BACKHOE

Service Manual

SM30A

Reprinted

CASE

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SERVICE MANUAL

INTERNATIONAL

BACKHOES

SM-30A

INTERNATIONAL HARVESTER COMPANY
OF GREAT BRITAIN LIMITED

PO BOX 25 259 CITY ROAD LONDON EC1P 1AD

GROUP INDEX

GENERAL 1

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THIS SAFETY ALERT SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL. WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS AND BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY OR DEATH.

M171B

If Safety Decals on this machine use the words **Danger, Warning or Caution,** which are defined as follows:

- **DANGER:** Indicates an immediate hazardous situation which if not avoided, will result in death or serious injury. The color associated with Danger is RED.
- **WARNING:** Indicates an potentially hazardous situation which if not avoided, will result in serious injury. The color associated with Warning is ORANGE.
- **CAUTION:** Indicates an potentially hazardous situation which if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

If Safety Decals on this machine are ISO two panel Pictorial, decals are defined as follows:

- The first panel indicates the nature of the hazard.
- The second panel indicates the appropriate avoidance of the hazard.
- Background color is YELLOW.
- Prohibition symbols such as  and  if used, are RED.

WARNING

IMPROPER OPERATION OF THIS MACHINE CAN CAUSE INJURY OR DEATH. BEFORE USING THIS MACHINE, MAKE CERTAIN THAT EVERY OPERATOR:

- Is instructed in safe and proper use of the machine.
- Reads and understands the Manual(s) pertaining to the machine.
- Reads and understands ALL Safety Decals on the machine.
- Clears the area of other persons.
- Learns and practices safe use of machine controls in a safe, clear area before operating this machine on a job site.

It is your responsibility to observe pertinent laws and regulations and follow Case Corporation instructions on machine operation and maintenance.

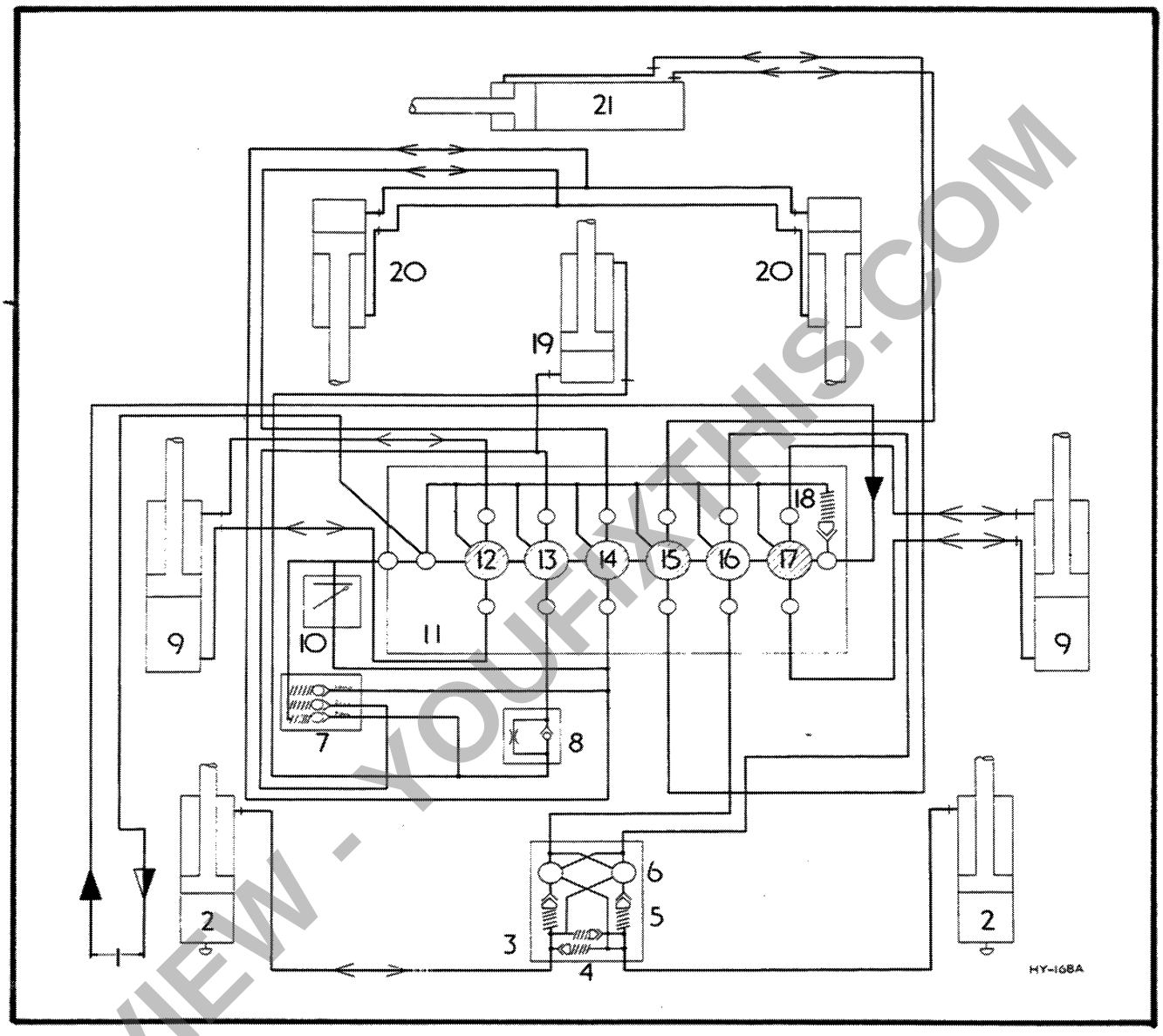
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1. Connections to pump and reservoir
2. Swing cylinders
3. Relief valves
4. Flow control and cushion valve
5. Check valves
6. Flow control spools
7. Relief valve manifold
8. Flow control valve - Dig
9. Stabilizer cylinders
10. Check valve
11. Main control valve
12. Left stabilizer spool
13. Dig spool
14. Lift spool
15. Bucket spool
16. Swing spool
17. Right stabilizer spool
18. Relief valve - Main
19. Dig cylinder
20. Lift cylinders
21. Bucket cylinder

Fig.1 SCHEMATIC DIAGRAM OF THE HYDRAULIC SYSTEM

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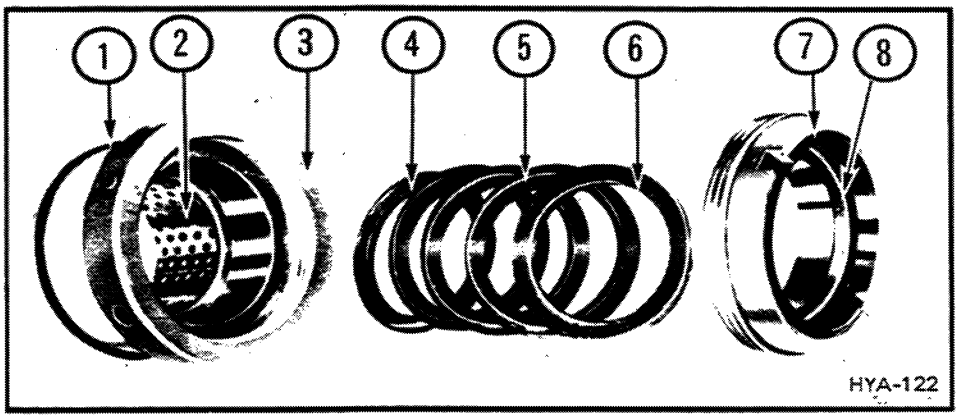
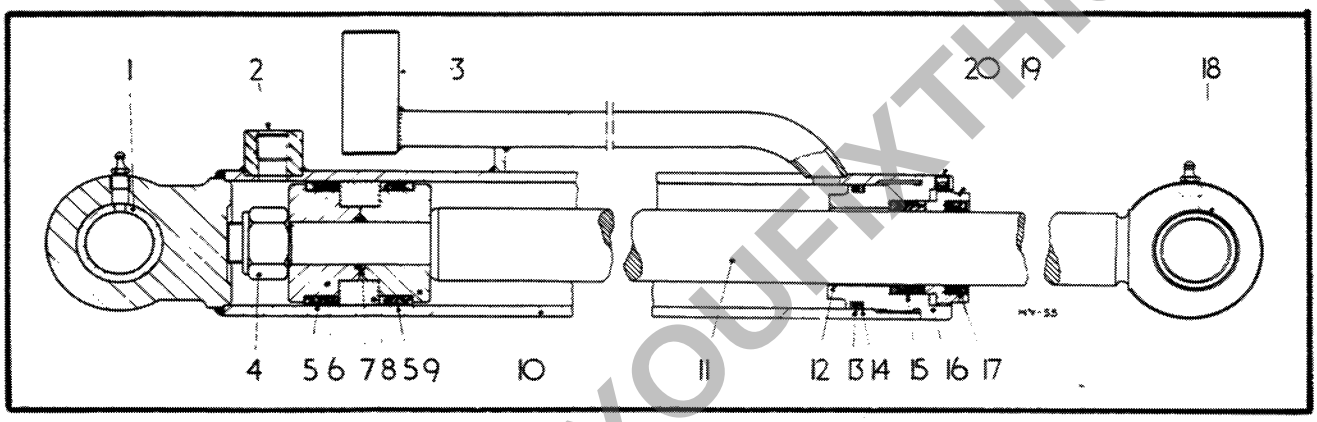


Fig.8



1. Bush
2. Lower port
3. Lift port
4. Nut
5. Piston seals
6. Piston half
7. 'O' ring
8. Wear ring
9. Piston half
10. Cylinder
11. Piston rod
12. Bush
13. 'O' ring
14. Backing washer
15. Rod seals
16. Cylinder head
17. Wiper seal
18. Bush
19. Packing flange
20. Setscrew and nylon pad

Fig.9 CROSS SECTION OF B-1 LIFT CYLINDER

2. HEAVY DUTY CYLINDER

(a) Remove the socket headed screws (15-10) then, using two of them in the extractor holes, withdraw the seal housing (16-10).

(b) Tap the bearing (8-10) down the cylinder until it is clear of the retaining key (13-10) then remove the three sections of the retaining key.

(c) Slide the piston rod (19-10) complete with bearing and piston assemblies from the cylinder (20-10).

(d) Remove the locking wire (1-10) then remove the bolts (2-10).

(e) Remove the piston half (3-10) and key (4-10) from the piston rod.

(f) Remove the piston half (7-10) complete with seal (6-10) and seal supports (5-10) from the piston rod then remove the seal and seal supports from the piston half.

(g) Remove the bearing (8-10) complete with 'O' ring (9-10), backing ring (10-10), oil seal (11-10), and anti-extrusion ring (12-10).

(h) Remove the seal housing (16-10) complete with 'O' ring (14-10) and wiper seal (17-10).

(i) Remove the 'O' ring, backing ring, oil seal and anti-extrusion ring from the bearing.

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3. STANDARD TORQUE DATA FOR NUTS AND BOLTS

Where no special torque data is specified the following torque figures should be applied.

Threads should be lubricated with engine oil or chassis grease. Apply the minimum figure to bolts that have previously been used.

BOLT SIZE (in)	TYPE 5				TYPE 8			
	MIN.		MAX.		MIN.		MAX.	
	kgm	lbft	kgm	lbft	kgm	lbft	kgm	lbft
1/4	1.24	9	1.26	10	1.66	12	1.93	14
5/16	2.62	19	2.90	21	3.73	27	4.14	30
3/8	4.56	33	5.11	37	6.22	45	6.91	50
7/16	7.32	53	8.30	60	10.37	75	11.75	85
1/2	11.06	80	12.44	90	15.90	115	17.97	130
9/16	15.90	115	17.97	130	22.81	165	25.58	185
5/8	22.12	160	24.89	180	30.42	220	34.56	250
3/4	40.09	290	44.24	320	55.30	400	62.21	450
7/8	58.07	420	64.98	470	89.87	650	100.93	730
1	87.10	630	98.16	710	134.11	970	150.70	1090
1-1/8	117.52	850	131.34	950	190.79	1380	214.30	1550
1-1/4	165.91	1200	186.64	1350	268.21	1940	301.40	2180

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4. SEALS AND PACKINGS

4a. GENERAL

Components of a hydraulic system would not operate without seals and packings to hold the fluid under pressure in the system.

For efficient operation of the system it is essential that seals and packing be leak free. Leaks, apart from loss of oil, can allow air and dirt to enter the system causing oil contamination resulting in rapid wear.

New seals and packings must be used whenever a unit is dismantled. All seals 'age' under the influence of heat and although they may not be visibly worn, it is false economy to use old seals.

Seals are carefully selected for each particular application and it is MOST IMPORTANT that a replacement seal be of the same type and size as the original. Always order from the relevant Parts Catalogue.

The following paragraphs describe some of the more important types of seals, their method of operation and installation instructions. In all illustrations, the arrows indicate the direction of the hydraulic pressure .

4b. TYPES

Seals and packings are classified according to their use:

(a) Static - These seal non-moving parts such as the sections of a pump and cylinder head.

(b) Dynamic - These seal moving parts such as pistons, piston rods, pump shafts and valve spools.

They may be further classified according to their type.

(i) 'O' rings.

(ii) Chevron or 'V' seals.

(iii) 'U' seals

(iv) Metallic seals.

(v) Mechanical seals.

(vi) Compression gaskets, etc.

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SECTION A
B-1 AND B-1 HEAVY DUTY
WAIN-ROY BACK HOES

1. DESCRIPTION

The B-1 and B-1 Heavy Duty Wain-Roy Back Hoes are equipped with two lift cylinders, one dig cylinder, one bucket cylinder and two stabilizer cylinders, all double acting and two single acting swing cylinders.

2. LIFT CYLINDER

2a. REMOVAL

(a) With the Back Hoe fully extended position a block under the boom as shown in Fig.1.

NOTE: On a Back Hoe removed from the tractor ensure that it is safely blocked to prevent any danger of collapsing if the control levers are moved.

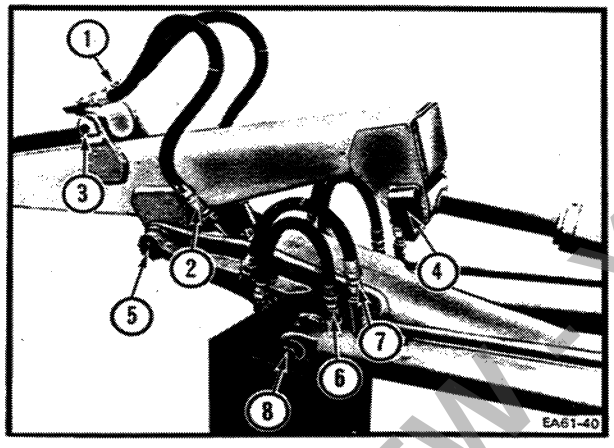


Fig.1

(b) Release the pressure in the lift section by moving the control lever backward and forward.

(c) Disconnect the hoses (6 & 7-1) from the cylinder to be removed and blank the exposed connections.

(d) Remove the nuts and washers then pull the cylinder off the pivot pins (8-1 & 4-2).

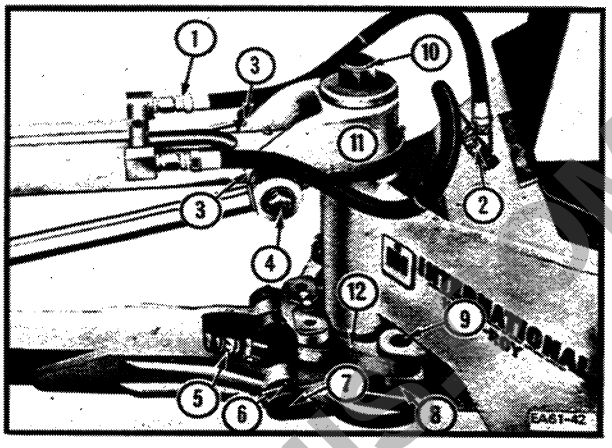


Fig.2

2b. DISMANTLING

1. B-1 CYLINDER

(a) Using a spanner manufactured to the dimensions shown in Fig.3, unscrew the cylinder head (4-5) from the cylinder.

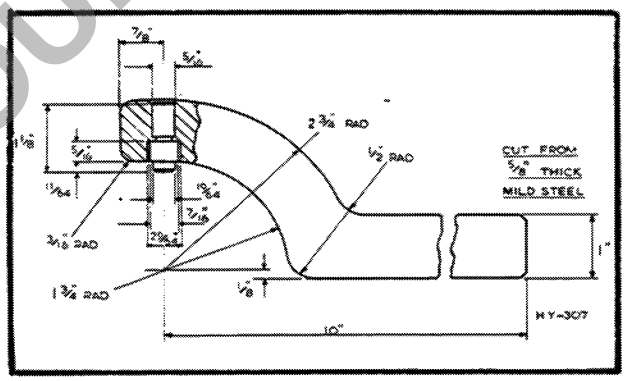


Fig.3 CYLINDER HEAD SPANNER

(b) Slide the piston rod, complete with piston assembly (2-6) and cylinder head (6-6) from the cylinder.

(c) Remove the retaining nut (1-6), then slide the piston half (1-7), seals (2, 3 & 4-7) and wear ring (6-7) from the piston rod (3-6).

(d) Remove the 'O' ring (5-7), then slide the piston half (10-7) and seals (7, 8 & 9-7) from the piston rod.

(e) Slide the cylinder head assembly (6-6) from the piston rod.

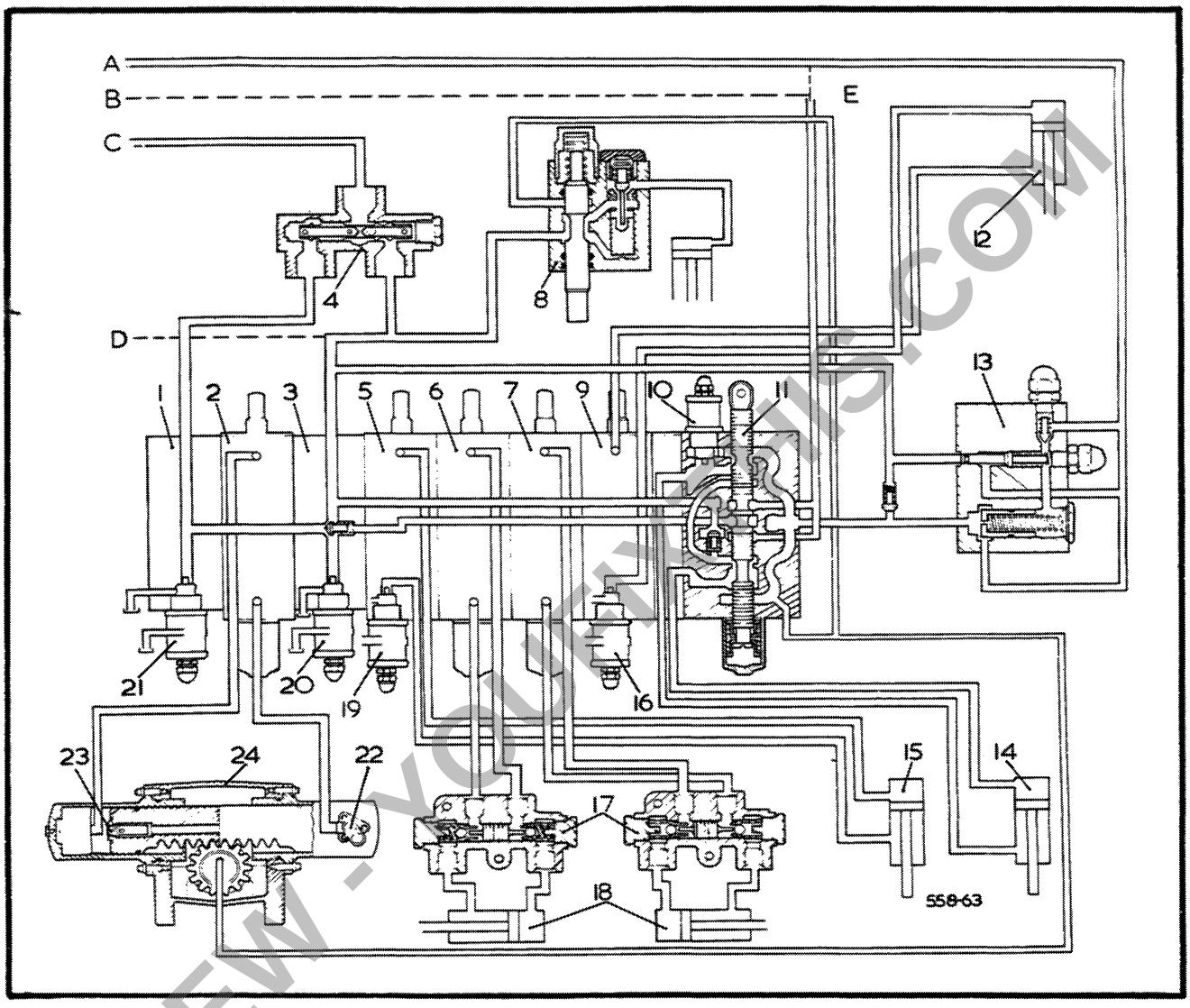
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		B-1	B-1 HEAVY DUTY
2. CYLINDERS			
LIFT CYLINDER			
Bore	mm (in)	76.2 (3.00)	88.9 (3.50)
Rod diameter	mm (in)	44.45 (1.75)	50.8 (2.00)
Stroke	mm (in)	863.6 (34.00)	863.6 (34.00)
Cylinder end bush			
I.D.	mm (in)	38.227 (1.505) to 38.354 (1.510)	38.278 (1.507) to 38.404 (1.512)
O.D.	mm (in)	47.651 (1.876) to 47.675 (1.877)	47.676 (1.877) to 47.701 (1.878)
Rod end bush			
I.D.	mm (in)	38.227 (1.505) to 38.354 (1.510)	38.278 (1.507) to 38.404 (1.512)
Piston bolt torque	kgm (lbft)	Not applicable	4.56 (33) to 5.12 (37)
DIG CYLINDER			
Bore	mm (in)	76.2 (3.00)	88.9 (3.50)
Rod diameter	mm (in)	50.8 (2.00)	57.15 (2.25)
Stroke	mm (in)	615.95 (24.25)	1308.1 (51.5)
Cylinder end bush			
I.D.	mm (in)	38.278 (1.507) to 38.404 (1.512)	38.151 (1.502) to 38.277 (1.507)
O.D.	mm (in)	47.676 (1.877) to 47.701 (1.878)	
Rod end bush			
I.D.	mm (in)	31.928 (1.257) to 32.054 (1.262)	
O.D.	mm (in)	41.326 (1.627) to 41.351 (1.628)	41.352 (1.628) to 41.376 (1.629)
Piston bolt torque	kgm (lbft)	Not applicable	4.56 (33) to 5.12 (37)
BUCKET CYLINDER			
Bore	mm (in)	76.2 (3.00)	88.9 (3.50)
Rod diameter	mm (in)	44.45 (1.75)	50.8 (2.00)
Stroke	mm (in)	571.5 (22.50)	797.05 (31.38)
Cylinder end bush			
I.D.	mm (in)	25.654 (1.010) to 25.781 (1.015)	Not applicable
O.D.	mm (in)	34.951 (1.376) to 34.975 (1.377)	Not applicable
Rod end bush			
I.D.	mm (in)	25.654 (1.010) to 25.781 (1.015)	38.278 (1.507) to 38.404 (1.512)
O.D.	mm (in)	34.951 (1.376) to 34.975 (1.377)	47.676 (1.877) to 47.701 (1.878)
Piston bolt torque	kgm (lbft)	Not applicable	4.56 (33) to 5.12 (37)
SWING CYLINDER			
Bore	mm (in)	101.6 (400)	
Rod diameter	mm (in)	38.1 (1.50)	
Stroke	mm (in)	374.6 (14.75)	
STABILIZER CYLINDER			
Bore	mm (in)	88.9 (3.50)	88.9 (3.50)
Rod diameter	mm (in)	44.45 (1.75)	44.45 (1.75)
Stroke	mm (in)	323.8 (12.75)	323.8 (12.75)

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3122
- A - Return to reservoir
- B - Power beyond to loader valve
- C - Supply from side pump
- D - Supply from MCV pump
- E - Not used

3142
- A - Return to reservoir
- B - Not used
- C - Power beyond from loader valve
- D - Not used
- E - Connection to return line

1. End inlet section
2. Swing spool section
3. Mid-inlet section
4. Proportional flow divider
5. Bucket spool section
6. Right stabilizer spool section
7. Left stabilizer spool section
8. Slidelock valve
9. Dig spool section
10. Line Relief valve
11. Lift spool section
12. Dig cylinder
13. Outlet section
14. Lift cylinder
15. Bucket cylinder
16. Line relief valve
17. Stabilizer check valves
18. Stabilizer cylinders
19. Line relief valve
20. Mid-inlet relief valve
21. Inlet relief valve
22. Decelerator valve
23. Cushion valve
24. Swing cylinder

Fig.1 SCHEMATIC VIEW OF BACK HOE SYSTEM

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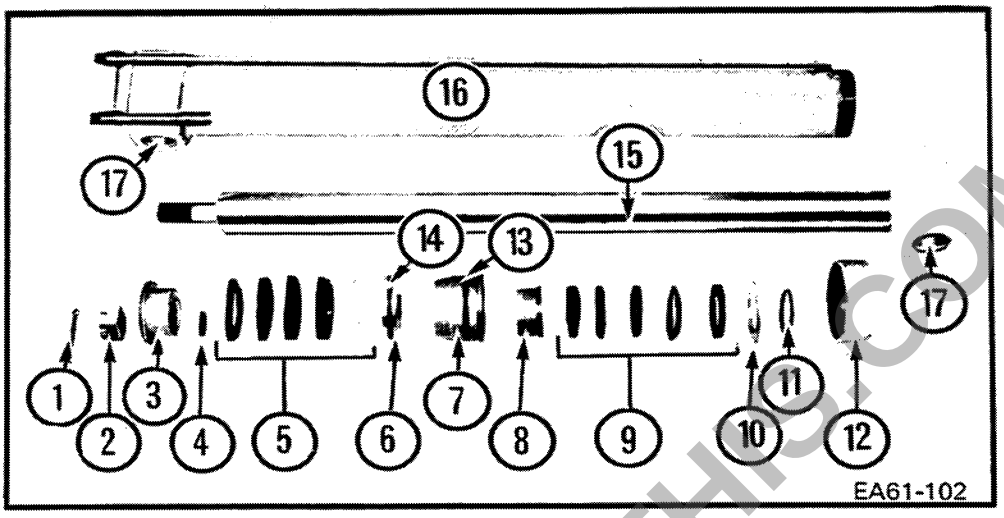


Fig.14

6d. ASSEMBLY

(a) Press in new bushes (17-14) if these were removed.

(b) Install the 'O' ring (11-14) and gland washer (10-14) into the gland cap (12-14) then thread the assembly onto the piston rod (15-14).

(c) Install the gland seals (9-14) into the gland housing assembly (7 & 8-14), install a new 'O' ring (13-14) onto the housing then thread the assembly onto the piston rod.

(d) Install the 'O' ring (14-14) onto the wear ring (6-14) then install the wear ring onto the piston rod.

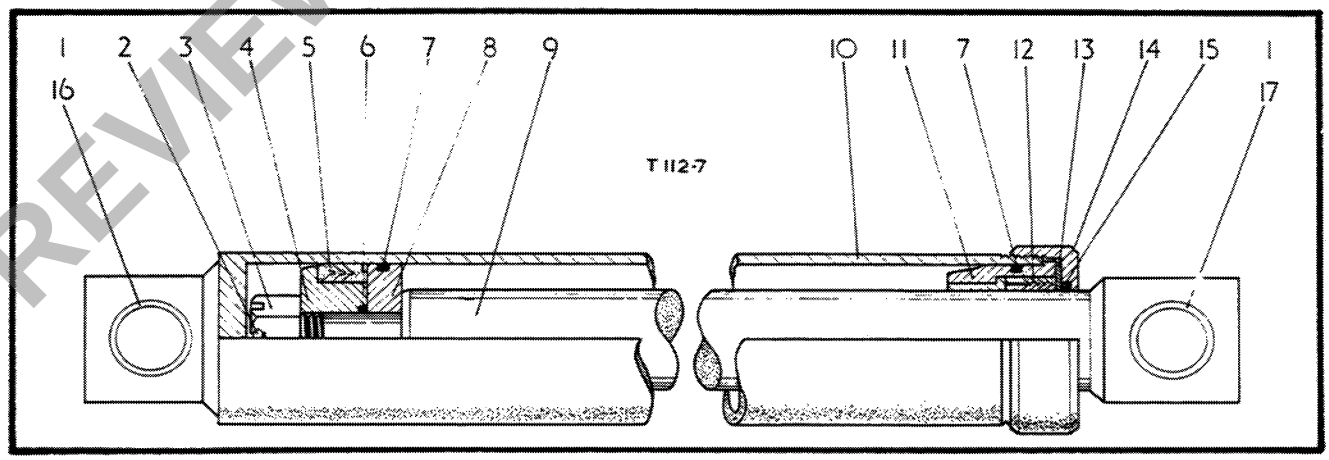
(e) Install the seals (5-14) and 'O' ring (4-14) on the plunger head (3-14) and thread onto the piston rod.

(f) Screw on the retaining nut (2-14) and lock with the cotter pin (1-14).

(g) Dip the piston in the correct grade oil then slide the assembly into the cylinder taking care not to damage the seals.

(h) Push the gland housing into the cylinder then screw on and tighten the gland cap (12-14).

(i) Fully retract the cylinder.



1. Bush
2. Cotter pin
3. Nut
4. Plunger head
5. Seals
6. 'O' ring
7. 'O' ring
8. Wear ring
9. Piston rod
10. Cylinder
11. Gland housing
12. Seals
13. Gland washer
14. Gland cap
15. 'O' ring
16. Spacer
17. Spacer

Fig.15 CROSS SECTION OF STABILIZER CYLINDER

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3c. INSPECTION

(a) Inspect the valve bodies for cracks.

(b) Inspect the spools and bores for scoring or wear. The spools are a selective fit and not serviced separately nor are the separate sections of the valve bank.

3d. ASSEMBLY

1. ASSEMBLING VALVE BANK

(a) Ensure that the mating surfaces are thoroughly clean then coat with clean HY-TRAN fluid.

(b) Position a new 'O' ring in the groove provided, referring to Figs.32 to 35.

(c) If the mid-inlet section, position the check valve poppet (1-34), spring (2-34) and spring seat (3-34). On the other spool sections, position the check valve plunger (2-33) and spring (1-33).

(d) Thread the sections onto the tie-rods ensuring that the check valve springs are not distorted and that on the mid-inlet section the spring seat is seated in its bore.

(e) Screw on the nuts at either end of the tie-rods until an equal amount of thread is showing at each end then tighten each nut a little at a time until a final torque of 6.64 kgm (48 lbft) is applied to the small nuts and 10.23 kgm (74 lbft) to the large nuts.

2. OUTLET SECTION

(a) Install a new 'O' ring (4-31) on the plug (1-31).

(b) Position the check valve poppet (3-31) in the housing then the spring (2-31) and screw in the plug.

(c) Install the pilot valve (1-30) and spring (2-30) then screw in the adjusting screw (3-30).

(d) Install the washer, locknut (4-30), washer and acorn nut (5-30) finger tight.

(e) Install a new 'O' ring (6-29) and backing ring (7-29) onto the plunger with the 'O' ring nearest the tip.

(f) Push the plunger into the housing then install the spring (4-29) and screw in the adjusting screw (3-29).

(g) Install the washer, locknut (2-29), washer and acorn nut (1-29) finger tight.

(h) Install a new 'O' ring (4-28) onto the plug (1-28).

(i) Insert the spring (2-28) into the unloading spool (3-28) then install the unloading spool in the housing and screw in the plug (1-28).

(j) Set the pilot valve and unloading valve referring to para.3g.

3. RELIEF VALVES

(a) Install a new 'O' ring (15-27) and backing ring (16-27) onto the poppet (3-27) ensuring that the 'O' ring is toward the piston seat.

(b) Insert the piston (4-27) into the poppet then position the poppet (3-27) inside the poppet (2-27) so that the piston is protruding through the tip.

(c) Install the assembled poppet (2-27) inside the cap (1-27).

(d) Install a new 'O' ring (12-27) and a new 'O' ring (14-27) and backing ring (13-27) on the plug (6-27) with the backing ring toward the head of the plug.

(e) Install the spring (5-27) onto the piston (4-27) then screw in the plug (6-27) .

(f) Install the poppet (7-27), spring (8-27) and adjusting screw (9-27).

(g) Install the washer, locknut (10-27), washer and acorn nut (11-27) finger tight.

(h) Screw the relief valve into its appropriate bore in the control valve.

(i) Set the relief valves referring to para.3g.

4. ANTI-CAVITATION VALVES

(a) Install a new 'O' ring (6-26) and a new 'O' ring (4-26) and backing ring (5-26) on the spacer with the backing ring toward the seal face.

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