Service Manual

Backhoe Loader

9803/3280	3CX, 4CX	930001 to 960000
	214e, 214, 215, 217	903000 Onwards

Publication No.
S2-eng

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World Class
Customer Support

Service Manual

**3CX, 4CX,
214e, 214, 215, 217
& VARIANTS**

Backhoe Loader

From M/c No. 930000 Onwards
From M/c No. 903000 Onwards (USA)

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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.

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

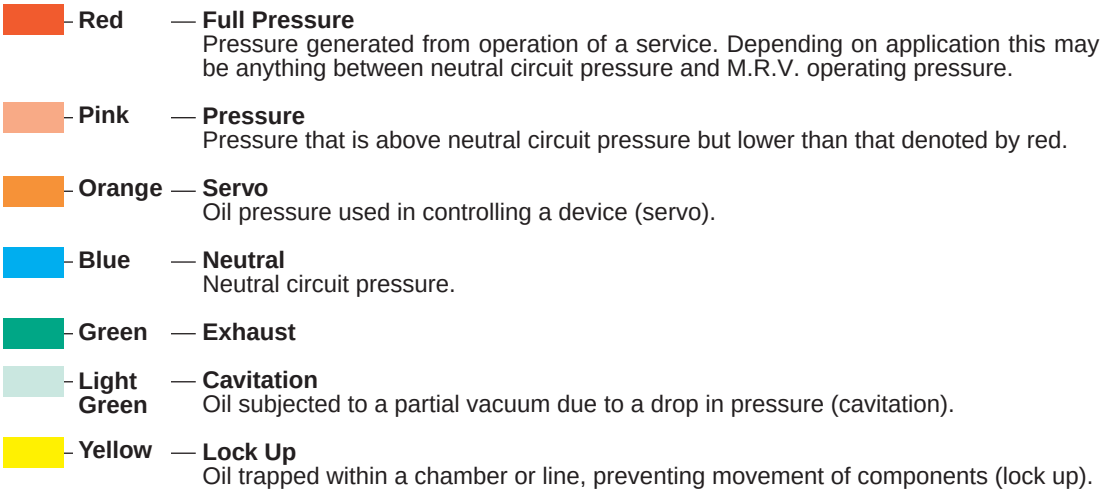
Machine Nomenclature

In this Service Manual, reference is made to machine models, e.g. 3CX, 4CX, these are European machine model names. North American machine models have different names, the table below shows the European and the equivalent North American nomenclature.

European		**North American**
3CX	=	214
4CX	=	214S, 215S, 217S

Colour Coding

The following colour coding, used on illustrations to denote various conditions of oil pressure and flow, is standardised throughout JCB Service publications.



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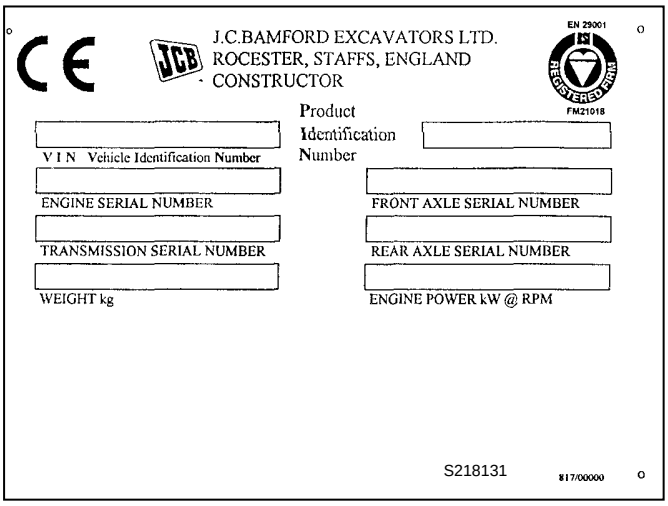
Machine Identification Plate

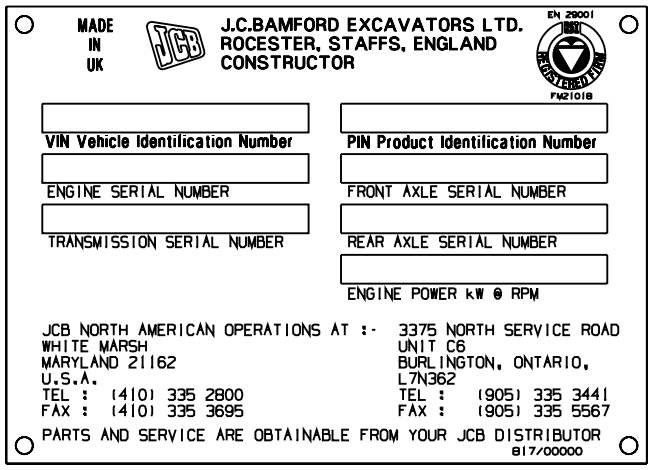
Your machine has an identification plate mounted on the loader tower. The serial numbers of the machine and its major units are stamped on the plate.

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.



U.K. and R.O.W.



North America

A246740

Typical Vehicle Identification Number (VIN)

SLP	3CX	T	S	V	E	930000
A	B	C	D	E	F	G

A World Manufacturer Identification

B Machine Model

C Steer Type (T= 2WS, F=4WS)

D Build Type (S=Sideshift, C=Centremount, L=Loader)

E Year of Manufacture:
2 = 2002
3 = 2003
4 = 2004
5 = 2005
6 = 2006
7 = 2007
8 = 2008

F Manufacturer Location (E = England)

G Product Identification Number (PIN)

Typical Engine Identification Number

AB	50262	U	500405	P
A	B	C	D	E

A Engine Type
AB = 4 cylinder turbo

B Build Number

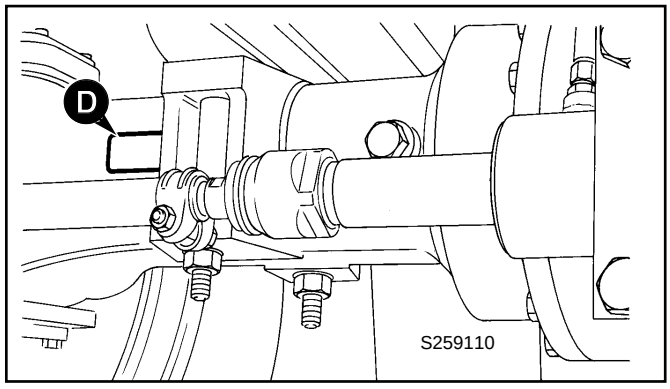
C Country of Origin

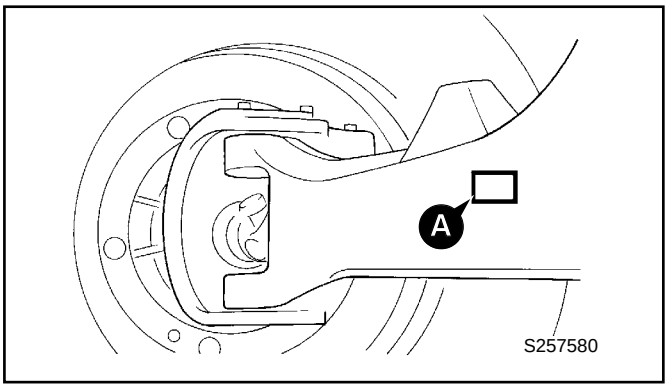
D Engine Sequence Number

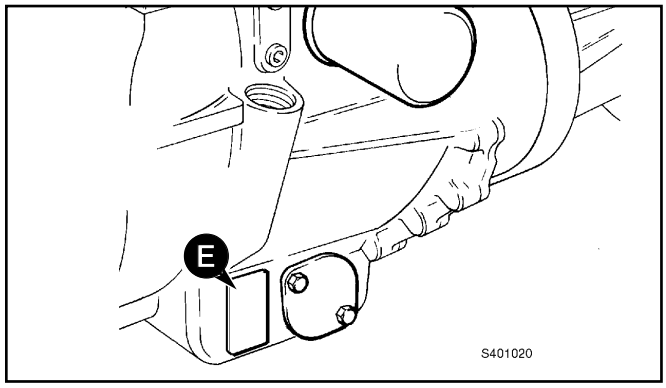
E Year of Manufacture

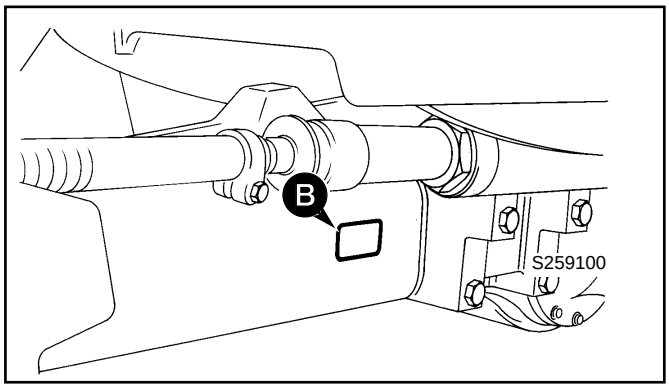
Serial Plates

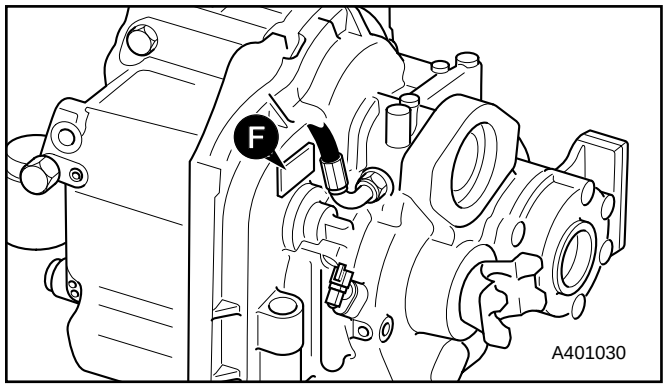
- **A** Front Axle (2WS machine)
- **B** Front Axle (4WS machine)
- **C** Rear Axle (2WS machine)
- **D** Rear Axle (4WS machine)
- **E** Synchro Shuttle Transmission
- **F** Powershift Transmission
- **G** Engine

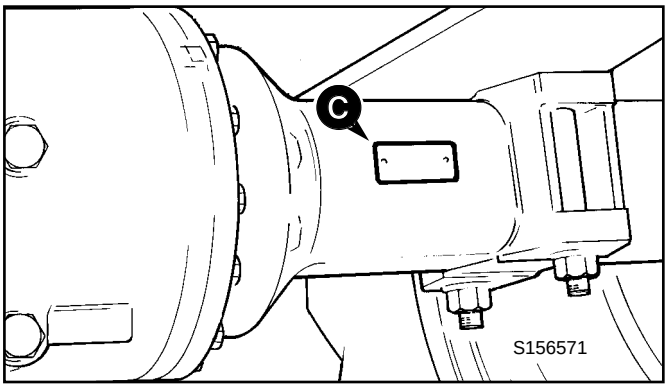


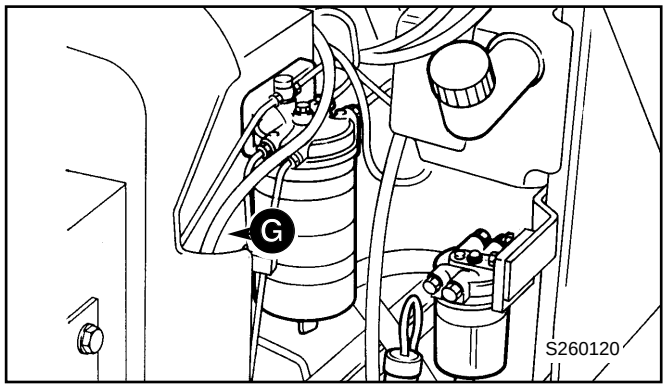












Torque Settings

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

UNF Grade 'S' Bolts

Bolt Size		Hexagon (A/F)	Torque Settings		
in	(mm)	in	Nm	kgf m	lbf ft
1/4	(6.3)	7/16	14	1.4	10
5/16	(7.9)	1/2	28	2.8	20
3/8	(9.5)	9/16	49	5.0	36
7/16	(11.1)	5/8	78	8.0	58
1/2	(12.7)	3/4	117	12.0	87
9/16	(14.3)	13/16	170	17.3	125
5/8	(15.9)	15/16	238	24.3	175
3/4	(19.0)	11/8	407	41.5	300
7/8	(22.2)	15/16	650	66.3	480
1	(25.4)	11/2	970	99.0	715
11/4	(31.7)	17/8	1940	198.0	1430
11/2	(38.1)	21/4	3390	345.0	2500

Metric Grade 8.8 Bolts

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

Bolt Size		Torque Settings (for steel rivet nuts)		
	(mm)	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

Service Tools Numerical List

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Service Tools (cont'd)

Section B - Body & Framework

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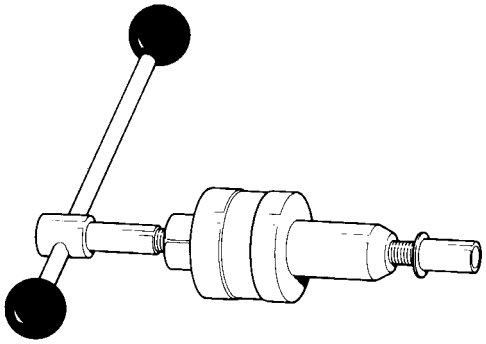
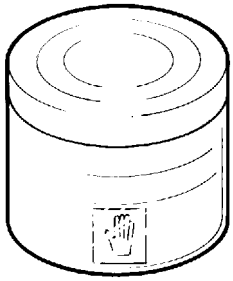
826/01102 M8 x 21mm Rivet Nut
826/01104 M10 x 23mm Rivet Nut
826/01105 M10 x 26mm Rivet Nut

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



S261210



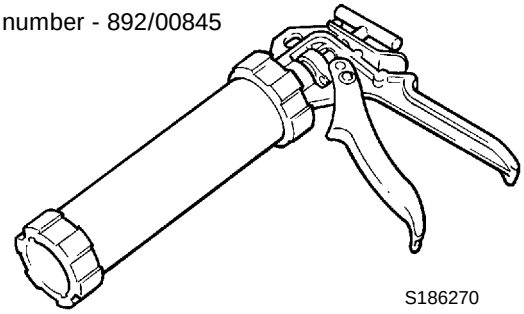
Hand Cleaner - special blend for the removal of polyurethane adhesives.

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



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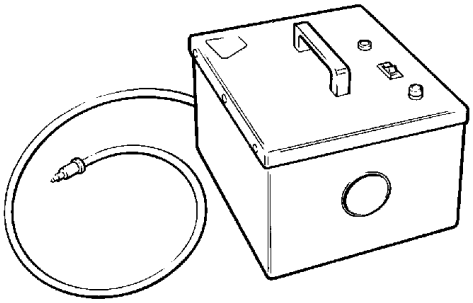
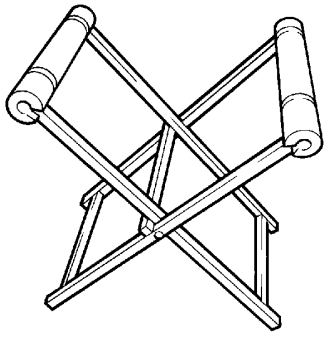


12V Mobile Oven - 1 cartridge capacity - required to pre-heat adhesive prior to use. It is fitted with a male plug (703/23201) which fits into a female socket (715/04300).

JCB part number - 992/12300

S186250



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

JCB part number - 892/00843

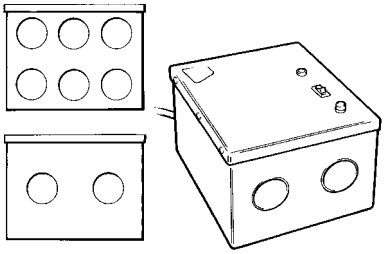
S186280

Service Tools (cont'd)

Section B - Body & Framework

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.

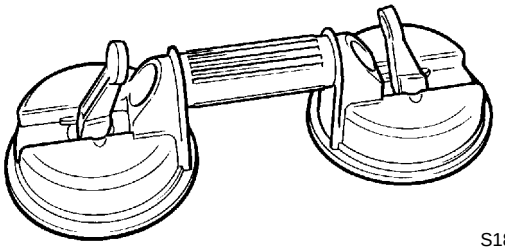
JCB part number:
992/12400 - 2 Cartridge x 240V
992/12600 - 6 Cartridge x 240V



S186260

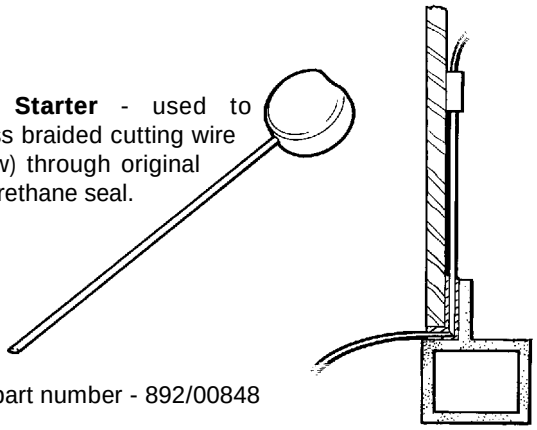
Glass Lifter - minimum 2 off - essential for glass installation, 2 required to handle large panes of glass. Ensure suction cups are protected from damage during storage.

JCB part number - 892/00842



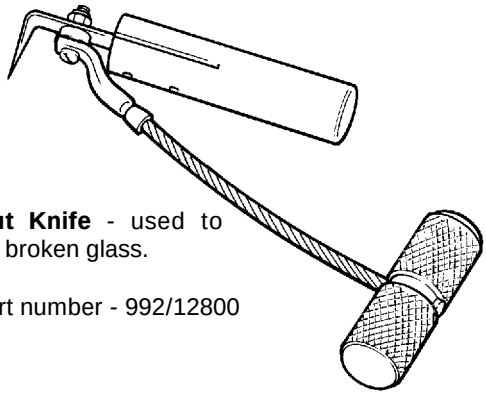
S186300

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



JCB part number - 892/00848

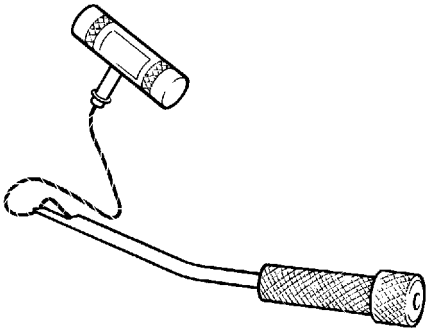
S186310



Cut-Out Knife - used to remove broken glass.

JCB part number - 992/12800

S186340



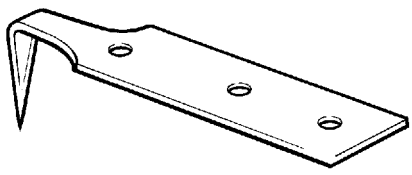
Glass Extractor (Handles) - used with braided cutting wire (below) to cut out broken glass.

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)



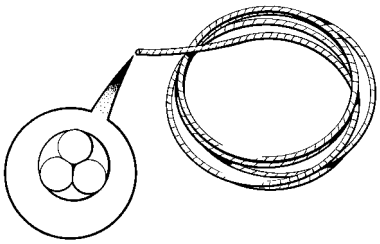
S186350

Service Tools (cont'd)

Section B - Body & Framework

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

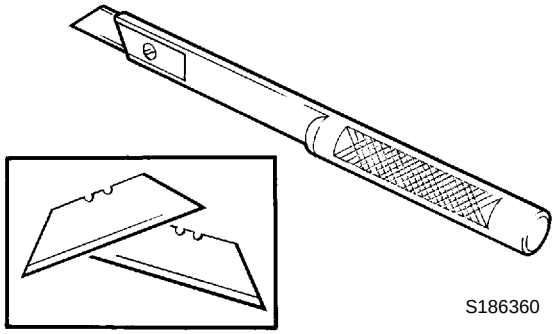
JCB part number - 892/00849
(approx 25 m length)



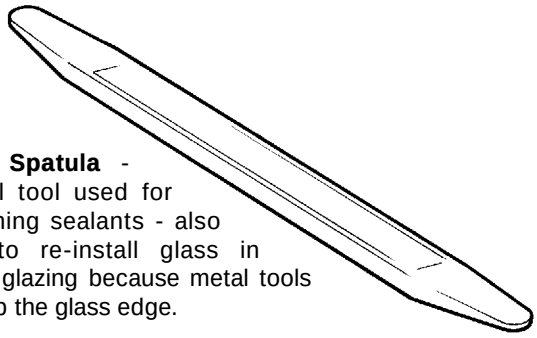
S186330

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

JCB part number - 892/00844



S186360



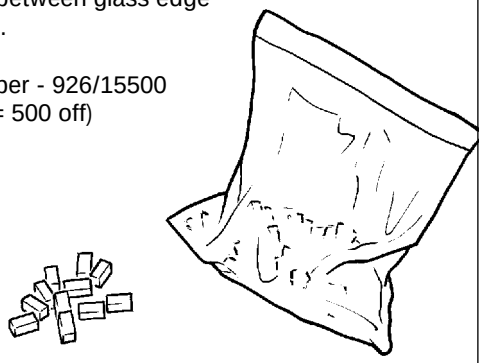
Nylon Spatula - general tool used for smoothing sealants - also used to re-install glass in rubber glazing because metal tools will chip the glass edge.

JCB part number - 892/00847

S186470

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

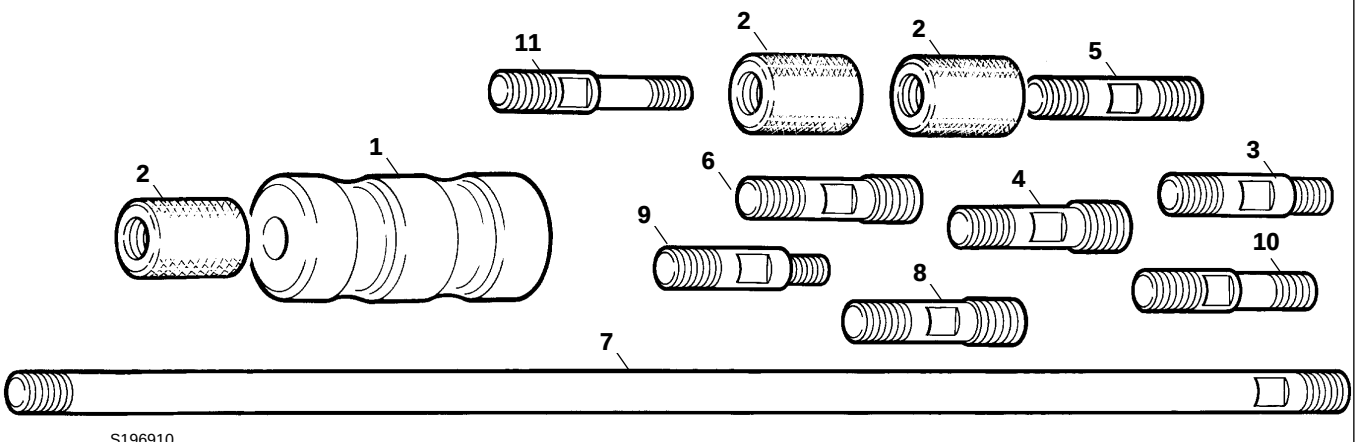
JCB part number - 926/15500
(unit quantity = 500 off)



S186550

Slide Hammer Kit - 993/68100

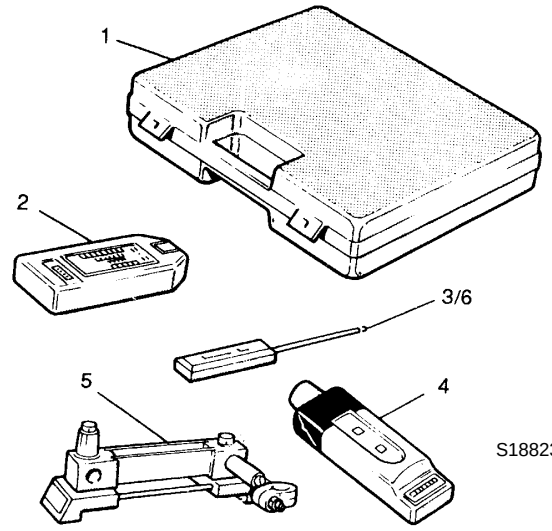
1	:993/68101	Slide Hammer
2	:993/68102	End Stops
3	:993/68103	Adaptor - M20 x 5/8" UNF
4	:993/68104	Adaptor - M20 x 1" UNF
5	:993/68105	Adaptor - M20 x M20
6	:993/68106	Adaptor - M20 x M24
7	:993/68107	Bar - M20 x M20 X 800MM
8	:993/68108	Adaptor - M20 x 7/8" UNF
9	:993/68109	Adaptor - M20 x M12
10	:993/68110	Adaptor - M20 x 5/8" UNF (Shoulder)
11	:993/68111	Adaptor - M20 x 1/2" UNF



S196910

Service Tools (cont'd)

Section C - Electrics

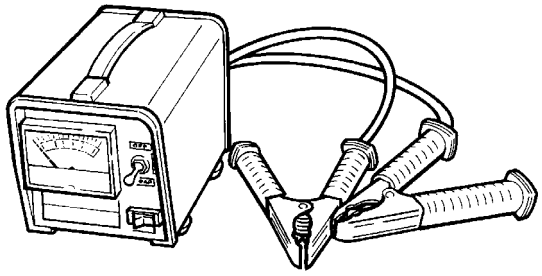


S188231

AVO Test Kit

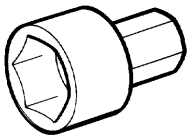
1	892/00283	Tool Kit Case
2	892/00298	Fluke Meter 85
3	892/00286	Surface Temperature Probe
4	892/00284	Venture Microtach Digital Tachometer
5	892/00282	100 amp Shunt - open type
6	892/00285	Hydraulic Temperature Probe

993/85700 Battery Tester



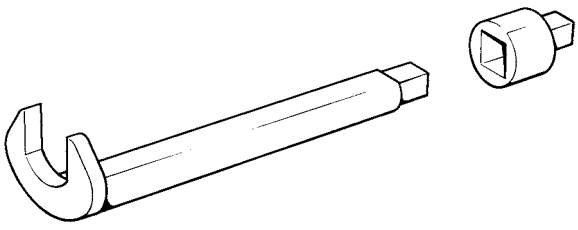
S239510

892/00882 Socket for Alternator Pulley Nut



S216770

825/00410 15 mm Crowfoot Wrench
825/99833 Adapter

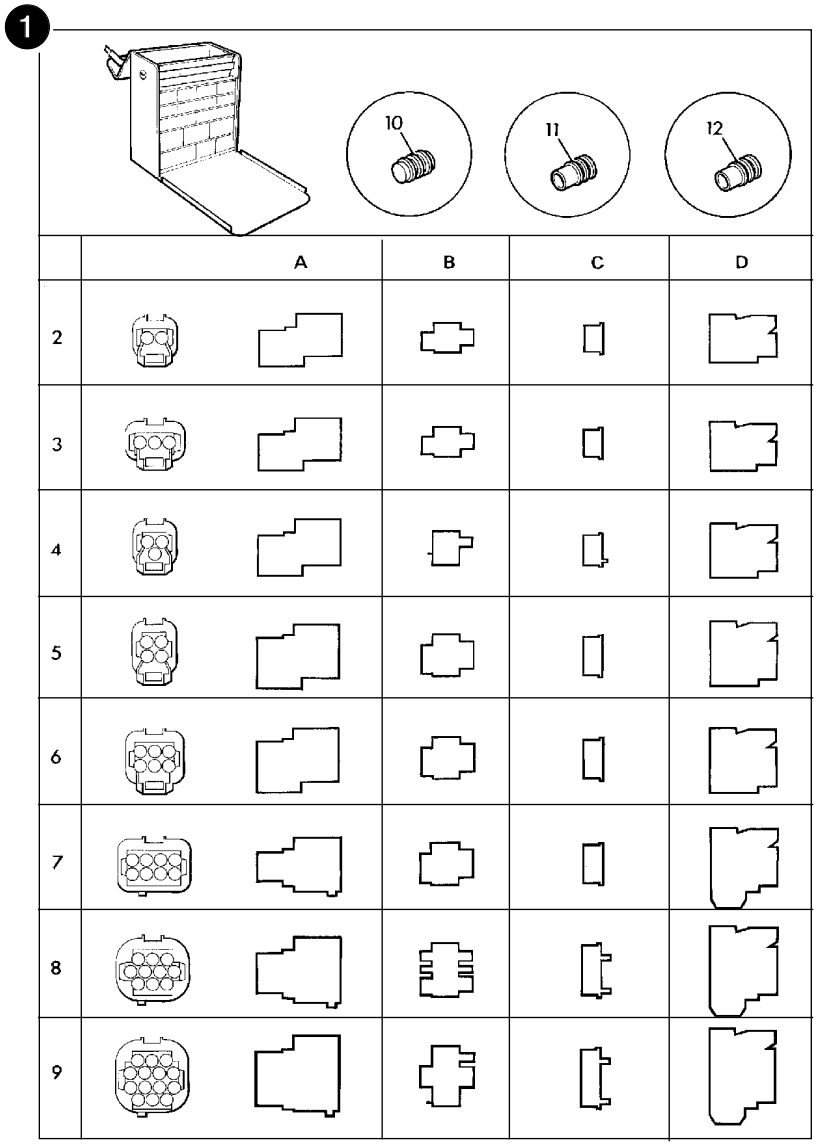


S216200

Service Tools (cont'd)

Section C - Electrics

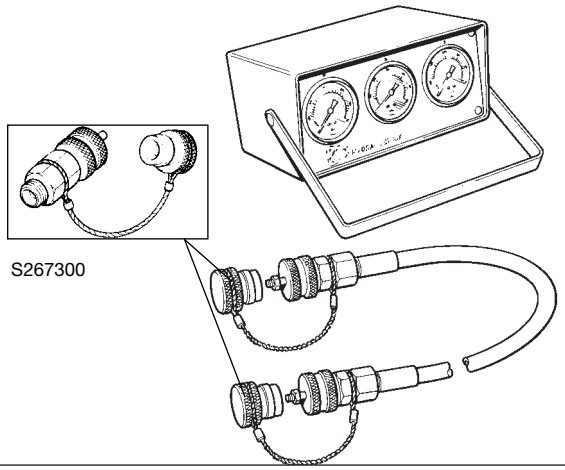
1		Electrical Repair Kit
2A	:7212/0002	2 Way Pin Housing
2B	:7212/0004	2 Way Pin Retainer
2C	:7212/0003	2 Way Socket Retainer
2D	:7212/0001	2 Way Socket Connector
3A	:7213/0002	3 Way Pin Housing
3B	:7213/0004	3 Way Pin Retainer
3C	:7213/0003	3 Way Socket Retainer
3D	:7213/0001	3 Way Socket Connector
4A	:7213/0006	3 Way Pin Housing (DT)
4B	:7213/0008	3 Way Pin Retainer (DT)
4C	:7213/0007	3 Way Socket Retainer (DT)
4D	:7213/0005	3 Way Socket Connector (DT)
5A	:7214/0002	4 Way Pin Housing
5B	:7214/0004	4 Way Pin Retainer
5C	:7214/0003	4 Way Socket Retainer
5D	:7214/0001	4 Way Socket Connector
6A	:7216/0002	6 Way Pin Housing
6B	:7216/0004	6 Way Pin Retainer
6C	:7216/0003	6 Way Socket Retainer
6D	:7216/0001	6 Way Socket Connector
7A	:7218/0002	8 Way Pin Housing
7B	:7218/0004	8 Way Pin Retainer
7C	:7218/0003	8 Way Socket Retainer
7D	:7218/0001	8 Way Socket Connector
8A	:7219/0002	10 Way Pin Housing
8B	:7219/0004	10 Way Pin Retainer
8C	:7219/0003	10 Way Socket Retainer
8D	:7219/0001	10 Way Socket Connector
9A	:7219/0006	14 Way Pin Housing
9B	:7219/0008	14 Way Pin Retainer
9C	:7219/0007	14 Way Socket Retainer
9D	:7219/0005	14 Way Socket Connector
10	:7210/0001	Dummy Plug
11	:7210/0002	Wire Seal (1.4 - 2.2 mm dia.)
12	:7210/0003	Wire Seal (2.2 - 2.9 mm dia.)



S188380

Service Tools (cont'd)

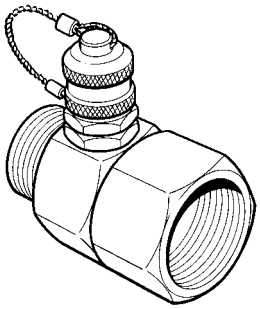
Section E - Hydraulics


S267300

Hydraulic Circuit Pressure Test Kit

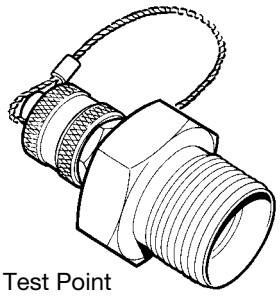
892/00253	Pressure Test Kit
:892/00201	Replacement Gauge 0-20 bar (0-300 lbf/in^2)
:892/00202	Replacement Gauge 0-40 bar (0-600 lbf/in^2)
:892/00203	Replacement Gauge 0-400 bar (0-6000 lbf/in^2)
:892/00254	Replacement Hose
993/69800	Seal Kit for 892/00254 (can also be used with probe 892/00706)
892/00706	Test Probe
* 892/00347	Connector - Hose to gauge

S188121


S188131

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 BSP x Test Point

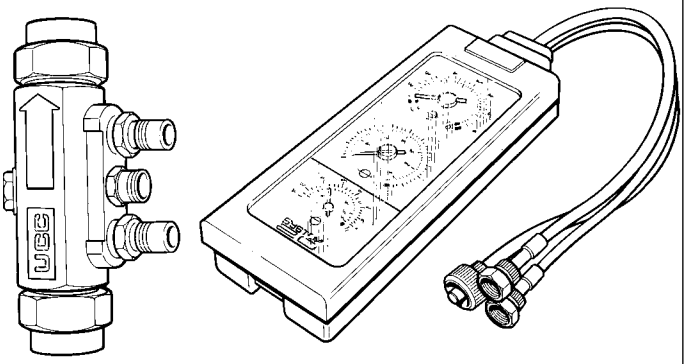

S200141

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

Flow Test Equipment

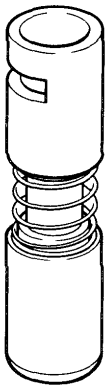
892/00268	Flow Monitoring Unit
892/00269	Sensor Head 0 - 100 l/min (0 - 22 UK gal/min)
892/00293	Connector Pipe
892/00270	Load Valve
1406/0021	Bonded Washer
1604/0006	Adapter 3/4 in M x 3/4 in M BSP
1612/0006	Adapter 3/4 in F x 3/4 in M BSP
892/00271	Adapter 3/4 in F x 5/8 in M BSP
892/00272	Adapter 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
892/00273	Sensor Head 0 - 380 l/min
892/00294	Connector Pipe
1606/0015	Adapter 1.1/4 in M BSP x 1 in M BSP
892/00078	Connector 1 in F x 1 in F BSP
1604/0008	Adapter 1 in M x 1 in M BSP
1606/0012	Adapter 1 in M x 3/4 in M BSP
816/20013	Adapter 3/4 in F x 1 in M BSP


S188151

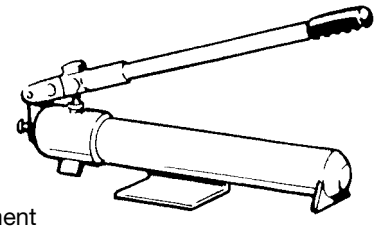
Service Tools (cont'd)

Section E - Hydraulics

892/00881 Valve Spool Seal Fitting Tool



S261220



Hand Pump Equipment

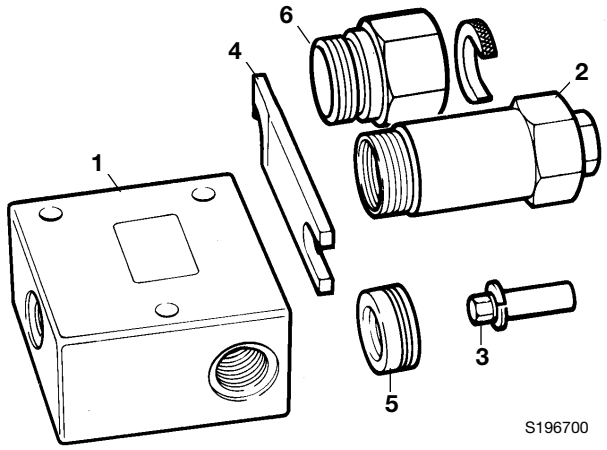
892/00223	Hand Pump
892/00137	Micro-bore Hose 1/4 in BSP x 3 metres
892/00274	Adapter 1/4 in M BSP x 3/8 in M BSP Taper
892/00262	1/4 in M BSP x 1/4 in F BSP x Test Point
892/00706	Test Probe
892/00278	Gauge 0 - 40 bar (0 - 600 lbf/in^2)
892/00279	Gauge 0 - 400 bar (0 - 6000 lbf/in^2)

S193850

Components for Valve Block A.R.V. Testing

For 4CX Variable Flow machines use 25/201103

	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



S196700

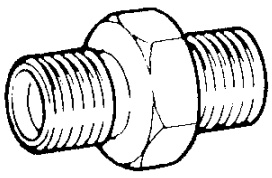
Bonded Washers

1406/0011	1/4 in. BSP
1406/0018	1/2 in. BSP
1406/0014	5/8 in. BSP
1406/0021	3/4 in. BSP
1406/0029	1.1/4 in. BSP

S188140

Male Adapters - BSP x NPT (USA only)

816/00439	3/8 in. x 1/4 in.
816/00440	1/2 in. x 1/4 in.
816/15007	3/8 in. x 3/8 in.
816/15008	1/2 in. x 3/8 in.



S193860

Male Adapters - BSP x BSP

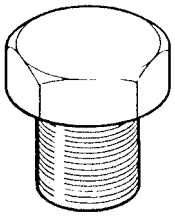
1606/0003	3/8 in. x 1/4 in.
1604/0003	3/8 in. x 3/8 in.
892/00071	3/8 in. x 3/8 in. taper
1606/0004	1/2 in. x 1/4 in.
1606/0007	1/2 in. x 3/8 in.
1604/0004	1/2 in. x 1/2 in.
1606/0017	5/8 in. x 1/2 in.
1606/0008	3/4 in. x 3/8 in.
1606/0009	3/4 in. x 1/2 in.
1604/0006	3/4 in. x 3/4 in.
1606/0012	3/4 in. x 1 in.
1606/0014	3/4 in. x 1.1/4 in.
1606/0015	1 in. x 1.1/4 in.

Service Tools (cont'd)

Section E - Hydraulics

Female Cone Blanking Plug

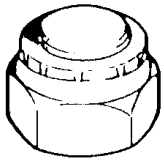
892/00055	1/4 in. BSP
892/00056	3/8 in. BSP
892/00057	1/2 in. BSP
892/00058	5/8 in. BSP
892/00059	3/4 in. BSP
892/00060	1 in. BSP



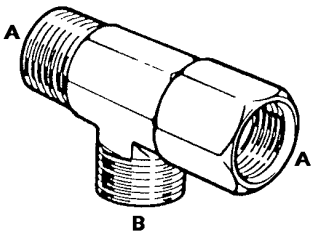
S193870

Male Cone Blanking Cap

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

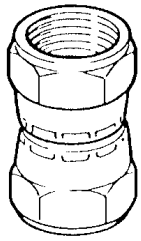


S193880



S193890

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)
892/00049	5/8 in. BSP (A) x 1/4 in. BSP (B)
816/50043	3/4 in. BSP (A) x 1/4 in. BSP (B)
892/00051	1 in. BSP (A) x 1/4 in. BSP (B)
816/50005	1/2 in. BSP (A) x 1/2 in. BSP (B)
816/60096	3/4 in. BSP (A) x 3/4 in. BSP (B)
816/00017	1 in. BSP (A) x 1 in. BSP (B)

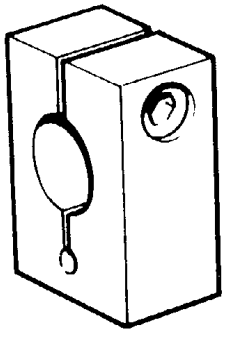


S193900

Female Connectors

892/00074	3/8 in. BSP x 3/8 in. BSP
892/00075	1/2 in. BSP x 1/2 in. BSP
892/00076	5/8 in. BSP x 5/8 in. BSP
892/00077	3/4 in. BSP x 3/4 in. BSP

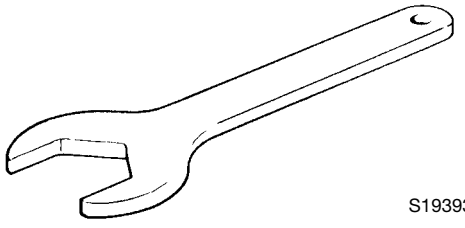
992/09100	Excavator Spool Clamp
892/00011	Spool Clamp



S216210

Hexagon Spanners for Ram Pistons and End Caps

992/09300	55mm A/F
992/09400	65mm A/F
992/09500	75mm A/F
992/09600	85mm A/F
992/09700	95mm A/F
992/09900	115mm A/F
992/10000	125mm A/F

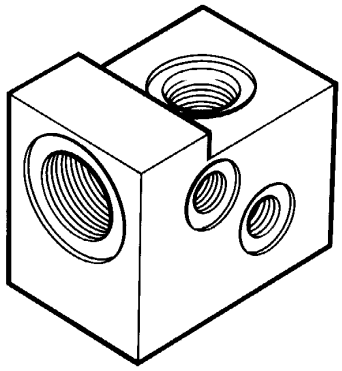


S193930

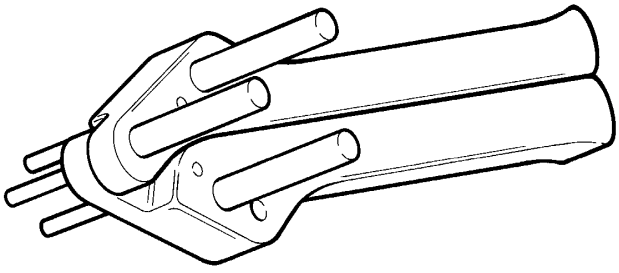
Service Tools (cont'd)

Section E - Hydraulics

892/00252 Test Block for Loader Valve A.R.V.
(214e Machines Only)

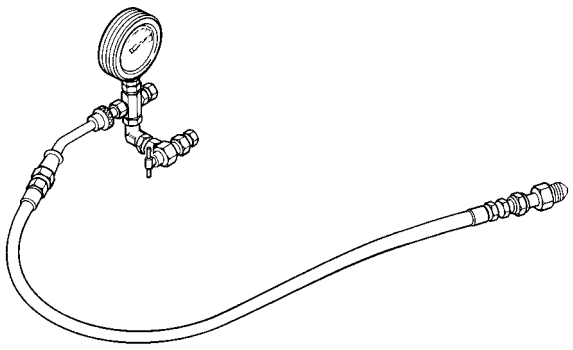


S220840



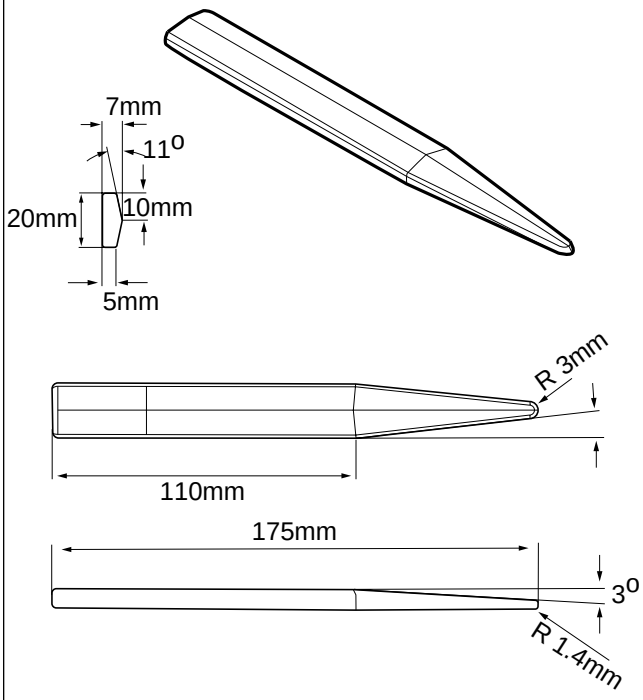
S216250

892/00334 Ram Seal Fitting Tool



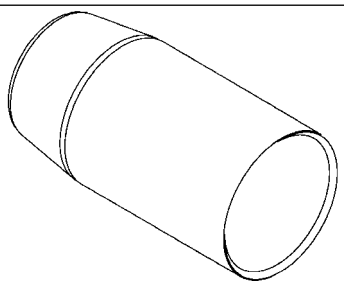
S308271

892/00948 Charging Kit (without gauge)
892/00949 Gauge



892/01027 Piston Seal Assembly Tool

338500



S338410

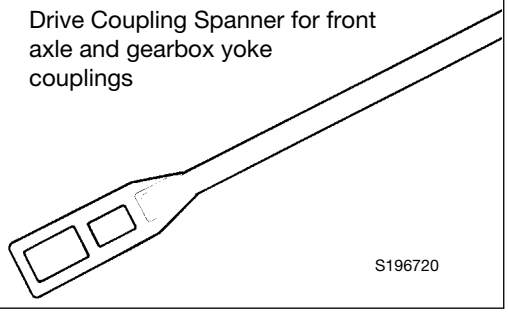
Ram Seal Protection Sleeves

892/01016 For 25 mm Rod Diameter
892/01017 For 30 mm Rod Diameter
892/01018 For 40 mm Rod Diameter
892/01019 For 50 mm Rod Diameter
892/01020 For 50 mm Rod Diameter (slew ram)
892/01021 For 60 mm Rod Diameter
892/01022 For 60 mm Rod Diameter (slew ram)
892/01023 For 65 mm Rod Diameter
892/01024 For 70 mm Rod Diameter
892/01025 For 75 mm Rod Diameter
892/01026 For 80 mm Rod Diameter
892/00167 For 90 mm Rod Diameter

Service Tools (cont'd)

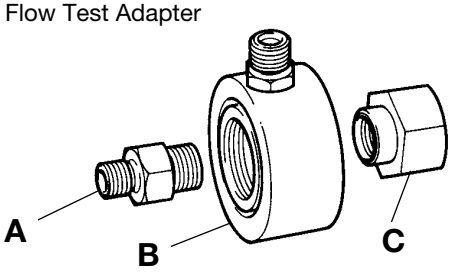
Section F - Transmission

892/00812 Drive Coupling Spanner for front axle and gearbox yoke couplings



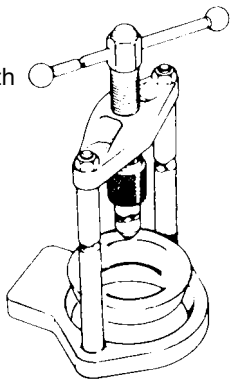
S196720

A 892/00920 Flow Test Adapter
B 892/00301 Flow Test Adapter
C 892/00302 Flow Test Adapter



S266880

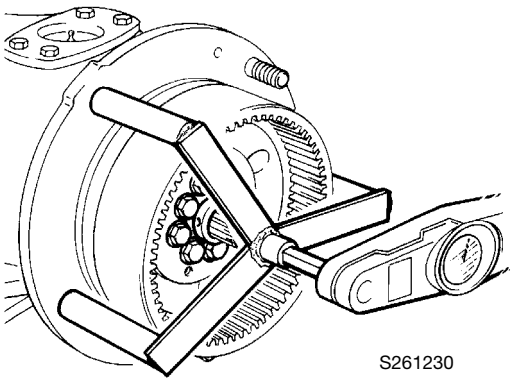
892/00179 Bearing Press (use with appropriate adapters)



S188200

992/07608 Bearing Adapter
992/07609 Bearing Adapter
992/07610 Bearing Adapter
992/07611 Bearing Adapter
992/07612 Bearing Adapter
992/07613 Bearing Adapter

S188160



S261230

Torque Measuring Tool for Wheel Hub Seals

Manufacture locally, procedures in this manual show checking the wheel hub seal using a rolling force. However, the torque can be measured using above locally manufactured tool.

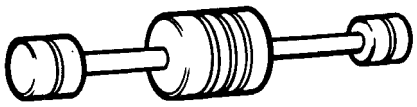
Bearing rolling torque is 12 to 22 Nm (9 to 16 lbf ft) excluding seal drag. Maximum permissible including seal drag is 40 Nm (29.5 lbf ft).

Service Tools (cont'd)

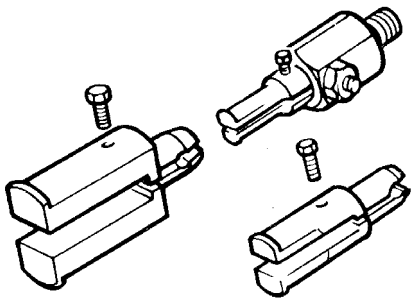
Section F - Transmission

892/00224

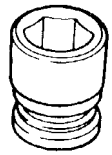
Impulse Extractor Set for Hub Bearing Seals



S197070



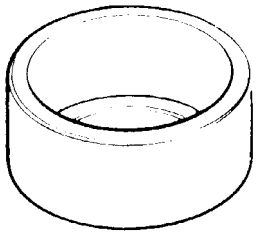
892/00225	Adapter - Impulse Extractor Small 17mm to 25mm Medium 25mm to 45mm Large 45mm to 80mm
993/59500	Adapter - Impulse Extractor (syncro shuttle and powershift transmission)



S216290

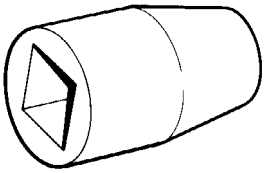
892/00817	17 mm A/F x 3/4in. square drive
892/00818	22 mm A/F x 3/4in. square drive
892/00819	15 mm A/F x 1/2in. square drive
892/00333	19 mm A/F x 3/4in. square drive

892/00174



Measuring Cup - Pinion Head Bearing

S190770



892/00822

Splined Bolt Socket for driveshafts

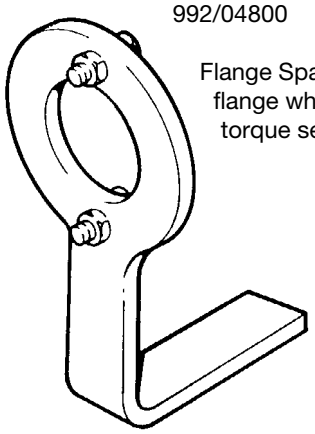
S197060

Service Tools (cont'd)

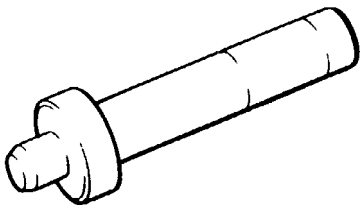
Section F - Transmission

992/04800

Flange Spanner - for locking pinion flange while pinion nut is slackened or torque set

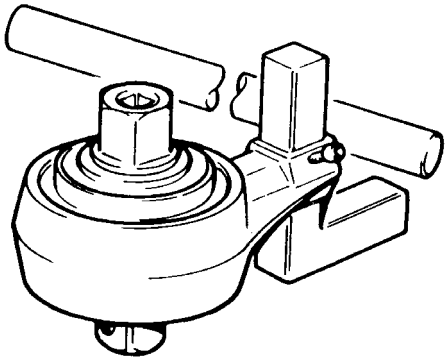


S197040



S216310

892/00182 Bearing Pad Driver

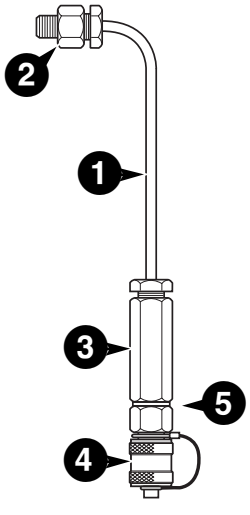


992/04000

Torque Multiplier (use in conjunction with a torque wrench to give a 5:1 multiplication when tightening pinion nuts)

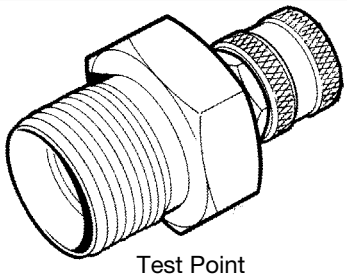
S197030

* 998/10650 Powershift Torque Converter - Pressure Test Kit



Comprises of:
1 Pipe
2 Adaptor
3 Adaptor
4 Test point adaptor
5 Sealing washer

A463020



S316250

Test Point

1 892/00964 Test point (1/8 BSP) Powershift

2 892/00965 Test point (3/8 BSP) Powershift

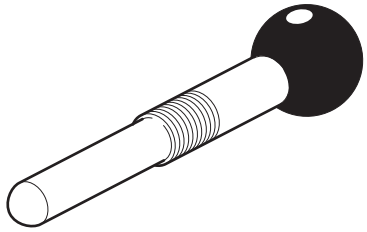
3 892/00966 Test point (1/4 BSP) Syncro Shuttle

These test points can be left in position after testing.

Service Tools (cont'd)

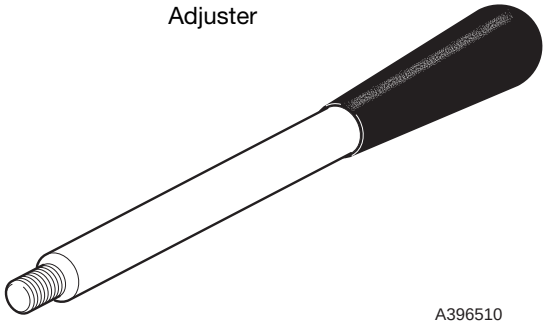
Section F - Transmission

892/01077 Synchro Shuttle Gearbox - Selector Shaft Lock Screw



A395350

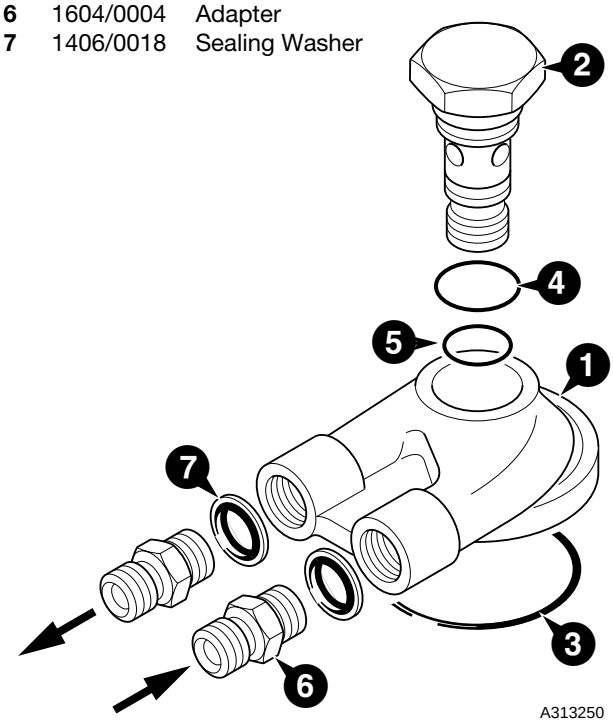
892/01078 Synchro Shuttle Gearbox - Mainshaft Adjuster



A396510

Powershift Gearbox Flow Test Adaptor

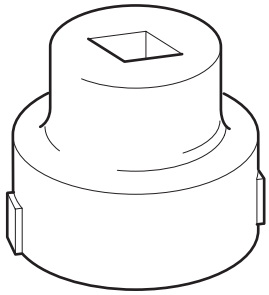
1	460/15708	Flow Test Adapter
2	460/15707	Banjo Bolt
3	2401/0222	O-ring
4	2403/0110	O-ring
5	2403/0108	O-ring
6	1604/0004	Adapter
7	1406/0018	Sealing Washer



A313250

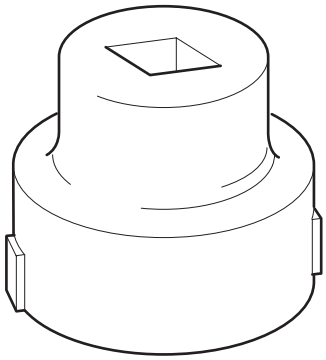
Synchro Shuttle Gearbox - Setting ring socket spanners

892/01079
(Mainshaft setting ring)



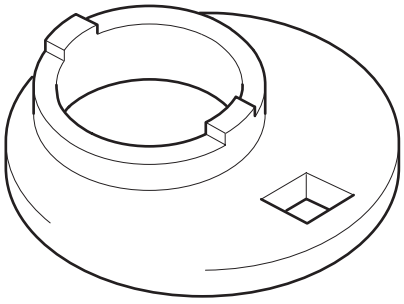
A396590

892/01080
(Layshaft setting ring)



A396600

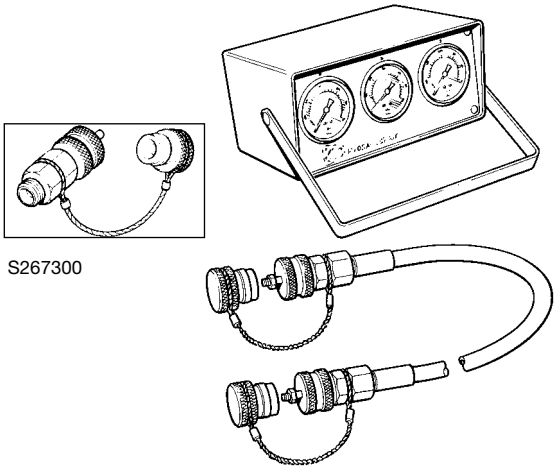
* 998/10738 Adaptor Spanner - Powershift 2/4WD Clutch (Germany)



A410370

Service Tools (cont'd)

Section F - Transmission



S267300

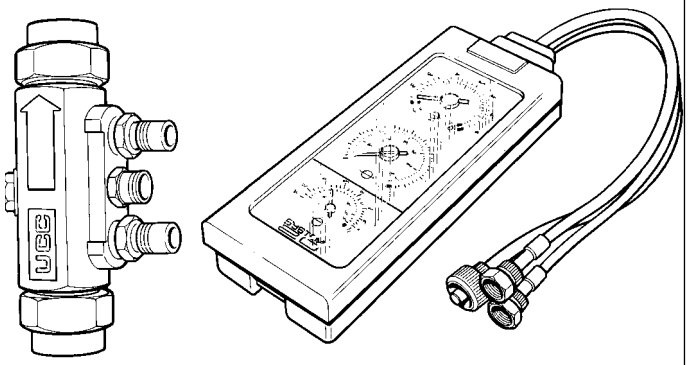
Hydraulic Circuit Pressure Test Kit (also used for main hydraulic system tests)

892/00253	Pressure Test Kit
:892/00201	Replacement Gauge 0-20 bar (0-300 lbf/in^2)
:892/00202	Replacement Gauge 0-40 bar (0-600 lbf/in^2)
:892/00203	Replacement Gauge 0-400 bar (0-6000 lbf/in^2)
:892/00254	Replacement Hose
993/69800	Seal Kit for 892/00254 (can also be used with probe 892/00706)
892/00706	Test Probe
* 892/00347	Connector - Hose to gauge

S188121

Flow Test Equipment (also used for main hydraulic system tests)

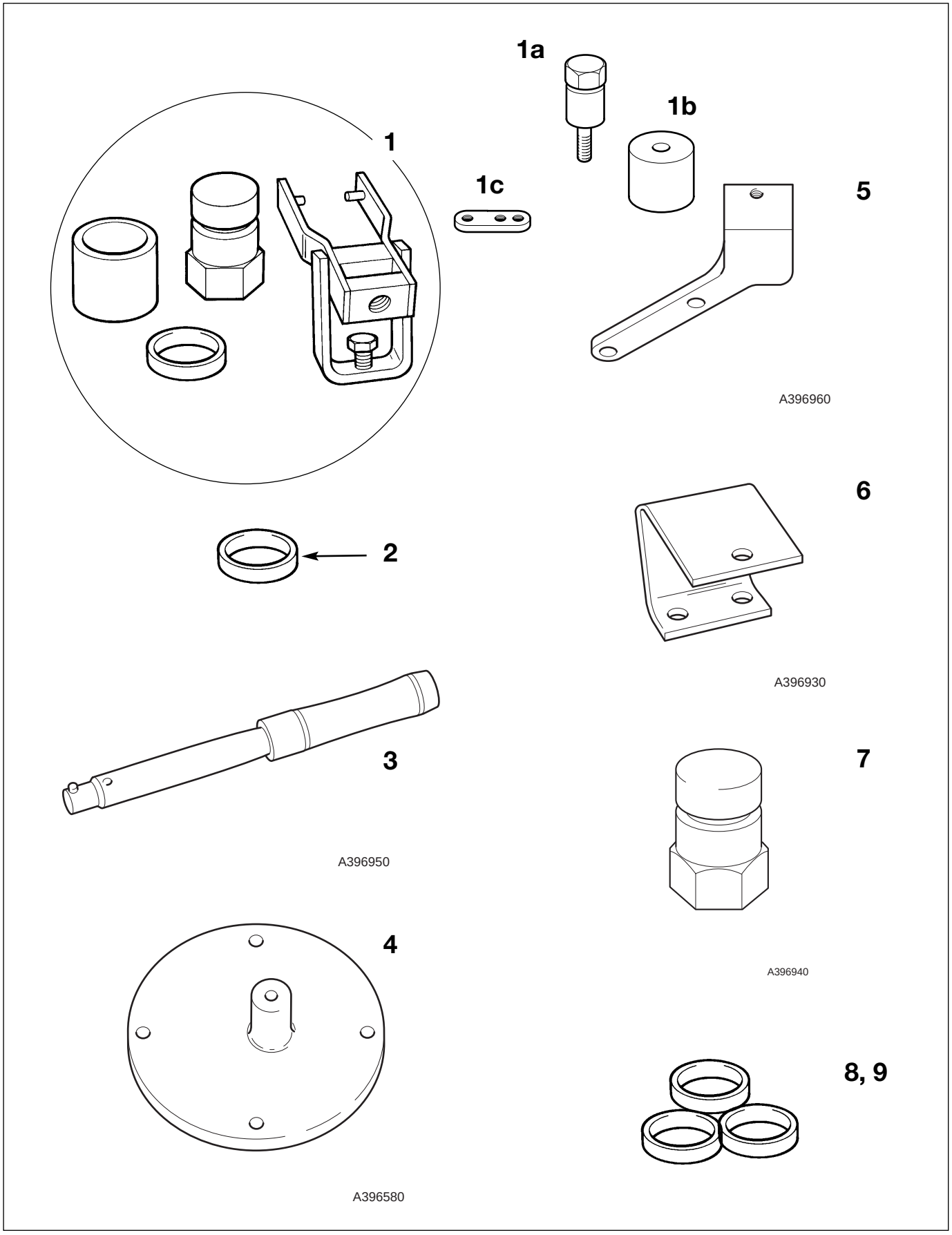
892/00268	Flow Monitoring Unit
892/00269	Sensor Head 0 - 100 l/min (0 - 22 UK gal/min)
892/00293	Connector Pipe
892/00270	Load Valve
1406/0021	Bonded Washer
1604/0006	Adapter 3/4 in M x 3/4 in M BSP
1612/0006	Adapter 3/4 in F x 3/4 in M BSP
892/00271	Adapter 3/4 in F x 5/8 in M BSP
892/00272	Adapter 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
892/00273	Sensor Head 0 - 380 l/min
892/00294	Connector Pipe
1606/0015	Adapter 1.1/4 in M BSP x 1 in M BSP
892/00078	Connector 1 in F x 1 in F BSP
1604/0008	Adapter 1 in M x 1 in M BSP
1606/0012	Adapter 1 in M x 3/4 in M BSP
816/20013	Adapter 3/4 in F x 1 in M BSP



S188151

Service Tools (cont'd)

Section F - Transmission



Service Tools (cont'd)

Section F - Transmission

Solid Spacer Setting Kit
Synchro Shuttle Gearbox, SD70, SD80 Axles, Powershift 2004 Gearbox

1	892/00918	Setting Tool Kit
*__1a__	892/01164	Adaptor (2004 Gearboxes)
*__1b__	892/01165	Sleeve (2004 Gearboxes)
*__1c__	892/01163	Support Bracket (2004 Gearboxes)
2	921/52627	Spacer 14.20 Service use
3	993/70111	Breakback Torque Wrench
4	892/01076	Support Bracket - Synchro Shuttle Gearbox
5	892/01075	Support Bracket PD70, SD80 Rear Axles
6	997/11000	Support Bracket SD55, SD70 Front Axles
7	998/10567	SD80 Pinion Shaft Adaptor
*__8__	921/53300	Spacer Kit - SD55 Axles

Comprises of:

	Spacer thickness mm		Spacer thickness mm
921/53322	13.550	921/53310	13.875
921/53323	13.575	921/53311	13.900
921/53324	13.600	921/53312	13.925
921/53325	13.625	921/53313	13.950
921/53301	13.650	921/53314	13.975
921/53302	13.675	921/53315	14.000
921/53303	13.700	921/53316	14.025
921/53304	13.725	921/53317	14.050
921/53305	13.750	921/53318	14.075
921/53306	13.775	921/53319	14.100
921/53307	13.800	921/53320	14.125
921/53308	13.825	921/53321	14.150
921/53309	13.850		

*__9__ 823/10547 Spacer Kit - Powershift 2004 Gearbox

Comprises of:

	Spacer thickness mm		Spacer thickness mm
829/30946	13.850	829/30953	13.675
829/30947	13.825	829/30954	13.650
829/30948	13.800	829/30955	13.625
829/30949	13.775	829/30956	13.600
829/30950	13.750	829/30957	13.575
829/30951	13.725	829/30958	13.550
829/30952	13.700		

*__10__ 921/53400 Spacer Kit - Sychro Shuttle Gearbox, SD70, SD80 Axles

Comprises of:

	Spacer thickness mm		Spacer thickness mm
921/52628	12.600	921/53425	13.300
829/30405	12.625	921/53426	13.325
921/52629	12.650	921/53427	13.350
829/30406	12.675	921/53428	13.375
921/52630	12.700	921/53401	13.400
829/30407	12.725	921/53402	13.425
921/52601	12.750	921/53403	13.450
829/30408	12.775	921/53404	13.475
921/52602	12.800	921/53405	13.500
829/30409	12.825	921/53406	13.525
921/52603	12.850	921/53407	13.550
829/30410	12.875	921/53408	13.575
921/52604	12.900	921/53409	13.600
829/30411	12.925	921/53410	13.625
921/52605	12.950	921/53411	13.650
829/30412	12.975	921/53412	13.675
921/52606	13.000	921/53413	13.700
829/30413	13.025	921/53414	13.725
921/52607	13.050	921/53415	13.750
829/30414	13.075	921/53416	13.775
921/52608	13.100	921/53417	13.800
829/30415	13.125	921/53418	13.825
921/52609	13.150	921/53419	13.850
829/30416	13.175	921/53420	13.875
921/52610	13.200	921/53421	13.900
829/30417	13.225	921/53422	13.925
921/52611	13.250	921/53423	13.950
921/53424	13.275	921/52626	14.000

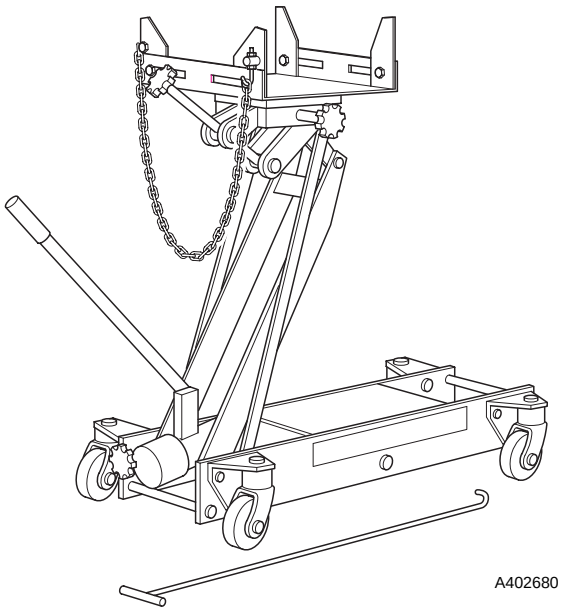
Note: After using a spacer, obtain a replacement to keep the set complete.

Service Tools (cont'd)

Section F - Transmission

892/01094 Transmission Jack

When removing the Powershift gearbox use of a special transmission jack is strongly recommended. This jack can also be used when removing Synchro Shuttle gearboxes.
Note that the jack must be used with special support plates, see below.



Powershift - Support plates, for use with transmission jack, Manufacture locally, for details see **Section F, Service Tools.**

892/01082 - Powershift - Assembly Cradle, for details see **Section F, Service Tools.**

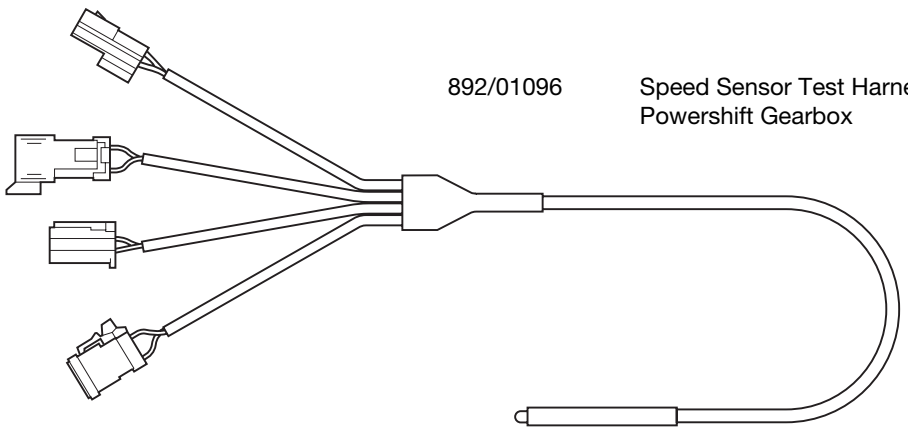
Powershift - Gearbox hydraulic pump removal tools, allow pump to be removed with torque converter housing fitted to gearbox. Manufacture locally, for details see **Section F, Service Tools.**

892/01083	Powershift - Assembly tool, transfer gear.
892/01084	Powershift - Transfer gear, bearing assembly.
892/01085	Powershift - Seal fitting tool

823/10420	Thrust Washer Kit - Powershift gearbox - Layshaft clutch
Comprises of:	
	Washer thickness mm
823/10421	4.3
823/10422	4.4
823/10423	4.5
823/10424	4.6
823/10425	4.7
823/10426	4.8

*

892/01096 Speed Sensor Test Harness - Powershift Gearbox



Service Tools (cont'd)

Section F - Transmission

Powershift Gearbox - 6 Speed (ShiftMaster)
Electronic Service Tool Kit

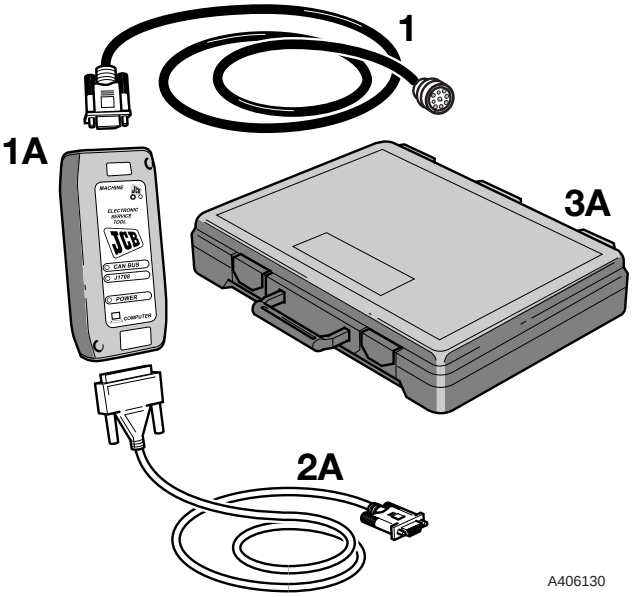
* **1** 721/10885 - Interconnecting cable (Data Link Adaptor to machine ECU diagnostics socket). Note that this cable must be ordered separately in addition to the kit below.

892/01033 - Service Tool Kit comprises:

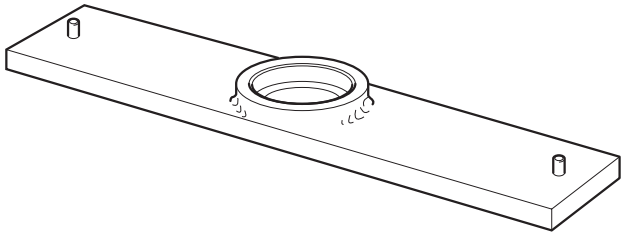
1A Data Link Adaptor (DLA), enables data exchange between the machine ECU (Electronic Control Unit) and a laptop PC loaded with the applicable ShiftMaster diagnostics software.

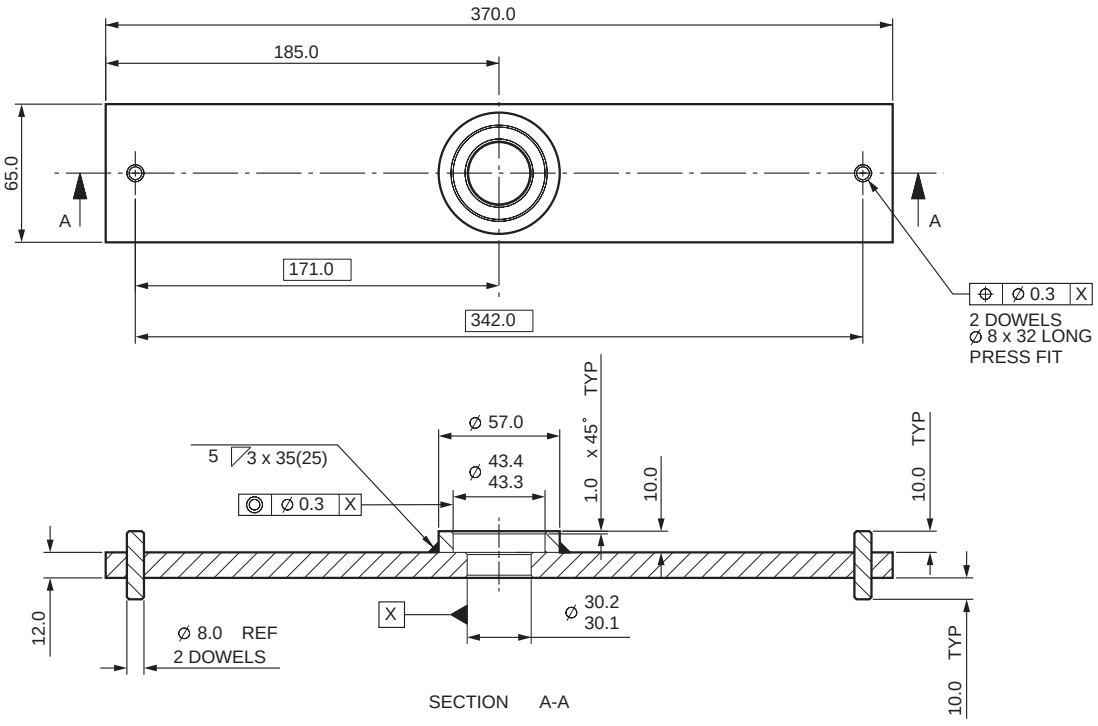
2A Interconnecting cable, DLA to laptop PC. Several cables are included to enable compatibility with different PC port types.

3A Kit carrying case.



892/01110 Torque Converter Alignment Tool
(for 12" and W300 torque converters)





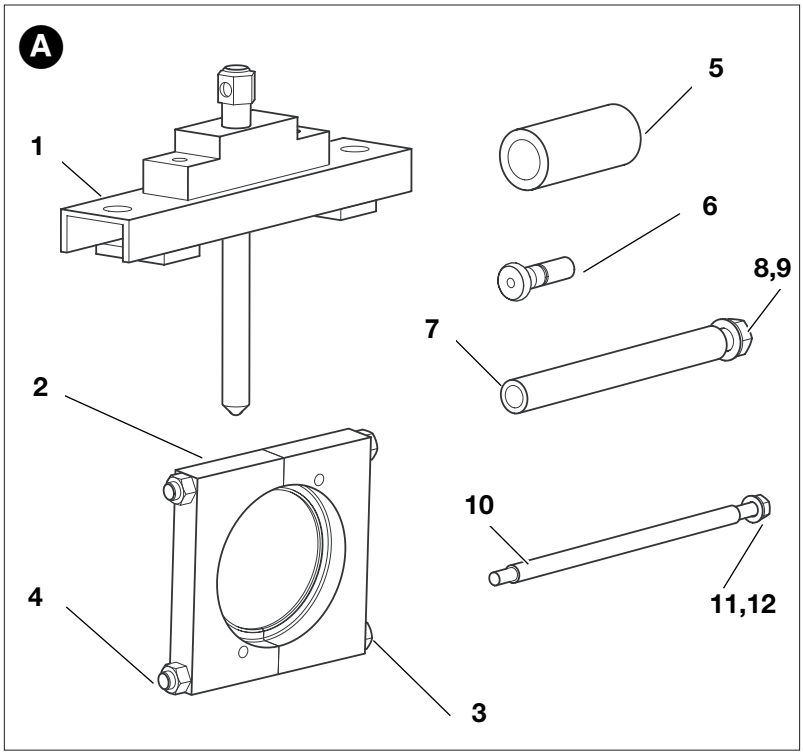
Service Tools (cont'd)

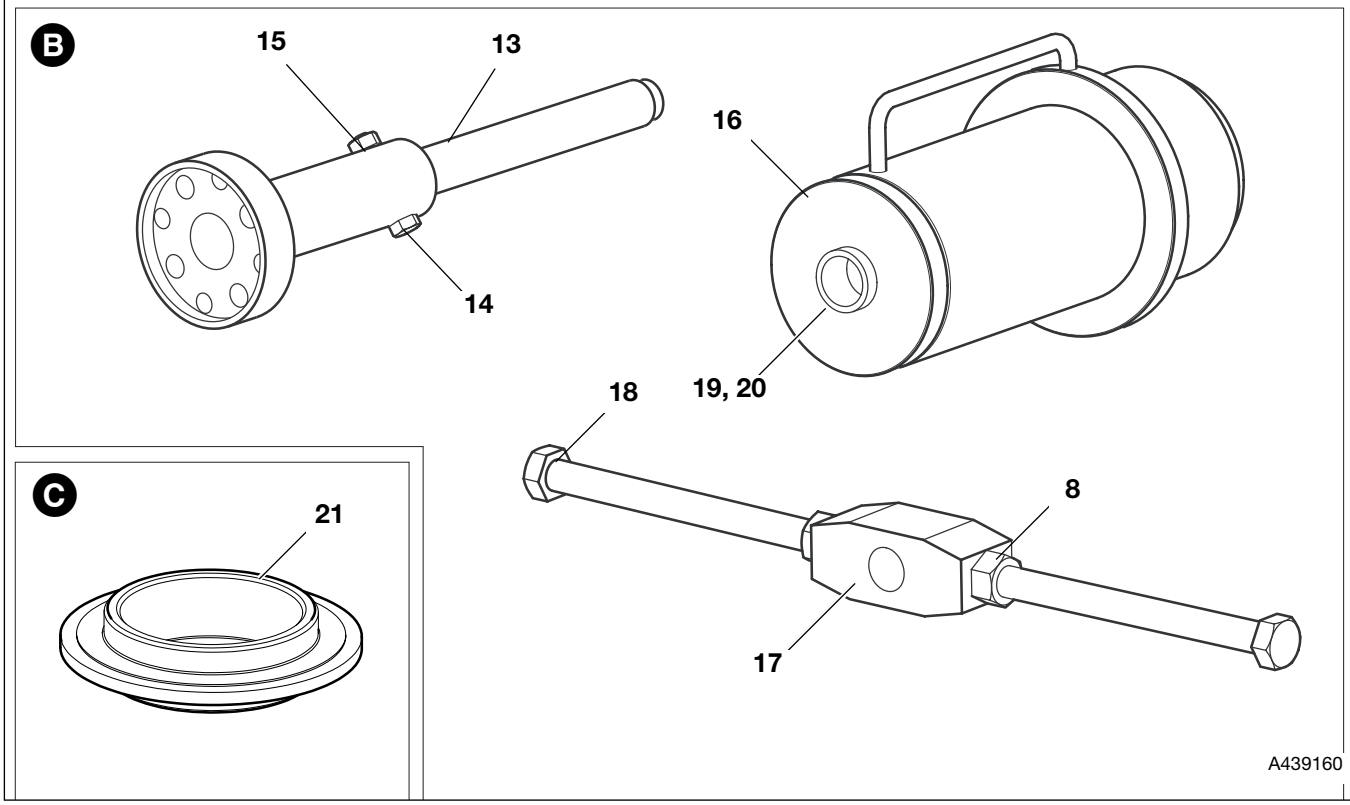
Section F - Transmission

Wheel Hub Service Tool -

A Bearing Puller
B Bearing Press
C Hub Seal Dolly

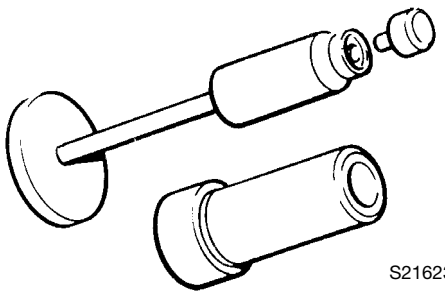
Item	Description	Part No.	Qty
A, **B** & **C** Hub Service Kit		892/01092	1
comprises of:			
1	Puller Beam	998/10623	1
2	Inner Bearing Plate	998/10607	1
3	Bolt M16x220	1315/3731Z	2
4	Nut M16	1370/0601Z	2
5	Reaction Tube	998/10614	1
6	ModifiedWheel Stud	998/10624	2
7	Wheel Bearing Carrier Puller	998/10615	2
8	Nut M20	1370/0701Z	4
9	Washer M20	1420/0012Z	2
10	Puller Rod	998/10610	2
11	Nut M12	1370/0401Z	2
12	Washer M12	1420/0009Z	2
13	Bearing Centre Puller	998/10608	1
14	Bolt M10x60	1315/3414Z	1
15	Nut M10	1370/0301Z	1
16	Bearing Fitting Tube	998/10606	1
17	Puller Handle Nut	998/10616	1
18	Bolt M20x300	1315/3835Z	2
19	Washer	445/12303	2
20	Bearing	917/02800	1
21	Seal Dolly	892/00891	1





Service Tools (cont'd)

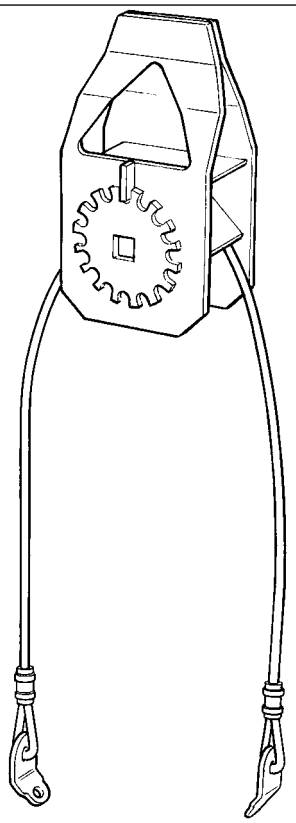
Section H - Steering



892/00180	Seal Fitting Tool for fitting 'O' ring and kin ring to Hydraulic Steer Unit
892/00181	Replacement Plastic Boss

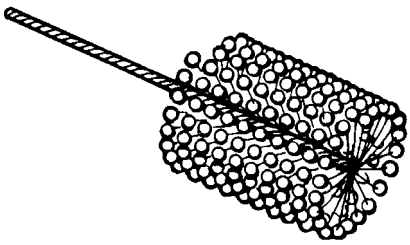
Service Tools (cont'd)

Section K - Engine



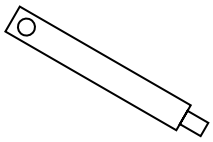
892/00836
Lifting Wire Assembly (for engine removal)

S219080



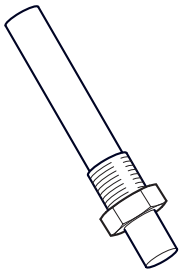
S192390

892/00041 De-glazing Tool for Cylinder Bores (to assist bedding-in of new piston rings)



A314530

892/00936 Timing pin for fuel injection pump (AK, AR)



* 892/01054 Adaptor for compression testing (AK, AR)

* For details of other engine service tools refer to the Engine Service Manual (publication no. 9806/2140) for low emission engines.

Sealing and Retaining Compounds

JCB Multi-Gasket	A medium strength sealant suitable for all sizes of gasket flanges, and for hydraulic fittings of 25-65mm 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 and Sealer	A high strength locking fluid for sealing and retaining nuts, bolts, and screws up to 50mm diameter, and for hydraulic fittings up to 25mm diameter.	4101/0250 4101/0251	10ml 50ml
Threadseal	A medium strength thread sealing compound.	4102/1951	50ml
Threadlocker	A locking fluid for use on threads larger than 50mm dia.	4101/0451	50ml
Activator	A cleaning primer which speeds the curing rate of anaerobic products.	4104/0251 4104/0253	(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	310 ml
† **Active Wipe 205**	For direct glazing	4104/1206 4104/1203	30 ml 250 g
† **Black Primer 206J**	For direct glazing	4201/4906	30 ml
Clear Silicone Sealant	To seal butt jointed glass	4102/0933	
Black Polyurethane Sealant	To finish exposed edges of laminated glass	4102/2309	310 ml
JCB Cleaner & Degreaser	For degreasing components prior to use of anaerobic adhesives and sealants.	4104/1538	Aerosol

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

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

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

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

⚠ 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

Operating Safety

⚠ WARNING

Machine Condition

A defective machine can injure you or others. Do not operate a machine which is defective or has missing parts. Make sure the maintenance procedures in this handbook are completed before using the machine.

INT-2-1-2

⚠ 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

Engine/Steering Failure

If the engine or steering fails, stop the machine as quickly as possible. Do not operate the machine until the fault has been corrected.

INT-2-1-5

⚠ 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

Entering/Leaving

Always face the machine when entering and leaving the cab. Use the step(s) and handrails. 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

⚠ 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

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

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 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

⚠ 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

Powershift Transmission

Do not change from a high gear to a low gear (for instance, 4th to 1st) in one sudden movement whilst the machine is moving. Otherwise the machine will rapidly decelerate, you or others could be killed or seriously injured. When selecting lower gears, allow the engine speed to drop before each gear change.

2-1-1-9/1

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

Modifications and Welding

Non-approved modifications can cause injury and damage. Parts of the machine are made from cast iron; welds on cast iron can weaken the structure and break. Do not weld cast iron. Contact your JCB distributor for advice before modifying the machine.

INT-3-1-2/1

⚠ 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 and/or damage.

INT-3-1-4

⚠ 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

⚠ DANGER

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

Maintenance Safety (cont'd)

⚠ 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 and injury if you do not follow these precautions.

INT-3-2-2

⚠ 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 handbook 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

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 system pressure escape, then remove the cap.

INT-3-2-9

⚠ WARNING

Always wear safety glasses when dismantling assemblies containing components under pressure from springs. This will protect against eye injury from components accidently flying out.

GEN 6-2

⚠ 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 Triochloroethane or paint thinners near 'O' rings and seals.

INT-3-2-12

⚠ 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 elecrical 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

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

Maintenance Safety (cont'd)

⚠ 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

Safety Strut

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

A raised and badly supported machine can fall on you. Position the machine on a firm, level surface before raising one end. Ensure the other end is securely chocked. Do not rely solely on the machine hydraulics or jacks to support the machine when working under it.

Disconnect the battery, to prevent the engine being started while you are beneath the machine.

GEN-1-1

⚠ WARNING

Waxoyl contains turpentine substitute, which is flammable. Keep flames away when applying Waxoyl. Waxoyl can take a few weeks to dry completely. Keep flames away during the drying period.

Do not weld near the affected area during the drying period. Take the same precautions as for oil to keep Waxoyl off your skin. Do not breathe the fumes. Apply in a well-ventilated area.

5-3-1-9

⚠ WARNING

Make the machine safe before working underneath it. Park the machine on level ground, lower the arms. Apply the parking brake, put the transmission in neutral and stop the engine. Chock both sides of all four wheels.

Disconnect the battery, to prevent the engine being started while you are beneath the machine.

GEN-1-2

⚠ WARNING

To avoid burning, wear protective gloves when handling hot components. To protect your eyes, wear goggles when using a wire brush to clean components.

HYD 1-3

⚠ WARNING

JCB Extradig Dipper Lubricant

JCB Extradig dipper lubricant contains 1.53% lead. The repeated swallowing of very small quantities can cause chronic lead poisoning. Do not smoke or touch food while handling this lubricant. Dispose of waste (rags etc.) in accordance with local regulations.

2-1-1-8

⚠ 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

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Inspect steelwork for damage. Note damaged paintwork for future repair.

Make sure all pivot pins are correctly in place and secured by their locking devices.

Ensure that the steps and handrails are undamaged and secure.

Check for broken or cracked window glass. Replace damaged items.

Check all bucket teeth for damage and security.

Check all lamp lenses for damage.

Inspect the tyres for damage and penetration by sharp objects.

Check that all safety decals are in place and undamaged. Fit new decals where necessary.

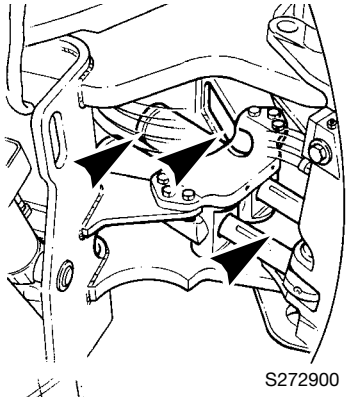
Park the machine on firm level ground, engage the parking brake and set the transmission to neutral. Lower the attachments to the ground and stop the engine.

Clean the machine using water and/or steam. Do not allow mud, debris etc to build upon the machine, pay particular attention to the following areas:

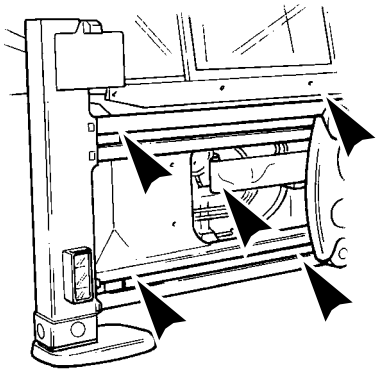
1 Backhoe hoses passing through mainframe.
2 Around twin slew rams.
3 Twin ram slew recess in chassis (centremount).
4 Kingpost slide rails (sideshift).
5 Kingpost hose tray and bottom ‘shelf’ (sideshift).
6 Recess between slew ram and kingpost casting (sideshift).

Stabiliser cavities can become clogged when operating in soft/wet ground conditions. Remove and clean away all debris that may have built up.

Do not allow mud to build up on the engine and transmission. Make sure the radiator grille is not clogged up.



S272900



S272880

⚠ WARNING

Airborne particles of light combustible material such as straw, grass, wood shavings, etc. must not be allowed to accumulate within the engine compartment or in the propshaft guards (when fitted). Please inspect these areas frequently and clean at the beginning of each work shift or more often if required. Before opening the engine cover, ensure that the top is clear of debris.

5-3-1-12/2

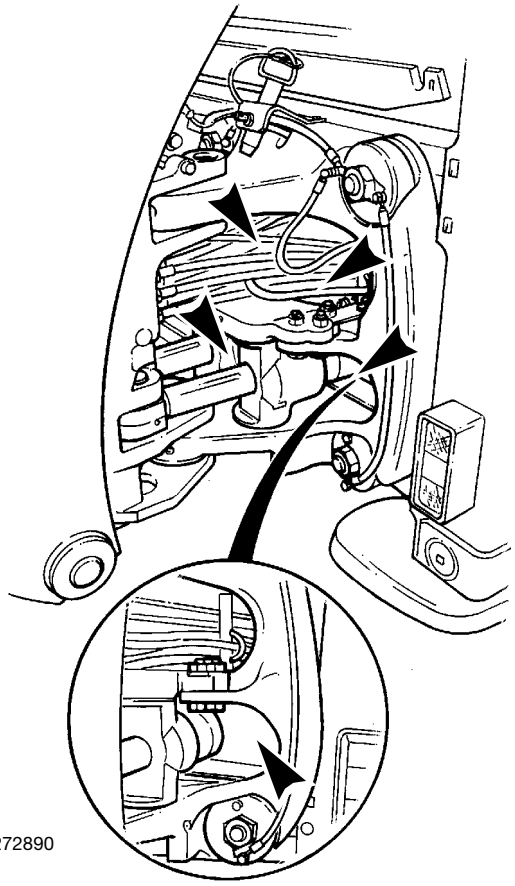
Avoid using neat detergent - always dilute detergents as per the manufacturer's recommendations, otherwise damage to the paint finish may occur.

It is important to note that excessive power washing can cause damage to the seals or bearings. Take care during routine machine washing not to direct high power water jets directly at oil seals or universal joints.

Note: The machine must always be greased after pressure washing or steam cleaning.

Always adhere to local regulations regarding the disposal of debris created from machine cleaning.

The illustrations show some of the areas that must be thoroughly cleaned as required.



S272890

Checking the Seat Belt Condition and Security

⚠ WARNING

When a seat belt is fitted to your machine replace it with a new one if it is damaged, if the fabric is worn, or if the machine has been in an accident. Fit a new seat belt every three years.
2-3-1-7/1

Inspect the seat belt for signs of fraying and stretching. Check that the stitching is not loose or damaged. Check that the buckle assembly is undamaged and works correctly.

Check that the belt mounting bolts are undamaged, correctly fitted and tightened.

Fire Extinguisher
(when fitted)

Checking the Fire Extinguisher

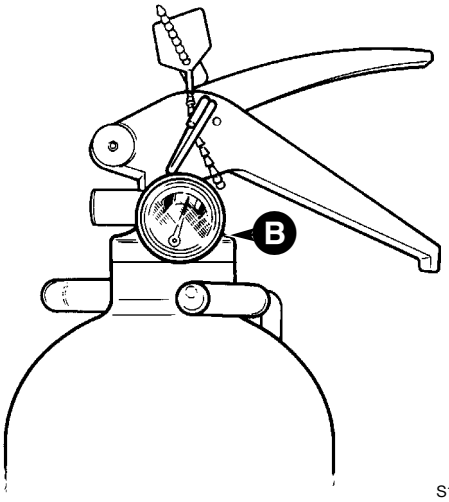
Check the fire extinguisher for damage, security and signs of leaking.

Check that the gauge **B** indicates that the extinguisher is charged ie. the needle is in the GREEN segment.

Note: If the needle is in or very near the RED segment at either end of the gauge, the extinguisher must be serviced or replaced.

Make sure the safety pin is fitted and secure.

The extinguisher should be serviced every 12 months by a suitably qualified person.



S170520

Checking the ROPS/FOPS Structure

The procedure for checking the ROPS/FOPS structure is described in the Body & Framework section. Refer to **Section B Body & Framework, Service Procedures, Cab ROPS/FOPS Structure - Checks.**

Tyre Inflation

These instructions are for adding air to a tyre which is already inflated. If the tyre has lost all its air pressure, call in a qualified tyre mechanic. The tyre mechanic should use a tyre inflation cage and the correct equipment to do the job.

⚠ WARNING

An exploding tyre can kill, inflated tyres can explode if overheated. Do not cut or weld the rims. Use a tyre/wheel specialist for all repair work.
2-3-2-7

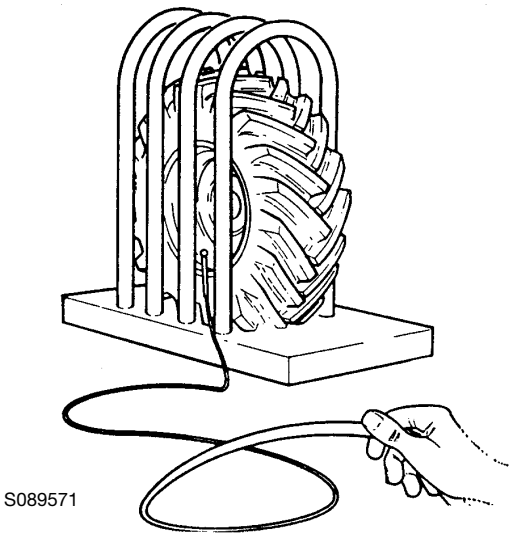
1 Prepare the Wheel
Before you add air to the tyre, make sure it is correctly fitted on the machine or installed in a tyre inflation cage.

2 Prepare the Equipment
Use only an air supply system which includes a pressure regulator. Set the regulator no higher than 1.38 bar (20 psi) above the recommended tyre pressure. See Section F, **Technical Data** for recommended tyres and pressures for your machine.

Use an air hose fitted with a self-locking air chuck and remote shut-off valve.

3 Add the Air
Make sure that the air hose is correctly connected to the tyre valve. Clear other people from the area. Stand behind the tread of the tyre while adding the air.

Inflate the tyre to the recommended pressure. Do not over-inflate.


S089571

Checking the Wheel Nut Torques

On new machines, and whenever a wheel has been removed, check the wheel nut torques every two hours until they stay correct.

Every day, before starting work, check that the wheel nuts are tight.

The correct torques are shown in the table below.

Front -	**Nm**	**lbf ft**
	680	500
Rear -	**Nm**	**lbf ft**
	680	500

⚠ WARNING

If, for whatever reason, a wheel stud is renewed, all the studs for that wheel must be changed as a set, since the remaining studs may have been damaged.
2-3-2-8

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

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, so take special care when handling used oils, which might 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, plus 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 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 the normal care and hygiene practices.

Used Oil.

Used engine crankcase lubricants contain harmful contaminants.

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

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

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

4 Avoid skin contact with oil soaked clothing.

5 Don't keep oily rags in pockets.

6 Wash dirty clothing before re-use.

7 Throw away oil-soaked shoes.

First Aid - Oil

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

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

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

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. Fire-fighters should use self-contained breathing apparatus.

A badly maintained machine is a danger to the operator and the people working around him. Make sure that the regular maintenance and lubrication jobs listed in the service schedules are done to keep the machine in a safe and efficient working condition.

⚠ WARNING

Maintenance

Maintenance must be done by suitably qualified personnel. Before attempting any maintenance work, make sure the machine is safe. Park on level ground. If it is necessary to work with the loader arms raised, then the loader arm safety strut must be fitted as shown in Loader Arm Safety Strut in MAINTENANCE section.

2-3-1-1

Apart from the daily jobs, the schedules are based on machine running hours. Keep a regular check on the hourmeter readings to correctly gauge service intervals. Do not use a machine which is due for a service. Make sure any defects found during the regular maintenance checks are rectified immediately.

Calendar equivalents:

10 Hours	=	Daily
50 Hours	=	Weekly
500 Hours	=	Six Months
1000 Hours	=	Yearly
2000 Hours	=	2 Years

Pre-start Cold Checks **Service Points and Fluid Levels**	**Operation**	**10 Hr**	**50 Hr**	**†100 Hr**	**500 Hr**	**1000 Hr**	**2000 Hr**
ENGINE							
Oil level	- Check	•	•				
Oil and Filter (AK and AR Build) ④	- Change			•	•	•	•
Oil and Filter (RE and RG Build) ④	- Change				•	•	•
Air Cleaner Outer Element ⑥	- Change					•	•
Air Cleaner Inner Element	- Change						•
Fuel Filter (AK and AR Build)	- Change			•	•	•	•
Fuel Filter (RE and RG Build)	- Change				•	•	•
Fuel Filter	- Drain		•				
Lift Pump Strainer (AK and AR Build Only)	- Clean			•	•	•	•
Coolant Quality/Level	- Check	•	•	•	•	•	•
Fuel Sedimenter	- Drain and Clean		•	•	•	•	•
Fan Belt Tension/Condition	- Check		•	•	•	•	•
Valve Clearances and Clean Breather Gauze (if fitted) ③	- Check and Adjust					•	•
Engine Mounting Bolts for Tightness ③	- Check			•	•	•	•
Radiator	- Clean				•	•	•
All Hoses - Condition	- Check			•	•	•	•
TRANSMISSION, AXLES AND STEERING							
Transmission Oil Level	- Check	•	•	•	•		
Transmission Oil ⑧	- Change					•	•
Transmission Filter	- Change			•	•	•	•
Axle Oil Level (incl. Hubs when applicable) ①	- Check			•	•		
Axle Oil (incl. Hubs when applicable) ⑨	- Change					•	•
Axle Oil - Limited Slip Differential	- Change				•	•	•
Tyre Pressures/Condition	- Check	•	•	•	•	•	•
Front Hub Bearings ③	- Check			•	•	•	•
Transmission Strainer	- Clean					•	•
Drive Shafts	- Security/Grease			•	•	•	•
Steer Axle Movement/Shimming ③	- Check			•	•	•	•
Steer Axle Pivots and Linkages ⑦	- Grease			•	•	•	•
Front Axle Main Pivot	- Grease	•	•	•	•	•	•
HYDRAULICS							
Oil Level ②	- Check	•	•	•	•	•	
Oil ③	- Sample/Change						•
Oil Filter	- Change			•	•	•	•
Rams - Chrome Condition	- Check			•	•	•	•