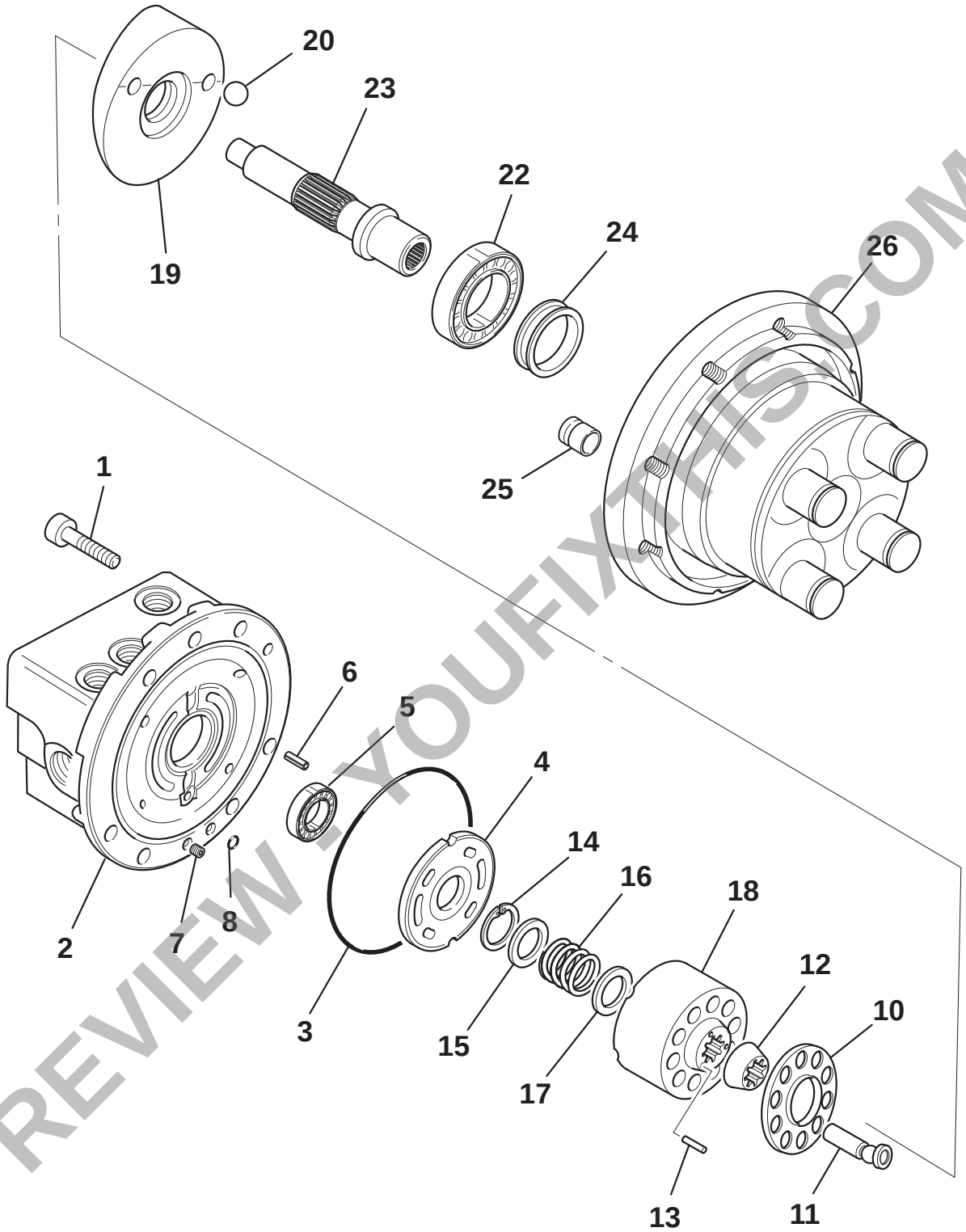


Fig 63.

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Schematic Circuits

8014, 8016, 8018 (Tier 2 Machines)

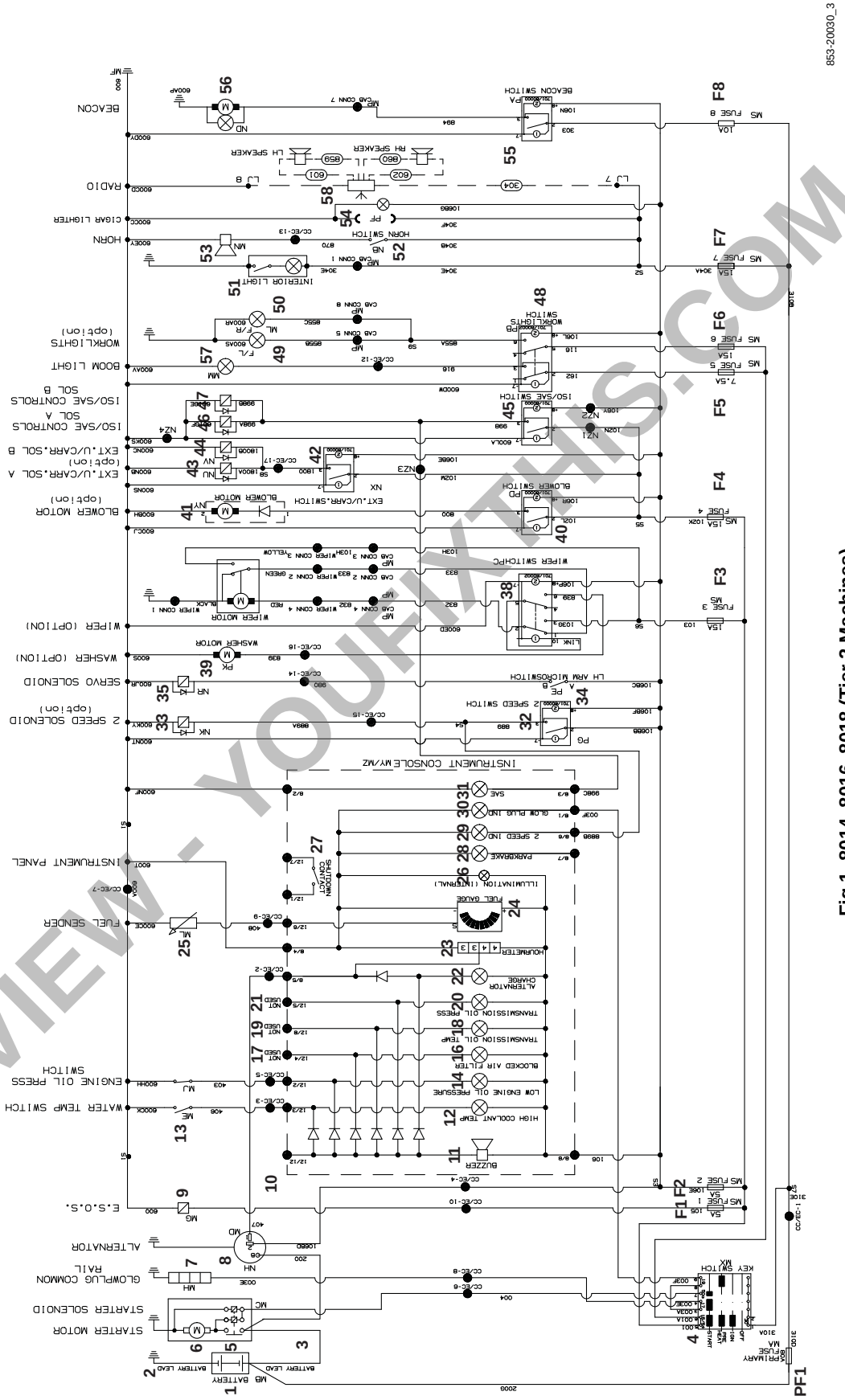


Fig 1. 8014, 8016, 8018 (Tier 2 Machines)

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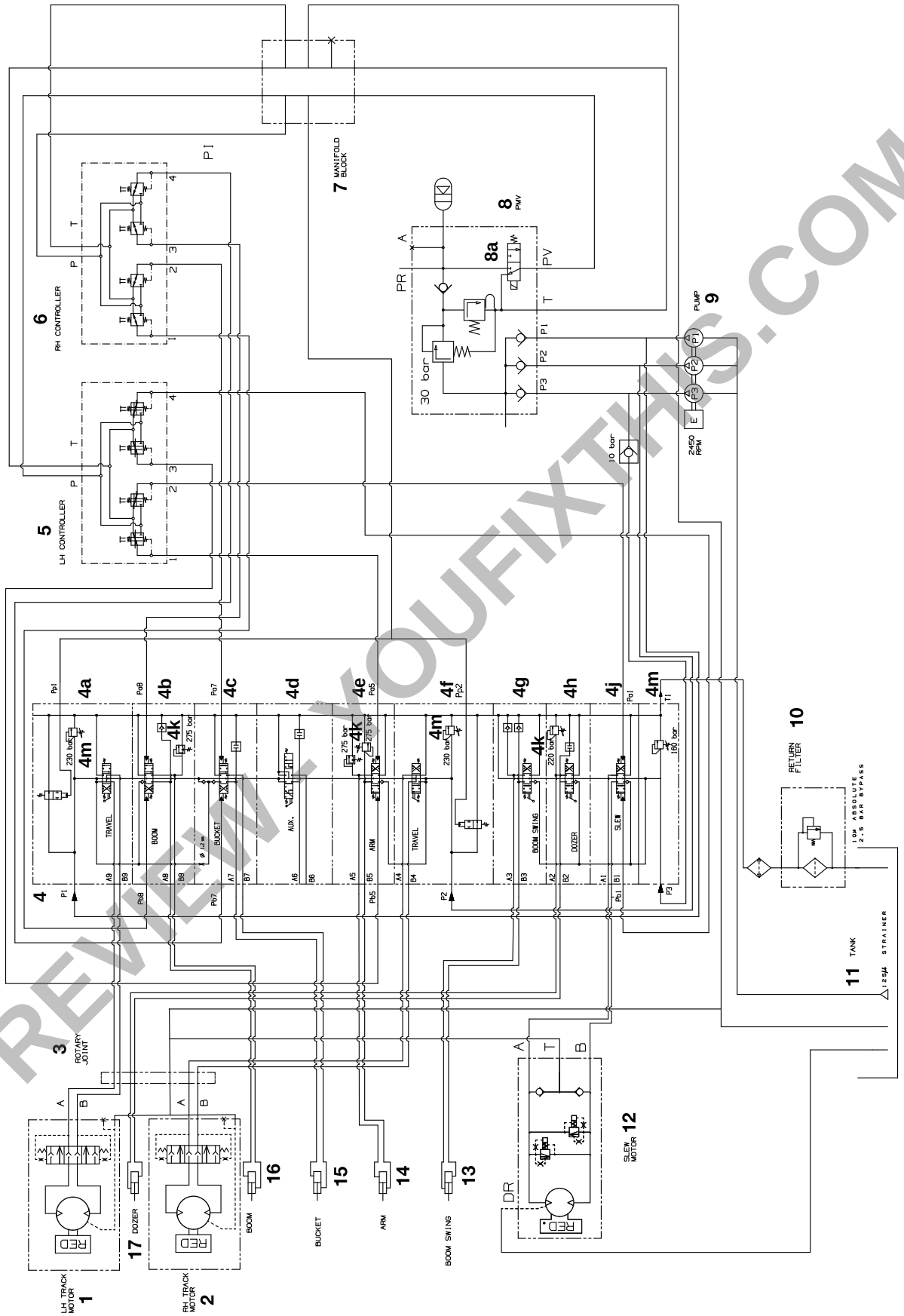


Fig 8. 236/60023 issue 12

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Slew Motor and Gearbox

Table 7.

Fault	Possible Cause	Action
Motor does not turn (The supplied pressure is correct)	Relief valve pressure too low or faulty	Renew the relief valve
	Motor has too much internal leakage	Renew the motor assembly
	Motor has burned inner parts	Renew the motor assembly
	Reduction gears damaged	Renew the gears
	Overload	Remove the overload
Insufficient torque	Relief valve pressure too low or faulty	Renew the relief valve
	Motor has too much internal leakage	Renew the motor assembly
	Motor has burned inner parts	Renew the motor assembly
	Reduction gears damaged	Renew the gears
	Bearings damaged	Renew the bearings
Abnormal noise	Cavitation noise due to insufficient flow	Check oil level and pipework
	Motor has damaged sliding parts	Renew the motor assembly
	Reduction gears damaged	Renew the gears
	Bearings damaged	Renew the bearings
	Pinion gear damaged	Renew pinion
Oil leakage at housing joint face	Damaged `O' rings	Renew `O' rings
	Loose bolts	Retighten
Oil leakage at pinion gear	Damaged oil seal	Renew oil seal
Delay in starting	Relief valve pressure too low or faulty	Renew the relief valve
	Check valve internal leakage	Renew check valve
Excessive heat generation	Motor has burned or damaged sliding parts	Renew the motor assembly
	Reduction gears damaged	Renew the gears
	Bearings damaged	Renew the bearings

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Technical Data

All Machines

	8014/8016	8018/8020
Pump		
Type	Three section gear pump driven directly from the engine crankshaft.	
Flow Rates at neutral circuit pressure		
Pumps **P1** and **P2**	13.5 l/min. (3.0 UK gall/min.) @ 2450 rev/min	15.7 l/min. (3.5 UK gal/min.) @ 2450 rev/min
Pump **P3**	12.2 l/min. (2.7 UK gall/min.) @ 2450 rev/min	

Machines Up To May 2012	**8014**		**8016**		**8018/8020**	
Relief Valve Operating Pressures(1)	**bar**	**lbf/in²**	**bar**	**lbf/in²**	**bar**	**lbf/in²**
Main Relief Valves (M.R.V.)						
Swing/Dozer/Slew	160	2320	160	2320	160	2320
Tracks/Dipper/Aux	230	3335	230	3335	220	3190
Tracks/Boom/Bucket	230	3335	230	3335	220	3190
Servo Pressure						
Maintenance Valve - Single Speed	30	435	30	435	30	435
Maintenance Valve - Two Speed	30	435	30	435	30	435
Auxiliary Relief Valves (A.R.V.)						
Boom rod side	275	3988	275	3988	275	3988
Dipper rod and head side	275	3988	275	3988	275	3988
Dozer head side	220	3190	220	3190	220	3190
Slew Crossline Relief Valves	160	2320	160	2320	160	2320

(1) At hydraulic oil temperature of 50 °C (122 °F)

Machines From June 2012	**All Machines**	
Relief Valve Operating Pressures(1)	**bar**	**lbf/in²**
Main Relief Valves (M.R.V.)		
Swing/Dozer/Slew	160	2320
Tracks/Dipper/Aux	230	3335
Tracks/Boom/Bucket	230	3335
Servo Pressure		
Maintenance Valve - Single Speed	30	435
Maintenance Valve - Two Speed		

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This may be needed every six months or at least annually in some countries to meet and comply with legislation and for insurance purposes.

Check with your local JCB distributor for further advice.

Obtaining Replacement Parts

T3-096

If you use non-genuine JCB parts or consumables, then you can compromise the health and safety of the operator and cause machine failure

A Parts Book for your machine is available from your JCB Distributor. The Parts Book will help you identify parts and order them from your JCB distributor.

Your dealer will need to know the exact model, build and serial number of your machine. See ***Identifying Your Machine (Introduction section)***.

The data plate also shows the serial numbers of the engine, transmission and axle(s), where applicable. But remember if any of these units have been changed, the serial number on the data plate may be wrong. Check on the unit itself.

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Installing a Bucket on a Quickhitch

See ***Bucket Selection.***

1 Position the Bucket

Set the bucket on firm level ground. Use safe and correct lifting equipment to move the bucket.

2 Position the machine

a Position the machine so that the Quickhitch and bucket are correctly aligned for connection as shown.

b Use the excavator controls to engage jaw **A** of the Quickhitch with the pivot pin **B** of the bucket.

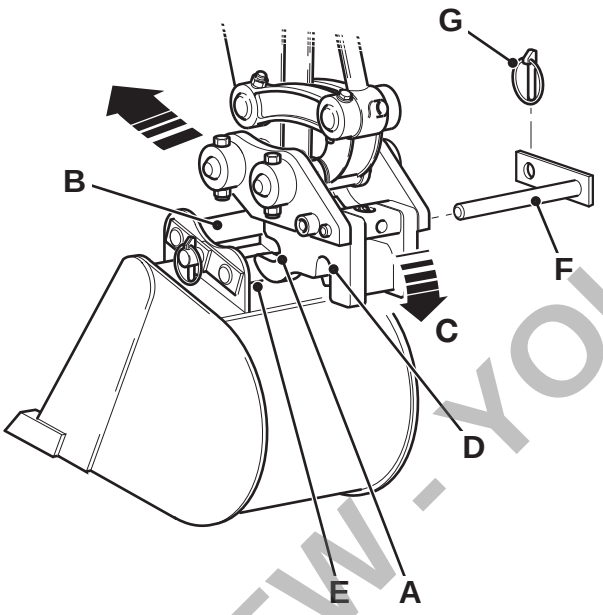


Fig 6.

c Use the excavator controls to roll the Quickhitch in the direction of arrow **C** until the latch hook **D** has fully engaged the pivot pin **E** on the bucket. Due to the light weight of some bucket it may be necessary to apply a load on the bucket teeth to achieve Quickhitch connection.

Alternatively, use the tommy bar to lever the latch off, allowing the attachment pivot pin **E**, to locate in jaw **D** of the Quickhitch.

⚠ CAUTION

Make sure that the latch hook has fully engaged.

2-4-4-3

d Fit the latch hook locking pin **F** and secure with lynch pin **G**.

⚠ WARNING

Always fit the Quickhitch latch hook locking pin. Failure to fit the pin will result in possible failure of the latching mechanism. Such a failure would result in the sudden release of an attachment from the machine; you or others could be killed or seriously injured.

3-4-1-9

⚠ CAUTION

When the Quick-Hitch is installed and its attachment fitted, there is a danger of the attachment hitting the underside of the boom. Operate the boom and dipper carefully when the Quick-Hitch and its attachment are fitted.

2-4-4-2

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Testing

This test is to determine the electrical condition of the battery and to give an indication of the remaining useful `life'.

Before testing ensure that the battery is at least 75% charged (SG of 1.23 to 1.25 for ambient temperature up to 27°C).

Ensure that the battery is completely disconnected from the vehicle.

Connect up the battery tester as follows:

1 Set the CHECK/LOAD switch **14-A** to OFF.

2 Set rocker switch **14-B** to the battery voltage (12V).

3 Connect the red flying lead to the battery positive (+) terminal and the black flying lead to the battery negative (-) terminal.

4 Set the CHECK/LOAD switch **14-A** to CHECK to read the battery no-load voltage which should be at least 12.4 volts.

5 Set the CHECK/LOAD switch **14-A** to LOAD and hold down for 5-10 seconds until the meter reading stabilises. The reading should be at least 9 volts.

Note: *Do not hold the switch in the LOAD position for more than 10 seconds.*

6 ⇨ *Table 1. Fault Diagnosis (C-14)*, if the foregoing tests are unsatisfactory.

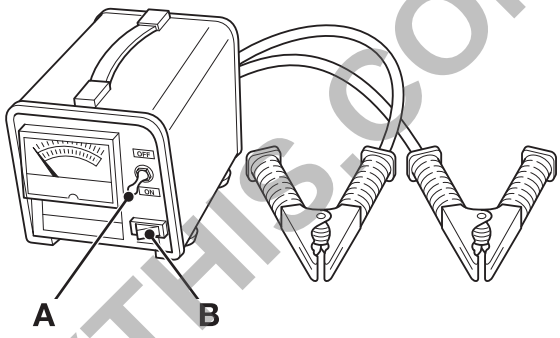


Fig 14. Battery Tester

Table 1. Fault Diagnosis

Battery Tester Readings		Remedy
1	CHECK: 0 - 12.6 Volts LOAD: less than 6 Volts	Renew battery
2	CHECK: 6 - 12.4 Volts LOAD: less than 9 Volts and falls steadily but remains in yellow zone.	Recharge and re-test. If tests still unsatisfactory renew battery.
3	CHECK: less than 10 Volts LOAD: less than 3 Volts	Indicates battery has been over-discharged and unlikely to recover. Renew battery.
4	CHECK: more than 11 Volts LOAD: 6 - 10 Volts steady	Charge battery which will probably recover.

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Removal and Replacement (Later Machines)

Remove

1 Remove knobs **A** from track levers

2 Unfold the gaiter **B** from its location in the foot moulding and slide up the track lever.

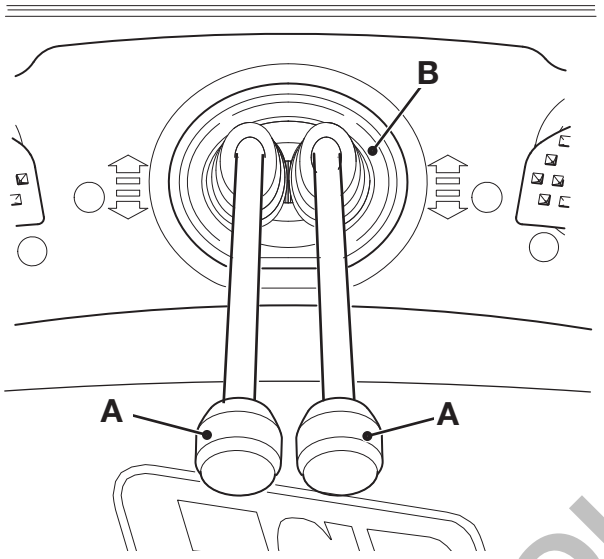


Fig 3.

3 Undo Fixings **C** and remove track levers **D**.

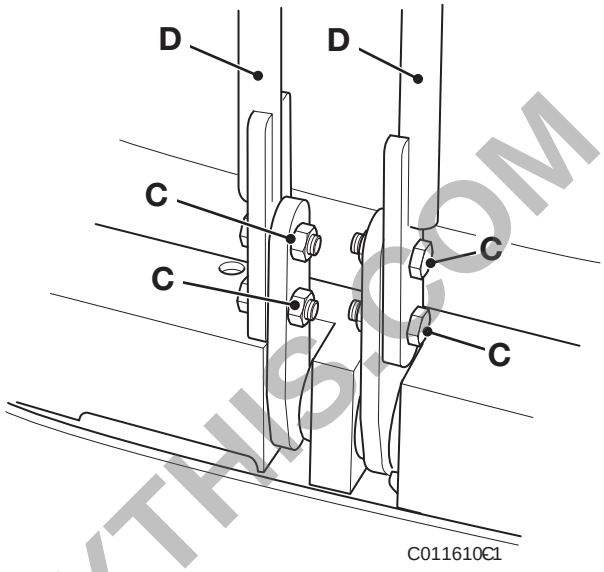


Fig 4.

Replace

Replacement of the track levers is the reversal of the removal sequence.

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Auxiliary Relief Valves

1 Remove the auxiliary relief valve from the control valve and plug the valve port.

2 Install the auxiliary relief valve into the test block **B** part number 331/31069.

3 Connect a 0 - 400 bar (0 - 6000lbf/in^2) pressure gauge and hand pump, part number 892/00223, to test block.

4 Operate pump and adjust pressure setting plug **C** until valve opens at correct pressure, ⇨ *Technical Data (E-3)*.

5 Lock the pressure setting plug with the locknut **D** and retest. Remove auxiliary relief valve from test block and refit to control valve.

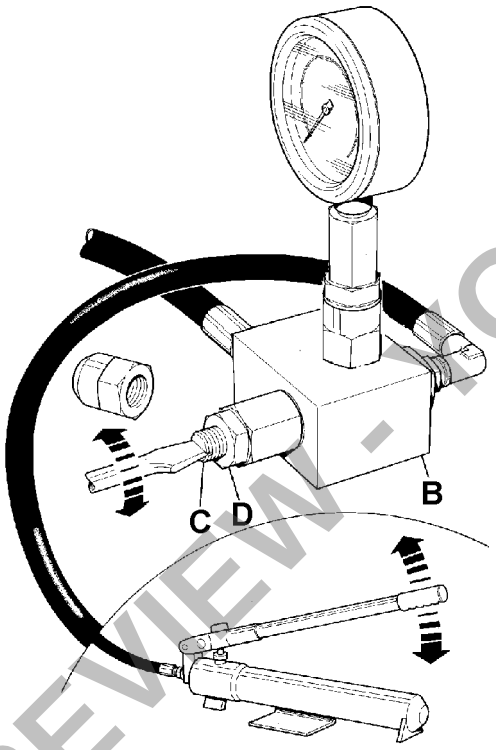


Fig 16.

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8016, 8018 Two Speed Machines

Removal

Note: *Before removing a suspected leaking coupling, ensure that the leak is from the coupling core and not a hose adaptor. Ensure all adaptors are tight.*

⚠ WARNING

Fluid Under Pressure

Fine jets of fluid at high pressure can penetrate the skin. Keep face and hands well clear of fluid under pressure and wear protective glasses. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of fluid. If fluid penetrates your skin, get medical help immediately.

INT-3-1-10_2

1 Raise cab to gain access to rotary coupling, see ***Cab tilting procedure Section B***.

⚠ WARNING

Postion the machine on a firm, level surface before tilting the cab. The tilting gas struts must be fully raised and locked in position before attempting any service procedure.

8-5-1-4

2 Identify and remove the hydraulic hoses from the adaptors **A** and **B**. Blank both the hoses and the adaptors.

3 Remove the four bolts, nuts and washers **C** securing the rotary coupling to the undercarriage and lift clear of the mainframe.

Replacement

1 Replace in reverse order of removal.

2 Reconnect hydraulic hoses using new lightly lubricated 'O' rings.

3 Test the assembly for leaks.

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