TABLE OF CONTENTS

EMERGENCY PUMP USE
- Electric Pump H-4
- Manual Pump H-7

HYDRAULIC COMPONONTS SCHELDULE H-8

SERVICE PARTS H-9

PRESSURE SETTINGS H-11

PUMP PRESSURE COMPENSATOR H-12

PROPEL MAINIFOLD
- Main Pressure Relief Valves H-12
- Propel Cross Over Relief Valves H-13

LEFT HAND WORK HEAD MANIFOLD
- Guide Roller Cylinder Pressure Reducing Valve H-14
- Guide Roller Cylinder (RAISE) Flow Control Valve H-15
- Guide Roller Cylinder (LOWER) Flow Control Valve H-15
- # 1 & # 2 Borer Cylinder Up/Down Pressure Reducing Valves H-15
- # 1 & # 2 Borer Cylinder LOWER Flow Control Valve H-16
- # 1 & # 2 Borer Cylinder RAISE Flow Control Valve H-16
- Drill Motor Flow Control Valves H-16

RIGHT HAND WORK HEAD MANIFOLD
- Guide Roller Cylinder Pressure Reducing Valve H-17
- Guide Roller Cylinder (RAISE) Flow Control Valve H-18
- Guide Roller Cylinder (LOWER) Flow Control Valve H-18
- # 3 & # 4 Borer Cylinder Up/Down Pressure Reducing Valves H-18
- # 3 & # 4 Borer Cylinder LOWER Flow Control Valves H-19
- # 3 & # 4 Borer Cylinder RAISE Flow Control Valves H-19
- Drill Motor Flow Control Valves H-20

JOYSTICK PRESSURE REDUCING VALVE H-20

POWER LOCK UP PRESSURE REDUCING VALVE H-21

POWER LOCK UP FLOW CONTROL VALVE H-22

EMERGENCY PUMP PRESSURE RELIEF VALVE H-22

SUCTION LINE FILTER **H-23**

MANIFOLD WARM UP SYSTEM VALVE (Cold Weather OPTION) **H-24**

AUXILLARY MANIFOLD FOR HYDRAULIC TOOLS (OPTION) **H-24**

AUXILLARY MANIFOLD PRESSURE RELIEF VALVES (OPTION) **H-26**

TROUBLESHOOTING

- **General** **H-27**
- **Inspection** **H-27**
- **Fluid Contamination** **H-28**
- **Filters** **H-28**
- **Locating Leak Sources** **H-28**
- **Hoses** **H-28**

TROUBLESHOOTING GUIDE **H-29**

TROUBLESHOOTING POST **H-32**

This Page Left Intentionally Blank

EMERGENCY PUMP USE – ELECTRIC PUMP

THE FOLLOWING PROCEDURES WILL REQUIRE TWO OR MORE PERSONS TO COMPLETE.

Emergency procedures to return hydraulic components to the point where lock ups can be engaged.

See the following sections for emergency procedures to release spring applied hydraulic brakes and raise the turntable Cylinder.

1. Check that the battery disconnect switch is ON.
2. Attach one end of the hose (found in the toolbox) to the pressure port on the emergency pump located on left front of machine (Figure 1). Attach the other end of the hose to the main pressure tap on the high pressure filter (Figure 2).
3. Turn the main pump shut off valve to closed position (Figure 3). Indicator line on ball valve shut off will be perpendicular to the hydraulic flow in the pressure line.
4. Pressurize the hydraulic system by raising and holding the emergency pump switch located on the left side (front) (Figure 4) while manually or electrically shifting the directional control to the component that needs to be raised to the point where you can insert the lock ups.

⚠ CAUTION

Operate the 24 volt emergency pump in intervals for a maximum of 15 seconds at a time. The 24 volt emergency pump is designed for emergency use ONLY and is NOT to be run continuously.

5. Open the main pump shut valve (Figure 3). Indicator line on the main shut off valve will be in line to the hydraulic flow.
6. Return hose to tool box.

Figure 1

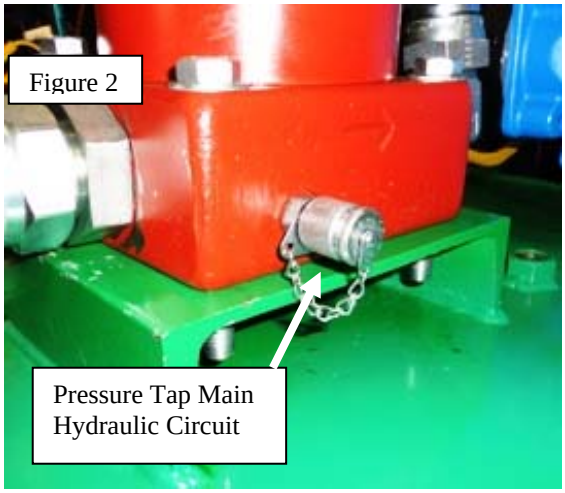


Figure 2

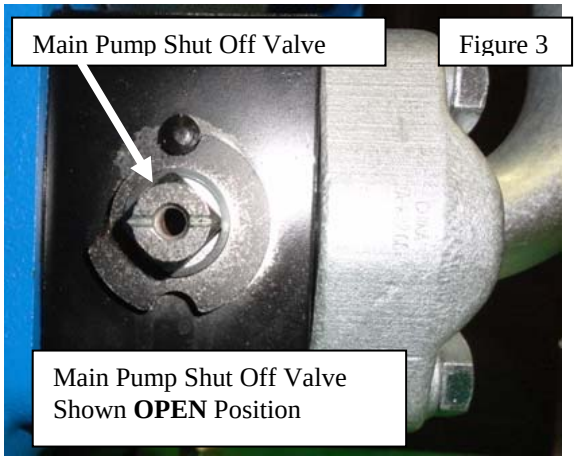


Figure 3

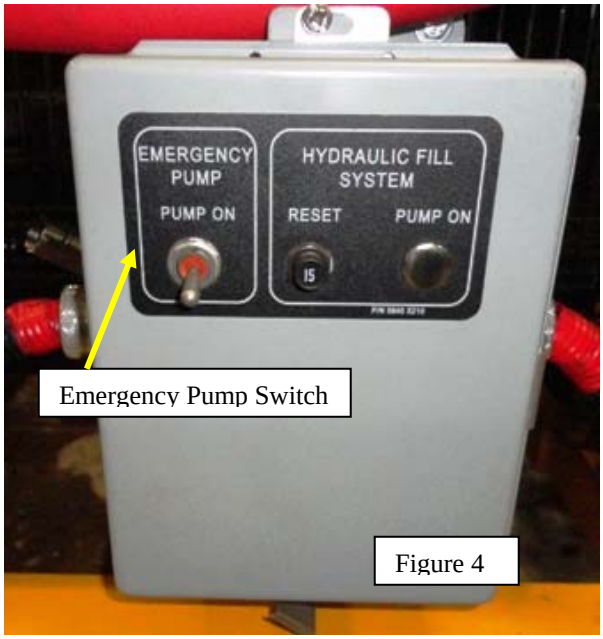


Figure 4

The following steps are used for towing or for replacing brake shoes

The brake lock-off valve was designed to allow collapsing of the brake cylinder without having to energize any other components.

⚠ CAUTION

Nordco recommends the use of the emergency pump during replacement of brake shoes, whether or not hydraulic power is available. Instructions are written for use with emergency pumps.

1. With the machine on level track, chock ALL wheels to prevent movement.

DO NOT TURN OFF BATTERY DISCONNECT SWITCH!

2. Close the Brake Shut Off Valve located on the right side of machine and lock in the CLOSED position (CLOSED is when the handle is perpendicular to the hose line. Figure 3 shows the brake valve in the OPEN position (the handle is in line with hose).
3. Attach one end of the hose (found in the toolbox) to the quick disconnect at the brake shut off valve (Figure 3) and attach the other end of the hose to the emergency pump quick disconnect (Figure 1).
4. Turn on the emergency pump switch at the control box (left side/front of machine) until the both hydraulic brake cylinders have collapsed and the brakes are released.

⚠ CAUTION

Operate the 24 volt emergency pump in intervals for a maximum of 15 seconds at a time. The 24 volt emergency pump is designed for emergency use ONLY and is NOT to be run continuously.

5. Install the lock pins (1) and hairpin cotters (2) as shown in Figure 6.
6. Turn off emergency pump
7. Replace brake shoes if a brake pad is under ¼".

OR

8. Remove hose and wheel chocks, and perform towing as required.

⚠ CAUTION

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

REDUCE SPEED ACCORDINGLY AS DICTATED BY WEATHER OR TRACK CONDITIONS.

9. Once you have towed to a site to perform maintenance on the hydraulic system or replace brake shoes, open the brake shut off valve (Figure 3) and lock in the OPEN position.

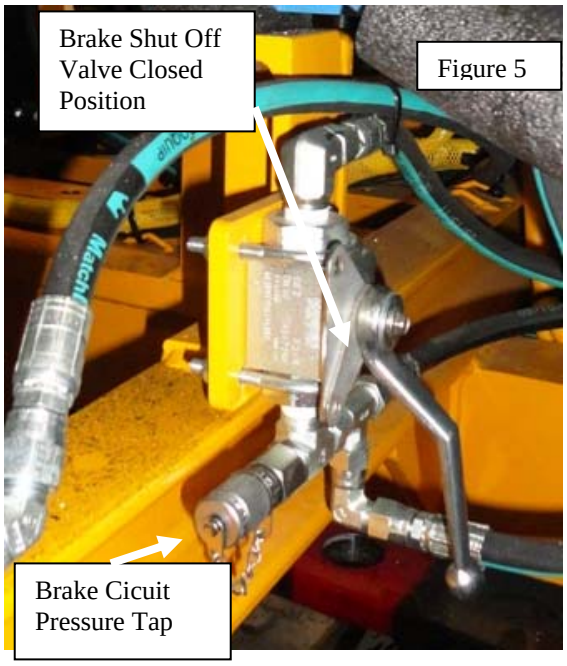


Figure 5

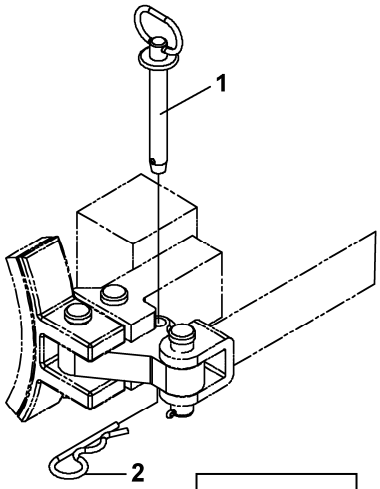


Figure 6

The following steps are used to raise* the *Turntable Cylinder if machine's engine/hydraulics is disabled:

1. Check that the battery disconnect switch is turn to the ON position.
2. Attach one end of the hose (found in tool box) to the pressure tap of the emergency pump (Figure 1).
3. Attach the other end of the hose to the turntable valve pressure tap (Figure 7).
4. The Turntable Valve (Figure 7) has a locking pin & bracket that locks the turntable valve in the DOWN position (MACHINE IS DOWN ON THE TRACK). Hydraulic oil is directed to the retract side of the turntable cylinder in this position.
5. Pressurize the hydraulic system by turning on the emergency pump switch (Figure 4) located on left front of the machine.

⚠ CAUTION

Operate the 24 volt emergency pump in intervals for a maximum of 15 seconds at a time. The 24 volt emergency pump is designed for emergency use ONLY and is NOT to be run continuously.

6. After the Turntable Cylinder is retracted fully (machine DOWN position) turn off emergency pump and disconnect hose.
7. Return hose to tool box.

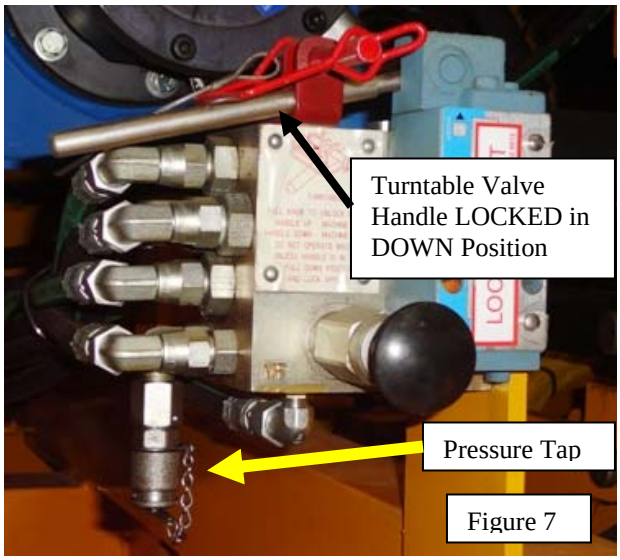


Figure 7

EMERGENCY PUMP USE – MANUAL PUMP

THE FOLLOWING PROCEDURES WILL REQUIRE TWO OR MORE PERSONS TO COMPLETE.

Tools And Equipment Required For These Procedures:

¾-Inch Combination Wrench
Company Furnished Padlock
Hand Pump Hose (Found In Toolbox)
Lock Pins (Found In Toolbox)

For All Components Except For Brakes & Turntable:

1. Turn ignition switch to the OFF position.
2. Attach one end of the hose (found in the toolbox to hand pump and the other end of the hose to the pressure tap on the pressure filter (Figure 2).
3. Turn the main pump ball valve to closed position (Figure 3) (Indicator line on ball valve off) will be perpendicular to flow in the pressure line.
4. Pressurize the hand pump by moving the hand valve lever (lever with round knob) on the pump toward the pump. While manually/electrically shifting the directional control to the component that needs to be raised to the point where you can insert the lock ups. Insert lockup pins.
5. Return hose to tool box.

For the Hydraulic Brakes (RELEASE):

1. With the machine on level track, chock ALL wheels to prevent movement.
2. Close the Brake Shut Off Valve (Figure 5) on the machine's right side and lock in the CLOSED position. (CLOSED is perpendicular to the hose line, OPEN is parallel to the hose line.)
3. Attach one end of the hose (found in the toolbox) to the hand pump. Attach the other end of the hose to the brake circuit pressures tap (Figure 5).
4. Pressurize the hand pump by moving the hand valve lever (lever with round knob) on the pump toward the pump.
5. Continue pumping until the hydraulic brake cylinder has collapsed and has released the brakes.
6. Install the lock pins (1) and hairpin cotters (2) (Figure 6).
7. Release hand pump pressure by moving the hand valve lever on the pump away from the pump, , remove hose and wheel chocks, and perform towing as required.
8. Once you have towed to a site to perform maintenance on the hydraulic system, open the Brake Shut – Off Valve
9. Return hose to tool box.

To raise the Turntable Cylinder:

1. Check that the battery (24 v) switch is turn to the OFF position.
2. Attach one end of the hose (found in tool box) to the pressure tap of the manual emergency pump.
3. Attach the other end of the hose to the turntable valve pressure tap (Figure 7).
4. The Turntable Valve (Figure 7) has a locking pin & bracket that locks the turntable valve in the DOWN position (MACHINE IS DOWN ON THE TRACK). Hydraulic oil is directed to the retract side of the turntable cylinder in this position.
5. Pressurize the hydraulic system by moving the hand valve lever (lever with round knob) on the pump toward the pump then manually pump the emergency pump.

⚠ CAUTION

6. After the Turntable Cylinder is retracted fully (machine DOWN position) disconnect hose.
7. Return hose to tool box.

HYDRAULIC COMPONENT MAINTENANCE SCHEDULE

Hydraulic Component Maintenance Schedule					
Item	**10 Hours (Day)**	**50 Hours (Week)**	**150 Hours (Month)**	**500 Hours (3 Months)**	**2000 Hours (6 Months)**
Hydraulic Oil Level	I/F				
Oil Cleanliness	I			I/T	
Check Hydraulic Oil Filter Indicators (option)	I		I		
Check hoses & fittings for leaks	I	I*	I		
Check top off filter indicator Gauge (optional) while in use	I/R				
Oil Cooler			CL		
Pressure Checks❶			❶T		
Test hydraulic oil cleanliness				I/R	
Replace pressure filter				I/R	
Replace return filter				I/R	
Replace case drain filter (option)				I/R	
Replace tank breathers				I/R	
Drain & replace oil in hydraulic tank					I/R
Inspect suction strainer element					I/R
Steam clean oil cooler					I/R

Key:

Some maintenance requires that a two step procedure be performed. For example, I/F requires inspection and Filling.

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.

❶ Monthly pressure checks are recommended. Fluctuation of hydraulic power may require more frequent checks.

SERVICE PARTS

Description	NORDCO Part Number

(Non Nordco P/N in parentheses):

SUCTION STRAINER 3879255

- **Element** **3894255**
- **Gasket** **35552965**

RETURN FILTER 3880323

- **Element** **3894289**
- **Pressure Switch** **5193975**
- **Gasket Kit** ..... (**ALFT503)**

PRESSURE FILTER 3880252

- **Element** **3894289**
- **Pressure Switch** **5193970**

CASE DRAIN FILTER 3880353 option

- **Element** **3890145**
- **Pressure Switch** **5193969**

HYDRAULIC TANK 79149725

- **Reservoir Breather**
  - **Element** **1673251**
  - **Relief Valve** **1677206**
- **Reservoir Breather/Air Relief Valve** **1673250**
- **Reservoir Level Site Gauge with Temperature Gauge** **7030872**
- **Reservoir Temperature Sending Unit** **5193967**

.

OIL COOLER 26740210 option

- **Core** **60570039**
- **(24 Volt) Motor & Fan** **50211530**
- **Temperature Switch** **5194800**

TOP-OFF PUMP PUSH-PULL 460203 option

- **Element** **3874980**
- **Pump Manual (Push-Pull)** **59424140**

EMERGENCY PUMP 460557

Pump **59420465**

Relief Valve **1677313**

PUMP MAIN 59427960

Ball Shut Off Valve **1605826**

Unloaded Valve **37750013**

Coil **507848**

Pressure Settings

GENERAL

Pressure to the various devices in the Quad Drill hydraulic system is controlled by the Pump 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.

Main System Pressure (Pump Pressure Compensator .....**2500 PSI**

Main Pressure Relief ..... **3000 PSI**

Propel Cross Over Reliefs .....**2900 PSI**

Borer Up/Down Cylinder Pressure Reducing Valve .... **500 PSI**

Guide Roller Cylinder Pressure Reducing Valve .... **500 PSI**

Joystick Spotting Pressure Reducing Valve ..... **1500 PSI**

Power Lock Up Pressure Reducing Valve ..... **500 PSI**

Auxiliary Manifold Pressure Reducing Valve..... **2450 PSI**

Emergency Pump Relief Valve ..... **2250 PSI**

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.

Pump Pressure Compensator

1. Install a pressure gage on the pressure tap lon the propel manifold (Figure 8).
2. Turn on pump and read pressure.
3. If pressure is higher than 2500 psi, loosen pump pressure compensator adjusting screw lock nut (Figure 9) and turn adjusting screw counterclockwise (CCW) until pressure reads 2500 psi.
4. Hold adjusting screw at new location while tightening lock nut.
5. If pressure is lower than 2500 psi, loosen pump pressure compensator adjusting screw lock nut (Figure 9) and turn adjusting screw clockwise (CW) until pressure reads 2500 psi.
6. Hold adjusting screw at new location while tightening lock nut.
7. If the pump pressure compensator adjustment does not increase to 2500 psi the main system relief may require adjustment/repair. The main system relief is set to 3000 psi for proper operation.

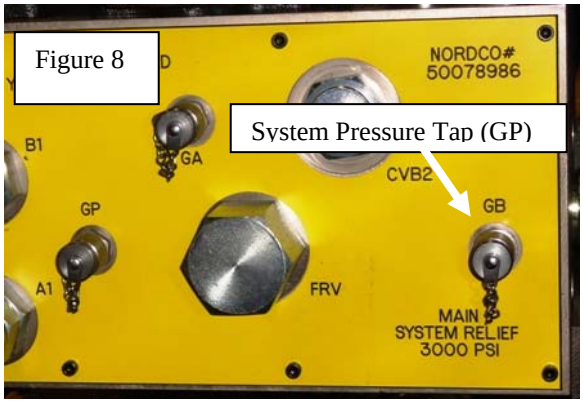


Figure 8

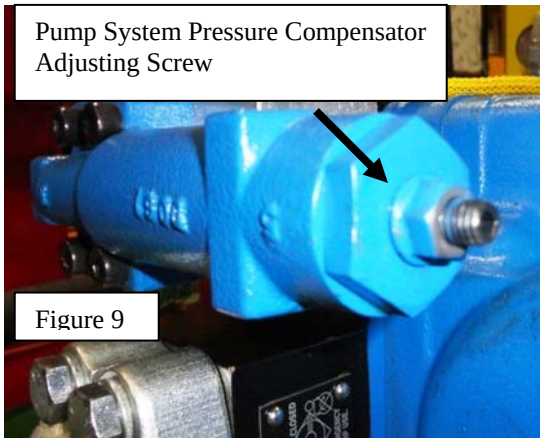


Figure 9

PROPEL MANIFOLD

Main Pressure Relief Valve 3000 PSI

1. Install a pressure gage on the pressure tap on the propel manifold (Figure 8).
2. On the propulsion manifold opposite side of the pressure tap is the Main Relief Valve (RVP) (Figure 10). Remove protective cap and loosen lock nut on relief valve adjusting screw and turn relief valve adjusting screw to full clockwise (CW) position (maximum pressure).
3. Loosen PUMP COMPENSATOR adjusting screw lock nut (Figure 9).
4. Turn pump pressure compensator adjusting screw counterclockwise (CCW) (about 2-3 turns), but do not remove screw. Leave enough thread engagement to prevent leakage. Start engine and turn on the Pump.
5. Turn pump compensator adjusting screw clockwise (CW) until 3000 psi has been reached. Read this pressure at the (GP) (Figure 8) pressure tap on the propulsion manifold.
6. Turn main relief valve adjusting screw (RVP) (Figure 10) counterclockwise (CCW) until pressure at gauge just begins to drop. This is considered cracking pressure. Turn back 1/8 of a turn and tighten nut on valve.
7. Return Pump Pressure Compensator to 2500 psi (see above).

THIS IS SYSTEM PRESSURE!
When adjusting Main Pressure Relief and/or Cross over Relief always return Pump Pressure Compensator back to 2500 psi.

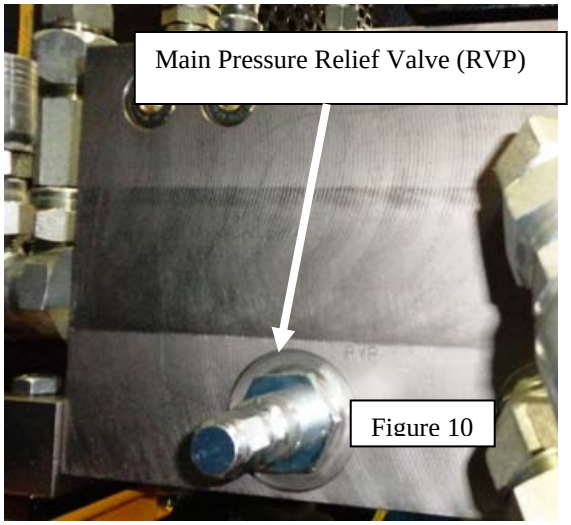


Figure 10

Propel Cross Over Relief Valve 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

1. Turn Brake Shut –Off valve (above LH Front drive wheel) to ***CLOSED*** position to disable brakes. Handle will be perpendicular to hose (Figure 11).
2. The propel cross over relief valves are located on the machine's right side manifold (Figure 12).
3. Install pressure gage on the pressure tap label (**GP)** on the propulsion manifold (Figure 8) and on the pressure tap label **GB** (reverse propel) on the propulsion manifold (Figure 12).
4. Turn both (RVA & RVB) crossover relief valve adjustments screws to full clockwise (CW) position (maximum pressure) (Figure 12).
5. Loosen System Pressure Compensating Screw lock nut (Figure 9).
6. Start engine and turn on the Pump.
7. Turn pump compensator adjusting screw (Figure 9) clockwise (CW) until 2900 psi has been reached. Read this pressure at the (GP) pressure tap on the propulsion manifold (Figure 2).
8. Manually override the propel reverse directional control valve (B) by pushing in the **push pin** (Figure 14) while adjusting (**RVB**) valve (Figure 13) 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.
9. Turn off pump and engine.
10. Move pressure gage to the pressure tap label **GA** (forward propel) on the right hand manifold (Figure 12).
11. Manually override the forward directional control valve (A) by pushing in the **push pin** (Figure 14) while adjusting (**RVA**) valve (Figure 13) counterclockwise (CCW) until pressure at gauge just begins to drop.
12. Adjust pump pressure compensator adjusting screw counterclockwise (CCW) to system operating pressure (2500 psi).
13. Tighten lock nut on adjusting screw.
14. Open Brake Shut-Off Valve

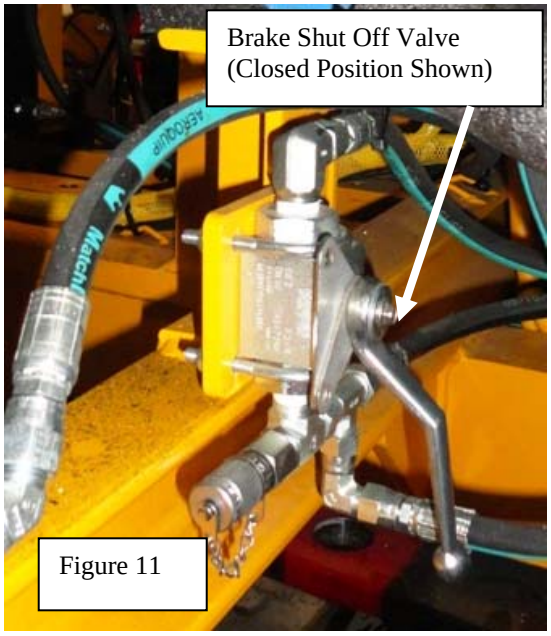


Figure 11

Figure 12

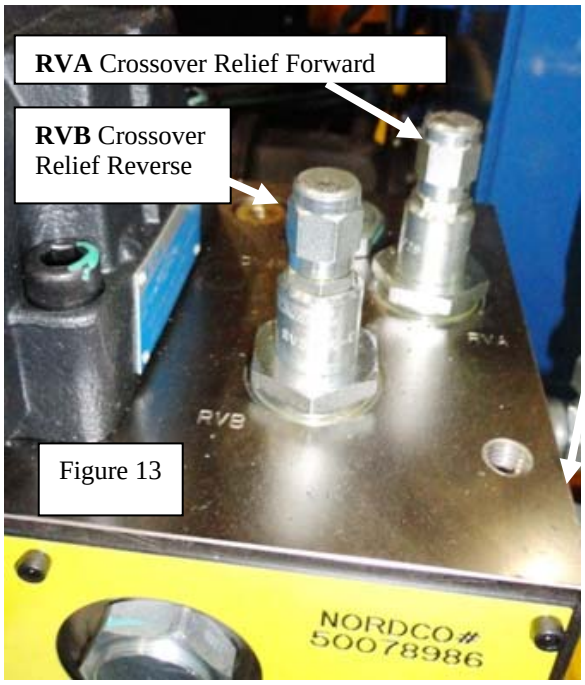


Figure 13

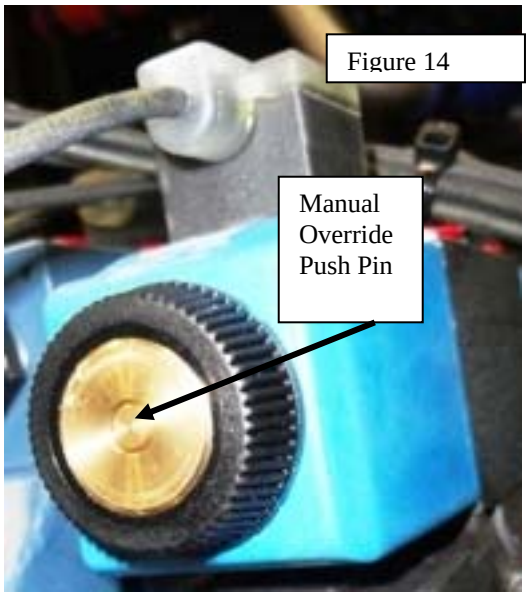


Figure 14

LEFT HAND WORK HEAD MANIFOLD

Left Guide Roller Cylinder Pressure Reducing Valve

1. The left guide roller cylinder pressure reducing valve is located on the bottom of the machine's left work head manifold.

2. Install gage at Guide Roller Cylinder pressure tap (Figure 15) that is being tested and turn on pump.

3. If pressure is higher than 500 psi, Loosen guide roller cylinder pressure reducing valve adjusting screw lock nut (Figure 16) turn the adjusting screw counterclockwise out (CCW) until pressure reads 500 psi.

4. Tighten lock nut.

5. If pressure is lower than 500 psi, loosen guide roller cylinder pressure reducing valve adjusting screw lock nut (Figure 16) turn the adjusting screw in clockwise (CW) until pressure reads 500 psi.

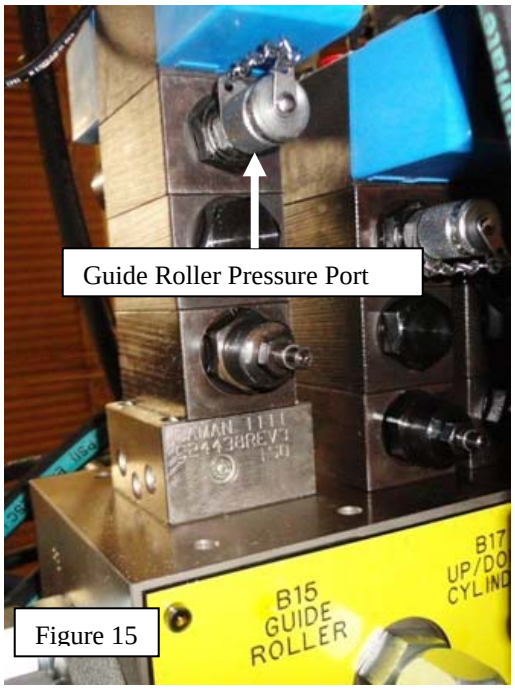


Figure 15

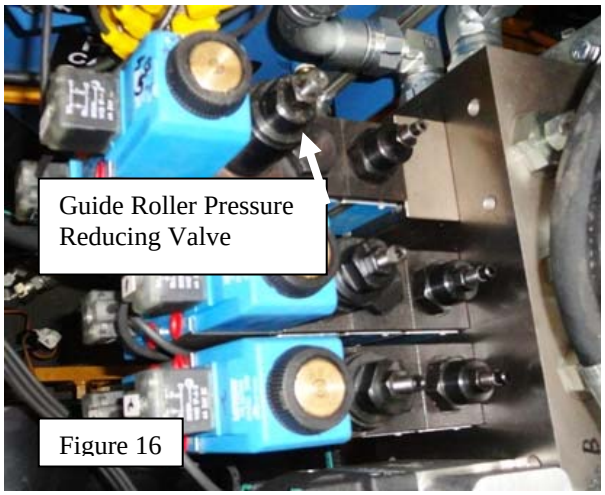


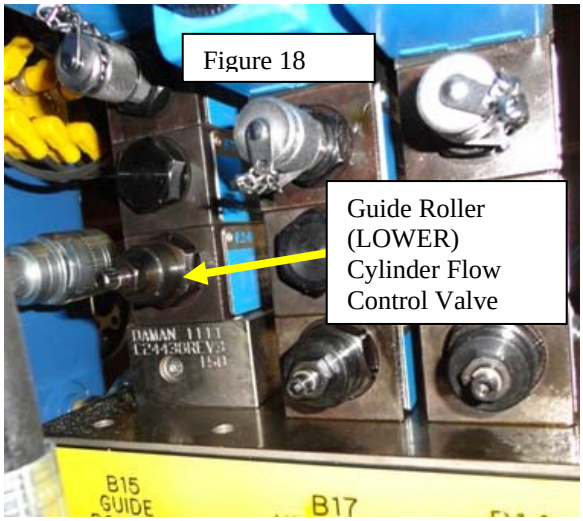
Figure 16

Left Guide Roller Cylinder (RAISE) Flow Control Valve

1. The left guide roller cylinder (raise) flow control valve is located on the top of the machine's left work head manifold.
2. To adjust the speed of the work head cylinder (raise) flow control valve loosen up lock nut (Figure 17) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).
3. Tighten lock nut.

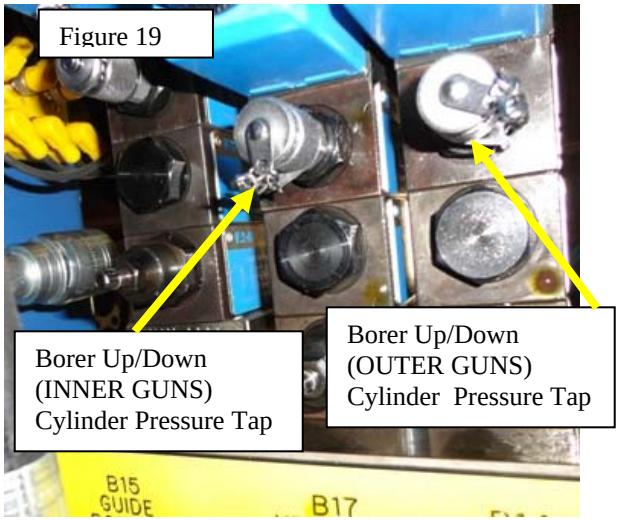
Left Guide Roller Cylinder (LOWER) Flow Control Valve

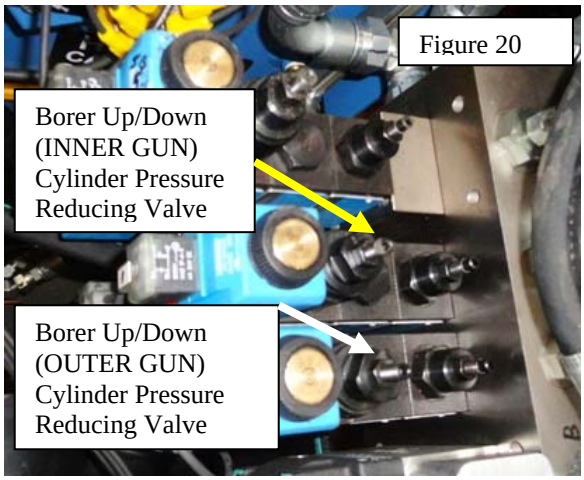
1. The left guide roller cylinder (lower) flow control valve is located on the bottom of the machine's left work head manifold (Figure 18).
2. To adjust the speed of the work head cylinder (lower) flow control valve loosen up lock nut (Figure 18) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).
3. Tighten lock nut.



Borer Up/Down Cylinder Pressure Reducing Valve

1. The # 1 & # 2 borer up/down cylinder valves are located on the machine's left work head manifold.
2. Install gage at the Borer Up/Down Cylinder pressure tap being tested (Figure 19).
3. If pressure is higher than 500 psi, Loosen work head up/down cylinder pressure reducing valve adjusting screw lock nut (Figure 20) turn the adjusting screw counterclockwise out (CCW) until pressure reads 500 psi.
4. Tighten lock nut.
5. If pressure is lower than 500 psi, loosen work head cylinder up/down pressure reducing valve adjusting screw lock nut (Figure 20) turn the adjusting screw in clockwise (CW) until pressure reads 500 psi.
6. Tighten lock nut.





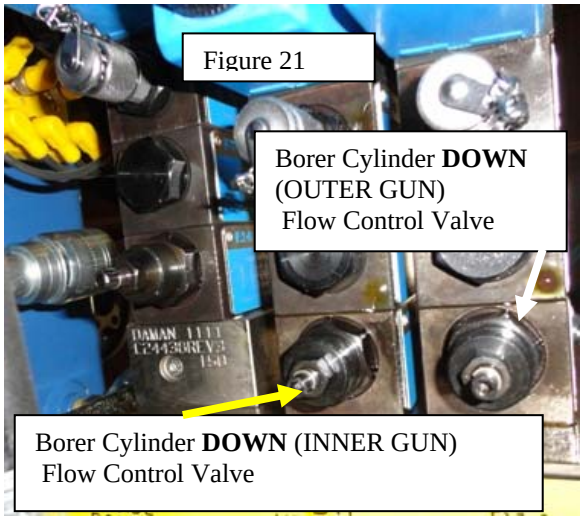
Borer Cylinder (LOWER) Flow Control Valves

1. The # 1 & # 2 borer cylinder (lower) flow control valves are located on the bottom of the machine's left hand work head manifold (Figure 21).

2. To adjust the speed of the work head cylinder (lower) flow control valve loosen up lock nut (Figure 21) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).

3. Tighten lock nut.

4. To reset the work head cylinder (raise) flow control valve to factory setting turn the adjusting screw (Figure 21) counterclockwise (CW) all the way out, then 3 of a turn in clockwise (CW).



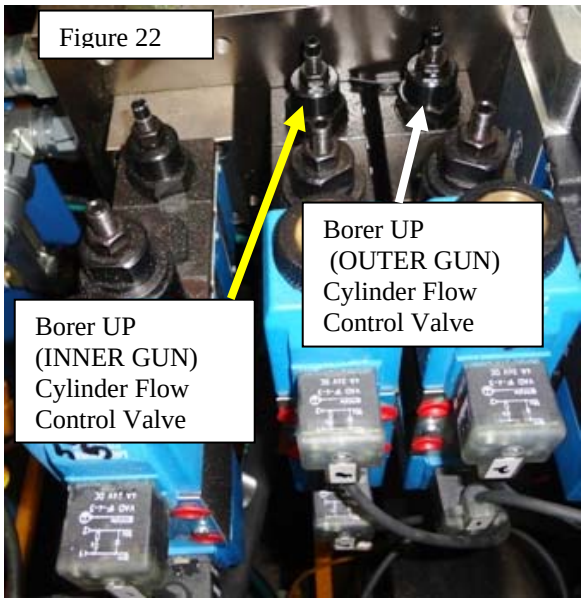
Borer Cylinder (RAISE) Flow Control Valves

1. The # 1 & # 2 borer cylinder (raise) flow control valves are located on the top of the machine's right hand work manifold (Figure 22).

2. To adjust the speed of the work head cylinder (raise) flow control valve loosen up lock nut (Figure 22) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).

3. Tighten lock nut.

4. To reset the work head cylinder (raise) flow control valve to factory setting turn the adjusting screw (Figure 22) counterclockwise (CW) all the way out, then 3 of a turn in clockwise (CW).



Drill Motor Flow Control Valve 15 GPM/1000 RPMS

1. Drill Motor flow control valves are located on the machine's both work head Manifold (Figure 23).

2. The drill motor flow control cartridges have tamper resistant covers that are pressed fitted onto the cartridge shoulder and are not adjustable.

3. To check the rpms of the drill motor use a digital tachometer with reflective tape for an accurate reading of drill motor rpms.

4. Turn off engine and install the reflective tap on the drill chuck for the drill motor being tested (Figure 24).

5. Start engine, turn on hydraulic pump, and set engine to full throttle (2400 rpms).

6. Manually override the drill motor directional control valve by pushing in the **push pin** (Figure 26) for the drill motor being tested.

7. Maximum speed of a drill is 1000 rpms.

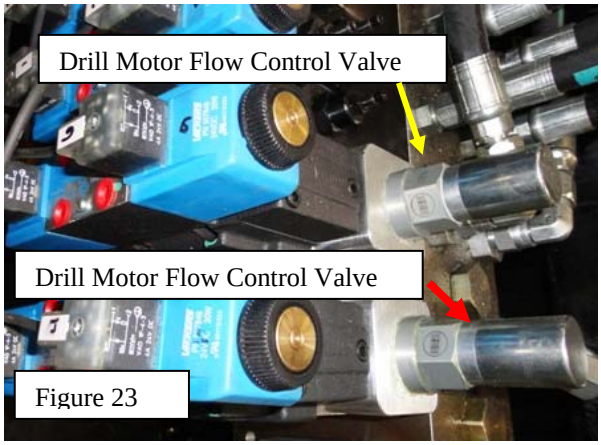


Figure 23

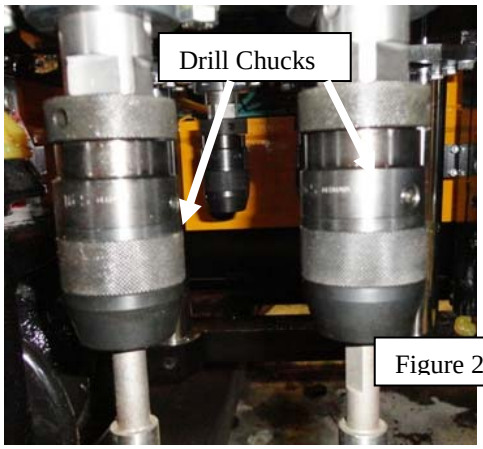


Figure 24

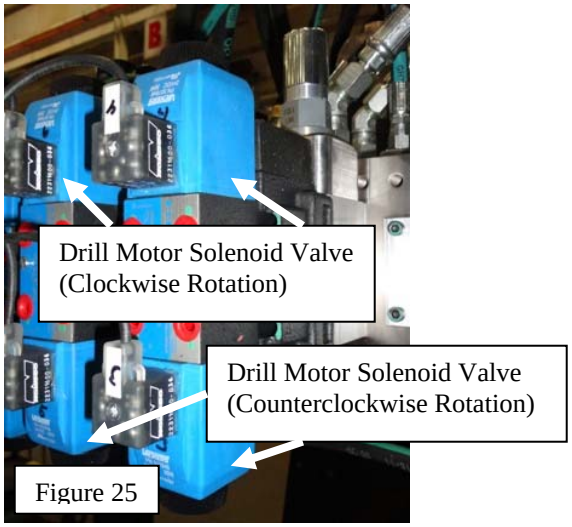


Figure 25

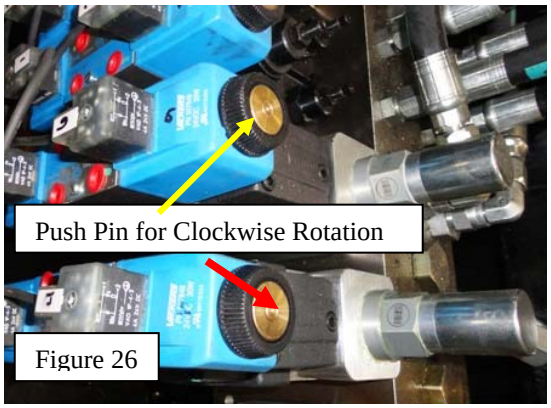


Figure 26

RIGHT HAND WORK HEAD MANIFOLD

Right Guide Roller Cylinder Pressure Reducing Valve 500 PSI

1. The right guide roller cylinder pressure reducing valve is located on the machine's right work head manifold.

2. Install gage at Guide Roller Cylinder pressure tap (Figure 27) that is being tested and turn on pump.

3. If pressure is higher than 900 psi, Loosen guide roller cylinder pressure reducing valve adjusting screw lock nut (Figure 28) turn the adjusting screw counterclockwise out (CCW) until pressure reads 500 psi.

4. Tighten lock nut.

5. If pressure is lower than 900 psi, loosen guide roller cylinder pressure reducing valve adjusting screw lock nut (Figure 28) turn the adjusting screw in clockwise (CW) until pressure reads 900 psi.

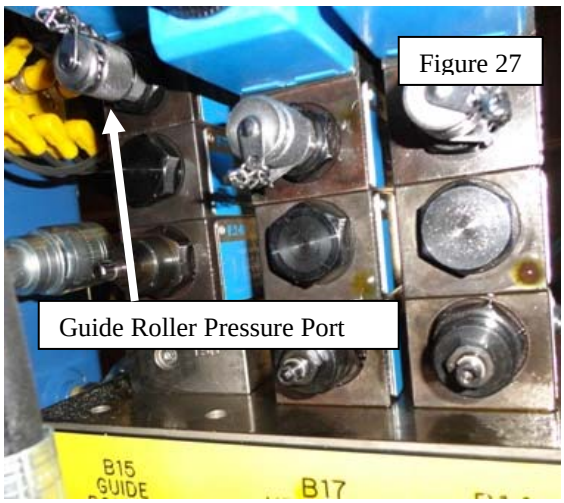


Figure 27

Right Guide Roller Cylinder (RAISE) Flow Control Valve

1. The right guide roller cylinder (raise) flow control valve is located on the top of the machine's right work head manifold (Figure 29).

2. To adjust the speed of the work head cylinder (raise) flow control valve loosen up lock nut (Figure 29) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).

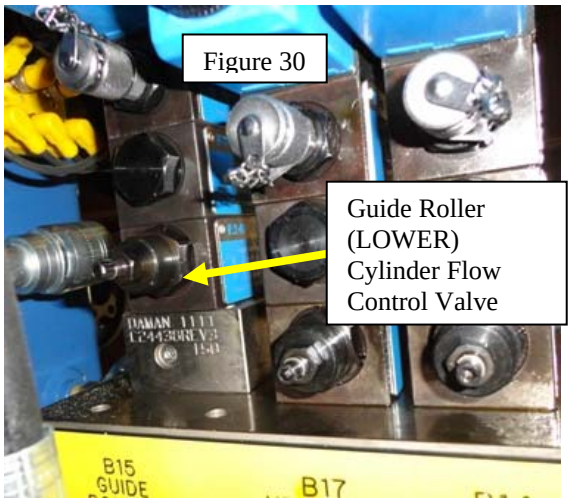
3. Tighten lock nut.

Right Guide Roller Cylinder (LOWER) Flow Control Valve

1. The right guide roller cylinder (lower) flow control valve is located on the bottom of the machine's right work head manifold (Figure 30).

2. To adjust the speed of the work head cylinder (lower) flow control valve loosen up lock nut (Figure 30) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).

3. Tighten lock nut.



Borer Up/Down Cylinder Pressure Reducing Valve 500 PSI

1. The # 3 & # 4 borer up/down cylinder pressure reducing valves are located on the machine's right side work head manifold.

2. Install gage at Borer Up/Down Cylinder pressure tap (Figure 31).

3. If pressure is higher than 500 psi, Loosen work head up/down cylinder pressure reducing valve adjusting screw lock nut (Figure 32) turn the adjusting screw counterclockwise out (CCW) until pressure reads 500 psi.

4. Tighten lock nut.

5. If pressure is lower than 500 psi, loosen work head cylinder up/down pressure reducing valve adjusting screw lock nut (Figure 32) turn the adjusting screw in clockwise (CW) until pressure reads 500 psi.

6. Tighten lock nut.

Figure 31

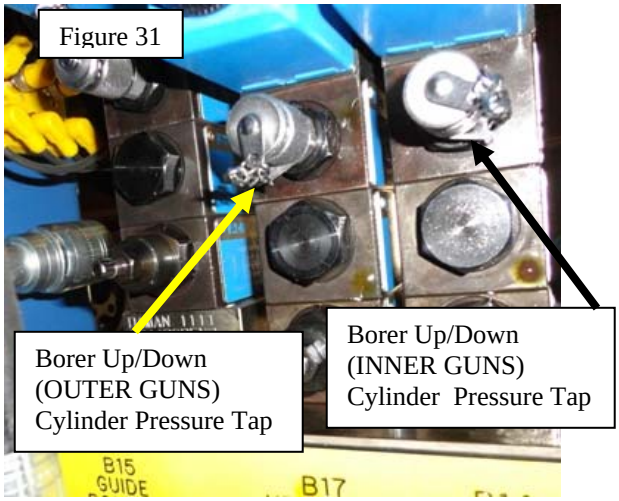
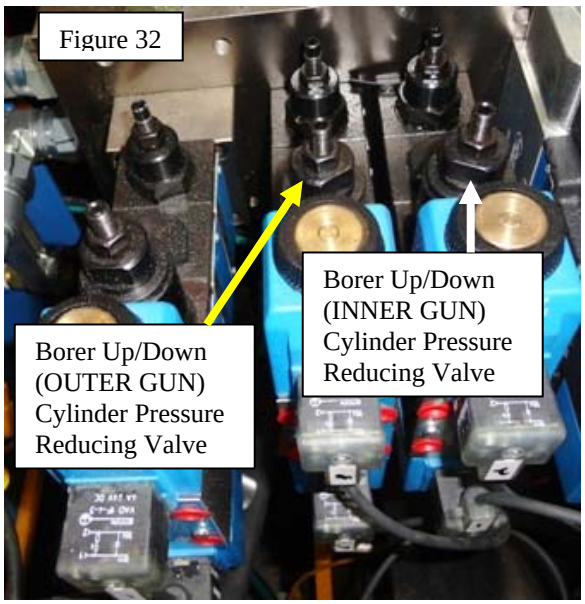


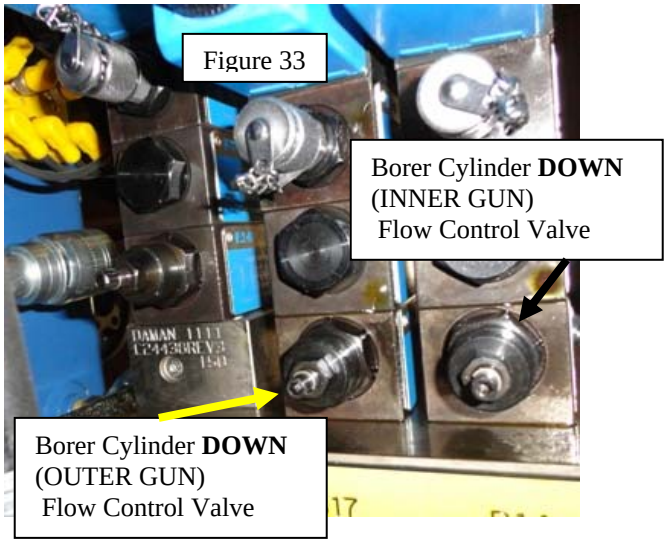
Figure 32



Borer Cylinder (LOWER) Flow Control Valves

1. The # 3 & # 4 borer cylinder (lower) flow control valves are located on the bottom of the machine's right hand work head manifold.
2. To adjust the speed of the work head cylinder (lower) flow control valve loosen up lock nut (Figure 33) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).
3. Tighten lock nut.
4. To reset the work head cylinder (lower) flow control valve to factory setting turn the adjusting screw (Figure 33) counterclockwise (CCW) all the way out, then 6 turns in clockwise (CW).
5. Tighten lock nut.

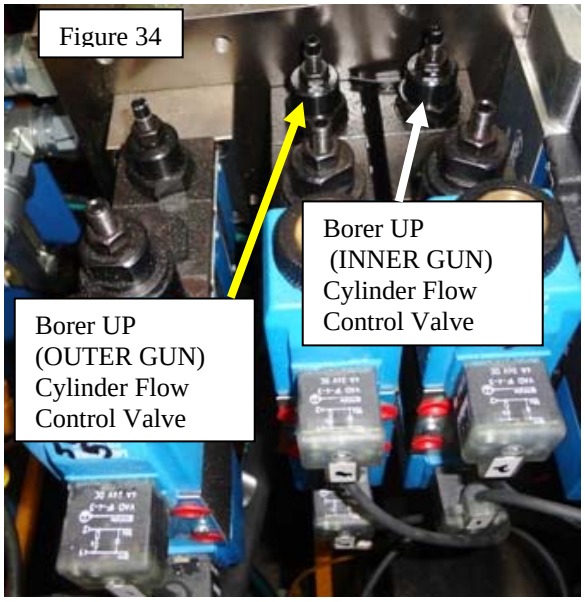
Figure 33



Borer Cylinder (RAISE) Flow Control Valves

1. The # 3 & # 4 borer cylinder (raise) flow control valves are located on the top of the machine's right hand work head manifold (Figure 34).
2. To adjust the speed of the work head cylinder (raise) flow control valve loosen up lock nut (Figure 34) turn adjusting screw in clockwise (CW) to decrease flow or out counterclockwise (CCW) to increase flow (speed).
3. Tighten lock nut.
4. To reset the work head cylinder (raise) flow control valve to factory setting turn the adjusting screw (Figure 34) counterclockwise (CW) all the way out, then 3 of a turn in clockwise (CW).

Figure 34



Drill Motor Flow Control Valve 15 GPM/1000 RPMS

1. Drill Motor flow control valves are located on the machine's both work head Manifold (Figure 35).

2. The drill motor flow control cartridges have tamper resistant covers that are pressed fitted onto the cartridge shoulder and are not adjustable.

3. To check the rpms of the drill motor use a digital tachometer with reflective tape for an accurate reading of drill motor rpms.

4. Turn off engine and install the reflective tap on the drill chuck for the drill motor being tested (Figure 36).

5. Start engine, turn on hydraulic pump, and set engine to full throttle (2400 rpms).

6. Manually override the drill motor directional control valve by pushing in the **push pin** (Figure 38) for the drill motor being tested.

7. Maximum speed of a drill is 1000 rpms.

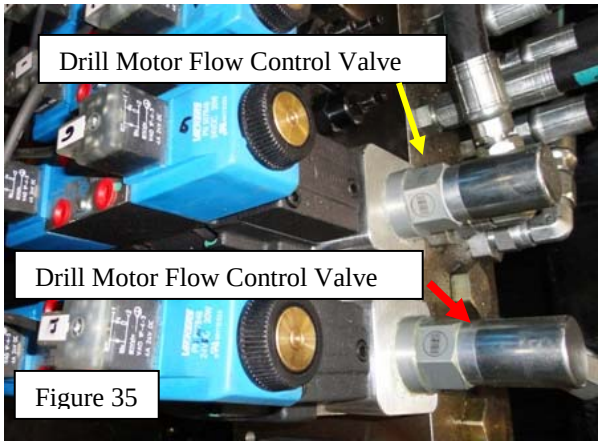


Figure 35

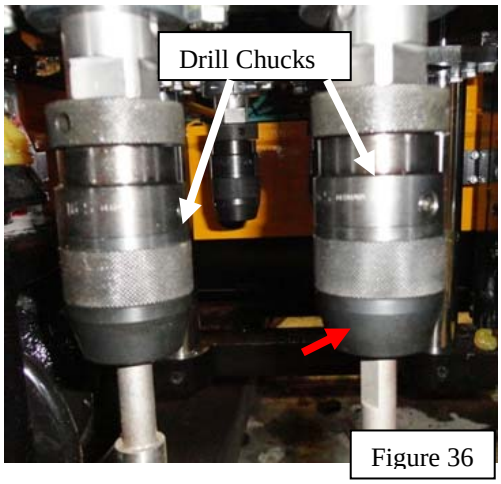


Figure 36

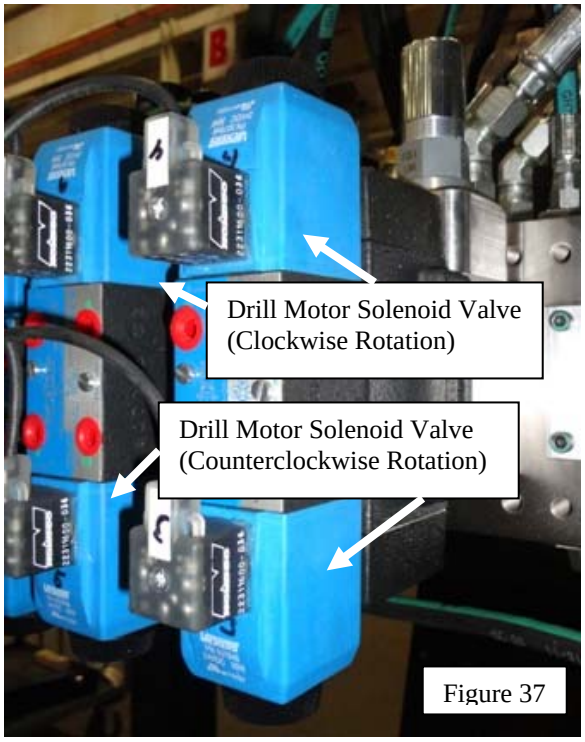


Figure 37

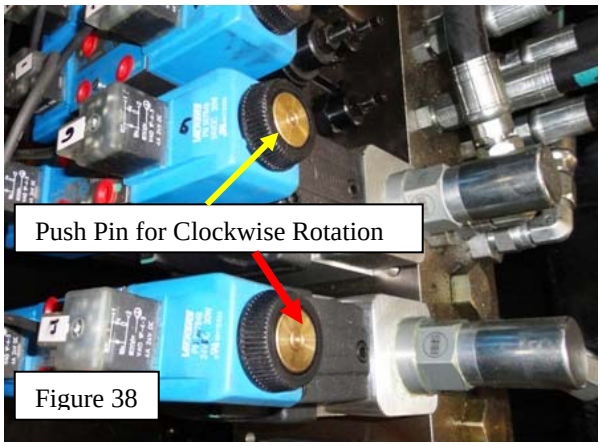


Figure 38

Joystick (SPOTTING) Pressure Reducing Valve 1500 PSI

1. The joystick pressure reducing valve is in the brake manifold next to the right work head manifold.

2. Install a pressure gage at joystick pressure tap (Figure 39).

3. If pressure is higher than 1500 psi, loosen the joystick pressure reducing valve adjusting screw lock nut (Figure 40) and turn the adjusting screw counterclockwise (CCW) until pressure reads 1500 psi.

4. Tighten lock nut.

5. If pressure is lower than 1500 psi, loosen the joystick pressure reducing valve adjusting screw lock nut (Figure 40) and turn the adjusting screw clockwise (CW) until pressure reads 1500 psi.

6. Tighten lock nut.

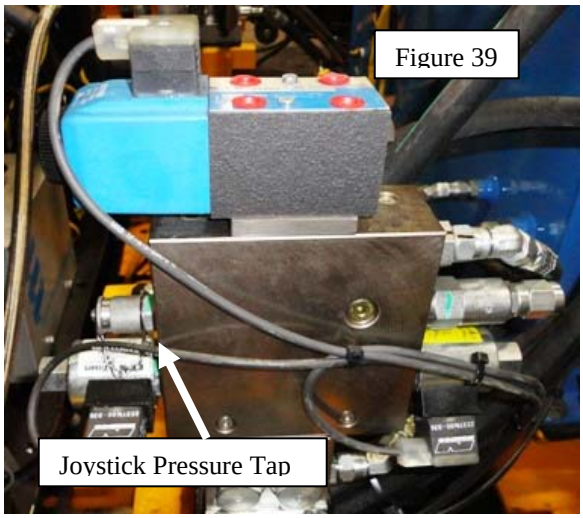


Figure 39

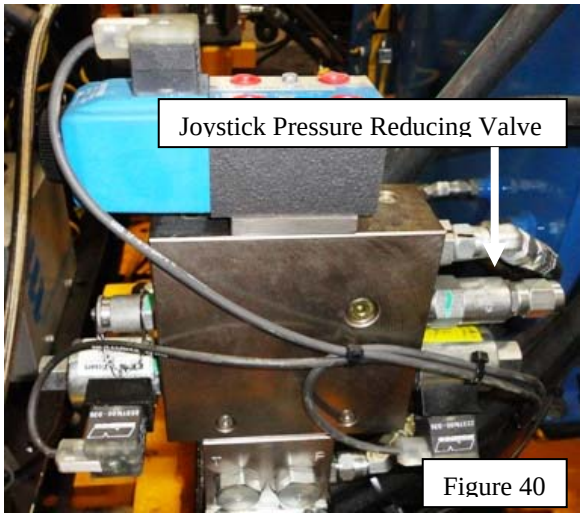


Figure 40

POWER LOCK UP MANIFOLDS

Power Lock Up Pressure Reducing Valve

1. Install a hydraulic pressure gage in the power lock up pressure (IN) line (Figure 41).

2. Start engine and turn on pump.

3. If pressure is higher than 700 psi, loosen the power lock up pressure reducing valve adjusting screw lock nut (Figure 42) and turn the adjusting screw out counterclockwise (CCW) until pressure reads any where between 600 to 700 psi, tighten lock nut.

4. If pressure is lower than 700 psi, loosen the power lock up pressure reducing valve adjusting screw lock nut (Figure 42) and turn the adjusting screw in clockwise (CW) until pressure reads any where between 600 to 700 psi, tighten lock nut.

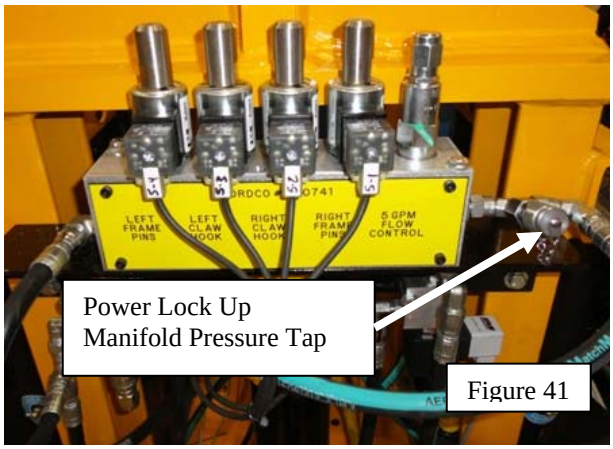


Figure 41

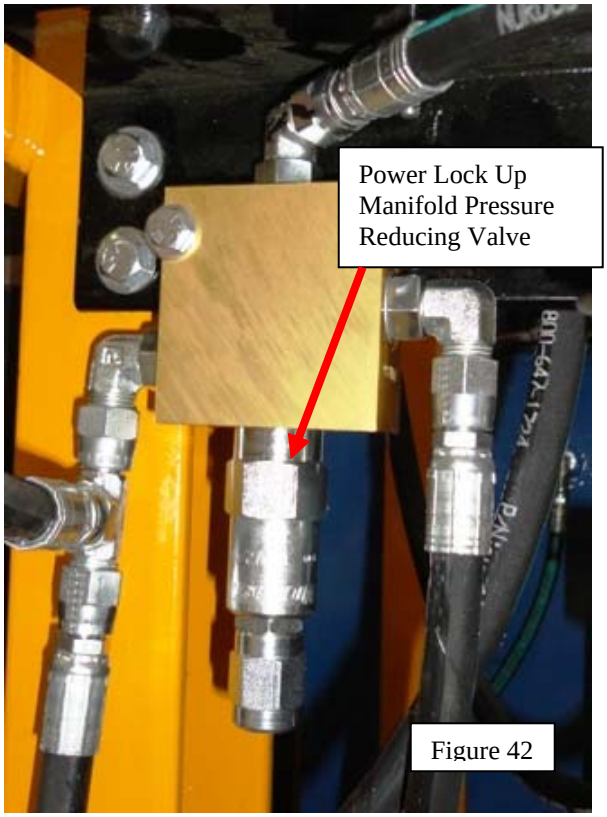


Figure 42

POWER LOCK UP MANIFOLD

Power Lock Up Flow Control Valve

1. Valve maintains a constant flow regardless of pressure changes downstream.
2. Valve is factory set, to reset remove protective cap and loosen lock nut (Figure 43), turning in flow adjusting screw all the way in clockwise (CW) until it bottoms out.

Figure 43

Emergency Pump Pressure Relief Valve 2250 PSI (OPTION)

1. Install a pressure gage at the emergency pump pressure tap (Figure 44).
2. Turn on emergency pump switch (Figure 45) and read pressure at gage.

⚠ CAUTION

Operate the 24 volt emergency pump in intervals for a maximum of 15 seconds at a time. The 24 volt emergency pump is designed for emergency use ONLY and is NOT to be run continuously.

3. If pressure is higher than 2250 psi remove protective cap and loosen up lock nut (Figure 44).Turn adjusting screw out counterclockwise to decrease pressure.
4. Tighten lock nut & install cap.
5. If pressure is lower than 2250 psi remove cap and loosen up lock nut (Figure 46). Turn adjusting screw in clockwise to increase pressure.
6. Tighten lock nut & install cap.

Figure 44

Figure 45

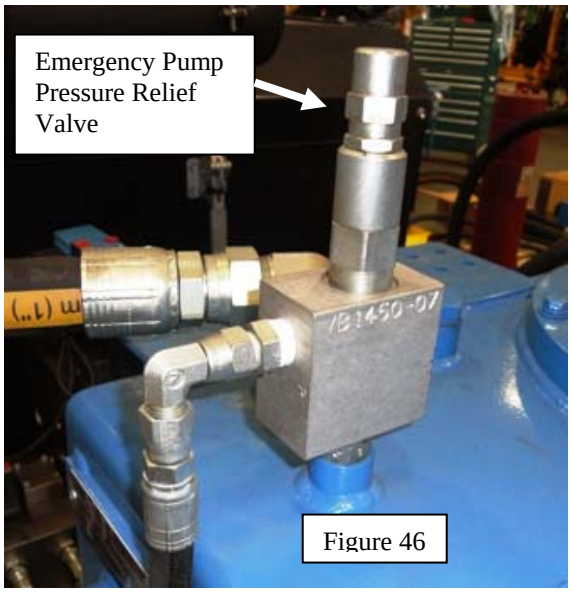


Figure 46

Suction Line Filter

This machine is equipped with a lockout device as a replacement for a handle on the suction strainer. This lockout prevents the valve from being opened or closed without the operator's knowledge.

The suction line strainer is located on the right side of the reservoir (Figure 47), remove and inspect the filter after the first 40 hours of operation and refer to Hydraulic Component Maintenance Schedule inspection for designated intervals.

To access suction line filter cartridge:

1. Turn off engine.
2. Remove Lock out device & plug (Figure 47).
3. Turn socket head cap screw (Figure 48) out counterclockwise OUT) till it stops.
   Do not try removing screw!
4. Turn the six front cover cap screws (Figure 48) out counterclockwise and lift off the front cover.
5. Remove and clean suction line strainer.
6. When suction line strainer is cleaned reinstall.
7. Install front cover and six cap screws.
8. Turn socket head cap screw (Figure 48) in clockwise till it stops.
9. Replace the plug.
10. Put padlock (Lockout) back on and secure.

NOTE: If for any reason when removing the suction line filter for any length of time, seal the hydraulic tank opening to prevent external contamination.

Contamination on the outlet side of the filters can be flushed into the system and cause malfunctions. Contamination on the inlet side reduces the life of the filter element.

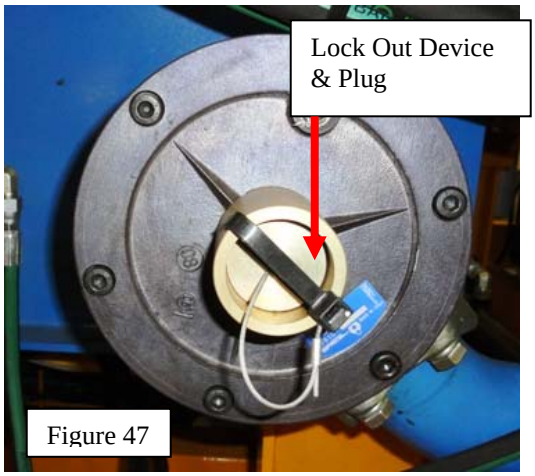


Figure 47

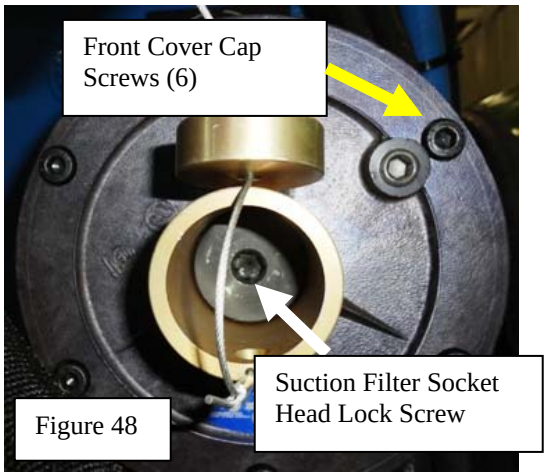


Figure 48

Manifold Warm Up System Valve

The warm up system valve is installed on the Quad Drill Machine as an option where the machine may be exposed to cold conditions to aid in bringing the hydraulic oil in the reservoir to operating temperature.

⚠ CAUTION

The Quad Drill should not be put into High speed or high pressure operation UNTILL the hydraulic fluid is warmed up to operational temperature (plus 70 degrees Fahrenheit).

The following conditions will occur:

Pump cavitation – at lower temperatures the oil is too viscous (thicker) to easily flow into the pump inlet.

There will be slow / sluggish operation of hydraulic components.
Lubrication of hydraulic internal components will be reduced.

Fillters will be by passing because of the higher back pressure to flow. Thus contamination will not be removed until the temperature of the oil is at operational temperature.

If equipped the Manifold Warm Up System Valve is located on the right side of machine next to the turn table valve. Figure 49 shows the manifold warm up valve in the closed (OFF) position.

1. After starting the engine, turn on pump, and turn the warm up system valve to the **ON** position, when starting up the Quad Drill when the temperature is below 32 degrees Fahrenheit / 0 degrees Celsius.
2. If the oil in the reservoir reaches 120 degrees Fahrenheit turn OFF the Warm Up System Valve. Off is perpendicular to the flow through the hoses.
3. At temperatures below 32 degrees Fahrenheit / 0 degrees Celsius, continue to observe the hydraulic fluid temperature through out the work day and while the machine is idle.

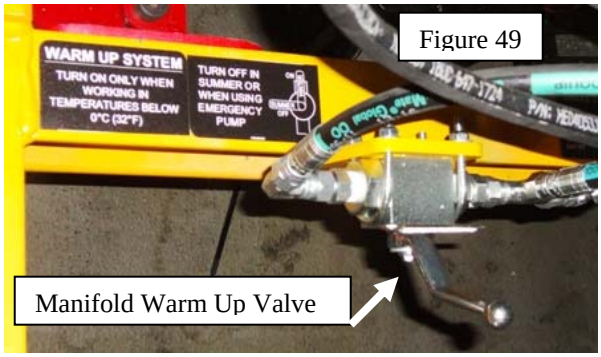


Figure 49

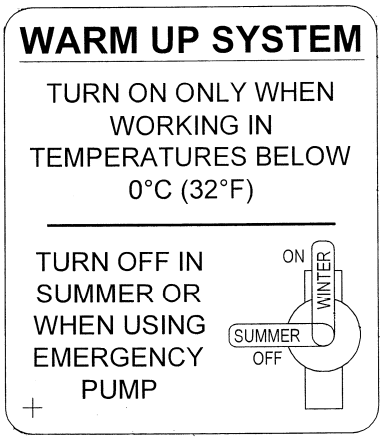


Figure 50

Auxiliary Manifold For Hydraulic Tools: (OPTION)

CAUTION

1. Always turn OFF the flow controls valves (Figure 51) on any tool circuit not being used or when shutting a hydraulic tool system off.
2. Check that the flow control valve (Figure 51) is OFF (turn counterclockwise) before attempting to connect tool hoses.
3. Always wipe/clean hydraulic tool couplers before connecting to prevent contaminating hydraulic system (Figure 52 & 54).
4. A return hose may be connected to either tank return couplers.
5. In cold weather, bring hydraulic oil to above 50 degrees Fahrenheit before applying any load to the tool being used.

Procedure for connecting 10 GPM Power Tool to Hydraulic Tool Outlet Manifold:

1. Turn off engine.
2. Verify that the power tool shut off valve is in the OFF position (Figure 51). The valve handle will be perpendicular to hose. Located on the left side of machine behind the cab..
3. Connect the hoses to the **10 GPM and tank** tool quick couplers marked (Figure 52), and turn BOTH GPM valves to the full ON Position (Figure 53).
4. Turn the power tool shut off valve to the ON position (Figure 51). The valve handle will be parallel to the hydraulic hose

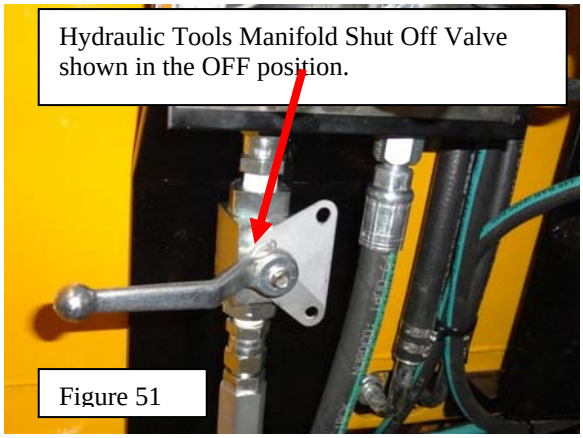


Figure 51

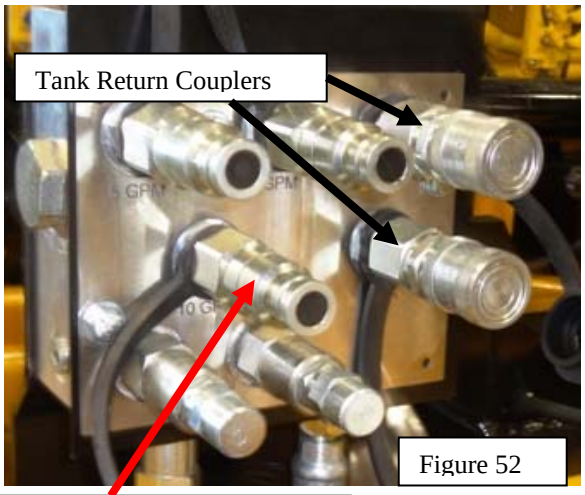


Figure 52

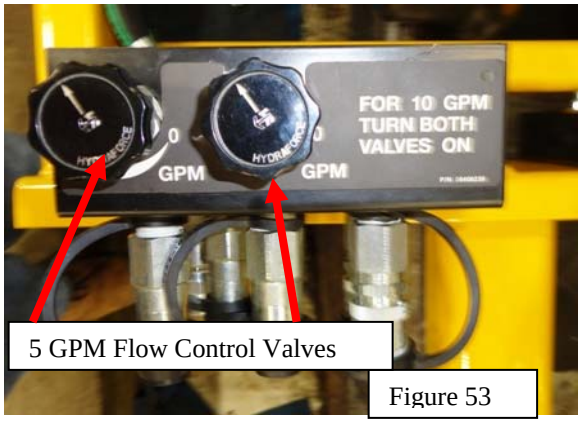


Figure 53

Procedure for connecting 5 GPM power tool to Hydraulic Tool Outlet Manifold:

1. Turn off engine.
2. Verify that the power tool shut off valve is in the OFF position (Figure 51). The valve handle will be perpendicular to hose. Located on the left side of machine behind the cab..
3. Connect the hoses to either **5 GPM and tan** tool quick couplers (Figure 54), and turn BOTH VALVES to the full ON Position (Figure 51).
4. Turn the power tool shut off valve to the ON position (Figure 51). The valve handle will be parallel to the hydraulic hose.

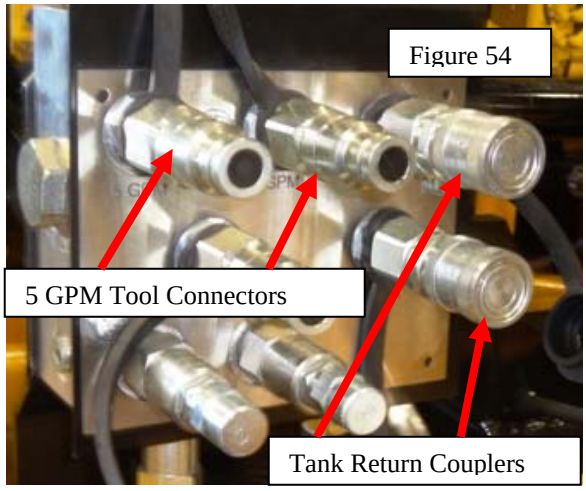


Figure 54

NOTE: The hydraulic manifold will provide hydraulic oil for:

1. **One 10 GPM tool**
2. **One 5 GPM Tool**
3. **Two 5 GPM tools used at the same time**

Auxiliary Manifold Pressure Relief Valve

1. Turn off engine.
2. Verify that the power tool shut off valve is in the OFF position (Figure 51). The valve handle will be perpendicular to hose. Located on the end of brake manifold on the right front machine.
3. Install a pressure gage at the 5 GPM tool connector that needs to be tested (Figure 54).
4. Install a pressure gage at the main system pressure port (Figure 53) on main hydraulic pump pressure line.
5. Turn on pump and open power tool shut off valve to the ON position (Figure 51).
6. Check for 2500 psi pressure at the main system pressure port (Figure 55). If not reading 2500 Psi, refer to the Pump Pressure Compensator adjustment procedures.
7. Check pressure gage at the 5 GPM tool circuit that is being tested.
8. If pressure is higher than 2450 psi, loosen the lock nut on the 5 GPM pressure reducing valve adjusting screw (Figure 56) and turn adjusting screw clockwise (CW) until pressure reads 2450 psi.
9. Tighten lock nut and install protective cap.
10. If pressure is higher than 2450 psi, loosen the lock nut on the 5 GPM pressure reducing valve adjusting screw (Figure 56) and turn adjusting screw counterclockwise (CCW) until pressure reads 2450 psi.
11. Tighten lock nut and install protective cap.

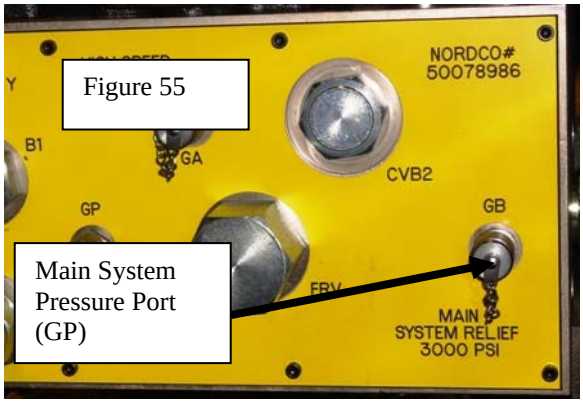


Figure 55

Main System Pressure Port (GP)

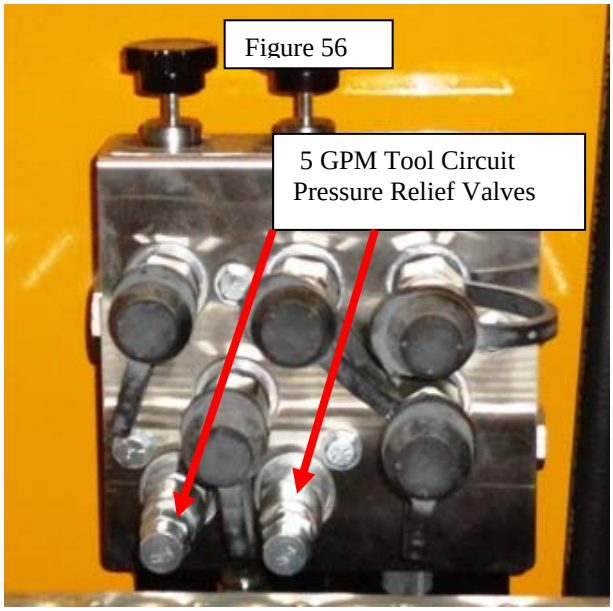


Figure 56

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. The QD2R Quad Drill is a group of rather simple systems. If you understand the basic workings of these systems individually and how they relate to each other, troubleshooting becomes a relatively simple task.

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.

⚠ CAUTION

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.

⚠ CAUTION

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.

⚠ WARNING

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.

6. While machine is running, and before working, inspect for leaks.

FLUID CONTAMINATION

The QD2R Quad Drill utilizes high pressures up to 2400 psi and 2500 RPM's engine speed, **Contamination** is an extreme issue that must always be addressed.

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.

Use a Beta 3 Micron 1000 Filter when adding oil to the reservoir (Refer to Service Parts Listing)

FILTERS

The right combination of filters (tank breather, suction, pressure, return, and case) will keep the oil in the hydraulic circuit clean and within the contamination code.

When replacing a hydraulic filter use a filter that is equal in quality to and has the same BETA RATING as the one Nordco installed on the QD2R Quad Drill (Refer to Service Parts Listing).

For a hydraulic filter to work in cleaning hydraulic oil, multiple passes are needed to remove all the contaminates to within contamination code.

LOCATING LEAK SOURCES

Petroleum oils are used in most hydraulic application to lubricate parts as well as transmit power. As oil temperature increases and as the hydraulic pressure rises, 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 tbe 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 Celsius) 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.

The number one cause of hose failure is abrasion, protection and secure hoses where possible.

HYDRAULIC SYSTEM TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTION
Hydraulic pump does not develop pressure	Shut-off valve closed. (NOTE: if pump is run with valve closed, pump damage will occur.)	Open valve completely.
	Main relief valve bypassing. (NOTE: oil blowing past any relief valve can cause oil to overheat.)	Increase pressure setting on relief valve. (See Pressure checks)
	Main pump compensator setting is too low.	Adjust compensator setting. (See Pressure Checks)
	Pump is defective.	Refer to pump manual or replace pump.
	Destroke valve stuck.	Repair or replace.
	Pump valve turned off.	Turn on.
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.
Hydraulic Oil Overheats	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)
	Oil lines damaged causing excessive internal restriction	Inspect and repair.
	Propulsion crossover relief setting too low.	Check and reset

PROBLEM	POSSIBLE CAUSE	SOLUTION
Hydraulic Oil Filter Restriction Indicator Light stays on all the time (optional equipment) Note: Hydraulic oil must be close to operating temperature (not cold) otherwise indicator may light up	Restricted (dirty) oil filter Hydraulic Oil Filter Restriction Indicator switch defective	Replace filter Replace switch
Hydraulic Oil Foams	Water in oil Using wrong oil Low hydraulic level Damaged hydraulic oil lines Air leak in suction line to hydraulic pump or pump shaft seal leaking	Inspect oil for water. Drain and add correct oil as specified under "RECOMMENDED LUBRICANTS". Drain and add correct oil as specified under "RECOMMENDED LUBRICANTS". Fill Inspect, repair or replace. Inspect, repair or replace.
Quad Drill will not propel	Brakes on/not releasing Hydraulic pump not developing pressure Main relief is defective – debris in valve allowing fluid back to tank One or both counterbalance valves is defective – debris in valve allowing fluid back to tank Defective hydraulic motor Propel directional control valve spool will not shift	See brake section below. Inspect, repair, or replace hydraulic motor. Inspect, repair, or replace main relief valve. Debris in valve, disassemble, inspect, clean, repair, or replace valve. Disassemble, inspect, clean, repair, or replace motor. Disassemble, inspect, clean, repair, or replace motor. .

PROBLEM	POSSIBLE CAUSE	SOLUTION
Multiple work head functions -- response is sluggish	Check system relief valve	See Hydraulic Instructions
	Check pump pressure compensator setting	See Hydraulic Instructions
	Internal system leaks	Worn internal parts – bad o-rings – Inspect and repair
	Hydraulic fluid viscosity above acceptable limits	Allow hydraulic oil to reach operating range.
	Check for problems in the valve's manifold	Disassemble, inspect, and repair
An individual work head (operation) function is slow or does not work	Check pressure reducing setting for that operation	See Hydraulic Instructions
	Directional control valve spool not shifting	Disassemble, inspect, repair or replace valve.
A Lock Up does not disengage	Check that lock up switch is in the unlock position	Put switch in unlock position
	Lock up solenoid valve not shifting	Check that coil is energized. If valve spool does not shift - disassemble, inspect, repair or replace valve.
	Check that cylinder is fully retracted to allow lock up mechanism move	Retract cylinder and try lock up again
	Flow control valve in manifold needs adjusting or debris blocking flow	Disassemble, inspect, repair, adjust or replace.
	With the Quad Drill in WORK MODE & when ELECTRICAL INTERLOCK BUTTON is pulled out the work head assembly should raise slightly first to allow lock ups to disengage.	Diagnose, inspect, & repair.
Emergency pump (electric/manual) Not developing pressure	Main pump ball valve not in closed position	Turn valve to closed position Caution return valve to open position when done and before starting engine.
	Check emergency pump pressure relief setting (electric)	See Hydraulic Instructions

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.