Service Manual

ROBOT 160, 170, 180T

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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)	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

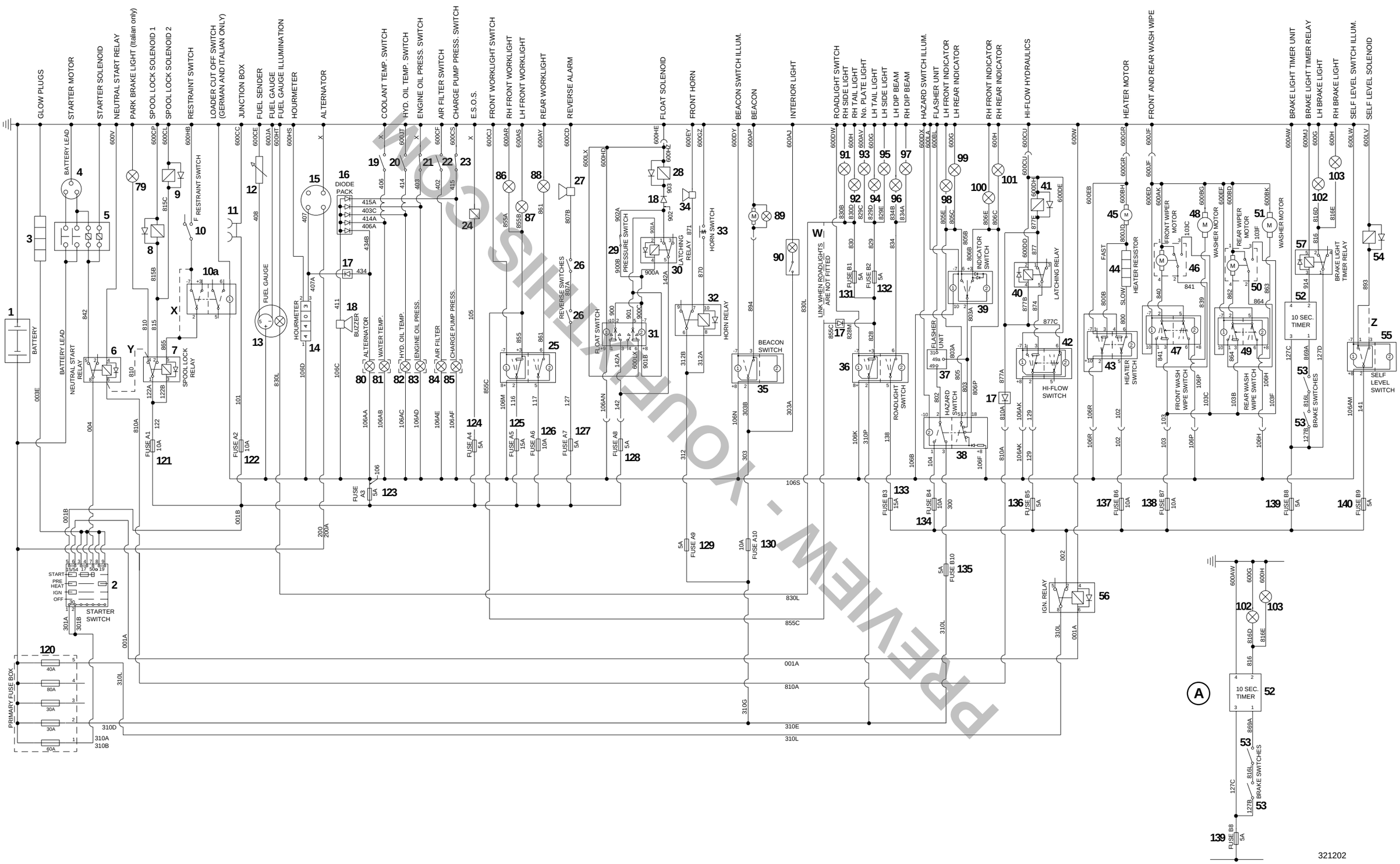
Metric Grade 8.8 Bolts

Bolt Size in	(mm)	Hexagon (A/F) in	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

Note: All bolts used on JCB machines are high tensile and must not be replaced by bolts of a lesser tensile specification.

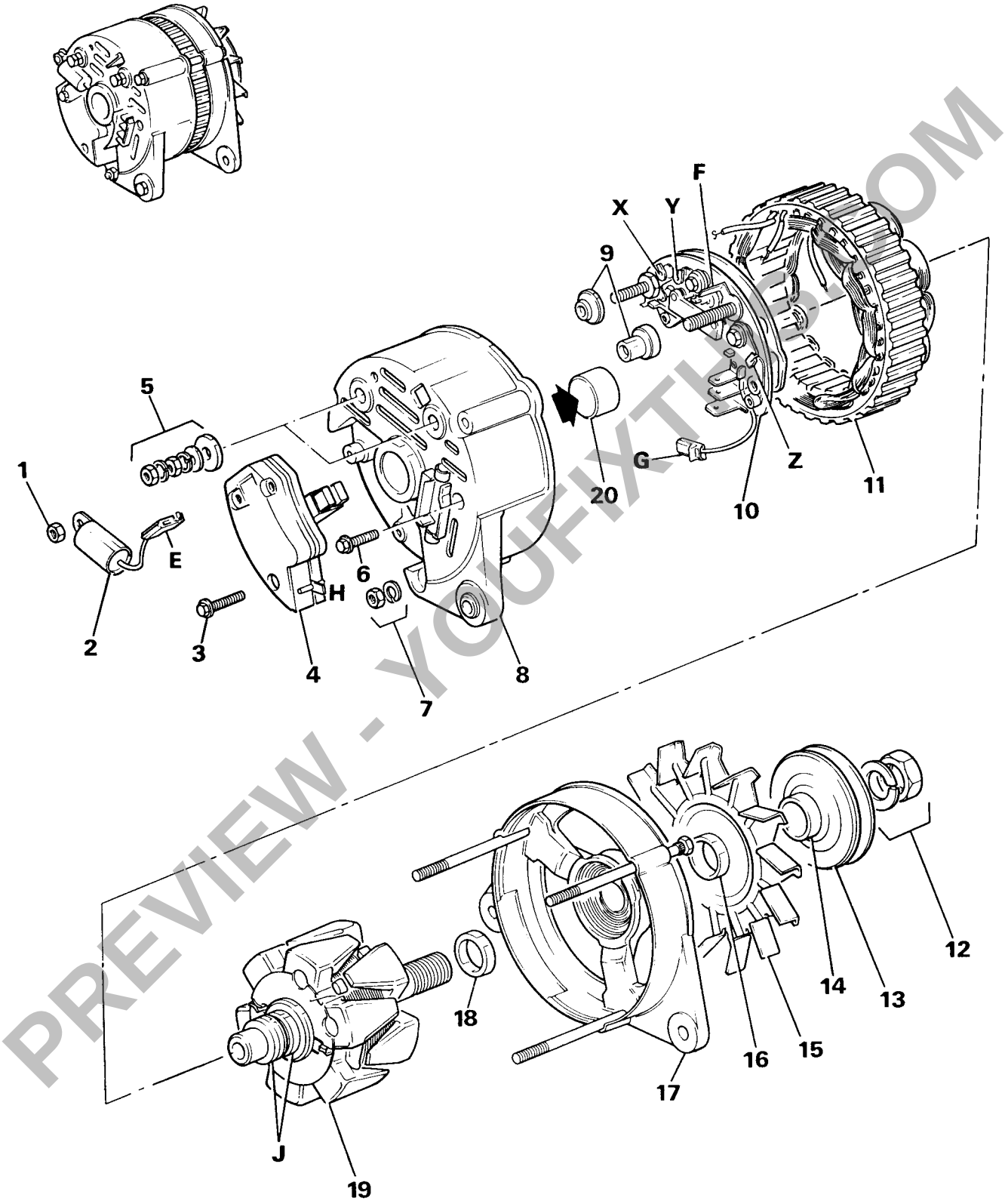
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Dismantling and Assembly

The exploded illustrations below and on the next two pages are included for reference. Dismantling and assembly procedures are straightforward and require no specific instructions other than the following:

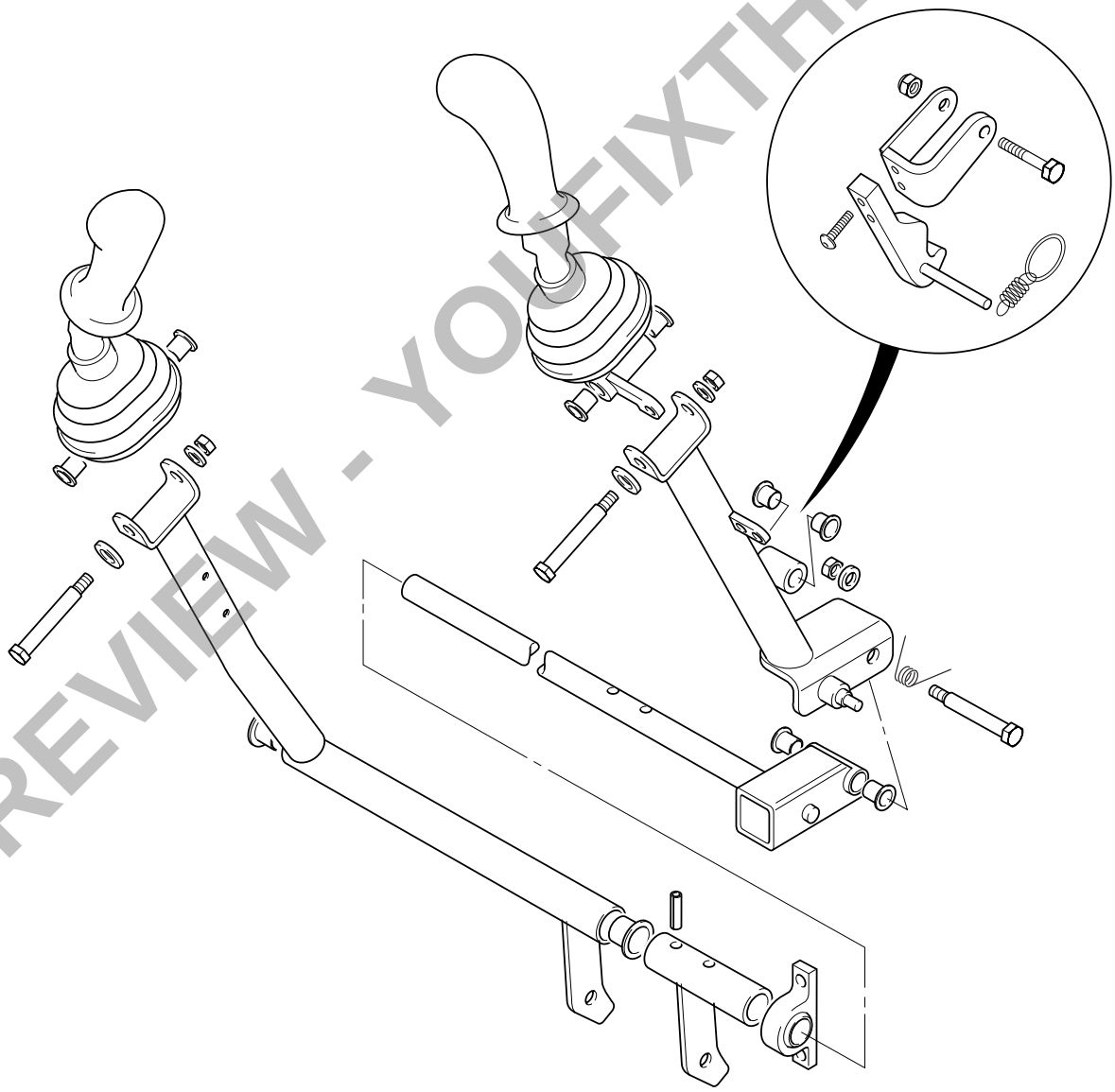
1 Renew worn parts as required.

2 Lubricate all moving parts during assembly.

* **3** Secure tension pins using JCB Retainer (High Strength).

4 Adjust length of operating rods as required to ensure correct function of the controls.

Manual Control Levers



344300

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Note: *System Cleanliness is to be to ISO 16/13 - See page E/20 - 1 for guidance.*

Loader Pump - Standard

Type	Gear
Maximum displacement at 205 bar (2972 lbf/in^2)	
- Robot 160	55 l/min (12.1 UK gal/min, 14.5 US gal/min)
- Robot 170 and 180T	60 l/min (13.2 UK gal/min, 15.8 US gal/min)

Loader Pump - High-Flow

Type	Tandem gear with integral priority valve
Maximum displacement at 150 bar (2175 lbf/in^2)	
- Front Section	54 l/min (11.9 UK gal/min, 14.2 US gal/min)
- Rear Section	61 l/min (13.4 UK gal/min, 16.1 US gal/min)
Priority Valve setting	19 l/min (4.2 UK gal/min, 5 US gal/min) at 20 bar (290 lbf/in^2)

Transmission Pump - 160/170 Servo Machines

Type	Tandem axial piston Series 42
Displacement	41 cc/rev (2.5 in^3/rev)
Control	Servo non-feedback proportional.
Charge Pressure (oil temperature at 50° C)	
- Standard Machines	10 bar (145 lbf/in^2) min. at engine idle 18-22 bar (261-319 lbf/in^2) at max. rev/min
- High-flow Machines	10 bar (145 lbf/in^2) min. at engine idle 18-22 bar (261-319 lbf/in^2) at max. rev/min (controlled by priority valve)
High Pressure 'Loop' Valve Pressure	385 bar (5582 lbf/in^2)

Transmission Pump - 160/170 Manual Machines

Type	Tandem axial piston Series 40
Displacement	44 cc/rev (2.68 in^3/rev)
Control	Direct Displacement Manual Control
Charge Pressure (oil temperature at 50° C)	
- Standard Machines	10 bar (145 lbf/in^2) min. at engine idle 18-22 bar (261-319 lbf/in^2) at max. rev/min
- High-flow Machines	10 bar (145 lbf/in^2) min. at engine idle 18-22 bar (261-319 lbf/in^2) at max. rev/min (controlled by priority valve)
High Pressure 'Loop' Valve Pressure	385 bar (5582 lbf/in^2)

Transmission Pump - 180T Servo Machines

Type	Tandem axial piston Series 42
Displacement	41 cc/rev (2.5 in^3/rev)
Control	Servo non-feedback proportional.
* Charge Pressure (oil temperature at 50° C)	
- Standard Machines	14 bar (203 lbf/in^2) min. at engine idle 22-26 bar (319-377 lbf/in^2) at max. rev/min
- High-flow Machines	14 bar (203 lbf/in^2) min. at engine idle 18-22 bar (261-319 lbf/in^2) at max. rev/min (controlled by priority valve)
High Pressure 'Loop' Valve Pressure	385 bar (5582 lbf/in^2)

Transmission Pump - 180T Manual Machines

Type	Tandem axial piston Series 40
Displacement	44 cc/rev (2.68 in^3/rev)
Control	Direct Displacement Manual Control
* Charge Pressure (oil temperature at 50° C)	
- Standard Machines	14 bar (203 lbf/in^2) min. at engine idle 20-24 bar (319-377 lbf/in^2) at max. rev/min
- High-flow Machines	14 bar (203 lbf/in^2) min. at engine idle 18-22 bar (261-319 lbf/in^2) at max. rev/min (controlled by priority valve)
High Pressure 'Loop' Valve Pressure	385 bar (5582 lbf/in^2)

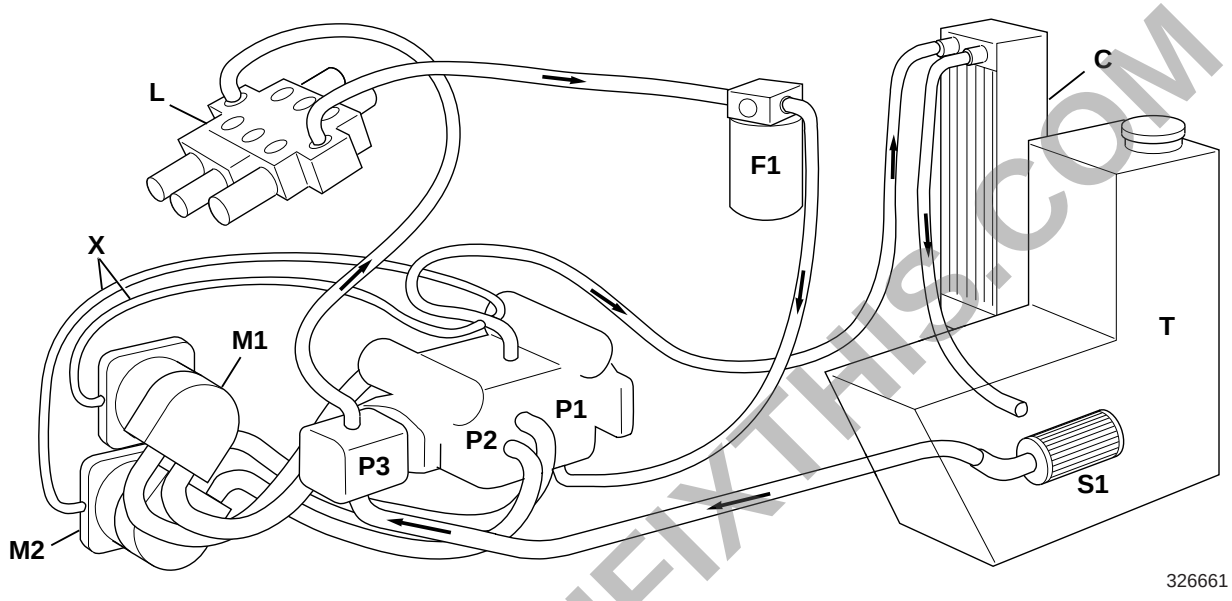
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Servo Machines

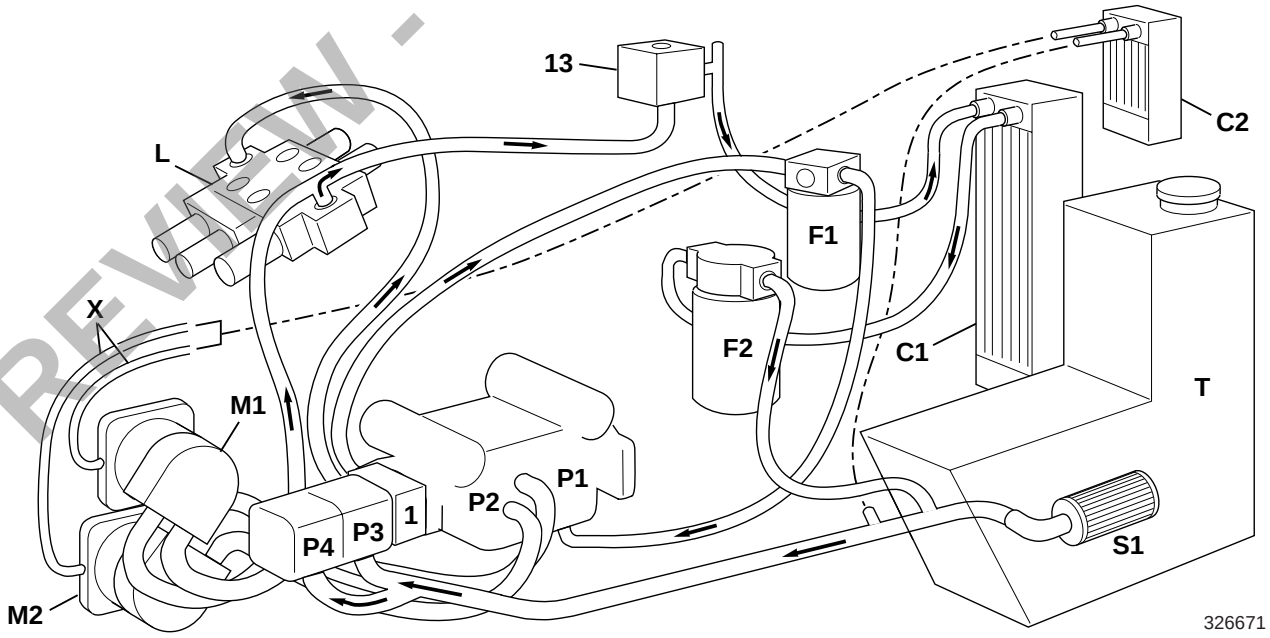
The illustrations show the major components of the hydraulic system in their approximate relative positions as viewed from the left hand side of the machine. The arrows show the neutral circuit flow. Refer also to the appropriate schematic circuit.

Neutral Circuit - Standard Machines



Oil is drawn from the tank **T** by the gear pump **P**3 via suction strainer **S**1. The pump **P**3 delivers pressurised oil to the loader control valve **L**. From the loader valve the oil passes to the loader and transmission servo joysticks and, via the filter **F**1, to the charge supply for the transmission pumps **P**1 and **P**2. Oil from **P**1 and **P**2 is returned via the cooler **C** to the tank **T**.

Neutral Circuit - High-flow Machines



Oil is drawn from the tank **T** by the gear pumps **P**3 and **P**4 via suction strainer **S**1. The pump **P**3 delivers pressurised oil to the charge pressure priority valve **1** which splits the oil flow between transmission charge and the loader system. A small amount of oil passes to the loader and transmission servo joysticks and, through filter **F**1, to the main pumps **P**1 and **P**2. The remaining oil flow passes through the loader control valve **L** and joins the flow from high-flow gear pump **P**4, passing through the high-flow control valve **13** and returns via the cooler **C1** and filter **F2** back to tank **T**.

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Hydrostatic Transmission

The purpose of this section is to help you trace transmission problems to a faulty unit (pump, motor, joystick etc). Once you have traced the faulty unit, refer to the appropriate dismantling, inspecting and test instructions given elsewhere in the manual.

* Before you begin problem solving, read the Safety Information at the beginning of this manual.
* Make simple checks before say, stripping a major component.
* Make sure that the hydraulic fluid is at correct working temperature (50 °C, 122 °F).
* Whatever the fault, check the condition of the hydraulic fluid. Drain and replace if necessary.
* Be sure to remove ALL contamination and if possible identify its origin. It may be part of a component from elsewhere in the circuit.

PROBLEM	CAUSE (servo machines)	CAUSE (manual machines)
No drive in any direction	1, 2, 4, 10, 17	1, 2, 4, 17
No drive in either forward or reverse	1, 2, 6, 9, 11, 12	1, 2, 6, 9, 12
No spin turn either left or right	3, 4, 11, 12, 15	3, 4, 11, 15
No drive on one side	2, 5, 6, 9, 11, 12, 15, 16	2, 5, 6, 8, 9, 12, 15, 16
Machine will not travel in a straight line	3, 7, 9, 11, 12, 13, 14, 15	2, 8, 9, 12, 14, 15
Poor drive performance, no tractive effort	4, 5, 6	4, 5, 6
Machine creeps in neutral	7	8
Machine will not move at idle but moves at max. revs.	4	4
Hydraulic fluid is overheating	1, 18, 19, 20	1, 18, 19, 20
Noise in transmission	16	16

	KEY TO CAUSE	REMEDY	PAGE REF.
1	No oil in hydrostatic system or oil level too low	Top-up as necessary.	3/8-1
2	Brake not released	Check mechanism.	Sect G
3	Tyres worn or pressure incorrect	Check tyre pressures and condition.	3/9-2
4	Charge pressure low	a Standard machines - Adjust charge pressure at transmission pump. b High-flow machines - Charge pressure is controlled by the Priority Valve. Carry out flow check. Check that transmission pump charge valve is disabled.	Manual E26-4 Servo E29-4 E11-4
5	No or low pump output	Check pump - carry out wheel speed check. If one pump suspect, swop motor feed hoses and notice if problem changes sides - if 'yes', pump related fault; if 'no', motor related fault.	E10-3 & E10-4
6	High pressure 'loop' relief valve/tow valve open/set incorrectly	Check that valves have been re-tightened after towing. Replace relief valve and re-check.	E10-8
7	Pump neutral position set incorrectly	Adjust servo neutral position.	E10-6
8	Manual controls incorrectly set	Adjust manual controls	E25-2

..... continued

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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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Service Schedules

EVERY 10 OPERATING HOURS OR DAILY whichever occurs first

Clean
1 Machine generally, including cab interior
2 Radiator matrix and oil cooler
3 Quickhitch locking peg housings

Check (engine stopped)
1 Generally for damage including ROPS/FOPS structure
* **2** Engine cooling system for leaks
3 Engine coolant level and antifreeze strength
4 Fuel system for leaks and contamination
5 Hydraulic fluid level
6 Hydraulic system for leaks
7 Engine oil level and condition
8 Engine generally for leaks
9 Alternator belt tension
10 Tyre pressures and condition
11 Tightness of wheel nuts
12 Windscreen washer level (if fitted)
13 Seat belt condition and security
* **14** Operation of horn
* **15** Operation of roadlights and beacon (if fitted)

Check (Engine Running)
1 Warning lights extinguished
2 Exhaust for excessive smoke
* **3** Operation of parking brake
* **4** Operation of reverse alarm (if fitted)

Grease
1 Quickhitch pivot pins

EVERY 50 OPERATING HOURS OR WEEKLY whichever occurs first

Do the Daily jobs plus:

Check (Engine Stopped)
1 Oil cooler connections
2 Radiator hoses and condition
3 Fuel filter - drain if necessary
4 Hoses and pipework for chafing and damage

Grease
1 Loader arm pivot points
2 Lift ram pivots

EVERY 100 OPERATING HOURS OR 2 WEEKLY whichever occurs first

Do the Daily and 50 hour jobs plus:

Clean
1 Battery terminals
2 Hydraulic tank breather

Check (Engine Stopped)
1 Ram piston rods for damage and corrosion
2 Air cleaner hose security
3 Wiring for chafing

Oil
1 All linkage points
2 Restraint pivots and parking brake linkage
3 Throttle controls and linkage
4 All hinges
5 Manual control shafts

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Loader Arm Safety Strut

Installing

⚠ WARNING

Raised loader arms can drop suddenly and cause serious injury. Before working under raised loader arms, fit the loader arm safety strut.
2-1-1-6

⚠ WARNING

You could be killed or seriously injured if the loader control is accidentally operated. Make sure that no-one goes near the machine whilst you fit the safety strut.
16-3-1-5

1 Empty the shovel or attachment, if appropriate, and raise the loader arm enough to fit the safety strut.

2 Stop the engine.

3 Fit the strut:

- a Remove the strut from its stowage position **C** on top of the lift arm.
- b Place the strut around the lift ram.
- c Secure the strut **A** into position using strap **B**.

4 Start the engine.

5 Slowly lower the loader arm onto the safety strut. Stop the movement immediately the weight of the arm is supported by the strut.

Note: Extreme care must be taken when lowering the loader arm onto the safety strut. 'Feather' the lever to lower the loader arm slowly.

Removing

⚠ WARNING

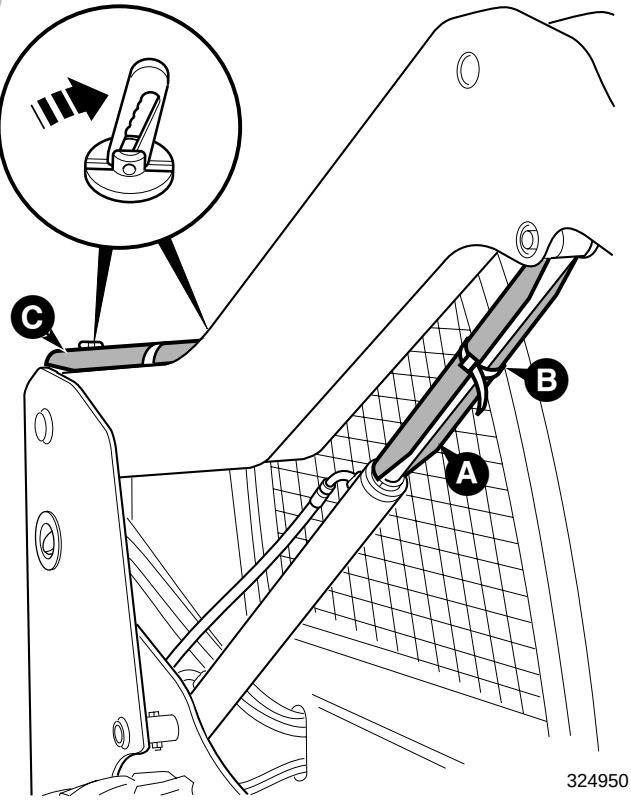
You could be killed or injured if the loader control is accidentally operated. Make sure no-one comes near the machine while you remove the safety strut.
2-3-1-3

1 Make sure that the drive control lever is in the neutral (rest) position.

2 Raise the loader arm to take the weight off the safety strut **A**. Stop the engine.

3 Remove the strut:

- a Release securing strap **B**.
- b Remove the safety strut from the lift ram.
- c Return the safety strut to its stowage position **C** on top of the lift arm.



324950

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General Purpose and Light Duty Shovels

Daily Maintenance

1 Clean with the rest of the machine (if fitted).

2 Ensure that the Quickhitch framework is not damaged or badly worn. Repair if necessary.

3 Check for damage. Repair or replace as necessary.

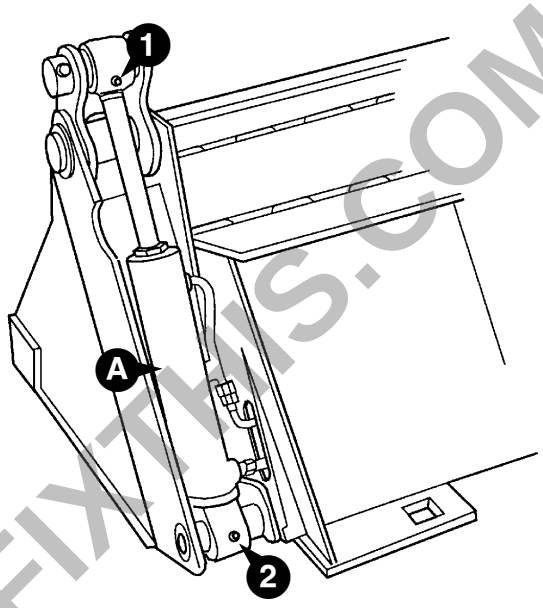
6-in-1 Shovel

Daily Maintenance

1 Clean with the rest of the machine.

2 Check for damage. Repair or replace as necessary.

3 Check for signs of hydraulic leaks at hoses, adapters and rams. Should the rams **A** and **B** require service see **Section E, Hydraulics**.



A174600

⚠ WARNING

Fine jets of hydraulic fluid at high pressure can penetrate the skin. Do not use your fingers to check for hydraulic fluid leaks. Do not put your face close to suspected leaks. Hold a piece of cardboard close to suspected leaks and then inspect the cardboard for signs of hydraulic fluid. If hydraulic fluid penetrates your skin, get medical help immediately.
INT-3-1-10/1

4 Grease at the points indicated.

Total of 4 grease points. (1 and 2 as illustrated, 3 and 4 at opposite end).

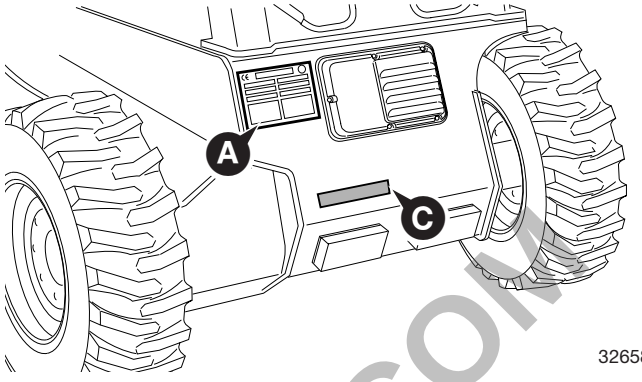
Note: Only one ram **A** is illustrated, ram **B** is at the opposite end.

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Machine Identification Plate

On early machines the machine identification plate is located as shown at **A**, on later machines the plate is located as shown at **B**. The plate is stamped with the serial numbers of the major individual units.



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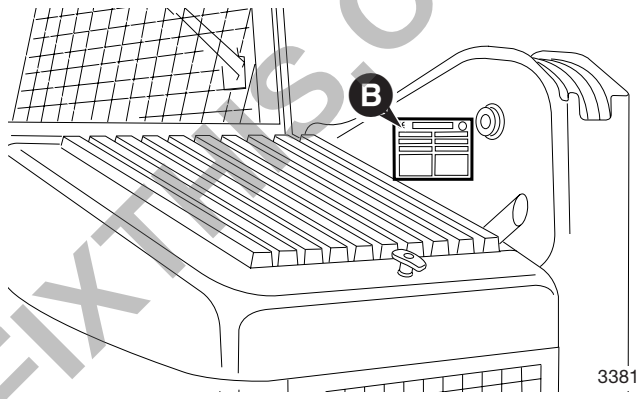
Typical Vehicle Identification Number (VIN)

SLP	165	S	B	V	E	677001
1	2	3	4	5	6	7

1. World Manufacturer Identification
2. Machine Model
3. Machine Type (S = Standard, H = High-flow)
4. Build Type (A = Canopy, B = Cab)
5. Year of Manufacture:

W = 1998	2 = 2002
X = 1999	3 = 2003
Y = 2000	4 = 2004
1 = 2001	5 = 2005

6. Manufacturer Location (E = England)
7. Product Identification Number (PIN)



338180

Unit Identification

The chassis serial number is stamped on the front face of the chassis as shown at **C**.

The engine serial number is stamped on a label **D** on the left side of the cylinder block.

The hydraulic pump unit serial number is stamped on a plate on the bottom face of the pump.

If any of the major units are replaced with new ones, the relevant serial number on the Machine Identification Plate will be superseded. Either stamp the plate with the new number or stamp out the old number.

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HAREWOOD ESTATE, LEEK ROAD,
CHEADLE, STOKE ON TRENT,
UNITED KINGDOM ST10 2JU

CONSTRUCTOR MADE IN UK

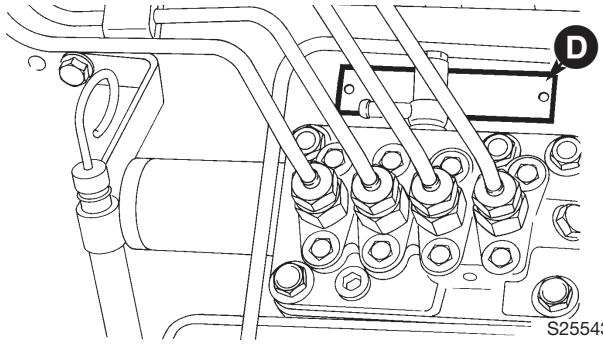
Vehicle Identification No. Product Identification No.

ENGINE SERIAL No. WEIGHT

PUMP SERIAL No. YEAR OF MANUFACTURE

MODEL	80/1269/EEC		MODEL	80/1269/EEC	
	POWER KW	R.P.M.		POWER KW	R.P.M.
160	35.7	2600	190	59.7	2200
170	37.3	2800	190 HF	59.7	2200
170 HF	37.3	2800	1110	68.6	2200
160 HF	35.7	2600	1110 HF	68.6	2200
1CX	37.3	2800	1CX HF	37.3	2800
180	44.7	2800	180 HF	44.7	2800

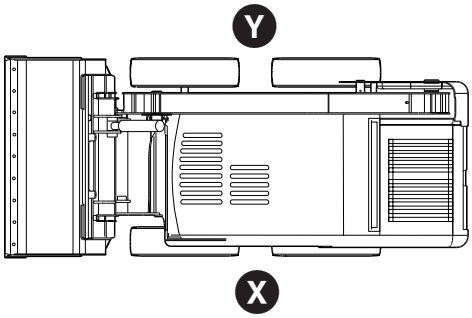
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S255430

Left Side, Right Side

In this manual, 'left' **X** and 'right' **Y** mean your left and right when you are seated correctly in the machine.



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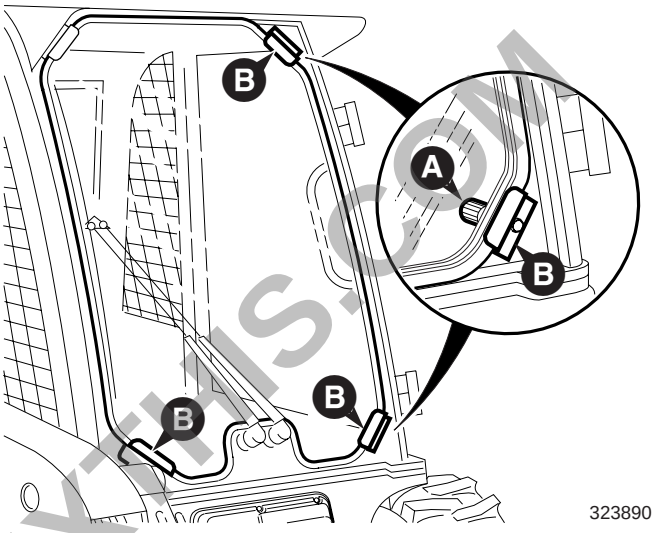
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Front Screen

⚠ CAUTION

The front screen is heavy. Removal and refitting of the front screen should be done by two people, one on either side of the machine.
3-2-1-4



323890

* **Removal up to machine no. 682512**

1 Stop the engine

2 Remove the front screen wiper blade

3 Remove the front screen as follows:

a Remove the three thumbscrews **A** (inside the cab).

b Support the screen and remove the securing plates **B** (outside the cab).

c Carefully lift the front screen away from the machine.

d Store the screen safely to prevent damage.

* **Removal from machine no. 682513**

1 Stop the engine

2 Disconnect the front screen wiper motor feed wire at the plug below the motor.

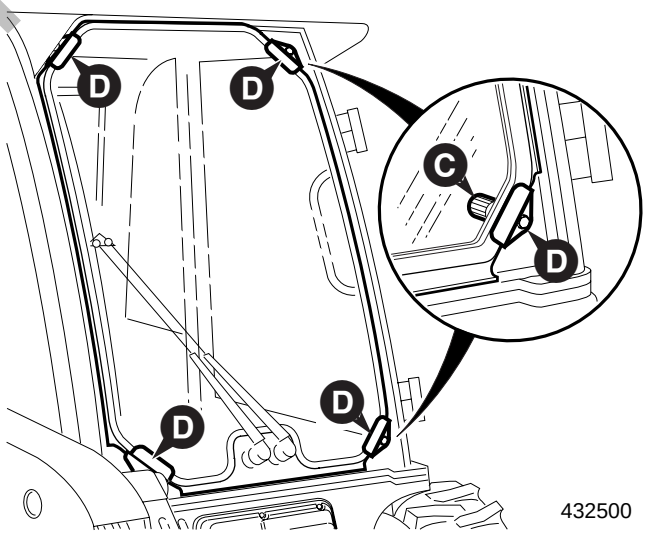
3 Remove the front screen as follows:

a Remove the four thumbscrews **C** (inside the cab).

b Support the screen and remove the securing plates **D** (outside the cab).

c Carefully lift the front screen assembly away from the machine.

d Store the front screen assembly safely to prevent damage.



432500

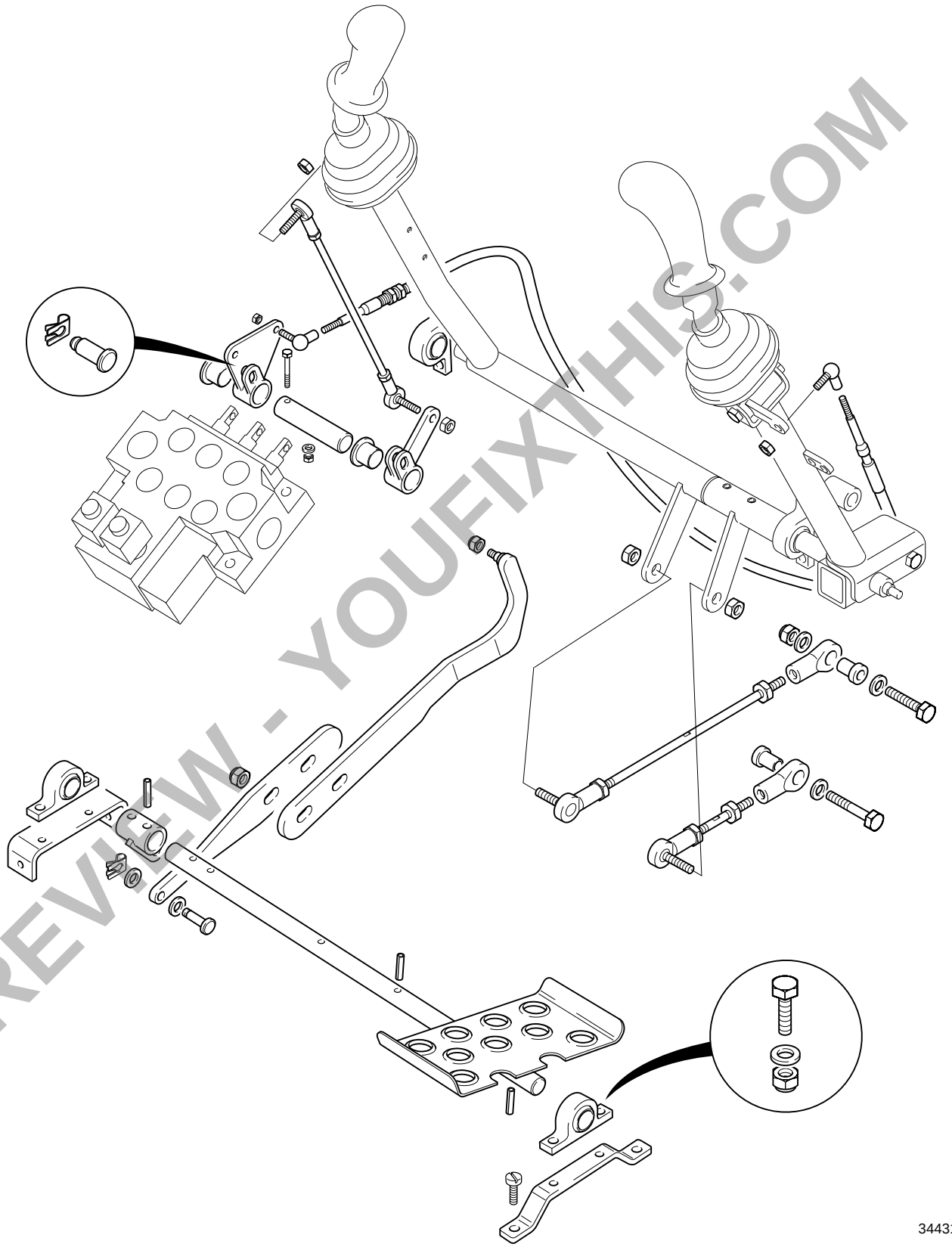
Replacement

Replacement is a reversal of the removal procedure.

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Manual Control Linkage - Hand Operated Loader



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Component Key - Standard Manual Machine

C Cooler
F1 Filter
P1 Transmission Pump ┐
P2 Transmission Pump ┘ Run in Tandem
P3 Loader Gear Pump
M1 Left Hand (upper) Drive Motor
M1a Left Hand Motor Shuttle Valve
M2 Right Hand (lower) Drive Motor
M2a Right Hand Motor Shuttle Valve
S1 Suction Strainer
T Tank
X1 Pressure Test Point
X2 Pressure Test Point
* **Y** Plan View of Pump

1 Oil Cooler By-pass Valve (3 bar [see note 2])
2 Loader Valve Block
2a Main Relief Valve (MRV)
2b Lift Spool
2c Tilt Spool
2d Auxiliary Spool
2e One Way Restrictor
2f Anti-cavitation Valve
2g Auxiliary Relief and Anti-cavitation Valve (see note 3)
3 Auxiliary Couplings
4 Tilt Ram
5 Levelling Valve (Optional)
6 Float Valve (Optional)
7 Lift Ram
8 Manual Load Lower Valve
9 Suction Manifold
10 Charge Pressure Switch
11 Hydraulic Oil Temperature Switch
12 Float Pressure Switch (Optional)

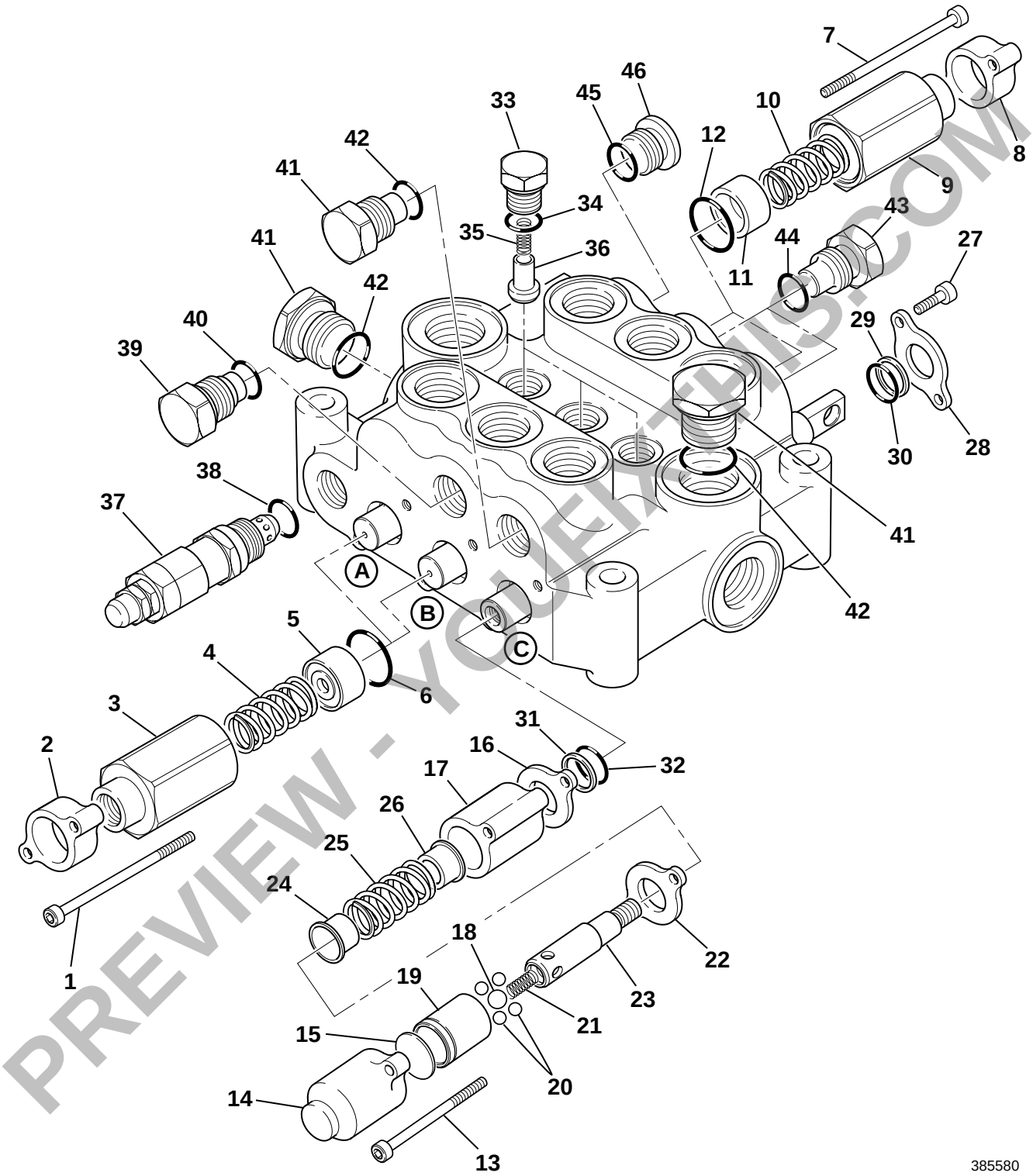
Note 1: Neutral Circuit shown in bold line

Note 2: Machines manufactured prior to July 2000 were fitted with a 2 bar by-pass valve. The 3 bar valve may be fitted to earlier machines.

Note 3: When machine is fitted with a breaker, item **2g** is used instead of **2f**.

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