

Service Manual

3CX, 4CX, 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.

-  **Red** — **Full Pressure**
Pressure generated from operation of a service. Depending on application this may be anything between neutral circuit pressure and M.R.V. operating pressure.
-  **Pink** — **Pressure**
Pressure that is above neutral circuit pressure but lower than that denoted by red.
-  **Orange** — **Servo**
Oil pressure used in controlling a device (servo).
-  **Blue** — **Neutral**
Neutral circuit pressure.
-  **Green** — **Exhaust**
-  **Light Green** — **Cavitation**
Oil subjected to a partial vacuum due to a drop in pressure (cavitation).
-  **Yellow** — **Lock Up**
Oil trapped within a chamber or line, preventing movement of components (lock up).

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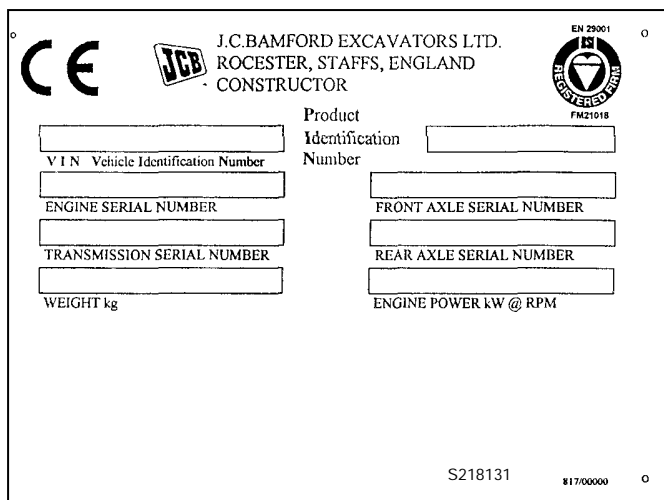
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Machine Identification Plate

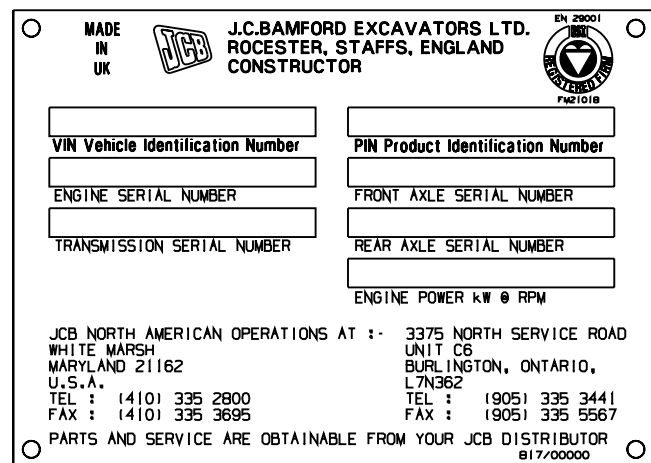
Your machine has an identification plate mounted on the loader tower. The serial numbers of the machine and its major units are stamped on the plate.

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)

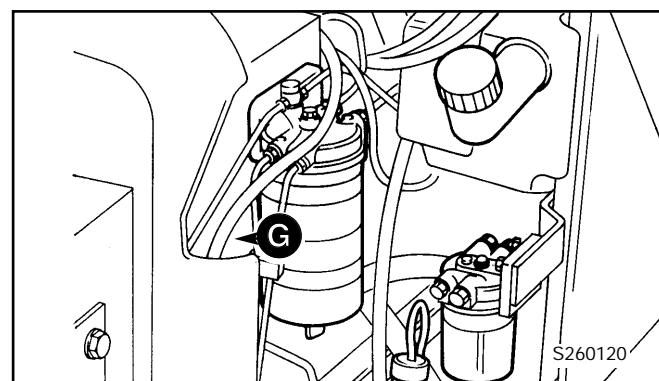
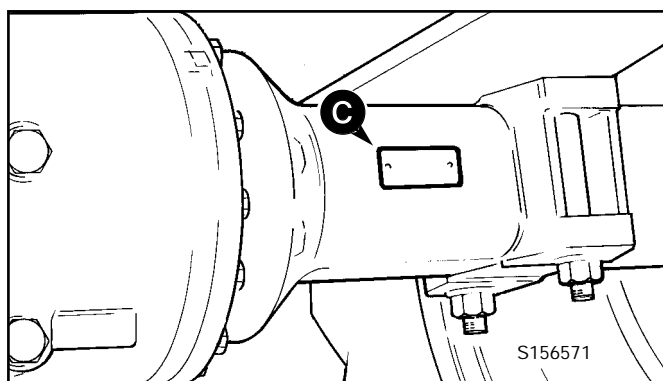
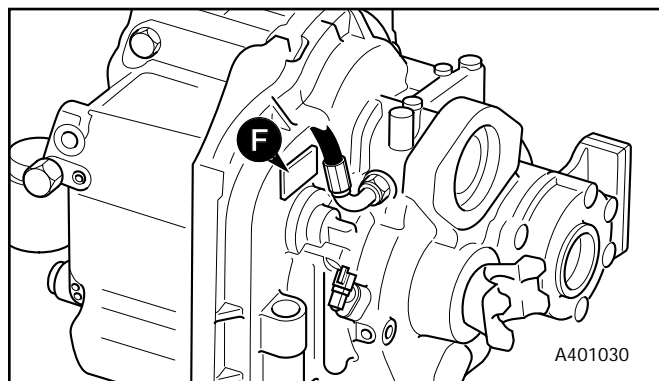
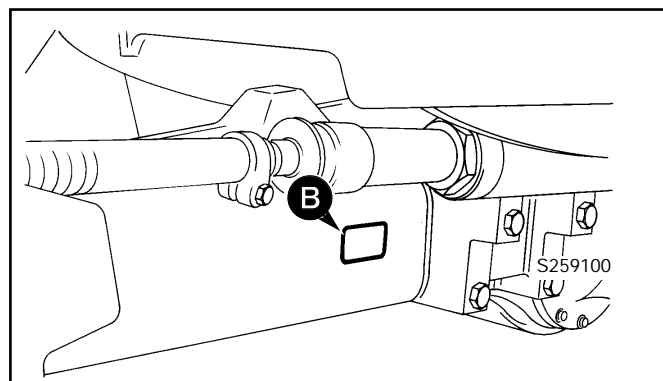
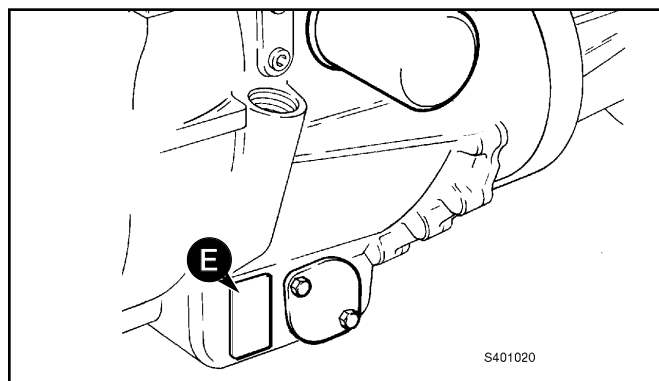
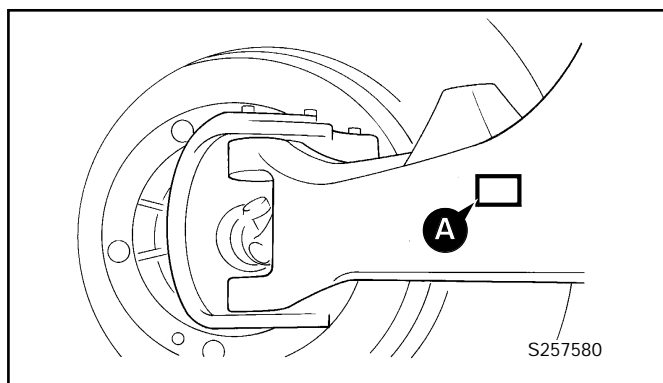
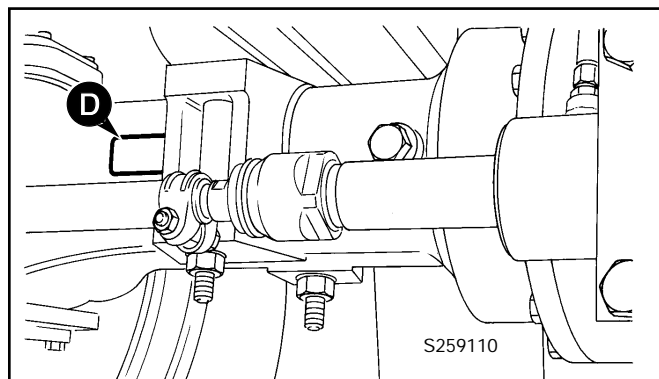
Typical Engine Identification Number

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

Metric Grade 8.8 Bolts

Bolt Size	(mm)	Hexagon (A/F) mm	Torque Settings		
			Nm	kgf m	lbf ft
M5	(5)	8	7	0.7	5
M6	(6)	10	12	1.2	9
M8	(8)	13	28	3.0	21
M10	(10)	17	56	5.7	42
M12	(12)	19	98	10	72
M16	(16)	24	244	25	180
M20	(20)	30	476	48	352
M24	(24)	36	822	84	607
M30	(30)	46	1633	166	1205
M36	(36)	55	2854	291	2105

Rivet Nut Bolts/Screws

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

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The following parts are replacement items for kits and would normally be included in the kit numbers quoted on pages 1/3-1 and 1/3-2.

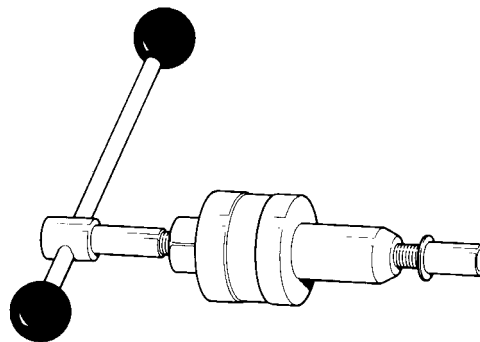
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Service Tools (cont'd)

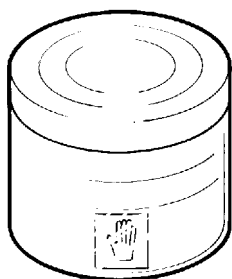
Section B - Body & Framework

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

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



S261210



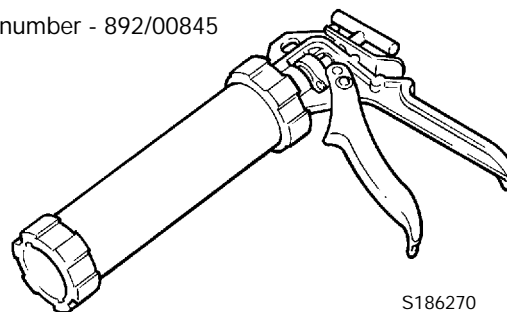
Hand Cleaner - special blend for the removal of polyurethane adhesives.

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

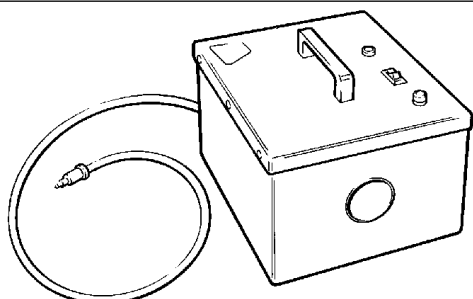
S186240

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

JCB part number - 892/00845



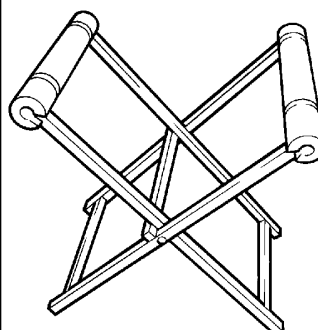
S186270



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

JCB part number - 992/12300

S186250



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

JCB part number - 892/00843

S186280

Service Tools (cont'd)

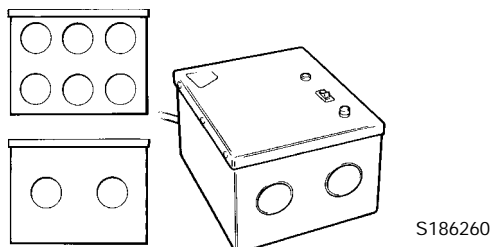
Section B - Body & Framework

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:

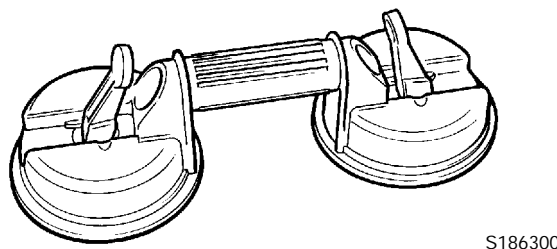
992/12400 - 2 Cartridge x 240V

992/12600 - 6 Cartridge x 240V

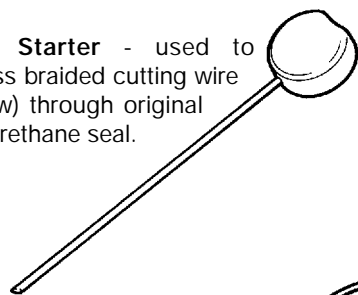


Glass Lifter - minimum 2 off - essential for glass installation, 2 required to handle large panes of glass. Ensure suction cups are protected from damage during storage.

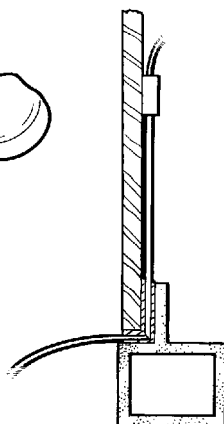
JCB part number - 892/00842



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

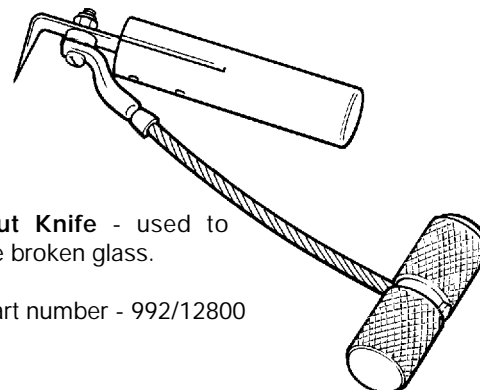


JCB part number - 892/00848



Cut-Out Knife - used to remove broken glass.

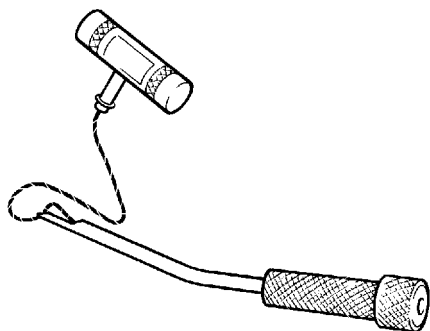
JCB part number - 992/12800



S186340

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

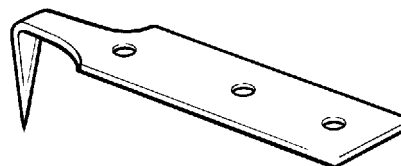
JCB part number - 892/00846



S186320

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

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



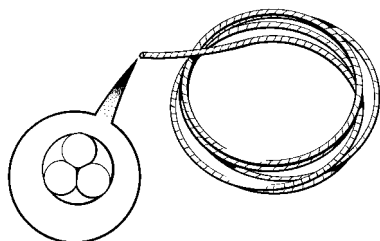
S186350

Service Tools (cont'd)

Section B - Body & Framework

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

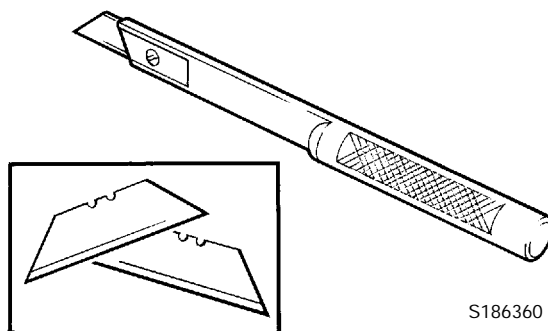
JCB part number - 892/00849
(approx 25 m length)



S186330

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

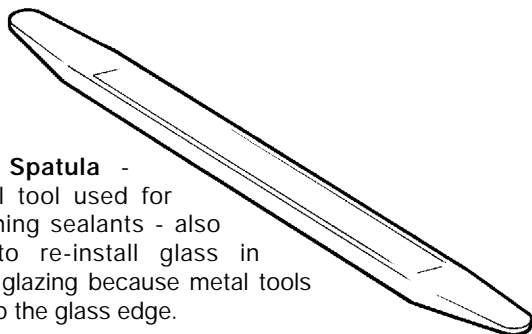
JCB part number - 892/00844



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.

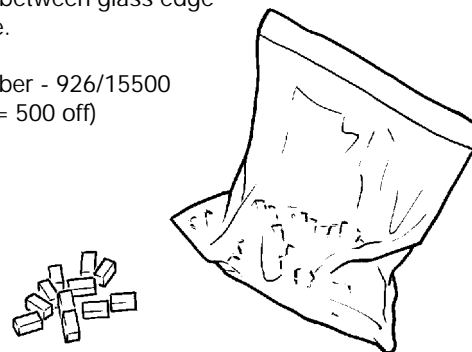
JCB part number - 892/00847



S186470

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

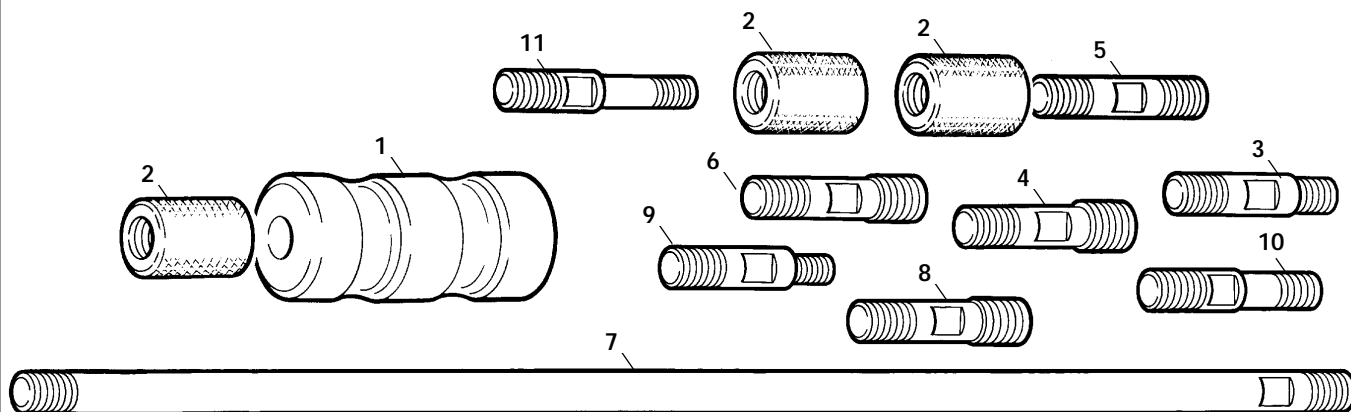
JCB part number - 926/15500
(unit quantity = 500 off)



S186550

Slide Hammer Kit - 993/68100

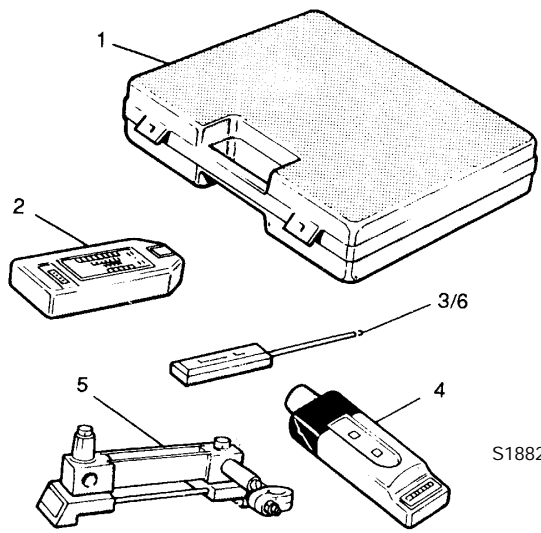
- | | | | |
|--------------|--------------------------|---------------|-------------------------------------|
| 1 :993/68101 | Slide Hammer | 6 :993/68106 | Adaptor - M20 x M24 |
| 2 :993/68102 | End Stops | 7 :993/68107 | Bar - M20 x M20 X 800MM |
| 3 :993/68103 | Adaptor - M20 x 5/8" UNF | 8 :993/68108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

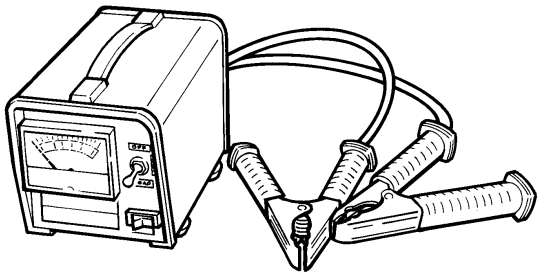


AVO Test Kit

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

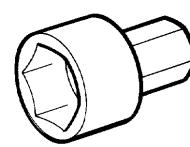
S188231

993/85700 Battery Tester



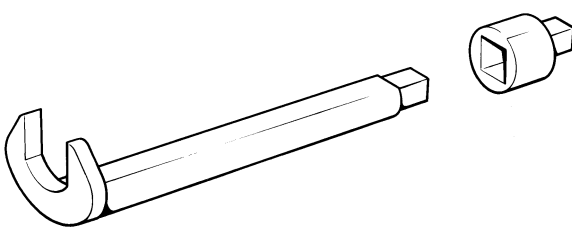
S239510

892/00882 Socket for Alternator Pulley Nut



S216770

825/00410 15 mm Crowfoot Wrench
825/99833 Adapter

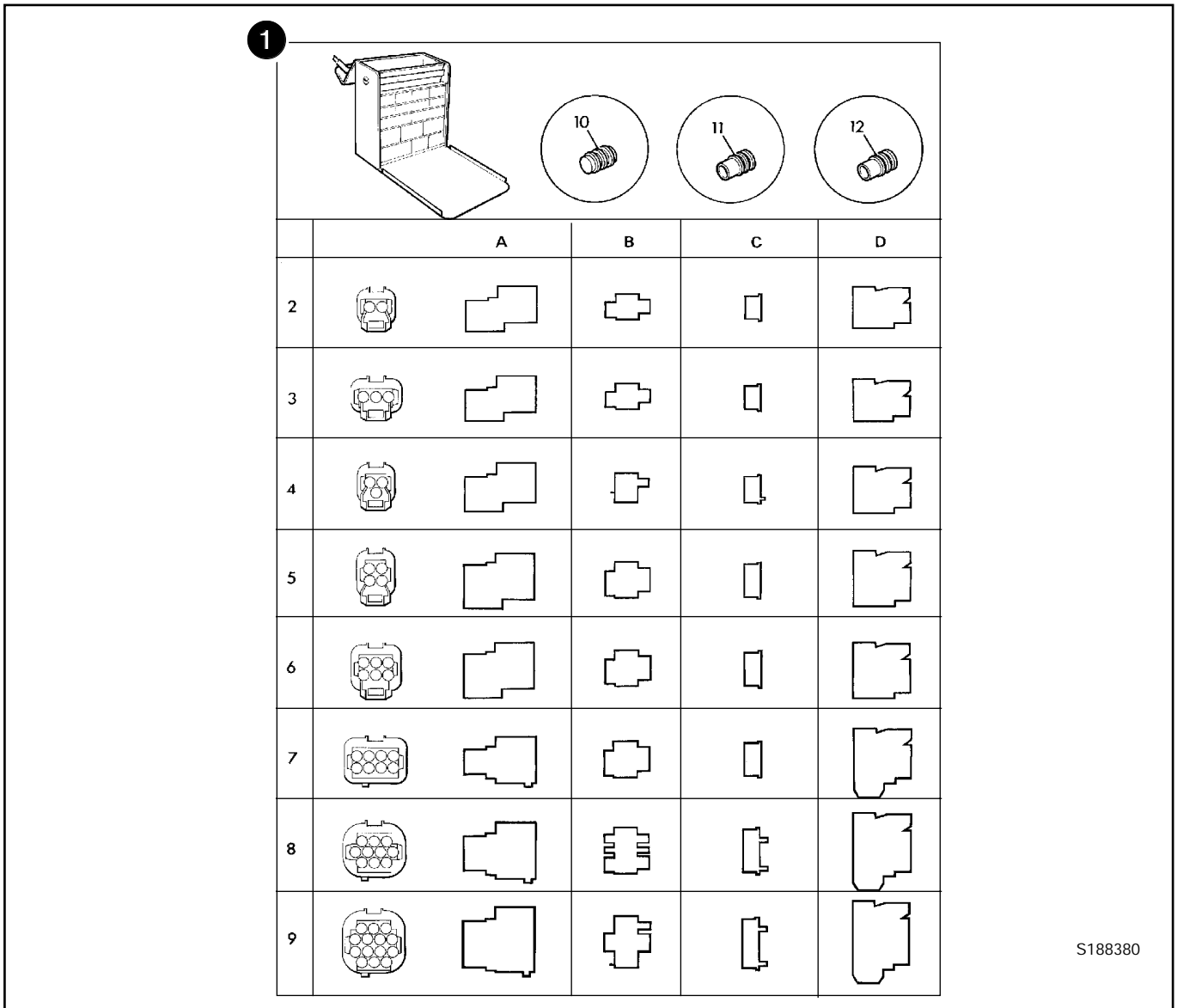


S216200

Service Tools (cont'd)

Section C - Electrics

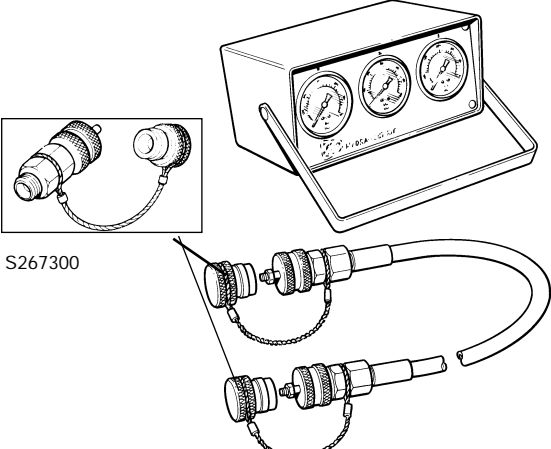
1	Electrical Repair Kit	6A :7216/0002	6 Way Pin Housing
2A :7212/0002	2 Way Pin Housing	6B :7216/0004	6 Way Pin Retainer
2B :7212/0004	2 Way Pin Retainer	6C :7216/0003	6 Way Socket Retainer
2C :7212/0003	2 Way Socket Retainer	6D :7216/0001	6 Way Socket Connector
2D :7212/0001	2 Way Socket Connector	7A :7218/0002	8 Way Pin Housing
3A :7213/0002	3 Way Pin Housing	7B :7218/0004	8 Way Pin Retainer
3B :7213/0004	3 Way Pin Retainer	7C :7218/0003	8 Way Socket Retainer
3C :7213/0003	3 Way Socket Retainer	7D :7218/0001	8 Way Socket Connector
3D :7213/0001	3 Way Socket Connector	8A :7219/0002	10 Way Pin Housing
4A :7213/0006	3 Way Pin Housing (DT)	8B :7219/0004	10 Way Pin Retainer
4B :7213/0008	3 Way Pin Retainer (DT)	8C :7219/0003	10 Way Socket Retainer
4C :7213/0007	3 Way Socket Retainer (DT)	8D :7219/0001	10 Way Socket Connector
4D :7213/0005	3 Way Socket Connector (DT)	9A :7219/0006	14 Way Pin Housing
5A :7214/0002	4 Way Pin Housing	9B :7219/0008	14 Way Pin Retainer
5B :7214/0004	4 Way Pin Retainer	9C :7219/0007	14 Way Socket Retainer
5C :7214/0003	4 Way Socket Retainer	9D :7219/0005	14 Way Socket Connector
5D :7214/0001	4 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

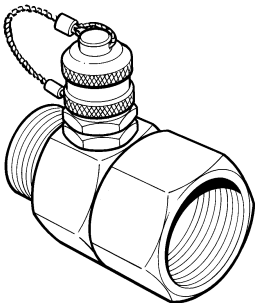


Hydraulic Circuit Pressure Test Kit

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

S267300

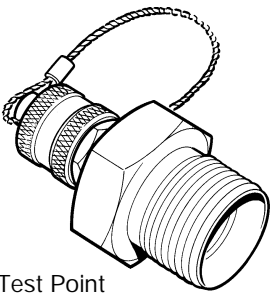
S188121



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



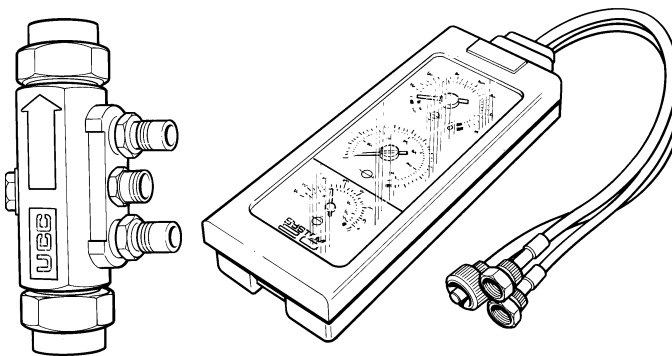
S200141

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

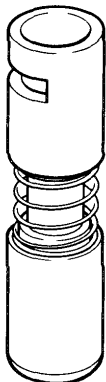


S188151

Service Tools (cont'd)

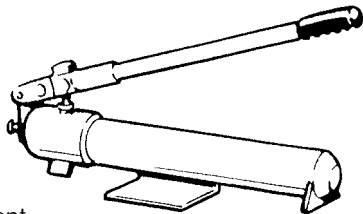
Section E - Hydraulics

892/00881 Valve Spool Seal Fitting Tool



S261220

Hand Pump Equipment



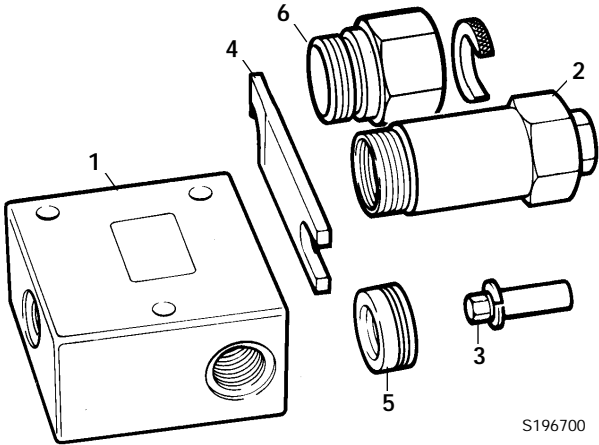
892/00223 Hand Pump
 892/00137 Micro-bore Hose 1/4 in BSP x 3 metres
 892/00274 Adapter 1/4 in M BSP x 3/8 in M BSP Taper
 892/00262 1/4 in M BSP x 1/4 in F BSP x Test Point
 892/00706 Test Probe
 892/00278 Gauge 0 - 40 bar (0 - 600 lbf/in²)
 892/00279 Gauge 0 - 400 bar (0 - 6000 lbf/in²)

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

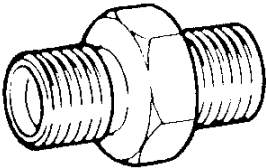
Bonded Washers

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

<p>Male Adapters - BSP x NPT (USA only)</p> <p>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.</p>	<p>Male Adapters - BSP x BSP</p> <p>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.</p>
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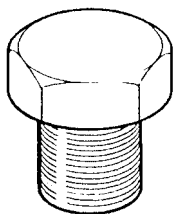
S193860

Service Tools (cont'd)

Section E - Hydraulics

Female Cone Blanking Plug

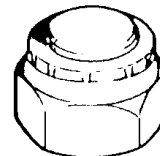
- 892/00055 1/4 in. BSP
- 892/00056 3/8 in. BSP
- 892/00057 1/2 in. BSP
- 892/00058 5/8 in. BSP
- 892/00059 3/4 in. BSP
- 892/00060 1 in. BSP



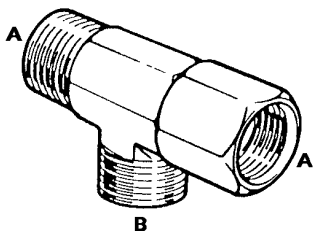
S193870

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

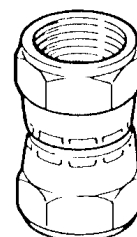


S193880



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)

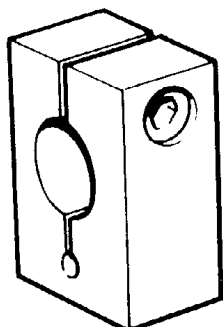


S193900

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

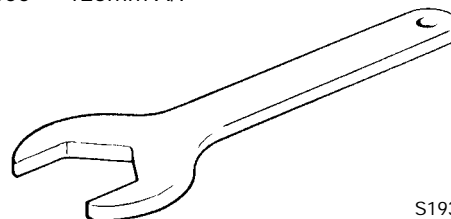
- 992/09100 Excavator Spool Clamp
- 892/00011 Spool Clamp



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

S216230

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

892/00181 Replacement Plastic Boss

892/01027 Piston Seal Assembly Tool

338500

S216250

892/00334 Ram Seal Fitting Tool

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

S308271

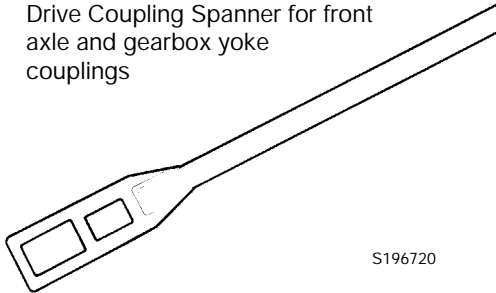
892/00948 Charging Kit (without gauge)

892/00949 Gauge

Service Tools (cont'd)

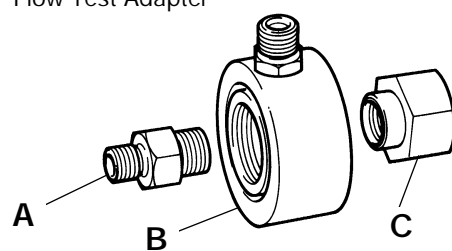
Section F - Transmission

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



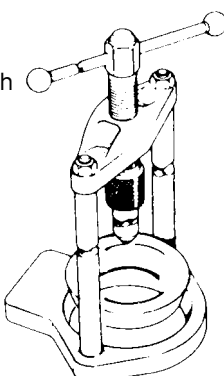
S196720

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)



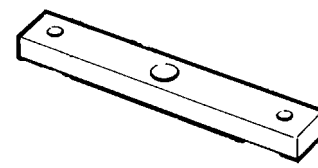
S188200

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

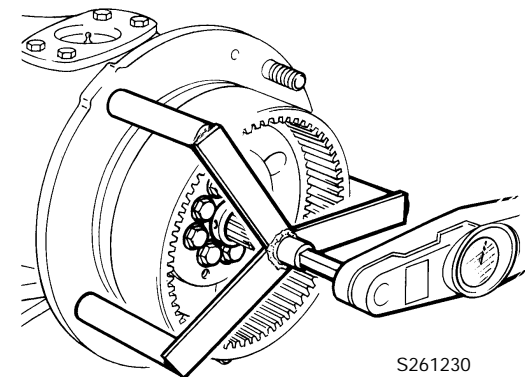


S188160

892/00922 12.2" Torque Converter Alignment Tool



S267260

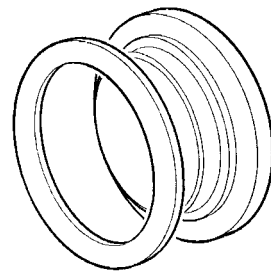


S261230

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).



892/00891

Fitting Tool Assembly for Wheel Hub Seals

S227760