

## 411, 416 Wheeled Loading Shovel

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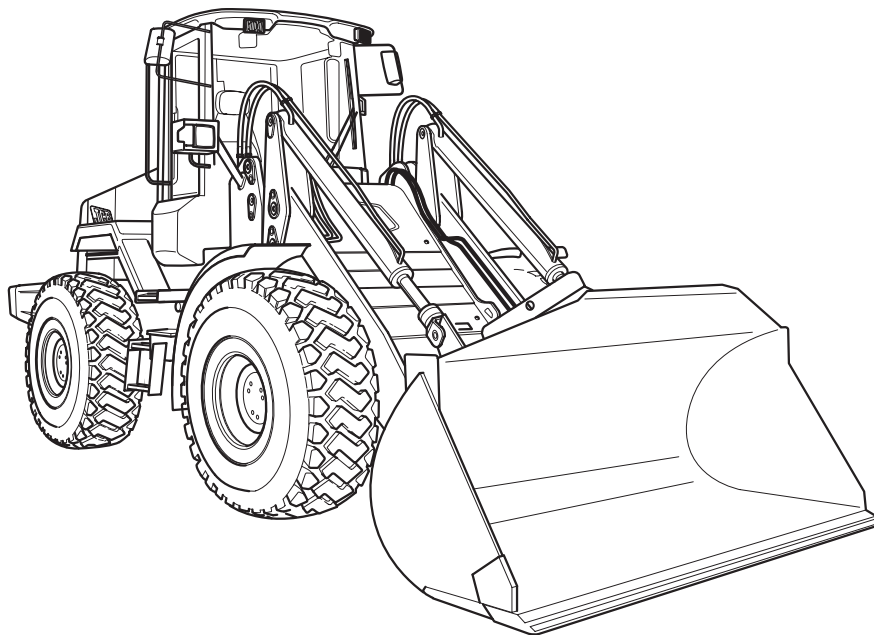
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# Section 1 - General Information

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# Introduction

## About this Publication

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.

This Service Manual covers the following machines:

411 Wheeled Loading Shovel from machine serial number 527000

416 Wheeled Loading Shovel from machine serial number 529000

411 Wheeled Loading Shovel from machine serial number M1241500

416 Wheeled Loading Shovel from machine serial number M1243000

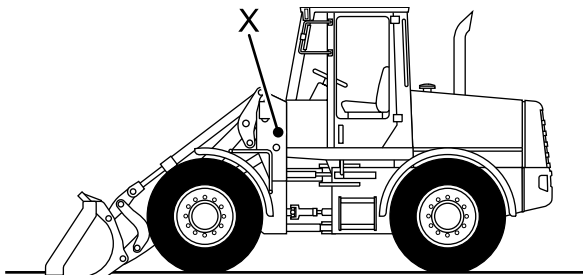
**Note:** Data and information for 412S Machines in this Service Manual may not be up to date. 412S and 414S Machines are now covered in Service Manual Part Number 9803/4170.

# Identifying your Machine

## Identification Plates

### Identification Plate

Your machine has an identification plate **1-X** mounted on the left hand side of the machine on the loader arm pillar. The serial numbers of the machine and its major units are stamped on the plate.



A203290-V2

Fig 1.

### Explanation of Vehicle Identification Number (VIN)

1	2	3	4	5
SLP	41100	S	E	0527001

- 1 World Manufacturer Identification, SLP = JCB
- 2 Machine Model, 41100 = 411
- 3 Year of Manufacture S, (P = 1993, R = 1994, S = 1995, T = 1996, V = 1997, W = 1998, X = 1999, Y = 2000, 1 = 2001, 2 = 2002, 3 = 2003, 4 = 2004)
- 4 Manufacturing Location (E = England)
- 5 Machine Serial Number (0527001)

The serial number of each major unit is also stamped on the unit itself. If a major unit is replaced by a new one, the serial number on the identification plate will be wrong. Either stamp the new number of the unit on the identification plate, or simply stamp out the old number.

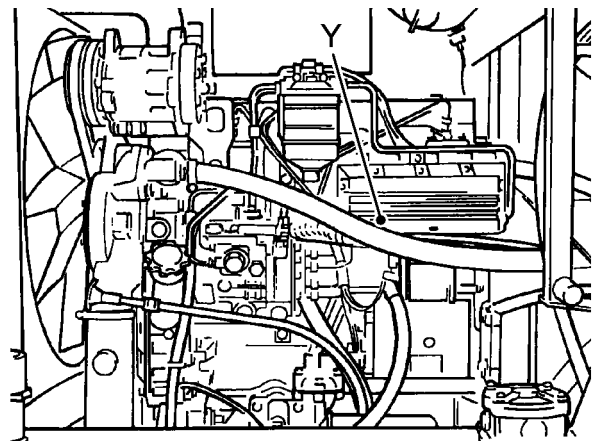
This will prevent the wrong unit number being quoted when replacement parts are ordered.

The machine and engine serial numbers can help identify exactly the type of equipment you have.

### Unit Identification

The engine serial number is stamped on a plate **2-Y** which is fastened to the right side of the cylinder block, near the fuel filter.

**Note:** For machines with the JCB 444 Series engine, see **Section K, Technical Data.**



S203700-V1

Fig 2.

### Typical Engine Identification Number

1	2	3	4	5
AA	50261	U	500405	P

1 Engine Type,

**A Series** - **AA** = 4 cylinder naturally aspirated, **AB** = 4 cylinder turbo.

**R Series** - **RG** = 4 cylinder turbo, low emission stage 2, **RJ** = 4 cylinder air to air charge cooled, low emission, stage 2.

2 Build Number

3 Country of Origin

4 Engine Sequence Number

5 Year of Manufacture

The Transmission serial number is stamped on plate **3-Z** as shown.

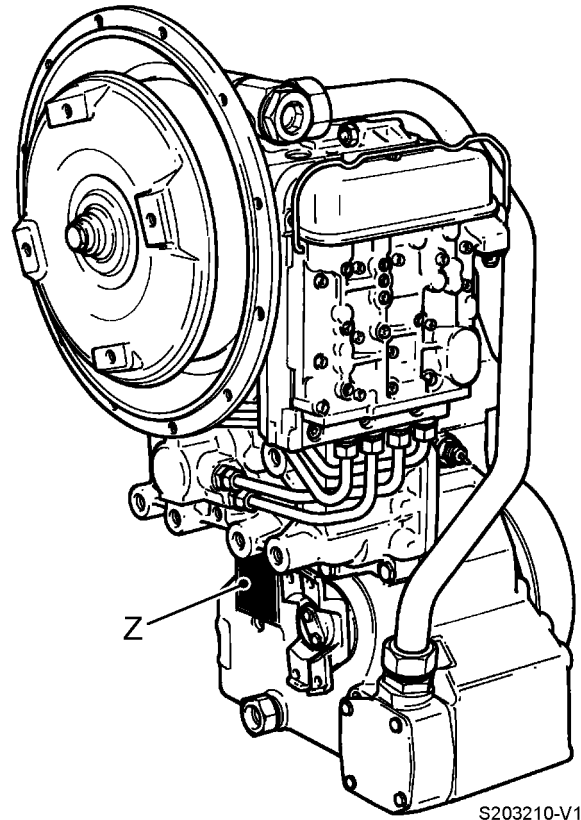


Fig 3.

# Torque Settings

## Zinc Plated Fasteners (golden finish)

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

Dia.	Bolt size		Torque Settings		
	(mm)	Hexagon (A/F) mm	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	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

Dia.	Bolt size		Torque Settings		
	(mm)	Hexagon (A/F) mm	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
M18	(18)	27	350	36	258
M20	(20)	30	476	48	352
M24	(24)	36	822	84	607
M30	(30)	46	1633	166	1205
M36	(36)	55	2854	291	2105

### Rivet Nut Bolts/Screws

Dia.	Bolt size (mm)	Torque Settings (for steel rivet nuts)		
		Nm	kgf m	lbf ft
M3	(3)	1.2	0.12	0.9
M4	(4)	3.0	0.3	2.0
M5	(5)	6.0	0.6	4.5
M6	(6)	10.0	1.0	7.5
M8	(8)	24.0	2.5	18.0
M10	(10)	48.0	4.9	35.5
M12	(12)	82.0	8.4	60.5

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

# Service Tools

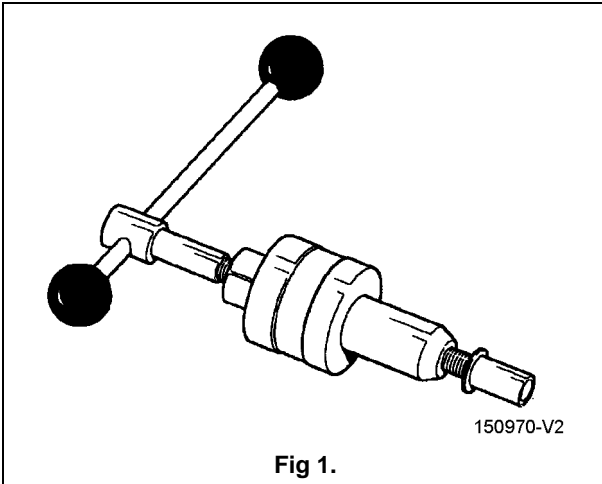
## Numerical List Section B - Body and Framework

The tools listed in the table are special tools required for removal and replacement of Body and Framework parts. These tools are available from JCB Service.

**Note:** Tools other than those listed will be required. It is expected that such general tools will be available in any well equipped workshop or be available locally from any good tool supplier.

<b>Part Number</b>	<b>Description</b>	<b>Tool Detail Reference</b>
825/99849	Dummy Bush	⇒ <a href="#">Fig 12. (□ 1-8)</a>
825/99850	Bearing Locator	⇒ <a href="#">Fig 12. (□ 1-8)</a>
826/01179	M6 x 16mm Rivet Nut	⇒ <a href="#">Fig 1. (□ 1-6)</a>
826/01106	M6 x 19mm Rivet Nut	⇒ <a href="#">Fig 1. (□ 1-6)</a>
826/01177	M8 x 18mm Rivet Nut	⇒ <a href="#">Fig 1. (□ 1-6)</a>
826/01176	M10 x 23mm Rivet Nut	⇒ <a href="#">Fig 1. (□ 1-6)</a>
826/01333	M10 x 26mm Rivet Nut	⇒ <a href="#">Fig 1. (□ 1-6)</a>
892/00842	Glass Lifter	⇒ <a href="#">Fig 3. (□ 1-6)</a>
892/00843	Glass Stand	⇒ <a href="#">Fig 2. (□ 1-6)</a>
892/00844	Long Knife	⇒ <a href="#">Fig 11. (□ 1-8)</a>
892/00846	Glass Extractor (Handles)	⇒ <a href="#">Fig 8. (□ 1-7)</a>
892/00847	Nylon Spatula	⇒ <a href="#">Fig 4. (□ 1-6)</a>
892/00848	Wire Starter	⇒ <a href="#">Fig 6. (□ 1-7)</a>
892/00849	Braided Cutting Wire	⇒ <a href="#">Fig 10. (□ 1-8)</a>
926/15500	Rubber Spacer Blocks	⇒ <a href="#">Fig 5. (□ 1-7)</a>
992/12800	Cut-Out Knife	⇒ <a href="#">Fig 7. (□ 1-7)</a>
992/12801	'L' Blades	⇒ <a href="#">Fig 9. (□ 1-8)</a>

### Tool Detail Reference Section B - Body and Framework



**Note:** 826/01179 M6 x 16mm Rivet Nut, 826/01106 M6 x 19mm Rivet Nut, 826/01177 M8 x 18mm Rivet Nut, 826/01176 M10 x 23mm Rivet Nut, 826/01333 M10 x 26mm Rivet Nut

Installation Tool Available from:

Bollhoff Fastenings Ltd.

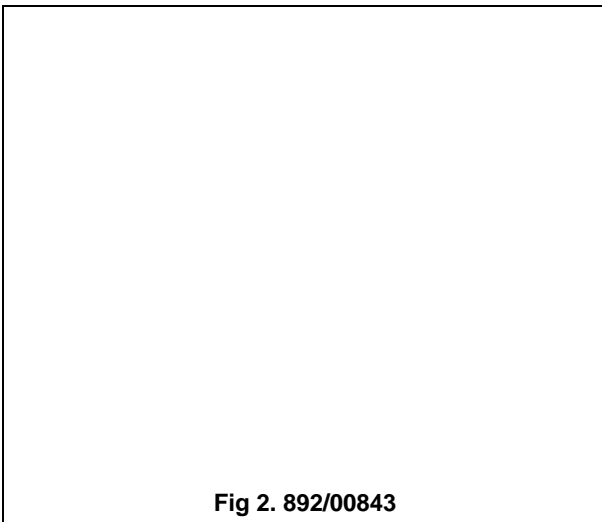
Midacre

The Willenhall Estate

Rose Hill

Willenhall

West Midlands, WV13 2JW







**Fig 9. 992/12801**

**Note:** - 25 mm (1 in) cut - replacement blades for cut-out knife (above), (unit quantity = 5 off)



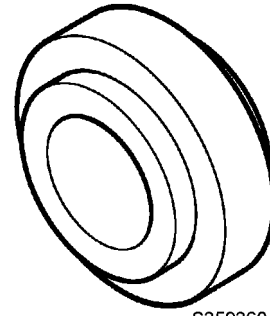
**Fig 10. 892/00849**

**Note:** - consumable heavy duty cut-out wire used with the glass extraction tool (above), (approx 25 m length)



**Fig 11. 892/00844**

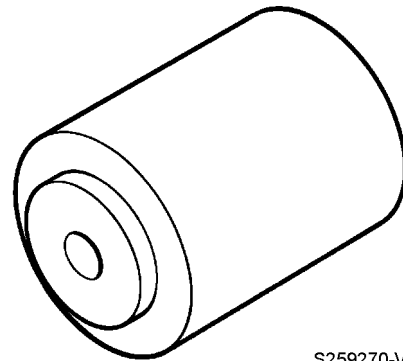
**Note:** - used to give extended reach for normally inaccessible areas.



S259260-V1

**Fig 12. 825/99849**

**Note:** - used with bearing locator to set up Upper Centre Pivot.



S259270-V1

**Fig 13. 825/99850**

**Note:** - used with dummy bush to set up Upper Centre Pivot.



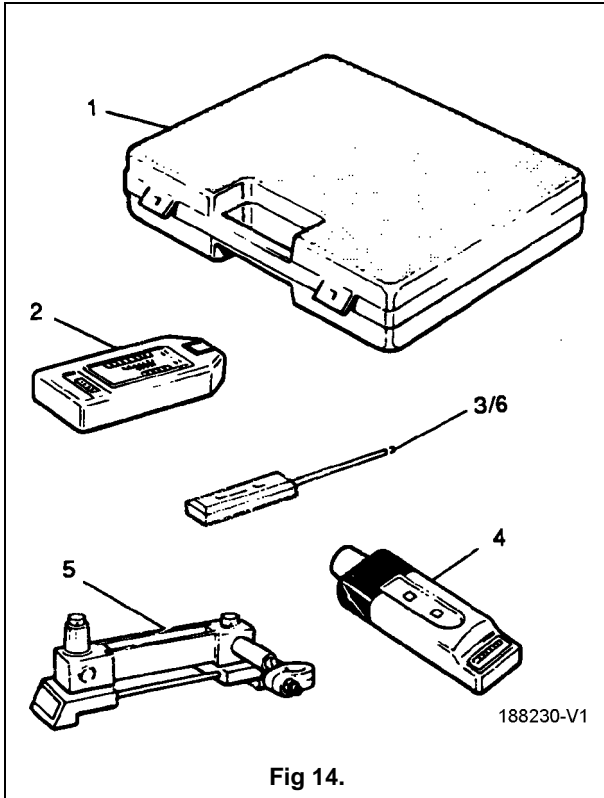
### Numerical List Section C - Electrics

The tools listed in the table are special tools required for testing electrics. These tools are available from JCB Service .

**Note:** *Tools other than those listed will be required. It is expected that such general tools will be available in any well equipped workshop or be available locally from any good tool supplier.*

<b>Part Number</b>	<b>Description</b>	<b>Tool Detail Reference</b>
892/00282	Shunt	<a href="#">⇒ Fig 14. (□ 1-10)</a>
892/00283	Tool Kit Case	<a href="#">⇒ Fig 14. (□ 1-10)</a>
892/00284	Digital Tachometer	<a href="#">⇒ Fig 14. (□ 1-10)</a>
892/00285	Hyd. Oil Temperature Probe	<a href="#">⇒ Fig 14. (□ 1-10)</a>
892/00286	Surface Temperature Probe	<a href="#">⇒ Fig 14. (□ 1-10)</a>
892/00298	Fluke Meter	<a href="#">⇒ Fig 14. (□ 1-10)</a>
993/85700	Battery Tester	<a href="#">⇒ Fig 15. (□ 1-10)</a>

**Tool Detail Reference Section C - Electrics**



**Fig 14.**

1	892/00283 Tool Kit Case
2	892/00298 Fluke Meter
3	892/00286 Surface Temperature Probe
4	892/00284 Venture Microtach Digital Tachometer
5	892/00282 100 amp Shunt - open type
6	892/00285 Hydraulic Temperature Probe

### Numerical List Section E - Hydraulics

The tools listed in the table are special tools required for testing, removing and replacing hydraulics. These tools are available from JCB Service .

**Note:** Tools other than those listed will be required. It is expected that such general tools will be available in any well equipped workshop or be available locally from any good tool supplier.

Part Number	Description	Tool Detail Reference
1406/0011	Bonded Washer	<a href="#">⇒ Fig 18. (1-14)</a>
1406/0014	Bonded Washer	<a href="#">⇒ Fig 18. (1-14)</a>
1406/0018	Bonded Washer	<a href="#">⇒ Fig 18. (1-14)</a>
1406/0021	Bonded Washer	<a href="#">⇒ Fig 18. (1-14)</a>
1406/0029	Bonded Washer	<a href="#">⇒ Fig 18. (1-14)</a>
1604/0006	Adapter	<a href="#">⇒ Fig 19. (1-14)</a>
1612/0006	Adapter	<a href="#">⇒ Fig 19. (1-14)</a>
816/00189	Blanking Cap	<a href="#">⇒ Fig 21. (1-15)</a>
816/00190	Blanking Cap	<a href="#">⇒ Fig 21. (1-15)</a>
816/00193	Blanking Cap	<a href="#">⇒ Fig 21. (1-15)</a>
816/00196	Blanking Cap	<a href="#">⇒ Fig 21. (1-15)</a>
816/00197	Blanking Cap	<a href="#">⇒ Fig 21. (1-15)</a>
816/00294	Blanking Cap	<a href="#">⇒ Fig 21. (1-15)</a>
816/15118	Pressure Test Adapter	<a href="#">⇒ Fig 22. (1-15)</a>
816/20008	Adapter	<a href="#">⇒ Fig 19. (1-14)</a>
816/55038	Pressure Test Adapter	<a href="#">⇒ Fig 17. (1-14)</a>
816/55040	Pressure Test Adapter	<a href="#">⇒ Fig 17. (1-14)</a>
892/00039	Spool Clamp	<a href="#">⇒ Fig 25. (1-16)</a>
892/00055	Blanking Plug	<a href="#">⇒ Fig 20. (1-15)</a>
892/00056	Blanking Plug	<a href="#">⇒ Fig 20. (1-15)</a>
892/00057	Blanking Plug	<a href="#">⇒ Fig 20. (1-15)</a>
892/00058	Blanking Plug	<a href="#">⇒ Fig 20. (1-15)</a>
892/00059	Blanking Plug	<a href="#">⇒ Fig 20. (1-15)</a>
892/00060	Blanking Plug	<a href="#">⇒ Fig 20. (1-15)</a>
892/00074	Female Connector	<a href="#">⇒ Fig 23. (1-15)</a>
892/00075	Female Connector	<a href="#">⇒ Fig 23. (1-15)</a>
892/00076	Female Connector	<a href="#">⇒ Fig 23. (1-15)</a>
892/00077	Female Connector	<a href="#">⇒ Fig 23. (1-15)</a>
892/00137	Micro-Bore Hose	<a href="#">⇒ Fig 26. (1-16)</a>
892/00223	Hand Pump	<a href="#">⇒ Fig 26. (1-16)</a>
892/00239	Charging Tool	<a href="#">⇒ Fig 27. (1-16)</a>

Part Number	Description	Tool Detail Reference
892/00253	Pressure Test Kit	⇒ <a href="#">Fig 16. (1-14)</a>
892/00255	Pressure Test Adaptor	⇒ <a href="#">Fig 22. (1-15)</a>
892/00256	Pressure Test Adaptor	⇒ <a href="#">Fig 22. (1-15)</a>
892/00257	Pressure Test Adaptor	⇒ <a href="#">Fig 22. (1-15)</a>
892/00258	Pressure Test Adaptor	⇒ <a href="#">Fig 22. (1-15)</a>
892/00259	Pressure Test Adaptor	⇒ <a href="#">Fig 22. (1-15)</a>
892/00260	Pressure Test Adaptor	⇒ <a href="#">Fig 22. (1-15)</a>
892/00261	Pressure Test Adaptor	⇒ <a href="#">Fig 22. (1-15)</a>
892/00262	Pressure Test Adaptor	⇒ <a href="#">Fig 26. (1-16)</a>
892/00263	Pressure Test Adaptor	⇒ <a href="#">Fig 17. (1-14)</a>
892/00264	Pressure Test Adaptor	⇒ <a href="#">Fig 17. (1-14)</a>
892/00265	Pressure Test Adaptor	⇒ <a href="#">Fig 17. (1-14)</a>
892/00268	Flow Monitoring Unit	⇒ <a href="#">Fig 19. (1-14)</a>
892/00269	Sensor Head	⇒ <a href="#">Fig 19. (1-14)</a>
892/00270	Load Valve	⇒ <a href="#">Fig 19. (1-14)</a>
892/00274	Adapter	⇒ <a href="#">Fig 26. (1-16)</a>
892/00275	Adapter	⇒ <a href="#">Fig 19. (1-14)</a>
892/00279	Gauge	⇒ <a href="#">Fig 26. (1-16)</a>
892/00309	A.R.V. Pressure Test Kit	⇒ <a href="#">Fig 28. (1-17)</a>
892/00335	A.R.V. Cartridge Removal Tool	⇒ <a href="#">Fig 28. (1-17)</a>
892/00340	Test Block Body	⇒ <a href="#">Fig 28. (1-17)</a>
892/00341	Setting Body	⇒ <a href="#">Fig 28. (1-17)</a>
892/00343	Spanner	⇒ <a href="#">Fig 28. (1-17)</a>
892/00345	Anti-cavitation Lock Out Bung	⇒ <a href="#">Fig 28. (1-17)</a>
892/00706	Test Probe	⇒ <a href="#">Fig 26. (1-16)</a>
892/00948	Charging Tool	⇒ <a href="#">Fig 27. (1-16)</a>
892/01042	Charging Tool	⇒ <a href="#">Fig 27. (1-16)</a>
892/01043	Adapter	⇒ <a href="#">Fig 27. (1-16)</a>
992/09300	Spanner	⇒ <a href="#">Fig 24. (1-16)</a>
992/09400	Spanner	⇒ <a href="#">Fig 24. (1-16)</a>
992/09500	Spanner	⇒ <a href="#">Fig 24. (1-16)</a>
992/09600	Spanner	⇒ <a href="#">Fig 24. (1-16)</a>
992/09700	Spanner	⇒ <a href="#">Fig 24. (1-16)</a>
992/10000	Spanner	⇒ <a href="#">Fig 24. (1-16)</a>
992/10100	Spool Clamp	⇒ <a href="#">Fig 25. (1-16)</a>
993/68300	Adjusting Pin	⇒ <a href="#">Fig 28. (1-17)</a>



## Section 1 - General Information Service Tools

Numerical List Section E - Hydraulics

The following parts are replacement items for kits and would normally be included in the kit numbers above.

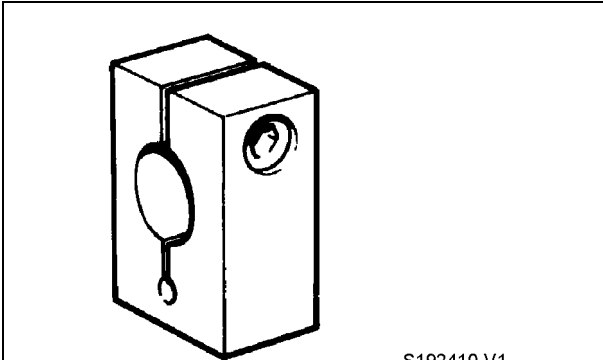
Replacement items for kit no. 892/00253

<b>Part Number</b>	<b>Description</b>	<b>Tool Detail Reference</b>
892/00201	Replacement Gauge	<a href="#">⇒ Fig 16. (□ 1-14)</a>
892/00202	Replacement Gauge	<a href="#">⇒ Fig 16. (□ 1-14)</a>
892/00203	Replacement Gauge	<a href="#">⇒ Fig 16. (□ 1-14)</a>
892/00254	Replacement Hose	<a href="#">⇒ Fig 16. (□ 1-14)</a>



**Fig 24. Hexagon Spanners for Ram Pistons and End Caps**

992/09300 55 mm
992/09400 65 mm
992/09500 75 mm
992/09600 85 mm
992/09700 95 mm
992/10000 125 mm



**Fig 25. Spool Clamps**

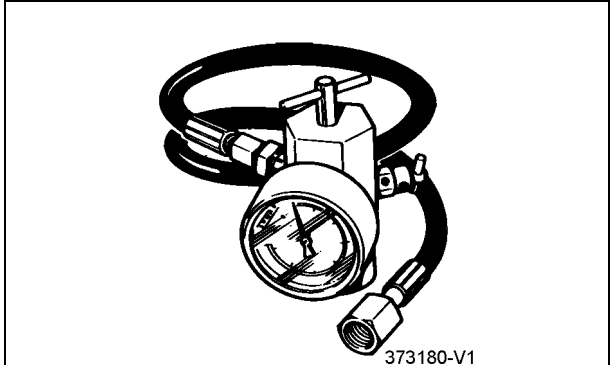
892/00039 Spool Clamp
992/10100 Spool Clamp



**Fig 26. Hand Pump Equipment**

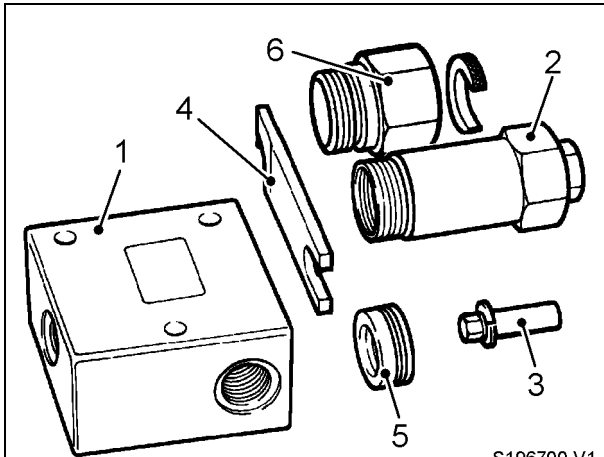
892/00223 Hand Pump
---------------------

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
892/00279 Gauge 0 - 400 bar (0 - 6000 lbf/in <sup>2</sup> )



**Fig 27. Accumulator Charge Equipment**

892/00239 Charging Tool (Diaphragm Accumulators)
892/01042 Charging Tool (Diaphragm Accumulators)
892/01043 Adapter (use with 892/01042)
892/00948 Charging Tool (Piston Accumulators)



S196700-V1

**Fig 28. Components for Valve Block A.R.V. Testing**

892/00309 A.R.V. Pressure Test Kit
1 892/00340 Test Block Body
2 892/00341 Setting Body
3 993/68300 Adjusting Pin
4 892/00343 Spanner
5 892/00345 Anti-cavitation Lock Out Bung
6 892/00335 A.R.V. Cartridge Removal Tool



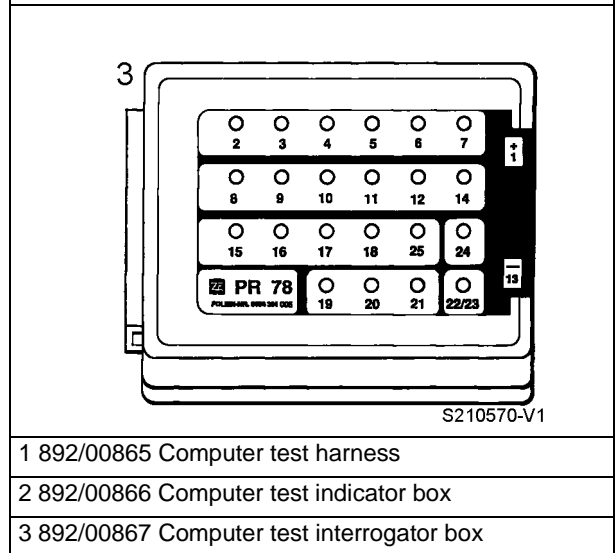
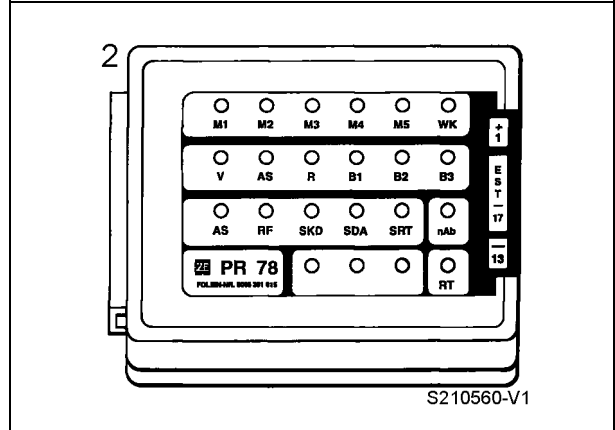
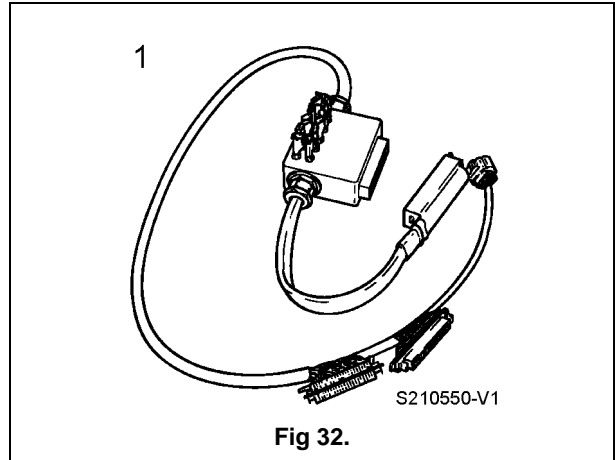
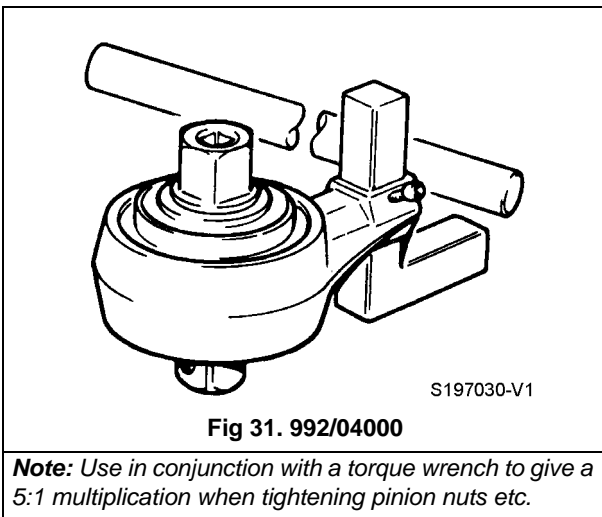
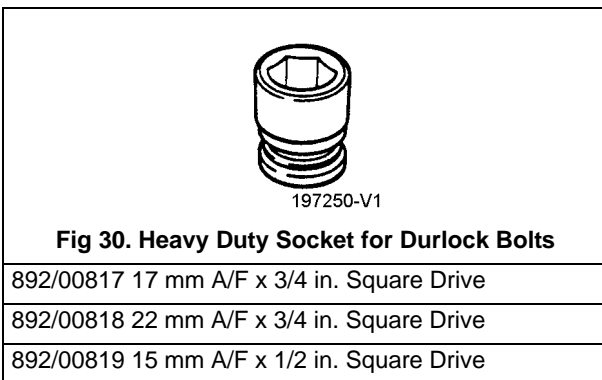
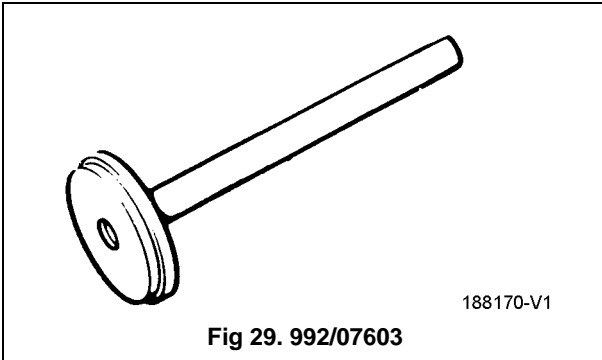
### Numerical List Section F - Transmission

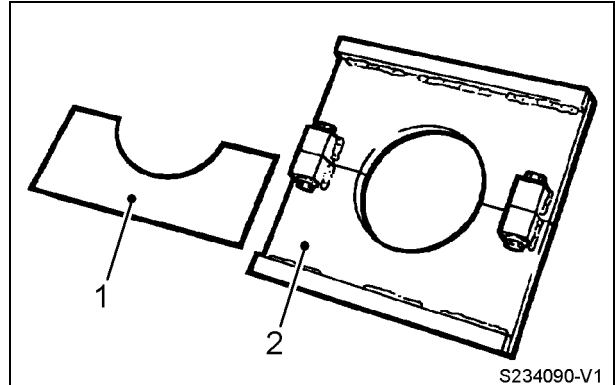
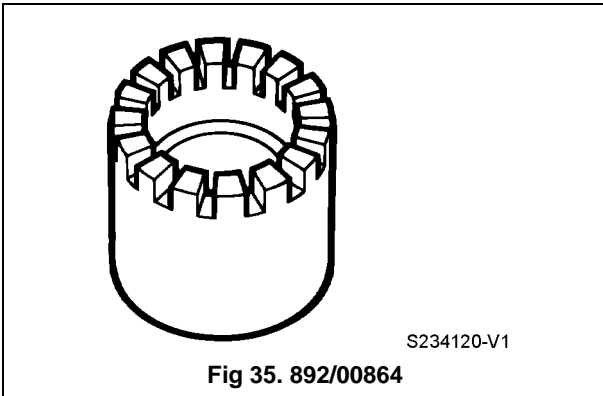
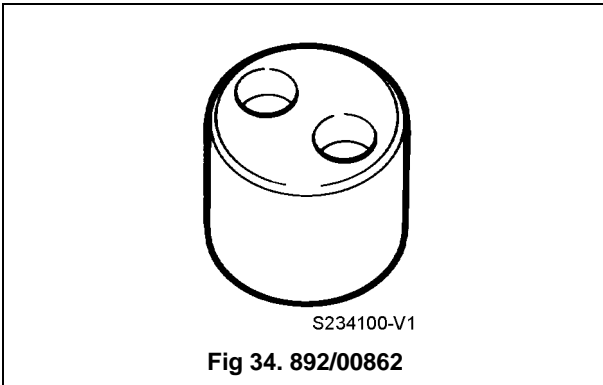
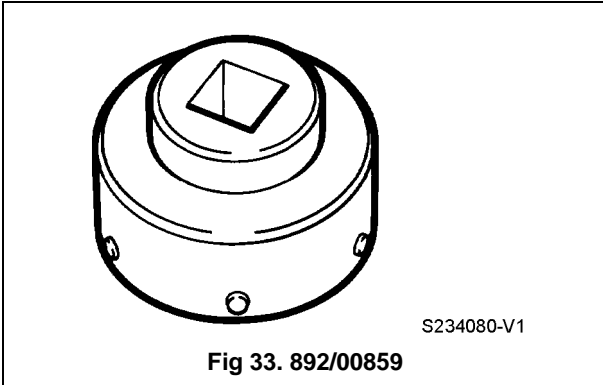
The tools listed in the table are special tools required for removal and replacement of Body and Framework parts. These tools are available from JCB Service.

**Note:** Tools other than those listed will be required. It is expected that such general tools will be available in any well equipped workshop or be available locally from any good tool supplier.

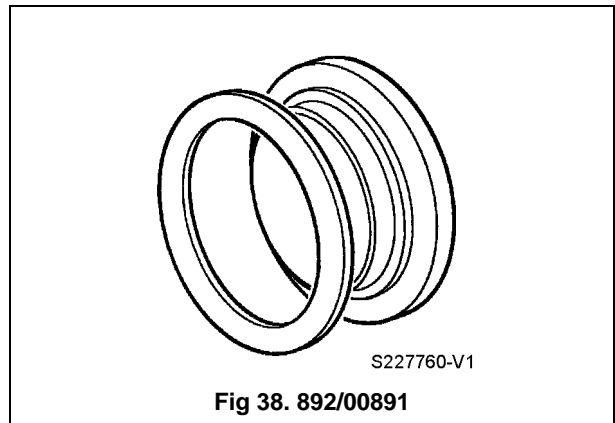
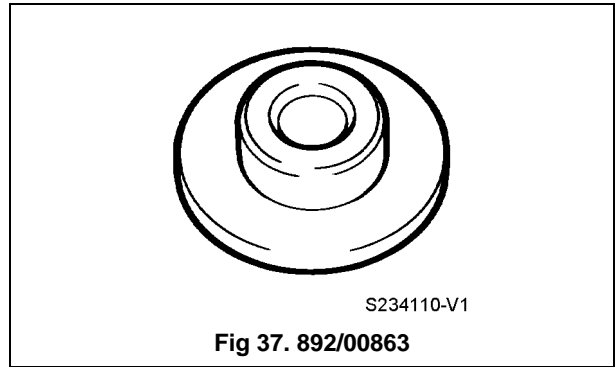
Part Number	Description	Tool Detail Reference
892/00817	Heavy Duty Socket	<a href="#">⇒ Fig 30. (□ 1-19)</a>
892/00818	Heavy Duty Socket	<a href="#">⇒ Fig 30. (□ 1-19)</a>
892/00819	Heavy Duty Socket	<a href="#">⇒ Fig 30. (□ 1-19)</a>
892/00859	Spanner Stake Nut	<a href="#">⇒ Fig 33. (□ 1-20)</a>
892/00860	Bearing Shim Remover	<a href="#">⇒ Fig 36. (□ 1-20)</a>
892/00861	Bearing Remover Base Tool	<a href="#">⇒ Fig 36. (□ 1-20)</a>
892/00862	Tab Washer Fitting Tool	<a href="#">⇒ Fig 33. (□ 1-20)</a>
892/00863	Blanking Plate Fitting Tool	<a href="#">⇒ Fig 37. (□ 1-20)</a>
892/00864	PD90 Locknut Spanner	<a href="#">⇒ Fig 35. (□ 1-20)</a>
892/00865	Computer Test Harness	<a href="#">⇒ Fig 32. (□ 1-19)</a>
892/00866	Computer Test Indicator Box	<a href="#">⇒ Fig 32. (□ 1-19)</a>
892/00867	Computer Test Interrogator Box	<a href="#">⇒ Fig 32. (□ 1-19)</a>
892/00891	Fitting Tool Assembly	<a href="#">⇒ Fig 38. (□ 1-20)</a>
892/01066	Interrogation lead	<a href="#">⇒ Fig 39. (□ 1-21)</a>
892/00909	Puller	<a href="#">⇒ Fig 35. (□ 1-20)</a>
992/04000	Torque Multiplier	<a href="#">⇒ Fig 31. (□ 1-19)</a>
992/07603	Replacer - Bearing Cup	<a href="#">⇒ Fig 29. (□ 1-19)</a>

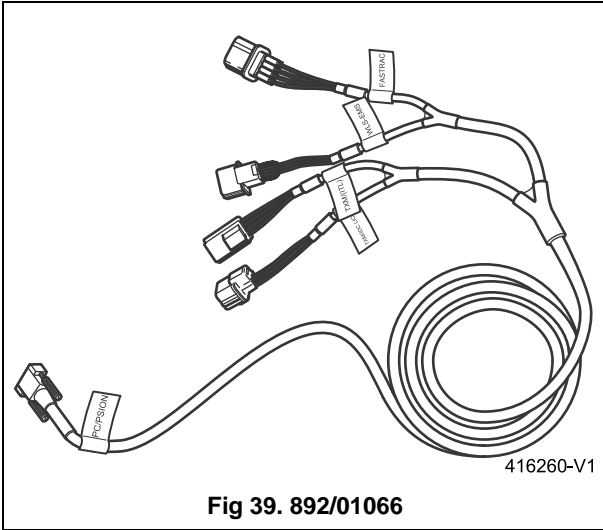
### Tool Detail Reference Section F - Transmission





- 1 892/00860 Bearing Remover Shim
- 2 892/00861 Bearing Remover Base Tool





**Fig 39. 892/01066**



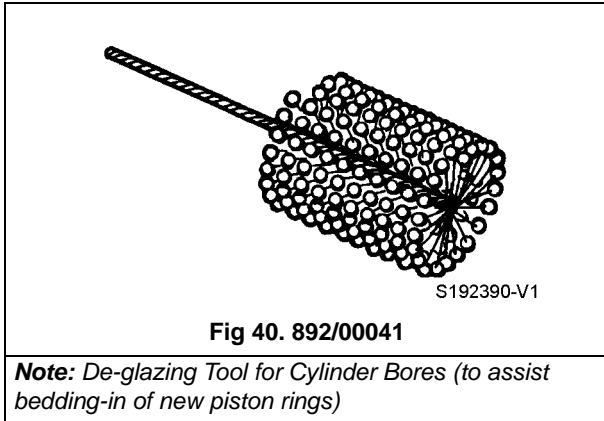
### Numerical List Section K - Engine

The tools listed in the table are special tools required for removal and replacement of Body and Framework parts. These tools are available from JCB Service.

**Note:** *Tools other than those listed will be required. It is expected that such general tools will be available in any well equipped workshop or be available locally from any good tool supplier.*

Part Number	Description	Tool Detail Reference
892/00041	De-glazing Tool	<a href="#">⇒ Fig 40. (□ 1-23)</a>

## Tool Detail Reference Section K - Engine



For details of other engine service tools refer to Perkins Service Manual Publication No. 9806/0100



# Service Consumables

## Sealing and Retaining Compounds

T11-001\_3

**Table 1.**

Type	Description	Part No.	Quantity
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	50 ml
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	50 ml
JCB Retainer (High Strength)	For all retaining parts which are unlikely to be dismantled.	4101/0651	50 ml
JCB Threadlocker and Sealer	A medium strength locking fluid for sealing and retaining nuts, bolts, and screws up to 50 mm diameter, and for hydraulic fittings up to 25 mm diameter.	4101/0250	10 ml
		4101/0251	50 ml
JCB Threadlocker and Sealer (High Strength)	A high strength locking fluid for sealing and retaining nuts, bolts, and screws up to 50 mm diameter, and for hydraulic fittings up to 25 mm diameter.	4101/0550	10 ml
		4101/0552	200 ml
JCB Threadseal	A medium strength thread sealing compound.	4102/1951	50 ml
JCB Activator	A cleaning primer which speeds the curing rate of anaerobic products.	4104/0251	200 ml (Aerosol)
		4104/0253	1 ltr (Bottle)
JCB Cleaner/Degreaser	For degreasing components prior to use of anaerobic adhesives and sealants.	4104/1557	400 ml (Aerosol)
Direct Glazing Kit	For one pane of glass; comprises of: <ul style="list-style-type: none"> <li>- 1 x Ultra Fast Adhesive (310 ml)</li> <li>- 1 x Active Wipe 205 (30 ml)</li> <li>- 1 x Black Primer 206J (30 ml)</li> <li>- plus applicator nozzle etc.</li> </ul>	993/55700	
Ultra Fast Adhesive	For direct glazing.	4103/2109	310 ml
Active Wipe 205	For direct glazing.	4104/1203	250 ml
Black Primer 206J	For direct glazing.	4201/4906	30 ml
Clear Silicone Sealant	To seal butt jointed glass.	4102/0901	
Plastic to Metal Bonder	To seal plastic to metal joints.	4103/0956	50 g
Black Polyurethane Sealant	To finish exposed edges of laminated glass.	4102/2309	310 ml



## Section 2 - Care and Safety

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# Safety Check List

## 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



### Safety - Yours and Others

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

As well as the warnings in the following pages, specific warnings are given throughout the book. This section is designed to give a safety code for use of the machine generally and for operation and maintenance practices.

## General Safety

### WARNING

#### Decals

Decals on the machine warn you of particular hazards. You can be injured if you do not obey the decal safety instructions.

Each decal is attached close to a part of the machine where there is a possible hazard. Make sure replacement parts include warning decals where necessary.

Keep all decals clean and readable. Replace lost or damaged decals. 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\_1

### 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

#### 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

#### 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

## 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

#### Entering/Leaving

Entering or leaving the cab or canopy must only be made where steps and handrails are provided. Always face the machine when entering and leaving. Make sure the step(s), handrails and your boot soles are clean and dry. Do not jump from the machine. Do not use the machine controls as handholds, use the handrails.

INT-2-1-7\_1

### 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

#### Ramps and Trailers

Water, mud, ice, grease and oil on ramps 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.

INT-2-2-6

### 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

#### Engine Panels

The engine has exposed rotating parts.

Do not open the bonnet while the engine is running. Keep other people clear while you raise the engine cover using the boom. Do not use the machine with the bonnet open or the cover raised.

5-1-2-1

### WARNING

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

#### Reversing

Reversing at high speeds can cause accidents. Do not reverse in a high gear with full throttle. Always drive at a safe speed to suit working conditions.

INT-2-2-9\_1



---

### **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

---

### **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

## Maintenance Safety

### 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

#### 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

#### Asbestos

Asbestos dust can damage your lungs. Some engine gaskets contain asbestos. Do not dismantle the engine or exhaust system; get these jobs done by a qualified person who has a copy of the engine service manual.

5-1-6-1

### 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

### 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.

INT-3-2-1\_3

### WARNING

#### Jacking

A machine can roll off jacks and crush you unless the wheels have been chocked. Always chock the wheels at the opposite end of the machine that is to be jacked. Do not work underneath a machine supported only by jacks. Always support a jacked-up machine on axle stands before working underneath it.

INT-3-2-8

### WARNING

#### Diesel Fuel

Diesel fuel is flammable; keep naked flames away from the fuel system. Do not smoke while refuelling or working on the fuel system. 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\_1

### WARNING

#### Hot Coolant

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

INT-3-2-9\_1

### 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**

---

**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**

---

**Electrical Circuits**

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

INT-3-1-4

---

**⚠ WARNING**

---

**Fluid Under Pressure**

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

INT-3-1-10\_2

---

**⚠ WARNING**

---

**Hydraulic Pressure**

Hydraulic fluid at system pressure can injure you. Before disconnecting or connecting hydraulic hoses, stop the engine and operate the controls to release pressure trapped in the hoses. Make sure the engine cannot be started while the hoses are open.

INT-3-1-11\_1

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**⚠ WARNING**

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If you try to charge a frozen battery, or jump start and run the engine, the battery could explode. Do not use a battery if its electrolyte is frozen. To prevent the battery electrolyte from freezing, keep the battery at full charge.

0125

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**⚠ 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**

---

**Soft Ground**

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

INT-3-2-4

---

**⚠ 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**

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 Thoroughly wash contaminated area with 10% calcium hydroxide or other suitable alkali solution, if necessary use wire wool to remove burnt remains.
- 2 Thoroughly wash contaminated area with detergent and water.
- 3 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

### **WARNING**

#### Hydraulic Hoses

Damaged hoses can cause fatal accidents. Inspect the hoses regularly for:

- Damaged hose ends
- Chafed outer covers
- Balloned outer covers
- Kinked or crushed hoses
- Embedded armouring in outer covers
- Displaced end fittings.

INT-3-3-2



## Safety Decals

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 as illustrated. Each decal has a part number printed on it, use this number to order a new decal from your JCB dealer.

### 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\_1

### WARNING

#### Decals

**Decals on the machine warn you of particular hazards. You can be injured if you do not obey the decal safety instructions.**

**Each decal is attached close to a part of the machine where there is a possible hazard. Make sure replacement parts include warning decals where necessary.**

**Keep all decals clean and readable. Replace lost or damaged decals. 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\_1

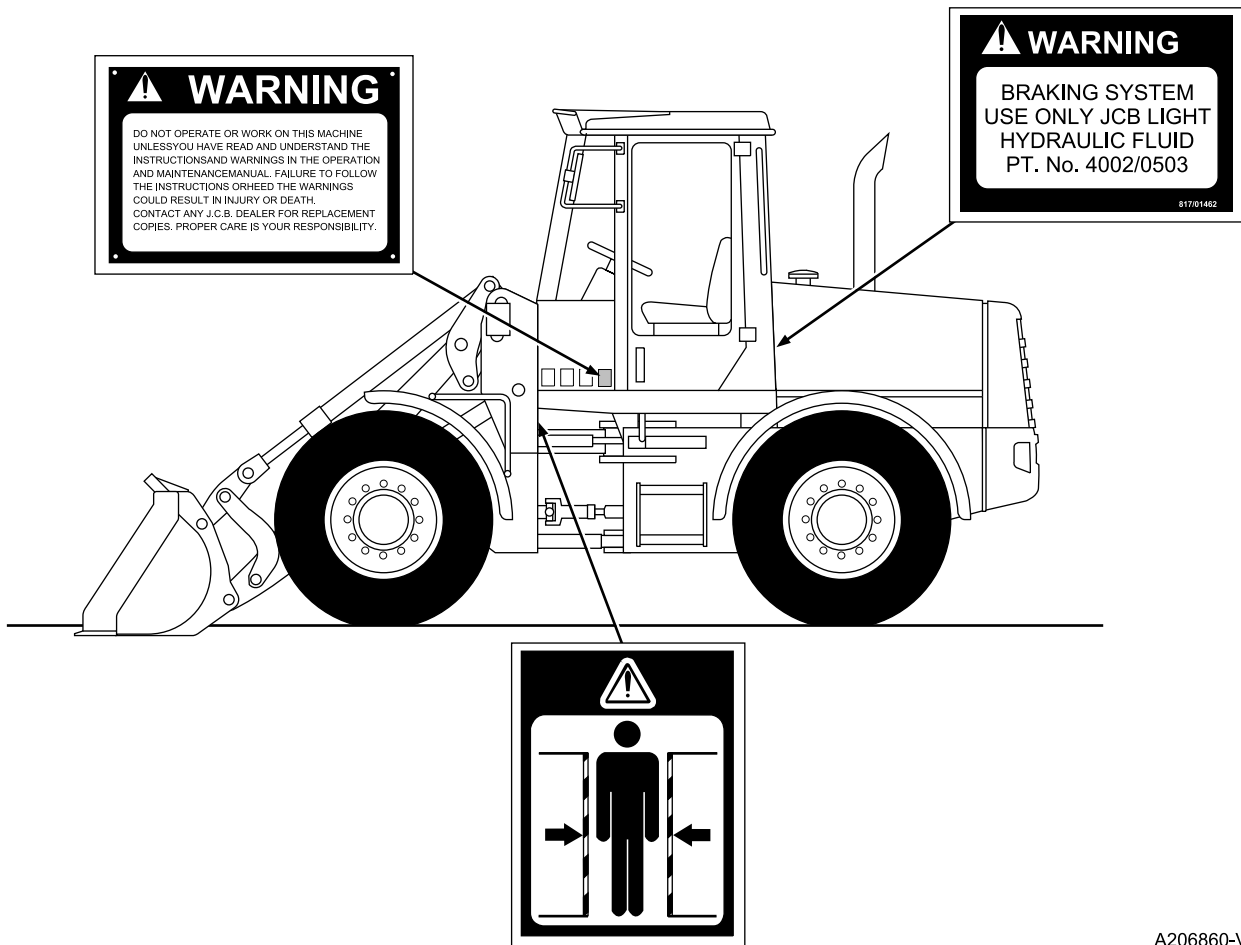


Fig 1.

A206860-V1





## Section 3 - Routine Maintenance

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