Open front screen

Service Manual

ROBOT 150, 165

PUBLISHED BY THE
TECHNICAL PUBLICATIONS DEPARTMENT
OF JCB SERVICE; ©
WATERLOO PARK, UTTOXETER,
STAFFORDSHIRE, ST14 5PA, ENGLAND
Tel. ROCESTER (01889) 590312
PRINTED IN ENGLAND

Publication No. 9803/8500

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.

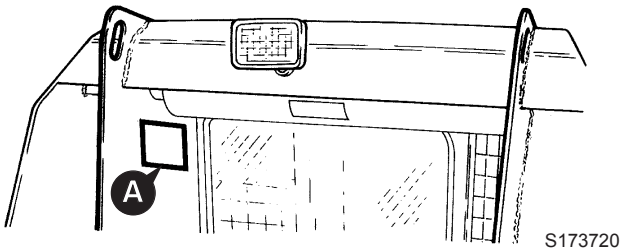
With the exception of slewing operations 'Left Hand' and 'Right Hand' are as viewed from the rear of the machine facing forwards.

Contents Page No.

The serial number of the chassis, engine, lift arm and hydraulic pump unit positively identify the type of JCB Skid Steer Loader you have.

Machine Identification Plate

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



S173720

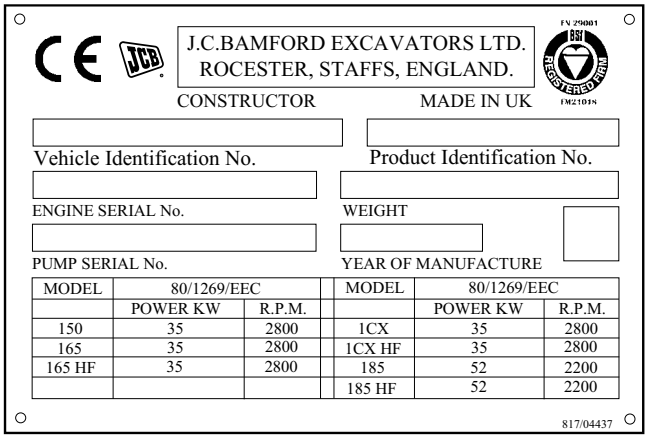
Typical Vehicle Identification Number (VIN)

SLP	165	S	B	V	E	677001
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:

T = 1996	1 = 2001
V = 1997	2 = 2002
W = 1998	3 = 2003
X = 1999	4 = 2004
Y = 2000	5 = 2005

6. Manufacturer Location (E = England)
7. Product Identification Number (PIN)



MODEL	80/1269/EEC		MODEL	80/1269/EEC	
	POWER KW	R.P.M.		POWER KW	R.P.M.
150	35	2800	1CX	35	2800
165	35	2800	1CX HF	35	2800
165 HF	35	2800	185	52	2200
			185 HF	52	2200

Unit Identification

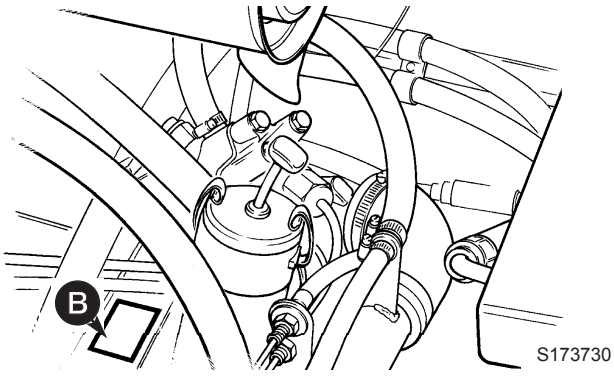
* The engine serial number on XUD engines is stamped on a machined area **B** on the top of the cylinder block. On JCB Diesel engines the number is stamped on a label **G** on the left side of the cylinder block.

The chassis serial number is stamped on the front edge of the right hand mudguard as shown at **C**. On early machines the serial number is stamped on the right hand side of the machine as shown at **F**.

The lift arm serial number is stamped on the rear of the lift arm as shown at **D**.

The hydraulic pump unit serial number is stamped on a plate on the top of the pump at **E**.

If any of the above 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.



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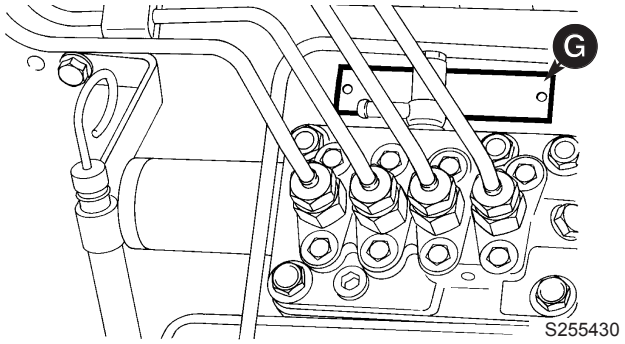

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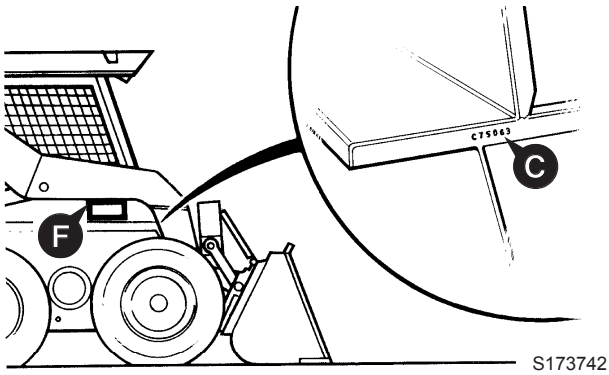

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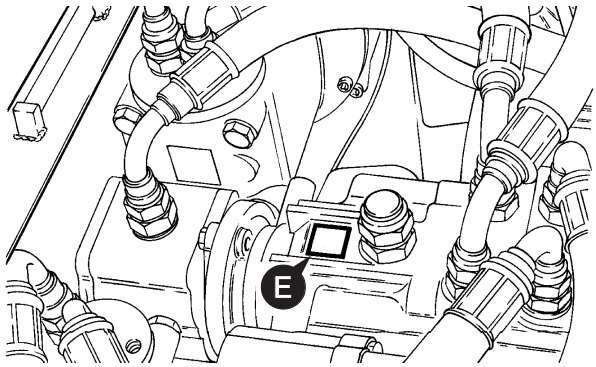

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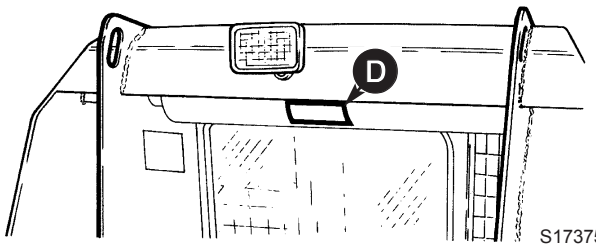
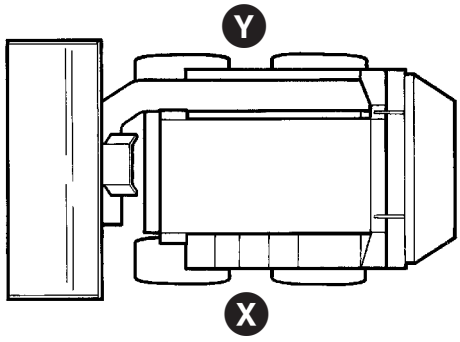


S173750

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.



S173660

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

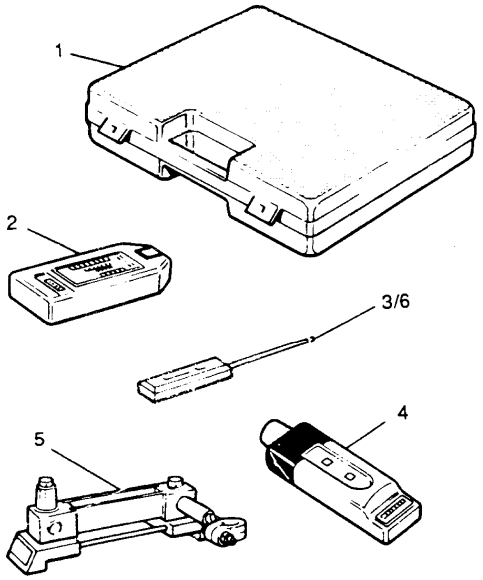
Note: All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.

Numerical List

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

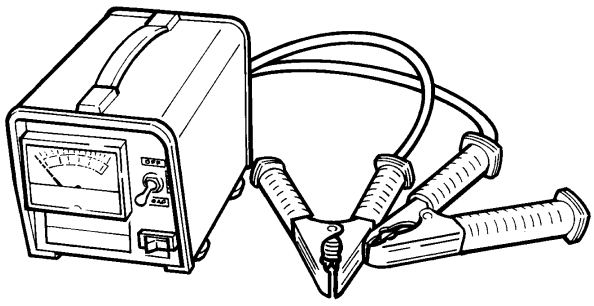
Section C - Electrics



188230

AVO Test Kit

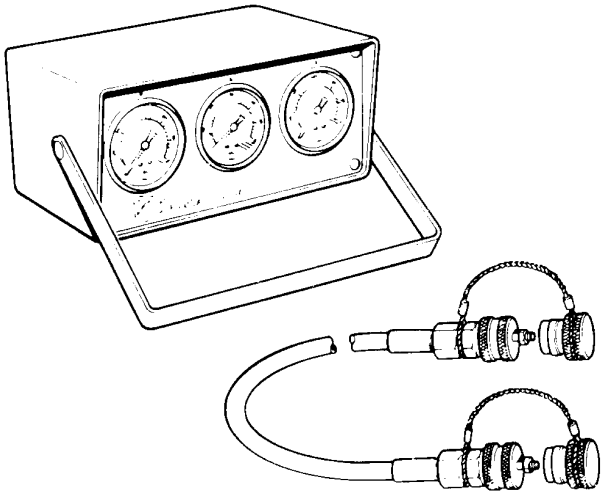
1	892/00283	Tool Kit Case
2	892/00281	AVO Meter
3	892/00286	Surface Temperature Probe
4	892/00284	Microtach Digital Tachometer
5	892/00282	Shunt - open type
6	892/00285	Hydraulic Oil Temperature Probe



239510

* 993/85700 Battery Tester

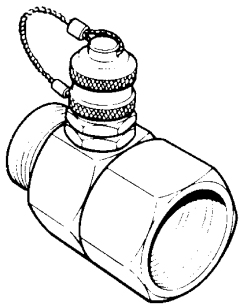
Section E - Hydraulics



188120

Hydraulic Circuit Pressure Test Kit

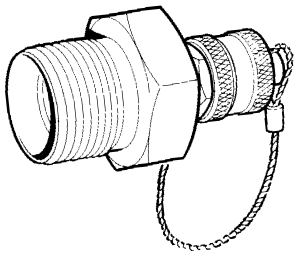
	892/00253	Pressure Test Kit
	892/00201	Replacement Gauge 0-20 bar (0-300 lbf/in²)
	892/00202	Replacement Gauge 0-40 bar (0-600 lbf/in²)
*	892/00203	Replacement Gauge 0-400 bar (0-6000 lbf/in²)
	892/00254	Replacement Hose



188130

Pressure Test 'T' Adapters

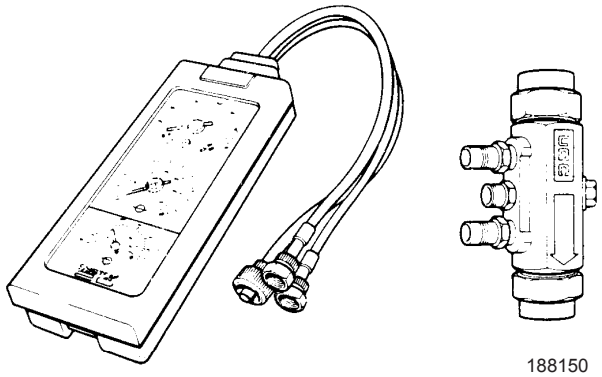
892/00262	1/4 in M BSP x 1/4 in F BSP x Test Point
816/55038	3/8 in M BSP x 3/8 in F BSP x Test Point
816/55040	1/2 in M BSP x 1/2 in F BSP x Test Point
892/00263	5/8 in M BSP x 5/8 in F BSP x Test Point
892/00264	3/4 in M BSP x 3/4 in F BSP x Test Point
892/00265	1 in M BSP x 1 in F BSPP x Test Point



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

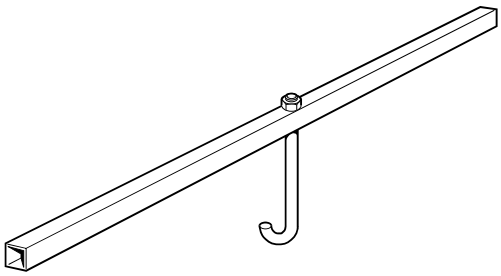


188150

Flow Test Equipment

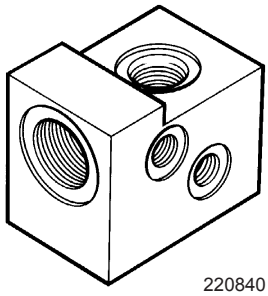
892/00268	Flow Monitoring Unit
892/00269	Sensor Head 0 - 100 l/min (0 - 22 UK gal/min)
892/00270	Load Valve
1406/0021	Bonded Washer
1604/0006	Adapter 3/4 in M x 3/4 in M BSP
1612/0006	Adapter 3/4 in F x 3/4 in M BSP
892/00271	Adapter 3/4 in F x 5/8 in M BSP
892/00272	Adapter 5/8 in F x 3/4 in M BSP
816/20008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



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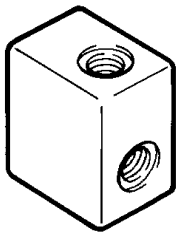
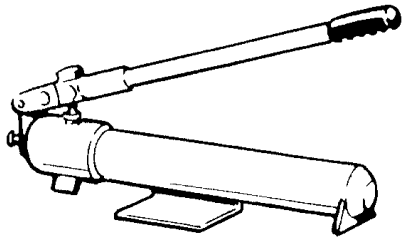


S270650

* 892/00252 Test Block for A. R. V. - Husco valves
* 892/00923 Test Block for A. R. V.
- Commercial Hydraulic valves



193850

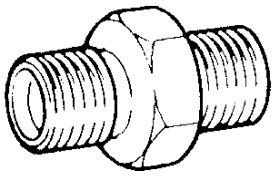
Hand Pump Equipment

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

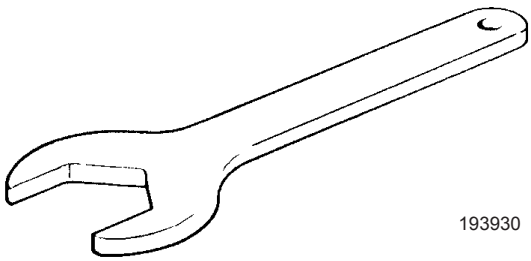
1406/0011	1/4 in BSP
1406/0018	1/2 in BSP
1406/0021	3/4 in BSP
1406/0029	1.1/4 in BSP



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

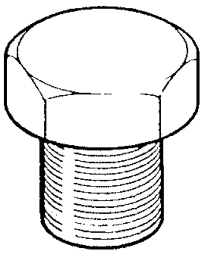


193930

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

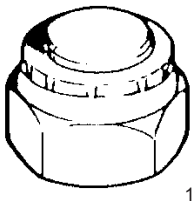
Section E - Hydraulics



193870

Female Cone Blanking Plug

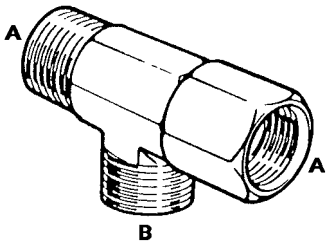
892/00055	1/4 in BSP
892/00056	3/8 in BSP
892/00057	1/2 in BSP
892/00059	3/4 in BSP
892/00060	1 in BSP'T'



193880

Male Cone Blanking Plug

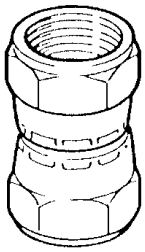
816/00294	1/4 in BSP
816/00189	3/8 in BSP
816/00190	1/2 in BSP
816/00197	5/8 in BSP
816/00196	3/4 in BSP
816/00193	1 in BSP



193890

'T' Adapters

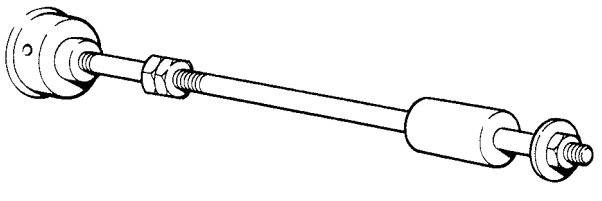
892/00047	3/8 in BSP (A) x 1/4 in BSP (B)
892/00048	1/2 in BSP (A) x 1/4 in BSP (B)
816/50043	3/4 in BSP (A) x 1/4 in BSP (B)
816/60096	3/4 in BSP (A) x 3/4 in BSP (B)



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



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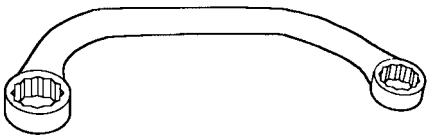

193920

* 993/68100 Slide Hammer

993/99510 Half Moon Spanner

JCB Multi-Gasket	A medium strength sealant suitable for all sizes of gasket flanges, and for hydraulic fittings of 25-65 mm diameter.	4102/1201	
JCB High Strength Threadlocker	A high strength locking fluid for use with threaded components.	4102/0551	
JCB Retainer (High Strength)	For retaining parts which are unlikely to be dismantled.	4101/0651	
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 dia.	4101/0251	
JCB Threadlocker & Sealer (High Strength)	A medium to high strength locking fluid for retention and sealing of ram piston heads.	4101/0552	
JCB Threadlocker	A locking fluid for use on threads larger than 50 mm dia.	4101/0451	
JCB Activator	A cleaning primer which speeds the curing rate of anaerobic products.	4104/0251 4104/0253	Aerosol Bottle
JCB Cleaner/Degreaser	For degreasing components prior to use of anaerobic adhesives and sealants.	4104/1557	Aerosol

The part numbers and descriptions of sealing and retaining compounds available from JCB Service have been revised with effect from January 1997 (see MI 563/H, 507/HA, 511/E). The list above has been changed accordingly.

References to these products on subsequent pages in this service manual will be progressively updated but for convenience a cross reference table is shown below.

Old Description	Old Part Number	New Description	New Part Number
JCB High Strength Threadlocker	4102/0502	**JCB High Strength Threadlocker**	4102/0551
JCB High Strength Retainer	4101/0602	**JCB Retainer (High Strength)**	4101/0651
JCB Lock & Seal	4101/0202	**JCB Threadlocker & Sealer**	4101/0251
Loctite 243	4101/1101	Use 4101/0251	
Loctite 262	4101/0502	**JCB Threadlocker & Sealer (High Strength)**	4101/0552
Loctite 932	4101/0402	**JCB Threadlocker**	4101/0451
Loctite Activator N	4104/0101 Aerosol 4104/0102 Bottle	**JCB Activator**	4104/0251 4104/0253
JCB Cleaner & Degreaser	4104/1538 Aerosol	**JCB Cleaner/Degreaser**	4104/1557

Contents	**Page No.**

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 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

⚠ 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

⚠ 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

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

Safety Decals (cont'd)

Contents

Contents Page No.

Fluids, Capacities and Lubricants - except North America

ITEM	CAPACITY	FLUID/LUBRICANT	SPECIFICATION
Engine Oil			
Peugeot XUD	5 litres	JCB 15W/40 Multigrade	API CE 15W 40
* **JCB Diesel**	8.2 litres	JCB 10W/30 Multigrade	API CC 10W 30
Hydraulic System	65 litres	JCB 15W/40 Multigrade JCB 10W/30 Multigrade	API CE 15W 40 API CC 10W 30
Cooling System			
Peugeot XUD			
Total coolant cap.	11 litres	Water/Anti-freeze (see ***Coolant Mixtures***)	Inhibited Ethanediol AL - 39
Antifreeze	5.5 litres		
* **JCB Diesel**			
Total coolant cap.	11 litres	JCB Universal Antifreeze/water	ASTM D3306-74
Antifreeze	5.5 litres	(see ***Coolant Mixtures***)	
Fuel System	60 litres	Diesel oil (see ***Types of Fuel***)	ASTM D975-66T Nos. 1D, 2D
Grease Points	-	JCB Special HP Grease or JCB Special MPL Grease	Lithium based, No. 2 consistency
Chain Case	Fill to level plug	Engine Oil	API CE 15W 40 or API CC 10W 30

Fluids, Capacities and Lubricants - North America

ITEM	CAPACITY	FLUID/LUBRICANT	SPECIFICATION
Engine Oil			
Peugeot XUD	1.32 US gal	JCB 30W	API CD/CE
* **JCB Diesel**	2.17 US gal	JCB 10W or JCB 15W/40	MIL-L-2104E
Hydraulic System	17.2 US gal	JCB 30W JCB 15W/40 (top up only)	API CD/CE MIL-L-2104E
Cooling System			
Peugeot XUD			
Total coolant cap.	2.9 US gal	Water/Anti-freeze (see ***Coolant Mixtures***)	Inhibited Ethanediol AL - 39
Antifreeze	1.45 US gal		
* **JCB Diesel**			
Total coolant cap.	2.9 US gal	Permanent Antifreeze	ASTM D3306-74
Antifreeze	1.45 US gal		
Fuel System	15.8 US gal	Diesel oil (see ***Types of Fuel)***	ASTM D975-66T Nos. 1D, 2D
Grease Points	-	JCB Moly EP #2 Grease	Lithium based, No. 2
Chain Case	Fill to level plug	Engine Oil	API CE 15W 40 or API CC 10W 30

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

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 JCB 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 density 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.

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 engine. 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, if possible, you lock the fuel cap to prevent theft and tampering.

Service Schedules

EVERY 10 OPERATING HOURS OR DAILY whichever occurs first, for the first 50 Operating Hours only

Check (engine stopped)

1 Tightness of wheel bolts

EVERY 10 OPERATING HOURS OR DAILY whichever occurs first

Clean

1 Machine generally, including cab interior

Check (engine stopped)

1 Generally for damage including ROPS/FOPS structure
2 Engine coolant level and condition
3 Fuel system for leaks and contamination
4 Hydraulic fluid level
5 Hydraulic system for leaks
6 Engine oil level and condition
7 Engine generally for leaks
8 Tyre pressures and condition
* **9** Windscreen washer level (if fitted)
10 Alternator belt tension (JCB Diesel engine only)
11 Fuel filter - drain if necessary (Peugeot engine only)
12 Seat belt condition and security

Check (Engine Running)

1 Warning lights extinguished
2 Operation of all electrical equipment
3 Exhaust for excessive smoke
4 Operation of all hydraulic services

Grease

1 Quickhitch pivot pins

AFTER THE FIRST 50 OPERATING HOURS ONLY

Change (Engine Stopped)

1 Engine oil and filter
* **2** Hydraulic fluid filter
3 Fuel filter - drain if necessary (JCB Diesel engine only)

Note: The engine is supplied with "Running in" oil. This must be changed together with engine oil filter after the first 50 operating hours. Failure to complete this could damage the engine.

EVERY 50 OPERATING HOURS OR WEEKLY whichever occurs first

Do the Daily jobs plus:

Check (Engine Stopped)

1 Oil cooler connections
2 Radiator hoses and condition
3 Alternator belt tension (Peugeot engine only)
4 Fuel filter - drain if necessary

Grease

1 Loader arm pivot points
2 Lift and compensating ram pivots

EVERY 100 OPERATING HOURS OR 2 WEEKLY whichever occurs first

Do the Daily and 50 hour jobs plus:

Clean

1 Battery terminals
2 Quickhitch square locking peg housings

Check (Engine Stopped)

1 Condition of ram piston rods
2 Hoses and pipework for chafing and damage
3 Air cleaner hose security
4 Wiring for chafing

Change

1 Air filter outer element when operating in dusty conditions

Oil

1 All linkage points
2 Hand throttle lever
3 Throttle pedal hinge bolt (if fitted)

Service Schedules (cont'd)

EVERY 250 OPERATING HOURS OR MONTHLY whichever occurs first

Do the Daily to 100 hour jobs plus:

Clean

1 Air cleaner dust valve
2 Radiator matrix
3 Hydraulic tank breather

Check (Engine stopped)
1 Tightness of wheel bolts

Check (Engine running)
1 Exhaust system security
2 Exhaust for excessive smoke
3 Cooling system for leaks
4 Throttle system and control pedal
5 Transmission operation
6 Operation of all hydraulic services
7 Operation of control isolation
8 Parking brake operation
9 Operation of electrical system
10 Operation of attachments

Change (Engine Stopped)

* **1** Engine oil and filter
2 Fuel filter element (JCB Diesel engine only)

EVERY 500 OPERATING HOURS OR 6 MONTHLY whichever occurs first

Do the Daily to 250 hour jobs plus:

Check (Engine Stopped)

1 Engine and pump mounting bolts for tightness
2 Pivot pins and bushes
3 Drive chain case oil levels
4 Hydraulic motor mounting bolts
* **5** Battery charge and condition
6 Valve clearances (JCB Diesel engine only)

Change

1 Hydraulic fluid filter(s)
2 Fuel filter element (Peugeot engine only)
3 Air filter outer element

EVERY 1000 OPERATING HOURS OR YEARLY whichever occurs first

Do the Daily to 500 hour jobs plus:

* **Check (Engine Stopped)**

1 Tighten cylinder head bolts (JCB Diesel engine only)
2 Engine cam belt - condition (Peugeot engine only)
3 Drive chain tension

Check (Engine Running)

1 Idling speed
2 Maximum governed speed
3 Pulled down speed
4 Compression
5 M.R.V. pressure
6 A.R.V. pressure
7 Drive pump pressure
8 Transmission stall pressure

EVERY 2000 OPERATING HOURS OR 2 YEARLY whichever occurs first

Do the Daily to 1000 hour jobs plus:

Clean

1 Engine injectors (and test)

Check (Engine Stopped)

1 Valve clearances (Peugeot engine only)
2 Wheel hub and hydraulic motor bearing clearance, replace as necessary

Change

1 Air filter inner element
2 Hydraulic fluid - sample/change (clean suction strainer)
3 Engine coolant
4 Engine cam belt (Peugeot engine only)
5 Drive chain case oil

Loader Arm Safety Strut

Installing

⚠ WARNING

Raised loader arms can drop suddenly and cause serious injury. Before working under raised loader arms, fit the loader arm safety strut.
2-1-1-6

⚠ WARNING

You could be killed or seriously injured if the loader control is accidentally operated. Make sure that no-one goes near the machine whilst you fit the safety strut.
16-3-1-5

1 Empty the shovel or attachment, if appropriate, and raise the loader arm enough to fit the safety strut.

2 Stop the engine.

3 Fit the strut:

a Remove the strut from its stowage position on the * right hand mudguard **C**.
b Place the strut around the lift ram.
c Secure the strut **A** into position using strap **B**.

4 Start the engine.

5 Slowly lower the loader arm onto the safety strut. Stop the movement immediately the weight of the arm is supported by the strut.

Note: Extreme care must be taken when lowering the loader arm onto the safety strut. 'Feather' the lever to lower the loader arm slowly.

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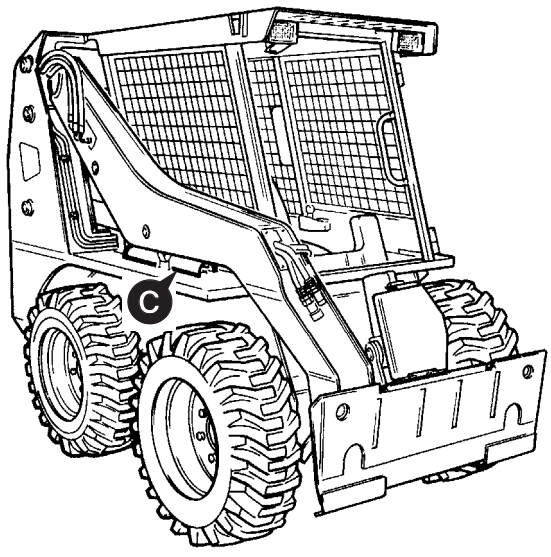


Removing

⚠ WARNING

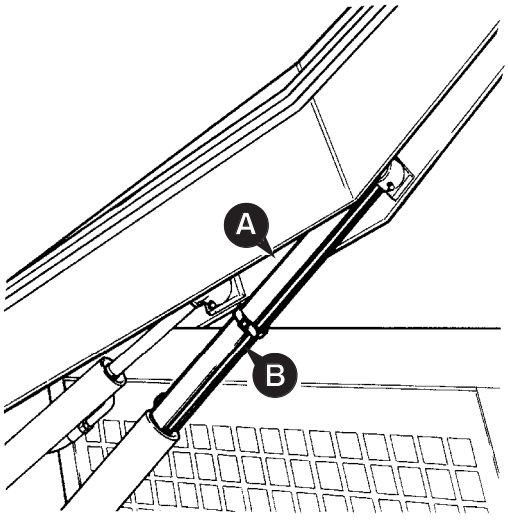
You could be killed or injured if the loader control is accidentally operated. Make sure no-one comes near the machine while you remove the safety strut.
2-3-1-3

1 Make sure that the drive control lever is in the neutral (rest) position.

2 Raise the loader arm to take the weight off the safety strut **A**. Stop the engine.

3 Remove the strut:

a Release securing strap **B**.
b Remove the safety strut from the lift ram.
* c Return the safety strut to its stowage position on the right hand mudguard **C**.



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Greasing

The machine must be greased regularly to keep it working efficiently. Regular greasing will also increase the machine's working life.

Grease should be applied with a grease gun, normally two strokes of the gun should be sufficient. Stop the greasing procedure when fresh grease appears at the joint. Use the recommended grease.

In the following illustrations, the grease points are numbered. Count off the grease points as you apply grease to each one. Refit the dust caps after greasing.

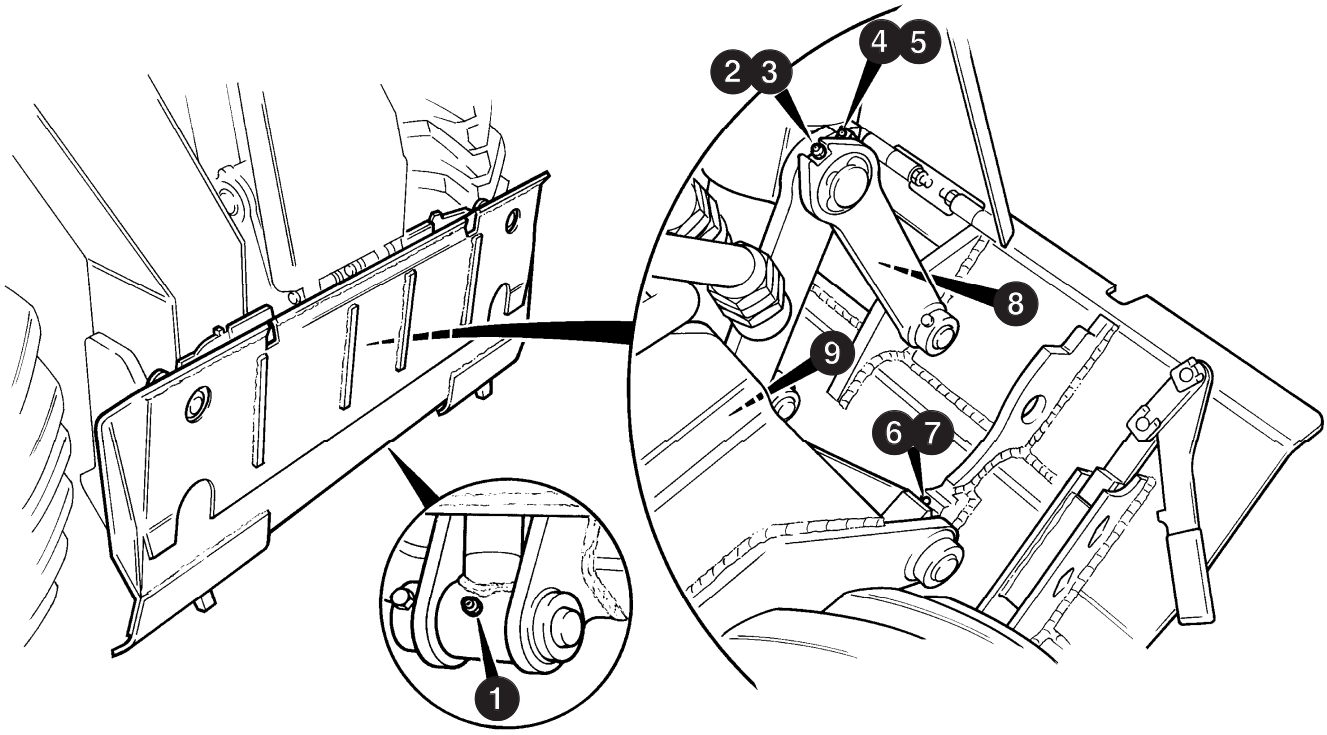
Quickhitch Pivot Pins - *for interval see Service Schedule*

Total of 9 grease points.

WARNING

Safety Strut

If it is necessary to work with the loader arm raised, you must fit the loader arm safety strut first. (See Loader Arm Safety Strut).
2-1-1-6



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