

SERVICE MANUAL

D 600 C

600 C

D 600 D

L 600 D

Hydraulic System

P R E F A C E

The Service Manual is intended to assist and instruct workshop personnel to service and repair the machine and to assist management to determine the facilities required to carry out these activities.

The data and instructions given in this manual apply to all machines unless stated otherwise. Also, minor differences between machine models will be recognized when viewing photographs, diagrams and studying the accompanying text, nevertheless, these should present no problems to the experienced tradesman when servicing the machine.

Service bulletins will be issued from time to time which may affect procedures given in this manual. Reference to these bulletins should be made before using this manual.

Routine maintenance for the machine is covered by the Operator's Manual issued with each machine.

SAFETY PRECAUTIONS

GENERAL

Accidents can be avoided by a few seconds thought and a more careful approach when working on the machine.

Your co-operation is essential to the success of an effective management policy on safety when at work. For example, you can avoid many accidents by observing certain precautions and insist that people working with you do the same.

As a guide the following are a few examples of safety precautions to be observed when working on the machine:

Never start the engine whilst standing beside the machine. Always start the engine when sitting in the driver's seat.

Never get on or off the machine whilst it is in motion.

Never make mechanical adjustments whilst the machine is in motion or the engine running.

Never carry out repairs or tighten hydraulic hoses or fittings when the system is under pressure or the engine running.

When checking the engine coolant, always remove the radiator cap very slowly and with care, especially when the engine is hot.

Do not exceed the lift capacities of hoists, cranes, jacks and slings when working on the machine.

If work is to be carried out beneath the machine, ensure that the machine is adequately supported. e. g. the weight is taken off a jack by using suitable blocks.

Ensure rules regarding flammable materials and other harmful substances are observed. When working on fuel or electrical systems, ensure fire equipment is available for immediate use and you know how to use it.

Know the correct and safe way of doing the job, avoid dangerous working practices.

Observe caution when carrying out adjustments near moving parts when the engine is running, for example, shafts, belts, pulleys and gears.

When carrying out road or equipment performance tests observe the safety precautions given in the appropriate operator manual.

These safety precautions are for your guidance and should be read and interpreted in conjunction with safety regulations valid in your country.

Remember "safety" is only a word until it is put into practice.

INDEX

GROUP 2200 (090) - HYDRAULIC SYSTEM

<u>Descriptions, fault diagnosis, tests and adjustments</u>	<u>Page</u>
Description	4
Oil tank with 3-spool control valve (L 600 D)	6
Mounting plate with 3-spool control valve (L 600 D)	8
Oil tank with 3-spool control valve (L 600 D from serial No. 3317 20 114)	12
Mounting plate with 3-spool control valve (L 600 D from serial No. 3317 20 114)	14
Hydraulic circuit diagram (600 C)	18
Hydraulic circuit diagram (D 600 C)	20
Hydraulic circuit diagram (D 600 D)	22
Hydraulic circuit diagram (L 600 D)	24
Dual-pressure hydraulic circuit diagram (L 600 D from serial No. 3317 20 114)	26
Electrical circuit diagram - automatic return to dig and boom kickout systems (L 600 D)	28
Automatic return to dig system - operation and adjusting (L 600 D)	31
Hydraulic pump (L 600 D/ D 600 D)	32
3-spool control valve (D 600 D with blade tilt system)	35
3-spool control valve - components and operation (L 600 D)	36
Pilot operated pressure relief valve - components (all models)	40
Dual-pressure relief valve - components (L 600 D from serial No. 3317 20 114)	43
Shock valve - components (all models)	44
Oil cooler by-pass valve - components (all models)	47
Shift control linkage (all models)	48
Fault diagnosis table (600 C/L 600 D)	50
Fault diagnosis table (D 600 C/D 600 D)	53
Fault diagnosis table -- hydraulic pump and pressure relief valve (all models)	55
Pressure test manifold (L 600 D / D 600 D)	56
System pressure test (all models except L 600 D from serial No. 3317 20 114)	57
System pressure test (L 600 D from serial No. 3317 20 114)	58
Testing the check valves (all models)	61

INDEX

GROUP 2200 (090) - HYDRAULIC SYSTEM

Instructions for removing, disassembling, re-assembling and replacing components

	<u>Page</u>
Removing and replacing the hydraulic pump (all models)	63-66
Removing and replacing the pressure relief valve (all models)	67-69
Disassembling and re-assembling the pressure relief valve (all models except L 600 D from serial No. 3317 20 114)	70-72
Removing and replacing the control valve (all models)	73-79
Disassembling and re-assembling the shift control linkage (all models)	81- 86
Removing and replacing a lift cylinder (D 600 C/D 600 D)	87-91
Disassembling and re-assembling a lift cylinder (all models)	93-95
Removing and replacing a lift cylinder pivot yoke assembly (D 600 C / D 600 D)	96
Disassembling and re-assembling a pivot yoke assembly (D 600 C/D 600 D)	96-97
Removing and replacing a bucket cylinder (600 C / L 600 D)	98-100
Disassembling and re-assembling a bucket cylinder (600 C / L 600 D)	101
Lift and bucket cylinders - components (600 C up to serial No. 310 06 098)	102
Lift cylinder - components (L 600 D)	105
Lift cylinder - components (D 600 D from serial No. 309 07 073)	106
Bucket cylinder - components (L 600 D)	109

HYDRAULIC SYSTEM

Description

The hydraulic system consists of a hydraulic oil tank, an oil pump, a control valve, a pressure relief valve, shock or service line relief valves, anti-cavitation valves, load hold check valves and hydraulic cylinders. The system is best described by dealing with each of these components in turn.

The hydraulic oil tank supplies oil for the operation of the system. As the system is a closed or sealed system, a pressurizing and depressurizing valve in the form of a screwed plug is provided on the oil tank. This valve must be opened before carrying out any service work on the system and closed after servicing is completed. The tank contains filter assemblies to clean the oil when it is recycled back to the tank during equipment operation. The control valve and its operating linkage are installed inside the tank.

Note: Earlier machines have a shut-off valve installed between the oil tank and oil pump.

The hydraulic oil pump is mounted on the torque converter transmission and is engine driven. It is a conventional rotary gear-type pump and its output varies depending on the type of machine, i. e. dozer or loader. It draws the oil from the tank and supplies it under pressure to the hydraulically powered components to which it is connected.

The control valve and operating linkage are, as already mentioned, installed inside the oil tank, therefore, short linkages for sensitive control of the system and no external oil leaks. A three-spool control valve is fitted as standard to the dozer and loader machines. In the dozer machine, one spool operates the blade lift and lower circuit, one spool operates the blade tilt circuit and one spool operates the rear ripper circuit. In the case of the loader machine, the three spools operate the bucket lift and lower circuit, the bucket rollback and dump circuit and the rear ripper circuit. Operation of the control valve is described elsewhere in this manual.

An optional four-spool control valve may be fitted. In this case the fourth spool operates a second supplementary equipment attachment, for example a side-dump bucket on a loader machine.

The pressure relief valve is externally mounted on the oil tank. The valve is set to relieve excess oil pressure in the system (the setting varies according to machine type), e. g. if the control levers are not returned to the neutral or hold position when the cylinders reach the end of their stroke, the relief valve will open and relieve excess pressure build-up in the control valve. When the valve opens, the main flow of oil from the pump will be directed back to the oil tank. Under normal pressure conditions the relief valve will remain closed.

Note: On later loader machines, a dual-pressure hydraulic system has been introduced whereby the bucket lift and lower and supplementary equipment circuits are operated at a higher pressure than the rear ripper and bucket rollback and dump circuits. These pressure are controlled by a dual-pressure relief valve which operates similar to the conventional relief valve described above except that a pressure sensing line tapped into the open centre gallery of the control valve directs pressure to the relief valve whenever the bucket lift and lower spool or the supplementary equipment spool is selected. This pressure acts on the pilot valve spring increasing its tension which, in turn, increases the opening pressure of the relief valve, thus obtaining a higher operating pressure for the bucket lift, lower and supplementary equipment functions.

HYDRAULIC SYSTEM

Description (continued)

Shock (service line relief) valves. Two valves attached to the control valve of the loader machine; one valve in the bucket lift service line and one valve in the bucket rollback service line. Generally, when a service fitted with a cylinder spool is in neutral, the service lines are isolated from the pressure relief valve and fluid in the circuit is trapped. To prevent any pressure build-up under these conditions, particularly when the bucket is raised or rolled back, these valves will open at a predetermined pressure so that any excess pressure in the circuit can be relieved into the tank return gallery in the control valve.

Anti-cavitation valves are attached to the control valve of the loader and dozer machines. One valve in the dozer blade lower service line and one valve each in the bucket lower and dump service lines. These valves prevent oil filling deficiencies at the piston side of the blade and bucket cylinders when the blade/bucket is lowered or when the bucket is dumped. Oil filling deficiencies not only lead to destructive cavitation but can also cause a rebound action of the piston in the cylinder which, in turn, can cause a partial vacuum leading to the intake of air past the piston rod seals.

Load hold check valves. Under some conditions the pressure in the service line is higher than the pump supply pressure in the control valve when a service is selected. To prevent the service moving in the wrong direction, a load hold check valve is installed in the pump supply port of each control spool. These valves open when the pressure in the pump gallery is higher than the pressure in the service line selected.

Hydraulic cylinders. All cylinders are conventional double acting type cylinders operated by oil supplied by the hydraulic oil pump. They are similar in construction and method of operation although the component parts vary.

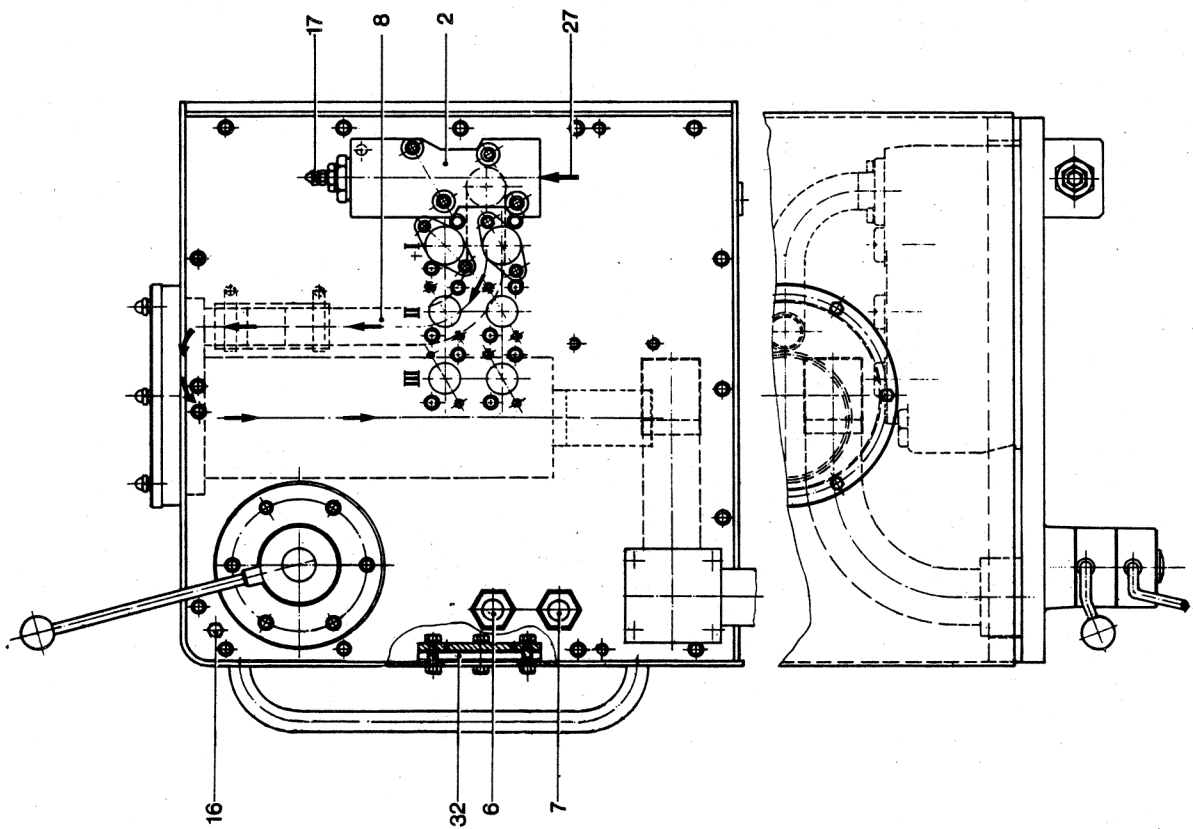
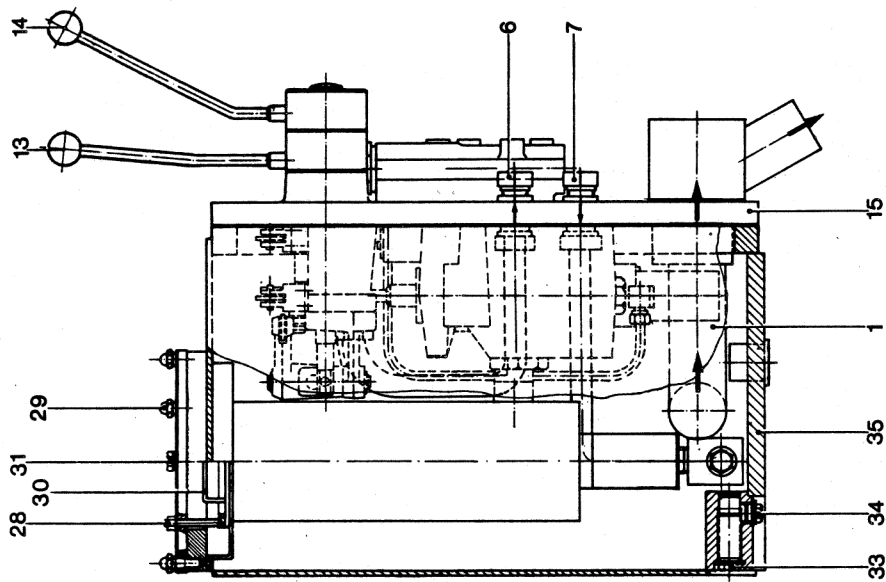
Loader machines may be equipped with automatic return to dig and boom kickout systems. These systems are electrically controlled by electromagnets and micro switches which in turn, control the bucket lift, float, rollback and dump hydraulic functions. Full details of these systems are given in the Operator's Manual supplied with each machine.

Hydraulic circuit oil flow

With the controls in neutral, the oil flows from the pump, passes through the pressure relief valve, continues through the open centre gallery of the control valve and returns to the oil tank via the filters.

With a service selected, the oil flows from the pump, passes through the pressure relief valve and into the control valve. The oil pressure increases and lifts the check valve allowing oil to flow through the delivery port of the control valve to the cylinder of the service selected. Oil returning from the other side of the cylinder flows back through the return gallery in the control valve and returns to the oil tank via the filters.

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