Open front screen

Service Manual

ROBOT 190, 1110

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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 JCB Technical Training Department.

These personnel should have a sound knowledge of workshop practice, safety procedures, and general techniques associated with the maintenance and repair of hydraulic earthmoving equipment.

Renewal of oil seals, gaskets, etc., and any component showing obvious signs of wear or damage is expected as a matter of course. It is expected that components will be cleaned and lubricated where appropriate, and that any opened hose or pipe connections will be blanked to prevent excessive loss of hydraulic fluid and ingress of dirt. Finally, please remember above all else **SAFETY MUST COME FIRST!**

The manual is compiled in sections, the first three are numbered and contain information as follows:

1 = **General Information** - includes torque settings and service tools.
2 = **Care & Safety** - includes warnings and cautions pertinent to aspects of workshop procedures etc.
3 = **Routine Maintenance** - includes service schedules and recommended lubricants for all the machine.

The remaining sections are alphabetically coded and deal with Dismantling, Overhaul etc. of specific components, for example:

A = **Attachments**
B = **Body & Framework** ...etc.

The page numbering in each alphabetically coded section is not continuous. This allows for the insertion of new items in later issues of the manual.

Section contents, technical data, circuit descriptions, operation descriptions, etc. are inserted at the beginning of each alphabetically coded section.

All sections are listed on the front cover; tabbed divider cards align directly with individual sections on the front cover for rapid reference.

Where a torque setting is given as a single figure it may be varied by plus or minus 3%. Torque figures indicated are for dry threads, hence for lubricated threads may be reduced by one third.

'Left Hand' and 'Right Hand' are as viewed from the rear of the machine facing forwards.

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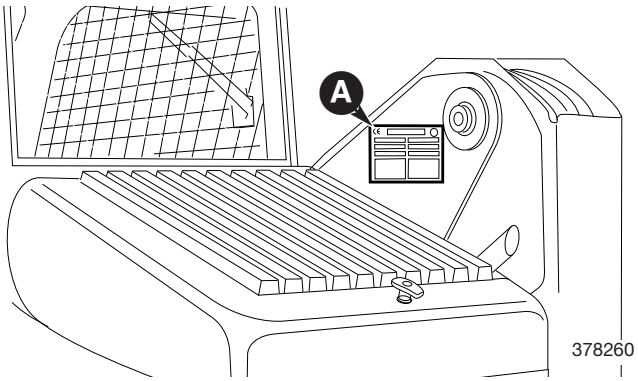
Machine Identification Plate

The machine identification plate **A** is located as shown. It is stamped with the serial numbers of the major individual units.

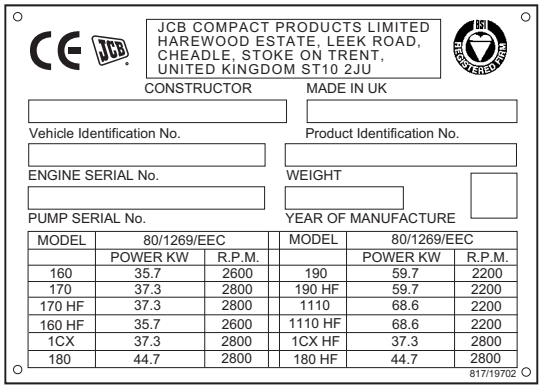


378260

Typical Vehicle Identification Number (VIN)

SLP 190 S B V E 888001
1 2 3 4 5 6 7

1. World Manufacturer Identification
2. Machine Model
3. Machine Type (S = Standard, H = High-flow)
4. Build Type (A = Canopy, B = Cab)
5. Year of Manufacture:
   W = 1998 2 = 2002
   X = 1999 3 = 2003
   Y = 2000 4 = 2004
   1 = 2001 5 = 2005
6. Manufacturer Location (E = England)
7. Product Identification Number (PIN)


JCB COMPACT PRODUCTS LIMITED
HAREWOOD ESTATE, LEEK ROAD,
CHEADLE, STOKE ON TRENT,
UNITED KINGDOM ST10 2JU
CONSTRUCTOR
MADE IN UK
Vehicle Identification No.
Product Identification No.
ENGINE SERIAL No.
WEIGHT
PUMP SERIAL No.
YEAR OF MANUFACTURE

MODEL	80/1269/EEC		MODEL	80/1269/EEC	
	POWER KW	R.P.M.		POWER KW	R.P.M.
160	35.7	2600	190	59.7	2200
170	37.3	2800	190 HF	59.7	2200
170 HF	37.3	2800	1110	68.6	2200
160 HF	35.7	2600	1110 HF	68.6	2200
1CX	37.3	2800	1CX HF	37.3	2800
180	44.7	2800	180 HF	44.7	2800

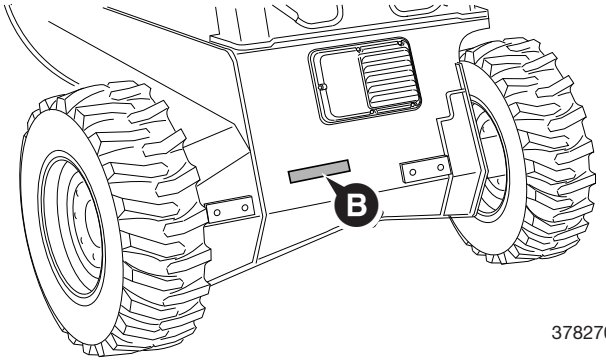
817/19702

Unit Identification

The chassis serial number is stamped on the front face of the chassis as shown at **B**.

The engine serial number is stamped on a label **C** on the side of the cylinder block.

If any of the major units are replaced with new ones, the relevant serial number on the Machine Identification Plate will be superseded. Either stamp the plate with the new number or stamp out the old number.



378270

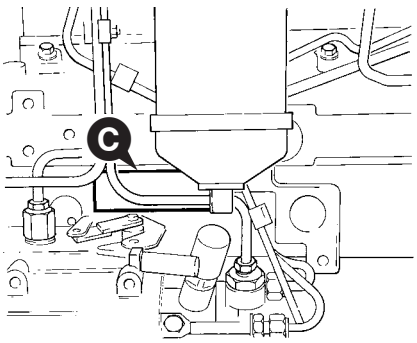
Typical Engine Identification Number

AR 50262 U 500405 P
A B C D E

A Engine Type

AR = 4 cylinder naturally aspirated - low emission
AK = 4 cylinder turbo - low emission
RE = 4 cylinder naturally aspirated - low emission stage 2
RG = 4 cylinder turbo - low emission stage 2

Where the service procedure differ between the engine types, the text and/or illustration will specify.



S181760

B Build Number

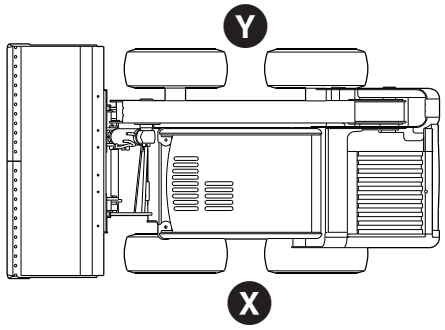
C Country of Origin

D Engine Sequence Number

E Year of Manufacture

Left Side, Right Side

In this manual, 'left' **X** and 'right' **Y** mean your left and right when you are seated correctly in the machine.



378210

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 in	(mm)	Hexagon (A/F) in	Torque Settings 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 in	(mm)	Hexagon (A/F) in	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

Note: All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.

BSP Adapters with Bonded Washers.

Adapter Size in	Spanner size mm	Torque Settings Nm	kgf m	lbf ft
1/8	11	20	2.0	15
1/4	19	34	3.5	25
3/8	22	75	7.6	55
1/2	27	102	10.4	75
5/8	30	122	12.4	90
3/4	32	183	18.7	135
1	38	203	20.7	150
1 1/4		305	31.1	225
1 1/2		305	31.1	225

SAE Adapters with 'O' rings.

Adapter Size in	Torque Settings Nm	kgf m	lbf ft
7/16	20	2.0	15
9/16	35	3.6	26
3/4	81	8.3	60
7/8	108	11.0	80
1 1/16	183	18.7	135
1 5/16	298	30.4	220
1 5/8	380	38.8	280

Hydraulic Coned BSP Hoses.

Hose Size in	Spanner size mm	Torque Settings Nm	kgf m	lbf ft
1/8	14	14	1.4	10
1/4	19	27	2.7	20
3/8	22	40	4.0	29
1/2	27	55	5.6	40
5/8	30	65	6.6	48
3/4	32	95	9.7	70
1	38	120	12.2	88
1 1/4		189	19.3	139
1 1/2		244	24.9	180

'O' Ring Face Seal System

Adaptors screwed into valve blocks

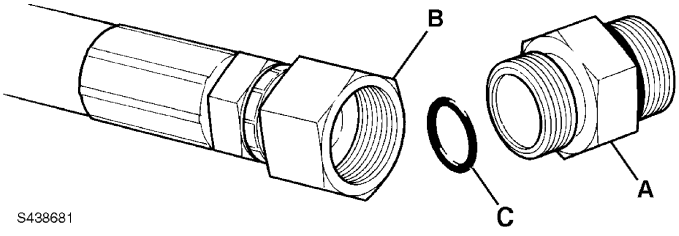
Adaptors screwed into valve blocks, etc. seal onto an 'O' ring which is compressed into a 45° seat machined in the face of the tapped port.

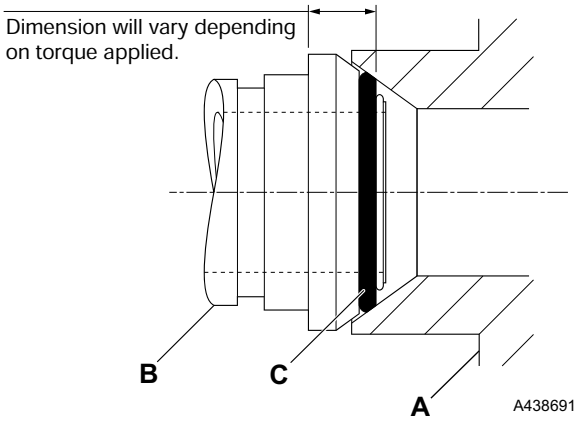
Adaptor Size	Common Spanner Size (A/F) mm	in.	Tightening Torque Nm	lbf ft
1/4" BSP	19	0.75	18	13
3/8" BSP	22	0.875	31	23
1/2" BSP	27	1	49	36
5/8" BSP	30		60	44
3/4" BSP	32	1.25	81	60
1" BSP	38	1.5	129	95
1 1/4" BSP			206	152

SAE Tube Size	SAE Port Thread Size	Common Spanner Size (A/F) mm	in.	Tightening Torque 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

Hoses Screwed onto Adaptors

Hoses **B** screwed onto adaptors **A** etc. seal onto an 'O' ring **C** which is compressed into a 45° seat machined in the face of the adaptor port.

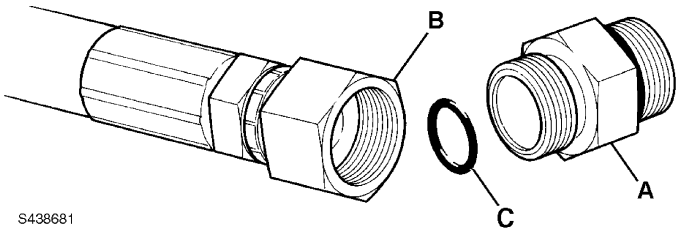


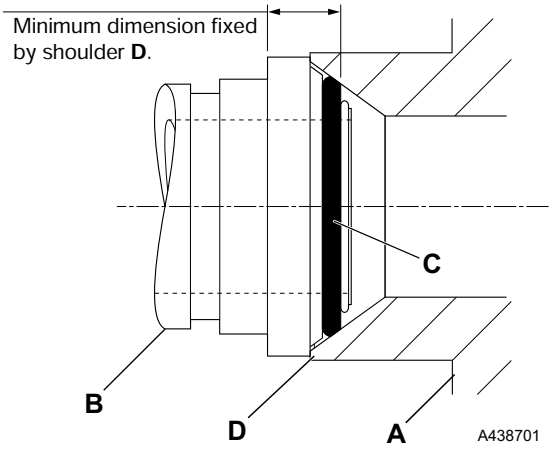


Hose Size	Common Spanner Size (A/F) mm	in.	Tightening Torque Nm	lbf ft
1/8" BSP	14		14	10
1/4" BSP	19	0.75	24	18
3/8" BSP	22	0.875	33	24
1/2" BSP	27	1	44	33
5/8" BSP	30		58	43
3/4" BSP	32	1.25	84	62
1" BSP	38	1.5	115	85
1 1/4" BSP			189	140
1 1/2" BSP			244	180

'Torque Stop' Hose System

'Torque Stop' Hoses **B** screwed onto adaptors **A** etc. seal onto an 'O' ring **C** which is compressed into a 45° seat machined in the face of the adaptor port. To prevent the 'O' ring being damaged as a result of over tightening, 'Torque Stop' Hoses have an additional shoulder, which acts as a physical stop.





Hose Size	Common Spanner Size (A/F) mm	in.	Tightening Torque Nm	lbf ft
1/8″ BSP	14		14	10
1/4″ BSP	19	0.75	27	20
3/8″ BSP	22	0.875	40	30
1/2″ BSP	27	1	55	40
5/8″ BSP	30		65	48
3/4″ BSP	32	1.25	95	70
1″ BSP	38	1.5	120	89
1 1/4″ BSP			189	140
1 1/2″ BSP			244	180

Numerical List

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892/00060	Blanking Plug	6 - 2
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892/00077	Female Connector	6 - 3
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892/00256	Pressure Test Adapter	6 - 1
892/00257	Pressure Test Adapter	6 - 1
892/00258	Pressure Test Adapter	6 - 1
892/00259	Pressure Test Adapter	6 - 1
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892/00277	Adapter	6 - 1
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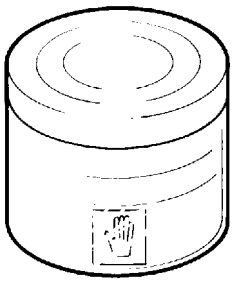
The following parts are replacement items for kits and would normally be included in the kit numbers quoted above.

Replacement items for kit no. 892/00253

892/00201	Replacement Gauge	6 - 1
892/00202	Replacement Gauge	6 - 1
892/00203	Replacement Gauge	6 - 1
892/00254	Replacement Hose	6 - 1

Section B - Body and Framework



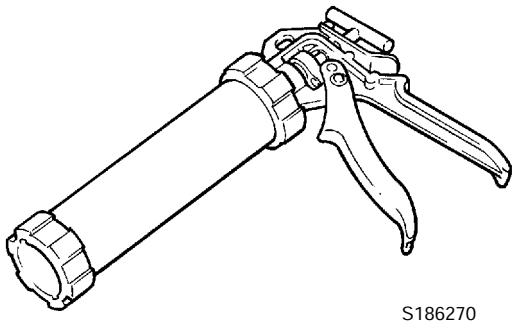
Hand Cleaner - special blend for the removal of polyurethane adhesives.

JCB part number - 4104/1310
(454g; 1 lb tub)

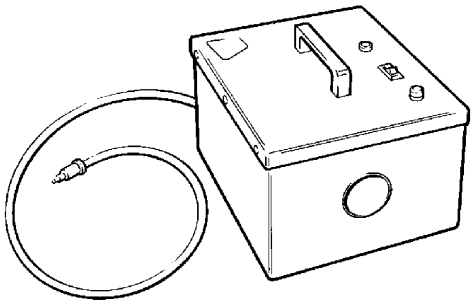
S186240

Cartridge Gun - hand operated - essential for the application of sealants, polyurethane materials etc.

JCB part number - 892/00845



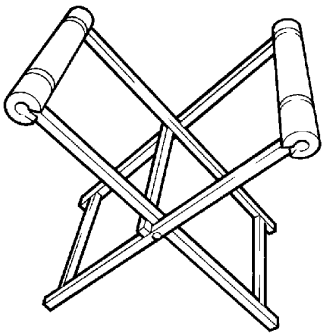
S186270



12V Mobile Oven - 1 cartridge capacity - required to pre-heat adhesive prior to use. It is fitted with a male plug (703/23201) which fits into a female socket (715/04300).

JCB part number - 992/12300

S186250



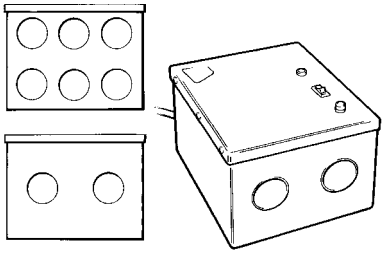
Folding Stand for Holding Glass - essential for preparing new glass prior to installation.

JCB part number - 892/00843

S186280

240V Static Oven - available with 2 or 6 cartridge capacity - required to pre-heat adhesive prior to use. No plug supplied. Note: 110V models available upon request - contact JCB Technical Service.

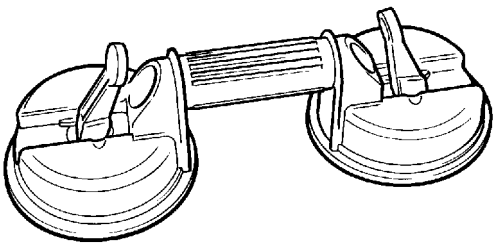
JCB part number:
992/12400 - 2 Cartridge x 240V
992/12600 - 6 Cartridge x 240V



S186260

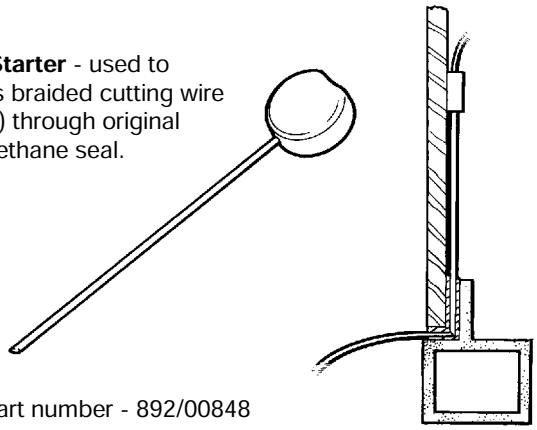
Glass Lifter - minimum 2 off - essential for glass installation, 2 required to handle large panes of glass. Ensure suction cups are protected from damage during storage.

JCB part number - 892/00842



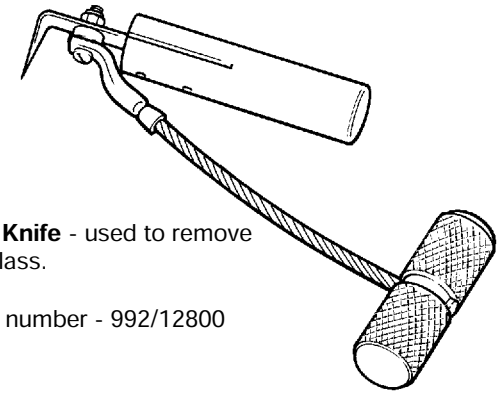
S186300

Wire Starter - used to access braided cutting wire (below) through original polyurethane seal.



JCB part number - 892/00848

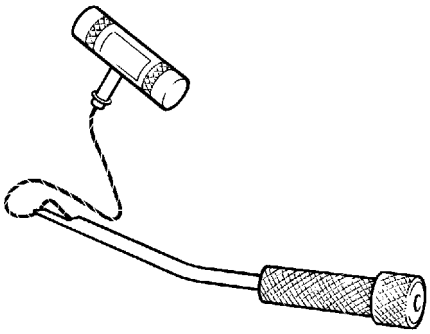
S186310



Cut-Out Knife - used to remove broken glass.

JCB part number - 992/12800

S186340



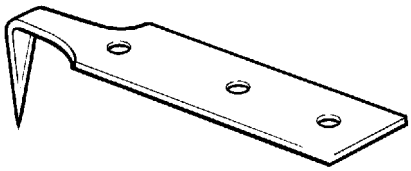
Glass Extractor (Handles) - used with braided cutting wire (below) to cut out broken glass.

JCB part number - 892/00846

S186320

'L' Blades - 25 mm (1 in) cut - replacement blades for cut-out knife (above).

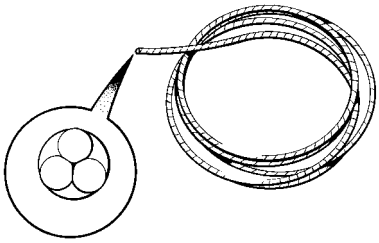
JCB part number - 992/12801 (unit quantity = 5 off)



S186350

Braided Cutting Wire - consumable heavy duty cut-out wire used with the glass extraction tool (above).

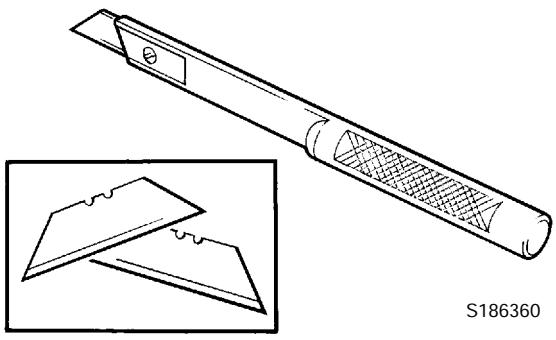
JCB part number - 892/00849
(approx 25 m length)



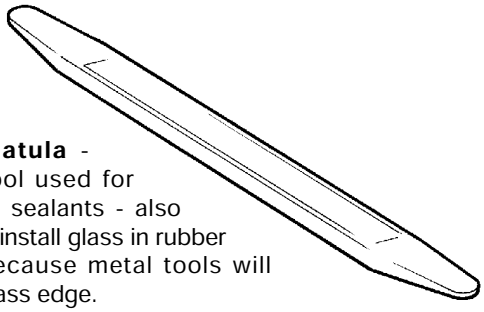
S186330

Long Knife - used to give extended reach for normally inaccessible areas.

JCB part number - 892/00844



S186360



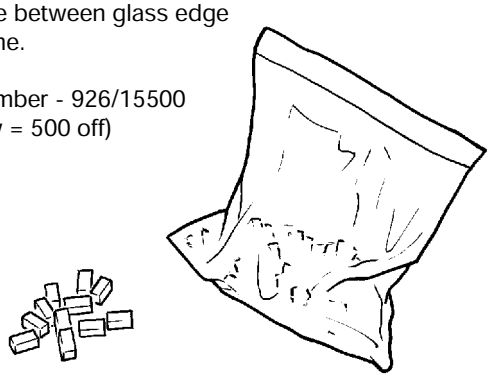
Nylon Spatula - general tool used for smoothing sealants - also used to re-install glass in rubber glazing because metal tools will chip the glass edge.

JCB part number - 892/00847

S186470

Rubber Spacer Blocks - used to provide the correct set clearance between glass edge and cab frame.

JCB part number - 926/15500
(unit quantity = 500 off)

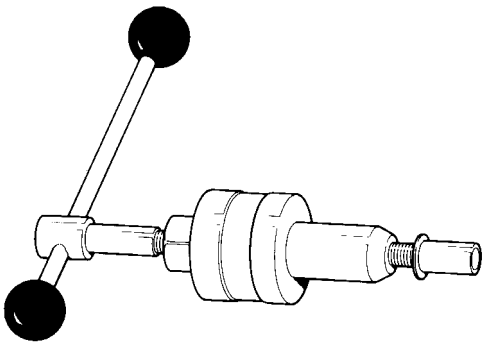


S186550

Rivet Nuts

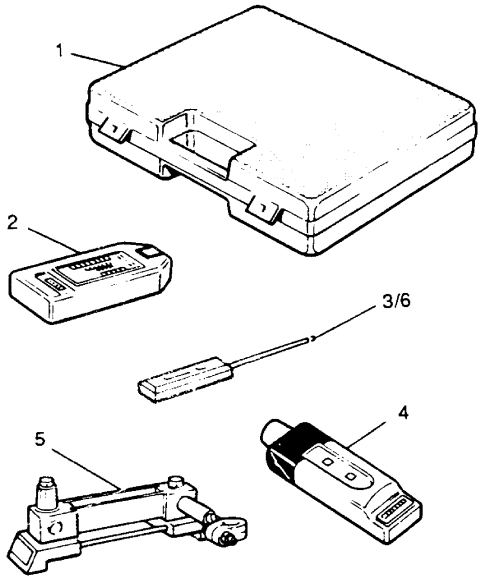
826/01099 M6 x 16mm Rivet Nut
826/01101 M6 x 19mm Rivet Nut
826/01103 M8 x 18mm Rivet Nut
826/01102 M8 x 21mm Rivet Nut
826/01104 M10 x 23mm Rivet Nut
826/01105 M10 x 26mm Rivet Nut

Installation Tool Available from:
Bollhoff Fastenings Ltd.
Midacre
The Willenhall Estate
Rose Hill
Willenhall
West Midlands, WV13 2JW



S261210

Section C - Electrics

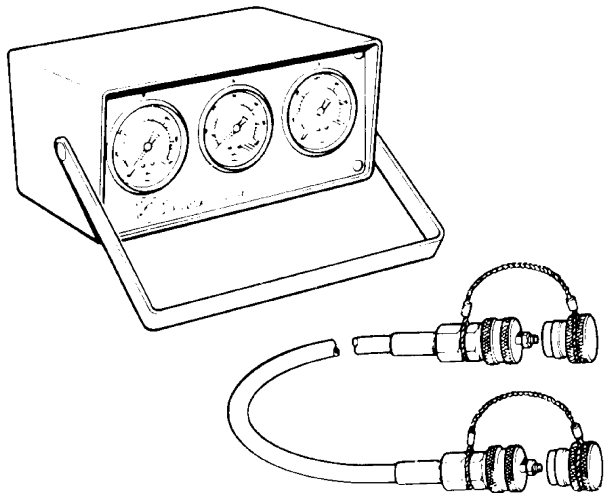


188230

AVO Test Kit

1	892/00283	Tool Kit Case
2	892/00281	AVO Meter
3	892/00286	Surface Temperature Probe
4	892/00284	Microtach Digital Tachometer
5	892/00282	Shunt - open type
6	892/00285	Hydraulic Oil Temperature Probe

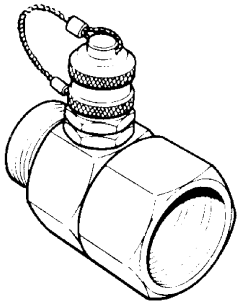
Section E - Hydraulics



188120

Hydraulic Circuit Pressure Test Kit

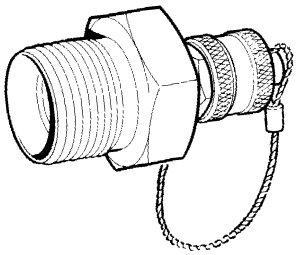
892/00253	Pressure Test Kit
892/00201	Replacement Gauge 0-20 bar (0-300 lbf/in²)
892/00202	Replacement Gauge 0-40 bar (0-600 lbf/in²)
892/00203	Replacement Gauge 0-400 bar (0-6000 lbf/in²)
892/00254	Replacement Hose



188130

Pressure Test 'T' Adapters

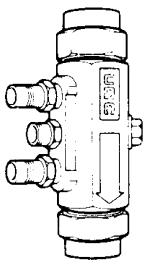
892/00262	1/4 in M BSP x 1/4 in F BSP x Test Point
816/55038	3/8 in M BSP x 3/8 in F BSP x Test Point
816/55040	1/2 in M BSP x 1/2 in F BSP x Test Point
892/00263	5/8 in M BSP x 5/8 in F BSP x Test Point
892/00264	3/4 in M BSP x 3/4 in F BSP x Test Point
892/00265	1 in M BSP x 1 in F BSPP x Test Point



200140

Pressure Test Adapters

892/00255	1/4 in BSP x Test Point
892/00256	3/8 in BSP x Test Point
892/00257	1/2 in BSP x Test Point
892/00258	5/8 in BSP x Test Point
816/15118	3/4 in BSP x Test Point
892/00259	1 in BSP x Test Point
892/00260	1.1/4 in BSP x Test Point
892/00261	5/8 in UNF x Test Point

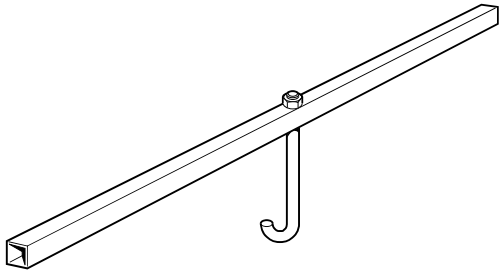


188150

Flow Test Equipment

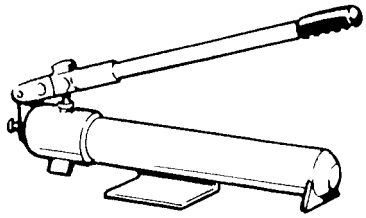
892/00268	Flow Monitoring Unit
892/00269	Sensor Head 0 - 100 l/min (0 - 22 UK gal/min)
892/00270	Load Valve
1406/0021	Bonded Washer
1604/0006	Adapter 3/4 in M x 3/4 in M BSP
1612/0006	Adapter 3/4 in F x 3/4 in M BSP
892/00271	Adapter 3/4 in F x 5/8 in M BSP
892/00272	Adapter 5/8 in F x 3/4 in M BSP
816/20008	Adapter 3/4 in F x 1/2 in M BSP
892/00275	Adapter 1/2 in F x 3/4 in M BSP
892/00276	Adapter 3/4 in F x 3/8 in M BSP
892/00277	Adapter 3/8 in F x 3/4 in M BSP

Section E - Hydraulics



A215880

892/00858 Pump support bracket - for engine removal.



193850

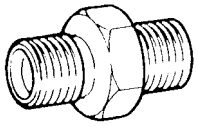
Hand Pump Equipment

892/00223	Hand Pump
892/00137	Micro-bore Hose 1/4 in BSP x 5 metres
892/00274	Adapter 1/4 in M BSP x 3/8 in M BSP Taper
892/00262	1/4 in M BSP x 1/4 in F BSP x Test Point
892/00706	Test Probe
892/00278	Gauge 0 - 40 bar (0 - 600 lbf/in^2)
892/00279	Gauge 0 - 400 bar (0 - 6000 lbf/in^2)

188140

Bonded Washers

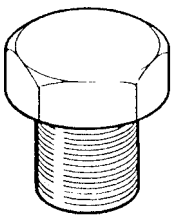
1406/0011	1/4 in BSP
1406/0018	1/2 in BSP
1406/0021	3/4 in BSP
1406/0029	1.1/4 in BSP



193860

Male Adapters - BSP x BSP

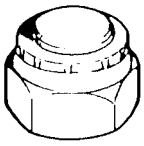
1606/0003	3/8 in x 1/4 in
1604/0003	3/8 in x 3/8 in
1606/0004	1/2 in x 1/4 in
1606/0007	1/2 in x 3/8 in
1604/0004	1/2 in x 1/2 in
1606/0008	3/4 in x 3/8 in
1606/0009	3/4 in x 1/2 in
1604/0006	3/4 in x 3/4 in



193870

Female Cone Blanking Plug

892/00055	1/4 in BSP
892/00056	3/8 in BSP
892/00057	1/2 in BSP
892/00059	3/4 in BSP
892/00060	1 in BSP'T'

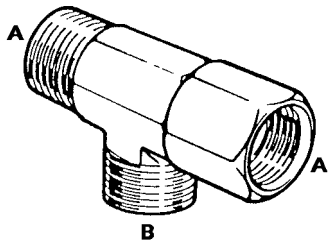


193880

Male Cone Blanking Plug

816/00294	1/4 in BSP
816/00189	3/8 in BSP
816/00190	1/2 in BSP
816/00197	5/8 in BSP
816/00196	3/4 in BSP
816/00193	1 in BSP

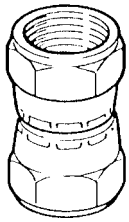
Section E - Hydraulics



193890

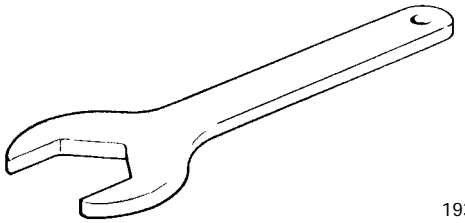
'T' Adapters

892/00047	3/8 in BSP (A) x 1/4 in BSP (B)
892/00048	1/2 in BSP (A) x 1/4 in BSP (B)
816/50043	3/4 in BSP (A) x 1/4 in BSP (B)
816/60096	3/4 in BSP (A) x 3/4 in BSP (B)


193900

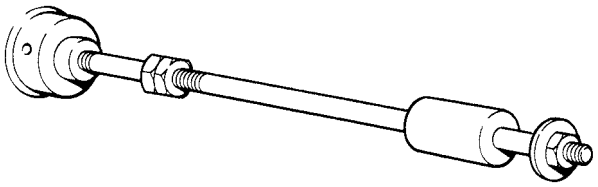
Female Connectors

892/00074	3/8 in BSP x 3/8 in BSP
892/00075	1/2 in BSP x 1/2 in BSP
892/00077	3/4 in BSP x 3/4 in BSP


193930

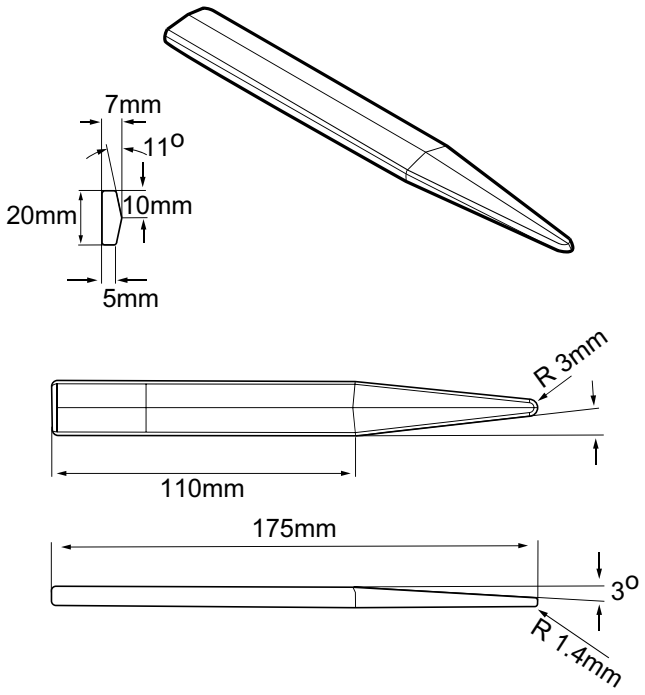
Hexagon Spanners for Ram Pistons and End Caps

992/09300	55 mm A/F
992/09400	65 mm A/F
992/09500	75 mm A/F
992/09600	85 mm A/F
* 992/09700	95 mm A/F


193910

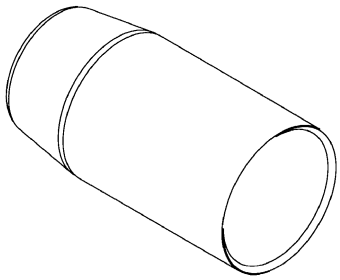
993/68100	Slide Hammer

Section E - Hydraulics



892/01027 Piston Seal Assembly Tool

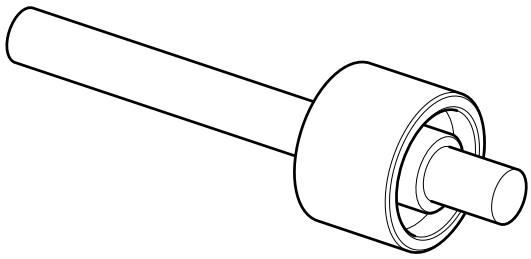
338500



S338410

Ram Seal Protection Sleeves

892/01018 For 40 mm Rod Diameter
892/01019 For 50 mm Rod Diameter



382310

331/22966 Pump drive alignment tool

Sealing and Retaining Compounds

JCB Multi-Gasket	A medium strength sealant suitable for all sizes of gasket flanges, and for hydraulic fittings of 25-65 mm diameter.	4102/1212	50ml
JCB High Strength Threadlocker	A high strength locking fluid for use with threaded components. Gasketing for all sizes of flange where the strength of the joint is important.	4102/0551	50ml
JCB Retainer (High Strength)	For all retaining parts which are unlikely to be dismantled.	4101/0651	50ml
JCB Threadlocker & Sealer	A medium strength locking fluid for sealing and retaining nuts, bolts, and screws up to 50 mm dia., and for hydraulic fittings up to 25 mm diameter.	4101/0250 4101/0251	10ml 50ml
Threadseal	A medium strength thread sealing compound.	4101/1951	10ml
Threadlocker	A locking fluid for use on threads larger than 50 mm dia.	4101/0451	50ml
Activator	A cleaning primer which speeds the curing rate of anaerobic products.	4104/0251 4104/0253	Aerosol (1ltr) Bottle (200ml)
Cleaner/Degreaser	For degreasing components prior to use of anaerobic adhesives and sealants.	4104/1557	400ml
Direct Glazing Kit	For one pane of glass; comprises items marked † below plus applicator nozzle, etc.	993/55700	
† **Ultra Fast Adhesive**	For direct glazing	4103/2109	310ml
† **Active Wipe 205**	For direct glazing	4104/1206 4104/1203	30ml 250g
† **Black Primer 206J**	For direct glazing	4201/4906	30ml
Clear Silicone Sealant	To seal butt jointed glass	4102/0933	
Black Polyuethane Sealant	To finish exposed edges of laminated glass	4102/2309	310ml
JCB Cleaner & Degreaser	For degreasing components proir to use of anaerobic adhesives and sealants.	4104/1538	Aerosol

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Safety Notices

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

All construction and agricultural equipment can be hazardous. When a JCB 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.

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

GEN-1-6

General Safety

⚠ WARNING

Decals

You can be injured if you do not obey the decal safety instructions. Keep decals clean. Replace unreadable or missing decals with new ones before operating the machine. Make sure replacement parts include warning decals where necessary.

INT-1-3-4

⚠ 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.

INT-1-3-6

⚠ WARNING

Lifting Equipment

You can be injured if you use faulty lifting equipment. Make sure that lifting equipment is in good condition. Make sure that lifting tackle complies with all local regulations and is suitable for the job. Make sure that lifting equipment is strong enough for the job.

INT-1-3-7

⚠ WARNING

Raised Attachments

Raised attachments can fall and injure you. Do not walk or work under raised attachments unless they are safely blocked.

INT-1-3-8

Operating Safety

⚠ WARNING

Controls

You or others can be killed or seriously injured if you operate the control levers from outside the cab. Operate the control levers only when you are correctly seated inside the cab.

INT-2-1-3

⚠ WARNING

Machine Limits

Operating the machine beyond its design limits can damage the machine, it can also be dangerous. Do not operate the machine outside its limits. Do not try to upgrade the machine performance with unapproved modifications.

INT-2-1-4

⚠ WARNING

Entering/Leaving

When entering and leaving the cab, use the step and handrails. Make sure the step, handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls or Safety Restraint Bar as handholds, use only the handrails.

3-1-1-1

⚠ WARNING

Engine

The engine has exposed rotating parts. Do not open the engine cover while the engine is running. Do not use the machine with the cover open.

INT-2-1-6/1

⚠ WARNING

ROPS/FOPS Structure

The machine is fitted with a Roll Over Protection Structure (ROPS) and a Falling Objects Protection Structure (FOPS). You could be killed or seriously injured if you operate the machine with a damaged or missing ROPS/FOPS. If the ROPS/FOPS has been in an accident, do not use the machine until the structure has been renewed. Modifications and repairs that are not approved by the manufacturer may be dangerous and will invalidate the ROPS/FOPS certification.

INT-2-1-9/3

⚠ WARNING

Seat Belts

The ROPS/FOPS cab is designed to give you protection in an accident. If you do not wear your seat belt, you could be thrown around inside the cab or thrown out of the machine and crushed. You must wear a seat belt when using the machine. Fasten the seat belt before starting the engine.

2-2-1-9

⚠ WARNING

Exhaust Gases

Breathing the machine exhaust gases can harm and possibly kill you. Do not operate the machine in closed spaces without making sure there is good ventilation. If possible, fit an exhaust extension. If you begin to feel drowsy, stop the machine at once. Get out of the cab into fresh air.

INT-2-1-10

⚠ WARNING

Passengers

Passengers in or on the machine can cause accidents. The JCB Skid Steer Loader is a one man machine. Do not carry passengers.

INT-2-2-2

⚠ WARNING

Communications

Bad communications can cause accidents. Keep people around you informed of what you will be doing. If you will be working with other people, make sure any hand signals that may be used are understood by everybody. Work sites can be noisy, do not rely on spoken commands.

INT-2-2-3

⚠ WARNING

Ramps and Trailers

Water, mud, ice, grease and oil on ramp or trailers can cause serious accidents. Make sure ramps and trailers are clean before driving onto them. Use extreme caution when driving onto ramps and trailers. Always reverse up a ramp if unloaded, travel forwards if loaded.

3-1-1-3/1

⚠ DANGER

Sparks

Explosions and fire can be caused by sparks from the exhaust or the electrical system. Do not use the machine in closed areas where there is flammable material, vapour or dust.

INT-2-2-10

⚠ WARNING

Attachments

Use only JCB approved attachments. Non-approved attachments, modified to fit the Skid Steer Loader, could cause damage to the machine, and/or make it unsafe. The use of non-approved attachments could invalidate your warranty.

3-1-2-1

Maintenance Safety

⚠ WARNING

Repairs

Do not try to do repairs or any other type of maintenance work you do not understand. To avoid injury and/or damage get the work done by a specialist engineer.

GEN-1-5

⚠ WARNING

Metal Splinters

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

INT-3-1-3

⚠ WARNING

Electrical Circuits

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

iNT3-1-4

⚠ WARNING

Communications

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

INT-3-1-5

⚠ WARNING

Petrol

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

INT-3-1-6

⚠ WARNING

Battery

A battery with frozen electrolyte can explode if it is used or charged. Do not use a machine with a frozen battery. To help prevent the battery from freezing, keep the battery fully charged.

INT-3-1-7

⚠ CAUTION

Do not switch the battery isolator OFF while the engine is running. Failure to comply may result in damage to the electrical circuits.

4-2-1-7

⚠ WARNING

Battery Gases

Batteries give off explosive gases. Keep flames and sparks away from the battery. Do not smoke close to the battery. Make sure there is good ventilation in closed areas where batteries are being used or charged. Do not check the battery charge by shorting the terminals with metal; use a hydrometer or voltmeter.

INT-3-1-8

⚠ WARNING

Battery Terminals

The machine is negatively earthed. Always connect the negative pole of the battery to earth.

When connecting the battery, connect the earth (-) lead last.

When disconnecting the battery, disconnect the earth (-) lead first.

INT-3-1-9

⚠ WARNING

Hydraulic Fluid

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

INT-3-1-10/1

⚠ WARNING

Hydraulic Pressure

It is not possible to vent all residual pressure. Loosen the connection one full turn and allow the pressure to dissipate. Keep face and hands well clear of pressurised hydraulic oil and wear protective glasses.

HYD 4-3

⚠ DANGER

Electrolyte

Battery electrolyte is toxic and corrosive. Do not breathe the gases given off by the battery. Keep the electrolyte away from your clothes, skin, mouth and eyes. Wear safety glasses. See Battery in MAINTENANCE section for First Aid treatment.

INT-3-2-1/2

⚠ WARNING

Diesel Fuel

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 or injury if you do not follow these precautions.

INT-3-2-2

Maintenance Safety (cont'd)

⚠ WARNING

Oil

Oil is toxic. If you swallow any oil, do not induce vomiting, seek medical advice. Used engine oil contains harmful contaminants which can cause skin cancer. Do not handle used engine oil more than necessary. Always use barrier cream or wear gloves to prevent skin contact. Wash skin contaminated with oil thoroughly in warm soapy water. Do not use petrol, diesel fuel or paraffin to clean your skin.
INT-3-2-3

⚠ WARNING

Soft Ground

A machine can sink into soft ground. Never work under a machine on soft ground.
INT-3-2-4

⚠ WARNING

Tyres and Rims

Over-inflated or over-heated tyres can explode. Follow the instructions in this manual for inflating the tyres. Do not weld or cut rims. Get a tyre/wheel specialist to do any repair work.
INT-3-2-6

⚠ WARNING

Fires

If your machine is equipped with a fire extinguisher, make sure it is checked regularly. Keep it in the operator's cab until you need to use it. Do not use water to put out a machine fire, you could spread an oil fire or get a shock from an electrical fire. Use carbon dioxide, dry chemical or foam extinguishers. Contact your nearest fire department as quickly as possible. Firefighters should use self-contained breathing apparatus.
INT-3-2-7/1

⚠ WARNING

Hot Coolant

The cooling system is pressurised when the engine is hot. Hot coolant can spray out when you remove the radiator cap. Let the system cool before removing the radiator cap. To remove the cap; turn it to the first notch and let the steam pressure escape, then remove the cap.
INT-3-2-9

⚠ CAUTION

Rams

The efficiency of the rams will be affected if they are not kept free of solidified dirt. Clean dirt from around the rams regularly. When leaving or parking the machine, close all rams if possible to reduce the risk of weather corrosion.
INT-3-2-10

⚠ CAUTION

Cleaning

Cleaning metal parts with incorrect solvents can cause corrosion. Use only recommended cleaning agents and solvents.
INT-3-2-11

⚠ CAUTION

'O' rings, Seals and Gaskets

Badly fitted, damaged or rotted 'O' rings, seals and gaskets can cause leakages and possible accidents. Renew whenever disturbed unless otherwise instructed. Do not use Trichloroethane or paint thinners near 'O' rings and seals.
INT-3-2-12

⚠ WARNING

Hydraulic Hoses

Damaged hoses can cause fatal accidents. Inspect the hoses regularly for:
Damaged end fittings
Chafed outer covers
Ballooned outer covers
Kinked or crushed hoses
Embedded armouring in outer covers
Displaced end fittings.
INT-3-3-2

⚠ WARNING

Always wear safety glasses when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidentally flying out.
GEN-6-2

Maintenance Safety (cont'd)

⚠ WARNING

Fluoroelastomeric Materials

Certain seals and gaskets (e.g. crankshaft oil seal) on JCB machines contain fluoroelastomeric materials such as Viton, Fluorel and Technoflon. Fluoroelastomeric materials subjected to high temperatures can produce highly corrosive hydrofluoric acid. THIS ACID CAN SEVERELY BURN.

New fluoroelastomeric components at ambient temperature require no special safety precautions.

Used fluoroelastomeric components whose temperatures have not exceeded 300°C require no special safety precautions. If evidence of decomposition (e.g. charring) is found, refer to the next paragraph for safety instructions DO NOT TOUCH COMPONENT OR SURROUNDING AREA.

Used fluoroelastomeric components subjected to temperatures greater than 300°C (e.g. engine fire) must be treated using the following safety procedure. Make sure that heavy duty gloves and special safety glasses are worn:

1 Ensure that components have cooled then remove and place material into plastic bags.

2 Thoroughly wash contaminated area with 10% calcium hydroxide or other suitable alkali solution, if necessary use wire wool to remove burnt remains.

3 Thoroughly wash contaminated area with detergent and water.

4 Contain all removed material, gloves etc. used in this operation in sealed plastic bags and dispose of in accordance with Local Authority Regulations.

DO NOT BURN FLUOROELASTOMERIC MATERIALS.

If contamination of skin or eyes occurs, wash the affected area with a continuous supply of clean water or with calcium hydroxide solution for 15-60 minutes. Get medical attention immediately.

INT-3-3-5/1

Safety Decals

⚠ WARNING

Decals on the machine warn you of particular hazards. Each decal is attached close to a part of the machine where there is a possible hazard. Read and make sure you understand the safety message before you work with or on that part of the machine.

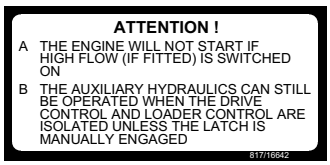
Keep all decals clean and readable. Replace lost or damaged decals. The decals and their attachment points are shown on the following pages. Each decal has a part number printed on it, use this number to order a new decal from your JCB distributor.

INT-3-3-3

⚠ WARNING

If you need eye-glasses for reading, make sure you wear them when reading the safety decals. Decals are strategically placed around the machine to remind you of possible hazards. Do not over-stretch or place yourself in dangerous positions to read the decals.

INT-3-3-4



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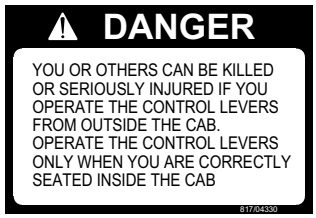

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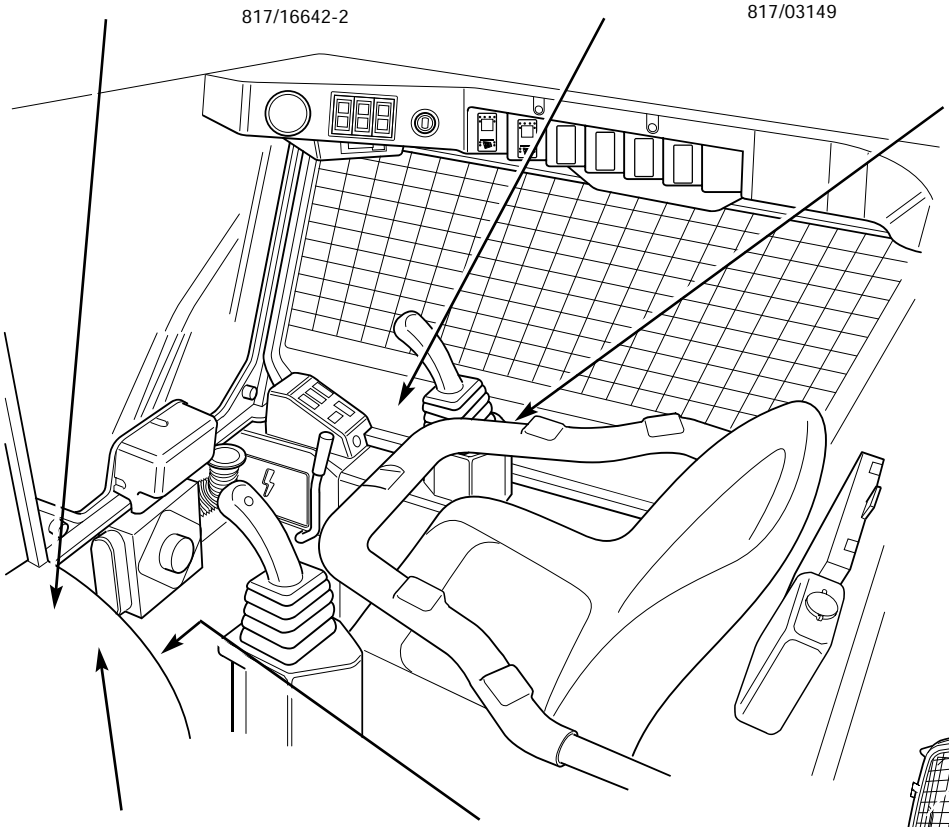

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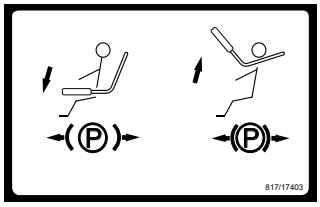

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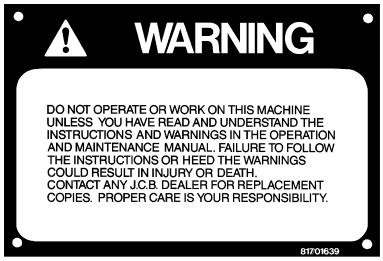

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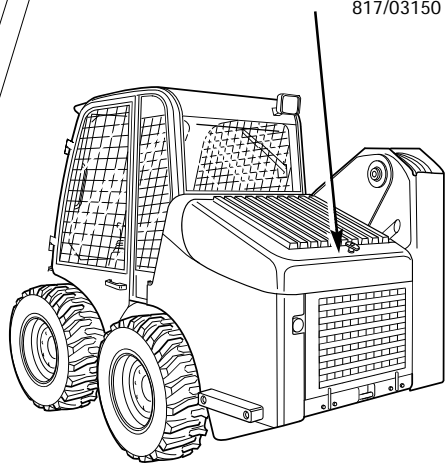

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Fluids, Capacities and Lubricants - Except North America

ITEM	CAPACITY	FLUID/LUBRICANT	SPECIFICATION
Engine Oil AR and AK Build	10.8 litres (2.4 UK gal)	**JCB High Performance 15W/40** -10 °C to 50 °C (14 °F to 122 °F) **JCB High Performance 10W/30** -15 °C to 40 °C (5 °F to 104 °F)	ACEA E2:B2:A2, API CF-4/SG API CF-4/SG
* **Engine Oil** RE and RG Build	10.5 litres (2.3 UK gal)	**JCB High Performance 15W/40** -10 °C to 50 °C (14 °F to 122 °F)	CG-4/SG
* **Hydraulic System**	26 litres (5.7 UK gal)	**JCB High Performance 10W/30** **JCB High Performance 15W/40** (top up only)	API CF-4/SG ACEA E2:B2:A2, API CF-4/SG
Cooling System **Total Coolant** **Antifreeze**	 15 litres (3.3 UK gal) 7.5 litres (1.7 UK gal)	**JCB Four Seasons Antifreeze & Summer Coolant/Water** (see ***Coolant Mixtures***)	ASTM D3306, BS6580
Fuel System	107 litres (23.5 UK gal)	Diesel oil (see ***Types of Fuel***)	ASTM D975-66T Nos. 1D, 2D
Grease Points	—	**JCB HP Grease** or **JCB Special MPL-EP Grease**	Lithium complex NLGI No. 2 consistency including extreme pressure additives. Lithium based NLGI No. 2 consistency including extreme pressure additives.
Chain Case - LH **Chain Case - RH**	10.8 litres (2.4 UK gal) 12.5 litres (2.8 UK gal)	Engine Oil	

Fluids, Capacities and Lubricants - North America

ITEM	CAPACITY	FLUID/LUBRICANT	SPECIFICATION
Engine Oil AR and AK Build	2.9 US gal (10.8 liters)	**JCB 15W/40 Engine Oil** -14 °F to 122 °F (10 °C to 50 °C) **JCB Engine Oil 10W/30** -4 °F to 50 °F (-20 °C to +10 °C)	CF-4/SG,SAE 15W 40 CF-4/SG, SAE 10W
* **Engine Oil** RE and RG Build	2.8 US gal(10.5 liters)	**JCB 15W/40 engine oil** -10 °C to 50 °C (14 °F to 122 °F)	CG-4/SG
* **Hydraulic System**	6.9 US gal (26 litres)	**JCB 30W** **JCB 15W/40** (top up only)	API CD/CE MIL-L-2104E
Cooling System **Total Coolant** **Antifreeze**	 4 US gal (15 liters) 2 US gal(7.5 liters)	**Permanent Antifreeze**	ASTM D3306-74
Fuel System	28.2 US gal (107 liters)	Diesel oil (see ***Types of Fuel***)	ASTM D975-66T Nos. 1D, 2D
Grease Points	—	**JCB MOLY EP #2 Grease**	Lithium based NLGI No. 2 consistency including extreme pressure additives.
Chain Case - LH **Chain Case - RH**	2.88 US gal (10.8 liters) 3.36 US gal (12.5 liters)	Engine Oil	API CE 15W 40 or API CC 10W 30

Note: New engines DO NOT require a running-in period. The engine/machine should be used in a normal work cycle immediately; glazing of the piston cylinder bores, resulting in excessive oil consumption, could occur if the engine is gently run-in. Under no circumstances should the engine be allowed to idle for extended periods; (e.g., warming up without a load). Engines of new machines are filled 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 appropriate recommended grade as shown in the lubrication chart. JCB 10W/30 Multigrade should also be used for the first 100 hours operation whenever a new or reconditioned engine is fitted to the machine. After the first 100 hours operation, it is essential that the 10W/30 oil is replaced by the lubricant recommended above.

It is most important that you read and understand this information and the publications referred to. Make sure that all of your colleagues who are concerned with lubricants read it too.

Lubricants - Health and Safety

Hygiene

JCB lubricants are not a health risk when used properly for their intended purposes.

However, excessive or prolonged skin contact can remove the natural fats from your skin, causing dryness and irritation.

Low viscosity oils are more likely to do this, therefore particular care is necessary in handling used oils which can be diluted with fuel contamination.

Whenever you are handling oil products you should maintain good standards of care and personal and plant hygiene. For details of these precautions we advise you to read the relevant publications issued by your local health authority, and note the following:

Storage

Always keep lubricants out of the reach of children.

Never store lubricants in open or unlabelled containers.

Waste Disposal

All waste products should be disposed of in accordance with all the relevant regulations.

The collection and disposal of used engine oil should be in accordance with any local regulations. Never pour used engine oil into sewers, drains or on the ground.

Handling

New Oil

There are no special precautions needed for the handling or use of new oil, beside normal care and hygiene practices.

Used Oil

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

Here are precautions to protect your health when handling used engine oil:

1 Avoid prolonged, excessive or repeated skin contact with used engine oils.

2 Apply a barrier cream to the skin before handling used engine oil.

3 Note the following when removing engine oil from skin:

- **a** Wash your skin thoroughly with soap and water.
- **b** Using a nail brush will help.
- **c** Use special hand cleansers to help clean dirty hands.
- **d** Never use petrol, diesel fuel or paraffin for washing.
- **e** Avoid skin contact with oil soaked clothing.
- **f** Don't keep oily rags in pockets.
- **g** Wash dirty clothing before re-use.
- **h** Throw away oil-soaked shoes.

First Aid - Oil

Swallowing.
If oil is swallowed you should not induce vomiting. Get medical advice.

Skin
In the case of excessive skin contact you should wash with soap and water.

Eyes
In the case of eye contact, flush with water for 15 minutes. If irritation persists, get medical attention.

Spillage

Absorb on sand or a locally approved brand of absorbent granules. Scrape up and remove to a chemical disposal area.

Fires

Extinguish with carbon dioxide, dry chemical or foam. Firefighters should use self contained breathing apparatus.

⚠ WARNING

Do not use water to put out an oil fire. This will only spread it because oil floats on water.

Extinguish oil and lubricant fires with carbon dioxide, dry chemical or foam. Fire fighters should use self contained breathing apparatus.
7-3-1-3/1

Types of Fuel

Use good quality diesel fuel to get the correct power and performance from your engine.

Recommended Fuel Specification

EN590 Diesel Fuel Types - Auto/Co/C1/C2/C3/C4
BS2869 Class A2

ASTM D975-91 Class 2-2DA, US DF1, US DF2, US DFA

JIS K2204 (1992) Grades 1, 2, 3, and Special Grade 3

Note: Where low sulphur/low aromatic fuels are used it is important that lubricity additives are used. The additives listed below are advertised as being suitable for bringing the lubricity levels of kerosene/low sulphur fuels up to those of diesel fuels. They have not been tested or approved by the engine manufacturer. They should be added by your fuel supplier who should understand the concentration level necessary.

1 Elf 2S 1750. Dosage 1000-1500 ppm (0.1 - 0.15%), specifically for Indian Superior Herosene (SKO) but may be applicable to other fuels.

2 Lubrizol 539N. Dosage (on Swedish low sulphur fuel) 250 ppm.

3 Paradyne 7505 (from Infineum). Dosage 500 ppm (0.05%).

⚠ CAUTION

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

Acceptable Fuel Specification

⚠ CAUTION

The fuel specification below is acceptable, however this fuel may reduce the life of the fuel injection equipment. The use of this fuel may also affect the engine performance.

ASTM D975-91 Class 1-1DA

JP7, MIL T38219 XF63

NATO F63

Sulphur Content

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 change the engine oil more frequently.

Percentage of sulphur in the fuel (%)	Oil Change Interval
Less than 0.5	Normal
0.5 to 1.0	0.75 of normal
More than 1.0	0.50 of normal

Aviation Kerosene Fuels

Note: Aviation kerosene fuels are not approved and their use may cause damage to components. Warranty will not be allowed on any component where damage is found to have been caused by the use of aviation kerosene.

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.)*

Fatty Acid Methyl Ester Fuels as a Replacement for Diesel Fuels

Fuel resources such as Rape Methyl Ester and Soybean Methyl ester, collectively known as Fatty Acid Methyl Esters are being used as alternatives and extenders for mineral oil.

Fatty Acid Methyl Esters must conform to certain standards to be of acceptable quality, just as mineral oils do at present.

Consult your JCB distributor for advice about the use of Fatty Acid Methyl Ester fuels, as improper application may impair engine performance.

⚠ 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.

INT-3-2-2

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.

INT-3-1-6

Filling the Tank

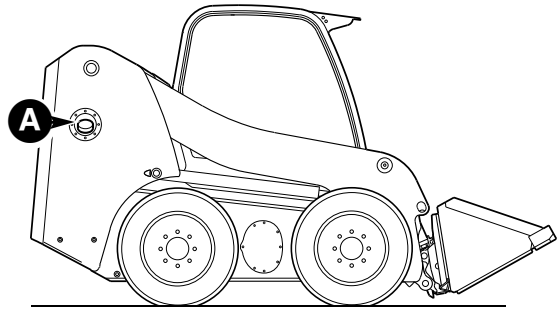
⚠ WARNING

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.

INT-3-2-2

At the end of every working day, fill the tank with the correct type of fuel. This will prevent condensation from developing in the fuel tank overnight.

We recommend that you lock the fuel cap to prevent theft and tampering.



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