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EMERGENCY PUMP (24 Volt)

To release spring applied hydraulic brakes if machine’s engine/hydraulics are disabled:

1. Verify that the Work Head Lift, Work Head Rotate, Guide Roller, and Turntable Cylinders are raised all the way up and in the LOCK UP position. If not, see the emergency pump procedure section for those components.
2. Turn the ignition switch to the OFF position.
3. Chock wheels
4. If machine is to be towed a long distance remove both propel motor drive chains.
5. Install tow bar between the machine and towing vehicle.
6. Attach one end of the hose (found in tool box) to the pressure tap of the emergency pump (Figure 1 or 2).
7. Attach the other end of the hose to brake valve pressure tap (Figure 3).
8. Close the brake shut off valve (Closed is perpendicular to the hose line).
9. Turn the main pump ball valve to closed position (Figure 4) (Indicator line on ball valve off) will be perpendicular to flow in the pressure.
10. Pressurize the hydraulic system by turning on the emergency pump with switch located in electrical box located on frame between the hydraulic tank and the fuel tank (Figure 4).

OPERATE EMERGENCY PUMP IN INTERVALS, FOR A MAXIMUM OF 15 SECONDS AT A TIME.

THE EMERGENCY PUMP IS DESIGNED FOR EMERGENCY USE ONLY AND IS NOT TO BE RUN CONTINUOUSLY.

11. When both brake cylinders are fully retracted install brake lock pins (1) and hair pins (2) on both brake assemblies (Figure 5).
12. Turn off emergency pump, and remove wheel chocks and perform towing or repairs as required.

13. Once you have towed to a site to perform maintenance on the hydraulic system, open the brake ball valve (closed under step 8) and lock the valve in the OPEN position.
14. Remove hose, lock and hair pins and return to tool box. Open the main pump ball valve (Figure 7) (Indicator line on shut off) will be in line to flow.

EXERCISE CAUTION WHEN TOWING MACHINERY & ALLOW EXTRA STOPPING DISTANCE WHEN TOWING THIS MACHINE.

REDUCE SPEED ACCORDINGLY AS DICTATED BY WEATHER OR TRACK CONDITIONS.

![Standard 24V Emergency Pump Pressure Tap](image1.png)
Figure 2

BNSF 24V Emergency Pump Pressure Tap

Figure 3

Brake Shut Off Shown in OPEN position

Figure 4

Brake Valve Pressure Tap

Figure 5

Emergency Pump Switch

Figure 6

Brake Valve Pressure Tap

Figure 7

Pump Ball Shut Off Valve Shown in Open Position
THE FOLLOWING PROCEDURES WILL REQUIRE TWO OR MORE PERSONS TO COMPLETE.

1. To raise Work Head Lift cylinder if machine’s engine/hydraulics are disabled:
   a. Turn the ignition switch to the OFF position.
   b. Attach one end of the hose (found in tool box) to the pressure tap of the emergency pump (Figure 1 or 2).
   c. Attach the other end of the hose to the Main System Pressure tap (Figure 6).
   d. Turn the main pump ball valve to closed position (Figure 4) (Indicator line on ball valve off) will be perpendicular to flow in the pressure.
   e. Turn the ignition switch to the ON position.
   f. At the Main Control Panel (in cab) POWER LOCKUPS.
   g. Push the Work Head Lift Unlock/Lock Switch to the left (UNLOCK POSITION) (Figure 7).
   h. Pressurize the hydraulic system by turning on the emergency pump with switch located in electrical box located on frame between the hydraulic tank and the fuel tank (Figure 4).

2. To raise Work Head Rotate cylinders if machine’s engine/hydraulics are disabled:
   a. Turn the ignition switch to the OFF position.
   b. Attach one end of the hose (found in tool box) to the pressure tap of the emergency pump (Figure 1 or 2).
   c. Attach the other end of the hose to the Main System Pressure tap (Figure 6).
   d. Turn the main pump ball valve to closed position (Figure 4) (Indicator line on ball valve off) will be perpendicular to flow in the pressure.
   e. Turn the ignition switch to the ON position.
   f. At the Main Control Panel (in cab) POWER LOCKUPS (Figure 7).
   g. Push the Work Head Rotation Unlock/Lock Switch to the left (UNLOCK POSITION) (Figure 7).
   h. Pressurize the hydraulic system by turning on the emergency pump with switch located in electrical box located on frame between the hydraulic tank and the fuel tank (Figure 4).

OPERATE EMERGENCY PUMP IN INTERVALS, FOR A MAXIMUM OF 15 SECONDS AT A TIME.

THE EMERGENCY PUMP IS DESIGNED FOR EMERGENCY USE ONLY AND IS NOT TO BE RUN CONTINUOUSLY.

i. At the same time located at either the Main Control Panel or the Work Head Control Box (Figure 8-9). Momentarily hold the Work Head UP switch to raise the work head up to the lock up position.
   j. Push the Work Head Lift Unlock/Lock Switch to the right (LOCK POSITION) and verify that Work head is fully raised and locked up.
   k. Open the main pump ball valve (Figure 7) (Indicator line on shut off) will be in line to flow. Return hose to tool box.
3. To raise Guide Roller cylinders if machine's engine/hydraulics are disabled:
   a. Turn the ignition switch to the OFF position.
   b. Attach one end of the hose (found in tool box) to the pressure tap of the emergency pump (Figure 1 or 2).
   c. Attach the other end of the hose to the Main System Pressure tap (Figure 6).
   d. Turn the main pump ball valve to closed position (Figure 4) (Indicator line on ball valve off) will be perpendicular to flow in the pressure.
   e. Note: Do not turn ON the ignition switch. Guide Roller circuit has a two way solenoid valve and in the unenergized state, hydraulic oil will flow to the up side of the Guide Roller Cylinders.
   f. At the Main Control Panel (in cab) POWER LOCKUPS (Figure 7).
   g. Push the Guide Rollers Unlock/Lock Switch to the left (UNLOCK POSITION).
   h. Pressurize the hydraulic system by turning on the emergency pump with switch located in electrical box located on frame between the hydraulic tank and the fuel tank (Figure 4).

**CAUTION**

OPERATE EMERGENCY PUMP IN INTERVALS, FOR A MAXIMUM OF 15 SECONDS AT A TIME.
THE EMERGENCY PUMP IS DESIGNED FOR EMERGENCY USE ONLY AND IS NOT TO BE RUN CONTINUOUSLY.

h. After the Guide Roller Cylinders are raised to the lock up position, push the Guide Roller Lockup Switch to the right (LOCK POSITION). Verify that Work Head Rotate cylinders are fully raised and locked up.
i. Open the main pump ball valve (Figure 7) (Indicator line on shut off) will be in line to flow. Return hose to tool box.

4. To raise Turntable cylinders if machine’s engine/hydraulics are disabled:

a. Turn the ignition switch to the OFF position.
b. Attach one end of the hose (found in tool box) to the pressure tap of the emergency pump (Figure 1 or 2).
c. Attach the other end of the hose to the Main System Pressure tap (Figure 6).
d. Turn the main pump ball valve to closed position (Figure 4) (Indicator line on ball valve off) will be perpendicular to flow in the pressure.
e. At the Main Control Panel (in cab) POWER LOCKUPS (Figure 7).
f. Push the Turntable Unlock/Lock Switch to the left (UNLOCK POSITION).
g. NOTE: The Turntable Valve (Figure 10-11) has a locking pin & bracket that locks the turntable valve in the DOWN position. Hydraulic oil is directed to the retract side of the turntable cylinder in this position.
h. Pressurize the hydraulic system by turning on the emergency pump with switch located in electrical box located on frame between the hydraulic tank and the fuel tank (Figure 4).

CAUTION

OPERATE EMERGENCY PUMP IN INTERVALS, FOR A MAXIMUM OF 15 SECONDS AT A TIME.

THE EMERGENCY PUMP IS DESIGNED FOR EMERGENCY USE ONLY AND IS NOT TO BE RUN CONTINUOUSLY.
Turntable Directional Control Valve (Dual) Option

Figure 11
# HYDRAULIC COMPONENT SCHEDULE

<table>
<thead>
<tr>
<th>Item</th>
<th>10 Hours (Day)</th>
<th>50 Hours (Week)</th>
<th>150 Hours (Month)</th>
<th>500 Hours (3 Months)</th>
<th>2000 Hours (6 Months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic Oil Level</td>
<td>I/F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil Cleanliness</td>
<td>I</td>
<td></td>
<td></td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Check Hydraulic Oil Filter Indicators (option)</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Check hoses &amp; fittings for leaks</td>
<td>I</td>
<td>I*</td>
<td></td>
<td>I</td>
<td></td>
</tr>
<tr>
<td>Check top off filter indicator</td>
<td>I/R</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gauge (optional) while in use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil Cooler</td>
<td></td>
<td></td>
<td>CL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Checks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test hydraulic oil cleanliness</td>
<td></td>
<td></td>
<td></td>
<td>I/R</td>
<td></td>
</tr>
<tr>
<td>Replace pressure filter</td>
<td></td>
<td></td>
<td></td>
<td>I/R</td>
<td></td>
</tr>
<tr>
<td>Replace return filter</td>
<td></td>
<td></td>
<td></td>
<td>I/R</td>
<td></td>
</tr>
<tr>
<td>Replace case drain filter (option)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Replace tank breathers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain &amp; replace oil in hydraulic tank</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inspect suction strainer element</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Steam clean oil cooler</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key:**

A = Adjust  C = Change  CL = Clean  I = Inspect  
L = Lube  R = Replace  S = Service  T = Test  
F = Fill  

* Hydraulic filters require inspection during the first 40 hours of service and at designated intervals thereafter.  
  
Ω Monthly pressure checks are recommended. Fluctuation of hydraulic power may require more frequent checks.
## SERVICE PARTS

<table>
<thead>
<tr>
<th>Description</th>
<th>NORDCO Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filters (Non Nordco P/N in parentheses):</td>
<td></td>
</tr>
<tr>
<td>Suction Strainer (3879255)</td>
<td>3894255</td>
</tr>
<tr>
<td>Element</td>
<td></td>
</tr>
<tr>
<td>Gasket</td>
<td>35552965</td>
</tr>
<tr>
<td>Return Filter (3880323)</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>3894289</td>
</tr>
<tr>
<td>Pressure Switch</td>
<td>5193975</td>
</tr>
<tr>
<td>Gasket Kit (ALFT503)</td>
<td></td>
</tr>
<tr>
<td>Reservoir Breather</td>
<td>1673251</td>
</tr>
<tr>
<td>Element</td>
<td></td>
</tr>
<tr>
<td>Relief Valve</td>
<td>1677206</td>
</tr>
<tr>
<td>Pressure Filter (3880252)</td>
<td>3894289</td>
</tr>
<tr>
<td>Element</td>
<td></td>
</tr>
<tr>
<td>Case Drain Filter (3880353) (option)</td>
<td>3890145</td>
</tr>
<tr>
<td>Element</td>
<td></td>
</tr>
<tr>
<td>Reservoir Breather Filter</td>
<td>21880019</td>
</tr>
<tr>
<td>Reservoir Breather – Used with Dual Top Off Pump Assy – Silica Jell (BNSF option)</td>
<td>1673252</td>
</tr>
<tr>
<td>Breather</td>
<td></td>
</tr>
<tr>
<td>Dual Top-Off Pump Push-Pull (option) (96310020)</td>
<td>3894262</td>
</tr>
<tr>
<td>Element</td>
<td></td>
</tr>
<tr>
<td>Dual Top-Off w/Electric Pump (option) (3875040)</td>
<td>3894262</td>
</tr>
<tr>
<td>Element</td>
<td></td>
</tr>
<tr>
<td>Rotary Top-Off Pump Assy (option) (96310042)</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>(Zinga AE-10)</td>
</tr>
<tr>
<td>Single Filter Top-Off Pump Push-Pull (option) (96310145)</td>
<td></td>
</tr>
<tr>
<td>Element</td>
<td>(Zinga AE-10)</td>
</tr>
</tbody>
</table>
HYDRAULIC ADJUSTMENTS

GENERAL

Pressure to the various devices in the hydraulic system is controlled by the Compensator, Pressure Reducing Valves, Counterbalance Valves, and Relief Valves. It is important for the proper operation of the machine that pressures are maintained at the correct levels as shown below. Adjustments may also be necessary anytime the machine is not operating normally. Test and adjust pressure as shown on the following pages.

PRESSURE SETTINGS

Propulsion Manifold
- Main System Pressure (Pump Pressure Compensator) ................................................................. 2500 PSI
- Main Pressure Relief ................................................................. 3000 PSI
- Propel Cross Over Reliefs ........................................................ 2900 PSI

Work Head Manifold
- Guide Roller Pressure Reducing Valve ................................................................. 600 PSI
- Box Pressure Reducing Valve ................................................................. 1000 PSI
- Tool Flip Pressure Reducing Valve ................................................................. 1000 PSI

Work Head Feed Manifold
- L. H. Grip Pressure Reducing Valve ................................................................. 650 PSI
- R. H. Grip Pressure Reducing Valve ................................................................. 650 PSI

24 Volt Emergency Pump Relief Valve (BNSF) ................................................................. 1500 PSI
24 Volt Emergency Pump Relief Valve (CN) ................................................................. 2000 PSI

WARNING!

Always turn off machine when performing maintenance, making adjustments, or whenever unintended movement of machine could occur; unless directed otherwise. Failure to comply could result in personal injury and/or damage to the machine.
INSTRUCTION:

PROPULSION MANIFOLD

PUMP PRESSURE COMPENSATOR

Install a pressure gage at the pressure tap label (Main System Pressure) on the Propulsion Manifold (Figure 12).

Turn on pump, if pressure is higher than 2500 psi, loosen the set screw (Figure 13) and turn the pump pressure compensator adjusting plug (Figure 14) counterclockwise (CCW) until pressure reads 2500 psi. Tighten set screw.

If pressure is lower than 2500 psi, loosen the set screw and turn the pump pressure compensator adjusting plug clockwise (CW) until pressure reads 2500 psi. Tighten set screw.

If the pressure does not increase, the main system relief valve might require adjustment. The main system relief valve must be set to 3000 psi for proper operation.

Main System Relief

Install a hydraulic pressure gage at pressure tap label (Main System Pressure) on the Propulsion Manifold (Figure 12).

Remove protective cap and loosen adjusting screw lock nut on main relief valve adjusting screw (RVP) (Figure 15), then turn adjusting screw all the way in clockwise (CW).

Turn on pump, gage should read 2500 psi. To set and adjust main system relief you need to adjust pump pressure compensator pressure to 3000 psi (see procedure listed above).

With pump pressure compensator set to 3000 psi. Turn main pressure relief valve adjustment screw counterclockwise (CCW) until the diesel engine just begins to load up & the needle on the gage drops slightly, then turn back in clockwise (CW) a quarter of a turn. Tighten lock nut and install protective cap.

Return Pump Compensator back to 2500 psi. THIS IS SYSTEM PRESSURE!
Propel Cross Over Relief Setting 2900 Psi

**WARNING**

MAKE CERTAIN BRAKES ARE FULLY ENGAGED AND CAN HOLD MACHINE STATIONARY BEFORE CONTINUING WITH THESE ADJUSTMENTS. FAILURE TO DO SO MAY CAUSE SEVERE BODILY HARM

Turn Brake Shut –Off valve (Located on Work Head Manifold) to **CLOSED** position to disable brakes. Handle will be perpendicular to hose (Figure 18).

Install pressure gage on the Main System Pressure tap on the propulsion manifold (Figure 12) and on the pressure tap label RVB (forward propel) on the propulsion manifold (Figure 16).

Remove protective cap and loosen adjusting screw lock nut to both (RVA & RVB) crossover relief valve adjustments screws. Then turn both crossover relief valve adjustments screws to full clockwise (CW) position (maximum pressure) (Figure 16).

Loosen System Pressure Compensating Screw lock nut (Figure 13 & 14).

Start engine and turn on the Pump.

Turn pump compensator adjusting screw (Figure 14) clockwise (CW) until 2900 psi has been reached. Read this pressure at the Main System Pressure tap on the propulsion manifold (Figure 12).

Manually override the forward directional control valve (B) by pushing in the **push pin** (Figure 17) while adjusting (RVB) valve counterclockwise (CCW) until pressure at gauge just begins to drop. This is considered cracking pressure. Turn back 1/8 of a turn and tighten locknut. Turn off pump and engine.

Move pressure gage to the pressure tap label PVA (reverse propel) (Figure 16) on the propulsion manifold.

Start engine and turn on the Pump.

Manually override the reverse directional control valve (A) by pushing in the **push pin** (Figure 17) while adjusting (RVA) valve counterclockwise (CCW) until pressure at gauge just begins to drop. This is considered cracking pressure. Turn back 1/8 of a turn and tighten locknut.

Adjust pump compensator adjusting screw counterclockwise (CCW) to system operating pressure of 2500 psi (Figure 14). Tighten lock nut on adjusting screw.

Open Brake Shut-Off Valve
WORK HEAD MANIFOLD

Work Head Rotate Needle Valve

Controls the speed of the Work Head Rotate Cylinder. From fully extended to fully retracted should take approximately ½ second.

To reset to factory’s setting, turn on pump, loosen lock not (Figure 19) and turn flow adjusting screw clockwise (CW) all the way in. Then eight turns counterclockwise (CCW) back out and tighten lock nut. If further adjustment is needed turn counterclockwise (CCW) for more speed; turn clockwise (CW) to slow down Work Head Rotate cylinder speed.

Work Head Rotate Counterbalance Valve

Work head rotate cylinder should not drift down when the machine is shut down.

To reset factory’s initial setting, turn on pump, loosen lock not (Figure 20) and turn counterbalance valve adjusting screw clockwise (CW) all the way in. Then 1 ½ turns counterclockwise (CCW) back out. Tighten lock nut.

If more adjustment is needed, adjust in ¼ turn increments.
Work Head Lift Needle Valve

Controls the speed of the Work Head Lift Cylinder. From fully extended to fully retracted should take approximately 1 second.

Turn on pump and remove the slow speed valve din connector (Figure 21).

To reset factory's initial setting, turn on pump, loosen lock nut (Figure 22) and turn flow adjusting screw clockwise (CW) all the way in. Then 7 turns counterclockwise (CCW) back out and tighten lock nut. Turn counterclockwise (CCW) for more speed; turn clockwise (CW) to slow down work head rotate cylinder speed.

Reinstall the slow speed valve din connector.
**Work Head Lift Counterbalance Valve**

Work head lift cylinder should not drift down when the machine is shut down or when work head is rotated.

Turn on pump and place work head lift lock up switch in the unlock position.

To reset factory’s initial setting, turn on pump, loosen lock nut (Figure 23) and turn counterbalance valve adjusting screw clockwise (CW) all the way in. Then 3½ turns counterclockwise (CCW) back out. Tighten lock nut.

If more adjustment is needed, adjust in ¼ turn increments.

---

**Work Head Lift 2 Speed Lift Flow Control Valve**

The time to extend the work head lift cylinder is 1” in approximately 1 second.

Turn on pump and loosen the 2 speed lift flow control valve lock nut (Figure 24). Turn adjusting screw clockwise (CW) all the way in and then ¾ of a turn counterclockwise (CCW) out.

---

**Tool Flip Pressure Reducing Valve**

Install a pressure gage at pressure tap above (B7) Tool Flip Label on work head manifold (Figure 25).

Turn on pump, if pressure is higher than 1000 psi, remove protective cap (Figure 26), loosen lock nut from pressure reducing screw and turn adjusting screw counterclockwise (CCW) until pressure reads 1000 psi. Tighten lock nut and install protective cap.

If pressure is lower than 1000 psi, remove protective cap, loosen lock nut from pressure adjusting screw and turn adjusting screw clockwise (CW) until pressure reads 1000 psi. Tighten lock nut and install protective cap.
Box Pressure Reducing Valve 1000 PSI

Install a pressure gage pressure port above (B4) Box label on work head manifold (Figure 27).

Turn on pump, if pressure is higher than 1000 psi, remove protective cap (Figure 28) and loosen lock nut from pressure reducing screw. Turn the screw counterclockwise (CCW) until pressure reads 500 psi. Tighten lock nut and install protective cap.

If pressure is lower than 1000 psi, remove protective cap and loosen lock nut from pressure reducing screw. Turn the screw clockwise (CW) until pressure reads 500 psi. Tighten lock nut and install protective cap.

Guide Roller Pressure Reducing Valve 600 PSI

Install a pressure gage (0-1000 psi) pressure tap above (B3) Guide Roller label on work head manifold (Figure 27).

Turn on pump, if pressure is higher than 600 psi, remove protective cap (Figure 29) and loosen lock nut from pressure reducing screw. Turn the pressure reducing adjusting screw counterclockwise (CCW) until pressure reads 600 psi. Tighten lock nut and install protective cap.

If pressure is lower than 600 psi, remove protective cap and loosen lock nut from pressure reducing screw. Turn the pressure reducing adjusting screw clockwise (CW) until pressure reads 600 psi. Tighten lock nut and install protective cap.
Bulk Loader Flow Control Valve

Controls speed of pusher ram cylinder as it extends.

Turn on pump and loosen bulk loader flow control valve lock nut (Figure 30). Turn adjusting screw clockwise (CW) all the way in and then 8 turns counterclockwise (CCW) out.

Bulk Loader Kick Down Relief Valve

2000 PSI

Bulk loader kick down valve unloads completely when 2000 psi is reached in the pusher ram cylinder retract circuit allowing oil to flow to the bulk loader vibrator motor & will reset after the fluid supply is removed.

Tee in a pressure gage in the pusher ram cylinder retract circuit located under loader bin.

Turn on pump, hold the momentary bulk loader ram control switch in the down position and watch the pressure gage so that the vibrator only turns on after the pusher cylinder is fully retracted approximately 2000 psi.

If pressure is higher than 2000 psi, loosen lock nut from pressure relief screw (Figure 31). Turn the pressure relief adjusting knob counterclockwise (CCW) until pressure reads 2000 psi. Tighten lock nut.

If pressure is lower than 2000 psi, loosen lock nut from pressure relief screw. Turn the pressure relief adjusting knob clockwise (CW) until pressure reads 2000 psi. Tighten lock nut.

WORKHEAD FEED MANIFOLD

L. H. /R. H. Grip Pressure Reducing Valve 650 psi

Install a pressure gage(s) at gage port above (B2) Right Grip / (B1) Left Grip label on work head feed manifold (Figure 32).

Turn on pump, if pressure is higher than 650 psi, remove protective cap and loosen lock nut from pressure reducing screw. Turn the adjusting screw counterclockwise (CCW) until pressure reads 650 psi. Tighten lock nut and install protective cap.

If pressure is lower than 650 psi, remove protective cap and loosen lock nut from pressure reducing screw (Figure 33). Turn the adjusting screw clockwise (CW) until pressure reads 650 psi. Tighten lock nut and install protective cap.
POWER LOCK UP MANIFOLD

Power Lock Up Flow Control Valve

Valve maintains a constant flow regardless of pressure changes downstream.

Valve is factory set, to reset remove protective cap and loosen lock nut (Figure 34), turning in flow adjusting screw all the way in clockwise (CW) until it bottoms out.

TURNTABLE

Turntable Flow Divider Cartridges

Located on hydraulic tank below turntable control valve (Figure 35) and used to split the oil flow equally to each of the turntable cylinders.

Remove a cartridge one at a time and inspect for damage. Flush completely with compressed air to clear any contaminants from all orifices.

Cartridges are not interchangeable so note where each was removed from.
Turntable Counterbalance Valve

Used in the turntable circuit so the turntable cylinders extend and retract at the same rate of speed.

First check that there is no debris or damage to the flow divider valve’s cartridges. Follow instructions listed above.

On serial number 690030 and above machines there are a total of eight counterbalance valves.

To check and reset to factory setting loosen the counterbalance adjusting screw lock nut (Figure 36). Turn adjusting screw clockwise (CW) until it bottoms out, and then turn counterclockwise (CCW) ¼ of a turn. Hold in position while tightening down lock nut.

EMERGENCY PUMP CIRCUIT (OPTIONS)

24 Volt Emergency Pump  Pressure Relief Valve (Standard) 2000 PSI

Emergency pump pressure relief valve in figure # 37 is factory set to 2000 psi and is not adjustable.

To check emergency pump pressure, install a pressure gage (0-3000 psi) at pressure line female coupling.

Turn the main pump ball valve to closed position (Figure 38) (Indicator line on ball valve off) will be perpendicular to flow in the pressure line.

Start engine, emergency pump On-Off to the on position and read the pressure.

When finished and before turning on main hydraulic pump, open the main pump ball valve (Figure 7) (Indicator line on shut off) will be in line to flow.
Figure 37

Emergency Pump Pressure Tap

Main Pump Ball Valve Shut Off (in OPEN position)

Figure 39

BNSF Option Emergency Pump Pressure Relief Valve

Figure 38

Main Pump Ball Valve Placard
Emergency Pump Pressure Relief Valve 1500 PSI (BNSF OPTION)

Reduces pressure in the emergency pump circuit to 1500 psi.

Install a pressure gage (0-3000 psi) at pressure tap at emergency pump (Figure 39).

Turn the main pump ball valve to closed position (Figure 38) (Indicator line on ball valve off) will be perpendicular to flow in the pressure line.

Turn on emergency pump, if pressure is higher than 1500 psi remove cap and loosen up lock nut (Figure 38). Turn adjusting screw counterclockwise (CCW) to decrease pressure. Tighten lock nut & install cap.

If pressure is lower than 1500 psi remove cap and loosen up lock nut. Turn adjusting screw clockwise (CW) to increase pressure. Tighten lock nut and install cap.

When finished and before turning on main hydraulic pump, open the main pump ball valve (Figure 39) (Indicator line on shut off) will be in line to flow.
TROUBLESHOOTING - GENERAL

Troubleshooting is a matter of quickly and logically isolating the cause of a problem and taking corrective action. Operating experience, a thorough understanding of the information in this manual, and accurate maintenance and operation records are the best troubleshooting tools an operator can have.

This is intended to give you basic troubleshooting guidelines for the hydraulic systems on this machine.

Local conditions and operating methods may result in problems, causes and remedies not covered in this guide. To use the guide most efficiently, locate a problem that matches the one being experience and, in a step-by-step method, check the causes listed until the correct remedy is found and the problem solved.

Always turn off machine when performing maintenance, making adjustments, or whenever unintended movement of machine could occur; unless directed otherwise. Failure to comply could result in personal injury and/or damage to the machine.

To avoid possible personal injury and/or engine damage from accidental engine startup, always disconnect the battery before servicing this machine.

INSPECTION

Inspect the hydraulic system for clues to the malfunction. Check to see if the unit can be operated without further damage. If not, shut down machine immediately. Always check these items before starting the machine:

1. Check hydraulic oil level.
2. Look for loose or disconnected hoses. An oil spot below the machine is a good indication of a loose hose or hydraulic component.
3. Make certain shut-off valve on suction strainer is OPEN. Opening valve can often correct what appears to be a malfunction.
4. Inspect all vital hose connections, especially at main pump and the main pump hose connection at the manifold.

Loosen fittings only when system is not pressurized. High pressure leaks can cause personal injury.

5. Look for cover damage and/or indications of twisted, worn, crimped, brittle, cracked, or leaking hoses. Hoses with their outer cover worn through or otherwise damages should be considered unfit for further service.
While machine is running, and before working, inspect for leaks. If the machine has not been run for some time, oil may thicken causing a variety of malfunctions. If this is true, make certain that the oil tank has been properly drained, cleaned and refilled.

If your visual inspection does not indicate the possible malfunction, refer to the troubleshooting guide that follows.

**FLUID CONTAMINATION**

Contamination comes in many forms. It may be air, water and cutting oils, rust, chips and grit. It is usually easier to keep contaminants out of a system rather than remove them after they are in the system.

Bulk handling and the re-use of oil containers almost guarantees you that “new” oil will be dirty. Make it a practice to filter all “new” oil before adding it to your system. Make it another practice to change filters on a regular basis before they become clogged.

**LOCATING LEAK SOURCES**

Petroleum oils are used in most hydraulic application to lubricate parts as well as transmit power. As oil temperature increases, however, the lubricating film thins out. The result is rubbing parts supported by the oil film move closer together; friction and wear increase; seal materials age more quickly, become stiff and hard, and may readily permit leakage.

The first step in locating leaks is to eliminate the possibility that an over-filled reservoir or spill created the "suspected" leak. The next step would be to clean the suspected area and watch. Leaks usually occur in fittings, hoses, O-rings, and other seals.

Most leaks occur at fittings, but too often, finding the fitting that is leaking is difficult because the fluid runs along the hose and drips off at some other point. Leaks in high pressure lines sometimes are difficult to pin-point because the fluid comes out as a mist.

Once you find the location of a leak, the specific cause has to be determined before it can be corrected. A scratch in a fitting seat or a cut in a seal lip that is big enough to leak excessively can still be too small to find with the naked eye. The use of a magnifying glass would assist you.

**HOSE LIFE**

Hose leakage or failure many times occurs where the end fitting grips the hose. Check the system for pressure spikes or surge. If bulges or bubbles occur on a flexible hose, a leak is taking place within the layers. The hose should be replaced.

High oil temperatures (over 200 degrees Fahrenheit, 93 degrees Celcius) quickly harden or stiffen a rubber hose. When pressure pulses flex a hardened hose, it fails by cracking. Every increase of 25° F (14°C) cuts hose life in half. Use a replacement hose rated for actual fluid temperatures. Keep a log of hose use so replacement can be made before failure occurs.

If a hose is installed with a twist in it, high operating pressures tend to force it straight. This can loosen the fitting or even burst the hose at the point of the strain.
# HYDRAULIC SYSTEM TROUBLESHOOTING GUIDE

<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>POSSIBLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic pump does not develop pressure</td>
<td>No hydraulic oil in tank (NOTE: if pump is run without oil in tank, pump damage will occur.)</td>
<td>Check oil level. Refill tank.</td>
</tr>
<tr>
<td></td>
<td>Shut-off valve closed. (NOTE: if pump is run with valve closed, pump damage will occur.)</td>
<td>Open valve completely.</td>
</tr>
<tr>
<td></td>
<td>Main relief valve bypassing. (NOTE: oil blowing past any relief valve can cause oil to overheat.)</td>
<td>Increase pressure setting on relief valve. (See Pressure checks)</td>
</tr>
<tr>
<td></td>
<td>Main pump compensator setting is too low.</td>
<td>Adjust compensator setting. (See Pressure Checks)</td>
</tr>
<tr>
<td></td>
<td>Pump is defective.</td>
<td>Refer to pump manual or replace pump.</td>
</tr>
<tr>
<td></td>
<td>Destroke valve stuck.</td>
<td>Repair or replace.</td>
</tr>
<tr>
<td></td>
<td>Pump switch turned off.</td>
<td>Turn on.</td>
</tr>
</tbody>
</table>

| Hydraulic pump excessively noisy             | Cold oil.                                                                      | Allow unit to warm up.                        |
|                                              | Low oil level.                                                                 | Check and add oil.                            |
|                                              | Oil viscosity too high (oil too thick)                                        | Drain and add correct oil as specified under "RECOMMENDED LUBRICANTS". |
|                                              | System relief valve set too low.                                              | Increase pressure setting on relief valve (see Pressure Checks) |
|                                              | Intake hose to pump restricted.                                               | Inspect and repair.                           |
|                                              | Defective pump.                                                               | See pump manual, repair or replace pump.      |

<table>
<thead>
<tr>
<th>Hydraulic Oil Filter Restriction Indicator Light stays on all the time (optional equipment)</th>
<th>Restricted hydraulic oil filter.</th>
<th>Replace filter.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hydraulic oil filter restriction switch</td>
<td>Replace switch.</td>
</tr>
<tr>
<td></td>
<td>Note:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hydraulic oil must be close to operating temperature (not cold) otherwise indicator may light up</td>
<td></td>
</tr>
<tr>
<td>PROBLEM</td>
<td>POSSIBLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-----------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Hydraulic Oil Overheats</td>
<td>Oil viscosity too high (oil too thick)</td>
<td>Drain and add correct oil as specified under &quot;RECOMMENDED LUBRICANTS&quot;.</td>
</tr>
<tr>
<td></td>
<td>System relief valve set too low.</td>
<td>Increase pressure setting on relief valve (see Pressure Checks)</td>
</tr>
<tr>
<td></td>
<td>Oil lines damaged causing excessive internal restriction</td>
<td>Inspect and repair.</td>
</tr>
<tr>
<td></td>
<td>Travel relief set too low</td>
<td>Check and reset</td>
</tr>
<tr>
<td>Hydraulic Oil Foams</td>
<td>Water in oil</td>
<td>Inspect oil for water. Drain and add correct oil as specified under &quot;RECOMMENDED LUBRICANTS&quot;.</td>
</tr>
<tr>
<td></td>
<td>Using wrong oil</td>
<td>Drain and add correct oil as specified under &quot;RECOMMENDED LUBRICANTS&quot;.</td>
</tr>
<tr>
<td></td>
<td>Low hydraulic level</td>
<td>Fill</td>
</tr>
<tr>
<td></td>
<td>Damaged hydraulic oil lines</td>
<td>Inspect, repair or replace.</td>
</tr>
<tr>
<td></td>
<td>Air leak in suction line to hydraulic pump or pump shaft seal leaking</td>
<td>Inspect, repair or replace.</td>
</tr>
<tr>
<td>Brakes will not release</td>
<td>Brake lock valve closed.</td>
<td>Open lock valve.</td>
</tr>
<tr>
<td></td>
<td>Brake directional control valve</td>
<td>Check spool for free motion and that solenoid is being energized.</td>
</tr>
<tr>
<td>Machine will not propel</td>
<td>Brakes on/not releasing</td>
<td>See brake section above.</td>
</tr>
<tr>
<td></td>
<td>Hydraulic pump not developing pressure</td>
<td>Inspet, repair, or replace hydraulic motor.</td>
</tr>
<tr>
<td></td>
<td>Main relief is defective – debris in valve allowing fluid back to tank</td>
<td>Inspect, repair, or replace main relief valve.</td>
</tr>
<tr>
<td></td>
<td>One or both counterbalance valves is defective – debris in valve allowing fluid back to tank</td>
<td>Debris in valve, disassemble, inspect, clean, repair, or replace valve.</td>
</tr>
<tr>
<td></td>
<td>Defective hydraulic motor</td>
<td>Disassemble, inspect, clean, repair, or replace motor.</td>
</tr>
<tr>
<td></td>
<td>Propel directional control valve spool will not shift</td>
<td>Disassemble, inspect, clean, repair, or replace motor.</td>
</tr>
<tr>
<td>PROBLEM</td>
<td>POSSIBLE CAUSE</td>
<td>SOLUTION</td>
</tr>
<tr>
<td>---------</td>
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<td>----------</td>
</tr>
</tbody>
</table>
| Multiple work head functions -- response is sluggish | Check system relief valve  
Check pump pressure compensator setting  
Internal system leaks  
Hydraulic fluid viscosity above acceptable limits  
Check for problems in the valve’s manifold | See Hydraulic Instructions  
See Hydraulic Instructions  
Worn internal parts – bad o-rings – Inspect and repair  
Allow hydraulic oil to reach operating range  
Disassemble, inspect, and repair |
| Work Head Lift / Rotate Cylinder(s) drifts down or chatters | Counterbalance valve(s) out of adjustment  
Debris in counterbalance valve | Adjust  See Hydraulic Troubleshooting  
Disassemble, inspect, repair, or replace. |
| Boxing cylinder will not operate or push anchors against both sides of the tie | See hydraulic pressure settings section for proper pressure settings – repair valve  
Inspect and repack cylinder |
| A Lock Up does not disengage | Check that lock up switch is in the unlock position  
Lock up solenoid valve not shifting  
Check that cylinder is fully retracted to allow lock up mechanism move  
Flow control valve in manifold needs adjusting or debris blocking flow  
With RPI in WORK MODE & when ELECTRICAL INTERLOCK BUTTON is pulled out the work head assembly should raise slightly first to allow lock ups to disengage. | Put switch in unlock position  
Check that coil is energized. If valve spool does not shift - disassemble, inspect, repair or replace valve.  
Retract cylinder and try lock up again  
Disassemble, inspect, repair, adjust or replace.  
Diagnose, inspect, & repair. |
<table>
<thead>
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<th>PROBLEM</th>
<th>POSSIBLE CAUSE</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turntable extends/retracts at different speeds</td>
<td>Counterbalance Valve needs adjusting</td>
<td>See Hydraulic Troubleshooting</td>
</tr>
<tr>
<td></td>
<td>Flow divider / combiner valve spool jammed or debris in valve</td>
<td>Remove and blow out cartridges with compress air, inspect. Do not mix cartridges not interchangeable</td>
</tr>
<tr>
<td></td>
<td>A Bad cylinder</td>
<td>Inspect, repair, or replace cylinder</td>
</tr>
<tr>
<td>Grippers do not grip and hold anchors</td>
<td>Pressure reducing valve needs adjusting or repairs</td>
<td>See hydraulic pressure settings section for proper pressure settings – repair valve</td>
</tr>
<tr>
<td></td>
<td>Quick disconnect not connected</td>
<td>Connect hydraulic hose at disconnect</td>
</tr>
<tr>
<td></td>
<td>Contaminations in quick connect.</td>
<td>Clean quick connects before assembling</td>
</tr>
<tr>
<td></td>
<td>Wrong anchor holders for the anchor being install</td>
<td>Change to correct anchor holders</td>
</tr>
<tr>
<td></td>
<td>Lateral Tray Position out of adjustment</td>
<td>See Tray Adjustments in Set UP Section</td>
</tr>
<tr>
<td></td>
<td>Debris build up in holder(s)</td>
<td>Remove clean debris from holders</td>
</tr>
<tr>
<td>Emergency Pump does not work (manual or electrical)</td>
<td>Main pump ball valve is in closed position.</td>
<td>Open main pump ball valve so that indicator is parallel to direction of flow. (See electric emergency pump emergency pressure relief)</td>
</tr>
</tbody>
</table>
Post-troubleshooting

After troubleshooting and eliminating the problems, be sure to follow correct procedures in restarting the machine. The items to be checked include the following:

- check to ensure replaced components are the correct units,
- ensure hydraulic connections are correct and tightened,
- ensure electrical connections are correct and tight,
- be sure pump and hydraulic motor housing cases are filled with clean oil (if required),
- properly set adjustable components,
- remove electrical interlocks,
- alert personnel to stand clear before starting the machine, and
- after the system is running, bleed the air and set the pressures to the proper settings.

Effective hydraulic system maintenance and troubleshooting is critical to reducing your hydraulic system downtime. While these guidelines do not address every possible problem, they offer a basic day-to-day approach to troubleshooting your hydraulic system.