EXCAVATOR LOADER

SERVICE MANUAL

2D, 2DS, 3, 3C, 3CS, 3D, 700

From machine serial number 55500

Preface

This volume is published mainly for the benefit of JCB Distributor Service Engineers, but copies are available from JCB Distributors to individual machine users.

The manual is compiled in sections, the first three of which are numbered and contain Care and Safety aspects of workshop procedure, Technical Data and Routine Maintenance. The remaining sections are alphabetically coded and deal with Dismantling, Overhaul etc., of specific components.

For Example:—

B = Body and Framework
E = Hydraulics

All sections are listed on the front cover, the bands of which coincide with divider cards for rapid reference. Each individual section also has its own Contents Page.

Removal, Replacement, Dismantling and Assembly procedures should be carried out in accordance with the sequences shown on the illustrations, paying particular attention to items noted in the text.

Where more detailed information is necessary, this is given in the text in the form of step by step instructions.

Left Hand and Right Hand, where used, are as viewed from the rear of the machine.

* Torque Settings in this Publication are given as 'mean' figures and may vary by 3% higher or lower.

Distributor copies of the manual will be continuously updated by the issue of Replacement Pages. These should be inserted at the appropriate place and the existing page (if any) withdrawn and discarded.

Where possible, revised information is indicated by an asterisk (*)against the item concerned, the page issue number in the bottom right hand corner being similarly marked. Where the entire page or illustration has been revised the asterisk will not be used, only the page issue number will be raised.

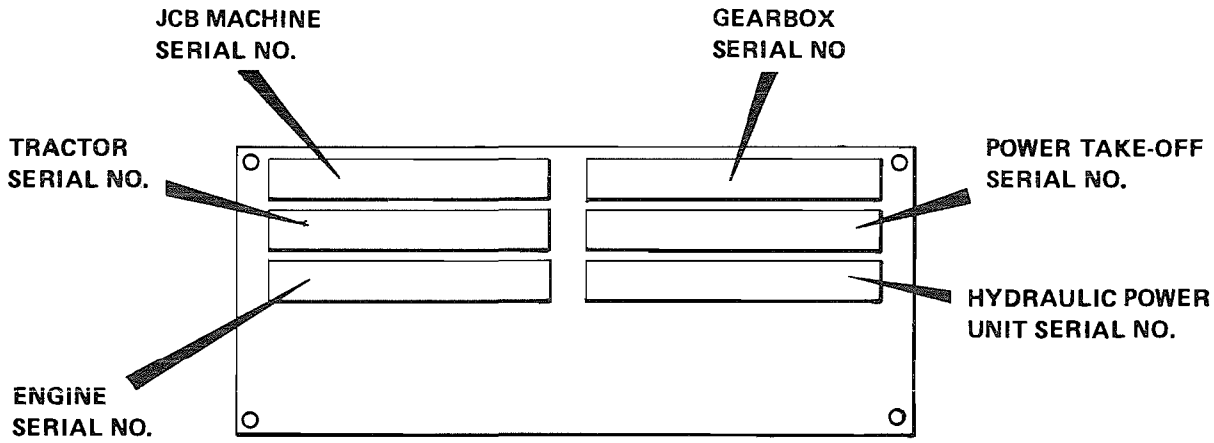
A publication detailing all the special tools required for the machines is available separately.

MACHINE IDENTIFICATION

The following information explains the various serial numbers to be found on the Data Plate attached to the machine.

It is essential that the serial numbers are used to ensure the correct supply of parts and to locate the correct service information.

SKIDDED TRANSMISSION MACHINES – Manual and /3 build



JCB Machine Serial Number e.g. 3DIII 129564 / 3

MACHINE TYPE AND MARK

SEQUENTIAL SERIAL NO.
- 55000–68150 MKII range
- 100001–124999 and loaders
- 125001–199999 MKIII range

BUILD IDENTIFICATION
- Blank–Manual Transmission
- /3 –Torque converter

MACHINE IDENTIFICATION

Tractor Serial No. **e.g.** **384B / 7 / 237580**

TRANSMISSION TYPE
- 384B–10 speed, manual or torque converter
- 272B–9 speed, manual only.

BUILD TYPE
- 1–Manual, standard
- 3–Torque converter, standard
- 7–Manual, German
- 8–Torque converter, German
- 9–P.T.O. with hydraulics
- 10–P.T.O. less hydraulics

SEQUENTIAL SERIAL NO.

Tractor Serial No.–JCB Build skid **e.g.** **SK1 / 002676**

BUILD TYPE
- SK1–Standard
- SK2–German/Austrian

SEQUENTIAL SERIAL NO.

Engine Serial No. **e.g.** **498NT / 1897 / 61294**

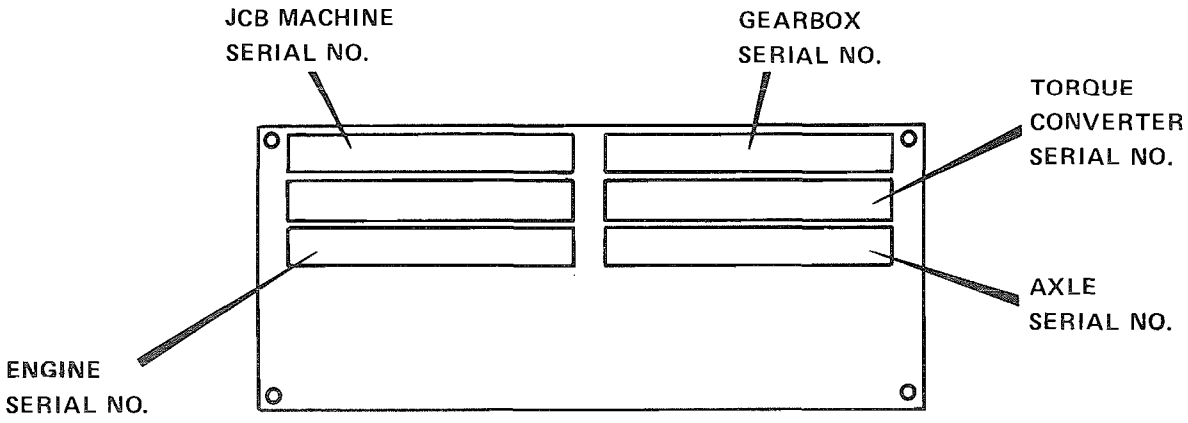
ENGINE TYPE
- 4–Number of cylinders
- 98–Bore in millimetres

ENGINE BUILD LIST NO.

SEQUENTIAL SERIAL NO.

MACHINE IDENTIFICATION

POWERTRAIN –/5 build



JCB Machine Serial No. e.g. 3DIII 129564/5

MACHINE TYPE AND MARK

SEQUENTIAL SERIAL NO
125001-199999-MKIII range

BUILD IDENTIFICATION
/5 - Torque Converter

Engine Serial No. e.g. 498NT / 2058 / 64878

ENGINE TYPE
4 - Number of cylinders
98 - Bore in millimetres

ENGINE BUILD LIST NO.

SEQUENTIAL SERIAL NO.

Gearbox Serial No. e.g. 12731 / 1078 / 1

BUILD LIST NO.

BUILD DATE
Month and year

SEQUENTIAL SERIAL NO.
Over yearly period

Torque Converter Serial No.

SEQUENTIAL SERIAL NO.

Axle Serial No.

SEQUENTIAL SERIAL NO.

Contents

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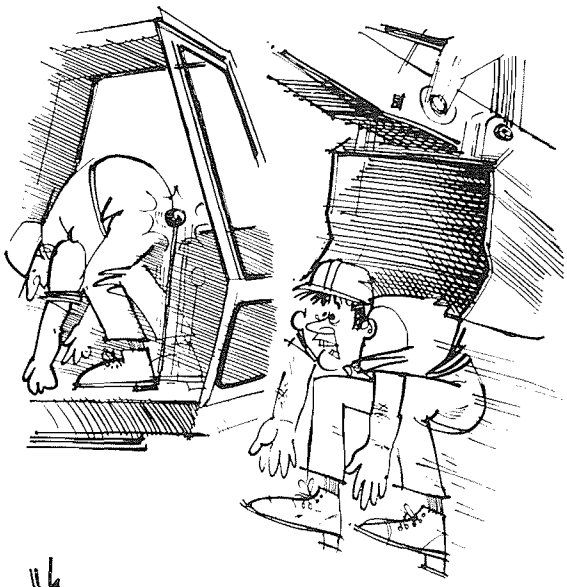
COMPONENT REMOVAL

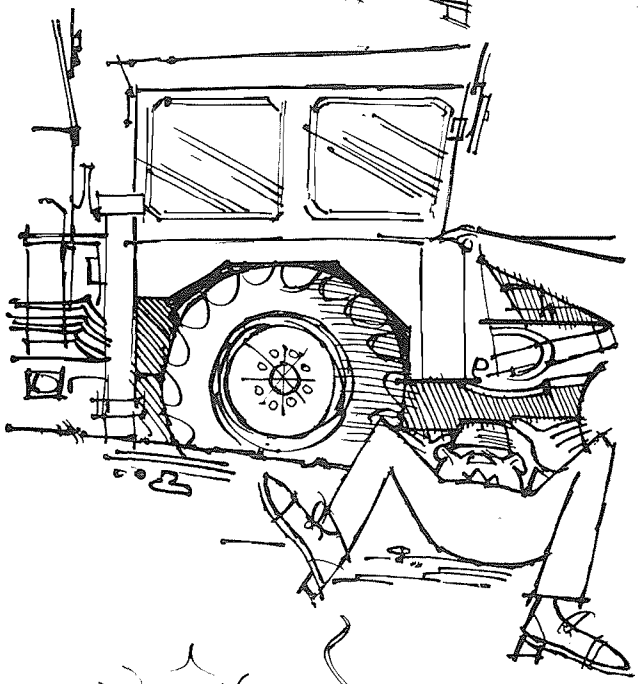
Secure all moving parts of the machine to prevent inadvertent actions by other personnel causing dangerous movement and possible injury.

For example: Always set buckets and shovels on the ground or on adequate supports before work is commenced.



Safety first!

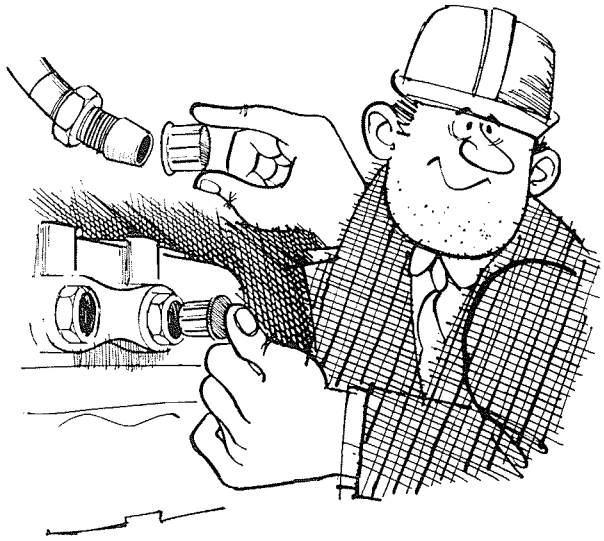
Never work beneath a machine unless it is standing on hard ground,preferably concrete or tarmacadam. If a machine is lifted to improve accessibility, always place substantial supports under the main frame or track frame before work is commenced.



Never take risks!

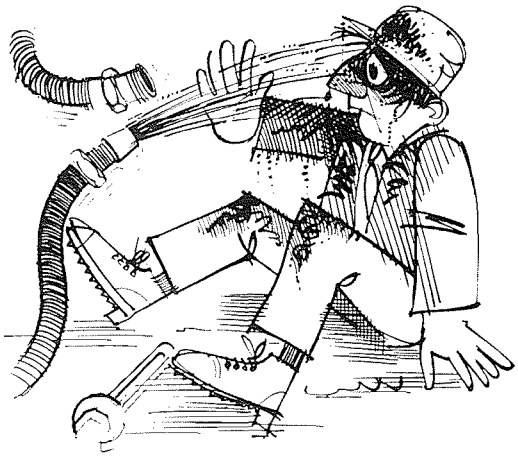
Always check lifting equipment, slings, chains etc. before components are hoisted. Always use equipment which is adequate for the job in hand.

HOSES AND PIPES



Always fit blanking plugs whenever hoses or pipes are disconnected. Serious damage can occur if dirt or abrasive material enters the hydraulic system.

Dirt...the enemy!



Rest the digging equipment on the ground, stop the engine and operate all control levers to vent any residual pressure from the hydraulic circuit before hoses or pipes are disconnected. This minimises the chance of injury from spurting oil when a connection is loosened.

Hot oil burns!

Test the temperature of adjacent pipework and components with the hand prior to disconnecting a hose or pipe. If the oil is considered too hot for safety, allow sufficient time for it to cool before a connection is loosened.

Renew hoses if any of the following faults are found.

1 End fitting damaged or leaking.

If hose elbows are dented or crushed, oil flow is restricted and the speed at which the service operates will be reduced. Badly crushed elbows can completely block the oil flow and prevent the service from operating.

2 Outer covering chafed or cut and wire reinforcing exposed.

If a hose remains in service in this condition water will seep into the internal wire reinforcing and cause concealed corrosion and consequent weakening of the hose structure. This may not be apparent until the hose subsequently fails.

3 Outer covering ballooning locally.

This is caused by failure of the hose structure which allows hydraulic oil to leak internally. The oil eventually forces its way into the outer layers of the hose's construction and ultimately causes the hose to burst.

4 Evidence of kinking or crushing on flexible part of hose.

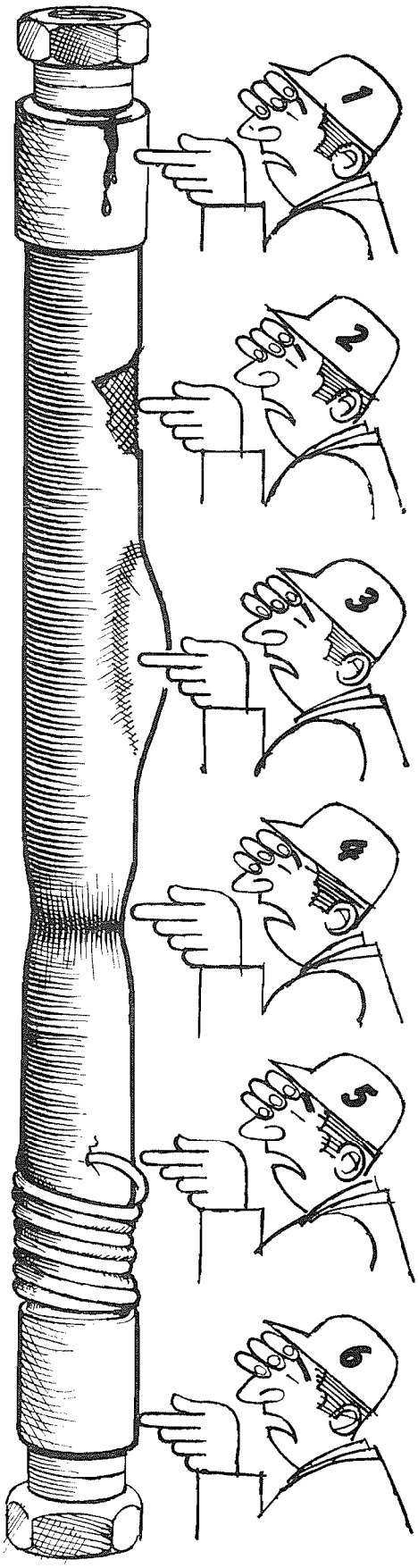
If a hose is deformed past its designed limits, damage to the internal structure is caused. This can result in restriction of oil flow or local weakening of the hose.

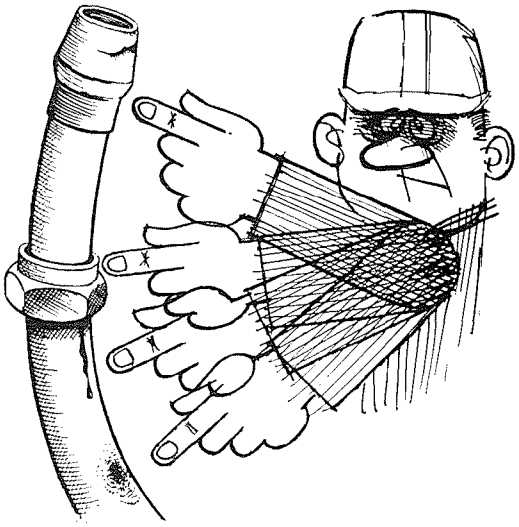
5 Armouring embedded in outer cover.

If armouring is deformed, internal damage similar to that caused by crushing or kinking will almost certainly have occured.

6 End fittings displaced.

If the swaged sleeve of an end fitting appears to have moved from its original position, there is a possibility that partial failure has occured in the area where the sleeve grips the flexible part of the hose. Ultimately the end fitting will pull off.





Renew pipes if any of the following faults are found.

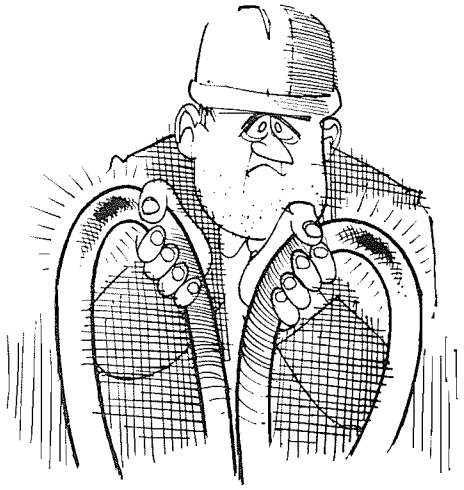
1 Cone damaged or distorted.

2 Thread damaged.

3 End fittings damaged or leaking.

4 Outer surfaces damaged or severely corroded.

Check carefully!

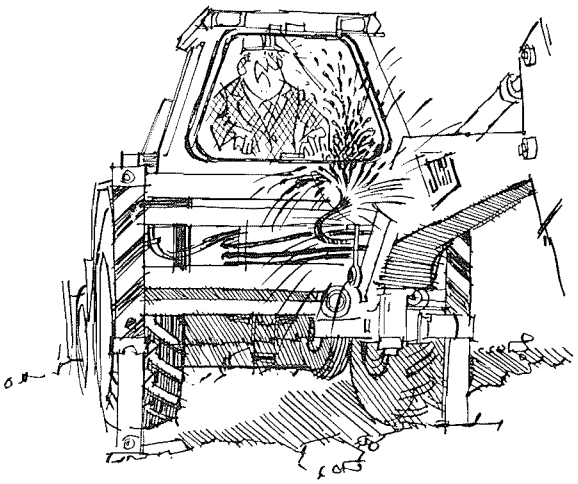


Unsupported hoses or pipes must not touch each other or adjacent components or chafing will be caused.

Good fitting pays!

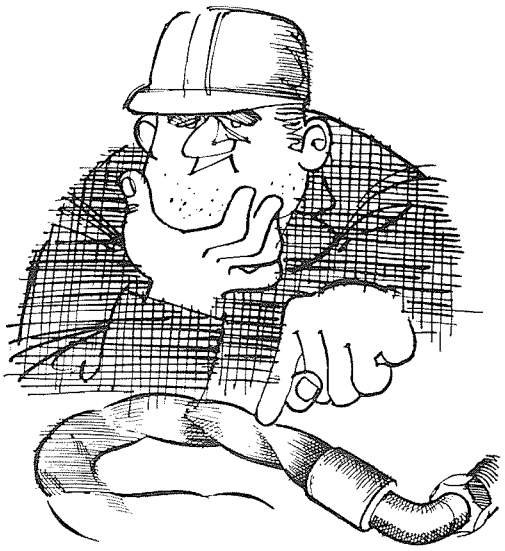
Loosely connect each end, settle the hose or pipe into position and tighten connections Clamps should be tightened sufficiently to retain the hose or pipe without causing crushing.

If a hose is connected to moving components, the components should be moved over the full extent of their travel to check that the hose does not foul as it is bent.



Care!

Hoses must never be twisted when fitting.



DISMANTLING & ASSEMBLY

Thoroughly clean the exterior of all components before dismantling. If dismantling is commenced without removing a component from the machine, cleanliness is doubly important since the service life of a component is drastically reduced if dirt or abrasive matter is not excluded at all times.

Clean it..first!

Sometimes components are dismantled in adverse conditions without workshop facilities being available. If this is necessary, suitable precautions must be taken to prevent dust and dirt settling on internal parts, particularly on oiled surfaces where it will be retained and contaminate any new oil with which a component is filled.

Clean with care!

Select cleaning agents and solvents with care. The following are recommended: Petrol, alcohol, methylated spirits and carbon tetrachloride. All these solvents evaporate at room temperature and do not leave residue.

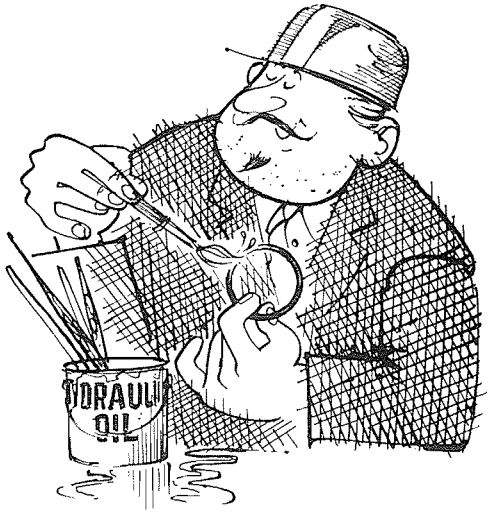
WARNING: Solvent type cleaners are dangerous when used in a confined area. Avoid inhalation of the vapour or contact with the skin. Do not use near a naked flame.

Trichlorethylene or paint thinners must not be used in the presence of seals and 'O' rings because they can severely damage certain types of rubber.

Care!

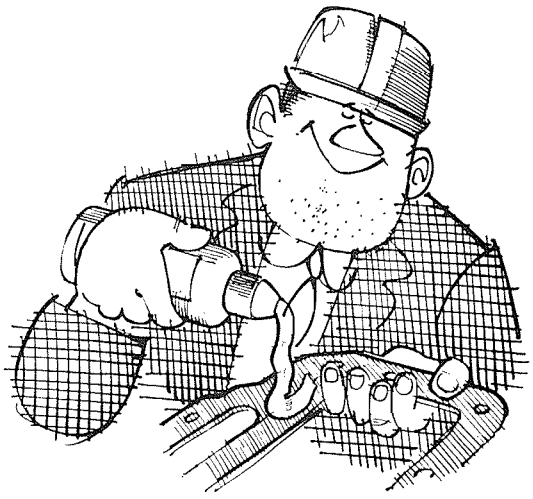
Renew 'O' rings, seals and gaskets, regardless of condition, whenever they are disturbed, unless instructed otherwise.

Lightly coat 'O' rings and gaskets with hydraulic oil before fitting, unless instructed otherwise.



Good sealing pays!

Coat gaskets with a suitable jointing solution before fitting, unless instructed otherwise. Proprietary solutions which are compatible with the various oils used by JCB are given and are referred to where appropriate.

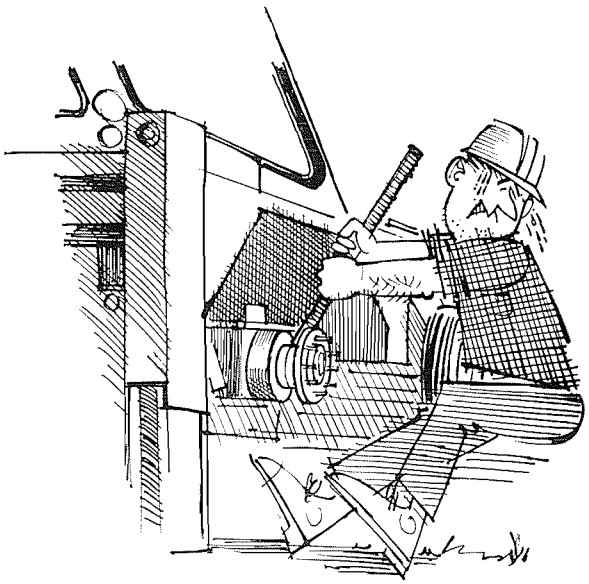


BEARINGS

REMOVAL

Do not remove bearings unless they are to be renewed (see Inspection) or unless unavoidable in a dismantling sequence.

Whenever possible, use a suitable puller or extractor to minimise risk of damage to both the bearing and adjacent parts. Keep bearings with loose rings, balls or rollers as matched assemblies; they are selectively assembled and parts do not interchange from one bearing to another.



Check carefully !

INSPECTION

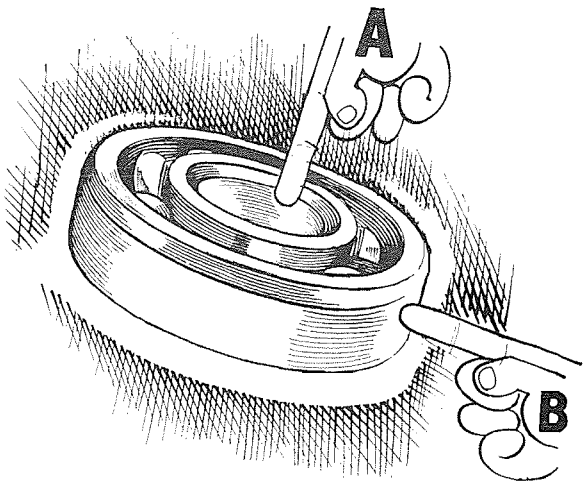
Check that the bearing has had ample lubrication and that the lubricant has not been contaminated.

Check for discoloration and signs of overheating.

Check the bearing for excessive clearance and the cage for wear, cracks and scuffing. If in doubt regarding the clearance, compare this with an identical new bearing.

NOTE. Journal bearings are graded by the internal clearance when new, this is indicated by one, two or three feint circles marked on one ring. Ensure that both bearings are of the same grade when comparing new with old.

Check the finish of the locating surfaces A & B. They may have been lightly marked on assembly but should not be polished. Polishing indicates that the ring has been turning relative to its seating– this is confirmed if the seating is also polished.



If bearing rings have been turning, the mating parts must be either renewed or built up and machined to their original sizes.

Check the bearing tracks, rollers or balls for surface imperfections.

Check thoroughly!

Renew the needle roller bearings if:–

1 Rollers, cages or rings are damaged.

2 Rollers fall from cage.

3 Rollers can be moved noticeably out of alignment.

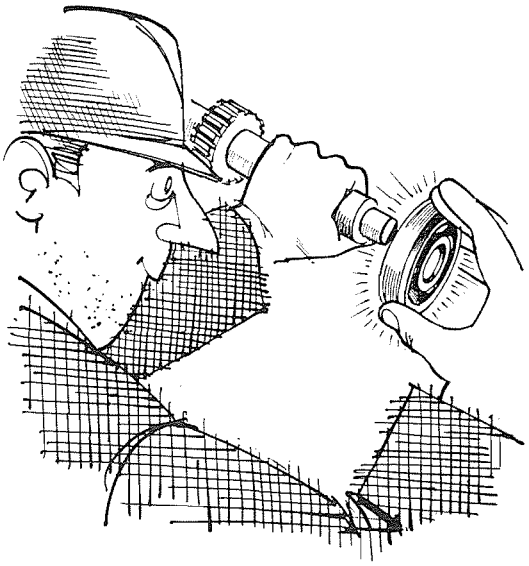
4 The shaft surface is damaged or worn. If this has occured, shaft particles will have entered the bearing and subsequent early failure is almost inevitable.

If in doubt, renew!

If a bearing is judged to be fit for further service, it should be carefully washed in clean solvent and immersed in clean oil for temporary storage.

FITTING

Bearings are normally a press fit on rotating parts and a sliding fit on static components such as housings.
Whenever possible fit the bearing to the rotating part first.

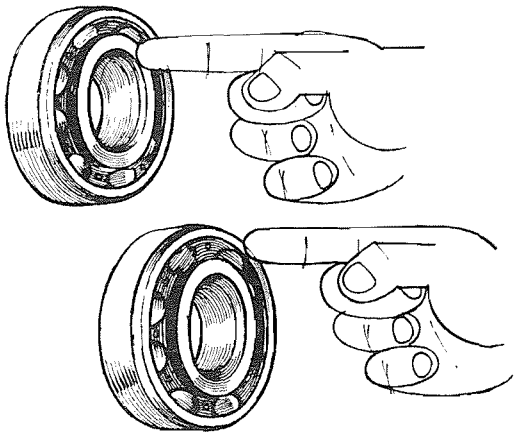


Good fitting pays!

Use a tubular drift or press tool but ensure that it does not contact the ring lip since damage may be caused.

Bearing on shaft—Exert effort against the inner ring.

Bearing in housing—Exert effort against the outer ring.

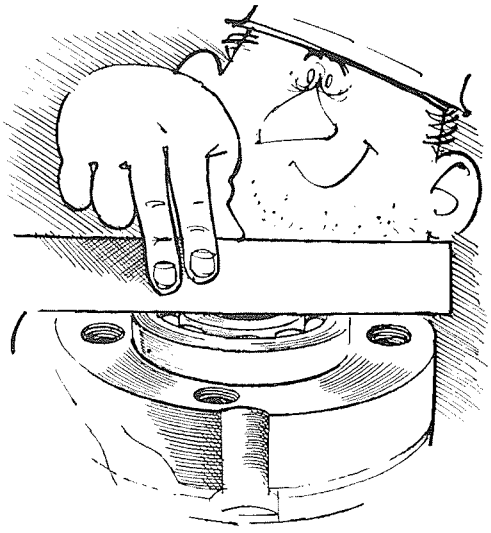


If a press is not available when fitting large bearings, it is preferable to either heat the bearing in hot oil or to heat the housing rather than use a large hammer and drift.

Care!

Check that the bearing abuts squarely against the locating face.

Any peculiarities regarding the fitting of specific bearings are covered in the appropriate assembly sequence.

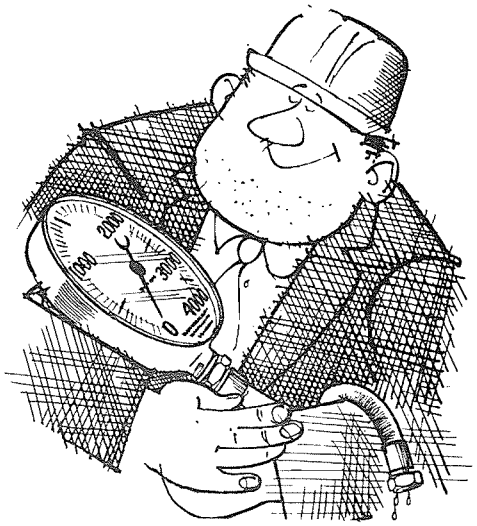


PRESSURE TESTING

Ensure that there are no leaks from hoses or pipework before pressure testing is carried out.

Readings should be taken using a gauge of adequate pressure range for the test, either liquid filled or fitted with a restrictor or damper.

Before adjusting a valve, unscrew the adjusting screw two or three turns to release any trapped dirt.



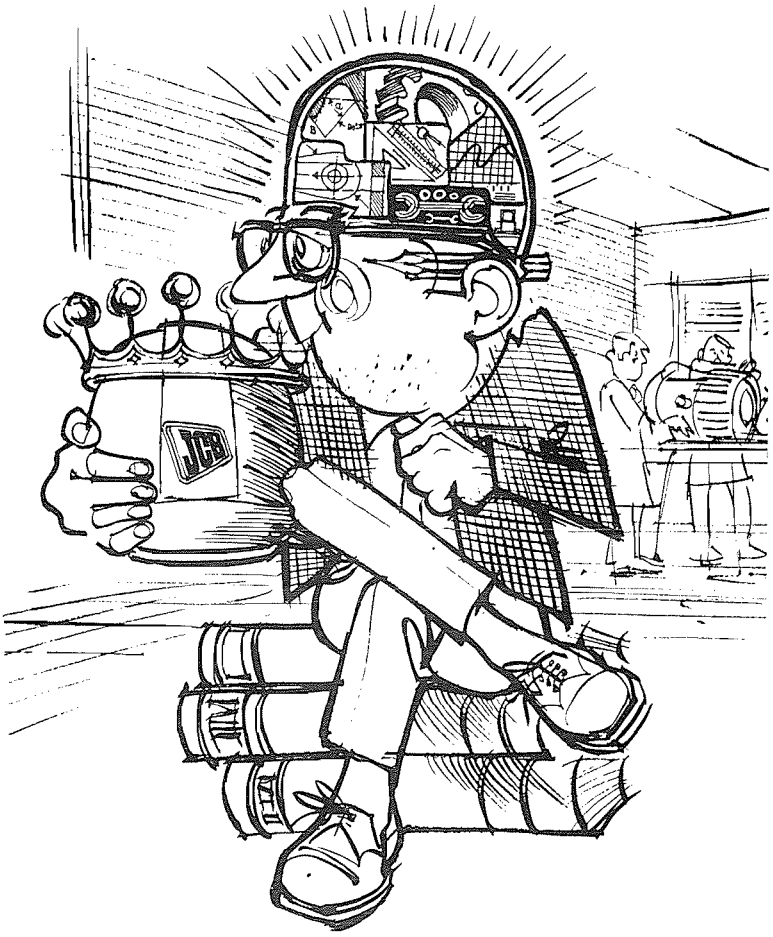
SUCTION STRAINERS

Thoroughly wash suction strainers in petrol or carbon tetrachloride, using a soft brush and air blasting if necessary.

Remove all traces of gummy deposit. It should be possible to see light through the mesh.

TRAINING

Training courses suitable for all grades of personnel are held at regular intervals. Details are readily available from JCB Service.



Contents

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ATTACHMENTS

JCB Roadbreaker

Pump Flow Rate at 2000 rev/min. and zero pressure. (Hamworthy and Commercial)	45 litres/min.	10 UK Gal/min.	12 US Gal/min.
Relief Valve Settings			
–System Relief Valve (Hamworthy)	138 bar	141 kgf/cm^2	2000 lbf/in^2
–System Relief Valve with combined Dipper Mounted Attachments (Parker Hannifin)	127 bar	130 kgf/cm^2	1845 lbf/in^2
–Component Relief Valve (L.H. and R.H.)	103 bar	105 kgf/cm^2	1500 lbf/in^2

JCB Extending Dipper JCB Jaw and JCB Powerbreaker

Pump Flow Rate at 2000 rev/min. and zero pressure. (Commercial).	45 litres/min.	10 UK Gal/min.	12 US Gal/min.
Relief Valve Settings. (Parker Hannifin)	127 bar	130 kgf/cm^2	1845 lbf/in^2

Hydraulic Power Take-off

Gearbox Ratio	3 : 1		
Output Shaft Diameter	35mm.	1.375in.	
	6 splines to BS1495/SAE J718d		
Flow to motor at 1800 engine rev/min. to give P.T.O. speed of 530–550 rev/min.	100 litres/min.	22 UK Gal/min.	26.5 US Gal/min.

*BRAKES

Type	Multiplate disc unit, mounted inboard on each rear wheel drive shaft.
Diameter to m/c no. 129502	165mm. x 89mm. (6.5in. x 3.5in.)
from m/c no. 129503 –dry	178mm. x 102mm. (7in. x 4in.)
–oil immersed (from m/c no. 138622/5)	Nominal 200mm. (8in.) dia.
Operation–Manual and /3 build	By foot or hand via mechanical linkage.
–/5 build	By foot via hydraulics

Parking Brake–/5 build only

Type	Disc unit mounted on gearbox out put shaft
Diameter	279mm. (11in.)
Operation	Lever and cable.

CAPACITIES

	litres	UK Gal	US Gal
ENGINE OIL—Manual and /3 build			
Balanced Engines – Steel Sump	9.6	2.1	2.5
– Alloy Sump	11.0	2.4	2.8
Non-balanced Engines—Steel Sump	11.0	2.4	2.8
—Alloy Sump	11.5	2.5	3.0
ENGINE OIL—/5 build	9.1	2.0	2.4
COOLING SYSTEM	13.6	3.0	3.6
TORQUE CONVERTER—/3 build	20.4	4.5	5.4
—/5 build	11.0	2.4	2.9
GEARBOX—10 speed	50.0	11.0	13.2
—9 speed (Synchro)	56.8	12.5	15.0
—/5 build	2.55	0.56	0.67
—with hydraulic lift	57.0	12.5	15.0
*DRIVE AXLE—/5 build with Dry Brakes	25.0	5.5	6.6
—/5 build with Oil Immersed Brakes	29.5	6.5	7.8
FUEL TANK	68.0	15.0	18.0
SLEW ACTUATOR			
2D,3,3C,3D	4.5	1.0	1.2
HYDRAULIC SYSTEM—2D,3	173.0	38.0	45.6
—2DS,3CS	159.0	35.0	42.0
—3C	195.0	43.0	51.6
—3D	205.0	45.0	54.0
—700	177.0	39.0	46.8

Note: The following original equipment engines were fitted with balancer units on production:

38TD engines from serial no. 44287
All 4/98NT engines.

Balancers may have been fitted in service to other engines. Steel and alloy sumps have been fitted intermittently.

ELECTRICAL SYSTEM

Type	12 volt negative earth	
Battery	12 volt	128 amp/h
Alternator To Engine No. 4/98NT 2724	Lucas 18ACR	
From Engine No. 4/98NT 2725	AC Delco DN460	
Sealed	CAV AC5HER	
Dynamo To Machine No. 61767	Lucas C40	
Starter Motor	Lucas M50	
Light Bulbs	Headlights	36/36W
	Working Lights	48W
	Side Lights	6W
	Rear Lights	6/21W
	Indicators	21W
	Instruments	2.2W
	Interior	18W

ENGINE

Make	BLMC 4 Cylinder diesel	
Type	38TD | Identifiable by serial	
Superseded by	4/98 ⌐ number prefix.	
Swept Volume	3.77 litres	230in^3
Bore 38TD	100 to 100.2mm.	3.937 to 3.9738in.
4/98	98 to 98.2mm.	3.8583 to 3.859in.
Stroke 38TD	120mm	4.7in.
4/98	125mm.	4.921in.
Compression Ratio 38TD	17.5 : 1	
4/98	16.8 : 1	
Firing Order	1, 3, 4, 2	
Valve Clearance (hot or cold)	0.33mm.	0.013in.
Injection Timing		
38TD	20° B.T.D.C.	
4/98 Simms Minimec	16° B.T.D.C.	
4/98 CAV D.P.A.	14° B.T.D.C.	
Engine Speed		
Idling	700–720 rev/min.	
Maximum Revs.	2000 rev/min.	
Maximum no load Revs	2200–2220 rev/min.	

Note: For full details, refer to Engine Service Manual (JCB Service Publication No. 9803/1200).

HYDRAULICS

Pump flow rates at 2000 rev/min. and maximum pressure.

Machine	m/c No.	Pump Type	Litres/min.	UK Gal/min.	US Gal/min.
2D,2DS,3	To 100611	Plessey Gear	102	22.5	27
	From 100612	Hamworthy Gear	93	20.5	24.6
3C,3CS,3D,700		Hamworthy Gear	126.1	27.75	33.3

Note: 2D,2DS and 3 machines fitted with JCB Roadbreaker or Hydraulic Power Take-off use the 3C type main pump.

Relief Valve Operating Pressures

	*bar	kgf/cm^2	lbf/in^2
Main Relief Valve (M.R.V.)	138	141	2000
Auxiliary Relief Valves (A.R.V.)			
Hamworthy(Shovel and Excavator)	186	191	2700
Slew Cylinders 127mm. (5in.) only	152	155	2200
Cessna Shovel Tip	207	210	3000
Cessna Shovel Clam	190	193	2750

STEERING

System Type	Fully Hydrostatic		
Pump	Plessey Gear Type		
Control Unit	Plessey Vane Type Danfoss Orbitrol		
*Max. flow to Control Unit			
–Manual Clutch machines	18 litres/min.	4 UK gal/min.	4.8 US gal/min.
–/3 build to m/c 131319	36–38 litres/min.	8–8.5 UK gal/min.	9.6–10.2 US gal/min.
from m/c 131320	16.3–19.1 litres/min	3.5–4.2 UK gal/min.	4.3–5 US gal/min.
*Relief Valve Operating Pressure			
to m/c no. 131319	121 bar	123 kgf/cm^2	1750 lbf/in^2
from m/c no. 131320	117–124 bar	120–127 kgf/cm^2	1700–1800 lbf/in^2
Camber Angle	5°		
Castor Angle	2°		
Toe-in	1.6mm. (1/16in.)		

TRANSMISSION

Manual Clutch Machines

Clutch	Single Dry Plate	330mm. (13in.) dia.	
Gear Ratios			
to m/c no. 130301	10 Forward–2 Reverse		
from m/c no. 130302	9 Forward–3 Reverse (Synchromesh)		

Torque Converter Machines –/3 build

Gear Ratios	4 Forward – 4 Reverse		
Direction Control	Forward/Reverse Clutch Pack		
Charging Pump	Plessey Gear Type		
*Flow at 2000 eng. rev/min.			
~~up to m/c 131319~~	36–38 litres/min.	8–8.5 UK gal/min.	9.6–10.2 US gal/min.
~~from m/c 131~~320	~~22.6 litres/min.~~	~~5 UK gal/min~~.	
Oil Temperature			
–Normal	90–100°C		
–Max. Intermittent	120°C		
Converter Out Pressure	0.7–1.7 bar	0.7–1.8 kgf/cm^2	10–25 lbf/in^2
Clutch Oil Pressure	8.2–11.0 bar	8.4–11.2 kgf/cm^2	120–160 lbf/in^2
Stall Test Speed	1780 engine rev/min.		

Torque Converter Machines–/5 build

TORQUE CONVERTER

Diameter	279mm. (11in.)		
Stall Torque Ratio	2.2 : 1		
Torque Absorption at stall	210 Nm (155 lbf ft) at 1700 rev/min.		
Converter Pressure	Bar	kgf/cm^2	lbf/in^2
In –			
1000 rev/min.	0.7–2.1	0.7–2.1	10–30
2000 rev/min.	4.1–6.2	4.2–6.3	60–90
Out –			
1000 rev/min.	0–1.3	0–1.4	0–20
2000 rev/min.	0.7–2.1	0.7–2.1	10–30

TRANSMISSION Continued

SHUTTLE TRANSMISSION

Direction Control	Forward/Reverse Clutch Packs
Ratios	1.0 : 1 Forward 1.1 : 1 Reverse

Pressures

	Bar	kgf/cm^2	lbf/in^2
Main Line –			
1000 rev/min.	6.9–8.9	7.0–9.1	100–130
2000 rev/min.	8.6–10.7	8.8–10.9	125–155
Forward Clutch –			
1000 rev/min.	6.2–7.9	6.3–8.1	90–115
2000 rev/min.	7.6–10.0	7.7–10.1	110–145
Reverse Clutch –			
1000 rev/min.	6.9–8.9	7.0–9.1	100–130
2000 rev/min.	8.3–10.3	8.4–10.5	120–150

Flow Rates

	l/min.	UK gal/min.	US gal/min.
Cooler at 50°C			
800 rev/min.	4.9–6.4	1.08–1.4	1.3–1.7
1000 rev/min.	8.6–9.1	1.9–2.0	2.3–2.4
2000 rev/min.	16.3–17.0	3.6–3.75	4.3–4.5
Cooler at 100°C			
800 rev/min.	6.4–6.8	1.4–1.5	1.7–1.8
1000 rev/min.	7.5–8.3	1.66–1.83	2.0–2.2
2000 rev/min.	19.5–20.4	4.3–4.5	5.2–5.4
Pump –			
1000 rev/min.	11.7	2.58	3.1
2000 rev/min.	29.1	6.4	7.7

GEARBOX

Ratios –	
First	5.55 : 1
Second	2.84 : 1
Third	1.64 : 1
Fourth	1.00 : 1

DRIVE AXLE

Ratio –	18.3 : 1

TYRES	Size	Pressure		
2D,2DS		bar	kgf/cm^2	lbf/in^2
* Standard front	7.50 x 16 x 10	4.00	4.08	58
Standard rear	14.9/13 x 28 x 8	1.79	1.82	26
Optional Front – Vredestein	9.00 x 16 x 10	3.93	4.00	57
– Other Makes	9.00 x 16 x 10	3.44	3.51	50
	10.5/80 x 18 x 10	4.62	4.71	67
Optional rear	16.9/14 x 28 x 8	1.65	1.68	24
3, 3C, 3CS		bar	kgf/cm^2	lbf/in^2
Standard Front – Vredestein	9.00 x 16 x 10	3.93	4.00	57
– Other Makes	9.00 x 16 x 10	3.44	3.51	50
Standard rear	16.9/14 x 28 x 8	1.65	1.68	24
Optional front	10.50 x 16 x 12	4.41	4.50	64
	10.50/80 x 18 x 10	4.62	4.71	67
	12.00 x 18 x 10	2.76	2.80	40
	12.00 x 18 x 12	3.93	4.00	57
	*13.0/65 x 18 x 12	3.59	3.67	52
Optional rear	16.9/14 x 28 x 10	2.07	2.10	30
	18.4/15 x 26 x 8	1.38	1.40	20
	18.4/15 x 26 x 12	2.14	2.18	31
3D		bar	kgf/cm^2	lbf/in^2
Standard front	12.00 x 18 x 10	2.76	2.80	40
OR	12.0/75 x 18 x 12	2.90	2.95	42
Standard rear	18.4/15 x 26 x 8	1.38	1.40	20
Optional front	*13.0/65 x 18 x 12	3.59	3.67	52
	16.0 x 19.5 x 10	2.07	2.10	30
Optional rear	18.4/15 x 26 x 12	2.14	2.18	31
700		bar	kgf/cm^2	lbf/in^2
Standard front	12.00 x 18 x 10	2.76	2.81	40
OR	12.00 x 18 x 12	3.93	4.00	57
Standard rear	18.40 x 26 x 12	2.14	2.18	31
*Optional front	13.0/65 x 18 x 12	3.59	3.67	52

* SPECIFIC TYRES FOR MACHINE OPTIONS

Machine	Option	Tyres
3C	JCB Powerbreaker JCB Extending Dipper JCB Jaw	Front: as available for standard machine Rear: 18.4/15 x 26 x 12
3	JCB Jaw	
2D	JCB 6 in1 Clamshovel	Front: 9.00 x 16 x 10 Rear: 16.9/14 x 28 x 8

TORQUE SETTINGS

Use only where no torque setting is specified in the text. Values are for Dry threads and may be within three per cent of the figures stated. For lubricated threads the values should be REDUCED by one third.

UNF Grade 'S' Bolts

Bolt Size		Hexagon(A/F)	Torque Settings		
in.	(mm.)	in.	Nm.	kgf m	lbf ft
1/4	(6.3)	7/16	14	1.4	10
5/16	(7.9)	1/2	28	2.8	20
3/8	(9.5)	9/16	49	5.0	36
7/16	(11.1)	5/8	78	8.0	58
1/2	(12.7)	3/4	117	12.0	87
9/16	(14.3)	13/16	170	17.3	125
5/8	(15.9)	15/16	238	24.3	175
3/4	(19.0)	1.1/8	407	41.5	300
7/8	(22.2)	1.5/16	650	66.3	480
1	(25.4)	1.1/2	970	99.0	715
1.1/4	(31.7)	1.7/8	1940	198.0	1430
1.1/2	(38.1)	2.1/4	3390	345.0	2500

Metric Grade 8.8 Bolts

Bolt Size		Hexagon (A/F)	Torque Settings		
in.	(mm.)	in.	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

TORQUE SETTINGS

Rams

NOTE: All torque figures are 'mean' settings and may be varied by 3% higher or lower.

2D,2DS,3,3C,3CS,3D,700
Split Pin Retained Piston Heads

Piston Rod dia		Cylinder Bore		Piston Head Nut			Cylinder End Bolts		
mm.	in.	mm.	in.	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft
25.4	1.0	–	–	136	13.8	100	–	–	–
38.1	1.5	–	–	420	42.9	310	–	–	–
50.8	2.0	–	–	408	41.5	300	–	–	–
64.0	2.5	102	4.0	522	53.2	385	–	–	–
64.0	2.5	114	4.5	780	79.5	575	–	–	–
76.0	3.0	127	5.0	1051	107.2	775	342	34.9	252

***Loctite Retained Piston Heads**

Piston Rod dia.		Cylinder Bore		Piston Head Nut			Cylinder End Bolts		
mm.	in.	mm.	in.	Nm	kgf m	lbf ft	Nm	kgf m	lbf ft
63.5	2.5	127	5.0	408	41	300	–	–	–

Slew Actuator

Piston Head Nuts	420Nm	42.9 kgf m	310 lbf ft
Cylinder Bolts	373Nm	38.0 kgf m	275 lbf ft

Contents Contents

LUBRICANTS

	Below –1 deg C (30 deg F)	–1 to 27 deg C (30 to 81 deg F)	Above 27 deg C (81 deg F)
ENGINE INJECTION PUMP (In line)	Mobil Delvac 1310	JCB Super X Universal (20W20) or Mobil Delvac 1320	Mobil Delvac 1330

TORQUE CONVERTER/SHUTTLE		Mobil Delvac 1310
GEARBOX/FINAL DRIVE–		
	10 Speed	Mobilube HD90
	4 Speed (/3 build)	Mobilube HD90
	9 Speed (synchro)	JCB Super X Universal (20W20) or Mobil Delvac 1320
GEARBOX	4 Speed (/5 build)	JCB Super X Universal (20W20) or Mobil Delvac 1320
DRIVE AXLE (/5 build) –		
To machine no. 138621/5 (Dry brakes)		JCB Super X Universal (20W20) or Mobil Delvac 1320
From machine no. 138622/5 (Oil-immersed brakes).		JCB Special Gear Oil
BRAKE SYSTEM (/5 build) –		
To machine no. 138621/5 (Dry brakes)		Mobil Hydraulic Brake Fluid 550
From machine no. 138622/5 (Oil-immersed brakes).		Below –20 deg C (–4 deg F) Mobil DTE 11 Above –20 deg C (–4 deg F) JCB 'Special' Hydraulic Fluid

CAUTION: USE OF INCORRECT BRAKE FLUID WILL CAUSE SERIOUS DAMAGE.

SLEWING ACTUATOR	Mobilube HD90
HYDRAULIC SYSTEM	JCB 'Special' Hydraulic Fluid
GREASE POINTS	JCB 'Special' MPL Grease or Mobilgrease Super
H.P.T.O. GEARBOX	JCB Super X Universal (20W20) or Mobil Delvac 1320
EXTENDING DIPPER	Mobiltac E

CAUTION: Mobiltac E contains 1.53% lead. Contaminated materials, e.g. rags, containers, etc., should only be disposed of in accordance with local regulations covering the disposal of toxic waste.