260-SERIES ELECTROHYDRAULIC LIFT SERVICE MANUAL

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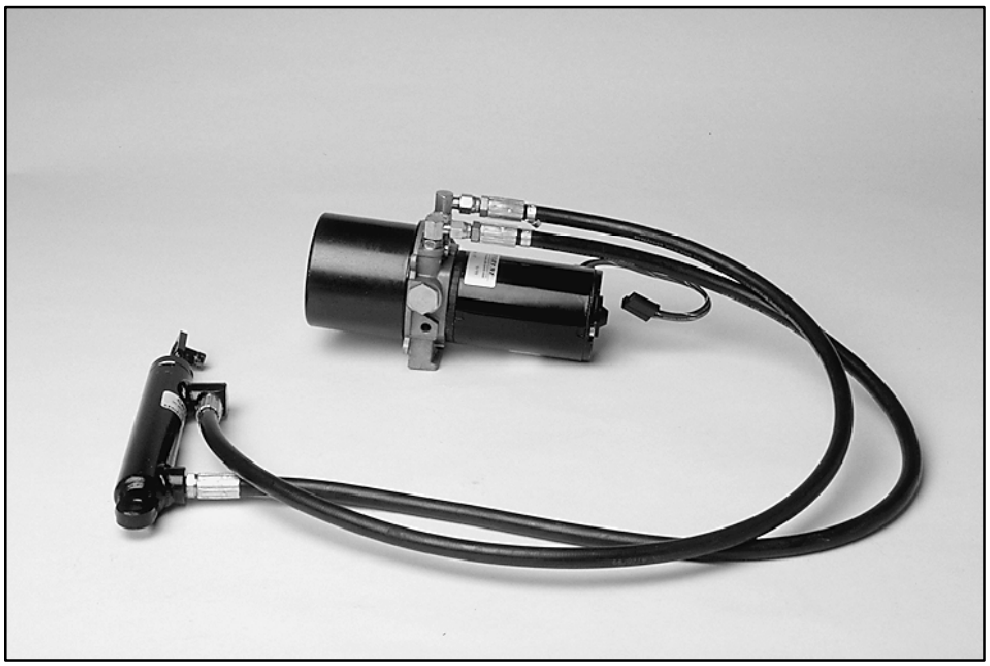
TORO®

260-Series Electrohydraulic Lift

SERVICE MANUAL



About This Manual

This manual was written expressly for 260-Series Hydrostatic Tractors equipped with an electrohydraulic lift system. The Toro Company has made every effort to make the information in this manual complete and correct.

This manual was written for the service technician; basic mechanical/electrical skills are assumed. The Contents page lists the systems and the related topics covered in this manual.

We hope that you will find this manual a valuable addition to your service shop. If you have any questions or comments regarding this manual, please contact us at the following address:

The Toro Company
Consumer Service Training Department
8111 Lyndale Avenue South
Bloomington, MN 55420–1196

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The Toro Company reserves the right to change product specifications or this manual without notice.

Contents

Safety Information

This symbol means WARNING or PERSONAL SAFETY INSTRUCTION—read the instruction because it has to do with your safety. Failure to comply with the instruction may result in personal injury or even death.

This manual is intended as a service and repair manual only. The safety instructions provided herein are for troubleshooting, service, and repair of the electrohydraulic lift system available with 260-Series hydrostatic tractors. The tractor and attachment operator's manuals contain safety information and operating tips for safe operating practices. Operator's manuals are available through your local Toro distributor or:

The Toro Company
Publications Department
8111 Lyndale Avenue South
Bloomington, MN 55420–1196

Think Safety First

Avoid unexpected starting of engine...

Always turn off the engine and disconnect the spark plug wire(s) before cleaning, adjusting, or repair.

Avoid injury from high pressure oil...

Keep body and hands away from pin hole leaks or nozzles that eject high pressure oil. Use cardboard or paper to locate hydraulic leaks. Oil escaping under high pressure can penetrate the skin and cause injury. Oil accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.

Avoid laceration and amputations...

Stay clear of all moving parts whenever the engine is running. Treat all normally moving parts as if they were moving whenever the engine is running or has the potential to start.

Avoid burns...

Do not touch the engine, muffler, or other components which may increase in temperature during operation, while the unit is running or shortly after it has been running.

Avoid fires and explosions...

Avoid spilling fuel and never smoke while working with any type of fuel or lubricant. Wipe up any spilled fuel or oil immediately. Never remove the fuel cap or add fuel when the engine is running. Always use approved, labeled containers for storing or transporting fuel and lubricants.

Avoid asphyxiation...

Never operate an engine in a confined area without proper ventilation.

Avoid injury from batteries...

Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes, and clothing. Battery gases can explode. Keep cigarettes, sparks, and flames away from the battery.

Avoid injury due to inferior parts...

Use only original equipment parts to ensure that important safety criteria are met.

Avoid injury to bystanders...

Always clear the area of bystanders before starting or testing powered equipment.

Avoid injury due to projectiles...

Always clear the area of sticks, rocks, or any other debris that could be picked up and thrown by the powered equipment.

Avoid modifications...

Never alter or modify any part unless it is a factory approved procedure.

Avoid unsafe operation...

Always test the safety interlock system after making adjustments or repairs on the machine.

Lift System

Components

The electrohydraulic lift system consists of the following components:

- Control Switch and Wire Harness

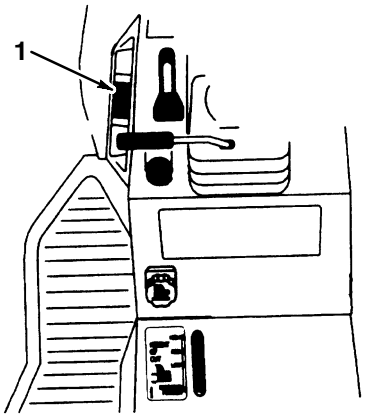

Figure 1

1. Control switch and wire harness

- Reservoir/Pump Assembly

  Oildyne 108 series Power Unit model 108AE19–AL–1HT

  Hydraulic Fluid – Dexron II or Dexron III

  Capacity – 12.5 oz. (.4 liter), not including hoses or cylinder.

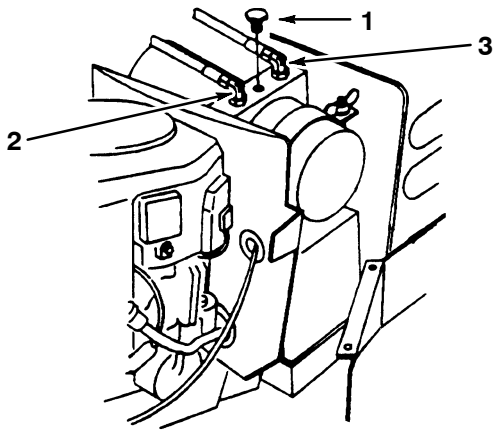

Figure 2

1. Filler plug/vent
2. Hose to rear of lift cylinder (Raise)
3. Hose to front of lift cylinder (Lower)

- Hydraulic Cylinder, Hoses, and Linkage

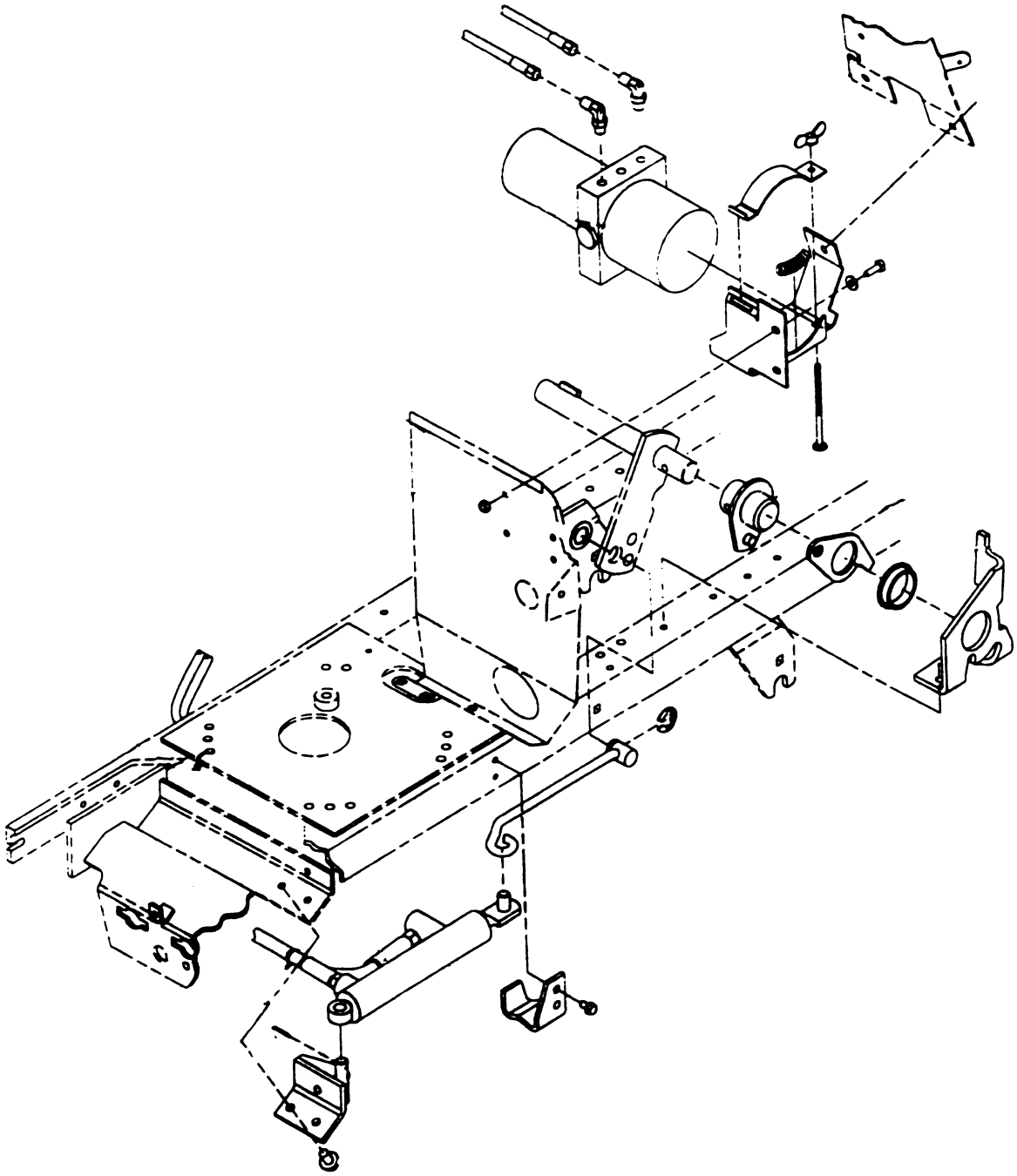

Figure 3

Pump Assembly Components

108 Series Power Unit Components

Item Number	Description	Quantity
1	Motor Mounting Stud	2
2	Motor	1
3	Coupling	1
4	O ring	1
5	Adapter	1
6	¼″ Steel Ball	3
7	Spool	1
8	Check Valve Body	2
9	Poppet Assembly	2
10	Spring	2
11	Hex Plug	2
12	3/16″ Ball	2
13	Eyelet	4
14	Spring	4
15	Thermal Relief	2
16	Shaft Seal	1
17	O ring	2
18	Pump	1
19	#10–32 UNF 1 5/16″ Torx Head Screw	2
20	Filter	2
21	Reservoir Seal	1
22	Reservoir	1
23	#10–32 X 1″ Hex Head Screw	1
24	O ring	1
25	3/16″ Steel Ball	1
26	7/16″–20 Jam Nut	2
27	Relief Valve Adjust Screw	2

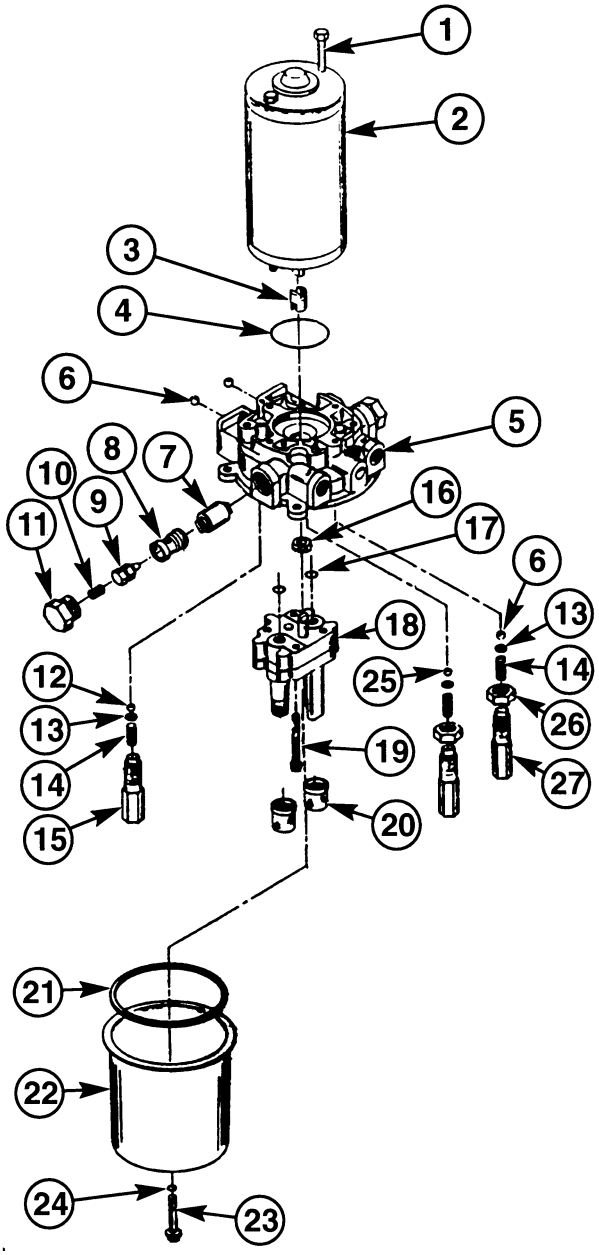

Figure 4

Operation

When the top half of the control switch is depressed, the pump is activated, sending oil from the pump to the base end of the cylinder. This retracts the cylinder and raises the lift linkage.

When the bottom half of the control switch is depressed, the pump is activated, sending oil from the pump to the rod end of the cylinder. This extends the cylinder and lowers the lift linkage.

Note: The Dial-A-Height linkage controls the mower's cutting height by limiting the travel of the lift linkage.

Pump/Valve Description

The pump is a gear type. It is driven in either a clockwise or counterclockwise rotation by an electric motor. Pump output is rated at 0.23 gallons per minute (0.9 liters per minute) at 500 psi (34 bar).

Two pressure relief valves protect the pump from overload. The "UP" mode is rated at 1000 psi (68 bar). The "DOWN" mode is rated at 400 psi (27.2 bar).

The thermal relief valves are set approximately 500 psi (34 bar) higher than the circuit relief valves. The thermal relief valves will bleed off excess pressure that builds up due to heat expansion of the oil when the pump is not being used.

Note: Thermal relief valves are not adjustable.

Pump/Valve Components

The pump/valve consists of the components shown in Fig. 5 (pump shown with reservoir removed).

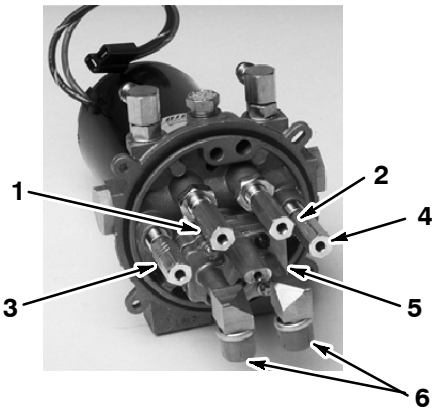

Figure 5

1. "UP" relief valve
2. "Down" relief valve
3. "UP" thermal relief valve
4. "DOWN" thermal relief valve
5. Pump
6. Filter screens

Adapter Block Components (as viewed from motor end)

The adapter housing encloses the components shown in Fig. 6.

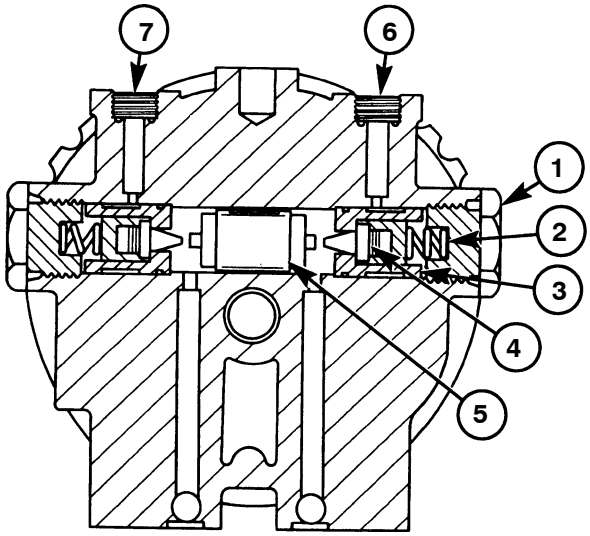

Figure 6

1. Hex cap
2. Spring
3. Check valve body
4. Check valve and poppet
5. Spool
6. High pressure port (Raise)
7. Low pressure port (Lower)

Oil Flow and Check Valve Operation (as viewed from motor end)

Pump in Neutral Mode

In neutral, the unit is at rest with the static oil in both ports. The check valves are seated against the check valve bodies. Because the pump is not rotating, there is no oil flow.

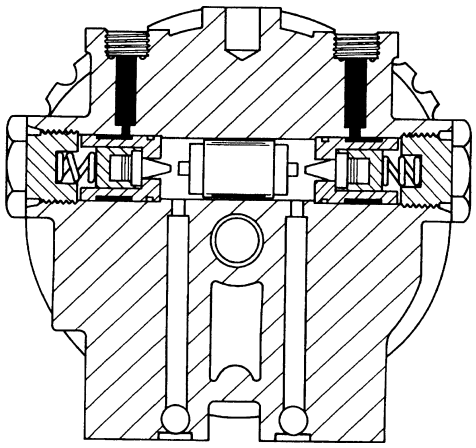

Figure 7

Pump in Raise Mode

With the lift switch held in the “RAISE” position, oil is directed to the high-pressure side of the adapter housing. Hydraulic pressure moves the spool, which unseats the low-pressure check valve. Since the low pressure check valve is unseated, oil from the unpressurized end of the lift cylinder is free to return to the pump reservoir.

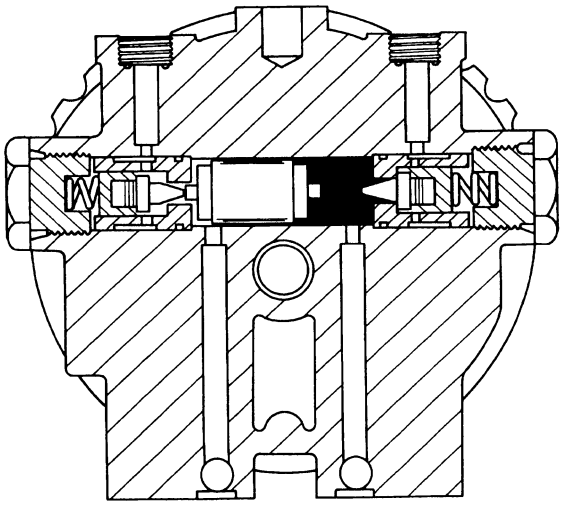

Figure 8

Hydraulic pressure also unseats the high-pressure check valve, allowing oil to flow through the high-pressure port to the cylinder, the cylinder rod retracts, raising the lift linkage.

When the lift switch is released, the pump stops rotating, the spool moves back to its centered position, and both check valves are reseated.

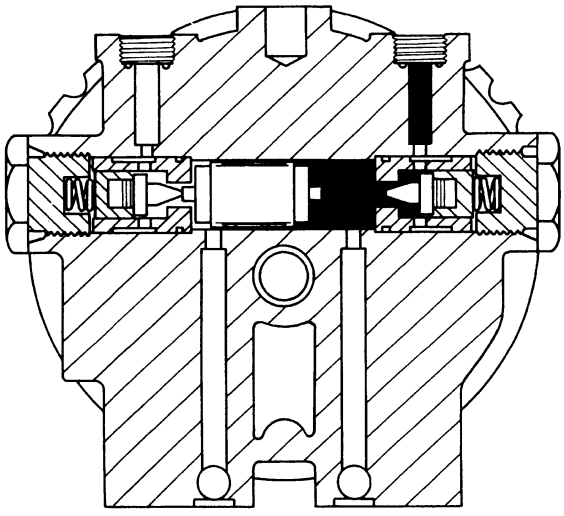

Figure 9

Pump in Lower Mode

With the lift switch held in the “LOWER” position, oil is directed to the low-pressure side of the adapter housing. Hydraulic pressure moves the spool, which unseats the high-pressure check valve. Oil from the unpressurized end of the lift cylinder is then free to return to the pump reservoir.

When the low-pressure check valve becomes unseated, oil flows through the low-pressure port from the pump to the cylinder, extending the cylinder rod and lowering the lift linkage.

When the lift switch is released, the pump stops rotating, the spool moves back to its centered position, and both check valves are reseated.

Relief Valve Testing (pump as viewed from reservoir end)

Up Mode

Remove the hose on the left side of the pump housing and install a 2000 psi (136 bar) gauge to the pump fitting.

Note: Fitting size is 7/16–20 37° flare.

Turn the key switch to the “RUN” position.

Place the lift switch in the “UP” position until the maximum pressure reading is obtained.

Record the pressure gauge reading.

Pressure reading should be 1000 psi (68 bar) ± 100 psi (6.8 bar).

Figure 10

Relief Valve Removal/Adjustment Procedure

If the pressure reading is not within specified limits, remove the relief valve located inside the reservoir (“1”, Fig. 5).

Note: Count and record the number of turns the valve body rotates as it is removed from the housing.

Inspect the relief valve ball and seat for any damage. Clean parts with solvent and then reassemble.

Replace the relief valve body into the housing using the same number of turns that were counted during removal.

Adjust the relief valve by loosening the jam nut and rotating the valve body clockwise to increase pressure or counterclockwise to decrease pressure. Tighten the jam nut after adjustment is completed.

If pressure remains low, the thermal relief valve may be leaking (“3”, Fig. 5).

Down Mode

Remove the hose on the right side of the pump housing and install a 1000 psi (68 bar) gauge to pump fitting.

Note: Fitting size is 7/16–20 37° flare.

Turn the key switch to the “RUN” position.

Place the lift switch in the “DOWN” position until the maximum pressure reading is obtained.

Record the pressure gauge reading.

Pressure reading should be 400 psi (27.2 bar) ± 100 psi (6.8 bar).

Relief Valve Removal/Adjustment Procedure

Follow the same removal/adjustment procedure as outlined in the previous section on Relief Valve Testing in the Up Mode (Valve “2”, Fig. 5). If pressure remains low, the thermal relief valve may be leaking (“4”, Fig. 5).

Pump Flow Testing (pump as viewed from reservoir end)

Note: Ambient temperature should be at least 70°F (39°C) when conducting this test.

Remove one of the hoses connected to the pump outlet fittings and place the end of the hose into a container.

Turn the key switch to the “RUN” position.

Place the lift switch in the “UP” position if the hose from the left side of the pump was removed (as in shown in the figure). Place the lift switch in the “DOWN” position if the hose was removed from the right side of the pump.

Activate the pump for 10 SECONDS ONLY.

IMPORTANT: Do not operate the pump for more than 10 seconds while the hose is removed. Longer operating times may pump the reservoir dry and result in pump damage. Be sure to refill the reservoir after testing.

Pump output should be 8 oz. (.2 liters) of oil in 10 seconds of operating time.

Note: Ambient temperatures less than 70°F (39°C) may result in less pump flow.

If test results show that less then 8 oz. (.2 liters) of oil are being pumped after 10 seconds of operating time:

- Check battery voltage for low charge.
- Check the fluid level in the reservoir.
- Check the pump’s internal parts for wear.
- Check the condition of the oil in the reservoir.

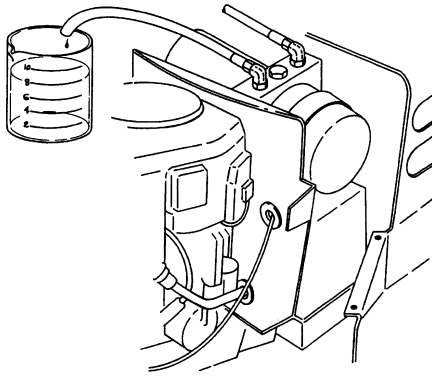

Figure 11

Checking Fluid Level

1. Raise attachment lift to the full “UP” position.
2. Disengage the power take off (PTO), set the parking brake, and turn the ignition key to “OFF” to stop the engine. Remove the key.
3. Open the hood.
4. Remove the plug on top of the power lift pump (Fig. 12). Fluid should be level with the bottom of the hole.
5. If the fluid is below the bottom of the hole fill with Dexron Type II or Type III automatic transmission fluid.

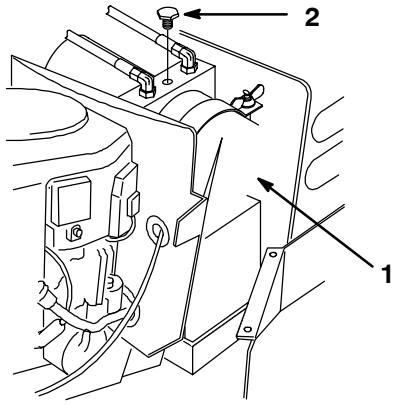

Figure 12

1. Power lift pump
2. Plug

Lift Cylinder Servicing

Description

The lift cylinder is a double acting cylinder measuring 1″ (25.4mm) in diameter. It is serviceable with Seal Kit 94–9723.

Rebuild Procedures

Disassembly

Clamp the cylinder in a vise.

IMPORTANT: Use wood blocks to prevent damage to the cylinder tube.

Using a spanner wrench, rotate the cylinder head counterclockwise to remove it from the cylinder tube.

With the cylinder head removed from the cylinder tube, pull the cylinder rod assembly from the tube.

IMPORTANT: Use care when removing the cylinder rod assembly to prevent damage to the seals on the cylinder tube threads.

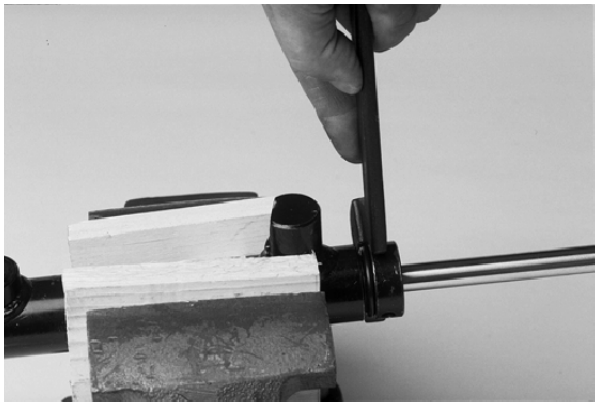

Figure 13

Remove the locknut from the end of the rod.

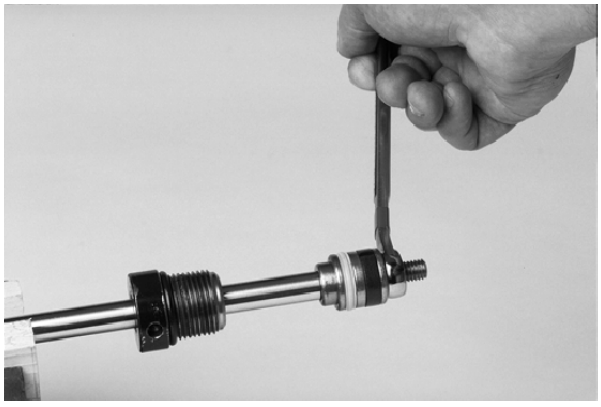

Figure 14

Grease the rod threads to protect the O rings and remove the piston and cylinder head from the rod.

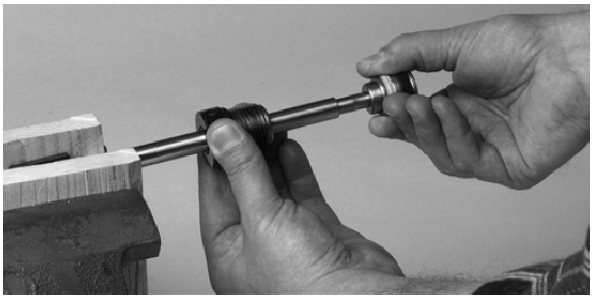

Figure 15

Remove the seals from the piston.

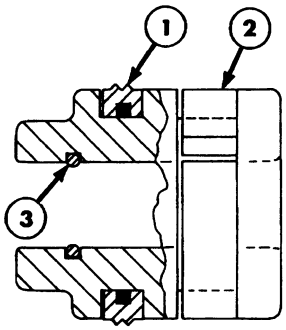

Figure 16

1. Piston seal
2. Wear band
3. O ring

Remove the seals from the cylinder head.

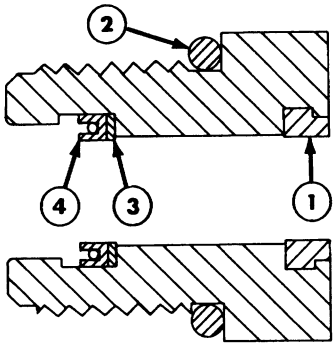

Figure 17

1. Wiper seal
2. O ring
3. Backup washer
4. Polypack seal

Reassembly

Cylinder Head

Insert the wiper seal, 1, into the cylinder head with seal lip facing outside (Fig. 17).

Place the O ring, 2, on the outside diameter of the cylinder head.

Install the backup washer, 3, into the groove, then insert the polypack seal, 4, into the groove.

Note: The polypack seal contains an O ring. This O ring faces away from the backup washer. Make sure that the polypack seal rests squarely in the groove and is not twisted.

Piston

Note: Warm piston seals in warm oil to make them more pliable.

Install piston seal, 1, in front groove of the piston.

Note: The piston seal contains an O ring.

Place the wear ring in the piston's rear groove, 2.

Install the O ring, 3, in the inside groove of the piston.

Note: Coat rod and cylinder threads with grease or petroleum jelly to protect O rings and seals during assembly.

Place the cylinder head and piston on the rod, then tighten the locknut on the end of the rod to 20–25 ft. lbs. (27–34N•m) torque.

Inspect the inside of the cylinder tube for any wear or sharp spots. Smooth bore if necessary, then insert the rod assembly.

Using Dexron II or Dexron III oil, lubricate the piston seals and the seals found inside the rod.

Insert the rod assembly into the cylinder tube, using care to prevent damage to the seals.

Replace the cylinder head into the tube and tighten until the cylinder head is seated against the tube.

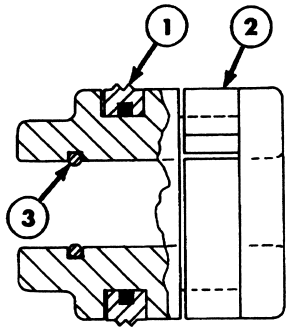

Figure 18

Lift System Electrical Components

The main components of the lift's electrical system are listed below, along with their functions:

- 25 amp Fuse – protects the system
- Latching Relay – directs current to the control switch
- Control Switch – directs current to the pump's electric motor
- Electric Pump Motor – rotates the hydraulic pump

Wiring Diagrams

Lift Electrical System De-energized

With the tractor key switch in the “OFF” position, voltage is present at the 25–amp fuse and terminal 30 of the relay.

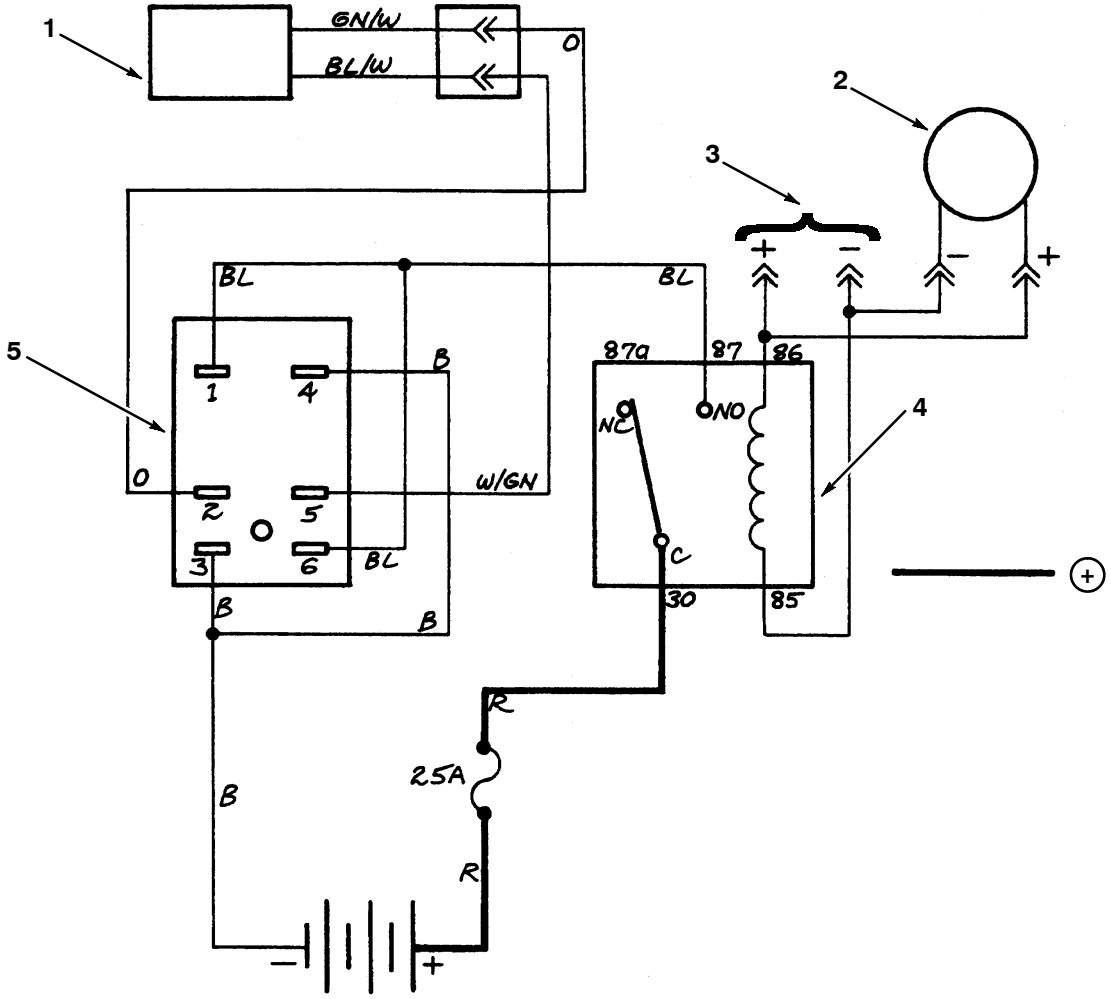

Figure 19

1. Pump motor
2. Hour meter
3. Main harness connection
4. Power lift relay
5. Lift switch

Color codes:

GN/W – Green/White
BL/W – Blue/White
W/GN – White/Green
B – Black
R – Red
BL – Blue
O – Orange

Lift Electrical System Energized

With the tractor key switch in the “RUN” position, the relay coil is energized (terminals 86/85), and terminals 30 and 87 are connected. Voltage is then present at terminals 1 and 6 of the lift switch.

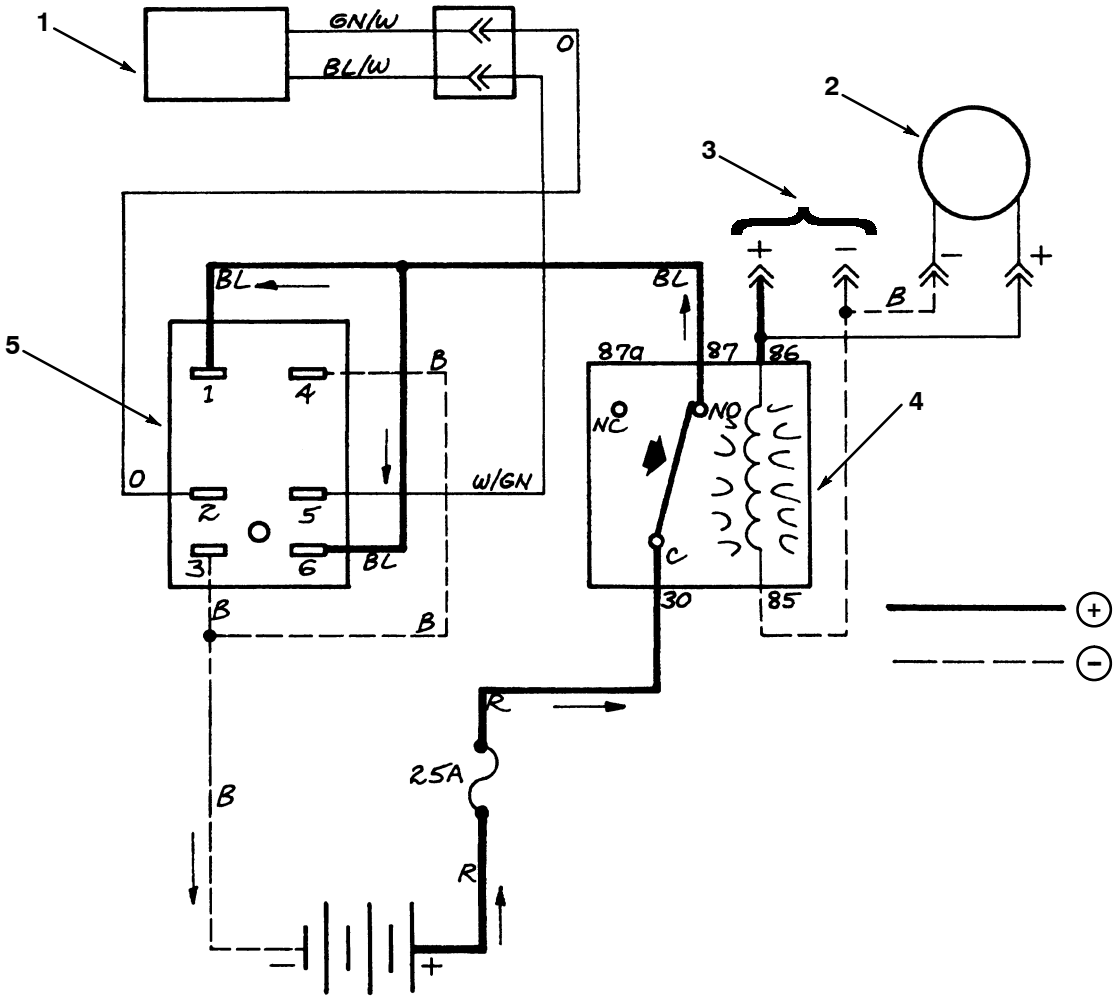

Figure 20

1. Pump motor
2. Hour meter
3. Main harness connection
4. Power lift relay
5. Lift switch

Color codes:

GN/W – Green/White
BL/W – Blue/White
W/GN – White/Green
B – Black
R – Red
BL – Blue
O – Orange

Lift Switch Current Flow

Up Position

With the lift switch in the “UP position, current is transferred from terminal 6 to terminal 5. From terminal 5, current flows to the white/green wire connected to the electric motor of the hydraulic pump. The ground circuit is between terminals 3 and 2 and the orange wire connected to the electric motor of the hydraulic pump.

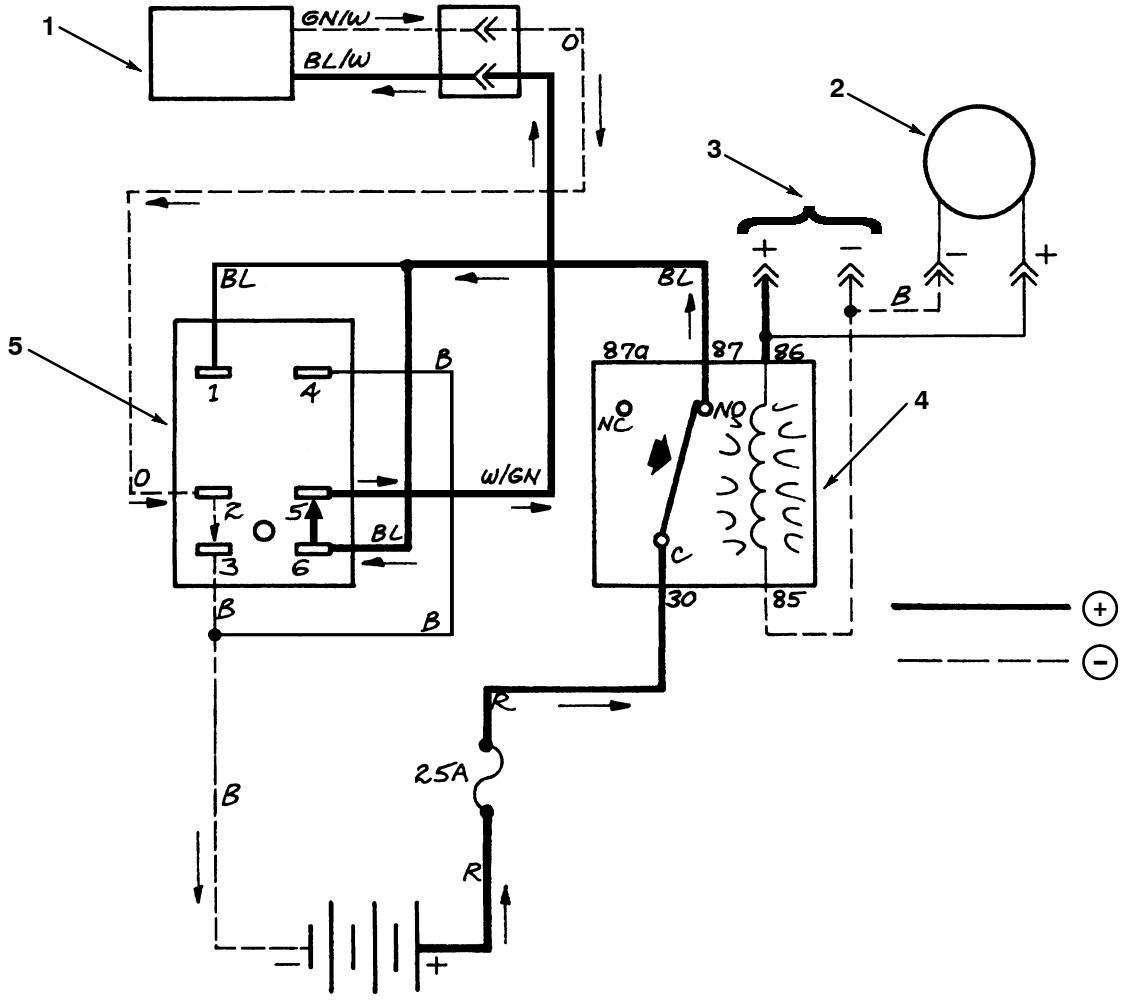

Figure 21

1. Pump motor
2. Hour meter
3. Main harness connection
4. Power lift relay
5. Lift switch

Color codes:

GN/W – Green/White
BL/W – Blue/White
W/GN – White/Green
B – Black
R – Red
BL – Blue
O – Orange

Down Position

With the lift switch in the “DOWN” position, current is transferred from terminal 1 to terminal 2. From terminal 2, current flows to the orange wire connected to the electric motor of the hydraulic pump. The ground circuit is between terminals 4 and 5 and the white/green wire connected to the electric motor of the hydraulic pump.

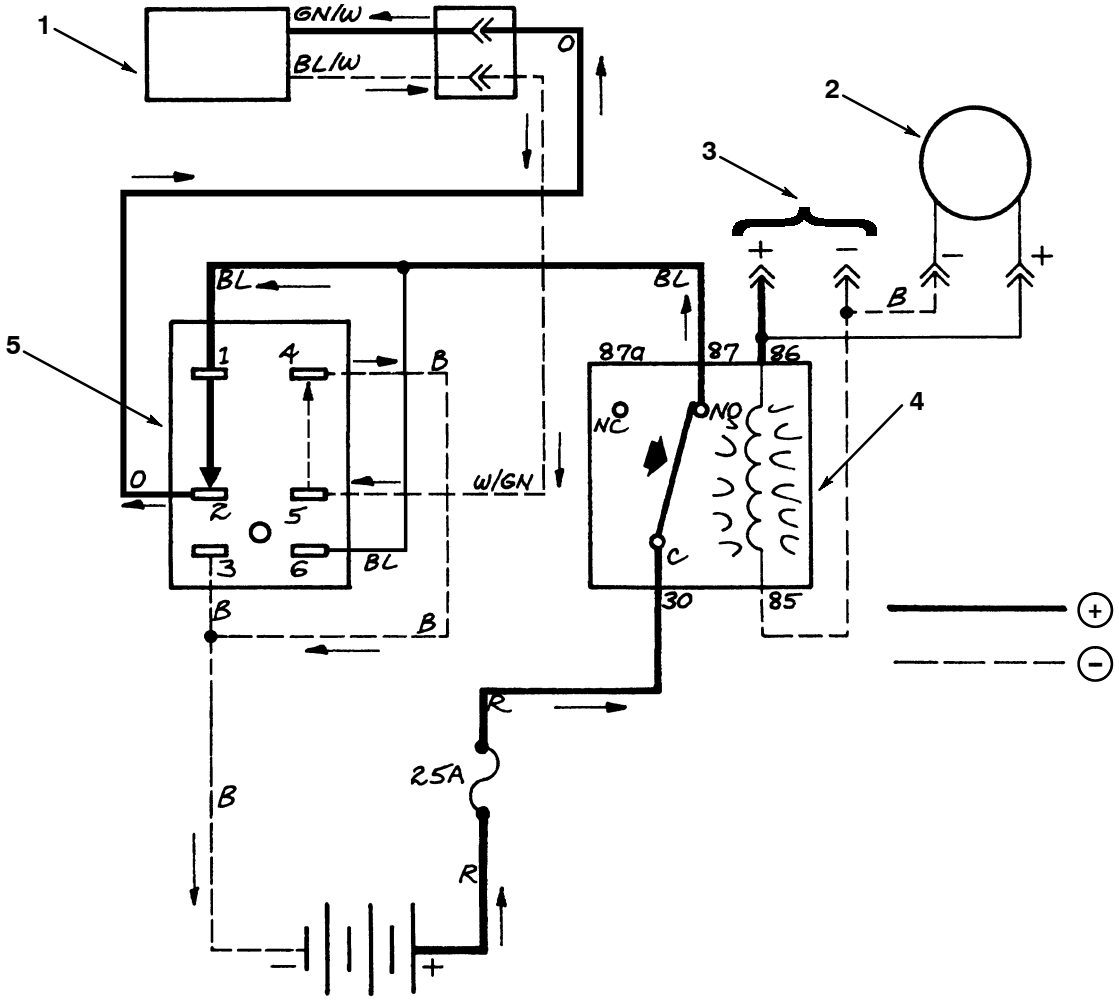

Figure 22

1. Pump motor
2. Hour meter
3. Main harness connection
4. Power lift relay
5. Lift switch

Color codes:

GN/W – Green/White
BL/W – Blue/White
W/GN – White/Green
B – Black
R – Red
BL – Blue
O – Orange