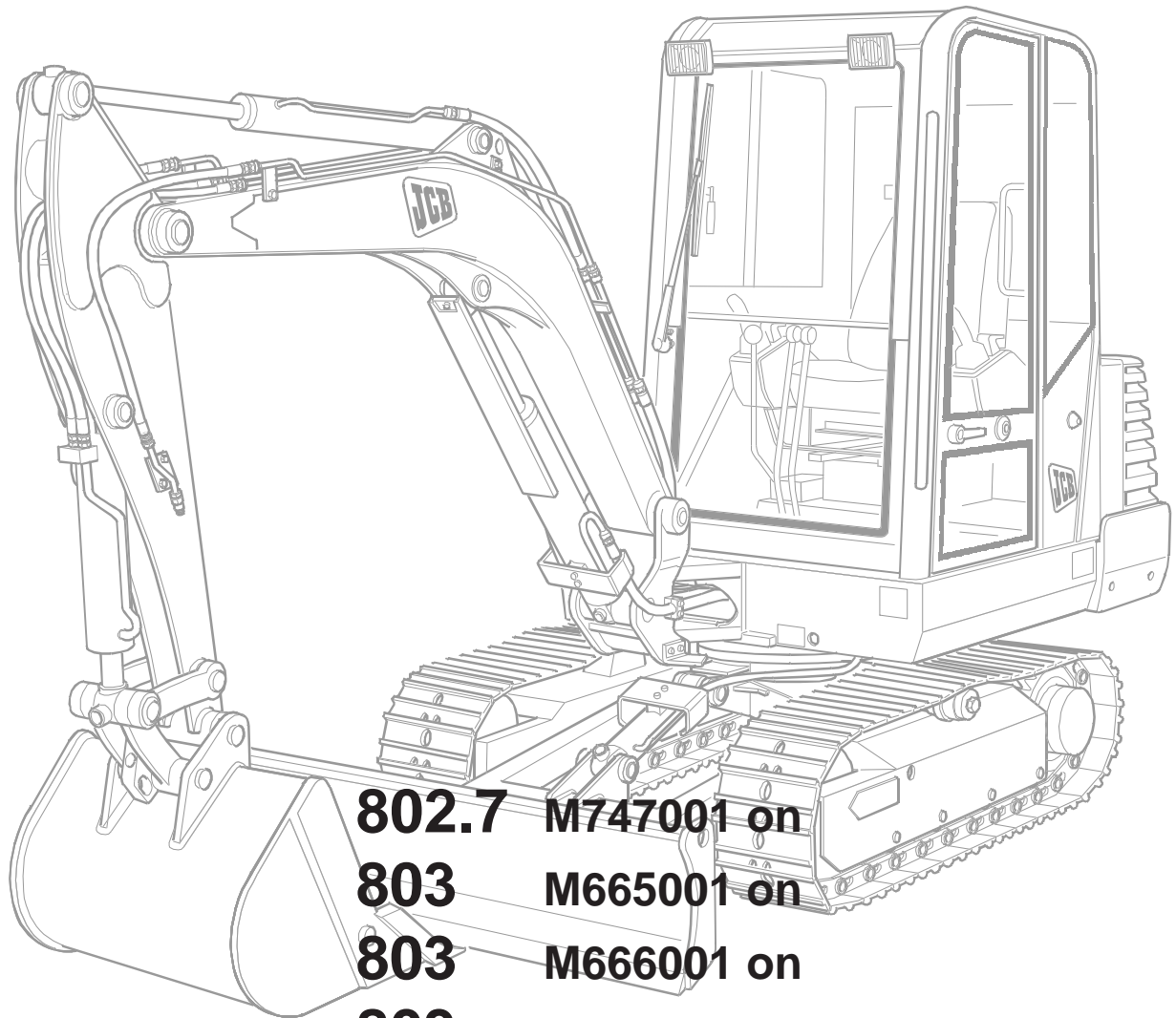




MINI-EXCAVATOR SERVICE MANUAL

HYDRAPOWER



802.7 M747001 on
803 M665001 on
803 M666001 on
803 M765001 on
804 M734001 on

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Best wishes.

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Introduction

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

It is assumed that such personnel have at least a sound knowledge of workshop practice, safety procedures and general techniques associated with the maintenance and repair of hydraulic earth moving equipment. Details of such are therefore generally omitted from this manual, the intention being to convey only the more specialised information concerning particular aspects of the machine or component in question.

For example, renewal of oil seals, gaskets etc. and any component showing obvious wear or damage is expected as a matter of course and information on these matters is therefore only included where a specialised procedure or range of wear tolerances is required. Similarly, it is expected that components will be thoroughly cleaned and lubricated where appropriate, also that any opened hose or pipe connections will be blanked to prevent entry of dirt and excessive loss of hydraulic fluid.

For convenience the manual is divided into sections, e.g. 'Hydraulics', 'Electrics' etc., but to find details of a specific component, reference should be made to the alphabetical index at the back of the book.

Illustrations showing a dismantled component are numbered as a guide to the dismantling sequence which can generally be reversed for assembly.

Torque settings quoted are given as 'mean' figures, which may be varied by $\pm 3\%$.

'Left Hand' and 'Right Hand' are as viewed from the rear of the machine or engine.

Replacement or additional pages for this manual will be issued from time to time and should be inserted in place of the existing pages which should be removed and destroyed.

Where possible, revised pages will bear an asterisk (*) against the new information, the page issue number in the bottom right hand corner being similarly marked.

A *Service Tools Microfiche*, detailing special tools required, is available separate.

FLUIDS, LUBRICANTS, CAPACITIES AND SPECIFICATIONS

LUBRICANTS AND CAPACITIES

Note: To promote thorough running-in, engines of new machines are fitted at the factory with JCB 10W/30 Multigrade oil. This oil should be drained after the first 100 hours operation and the engine filled with the recommended grade as shown in the engine lubrication chart. JCB 10W/30 Multigrade should also be used for the first 100 hours operation whenever a new or reconditioned engine is fitted into the machine. Alternatively, where a new or reconditioned engine requires protection against corrosion during prolonged storage, Mobilaroma 524 may be used during the storage period and for the first 100 hours operation. It is essential that both these oils are replaced by the recommended lubricant after the first 100 hours operation.

ITEM	CAPACITY Litres (UK Gal) [US Gal]	FLUID / LUBRICANT	INTERNATIONAL SPECIFICATION
Fuel Tank 802.7 M747001 on 803 to M665001 on & 666001 on 804 M734001 on 803 M765001 on	50 (11.0) [13.2] 45 (9.9) [11.8]	Diesel Oil (See Types of Fuel)	ASTM D975-66T Nos. 1D, 2D
Engine (Oil) *First 100 hours only	4.5 (1.0) [1.2]	JCB 10W/30 Multigrade above - 15°C (5°F) * JCB 5W/20 Multigrade - 15°C to - 25°C (5 °F to - 13°F)	MIL-L-46152, API CC/SF API CC/SE (recommended)
*After first 100 hours		JCB 15W/40 Multigrade above - 10°C (14°F) * JCB 5W/20 Multigrade - 10°C to - 25°C (14°F to -13°F)	SAE15W/40, MIL-L-46152B, AP1 CD/SE MIL-L-2104D API CC/SE or API CD/SE
Engine (Coolant) Canopy Cab	4.5 (1.0) [1.2] 5.0 (1.1) [1.3]	JCB Universal Antifreeze/water (See Coolant Mixtures)	ASTM D3306-74
Track Gearbox (each)	1.2 (0.26) [0.3]	JCB SAE 30 Engine Oil (NOT Multigrade)	API CD/SF, MIL-L-46152B MIL-L-2104B
Slew Gearbox Lubrication to M665736 *802.7 M747001 on 803 M666001 on 804 M734001 on *803 M765001-027	0.6 (0.13) [0.15] 0.7 (0.15) [0.18] 0.7 (0.15) [0.18] 0.7 (0.15) [0.18]	JCB HD90 Gear Oil JCB HD90 Gear Oil below 0°C (32°F) JCB HD 140 Gear Oil 0°C to 40°C (32°F to 104°F) Lubricated from hydraulic system	API-GL-5, MIL-L-2105D API-GL-5, MIL-L-2105D API-GL-5, MIL-L-2105D
*803 M765028 on			
Track Idler Wheels	Sealed Unit	JCB HD90 Gear Oil	API-GL-5, MIL-L-2105D
Track Rollers (bottom) (top)	Sealed Unit Sealed Unit	JCB HD90 Gear Oil JCB HD90 Gear Oil	API-GL-5, MIL-L-2105D API-GL-5, MIL-L-2105D
Hydraulic Tank *803 to M666704 *804 to M734085 *802.7M747001 on *803 M666705 on *803 M765001 on *804 M734086 on	90 (20) [24] 90 (20) [24] 62 (14) [16.8] 62 (14) [16.8] 61 (13.5)[16.2] 62 (14) [16.8]	JCB Hydraulic fluid 46 below - 10°C (14°F) JCB Special Hydraulic Fluid over 40°C (104°F)	

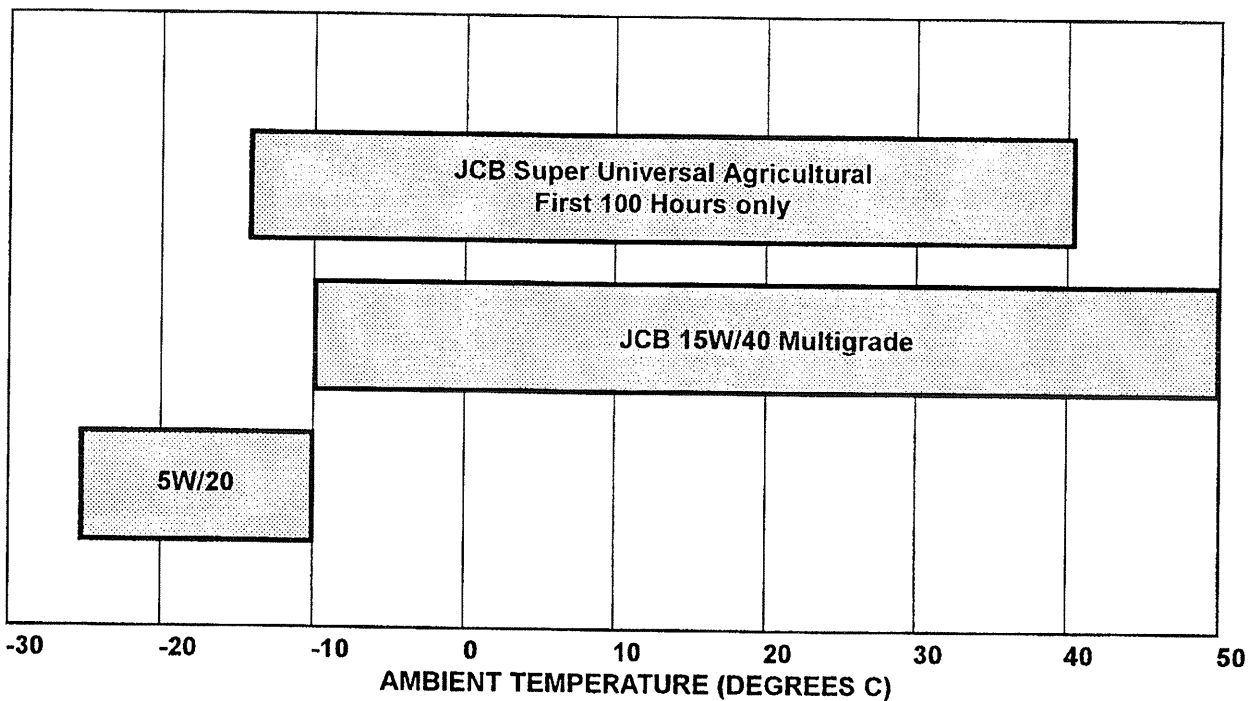
FLUIDS, LUBRICANTS, CAPACITIES AND SPECIFICATIONS

ITEM	CAPACITY Litres (UK Gal)	FLUID / LUBRICANT	INTERNATIONAL SPECIFICATION
#Slew Ring Bearings Gear Teeth		JCB MPL Grease JCB Slew Pinion Grease ##	Lithium based, No. 2 consistency.
All Other Grease Points		JCB MPL Grease	Lithium based, No. 2 consistency.

WARNING

JCB Slew Pinion Grease is harmful. It contains bitumen compounds 2811 with possible risks of irreversible effects. Excessive contact may lead to dermatitis or skin cancer. Always use a barrier cream or wear gloves. Wash contaminated skin thoroughly with soap and water. In the event of contact with the eye, immediately wash with plenty of water and seek medical advice.

ENGINE LUBRICATION CHART



TORQUE SETTINGS

Only use following when no setting is specified in text of manual.

CAUTION: All bolts used on JCB equipment are high tensile and must not under any circumstances be replaced with bolts of a lesser tensile specification.

Metric Grade 8.8 Bolts

Bolt Size	(mm)	Hexagon (A/F) mm	Torque Settings		
			Nm	kgf m	lbf ft
M5	(5)	8	7	0.7	5
M6	(6)	10	12	1.2	9
M8	(8)	13	28	3.0	21
M10	(10)	17	56	5.7	42
M12	(12)	19	98	10	72
M16	(16)	24	244	25	180
M20	(20)	30	476	48	352
M24	(24)	36	822	84	607
M30	(30)	46	1633	166	1205
M36	(36)	55	2854	291	2105

TABLE OF IMPORTANT TIGHTENING TORQUES

Tightening Points

Tightening Points	Tightening Torque		
	Nm	kgf m	lbf ft
*Track motor to undercarriage	113	11.5	83
Retaining bolts	250	25.5	184
Track roller	244	25	180
Idler yoke	98	10	72
Rotary coupling mounting	56	5.7	41
Rotary coupling torque arm	35	3.6	26
Slew ring	120	12.3	89
Slew gearbox case	244	25	180
Hydraulic oil tank	56	5.7	41
Fuel tank	56	5.7	41
Hydraulic filter cover	28	3.0	21
Rod end - controls	56	5.7	41
Silencer bolt	28	3.0	21
Exhaust tail pipe	56	5.7	41
Engine shock absorber (to slew frame)	56	5.7	41
Engine shock absorber (to engine)	98	10	72
Engine bracket	118	12	87
Engine support (to bell housing)	98	10	72
Counterweight	98	10	72
Track gearbox cover	56	5.7	41
*Slew ring to superstructure (803)	100	10.2	74
*Slew ring to superstructure (804)	160	16.3	118

Dipper Ram

Gland nut	300-350	30.6-35.7	240
Piston	700-750	71.4-76.5	535
Set screw	20-25	2.0-2.6	17

Bucket Ram

Gland nut	320-370	32.6-37.8	258
Piston	1100-1200	112-122	848
Set screw	20-25	2.0-2.6	17

Boom and Swing Rams

Gland nut	320-370	32.6-37.8	258
Piston	700-750	71.4-76.5	535
Set screw	20-25	2.0-2.6	17

Dozer Ram

Gland nut	350-400	35.7-41	277
Piston	1100-1200	112-122	848
Set screw	20-25	2.0-2.6	17

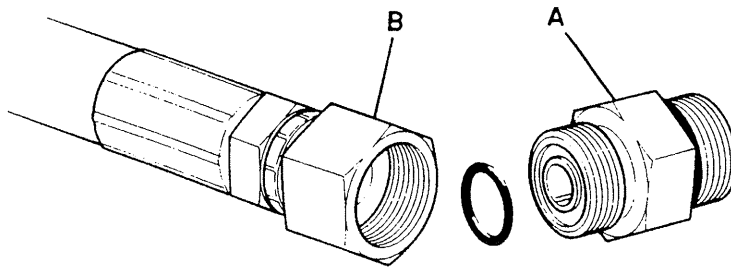
TABLE OF IMPORTANT TIGHTENING TORQUES (cont'd)
Tightening Points
Tightening Torque

	Nm	kgf m	lbf ft
Valve Block			
Tie rod (large diameter)	45	4.6	33
Tie rod (small diameter)	19	2.0	14
Spool spring retainer	TBA	TBA	TBA
End cap screw	7	0.7	5
Servo retaining cap screws	TBA	TBA	TBA
Slew Motor			
Brake valve plug (10 AF hex key)	78-88	4.6	33
Brake valve plug (32 AF hex key)	118-137	12-14	87-101
Relief valve plug	78-80	8.0-9.0	57-56
Check valve plug	24-29	2.5-3.0	18-21
Cap screws	58-69	5.9-7.0	43-51
Track Motor			
Motor to undercarriage bolts	98	10	72
Drive sprocket to motor bolts	98	10	72
Pump			
Drive coupling	54	5.5	40
Tie bolts (main)	43-46	4.4-4.7	32-34
Tie bolts (servo)	24-27	2.4-2.8	18-20
Engine			
Bearing holder bolts	49-54	5.0-5.5	36-40
Rear plate Bolts	13-18	1.4-2.4	10-13
Flywheel Housing bolts	24-28	2.5-2.9	18-21
Flywheel bolts	58-68	6.0-7.0	43-51
Connecting rod nuts	49-54	5.0-5.5	36-40
Oil suction filter bolts	9-12	1.0-1.2	7-9
Sump bolts	9-12	1.0-1.2	7-9
Crankshaft pulley nut	275-333	28-46	203-246
Cylinder head bolts (oiled)	88-93	9.0-9.5	65-69
Injection pump bolts	9-12	1.0-1.2	7-9
Injection pump nuts	9-12	1.0-1.2	7-9
Rocker arm nuts	20-24	2.0-2.5	14.5-18.1
Head cover nuts	8-12	0.8-1.2	6-9
Cooling fan bolts	9-12	1.0-1.2	7-9
Oil pipe banjo bolt	10-13	1.0-1.3	7.2-9.4
Oil sump drain bolt	30-39	3.1-4.0	22-29
Injector nozzle	59-69	6.0-7.0	44-51
Injector nozzle clamp	20-24	2.0-2.5	14.5-18.1
Injector pipe	15-24	1.5-2.5	11-18
Thermo switch	26-30	2.6-3.1	19-22
Oil pressure switch	15-20	1.5-2.0	11-15
Glow plug	15-20	1.5-2.0	11-15
Stop solenoid	15-20	1.5-2.0	11-15
Oil relief valve	57-69	6.0-7.0	44-51
Adjusting screw nut	6-16	1.0-1.6	7-12

HYDRAULIC FITTINGS & TORQUE SETTINGS

O-ring Face Seal

All the hydraulic fittings on the JCB 803 Tracked Excavator use the O-ring face seal system which achieves a leak-proof, non loosening connection.



Adapters screwed to valve blocks etc. seal onto an O-ring which is compressed into a 45° seat machined in the face of the tapped port.

ADAPTER (A)

SAE Tube Size	SAE Port Thread Size	A/F		Tightening Torque	
		mm	in	Nm	lbf ft
4	7/16 - 20	15.9	0.625	20 - 28	16.5 - 18.5
6	9/16 - 18	19.1	0.750	46 - 54	34 - 40
8	3/4 - 16	22.2	0.875	95 - 105	69 - 77
10	7/8 - 14	27.0	1.063	130 - 140	96 - 104
12	1.1/16 - 12	31.8	1.250	190 - 210	141 - 155
16	1.5/16 - 12	38.1	1.500	290 - 310	216 - 230
20	1.5/8 - 12	47.6	1.875	280 - 380	210 - 280

OUTER SLEEVE NUT (B)

SAE Tube Size	Hose/pipe Thread Size	A/F		Tightening Torque	
		mm	in	Nm	lbf ft
4	9/16 - 18	17.5	0.688	20 - 30	15 - 21
6	11/16 - 16	20.6	0.813	31 - 39	23 - 29
8	13/16 - 16	23.8	0.937	45 - 55	33 - 41
10	1 - 14	28.6	1.125	80 - 90	59 - 67
12	1.3/16 - 12	35.0	1.375	105 - 125	77 - 93
16	1.7/16 - 12	41.5	1.625	155 - 175	114 - 130

FUEL SYSTEM

Types of Fuel

Use good quality diesel fuel to get the correct power and performance from your engine. The recommended fuel specification for Perkins engines is given below.

Cetane Number:	45(minimum)
Viscosity:	2.5/4.5 centistokes at 40°C(104°F)
Density:	0.835/0.855 kg/litre (0.872/0.904 lb/pint)
Sulphur:	0.5% of mass (maximum)
Distillation:	85% at 350°C (662°F)

Cetane Number

Indicates ignition performance. Fuel with a low cetane number can cause cold start problems and affect combustion

Viscosity

Is the resistance to flow. If this is outside limits, the engine performance can be affected.

Density

Lower power will reduce engine power. Higher density will increase both engine power and exhaust smoke.

Sulphur

High sulphur content can cause engine wear, (High sulphur fuel is not normally found in North America, Europe or Australia). If you have to use high sulphur fuel you must also use a highly alkaline engine lubricating oil: or change the normal oil more frequently.

Distillation

This indicates the mixture of different hydrocarbons in the fuel. A high ratio of lightweight hydrocarbons can affect the combustion characteristics.

Fuel Standards

Consult your fuel supplier, JCB distributor or Perkins dealer about the suitability of any fuel you are unsure of.

Low Temperature Fuels

Special winter fuels may be available for engine operation at temperatures below 0°C (32°F). These fuels have a lower viscosity. They also limit wax formation in the fuel at low temperatures. (*Wax forming in the fuel can stop the fuel flowing through the filter.*)

Flow improvers may also be available. These can be added to the fuel to reduce wax formation.

Petrol



WARNING

Do not use petrol in this machine. Do not mix petrol with the diesel fuel. In storage tanks the petrol could rise to the top and form flammable vapours.

INT3-1-6

Advice

If you have to use non-standard fuels, contact your JCB distributor for advice on engine adjustments and oil change periods.



WARNING

Diesel fuel is flammable; keep naked flames away from the machine. Do not smoke while refuelling the machine or working on the engine. Do not refuel with the engine running. There could be a fire and injury if you do not follow these precautions

INT3-2-2

COOLANT MIXTURES

The protection provided by JCB Universal Anti-freeze is shown below. If any other anti-freeze is used, refer to the manufacturers' instructions and ensure that a corrosion inhibitor is included.

DO NOT use solutions of more than 60% or less than 50% or damage to the cooling system will occur.

Solution	Maintains circulation down to		Protects against damage down to	
	deg C	deg F	deg C	deg F
55%	-36	-33	-41	-42

The strength of the anti-freeze solution must be checked at least once a year, preferably at the beginning of the cold period.

It is an advantage to leave the anti-freeze in all the year round as it gives continued protection against corrosion. Always renew the anti-freeze every two years.

A 50% anti-freeze mixture must be used even if frost protection is not needed. This gives protection against corrosion and raises the coolant's boiling point.

Note: *In climates where anti-freeze is not necessary, a reputable inhibitor must be used. Renew the mixture every 6 months.*



WARNING

Anti-freeze can be harmful. Obey the manufacturers instructions when handling neat or diluted anti-freeze.

7-344

SERVICE SCHEDULES**EVERY 10 OPERATING HOURS OR DAILY
whichever occurs first****Clean**

- 1 Machine generally

Check and adjust where necessary (engine stopped)

- 2 Generally for damage
- 3 Hydraulic oil level
- 4 Engine oil level
- 5 Engine coolant
- 6 Fuel system for leaks
- 7 Engine air filter pre-cleaner
- 8 Track adjustment

Check and adjust where necessary (engine running)

- 9 Operation of horn
- 10 Operation of all other electrical equipment
- 11 Exhaust (excessive smoke)
- 12 Dozer operation
- 13 Excavator operation
- 14 Track and running gear operation
- 15 Hourmeter operation

**EVERY 50 OPERATING HOURS OR WEEKLY
whichever occurs first**

Do the daily jobs plus:

Clean

- 1 Drain and clean fuel filter
- 2 Drain fuel sediment bowl
- 3 Radiator matrix

Check and adjust where necessary (engine stopped)

- 4 Fan belt adjustment

Note: Failure to maintain correct fan belt adjustment can result in damage to timing case cover.

***FIRST 100 HOURS ONLY**

Do the jobs listed in 50 hours (above) plus:

Change

- 1 Engine oil and filter canister
- 2 Slew gearbox oil (802.7 M747001 on, 803 M666001 on, 803 M765001-765027 & 804 M734001 on)

Check

- 3 Track tension (rubber tracks only)

**EVERY 100 OPERATING HOURS OR 2 WEEKS
whichever occurs first**

Do the daily jobs through to 50 hours plus:

Clean

- 1 Battery terminals

Check and adjust where necessary (engine stopped)

- 2 Hose and pipework for security and damage
- 3 Condition of ram piston rods
- 4 All grease seals
- 5 Track, plate condition/rubber condition
- 6 Engine mounting bolts
- 7 Air cleaner hose security
- 8 Wiring for damage
- 9 Track tension

FIRST 250 OPERATING HOURS ONLY

Do the daily jobs through to 100 hours plus:

Change

- 1 Track gearbox oil

***Check**

- 2 Kingpost pivot pins retaining bolt torque.

**EVERY 250 OPERATING HOURS OR MONTHLY
whichever occurs first**

Do the daily jobs through to 100 hours plus:

Change

- 1 Engine oil
- 2 Engine oil filter canister

Grease

- 3 Slew ring grease nipples

**EVERY 500 OPERATING HOURS OR 6 MONTHS
whichever occurs first**

Do the daily jobs through to 250 hours plus:

Clean

- 1 Fuel lift pump

Change

- 2 Fuel filter element
- 3 Hydraulic fluid return filter element
- 4 Outer air cleaner element (very dusty conditions only)

**Check and adjust where necessary
(engine stopped)**

- 5 Exhaust system security
- 6 Slew gearbox oil levels
- 7 Track gearbox oil levels
- 8 Injectors and test
- 9 Tighten cylinder head
- 10 Valve clearances
- 11 Engine mounting bolts

**Check and adjust where necessary
(engine running)**

- 12 Main relief valve pressure
- 13 Auxiliary relief valve pressure
- 14 Slew crossline relief valve
- 15 Engine idle speed
- 16 Engine maximum speed

**EVERY 1000 OPERATING HOURS OR YEARLY
whichever occurs first**

Do the daily jobs through to 500 hours plus:

Clean

- 1 Air filter dust valve

Change

- 2 Air filter element (outer)
- 3 Track gearbox oil
- 4 Slew gearbox oil (802.7 M747001 on, 803 M666001 on, 803 M765001-7650025 & 804 M734001 on)

Check

- *5 Cab frame
- *6 Check security of all major component mounting bolts, gearboxes, slew motor, track motors, rotary joint etc.

Grease

- *7 Slew pinion and slew ring

**EVERY 2000 OPERATING HOURS OR 2 YEARS
whichever occurs first**

Do the daily jobs through to 1000 hours plus:

Change

- 1 Air cleaner element (inner)
- 2 Hydraulic fluid and clean suction strainer
- 3 Engine coolant
- *4 Idler wheel and track rollers, oil and seals

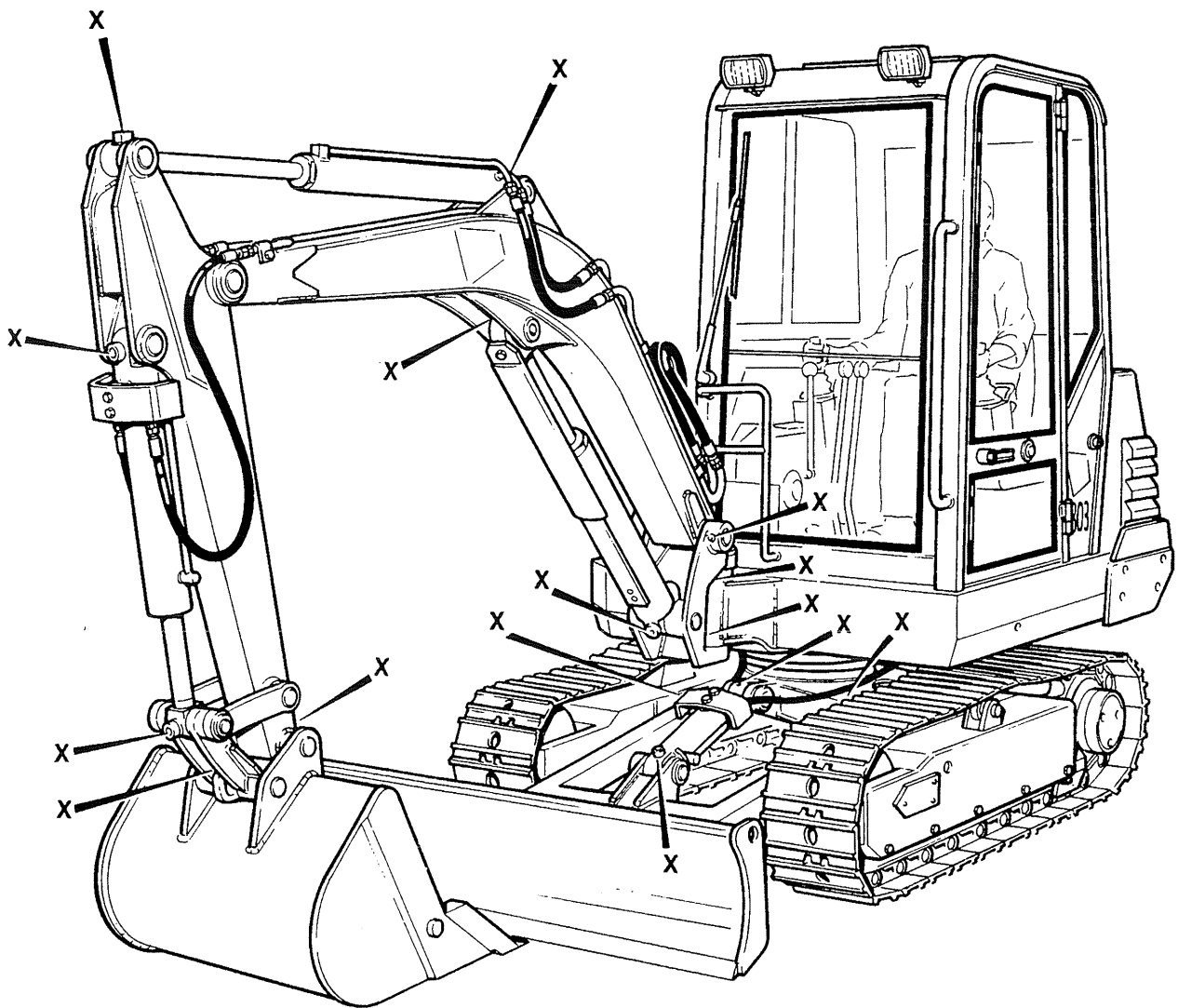
Check (engine stopped)

- *5 Battery electrolyte level (low maintenance)
- *6 Starter motor and alternator brush gear
- *7 Valve clearance and lubrication

GREASING

Daily

Normally two strokes of the grease gun should be sufficient.
Stop greasing when fresh grease appears at the joint.



GREASING (cont'd)

Every 250 Hours

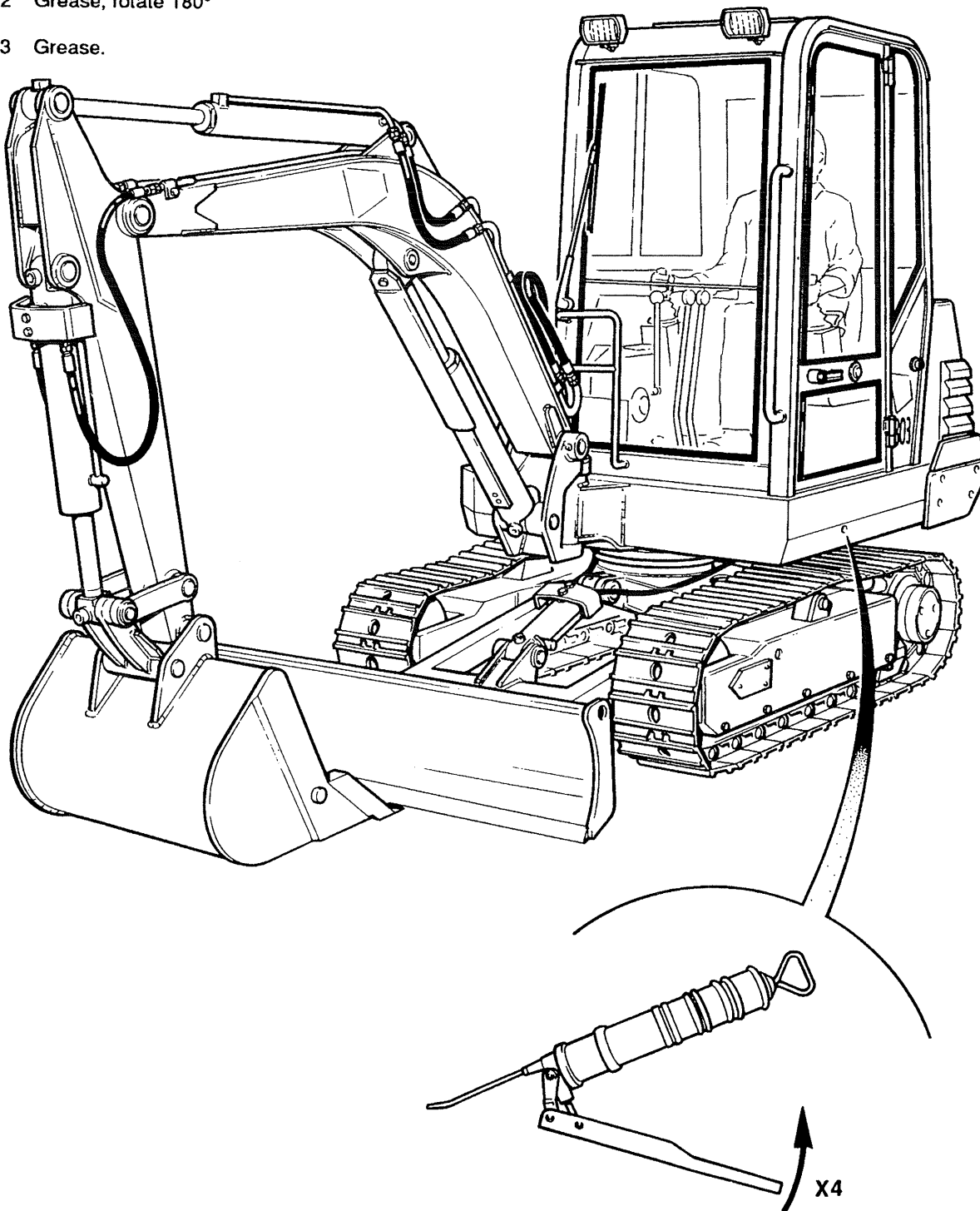
Slew Ring Bearings

Ensure the slew ring is kept full of grease.

Grease point on left hand side of mainframe.

To ensure distribution of grease, use the following procedure:

- 1 Grease, rotate 180°
- 2 Grease, rotate 180°
- 3 Grease.



GREASING (cont'd)**Every 1000 Hours****Slew Ring Gear Teeth****⚠ WARNING**

JCB Slew Pinion Grease is harmful as it contains bitumen compounds 2811. Excessive contact may lead to dermatitis or skin cancer. Always use a barrier cream or wear gloves; wash contaminated skin thoroughly with soap and water. In the event of eye contact, immediately wash with plenty of water and seek medical advice.

8-1-1-2

⚠ WARNING

A machine can sink into soft ground. Never work under a machine on soft ground.

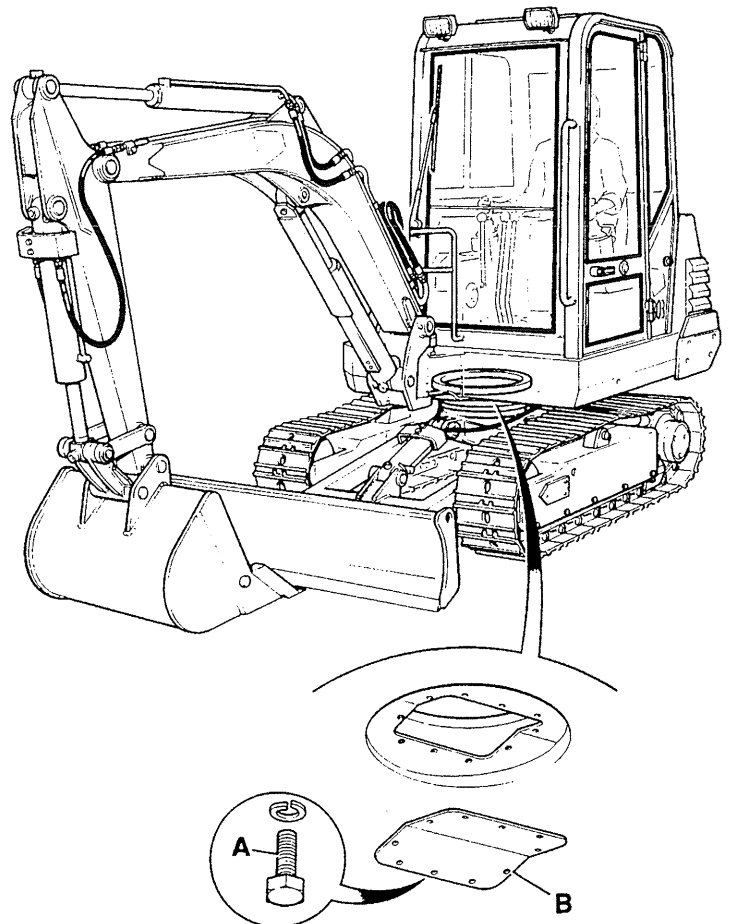
INT-3-2-4

⚠ WARNING

A machine can roll off jacks and crush you. Do not work under a machine supported only by jacks.

MD-1-6-1

- 1 Raise machine and support the undercarriage.
- 2 Stop the engine and remove the starter key.
- 3 Remove the bolts **A** and plate **B** in the underside of the undercarriage.
- 4 Apply the grease to the pinion using an applicator.
- 5 Insert the starter key and start the engine.
- 6 Rotate the main frame twice fully.
- 7 Stop the engine and remove the starter key.
- 8 Repeat step 4 as necessary.
- 9 Refit the plate **B** and bolts **A**.
- 10 Put the machine back on the ground.



TECHNICAL DATA

Pump Type 803 to M665736

Hydraulic quadruple gear type, driven directly from the engine crankshaft.

Pump Flow Rates

At 2600 engine rev/min. and at M.R.V. Pressure

Section P1 at 172bar (2500lbf/in ²).	New 14.98 litres/min. (3.3 UK gal/min. 3.96 US gal/min.) Service Limit 14.04 litres/min. (3.0 UK gal/min. 3.6 US gal/min.)
Section P2 & P3 at 207bar (3000lbf/in ²).	New 27.46 litres/min. (6.0 UK gal/min. 7.2 US gal/min.) Service Limit 25.74 litres/min (5.5 UK gal/min. 6.6 US gal/min.)
Section P4 at 34.5bar (500lbf/in ²).	New 3.04 litres/min (0.7 UK gal/min. 0.84 US gal/min.) Service Limit 2.85 litres/min (0.6 UK gal/min. 0.72 US gal/min.)

***Pump Type 802.7 M747001 on, 803 M666001 on & 803 M765001 on**

Hydraulic triple gear type, driven directly from the engine crankshaft.

***Pump Flow Rates 802.7 M747001 on**

2600 engine rev/min. and at M.R.V. pressure

Section P1 at 172bar (2500lbf/in ²).	New 12.3 litres/min (2.7 UK gal/min. 3.25 US gal/min.) Service Limit 11.5 litres/min (2.5 UK gal/min. 3.0 US gal/min.)
Section P2 & P3 at 207bar (3000lbf/in ²).	New 19.2 litres/min. (4.2 UK gal/min.5.0 US gal/min.) Service Limit 18.0 litres/min (4.0 UK gal/min.4.8 US gal/min.)

***Pump Flow Rates 803 M666001 on & 803 M765001 on**

2600 engine rev/min. and at M.R.V. pressure

Section P1 at 172bar (2500lbf/in ²).	New 17.47 litres/min (3.8 UK gal/min. 4.6 US gal/min.) Service Limit 16.38 litres/min (3.6 UK gal/min.4.3 US gal/min.)
Section P2 & P3 at 207bar (3000lbf/in ²).	New 27.46 litres/min. (6.0 UK gal/min. 7.2 US gal/min.) Service Limit 25.74 litres/min (5.5 UK gal/min.6.6 US gal/min.)

Pump Type 804 M734001 on

Single variable displacement piston type with two equal outlet flows in tandem with single gear type, driven directly from the engine crankshaft.

***Pump Flow Rates 804 M734001 on**

At 2500 engine rev/min.

PRESSURE		PUMP P1			PUMP P2 & P3		
Bar	lbf/in ²	l/min	UK gal/min	US gal/min	l/min	UK gal/min	US gal/min.
0	0	22	4.8	5.8	35	8.0	9.6
100	1500	22	4.8	5.8	34	7.5	9.0
150	2200	22	4.8	5.8	32	7.0	8.4
180	2600	21	4.6	5.5	31	6.8	8.2
200	2900	21	4.6	5.5	28	6.0	7.2
220	3200	-	-	-	26	5.7	6.8

**Relief Valve Operating Pressures
All Machines**

	803 to M665736			*802.7 M747001 on/ 803 M666001 on *803 M765001 on			804 M734001 on		
	bar	kgf/cm ²	lbf/in ²	bar	kgf/cm ²	lbf/in ²	bar	kgf/cm ²	lbf/in ²
Main Relief Valves (M.R.V.)									
-Swing/Slew/Dozer/Auxiliary	172	176	2500	172	176	2500	150	153	2175
-Tracks/Dipper/Boom/Bucket (Upper setting 803 m/c's only)	207	211	3000	207	211	3000	207	211	3000
(Lower setting 803 m/c's only)	175	180	2550	175	180	2550			
*Servo Pressures									
-Servo Pressure Relief Valve	34.5	35	500	41.5-44.5	42-45	600-645	41.5-44.5	42-45	600-645
-Pressure Maintenance	-	-	-	30-33	30-33	435-475	30-33	30-33	435/475
Auxiliary Relief Valves (A.R.V.)									
-Boom rod and head side	248	256	3600	248	256	3600	248	256	3600
-Dipper rod and head side	248	256	3600	248	256	3600	248	256	3600
-Dozer	200	204	2900	200	204	2900	200	204	2900
-Attachments	172	176	2500	172	176	2500	140	143	2030
Cross Line Relief Valves									
-Slew	170	173	2450	170	173	2450	140	143	2030
-Slew Start Up Pressure	-	-	-	70	70	1000	70	70	1000

1 - 2

1 - 2

Rams

	803						804					
	Bore		Rod Dia		Stroke		Bore		Rod Dia		Stroke	
	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
-Boom	80	3.15	40	1.57	465	18.31	90	3.54	45	1.77	475	18.7
-Dipper	70	2.76	40	1.57	570	22.44	75	2.95	45	1.77	645	25.39
-Bucket	75	2.95	50	1.97	374	14.72	80	3.15	50	1.97	374	14.72
-Swing	80	3.15	40	1.57	520	20.47	80	3.15	40	1.57	520	20.47
-Dozer	90	3.54	45	1.77	165	6.50	90	3.54	45	1.77	165	6.50

Motors*802.7****803****804****Track**

-Maximum tractive effort	2108 Nm	2930 Nm (16630 lbf ft)	3501Nm (20246 lbf ft)
-Motor displacement	26.6/11.1cc per rev	30.6/16.6cc per rev	30.6/16.6cc per rev
-Final displacement	752/405cc/rev	1019/553cc/rev	1242/574cc/rev
-Weight	T.B.A.	47 kg (104 lb)	47 kg (104 lb)
-Ratio	36 : 1	33 : 1	40.6 : 1
*Slew	Piston Motor 803 to M665736 Concentric gear 802.7 M747001 on, 803 M666001 on & 804 Piston Motor 803 M765028 on		Concentric gear

Filtration

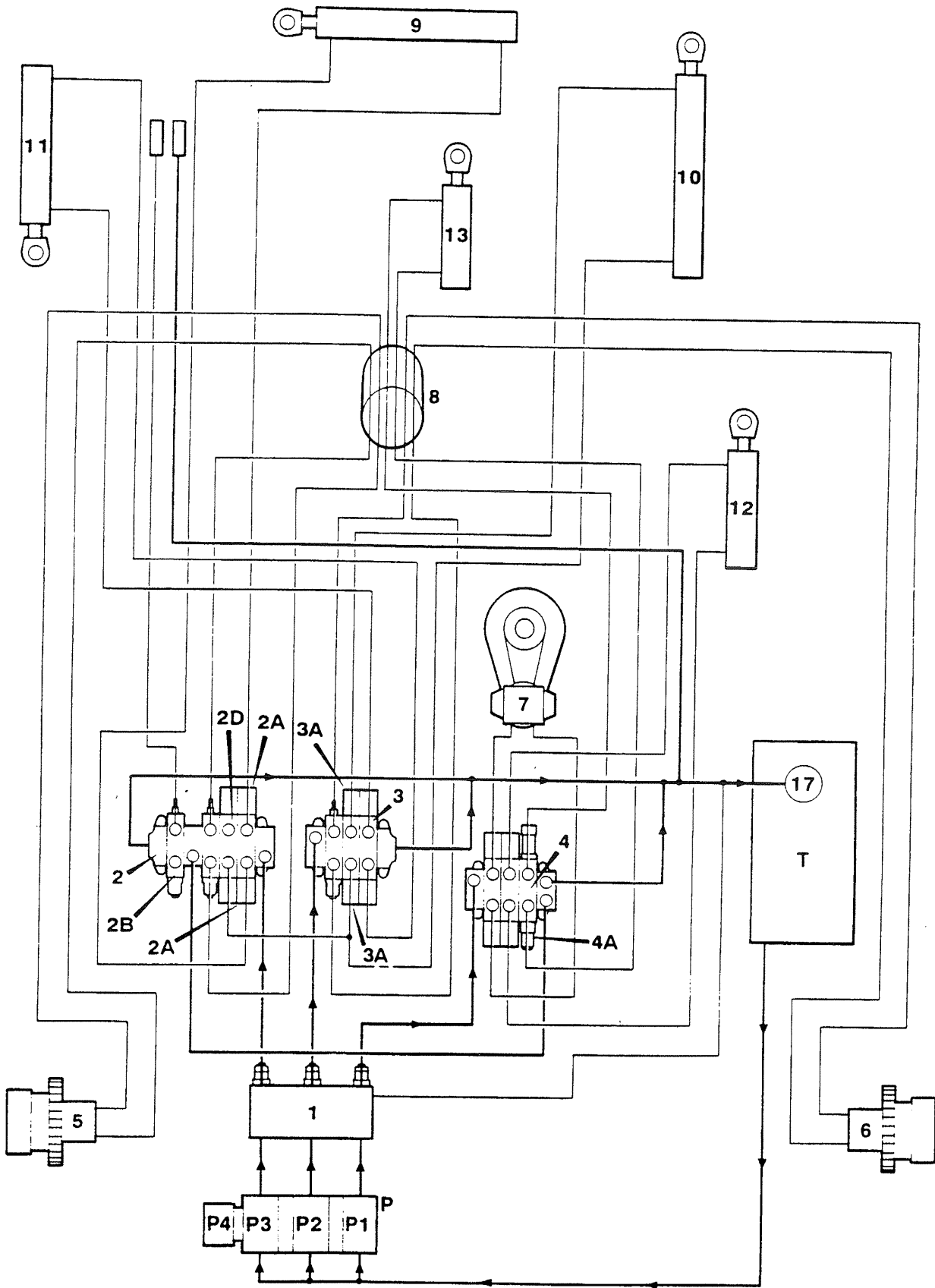
-Main Bypass pressure	1.5 bar (22 lbf/in ²)	1.5 bar (22 lbf/in ²)
-Servo Bypass pressure	2.0 bar (29 lbf/in ²) to M665736	

***Hydraulic System Capacities**

	Tank	System
803 M665001 to M666704	90 litres (20 UK Gal 24 US Gal)	105 litres (23 UK Gal 27.6 US Gal)
804 to M734085	90 litres (20 UK Gal 24 US Gal)	105 litres (23 UK Gal 27.6 US Gal)
802.7 M747001 on	62 litres (14 UK Gal 16.8 US Gal)	77 litres (17 UK Gal 20.4 US Gal)
803 M666705 on	62 litres (14 UK Gal 16.8 US Gal)	77 litres (17 UK Gal 20.4 US Gal)
803 M765001 on	62 litres (14 UK Gal 16.8 US Gal)	77 litres (17 UK Gal 20.4 US Gal)
804 M734086 on	62 litres (14 UK Gal 16.8 US Gal)	77 litres (17 UK Gal 20.4 US Gal)

HYDRAULIC CIRCUIT (SCHEMATIC)***803 Machines to M665736****Component Key**

P1	Pump Section 1	20	Accumulator (to M665143)
P2	Pump Section 2	21	Solenoid Lock Valve
P3	Pump Section 3	22	High Pressure Carry Over (HPCO) M666001 on
P4	Pump Section 4 to M665736	23	Servo Pressure Maintenance Valve Block M666001 on
T	Tank	23A	Pressure Maintenance Valve M666001 on
E	Engine	24	Oil Cooler M666001 on
1	Main Relief Valve Test Block		
1A	Swing/Slew Dozer Main Relief Valve		
1B	Digging and Tracking Main Relief Valve		
1C	Servo Main Relief Valve		
1D	Pressure Reducing Valve		
1E	By-pass Filter		
1F	Non-return Valves		
1G	Gauge Connection Points		
2	Valve Block		
2A	Auxiliary Relief Valves		
2B	Auxiliary Spool		
2C	Track Spool to M665736		
2D	Boom Boost Spool		
2E	Dipper Spool		
2F	Non-return Valves		
2G	Auxiliary Couplings (Double Acting)		
2H	Auxiliary Couplings (Single Acting)		
3	Valve Block		
3A	Auxiliary Relief Valves		
3B	Track Spool		
3C	Boom Spool		
3D	Bucket Spool		
3E	Non-return Valves		
3F	Restrictor		
4	Valve Block to M665736		
4A	Auxiliary Relief Valves to M665736		
4B	Slew Spool		
4C	Swing Spool		
4D	Dozer Spool		
4E	Non-return Valves to 665736		
5	L.H. Track Motor		
5A	Counterbalance Valve		
6	R.H. Track Motor		
6A	Counterbalance Valve		
7	Slew Motor		
7A	Brake Valve		
8	Rotary Coupling		
9	Dipper Ram		
10	Boom Ram		
11	Bucket Ram		
12	Swing Ram		
13	Dozer Ram		
14	R.H. Servo Hand Controller		
14A	Boom Control		
14B	Bucket Control		
14C	Check Valves (Standard setup)		
15	L.H. Servo Hand Controller		
15A	Swing / Slew Control		
15B	Dipper Control		
16	Dual Solenoid Valve		
17	Return Filter		
18	Suction Strainer		
19	High Speed Selector		



HYDRAULIC CIRCUIT *803 to M665736

The 2.8 Tonne mini-excavator hydraulic circuit is fed from a 90 litre (20 UK gal) capacity tank T, located to the right of the operator's cab.

The system is powered by a four section gear pump P, connected directly to the engine crankshaft.

When the engine is running, the pump draws fluid from the tank and routes it through a main relief valve test block 1, valve blocks comprising three individual control valves 2, 3, and 4 that provide ten service sections.

Pump section P1 supplies the control valve sections for:

- Dozer ram, 13
- Swing ram, 12
- Slew motor, 7

Pump section P2 supplies the control valve sections for:

- Right hand track motor, 6
- Boom ram, 10
- Bucket ram, 11

Pump section P3 supplies the control valve sections for:

- Left hand track motor, 5
- Dipper ram, 9
- Boom boost, 2D

A fourth section 2B (auxiliary) supplied by P3 is fitted with single acting pipework supplying 44 litres/min. to the excavator end.

Pump section P4 supplies the servo circuit for:

- Accumulator (Not fitted after M665143)
- Servo hand controllers
- High speed track selector

The supply line to the high speed track and servo hand controllers is via a solenoid lock valve.

The relief valve test block 1, houses the main relief valves, pressure reducing valve and check valves. Connections on the block allow the attachment of pressure gauges to permit the setting of the main relief valves.

Main relief valves (M.R.V.) fitted in the valve test block on the inlet sections to the control valves are set to open at P1, 172 bar (2500 lbf/in²). P2 and P3 have a dual setting of 207 bar (3000 lbf/in²) and 174 bar (2550 lbf/in²) depending on the hydraulic load on the engine. The valves vent excess pressure to tank T.

The M.R.V. on section P4 is set to open at 34.5 bar (500 lbf/in²).

Auxiliary relief valves (A.R.V.) 2A, 3A, and 4A are fitted to protect the service line on the dipper, boom and the head side only on the dozer ram from damage that might be generated through over-pressure conditions during operation. The A.R.V.'s are set to operate at the following pressures:

- Auxiliary service A.R.V.'s - 172 bar (2500 lbf/in²)
- Dipper ram A.R.V.'s - 248 bar (3600 lbf/in²)
- Boom ram A.R.V.'s - 248 bar (3600 lbf/in²)
- Dozer ram A.R.V.'s - 200 bar (2900 lbf/in²)

When the A.R.V.'s are open, over pressure fluid is routed to the control valve exhaust chamber and back to tank T.

The service lines to the dozer ram, the track motors and the pilot line from the high speed selector to the track motors are routed through a rotary coupling 8. This device allows the machine upper structure to turn without damaging hoses connected to services mounted on the undercarriage.

The remaining service lines connect directly to their relevant devices. Return fluid from services or from the neutral pressure circuit is routed back to tank through an exhaust line and return filter 17.

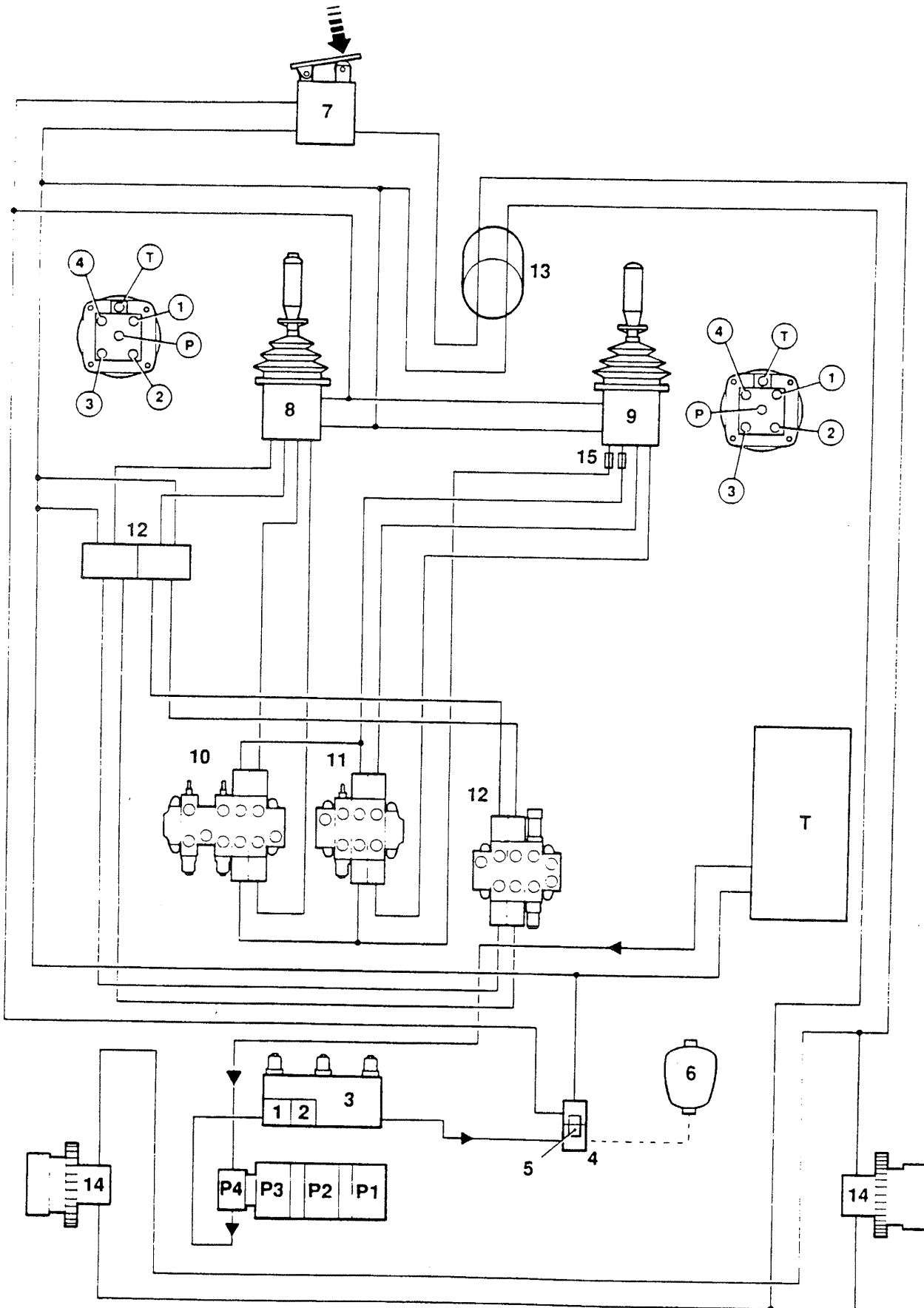
NEUTRAL PRESSURE CIRCUIT

With the engine running, but no service selected, the machine's neutral hydraulic circuit operates and fluid is routed through pump sections P1, P2 and P3 to valve inlet hoses via the relief valve test block 1.

The valve spools are spring loaded to the centre position, allowing fluid to pass through the valve's central flow path and returned to tank through the return line.

Spools in the slew and in the track valve sections allow return fluid to enter the motor valve's operating path. This fluid is routed through the motor's counterbalance valves set in neutral position, to the relevant motor. As equal pressure is applied to each side of the motor no rotation takes place.

Excess pressure in the selected circuit opens the M.R.V. associated with the valve section supplied and vents excess pressure back to tank T.



HYDRAULIC CIRCUIT (SCHEMATIC)**802.7 Machines****Component Key**

P1	Pump Section 1	14	R.H. Servo Hand Controller
P2	Pump Section 2	14A	Boom Control
P3	Pump Section 3	14B	Bucket Control
T	Tank	14C	Check Valves (Standard setup)
E	Engine	15	L.H. Servo Hand Controller
1	Main Relief Valve	15A	Swing / Slew Control
1A	Swing/Slew/Dozer Main Relief Valve	15B	Dipper Control
1C	Servo Main Relief Valve	16	Dual Solenoid Slew/Swing Changeover Valve
1G	Gauge Connection Point	17	Return Filter
2	Valve Block	18	Suction Strainer
2A	Auxiliary Relief Valves	19	High Speed Selector
2B	R.H. Track Spool	20	Accumulator
2C	L.H. Track Spool	21	Solenoid Lock Valve
2D	Boom Boost Spool	22	High Pressure Carry Over (HPCO)
2E	Dipper Spool	23	Servo Pressure Maintenance Valve Block
2F	Non-return Valve	23A	Pressure Maintenance Valve
2G	Auxiliary Couplings (Double Acting)	23B	Restrictor
2H	Auxiliary Couplings (Single Acting)	24	Oil Cooler
3	Valve Block		
3A	Auxiliary Relief Valve		
3B	Auxiliary Spool		
3C	Boom Spool		
3D	Bucket Spool		
3E	Anti-cavitation Valve		
3F	Restrictor		
4B	Swing Spool		
4C	Slew Spool		
4D	Dozer Spool		
5	L.H. Track Motor		
5A	Counterbalance Valve		
5B	High Speed Tracking Valve		
6	R.H. Track Motor		
6A	Counterbalance Valve		
6B	High Speed Tracking Valve		
7	Slew Motor		
7A	Brake Valve		
8	Rotary Coupling		
9	Dipper Ram		
10	Boom Ram		
11	Bucket Ram		
12	Swing Ram		
13	Dozer Ram		

*The 2.7 Tonne mini-excavator hydraulic circuit is fed from an hydraulic tank **T**, located to the right of the operator's cab.

The system is powered by a three gear pumps **P** connected to the engine crankshaft. The supply from the pump is divided into two equal flows **P2** & **P3**. Pump **P1** is a smaller gear pump supplying the servo system, the slew, swing and dozer circuits and the auxiliary service circuit.

When the engine is running, the three pump sections **P1/P2** and **P3** draw fluid from the tank **T**. Oil from sections **P2** and **P3** is routed through the centre inlet section of the six section control valve block **1**, a high pressure carry over (H.P.C.O.) hose **22** allows oil to flow from the six section valve block into the four section valve block **3** to supplement the supply to the auxiliary circuit, breaker/auger etc., along with flow from gear pump **P1**. Pump section **P1** is routed through a servo pressure maintenance valve block **23** and on into the inlet section of the four spool control valve block **2**.

Pump section **P1** supplies the control valve sections for:

- Dozer ram, **13**
- Swing ram, **12**
- Slew motor, **7**
- Servo hand controllers
- High speed track selector **19**

The supply line to the high speed track selector and servo hand controllers is via a solenoid lock valve **21**.

Pump section **P2** supplies the control valve sections for:

- Left hand track motor, **5**
- Dipper ram, **9**
- Boom boost, **2D**
- Auxiliary **2B** (supplied by **P1** & **P2** combined)

Pump section **P3** supplies the control valve sections for:

- Right hand track motor, **6**
- Boom ram, **10**
- Bucket ram, **11**

Main Relief Valves

The main relief valve (M.R.V.) for **P1** is located in the inlet section of the four spool valve block and is set to open at 150 bar (2170 lbf/in²). The main relief valve for **P2** is located at the rear of the centre inlet section, pump **P3**'s M.R.V. is located in the front of the centre inlet section of the six spool control valve block and both are set to open at 207 bar (3000 lbf/in²). The valves are designed to protect the pumps against overpressurisation when a selected service is stalled or a ram reaches the end of its travel. The M.R.V. opens to vent excess pressure to tank **T**. Connections to the pump pressure ports allow the attachment of pressure gauges to permit the setting of the main relief valves.

Auxiliary Relief Valves

Auxiliary relief valves (A.R.V.), are fitted to protect the dipper, boom and the head side only of the dozer ram from damage that might be generated through overpressure conditions during operation. The A.R.V.'s are set to operate at the following pressures:

- Auxiliary service A.R.V.'s - 172 bar (2500 lbf/in²)
- Dipper ram A.R.V.'s - 248 bar (3600 lbf/in²)
- Boom ram A.R.V.'s - 248 bar (3600 lbf/in²)
- Dozer ram A.R.V.'s - 200 bar (2900 lbf/in²)

When the A.R.V.'s are open, excess pressure is vented back to tank **T**.

The service lines to the dozer ram, the track motors and the pilot line from the high speed selector to the track motors are routed through a rotary coupling **8**. This device allows the machine upper structure to turn without damaging hoses connected to services mounted on the undercarriage.

The remaining service lines connect directly to their relevant devices. Return fluid from services or from the neutral circuit is routed back to tank through an exhaust line, cooler and return filter **17**.

NEUTRAL PRESSURE CIRCUIT

With the engine running, and no services selected oil flow from pumps **P1**, **P2**, and **P3** circulates through the valve blocks.

The valve spools are spring loaded to the centre neutral position allowing the hydraulic fluid to pass through their open centres and back to tank via an oil cooler **24** and filter **17**.

HYDRAULIC FLUID LEVEL

Check Level - For interval see Service Schedule.

! WARNING

Fine jets of hydraulic oil at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic oil leaks. Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leak and then inspect the cardboard for signs of hydraulic oil. If hydraulic oil penetrates your skin, get medical help immediately.

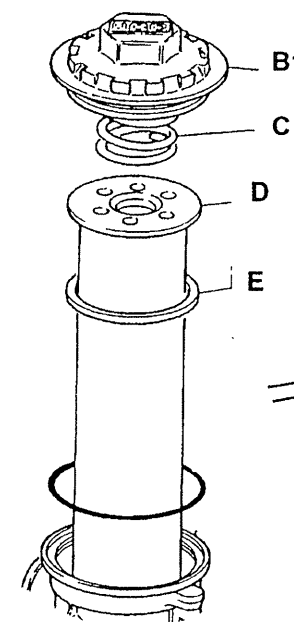
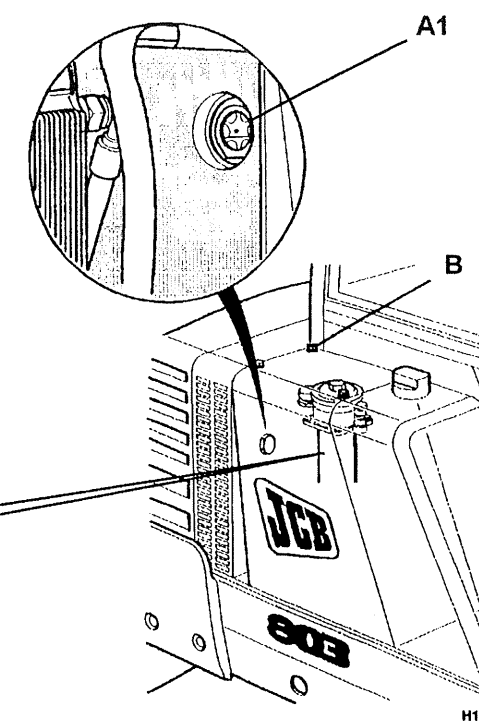
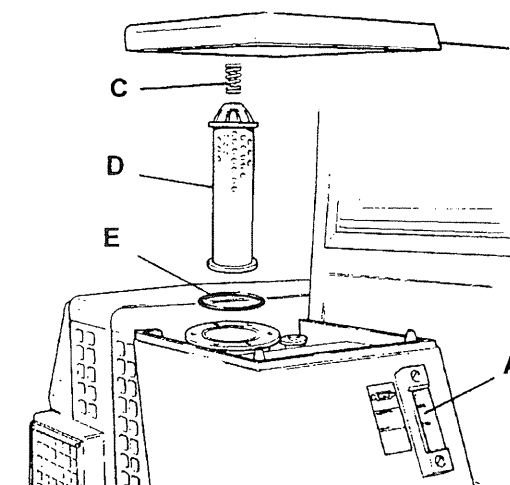
HYD-001

*Position the machine on firm level ground with the rams half extended. Check that the hydraulic level is to the correct mark **A** (803 to M667435 and 804) **A1** (803 M765001 on). Remove hydraulic tank cover, unscrew cap **B1** from return filter and top up tank as necessary. Replace cap and cover.

HYDRAULIC FILTER

Renew Filter - For interval see Service Schedule.

- 1 Remove hydraulic tank cover **B** (and filter cap **B1** 803 M765001 on).
- 2 Withdraw spring **C**, filter element **D** and seal **E** from body.
- 3 Clean all metal parts. Reassemble using new filter element **D** and seal **E**.
- 4 Replace and secure filler cap **B1** and hydraulic tank cover **B**.



H14340

HYDRAULIC CIRCUIT (SCHEMATIC) 804 machines

Component Key

P1	Pump Section 1	14	R.H. Servo Hand Controller
P2	Pump Section 2	14A	Boom Control
P3	Pump Section 3	14B	Bucket Control
T	Tank	14C	Check Valves (Standard setup)
E	Engine	15	L.H. Servo Hand Controller
1A	Swing/Slew/Dozer Main Relief Valve	15A	Swing / Slew Control
*1B	Excavator/Track M.R.V.	15B	Dipper Control
1C	Servo Main Relief Valve	*16	Dual Solenoid Valve Slew/Swing Changeover Valve
1G	Gauge Connection Point	17	Return Filter
2	Valve Block	18	Suction Strainer
2A	Auxiliary Relief Valve	19	High Speed Selector
*2B	RH Track Spool	20	Accumulator
*2C	LH Track Spool	21	Solenoid Lock Valve
2D	Boom Boost Spool	23	Servo Pressure Maintenance Valve Block
2E	Dipper Spool	23A	Pressure Maintenance Valve
2F	Non-return Valve	23B	Restrictor
2G	Auxiliary Couplings (Double Acting)	24	Oil Cooler
2H	Auxiliary Couplings (Single Acting)		
3	Valve Block		
3A	Auxiliary Relief Valve		
*3B	Auxiliary Spool		
3C	Boom Spool		
3D	Bucket Spool		
*3E	Anti-cavitation Valve		
3F	Restrictor		
*4B	Swing Spool		
*4C	Slew Spool		
4D	Dozer Spool		
5	L.H. Track Motor		
5A	Counterbalance Valve		
*5B	Two Speed Tracking Valve		
6	R.H. Track Motor		
6A	Counterbalance Valve		
*6B	Two Speed Tracking Valve		
7	Slew Motor		
7A	Brake Valve		
8	Rotary Coupling		
9	Dipper Ram		
10	Boom Ram		
11	Bucket Ram		
12	Swing Ram		
13	Dozer Ram		

*The 3.4 Tonne mini-excavator hydraulic circuit is fed from an hydraulic tank **T**, located to the right of the operator's cab.

The system is powered by a single piston pump **P** connected to the engine crankshaft. The supply from the pump is divided into two equal flows **P1** & **P2**. Pump **P3** is a gear pump attached to the back of the piston pump and driven by a common shaft.

When the engine is running, the pump sections **P1/ P2** and **P3** draw fluid from the tank **T**. Oil from sections **P2** and **P3** is routed through the centre inlet section of the six section control valve block **1**, a high pressure carry over (H.P.C.O.) hose **22** allows oil to flow from the six section valve block into the four section valve block **3** to supply the auxiliary circuit, breaker /auger etc., along with flow from gear pump **P3**. Pump section **P3** is routed through a servo pressure maintenance valve block **23** and on into the inlet section of the four spool control valve block.

Pump section **P1** supplies the control valve sections for:

- Right hand track motor, **6**
- Boom ram, **10**
- Bucket ram, **11**

Pump section **P2** supplies the control valve sections for:

- Left hand track motor, **5**
- Dipper ram, **9**
- Boom boost, **2D**
- Auxiliary **2B** (supplied by **P2** & **P3** combined)

Pump section **P3** supplies the control valve sections for:

- Dozer ram, **13**
- Swing ram, **12**
- Slew motor, **7**
- Servo hand controllers
- High speed track selector **19**

The supply line to the high speed track selector and servo hand controllers is via a solenoid lock valve **21**.

Main Relief Valves

The main relief valve for **P1** is located in the front of the centre inlet section of the six spool control valve block. The main relief valve for **P2** is located at the rear of the centre inlet section and both are set to open at 207 bar (3000 lbf/in²). **P3** is located in the inlet section of the four spool valve block and is set to open at 150 bar (2170 lbf/in²). The valves are designed to protect the pumps against over pressurisation when a selected service is stalled or a ram reaches the end of its travel. The M.R.V opens

to vent excess pressure to tank **T**. Connections to the pump outlet ports allow the attachment of pressure gauges to permit the setting of the main relief valves.

Auxiliary Relief Valves

Auxiliary relief valves (A.R.V.), are fitted to protect the dipper, boom and the head side only of the dozer ram from damage that might be generated through over-pressure conditions during operation. The A.R.V.'s are set to operate at the following pressures:

- Auxiliary service A.R.V.'s - 172 bar (2500 lbf/in²)
- Dipper ram A.R.V.'s - 248 bar (3600 lbf/in²)
- Boom ram A.R.V.'s - 248 bar (3600 lbf/in²)
- Dozer ram A.R.V.'s - 200 bar (2900 lbf/in²)

When the A.R.V.'s are open, excess pressure is vented back to tank **T**.

The service lines to the dozer ram, the track motors and the pilot line from the high speed selector to the track motors are routed through a rotary coupling **8**. This device allows the machine upper structure to turn without damaging hoses connected to services mounted on the undercarriage.

The remaining service lines connect directly to their relevant devices. Return fluid from services or from the neutral circuit is routed back to tank through an exhaust line, cooler and return filter **17**.

NEUTRAL PRESSURE CIRCUIT

With the engine running, and no services selected oil flow from pumps **P1**, **P2**, and **P3** circulates through the valve blocks.

The valve spools are spring loaded to the centre neutral position allowing the hydraulic fluid to pass through their open centres and back to tank via an oil cooler **24** and filter **17**.

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