HYDROSTATIC TRACTION DRIVE MODEL 909 SPEEDROWER®

SECTION 1 - SPEEDROWER SERVICE MANUAL

40844000

Reprinted

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ABOUT IMPROVEMENTS

New Holland is continually striving to improve its products, and therefore, reserves the right to make improvements or changes, when it becomes practical to do so, without incurring any obligations to make changes, or additions, to the equipment sold previously.

HYDROSTATIC TRACTION DRIVE

The Sperry New Holland Windrower is a three-wheeled vehicle that utilizes a simple, reliable form of power transmission. Two hydraulic pump-motor combinations are used to drive the Windrower's front wheels, each wheel being driven through double reduction gearing by one of the pump-motor combinations.

Although driven in only one direction by the engine, each pump can deliver oil through either of its working ports to the propelling motor by varying its yoke angle from one side of center to the opposite side.

Pump delivery, under pressure, flows from one working port in the pump to a working port in the motor. Flow continues through the motor and is discharged at low pressure from the other working port of the motor to the alternate working port of the pump. Thus we have a closed loop system because:

1. The pump does not receive its oil directly from the reservoir.
2. Discharge oil from the motor enters the inlet of the main pump.

Both speed and steering of the Windrower are controlled by a single control handle. Moving the control forward increases the pump's yoke angle for maximum displacement and speed; the motor is at minimum displacement for maximum forward vehicle speed. Moving the control backwards reverses both pump flow to the motor and the direction of vehicle travel.

When the control is turned partially to the side, pump displacement is decreased, thus reducing the speed of the motor for the wheel on that side. The wheel on the other side has greater speed, and turning results. When the control is moved to the extreme sideward position, the pump may be stroked over center, causing a reversal of motor rotation on that side. One wheel could thus be turning forward; the other, backward. Moving the control to the opposite side results in turning in that direction.

The transmission's variable delivery, over center, piston pumps are sized for 15 GPM at 1800 RPM. Each of these pumps has an integral positive displacement gear pump that replenishes the system. Valves incorporated in each main pump include two relief and replenishing valve assemblies which combine the functions of inlet check valves and pilot operated high pressure relief valves. A direct acting relief valve is provided to regulate replenishing pressure.

There is no flow when the pump yoke's centerline is at right angles to the centerline of the unit, see Figure 1. Maximum delivery through one working port occurs when the yoke is moved to either extreme angular position, see Figures 2 and 3. Maximum delivery through the other working port occurs when the yoke is moved over the center position to the extreme angular position on the opposite side of the pump. Therefore, by moving the yoke from one side of the center position to the other, the flow paths to the motor can be changed, thus changing the rotation of the motor without using directional valves.

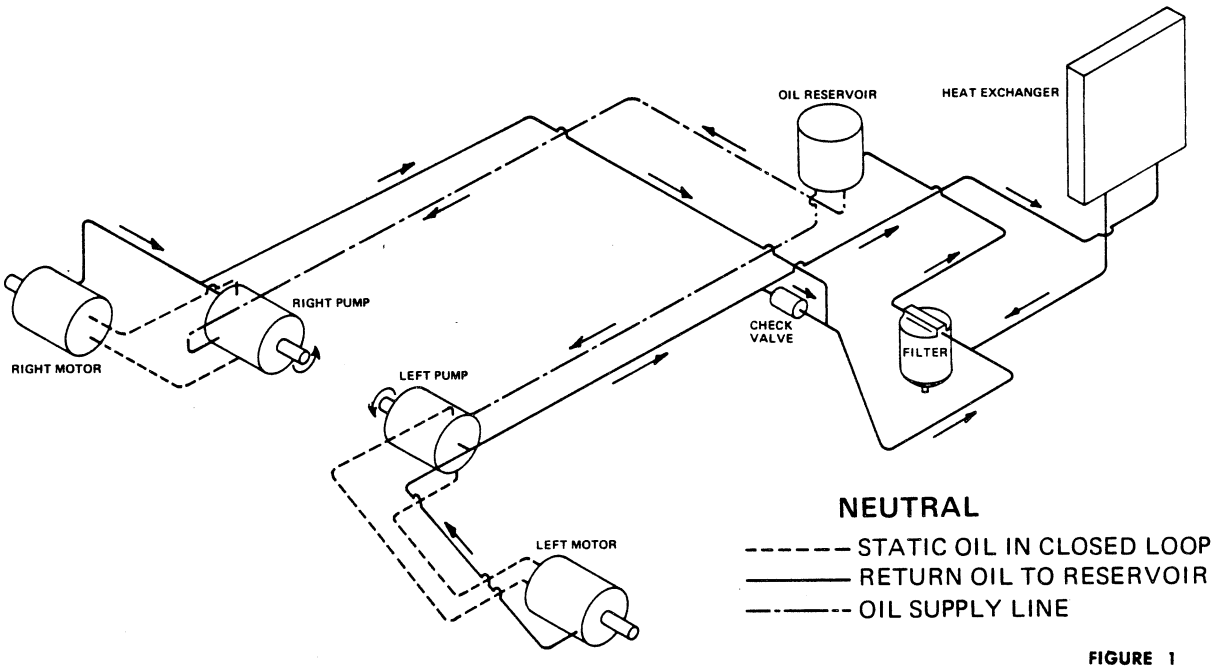

FIGURE 1

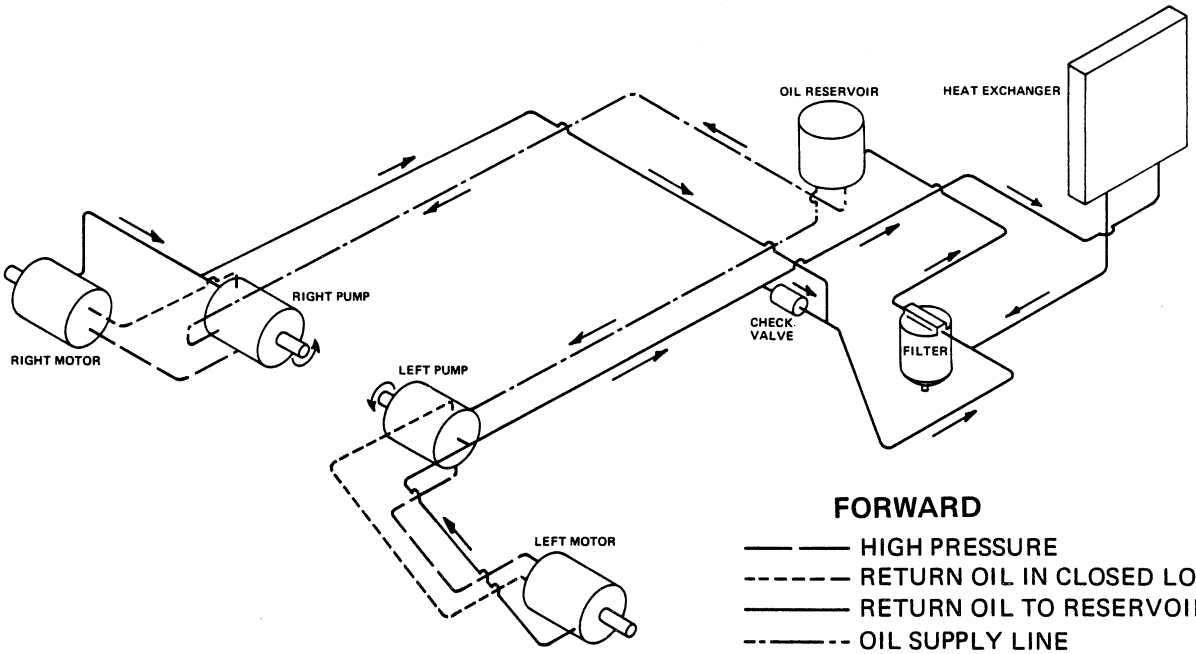

FIGURE 2

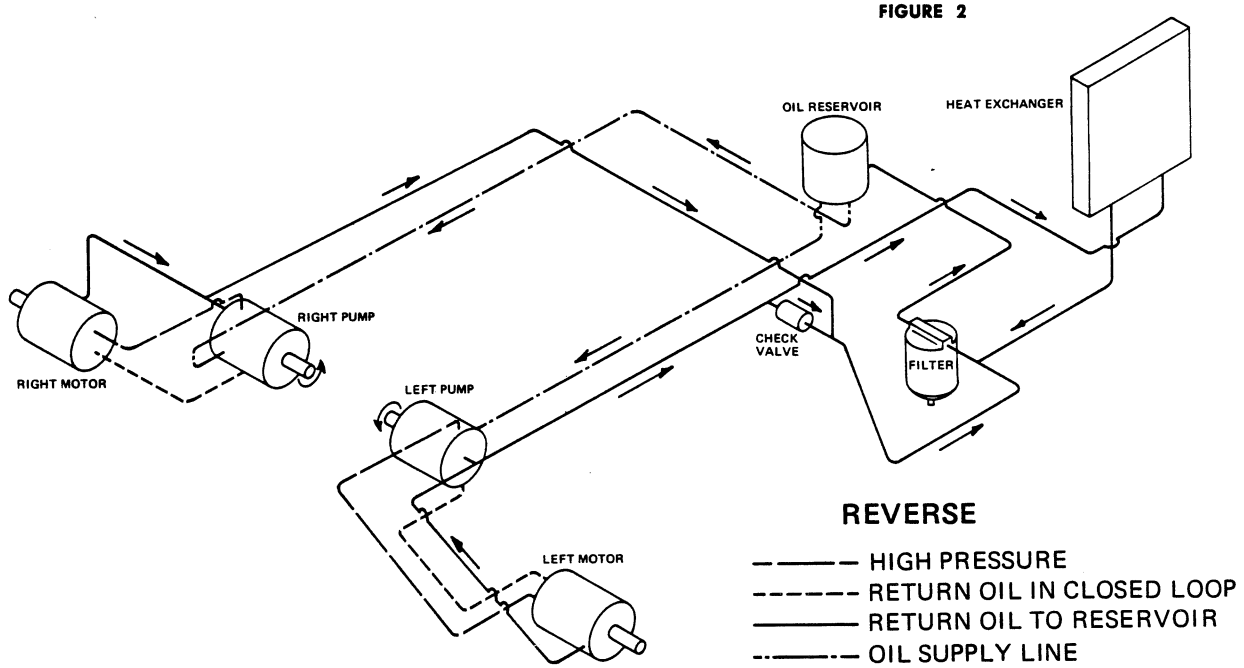

FIGURE 3

Some fluid is lost from the working loop of the transmission but is replenished by the delivery of the low pressure gear pump within the main pump. The gear pump is of fixed displacement design, delivering 5.4 GPM at 1800 RPM. Delivery is varied by the operating speed of the main pump.

Oil from the reservoir is forced into the replenishing pump by atmospheric pressure and is discharged into the inlet of the main pump at a pressure exceeding 25 PSI. Why do we say "exceeding 25 PSI"? The maximum pressure setting of the replenishing pump relief valve is 25 PSI. Pump leakage drains into the pump case. The resulting back pressure acts on the relief valve, increasing its pressure setting. The replenishing pump relief valve consists of a poppet and spring. Pressure acts directly on the poppet, against the spring. This is known as a simple or direct acting relief valve, see Figure 4.

Oil from the replenishing pump must also pass over replenishing or prefill check valves which are connected by a common passage. When the main pump delivery is directed to one working port, replenishing oil, when needed, overcomes the 10 PSI spring setting in the downstream leg of the circuit. Excess oil empties over the 25 PSI relief valve into the case. When the direction of fluid flow is reversed by moving the pump yoke over center, the fluid goes over the replenishing valve to the other working port.

In addition to the replenishing or prefill

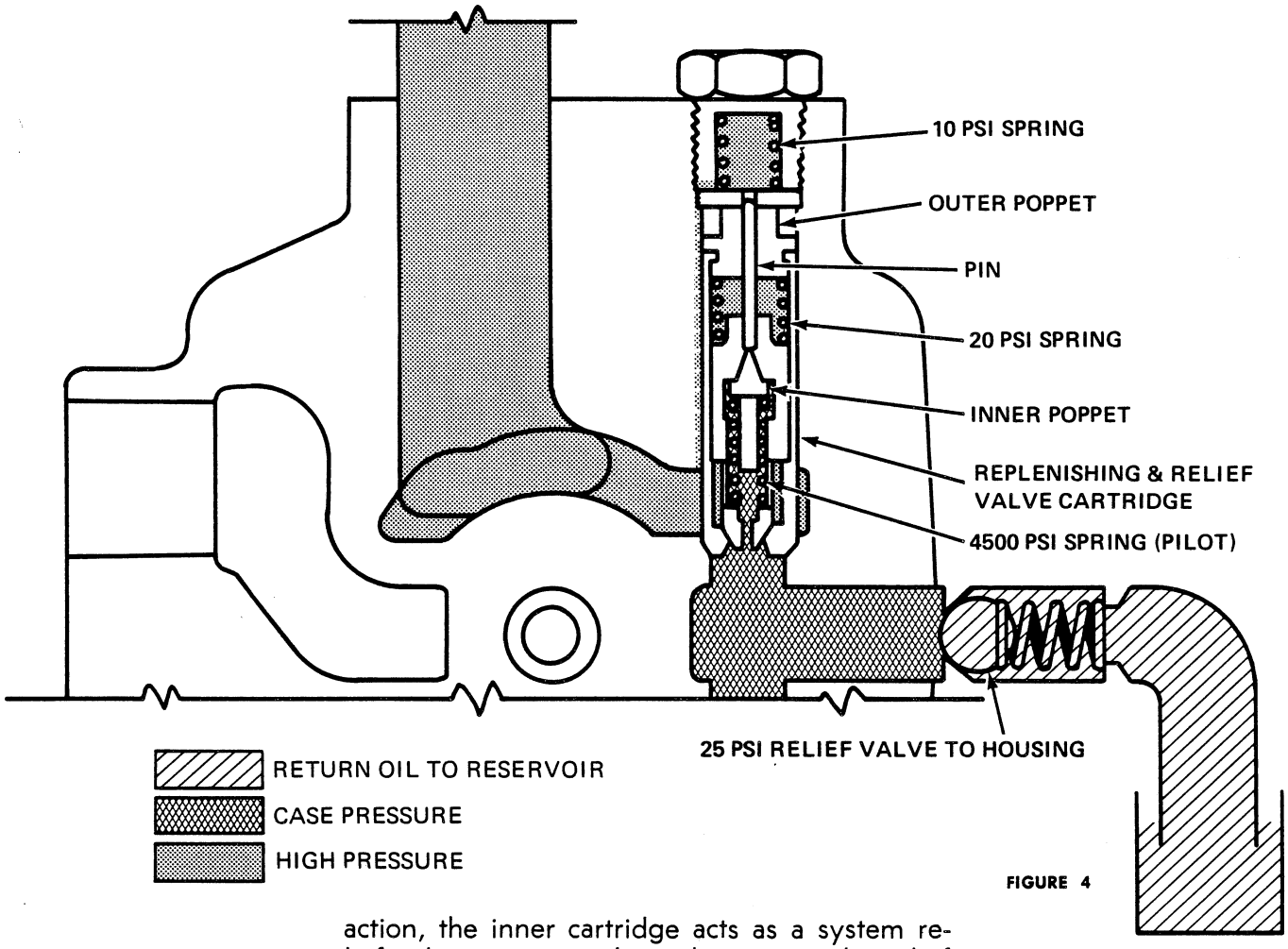

FIGURE 4

action, the inner cartridge acts as a system relief valve; one in each working port. The relief valve sub-assembly is contained in the replenishing check valve poppet, the poppet being made of hexagon stock. A hole through the poppet is subject to system pressure.

Oil under pressure is free to pass along the hexagon flats, through the cap around the restriction pin, where it acts on the exposed area of the internal poppet. When the pressure setting of the spring is exceeded the poppet is unseated, allowing oil to pass through the orifice in the end of the plunger. Oil passes out of this chamber faster than it can enter around the pin, thus creating a pressure drop greater than the valve of spring #2.

The plunger moves off its seat, allowing oil to pass out of hole "A" into the replenishing pump circuit; this is stage two. Thus we have a two stage or pilot operated relief valve. Note that the relief valve cartridge is pretested and preset and cannot be adjusted in the field.

Hydrostatic traction drives are designed for wheel spinout or slippage under normal conditions. Relief valve action is intended to take care of resulting momentary pressure surges. Pumping over the relief valve for more than 5 seconds could lead to overheating and transmission damage.

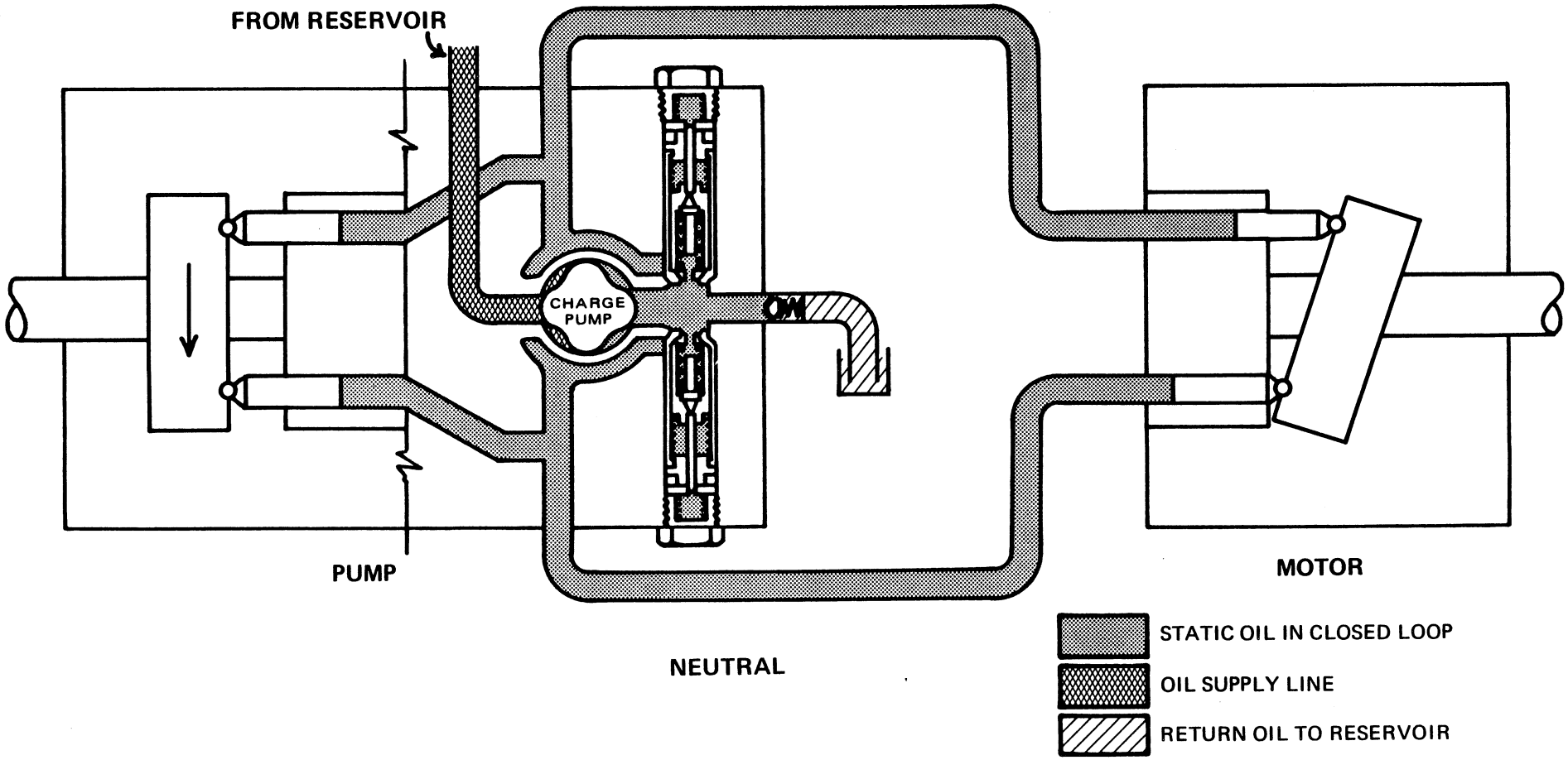
FROM RESERVOIR
CHARGE PUMP
PUMP
MOTOR
NEUTRAL
STATIC OIL IN CLOSED LOOP
OIL SUPPLY LINE
RETURN OIL TO RESERVOIR

FIGURE 5

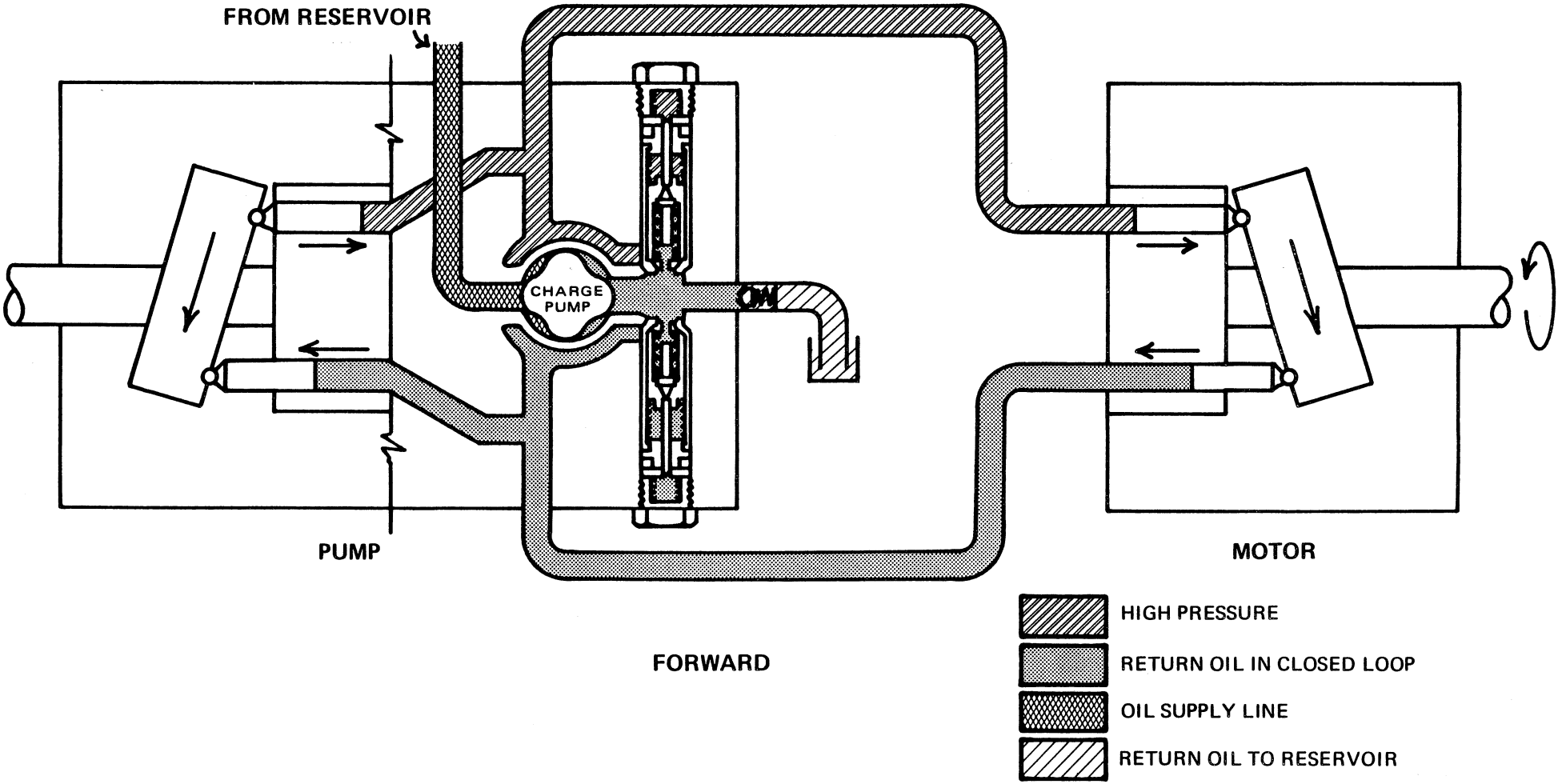

FIGURE 6

Oil from the pump enters one of the working ports of the motor, passes through the inlet ports of the valve plate, and acts on the area of some of the pistons in the cylinder block. Other pistons are either blocked by the valve plate or are open to discharge. The output shaft turns when the piston shoe sub-assembly contacts the swash plate at an angle see Figures 6 and 7.

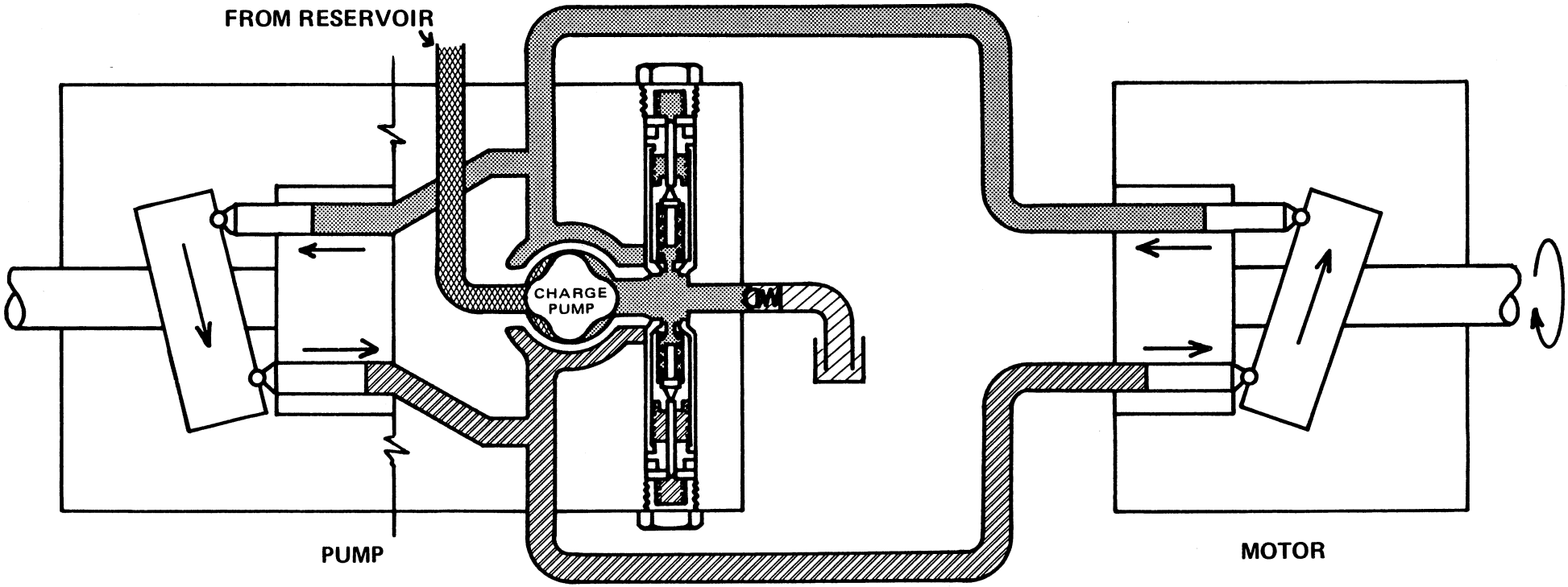
FROM RESERVOIR
CHARGE PUMP
PUMP
MOTOR
REVERSE
HIGH PRESSURE
RETURN OIL IN CLOSED LOOP
OIL SUPPLY LINE
RETURN OIL TO RESERVOIR

FIGURE 7

Hydraulic motor speed and torque can be varied. As in the pump, the yoke angle of the motor can be varied to change the displacement. The yoke angle is changed by moving a ever which is indirectly attached to the yoke.

At minimum stroke, the yoke angle is set at 8°. At maximum stroke, the yoke angle is set at 17½°. When the yoke is set for minimum stroke, the motor can reach maximum speed because there is less area in each piston bore for the pump to fill. There is, however, less torque at this time. When the yoke is set for maximum stroke, displacement is increased and we have maximum torque, but at a slower speed.

The system also includes a 25 micron filter to keep the oil clean, and a heat exchanger to dissipate heat.

Pump and motor case drain lines are piped directly to the reservoir and terminate below the fluid level.

INSTRUCTION FOR REMOVAL OF HYDROSTATIC PUMPS AND MOTORS FROM MODEL #909 SPEEDROWER

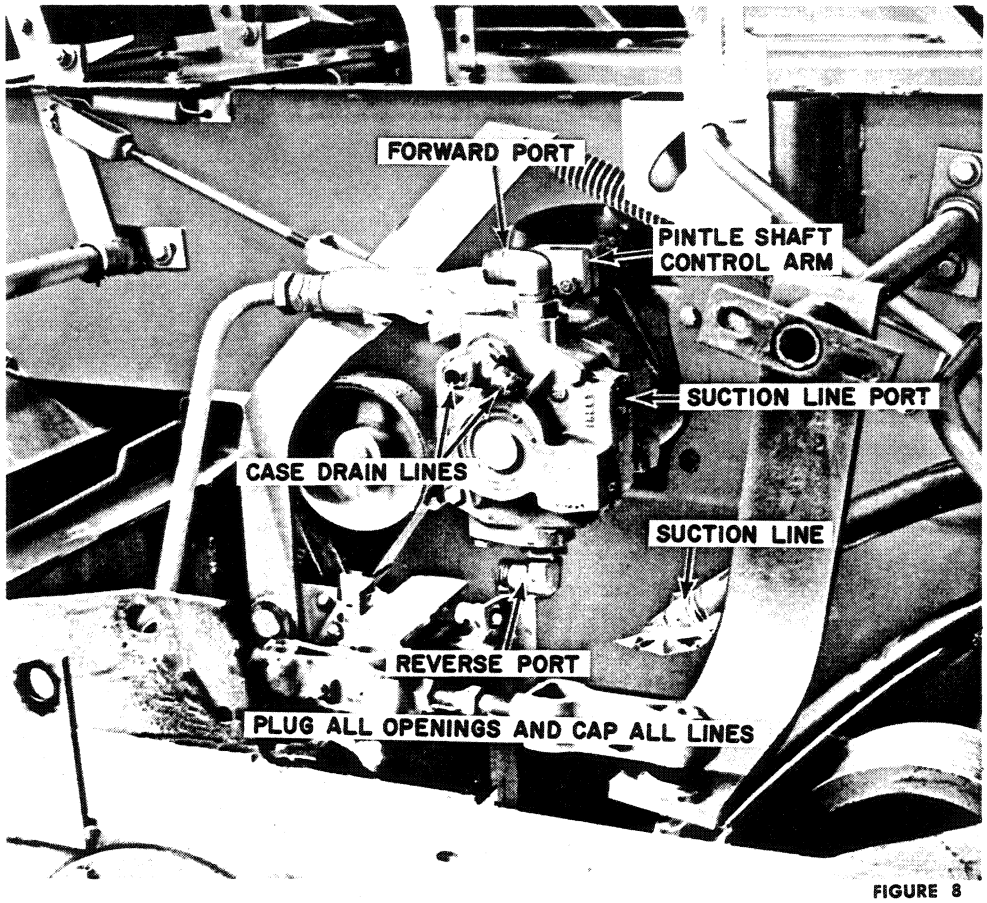

FIGURE 8

Thoroughly clean the area around the hydrostatic pump and motor to eliminate the possibility of foreign material entering an open line or port. Disconnect the pump section line at the pump to drain the hydraulic oil from the system, see Figure 8. After the system oil has drained from the suction line, wrap the end of the hose with a polyethylene bag and secure bag with a rubber band. Disconnect the forward and reverse line and the case drain line from the pump and wrap these lines with a polythylene bag and secure with a rubber band. This will prevent foreign material from entering the lines or hoses. Plug the openings in the pump with a plastic plug or tape the openings to prevent dirt from entering the pump.

Remove the pintle shaft control arm from the pintle shaft. It will be necessary to remove the brake mounting bolts on late model machines. Remove the two bolts which connect the pump to the support and pull the pump straight away from the drive shaft coupling, Figure 9.

Remove the case drain line from the motor and cap it with a polyethylene bag. Remove the forward and reverse lines and cap them with a polyethylene bag. Disconnect the pintle shaft control linkage at the ball and socket joint. Remove the two bolts which connect the motor to the bell housing and pull the motor straight away from the bell housing, see Figure 10. Plug all openings in the motor with plastic plugs or tape.

FIGURE 9

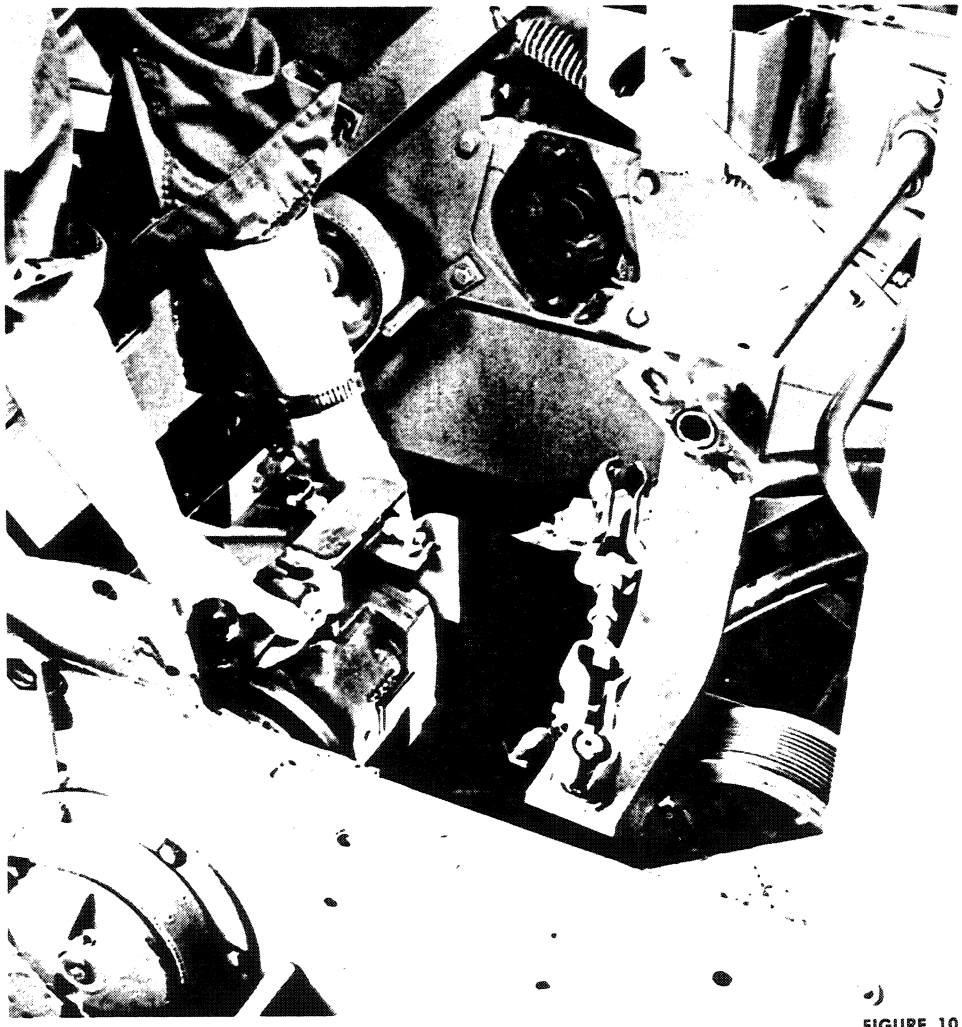

FIGURE 10