# EXCAVATOR LOADER

# SERVICE MANUAL

**2D, 2DS, 3, 3C, 3CS, 3D, 700**

**From machine serial number 55500**

PREVIEW - YOUFIXTHIS.COM

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## ATTACHMENTS

### JCB Roadbreaker

| | | | |
|---|---|---|---|
| Pump Flow Rate at 2000 rev/min. and zero pressure. (Hamworthy and Commercial) | 45 litres/min. | 10 UK Gal/min. | 12 US Gal/min. |
| Relief Valve Settings | | | |
| –System Relief Valve (Hamworthy) | 138 bar | 141 kgf/cm$^2$ | 2000 lbf/in$^2$ |
| –System Relief Valve with combined Dipper Mounted Attachments (Parker Hannifin) | 127 bar | 130 kgf/cm$^2$ | 1845 lbf/in$^2$ |
| –Component Relief Valve (L.H. and R.H.) | 103 bar | 105 kgf/cm$^2$ | 1500 lbf/in$^2$ |

### JCB Extending Dipper JCB Jaw and JCB Powerbreaker

| | | | |
|---|---|---|---|
| Pump Flow Rate at 2000 rev/min. and zero pressure. (Commercial). | 45 litres/min. | 10 UK Gal/min. | 12 US Gal/min. |
| Relief Valve Settings. (Parker Hannifin) | 127 bar | 130 kgf/cm$^2$ | 1845 lbf/in$^2$ |

### Hydraulic Power Take-off

| | | | |
|---|---|---|---|
| Gearbox Ratio | 3 : 1 | | |
| Output Shaft Diameter | 35mm. | 1.375in. | |
| | 6 splines to BS1495/SAE J718d | | |
| Flow to motor at 1800 engine rev/min. to give P.T.O. speed of 530–550 rev/min. | 100 litres/min. | 22 UK Gal/min. | 26.5 US Gal/min. |

## *BRAKES

| | |
|---|---|
| Type | Multiplate disc unit, mounted inboard on each rear wheel drive shaft. |
| Diameter to m/c no. 129502 | 165mm. x 89mm. (6.5in. x 3.5in.) |
| from m/c no. 129503 –dry | 178mm. x 102mm. (7in. x 4in.) |
| –oil immersed (from m/c no. 138622/5) | Nominal 200mm. (8in.) dia. |
| Operation–Manual and /3 build | By foot or hand via mechanical linkage. |
| –/5 build | By foot via hydraulics |

### Parking Brake–/5 build only

| | |
|---|---|
| Type | Disc unit mounted on gearbox out put shaft |
| Diameter | 279mm. (11in.) |
| Operation | Lever and cable. |

**CAPACITIES**

| | litres | UK Gal | US Gal |
|---|---|---|---|
| ENGINE OIL–Manual and /3 build | | | |
| Balanced Engines – Steel Sump | 9.6 | 2.1 | 2.5 |
| – Alloy Sump | 11.0 | 2.4 | 2.8 |
| Non-balanced Engines–Steel Sump | 11.0 | 2.4 | 2.8 |
| –Alloy Sump | 11.5 | 2.5 | 3.0 |
| ENGINE OIL–/5 build | 9.1 | 2.0 | 2.4 |
| COOLING SYSTEM | 13.6 | 3.0 | 3.6 |
| TORQUE CONVERTER–/3 build | 20.4 | 4.5 | 5.4 |
| –/5 build | 11.0 | 2.4 | 2.9 |
| GEARBOX–10 speed | 50.0 | 11.0 | 13.2 |
| –9 speed (Synchro) | 56.8 | 12.5 | 15.0 |
| –/5 build | 2.55 | 0.56 | 0.67 |
| –with hydraulic lift | 57.0 | 12.5 | 15.0 |
| *DRIVE AXLE–/5 build with Dry Brakes | 25.0 | 5.5 | 6.6 |
| –/5 build with Oil Immersed Brakes | 29.5 | 6.5 | 7.8 |
| FUEL TANK | 68.0 | 15.0 | 18.0 |
| SLEW ACTUATOR | | | |
| 2D,3,3C,3D | 4.5 | 1.0 | 1.2 |
| HYDRAULIC SYSTEM–2D,3 | 173.0 | 38.0 | 45.6 |
| –2DS,3CS | 159.0 | 35.0 | 42.0 |
| –3C | 195.0 | 43.0 | 51.6 |
| –3D | 205.0 | 45.0 | 54.0 |
| –700 | 177.0 | 39.0 | 46.8 |

Note: The following original equipment engines were fitted with balancer units on production:

38TD engines from serial no. 44287
All 4/98NT engines.

Balancers may have been fitted in service to other engines. Steel and alloy sumps have been fitted intermittently.

## 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) | 1.1/8 | 407 | 41.5 | 300 |
| 7/8 | (22.2) | 1.5/16 | 650 | 66.3 | 480 |
| 1 | (25.4) | 1.1/2 | 970 | 99.0 | 715 |
| 1.1/4 | (31.7) | 1.7/8 | 1940 | 198.0 | 1430 |
| 1.1/2 | (38.1) | 2.1/4 | 3390 | 345.0 | 2500 |

### Metric Grade 8.8 Bolts

| Bolt Size | | Hexagon (A/F) | Torque Settings | | |
|---|---|---|---|---|---|
| in. | (mm.) | in. | 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 |

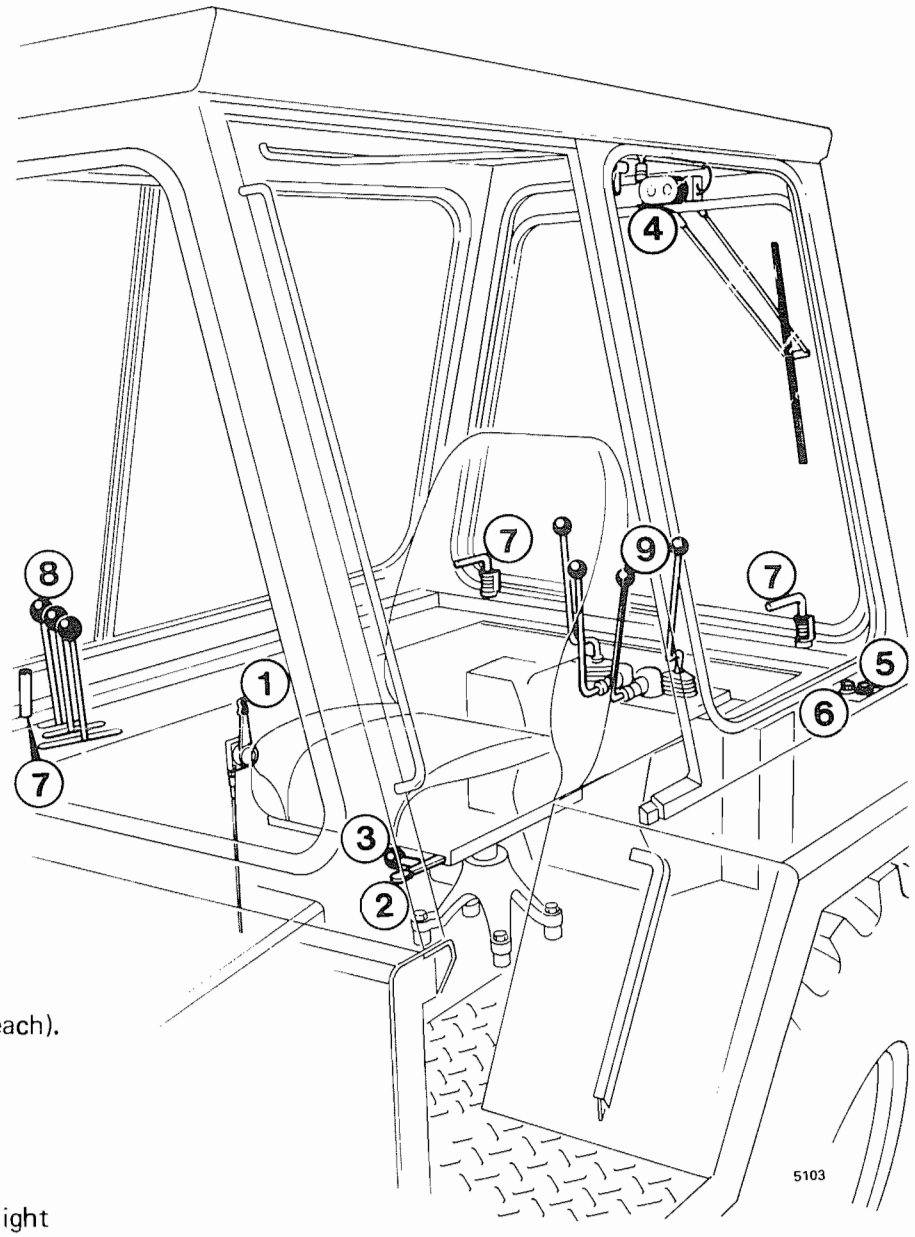
## SERVICE SCHEDULE

| Action | DAILY | Every 50 Hours | Every 100 Hours | Every 200 Hours | Every 400 Hours | Every 800 Hours | Every 1600 Hours |
|---|---|---|---|---|---|---|---|
| **Before Starting Engine** | | | | | | | |
| **Check/Adjust** | | | | | | | |
| Tightness wheel nuts | ■ | ■ | □■ | ■ | □■ | ■ | ■ |
| Tyre pressures | ■ | ■ | □■ | ■ | □■ | ■ | ■ |
| Wheel alignment | | | | | □■ | ■ | ■ |
| Front axle adjustment (to m/c no. 68150) | | | □ | | ■ | ■ | ■ |
| Brake adjustment | | ■ | □■ | ■ | □■ | ■ | ■ |
| Clutch adjustment | | ■ | □■ | ■ | □■ | ■ | ■ |
| Fan belt adjustment | | ■ | □■ | ■ | □■ | ■ | ■ |
| Air cleaner hose security | | | □■ | ■ | □■ | ■ | ■ |
| Starter motor, dynamo/ alternator brush gear | | | | | | | ■ |
| Torque Converter oil cooler /5 build | | ■ | □■ | ■ | □■ | ■ | ■ |
| **Clean** | | | | | | | |
| Drain fuel sediment trap and fuel filter | | ■ | □■ | ■ | □■ | ■ | ■ |
| * Fuel lift pump | | | □ | | ■ | ■ | ■ |
| Injectors and test | | | □ | | □■ | ■ | ■ |
| Air filter vacuator valve | | | | ■ | ■ | ■ | ■ |
| Battery terminals | | | □■ | ■ | □■ | ■ | ■ |
| **Change/Adjust** | | | | | | | |
| Fuel filter element | | | □ | | □■ | ■ | ■ |
| Air cleaner elements | | | | | | ■ | ■ |
| Valve clearances | | | □ | | □■ | ■ | ■ |
| Injector pump oil (In line pump only) | | | | ■ | ■ | ■ | ■ |

* □ ___ 1st 100/400 hr Dealer Service

■ ___ Routine Service

## CAB LAYOUT




1 Throttle Lever.

2 Seat Adjustment (Reach).

3 Seat Rotation Lock

4 Windscreen Wiper.

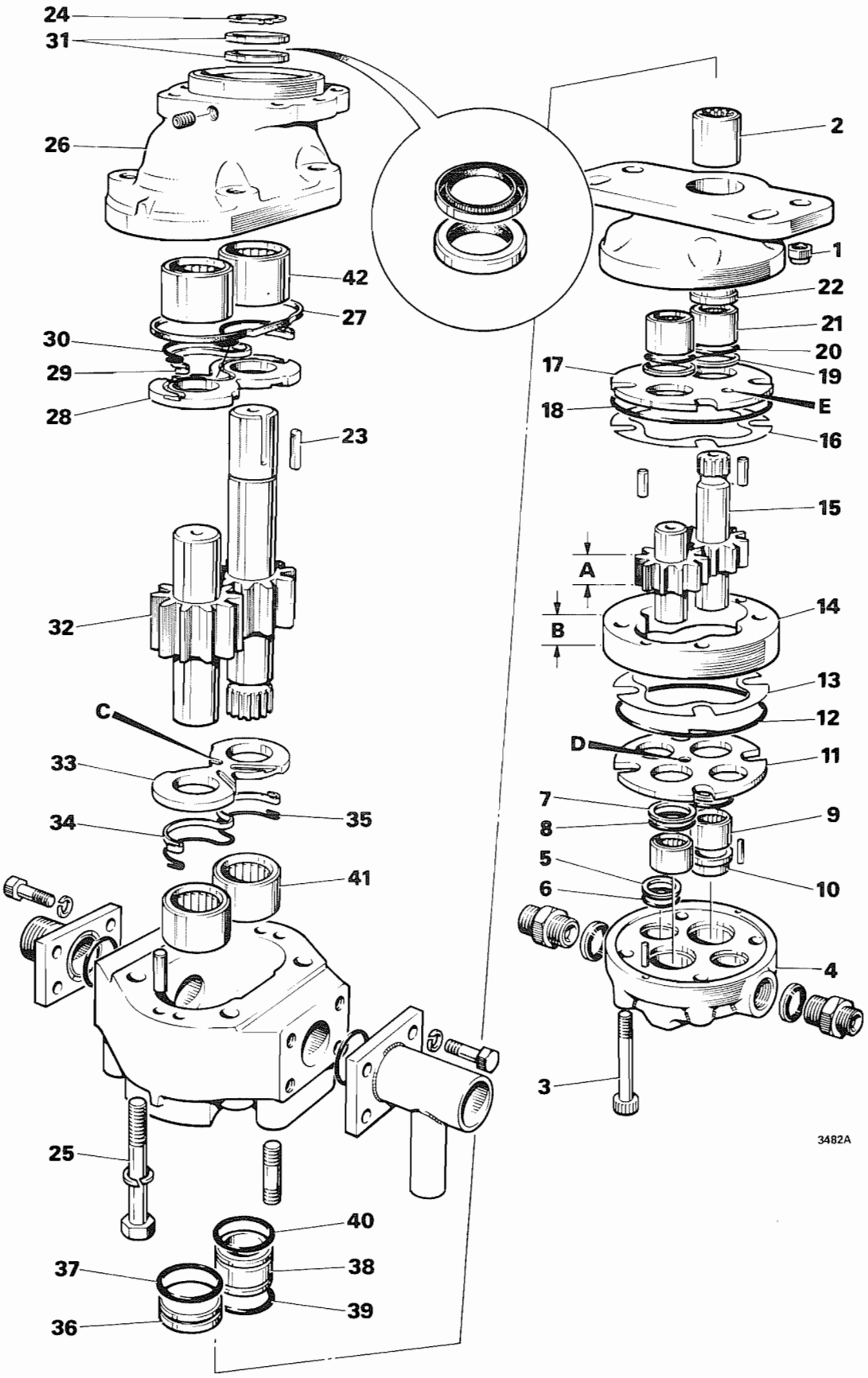
5 Generator Warning Light (Red).

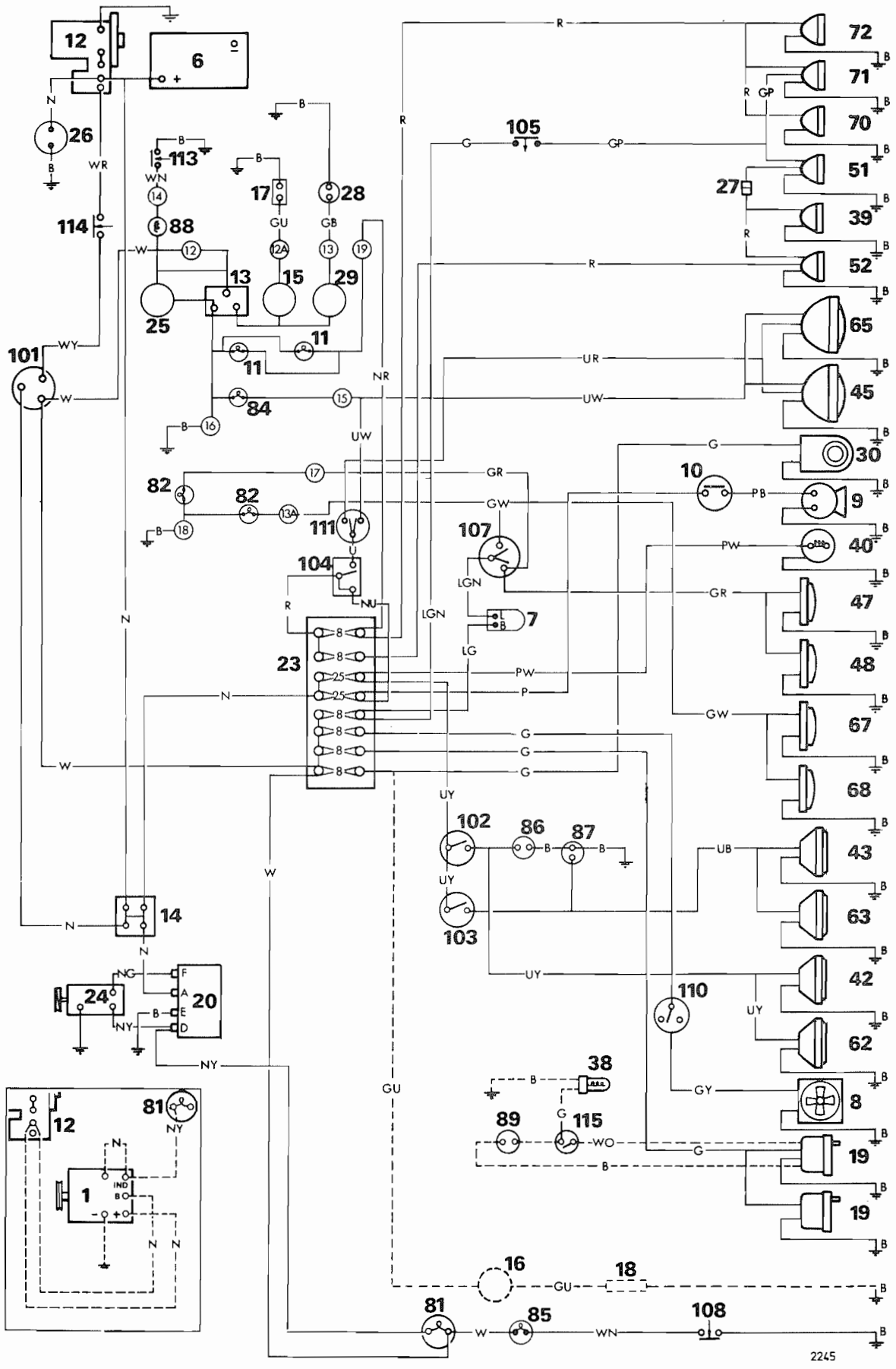
6 Oil Pressure Warning Light (Green).

7 Rear Window Stowage Pins and tubes.

8 Shovel Controls

9 Excavator Controls


24
31
26
42
27
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29
28
23
32
C
33
34
35
41
25
40
37
38
39
36
2
1
22
21
20
17
19
18
E
16
15
A
B
14
13
12
D
11
7
9
8
5
10
6
4
3
3482A


12
6
26
113
17
28
114
88
13
15
29
25
11
11
84
101
72
71
70
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27
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10
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48
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68
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42
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19
105
107
104
111
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82
23
7
102
86
87
103
14
24
20
110
38
89
115
81
1
16
18
85
108
2245

## FAULT FINDING – JCB Roadbreaker

A If breaker fails to operate with pressure available, start at check 1.

B. If breaker is slow to operate, start at check 4.

C. If there are oil leaks, check 9.

| Check | | Action |
|---|---|---|
| 1. | Are the couplings secure? | YES: Check 2<br>NO: Secure couplings |
| 2. | Is the distributor valve stuck? | YES: Raise breaker 300mm. (12in.), hold control handle down and drop on chuck.<br>NO: Check 3. |
| 3. | Are the tie rod nuts loose? | YES: Retorque<br>NO: Overhaul breaker |
| 4. | Is the hydraulic oil cold? | YES: Allow time to warm.<br>NO: Check 5 |
| 5. | Is the plunger sticking? | YES: Overhaul breaker.<br>NO: Check 6. |
| 6. | Is there a restriction in hose? | YES: Remove restriction or renew hose.<br>NO: Check 7. |
| 7. | Are the tie rods loose? | YES: Retorque.<br>NO: Check 8. |
| 8. | Is the muffling collar displaced on steel? | YES: Change to new steel.<br>NO: Check flow and pressure of system. |
| 9. | Where are the leaks showing? | In Handle: Renew seals.<br>On Steel: Overhaul breaker and renew gland seal. |

## CIRCUIT DIAGRAM –JCB 2D, 3 and 3C

The illustration on the right shows the standard circuit with the Hamworthy Shovel Valve.

The illustration below shows the optional shovel circuit with the Cessna Shovel Valve. Fitted from m/c No. 100000.

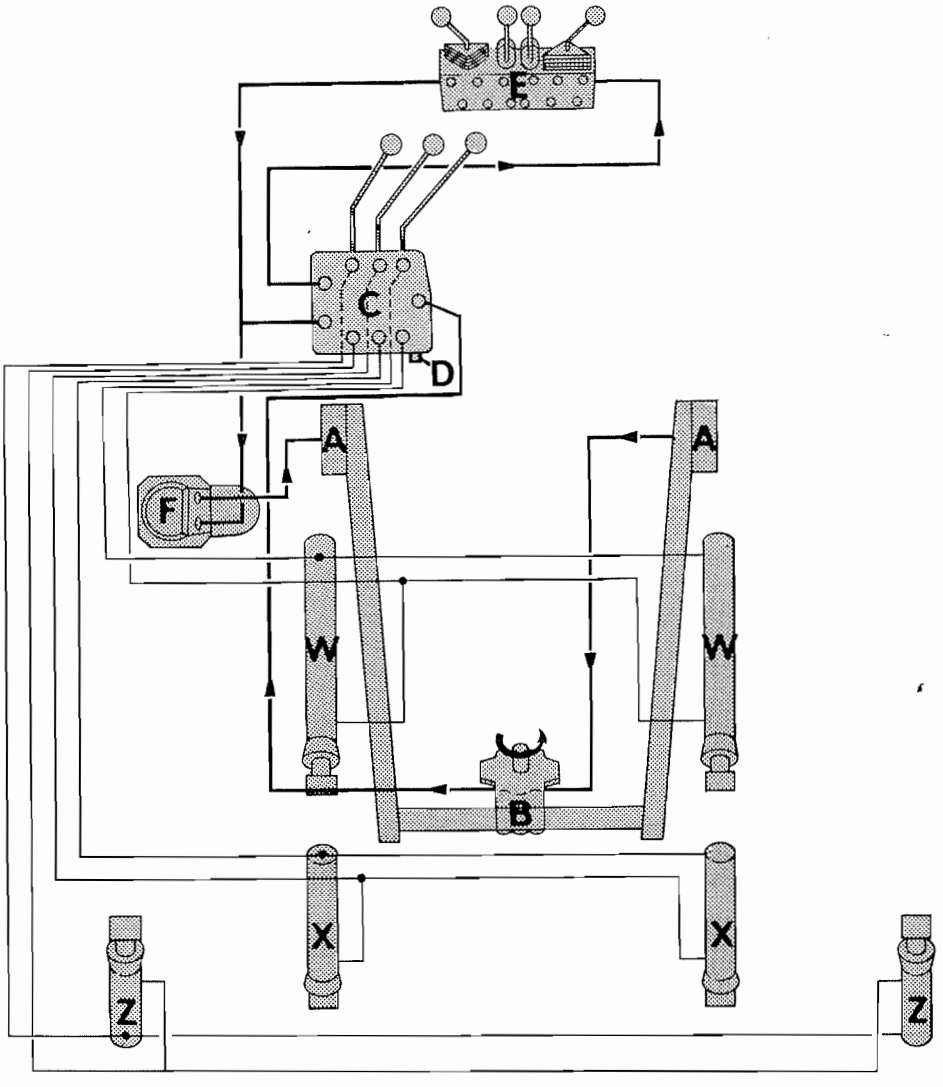
### Neutral Circuit

Oil in the neutral circuit (shown in bold line on the illustration) flows from the Hydra-chassis **A** to the Pump **B** and passes through the centre of the Shovel Valve **C** via the Main Relief Valve **D**. The oil then flows through the centre of the Excavator Valve **E** and returns to the hydra-chassis via the Filter **F**.

### Excavator or Shovel Operated

The neutral circuit is blocked by the selected spool and oil is diverted under pressure to the ram. Oil exhausted from the ram is returned by the other end of the spool to the filter and hydra-chassis.

| | | | |
|---|---|---|---|
| **A** | Hydra-chassis | **T** | Bucket Ram |
| **B** | Pump | **U** | Slewing Ram |
| **C** | Shovel Valve Block | **W** | Shovel Arm Ram |
| **D** | Main Relief Valve | **X** | Shovel Ram |
| **E** | Excavator Valve Block | **Y** | Stabiliser Ram |
| **F** | Filter | **Z** | Clam Ram (Optional) |
| **R** | Boom Ram | | |
| **S** | Dipper Ram | | |




3162A

# ENGINE
## (Manual Clutch Machines)

### Removal and Replacement

The numerical sequence illustrated is intended as a guide to removal.

For replacement, the sequence should be reversed.

### When Removing

The battery tray, air cleaner and sedimenter assembly **8** should be removed as one unit.

NOTE: The sedimenter was not fitted prior to machine no. 110552.

After draining the coolant and removing bolts **9**, unscrew sleeve **10**. The pump drive shaft will then divide when the radiator and mounting **14** are removed.

NOTE: The respective control cables and tachometer drive connections for the two types of fuel pump are shown thus:

C.A.V. D.P.A. Pump – **15** and **16**.
Simms "Mini-mec" Pump – **15A** and **16A**.

Unbolt the steering pump **17** from the timing cover. The hose connections need not be removed if the pump is adequately supported.

After removing clamp **19** and slackening clamp **20**, raise the pipes above the lower edge of the bodywork and secure with string.

Brake and clutch pedal return springs **27** must be removed before unbolting and lifting clear the floorplates **28** and **29**. It may also be necessary to disconnect the cable from the accelerator pedal.

If a cab heater is fitted, this must be removed by taking out bolts **30**. Cover plates **31** and **32** should then be removed to give clearance for the removal of clutch housing **36**.

Take out the retaining pins **37** and slide forward sleeve **38**.

When retaining clips **39** have been removed, the clutch withdrawal race will be free to be lifted out with the engine, after removal of the four mounting bolts **40**.

*When commencing to litt the engine ensure that slings are securely attached and all parts are disconnected and freely separating.

### When Replacing

Adjust clutch pedal free travel if required (see Section 3 page 6–1).

Refill cooling system and check engine oil level.

### Torque Settings

| Item | Nm | Kgf m | lbf ft |
|---|---|---|---|
| **33** | 57 | 5.8 | 42 |
| **34** | 130 | 13.3 | 96 |
| **40** | 130 | 13.3 | 96 |

## MACHINE IDENTIFICATION

**Tractor Serial No.** **e.g.** **384B / 7 / 237580**

TRANSMISSION TYPE
- 384B–10 speed, manual or torque converter
- 272B–9 speed, manual only.

BUILD TYPE
- 1–Manual, standard
- 3–Torque converter, standard
- 7–Manual, German
- 8–Torque converter, German
- 9–P.T.O. with hydraulics
- 10–P.T.O. less hydraulics

SEQUENTIAL SERIAL NO.

**Tractor Serial No.–JCB Build skid** **e.g.** **SKI / 002676**

BUILD TYPE
- SK1–Standard
- SK2–German/Austrian

SEQUENTIAL SERIAL NO.

**Engine Serial No.** **e.g.** **498NT / 1897 / 61294**

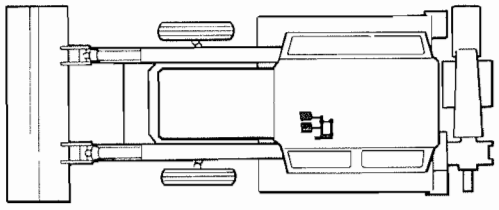
ENGINE TYPE
- 4–Number of cylinders
- 98–Bore in millimetres

ENGINE BUILD LIST NO.

SEQUENTIAL SERIAL NO.

# *HANDBRAKE

To Machine No. 129502



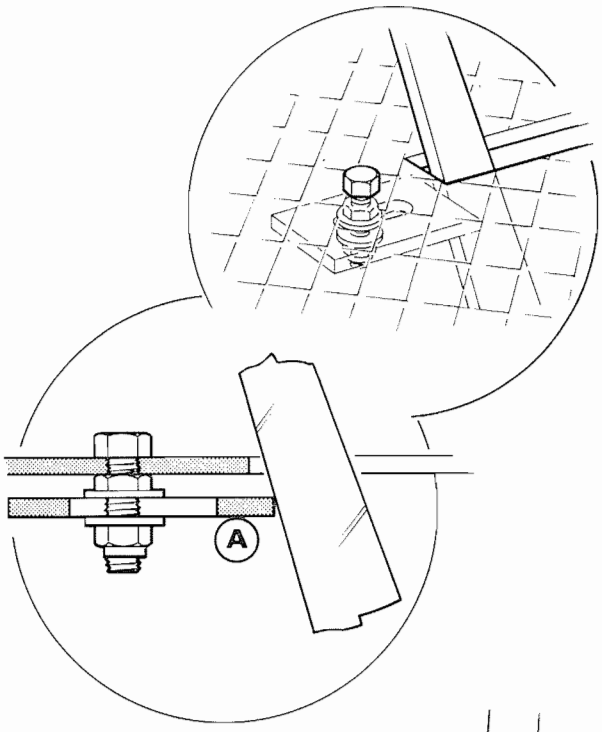
**CHECK**
**ADJUSTMENT** 50 Hours

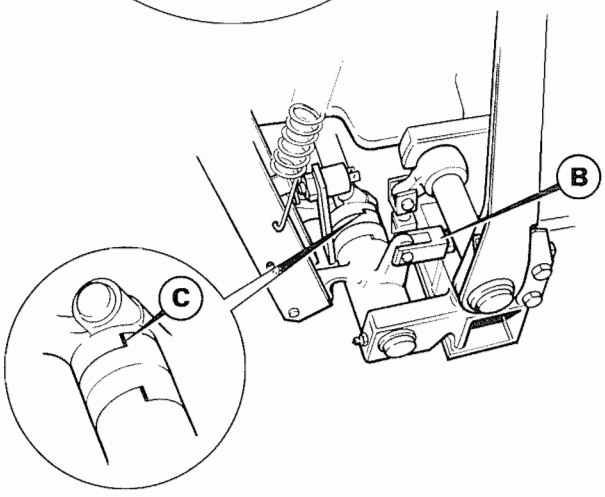
NOTE: The handbrake adjustment must always be checked after adjusting footbrakes.

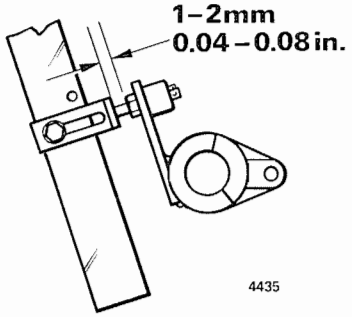
Set handbrake lever on first notch of ratchet and adjust stop **A**.

Adjust clevis **B** to remove free play **C**.

Set angle bracket to give switch clearance.



## EXTENDING DIPPER

### Removal and Replacement

Prior to disconnecting hoses fit locking pin **1**, stop engine and operate control lever to vent pressure.

Label hoses to ensure correct replacement.

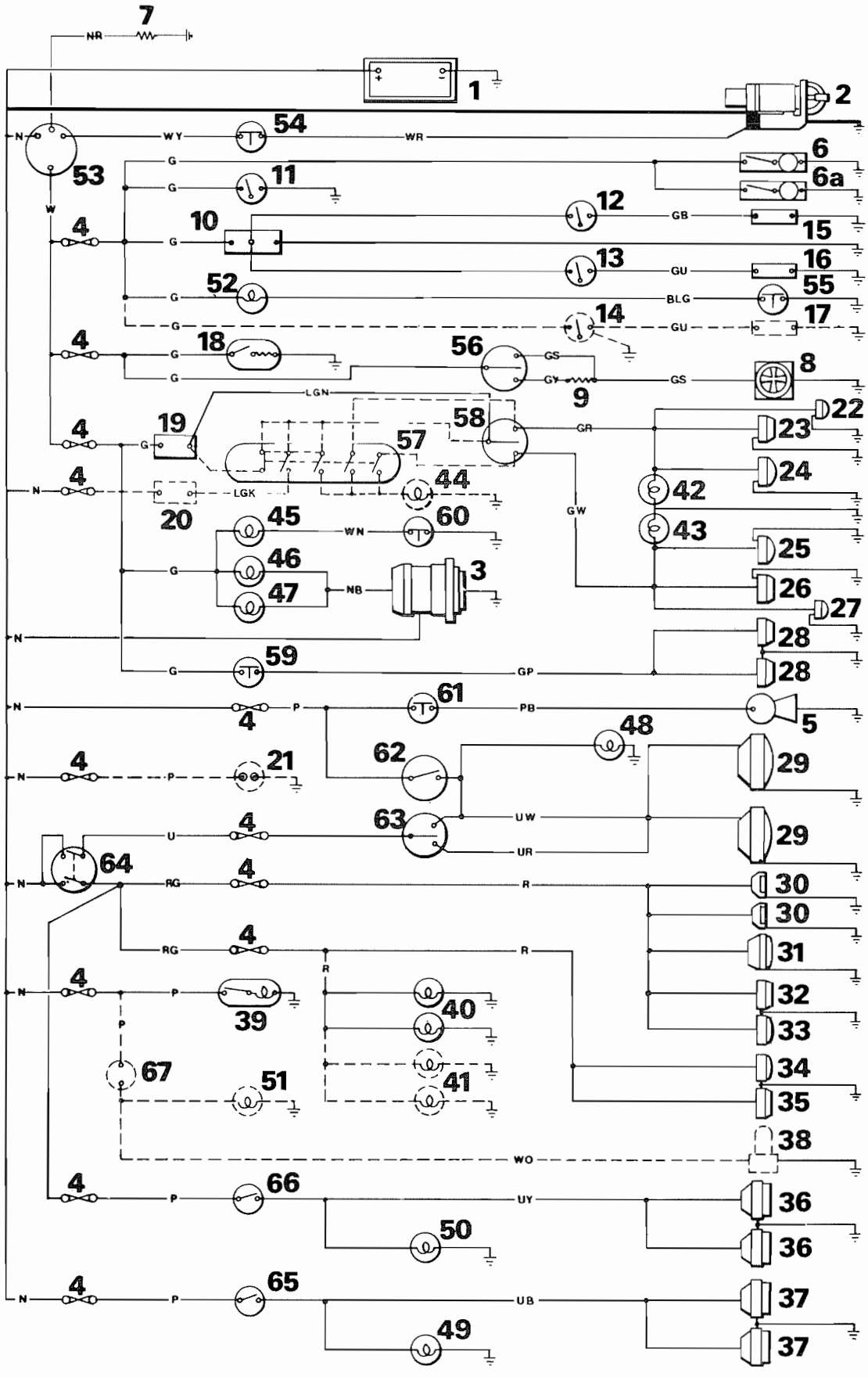
Blank all hoses and pipes to prevent entry of dirt and loss of hydraulic fluid.

### Dismantling and Assembly

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

For Assembly the sequence should be reversed.

For Ram Dismantling see page A 16–1.


7
NR
1
2
N
WY
54
WR
53
G
11
6
6a
W
12
GB
15
4
10
G
13
GU
16
52
BLG
55
14
GU
17
18
56
GS
8
GY
9
GS
LGN
19
58
GR
22
23
57
24
4
LGK
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44
42
45
WN
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43
25
46
3
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NB
26
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28
59
GP
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61
PB
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48
62
29
21
63
UW
UR
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RG
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32
33
67
51
41
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WO
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UY
36
50
36
65
UB
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49
37

3645B

## EXCAVATOR VALVE

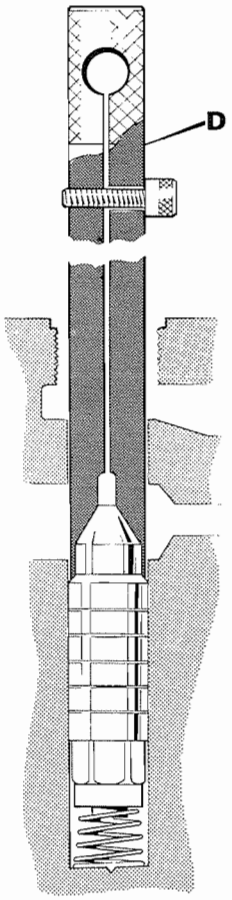
### Dismantling and Assembly

A–Auxiliary Relief Valve (A.R.V.)
(To m/c No. 58449 only)
B–Auxiliary Relief Valve (A.R.V.)
(All Machines)
C–Anti-cavitation Valve
(From m/c No. 58450 only).

The numerical sequences on the illustration are intended as a guide to dismantling.

For assembly the sequences should be reversed.

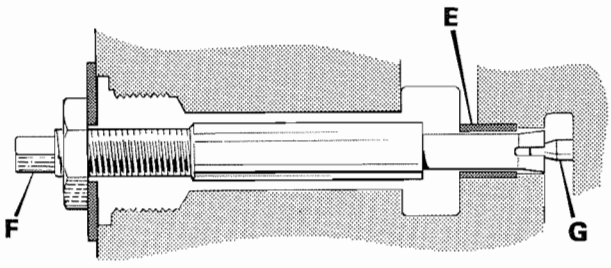
NOTE: To remove relief valves **B** from valve block, use extractor **D**, part no. 992/02800.




### When Dismantling

Hold cartridge body of valve **A** or **B** in a barrel clamp part no. 892/00039.

If it is necessary to remove seat **E**, use extractor **F**, part no. 992/02900. Insert tapered plug **G** into end of spigot and push spigot through valve seat until plug contacts gallery wall as shown. Strike end of extractor to expand spigot and then extract seat by tightening nut.




3891

### When Assembling

If seating face of valve is worn, renew both valve and seat.

Renew 'O' rings.

Thoroughly clean all components and lubricate with JCB 'Special' hydraulic fluid.

If A.R.V.'s **A** or **B** have been dismantled beyond item **4**, it is essential to reset the pilot setting (see page E 6–7).

## GEARBOX – Stage 2
## Manual Gearbox Only

### High/Low Selectors

### Dismantling and Assembly

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

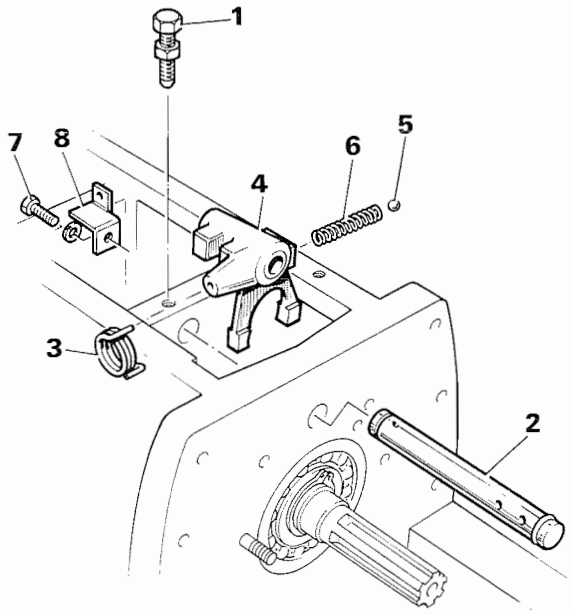
For assembly the sequence should be reversed.

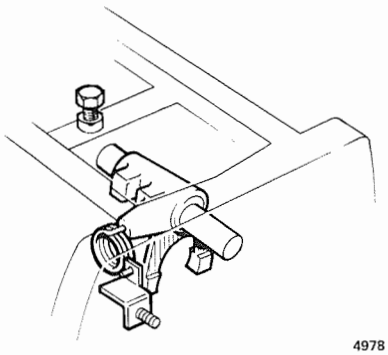
### When Dismantling

Care to be taken not to lose items **5** and **6**.

### When Assembling

Renew lockwire on item **1**.



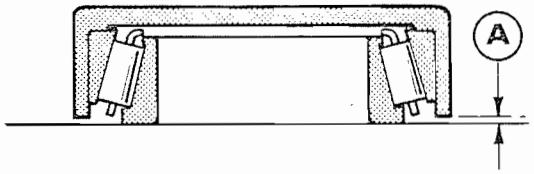



## DRIVE AXLE
## DIFFERENTIAL PINION

### Depth Setting

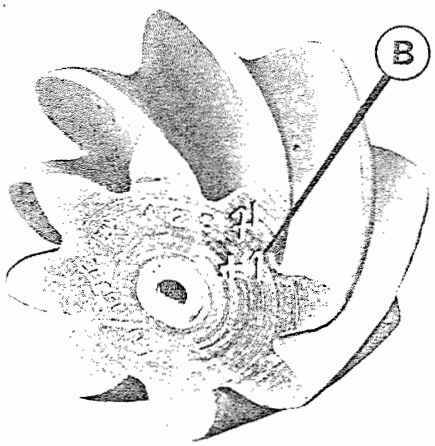
All dimensions are in millimetres.

Remove inner bearing from the pinion using tool no. ~~992/07612~~ 992/07602 and press part no. ~~47~~. MS47




Measure gap A, using tool no. 992/07606 on a flat surface, and add 36.4mm. to give bearing depth. The total should be 36.512–36.712mm.

Note the mounting distance **B** etched on the pinion and **C** stamped on the casing. These are in units of 0.01mm.



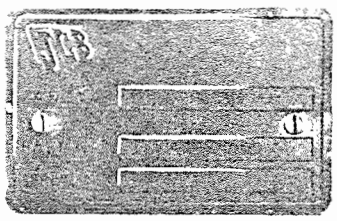

If dimension **B** is positive ADD to bearing depth, if negative SUBTRACT from bearing depth.

If dimension **C** is positive SUBTRACT, from total, if negative ADD to total.

The result should be subtracted from 37.44mm. to give the shim thickness.

### Example

| | |
|---|---|
| Dimension **A** | 0.302 |
| Add tool depth | 36.400 |
| | 36.702 |
| Add dimension **B** if positive. (Subtract if negative). | 0.010 |
| | 36.712 |
| Add dimension **C** if negative. (Subtract if positive). | 0.110 |
| | 36.822 |
| Standard value | 37.440 |
| Less total above. | 36.822 |
| SHIM THICKNESS | 0.618 |



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# PREVIEW ONLY

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