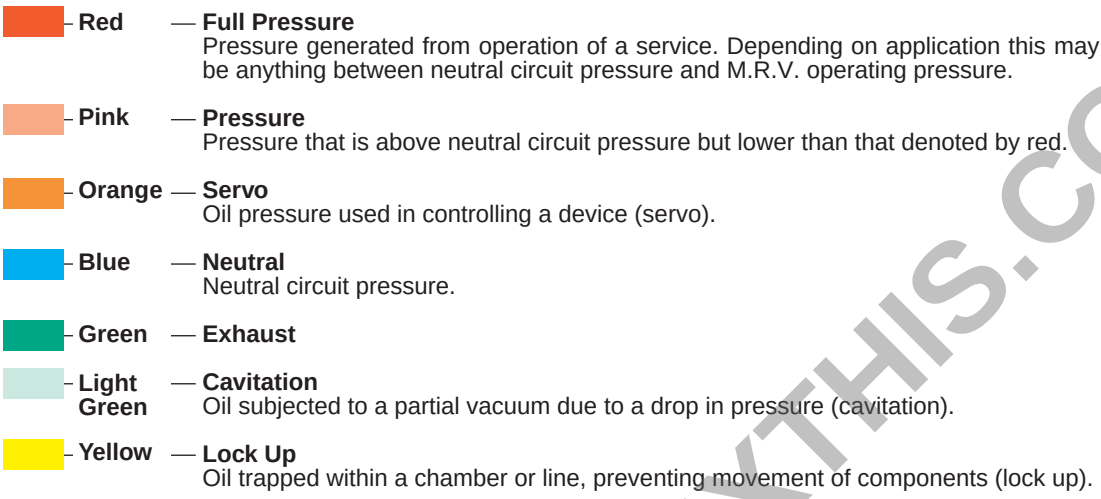
Colour Coding

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



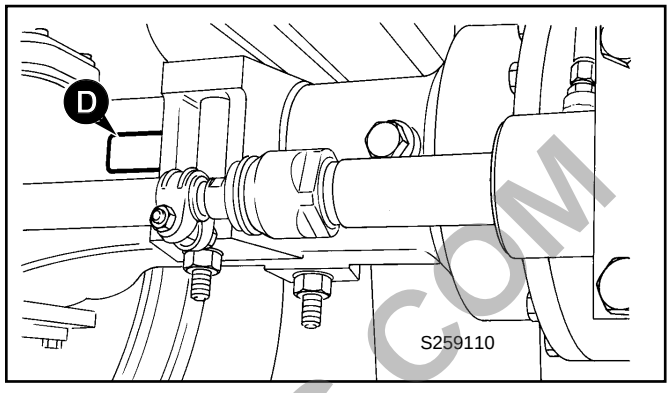
A390940

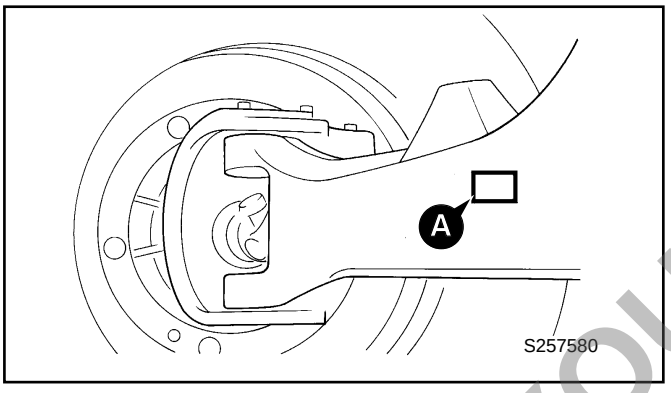
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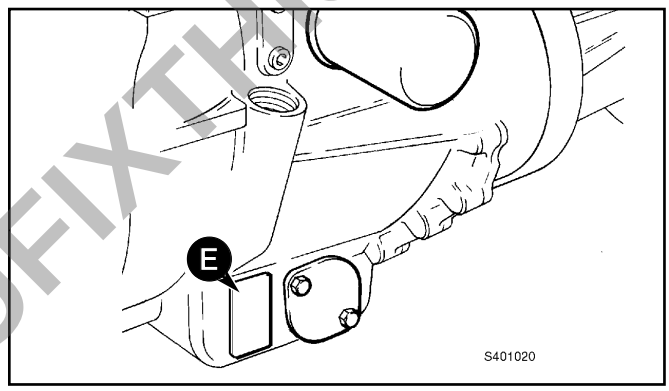
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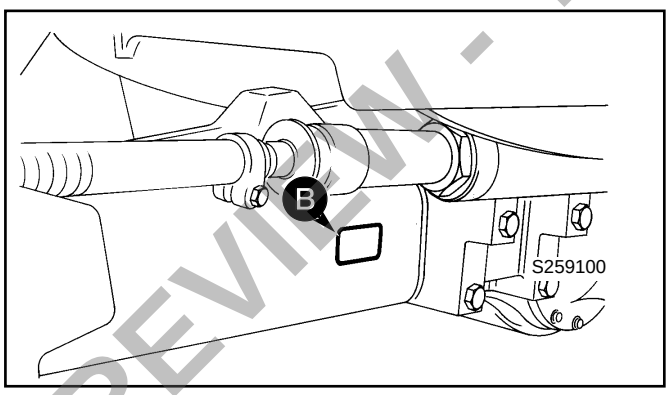
Serial Plates

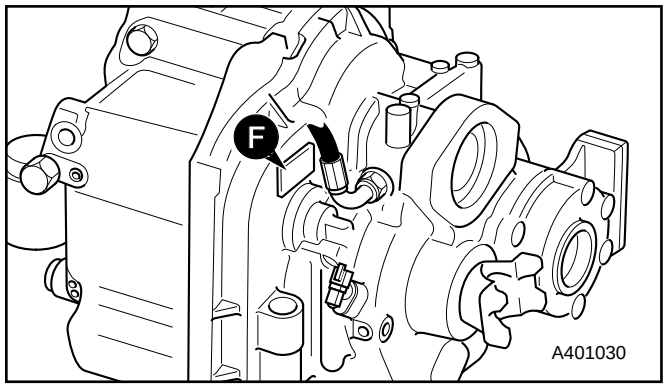
- **A** Front Axle (2WS machine)
- **B** Front Axle (4WS machine)
- **C** Rear Axle (2WS machine)
- **D** Rear Axle (4WS machine)
- **E** Synchro Shuttle Transmission
- **F** Powershift Transmission
- **G** Engine

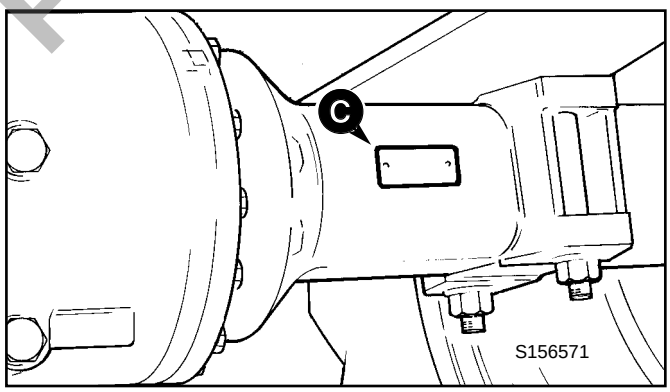


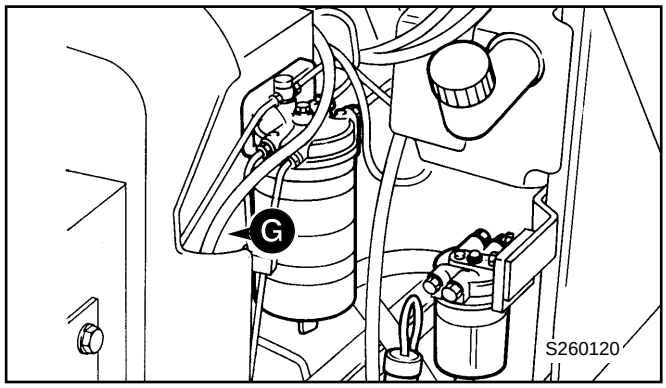












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Safety Notices

In this publication and on the machine, there are safety notices. Each notice starts with a signal word. The signal word meanings are given below.

⚠ DANGER

Denotes an extreme hazard exists. If proper precautions are not taken, it is highly probable that the operator (or others) could be killed or seriously injured.
INT-1-2-1

⚠ WARNING

Denotes a hazard exists. If proper precautions are not taken, the operator (or others) could be killed or seriously injured.
INT-1-2-2

⚠ CAUTION

Denotes a reminder of safety practices. Failure to follow these safety practices could result in injury to the operator (or others) and possible damage to the machine.
INT-1-2-3

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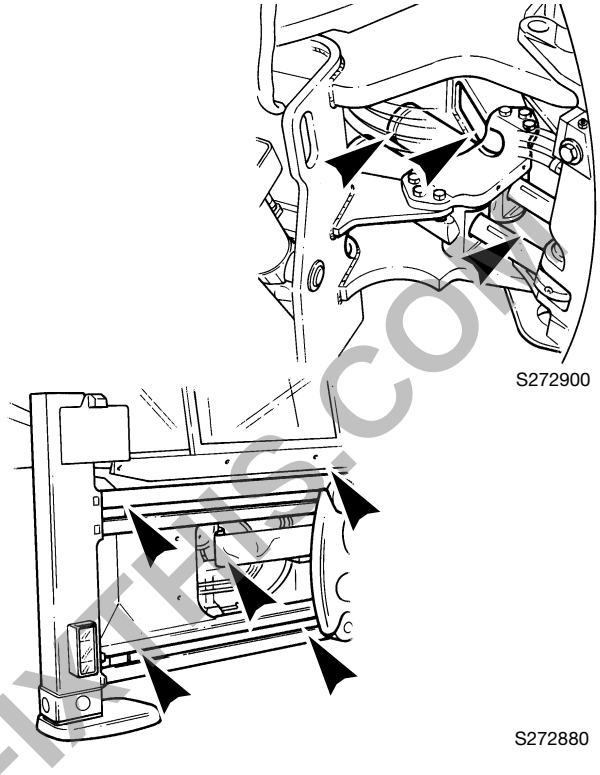
Park the machine on firm level ground, engage the parking brake and set the transmission to neutral. Lower the attachments to the ground and stop the engine.

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

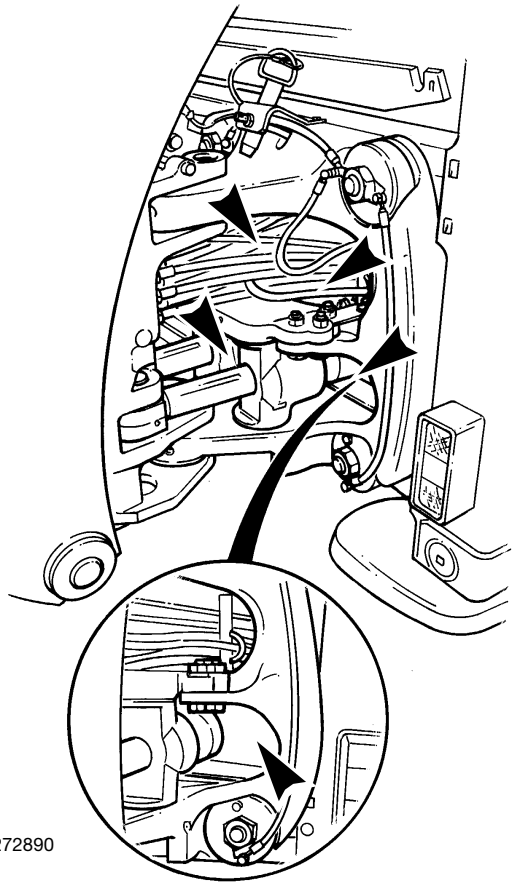
Avoid using neat detergent - always dilute detergents as per the manufacturer's recommendations, otherwise damage to the paint finish may occur.

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.

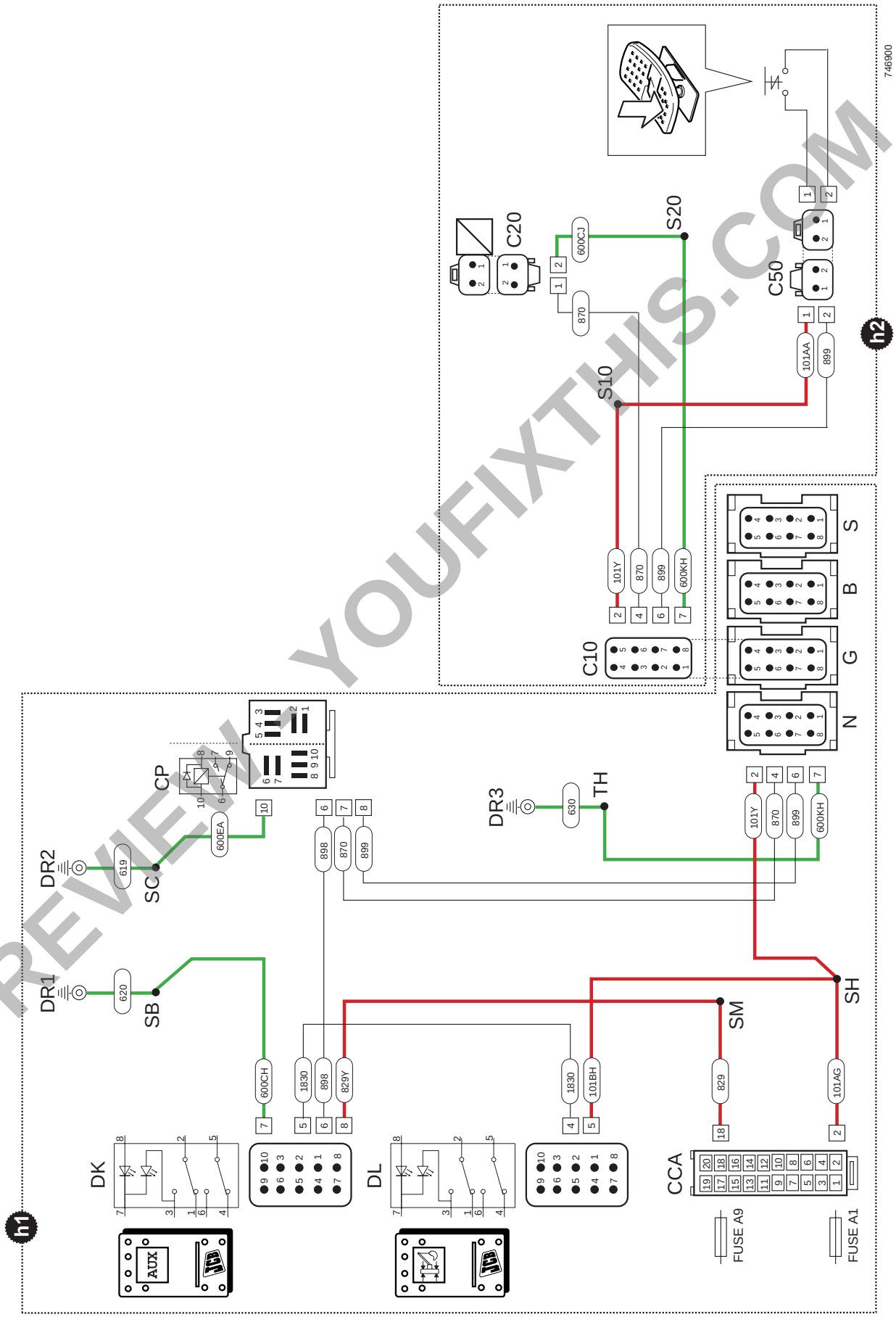
The illustrations show some of the areas that must be thoroughly cleaned as required.


S272890

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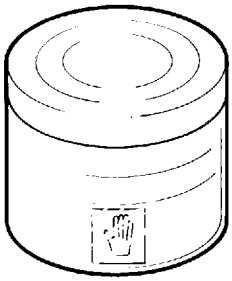
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Electrical Connections - NOT servo machines up to serial no. 941509



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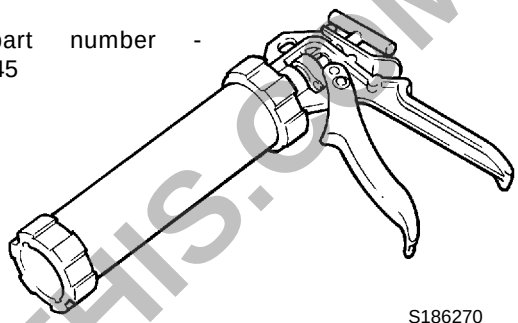
Hand Cleaner - special blend for the removal of polyurethane adhesives.

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

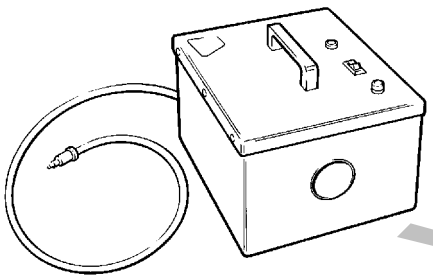
S186240

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

JCB part number - 892/00845



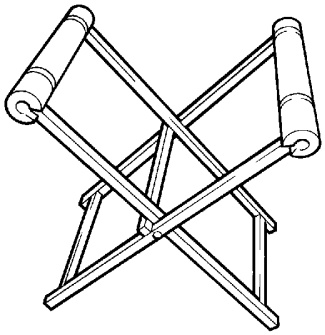
S186270



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

JCB part number - 992/12300

S186250



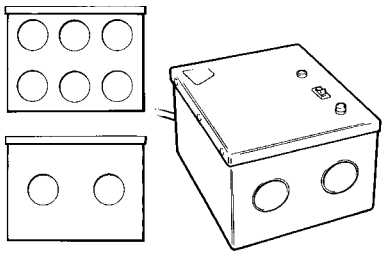
Folding Stand for Holding Glass - essential for preparing new glass prior to installation.

JCB part number - 892/00843

S186280

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

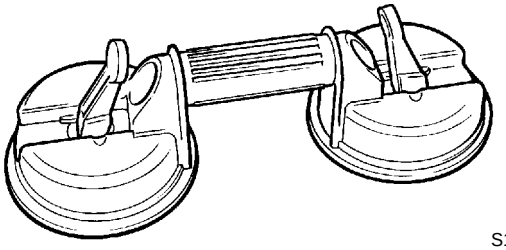
JCB part number:
992/12400 - 2 Cartridge x 240V
992/12600 - 6 Cartridge x 240V



S186260

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

JCB part number - 892/00842

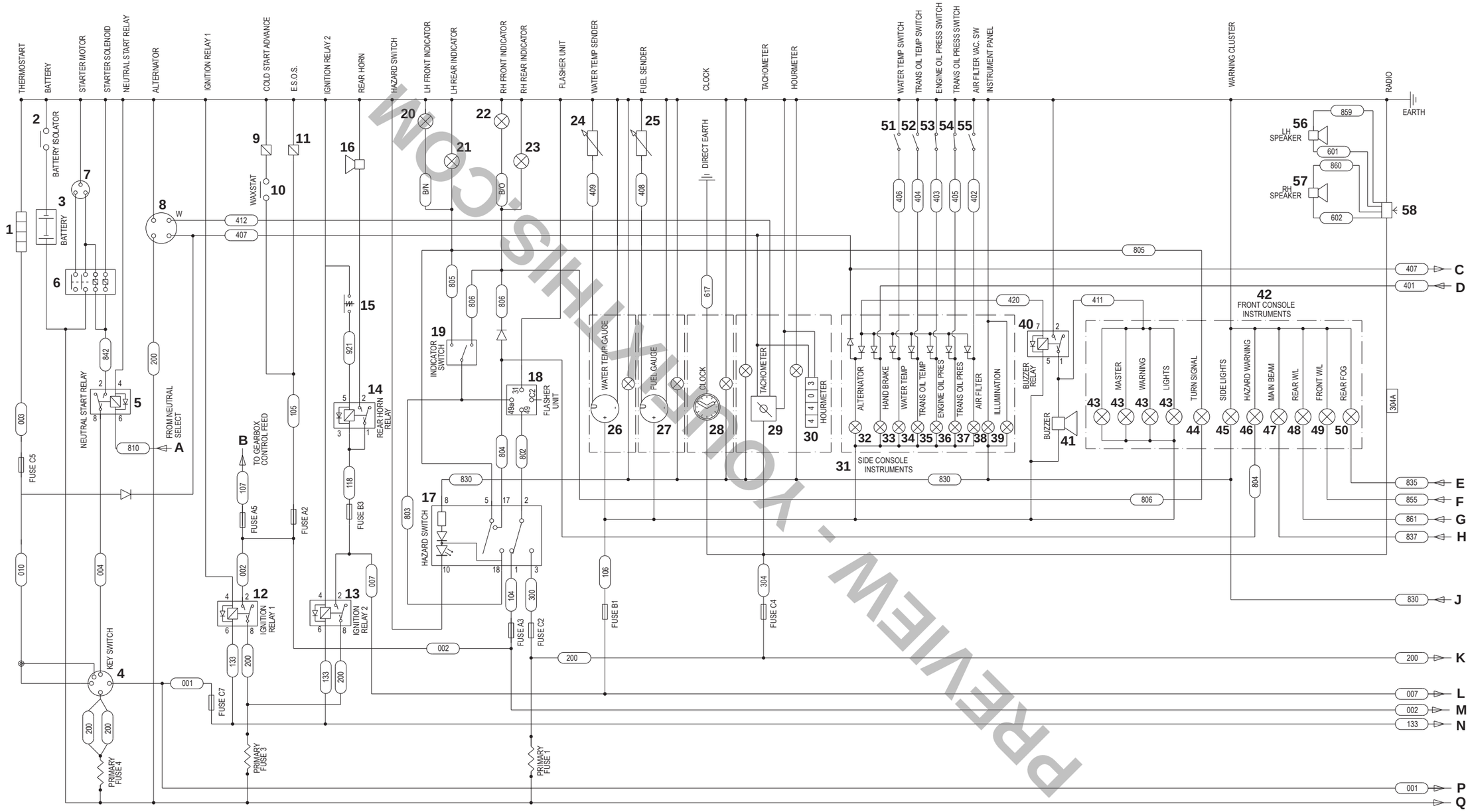


S186300

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Circuit Schematic - Basic Machine



A409180

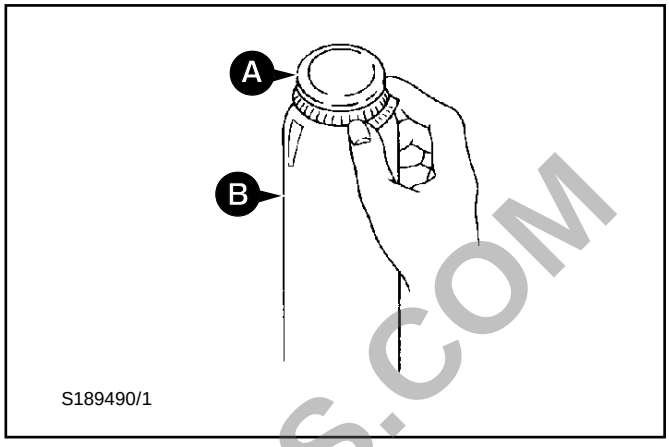
852/30241sht1 Iss1

WCJ.sIHLXIAO
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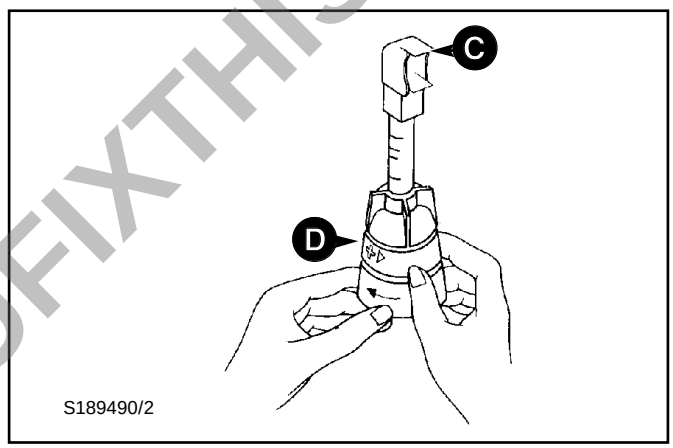
Wiring Harness - Repair Procedure (cont'd)

With the Butane Heater assembly 892/00350, seal the connection using the following procedure.

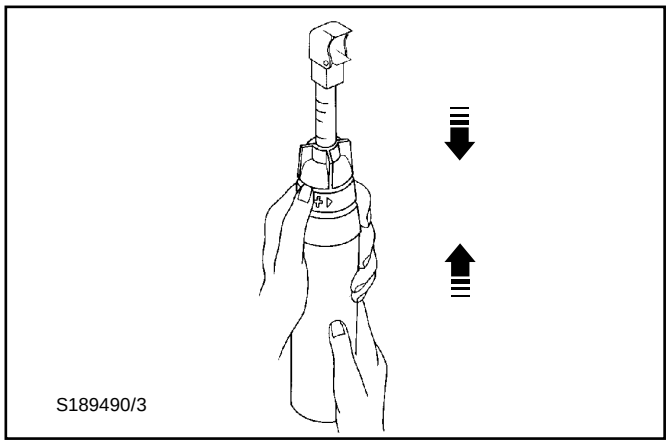
a Remove the cap **A** from the end of the disposable gas cartridge **B**.



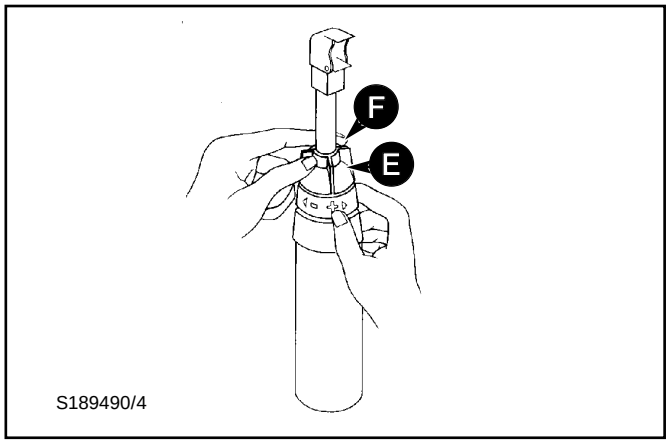
b Before assembling the gas cartridge to the reflector element **C**, turn the red ring **D** to the left, (in the direction of the minus sign marked on the ring).



c Position the tube hanging down from inside the reflector assembly into the hole at the top of the gas cartridge. Then press the gas cartridge up into the reflector assembly as far as possible until the two elements are clasped firmly together. A click will be heard.



d Turn the small ring **E** so that the air holes at **F** are completely closed.



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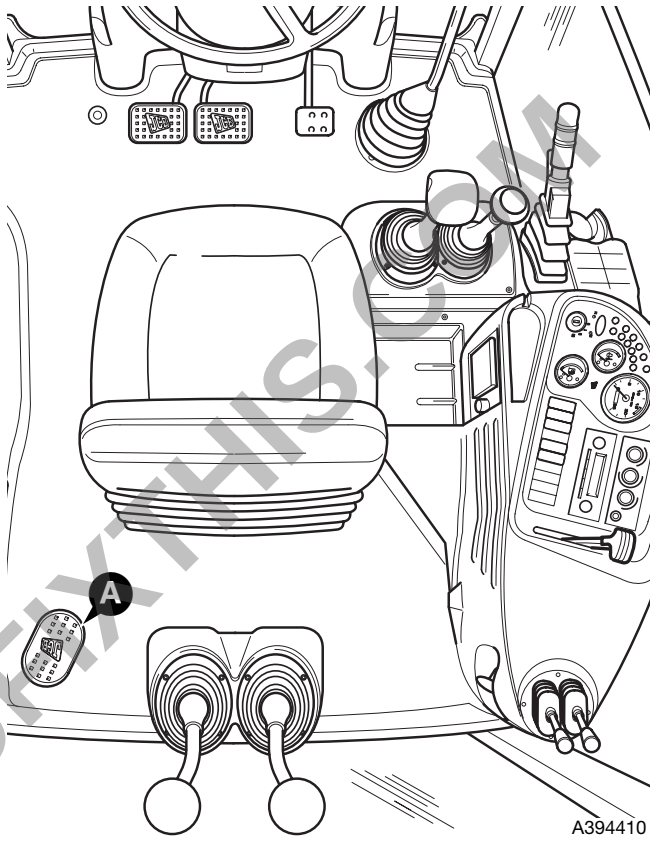
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Removal and Replacement

Auxiliary Footpedal Cable

The auxiliary footpedal control **A** is mounted in the cab floor as shown. The cable operates the auxiliary control valve located adjacent to the excavator valve. The cable is accessible underneath the rear L.H. corner of the cab.

Note the routing of the existing cable and route the new cable in the same way.



A394410

Removal

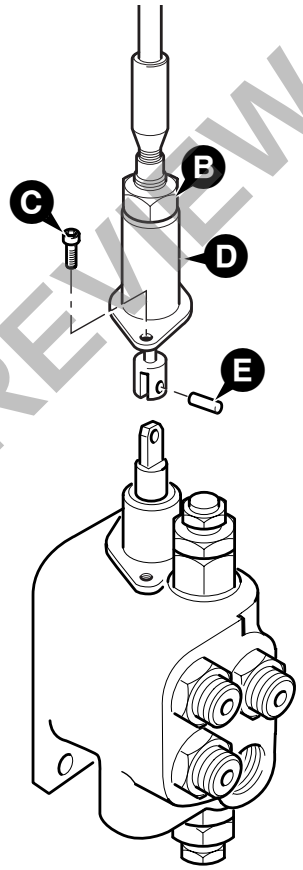
1 Park the machine on firm level ground, apply the parking brake. Lower the loader arms and excavator to the ground, switch OFF the engine and remove the starter key.

2 Working at the rear of the machine at the auxiliary valve, undo the locknut **B**. Remove the screws **C** and slide back the housing **D** to reveal the clevis as shown. Remove the clevis pin **E** to release the cable.

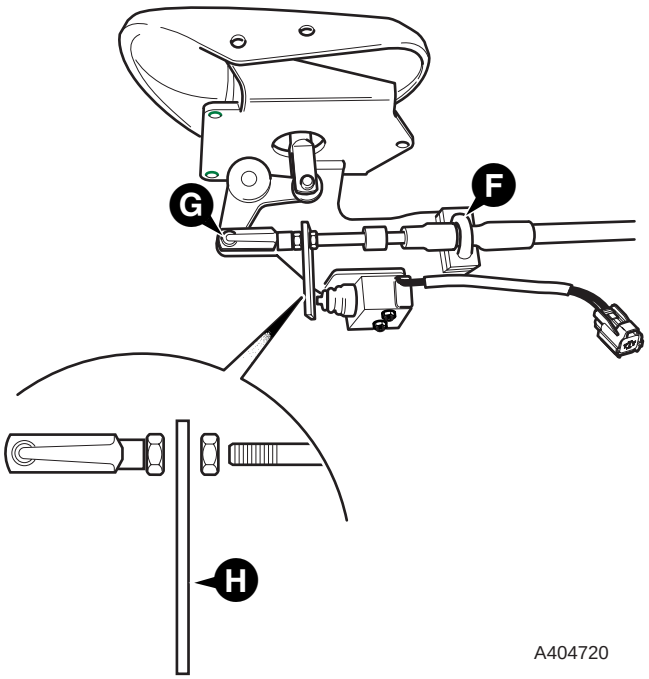
3 At the footpedal remove the U-clamp **F** securing the cable to the bracket. Remove the spring clip **G** to release the cable. If the cable is to be replaced, remove and retain the microswitch operating tab **H** from the old cable as shown.

Replacement

Replacement is the reverse of the removal sequence.



A404710



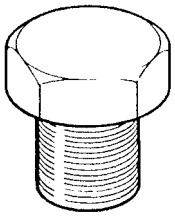
A404720

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Female Cone Blanking Plug

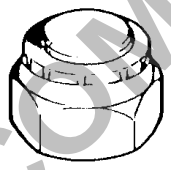
892/00055	1/4 in. BSP
892/00056	3/8 in. BSP
892/00057	1/2 in. BSP
892/00058	5/8 in. BSP
892/00059	3/4 in. BSP
892/00060	1 in. BSP



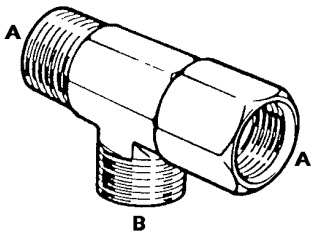
S193870

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

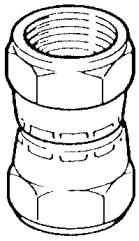


S193880



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)

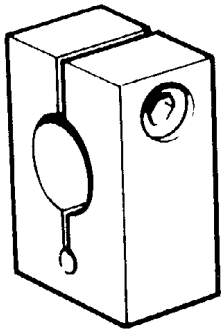


S193900

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

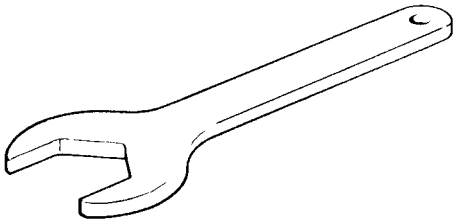
992/09100	Excavator Spool Clamp
892/00011	Spool Clamp



S216210

Hexagon Spanners for Ram Pistons and End Caps

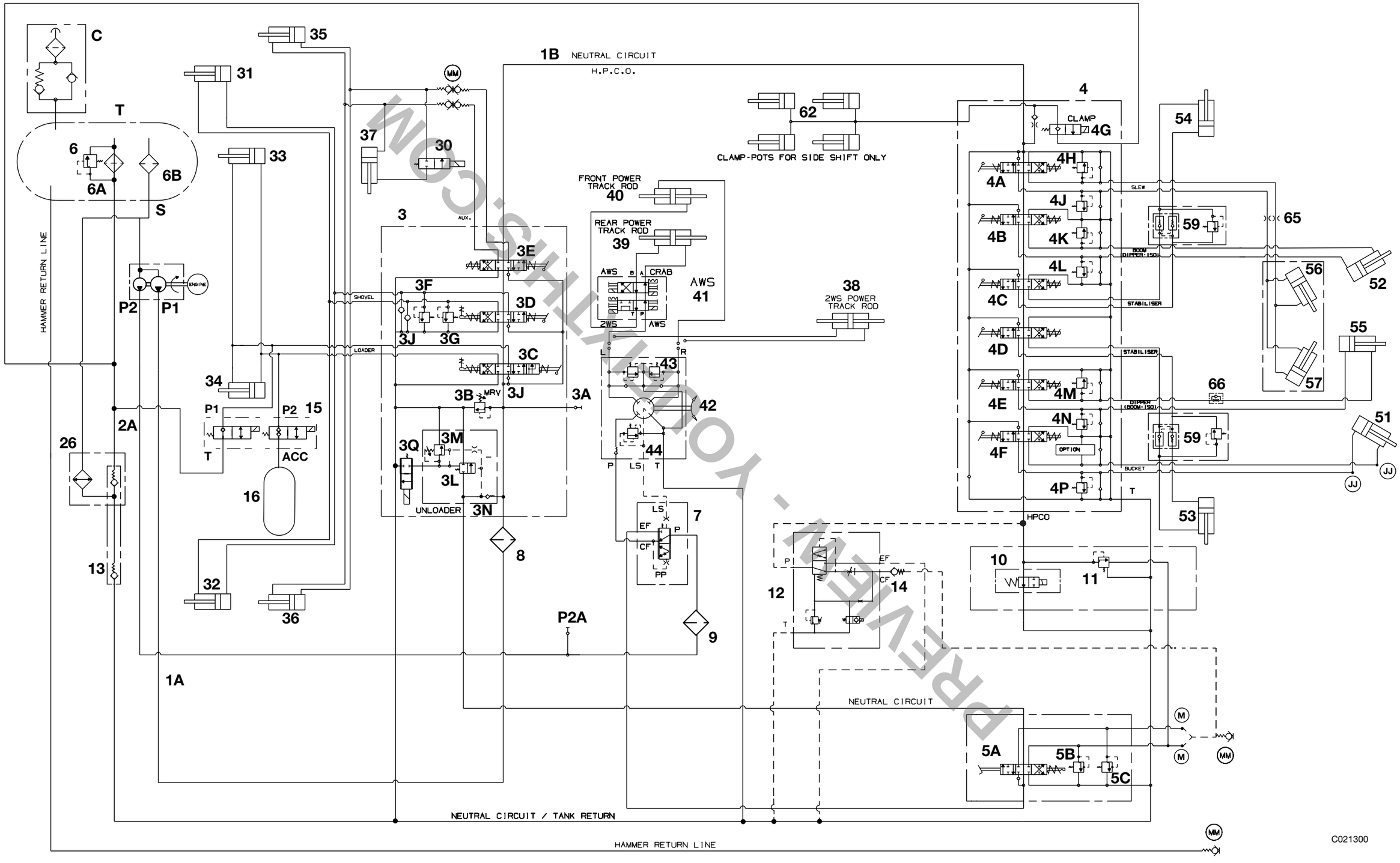
992/09300	55mm A/F
992/09400	65mm A/F
992/09500	75mm A/F
992/09600	85mm A/F
992/09700	95mm A/F
992/09900	115mm A/F
992/10000	125mm A/F



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3CX, 4CX, 214, 215, 217 & 'S' Series Machines



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Hydraulic Pump - Variable Flow

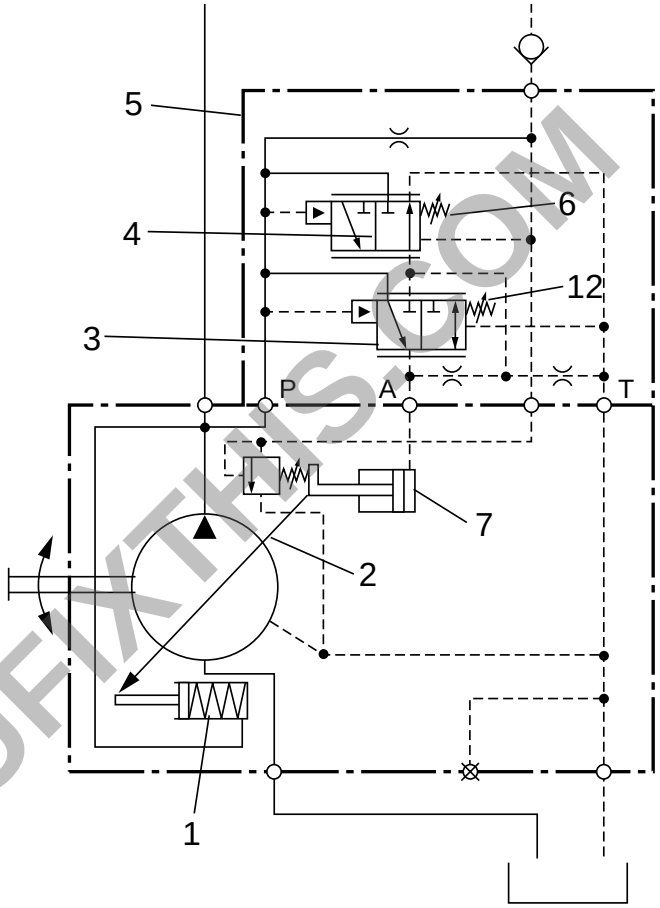
Pressure/Flow Regulator Valve

Load Sensing - Maximum Pressure (no flow)

When a service ram reaches the end of its stroke or the service meets resistance (for instance tearing out), the signal pressure from the loader (or backhoe) valve **13** will increase to the same pressure as pump output pressure.

The force of spring **6** is sufficient to move spool **4** down. The pressure in the system is also sufficient to move spool **3** up against the force of spring **12**, this creates a connection from the pump outlet to control piston **7** via port **A**.

Control piston **7** moves thus decreasing the angle of swashplate **2**. Pump output flow now decreases whilst the system pressure is maintained at maximum setting. There is now no flow but maximum system pressure.



A275780

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Hydraulic System - Variable Flow

Fault Finding Contents

	Page No.
Introduction	15 - 5
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Pump stays at high pressure	15 - 5
Pressure or flow obtained at one port only	15 - 5
No pressure or flow at either port	15 - 5
High work port leakage	15 - 5
Leaks between sections	15 - 6
Sticking spool	15 - 6
Detent will not hold	15 - 6
Electrical detent will not hold	15 - 6
Poor performance, slow operating speed and/or low maximum stall speed	15 - 6

Introduction

This section details the possible faults that may be found with the loader and backhoe valve blocks. The faults listed only appertain to valve blocks fitted on variable flow hydraulic machine systems (Rexroth valves).

1 Before you begin fault finding, read the Safety information at the beginning of this manual.

2 Make simple checks before say, stripping a major component.

3 Make sure that the hydraulic fluid is at correct working temperature (50 °C, 122 °F).

4 What ever the fault, check the condition of the hydraulic fluid. Drain and replace if necessary.

5 Make any relevant electrical checks before moving on to the hydraulics.

6 Be sure to remove ALL contamination and if possible identify its origin. It may be part of a component from elsewhere in the circuit.

7 Replace any seals such as 'O' rings before re-assembling hydraulic components.

PROBLEM: High or Low system pressure.
POSSIBLE CAUSE: 1) Wrong pressure and/or flow regulator valve settings. 2) Loss of pilot signal due to shuttle failure.
CORRECTIVE ACTION: 1) Readjust regulator valves. 2) Operate individual services to determine which shuttle is at fault, refer to **Service Procedures, Variable Flow Pumps, Shuttle Valve Signal Network - Testing**.

PROBLEM: Pump stays at high pressure.
POSSIBLE CAUSE: 1) Sticking main spool. 2) Sticking compensator spool.
CORRECTIVE ACTION: 1) See 'Sticking Spool' guide. 2) Remove & clean compensator spool.

PROBLEM: Can only obtain pressure or flow at one port.
POSSIBLE CAUSE: 1) Dirt in primary shuttle or damaged o-ring.
CORRECTIVE ACTION: 1) Remove & clean shuttle, inspect o-ring and replace if required.

PROBLEM: No pressure or flow at either port.
POSSIBLE CAUSE: 1) Dirt in secondary shuttle.
CORRECTIVE ACTION: 1) Shift one spool at a time with blocked ports until faulty section found, remove shuttle and clean, inspect o-ring and replace if required.

PROBLEM: High work port leakage.
POSSIBLE CAUSE: 1) Spool not centred. 2) Dirt in port relief valve.
CORRECTIVE ACTION: 1) Check centring springs. 2) Remove & clean relief valve.

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Dismantling and Assembly

Main Relief Valve (MRV)

The numerical sequence shown on the illustration is intended as a guide to dismantling.

For assembly the sequence should be reversed.

The following points MUST be avoided when dismantling and assembling the valve:

- CONTAMINATION
- DAMAGE TO SPOOL
- DAMAGE TO SEAL GROOVES

All or any of the above points may result in possible problems with the valve.

Dismantling

When removing 'O' rings and seals, use an appropriately rounded tool that WILL NOT cause any damage to the seal grooves.

Discard ALL 'O' rings and back up rings. DO NOT use worn or damaged items.

Inspect the valve components for scratches, nicks or any other type of damage, replace with new if required.

Assembly

Renew all 'O' rings and back-up rings.

Lubricate parts with JCB Hydraulic Fluid before assembling. Make sure that all the parts move freely.

Make sure that the 'O' rings and back-up rings are fitted the correct way, items **10** and **11**.

Adjust pressure setting as required.

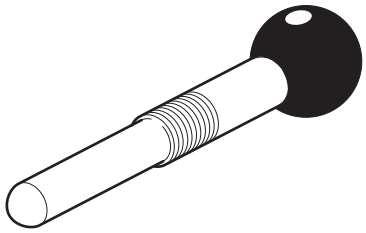
Torque Settings

Item	Nm	kgf m	lbf ft
3	5.4	0.6	4

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892/01077 Synchro Shuttle Gearbox - Selector Shaft Lock Screw



A395350

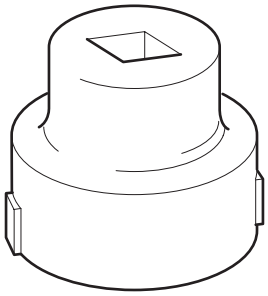
892/01078 Synchro Shuttle Gearbox - Mainshaft Adjuster



A396510

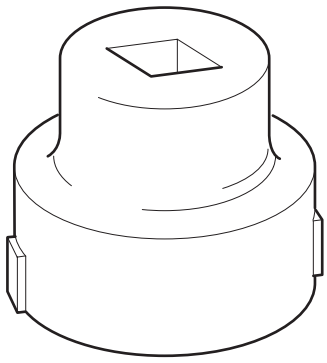
Synchro Shuttle Gearbox - Setting ring socket spanners

892/01079
(Mainshaft setting ring)



A396590

892/01080
(Layshaft setting ring)



A396600

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Synchro Shuttle Gearbox - 2/4 Wheel Drive Clutch (cont'd)

2WD CANNOT BE ENGAGED

No pressure is required to engage 2WD(spring loaded). Check that the solenoid spool is not sticking (in the 4WD position), then see below.

Possible Cause	Remedy
10 Incorrect type of solenoid valve fitted.	**10** Check solenoid. **Note:** Powershift and Syncro Shuttle machines have different types of solenoid - check parts list.
11 Non-return valve faulty (noticeable because 2WD cannot be engaged).	**11** Check the non-return valve.
12 2/4WD solenoid permanently energised.	**12** Check the 2/4WD relay and select switch, replace as necessary.

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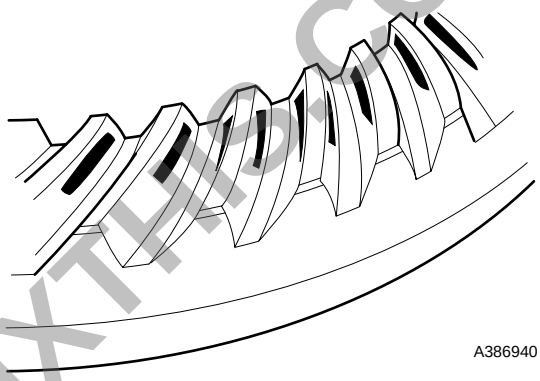
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Crownwheel and Pinion Meshing

Meshing of the gears should be checked by marking three of the pinion teeth with engineers marking compound and rotating the pinion.

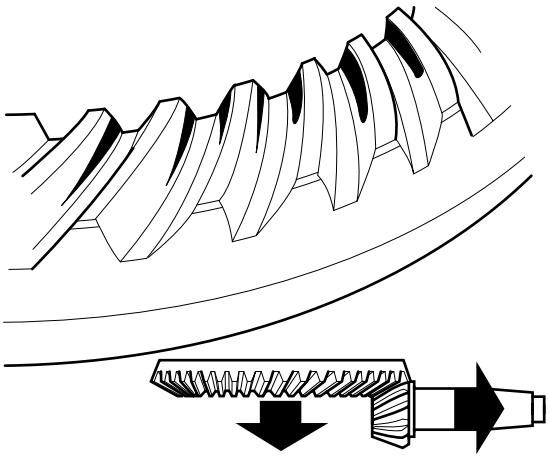
The marking will then be transferred to the crown wheel teeth.

Correct tooth marking.


A386940

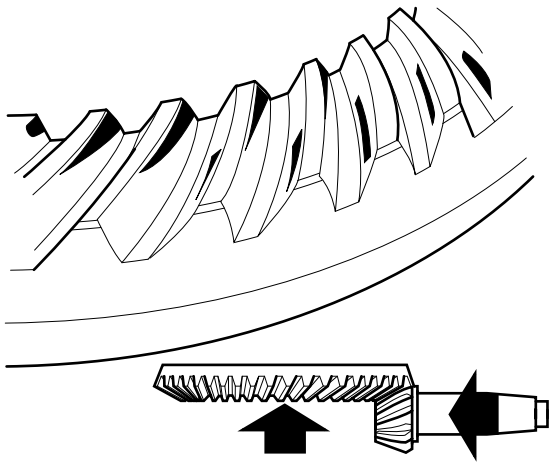
Pinion too deeply in mesh.

Decrease the shim thickness between the pinion inner bearing cup and the axle casing. Move the crown wheel towards the pinion to correct the backlash.


A386950

Pinion too far out of mesh.

Increase the shim thickness between the pinion inner bearing cup and the axle casing. Move the crown wheel away from the pinion to correct the backlash.


A386960

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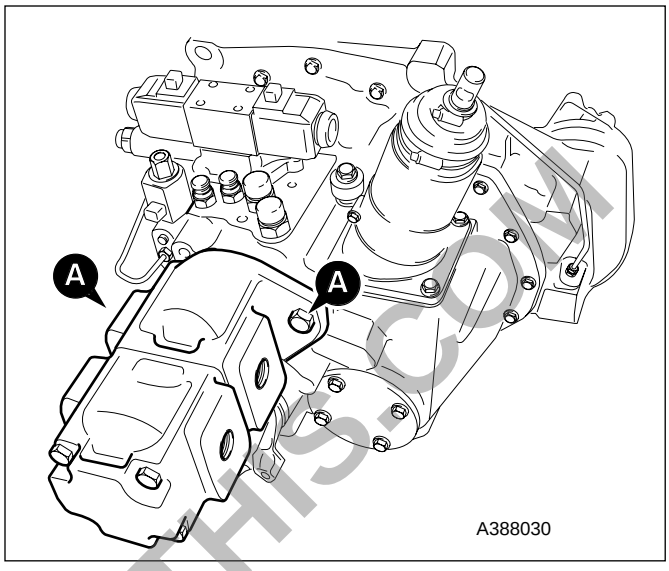
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Dismantling

Cleanliness is of the utmost importance when servicing the gearbox. All precautions to prevent any ingress of dirt, grit etc. must be taken. To this end wash the exterior of the gearbox assembly as follows;
Make sure that all open ports and orifices are effectively plugged. Remove any deposits of dirt, grit and oil from the outer casings using a suitable degreaser and water. Dry the casings.

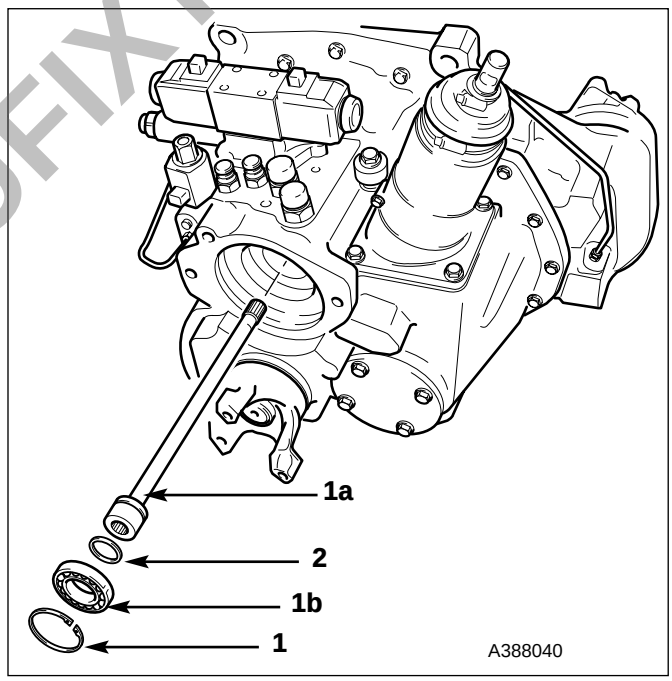
Note: For details of service tools refered to, see **Service Tools** at the front of this section.

Note: If the main hydraulic pump has not been removed, remove it. Support the pump, undo the 2 fixing bolts **A** and then withdraw the pump from the gearbox.



1 Remove the circlip and then withdraw the pump driveshaft **1a** together with its bearing **1b**.

2 Remove and discard the shaft sealing ring.



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System Type

Hydraulic servo assisted service brakes in rear axle only, operated from * separate pedals. Independant cable operated parking brake in the drive to the rear wheels.

Service Brake

Type	JCB Oil-immersed multi-plate disc
Actuation	Hydraulic - vacuum servo assisted
Location	Rear axle centre casing (2 brake packs)
Friction Plates (5 per brake pack)	
Outside Diameter	220 mm (7.992 in)
Inside Diameter	160 mm (6.299 in)
Nominal Facing Area per Plate	18603 mm^2 (28.8 in^2)
Hydraulic Piston Diameter	216 mm (8.5 in)

Master Cylinder (combined servo assistance)

Number of Cylinders	2
Type	Compensated master cylinder
Piston Diameter (each)	22.22 mm (0.875 in)

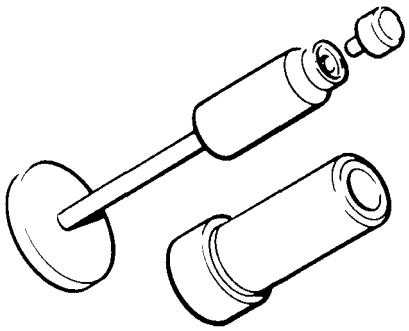
Parking Brake

Type	Disc brake, manually adjusted calliper
Actuation	Cable operated
Location	* Mounted on the rear axle drive head.
Disc Diameter	279.4 mm (11 in)

Note: Because the service brakes are located in the rear axle, instructions for dismantling and assembly are shown in Section F - **Rear Axle Brakes**.

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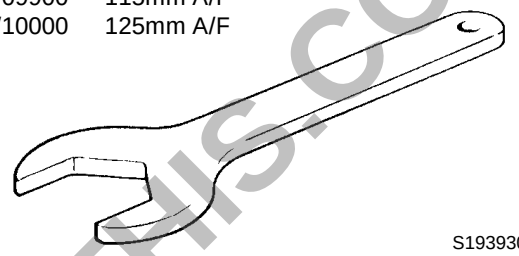


S191750

892/0018 Seal Fitting Tool for fitting 'O' ring and kin ring to Hydraulic Steer Unit

Hexagon Spanners for Ram Pistons and End Caps

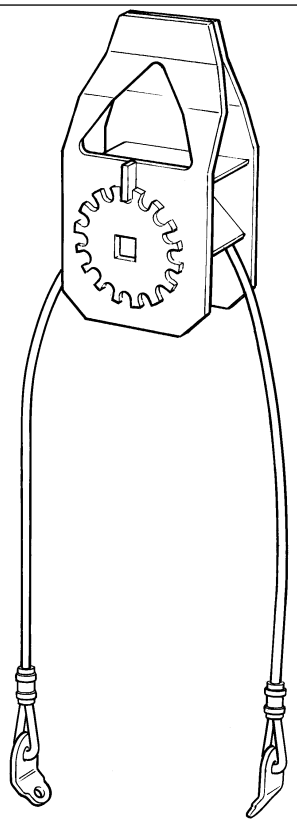
992/09300	55mm A/F
992/09400	65mm A/F
992/09500	75mm A/F
992/09600	85mm A/F
992/09700	95mm A/F
992/09900	115mm A/F
992/10000	125mm A/F



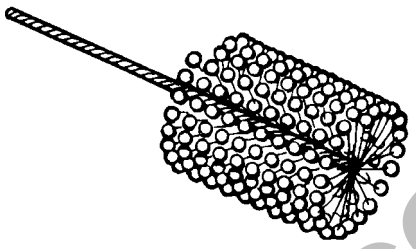
S193930

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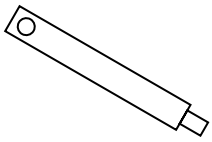
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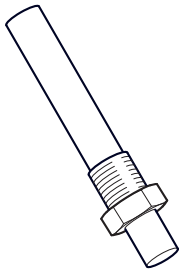
892/00836
Lifting Wire Assembly (for engine removal)



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



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.

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Relief Valve Pressures

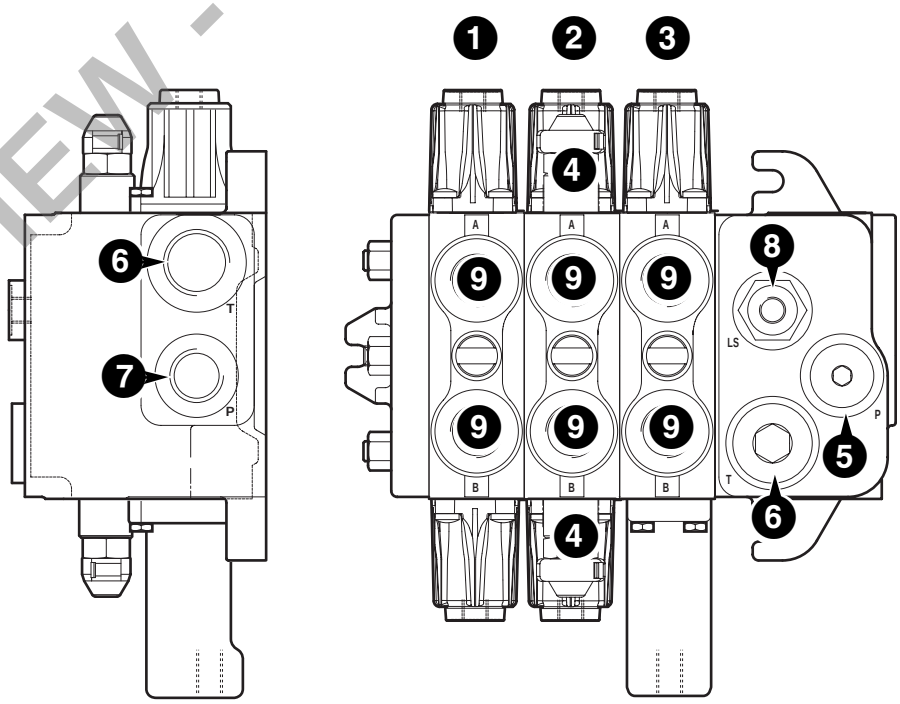
Loader Valve
(Machines from serial no. 937516)

	bar	kgf/cm²	lbf/in²
Auxiliary Relief Valves (A.R.V.)			
Shovel Ram Head Side	170 - 178	173 - 176	2450 - 2600
Shovel Ram Rod Side	310 - 318	316 - 324	4500 - 4600

Note: The auxiliary relief valves (ARV's) are factory set and the adjuster screw is sealed with a plastic locking cap.

Component Key:

1 Auxiliary (options)
2 Shovel service
3 Arms lift service
4 Auxiliary relief valves
5 Inlet port (pump secondary section P2 via inloader valve)
6 Tank port
7 Inlet port (pump main section P1 via high pressure manifold)
8 Load sense port
9 Service ports



A436470

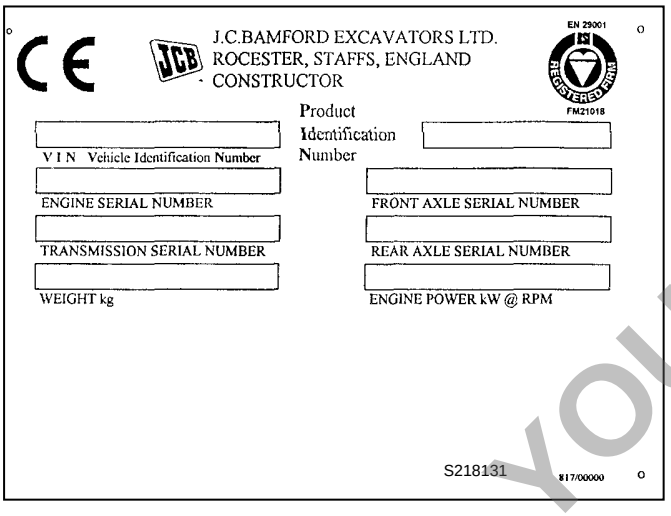
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Machine Identification Plate

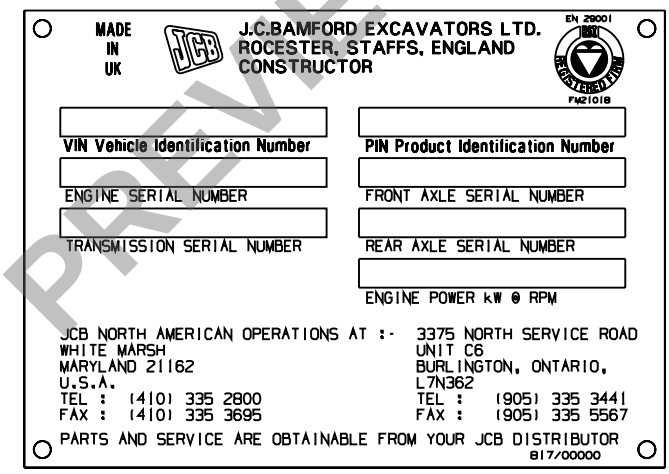
Your machine has an identification plate mounted on the loader tower. The serial numbers of the machine and its major units are stamped on the plate.

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

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Removal and Replacement

* On some machine models the steering column can be tilted to improve operator reach and comfort levels. This type of assembly is referred to as a 'tilt column'. Non tilting columns are referred to as a 'fixed column'.

The illustration on the adjacent page shows a 'tilt column' and is intended as a guide to removal and replacement.

Removal

1 Park the machine on firm level ground, engage the parking brake and set the transmission to neutral. Lower the loader arms to the ground. Switch OFF the engine, remove the starter key and disconnect the battery.

2 Remove the steering wheel as shown at **A**.

3 Remove socket screws **B** and take off the steering column pedestal cover.

4 Remove the control column switches **C**.

* **5** Remove the socket screw **D** securing the gas damper strut **E**. Note that on 'fixed column' assemblies a solid bracing link is fitted instead of the gas damper.

6 Remove socket screws **F** and lift up the rubber protective cover behind the brake pedals to gain access to the flexible coupling.

7 Remove the coupling bolt **G** and shoulder bolts **H**. Then carefully withdraw the steering column assembly (with the gas damper strut attached) from the flexible coupling **J**.

Replacement

Replacement is the reverse of the removal sequence.

Apply JCB Threadlocker and Sealer to threads of nuts **T**.

Note: The coupling bolt **G** must engage with the cut-out in the shaft.

After re-fitting check that the steering tilt functions correctly, and that the direction indicators and lights operate correctly. Check that the wires from the brake pedal switch do not rub on the steering column.

Torque Settings

	Item	Nm	kgf m	lbf ft
	D	14	1.4	10.3
	H	40	4.1	29.5
*	**V**	40	4.1	29.5

Dismantling and Assembly

The illustration on the adjacent page shows a 'tilt column' and is intended as a guide to dismantling and assembly.

Dismantling

* **1** Remove the self-cancelling indicator cam **W** (if fitted).

2 Using a screwdriver in the slot, carefully prise out the dust seal **L** from the outer column tube.

3 Remove external circlip **M**, washer **N**, tolerance ring **P** and withdraw the steering shaft from the outer column tube and pivot bracket.

Note: The top and bottom bearings **R** and **S** housed in the outer column tube are non serviceable parts. They may be removed for cleaning and inspection, but if the bearing(s) have failed a new outer column tube and pivot bracket assembly must be used.

Note: The gas damper strut **E** is a non serviceable part. If the damper is faulty it must be replaced with a new one.

Assembly

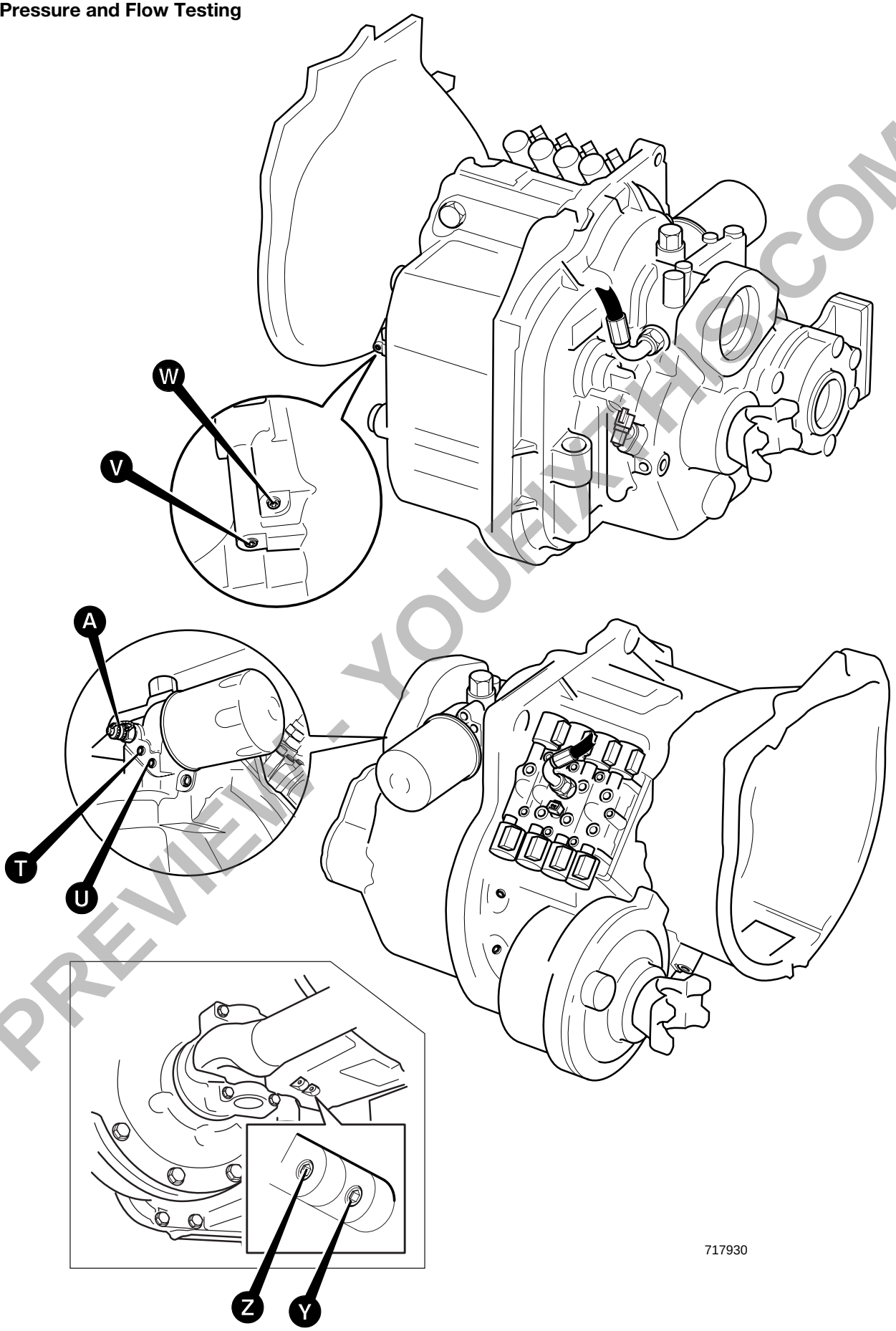
Assembly is the reverse of the dismantling sequence.

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Powershift Gearbox - 2004

Pressure and Flow Testing



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