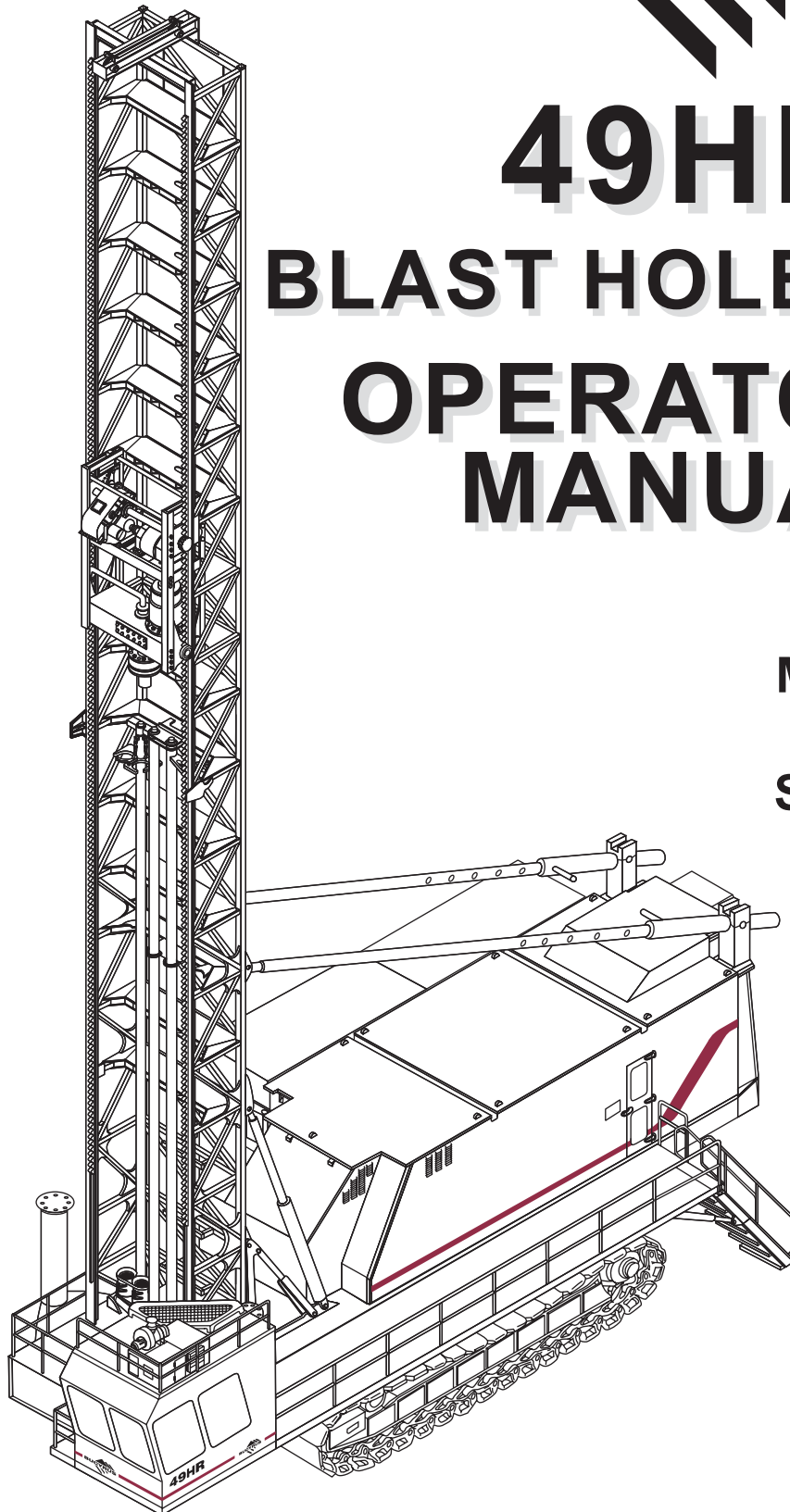




# 49HR BLAST HOLE DRILL OPERATOR'S MANUAL

Manual No.  
**10994**  
SN: 141363



141363mc.cdr Pg. 2

**Bucyrus International, Inc.**

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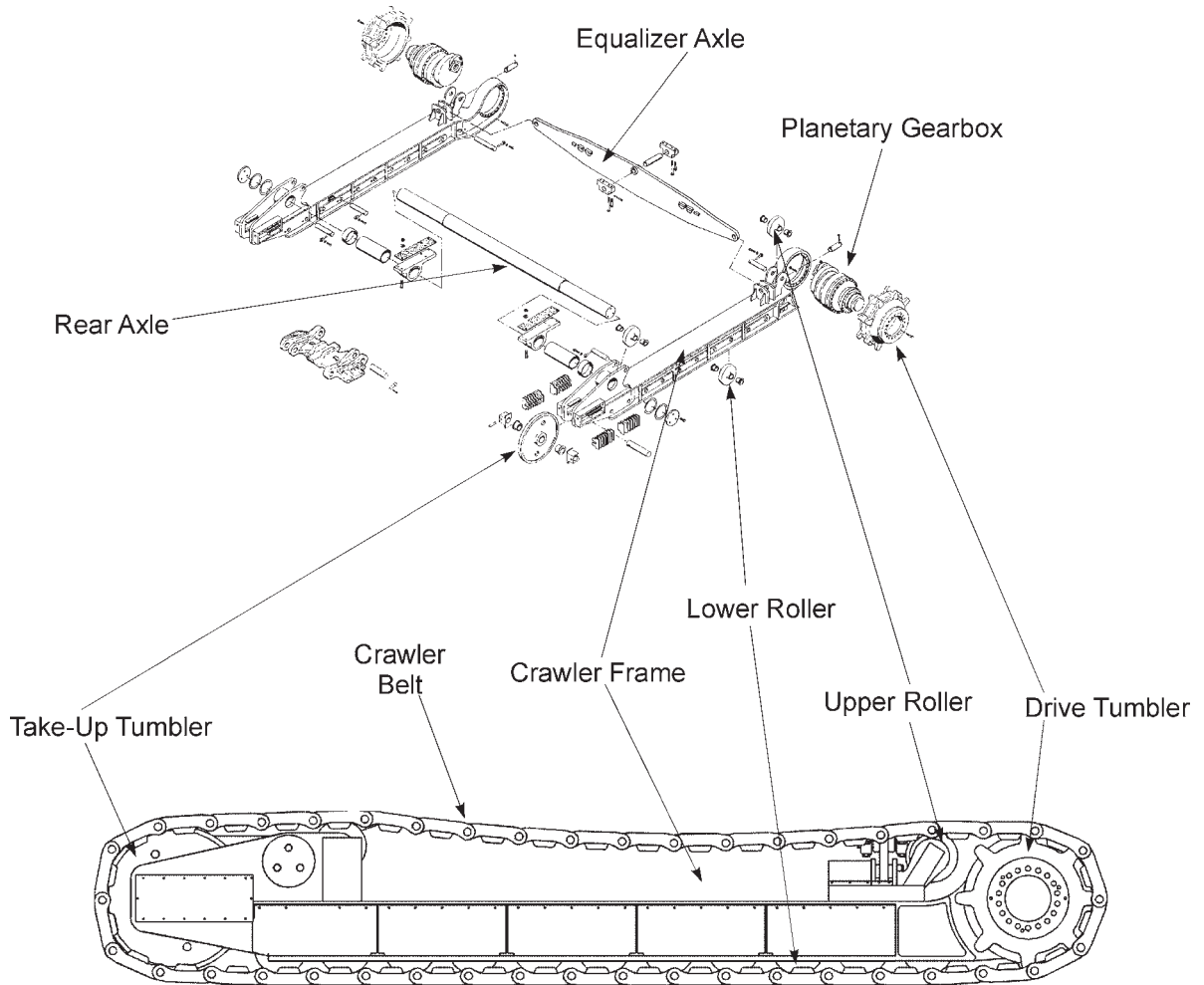
*Maintenance Precautions:*

- Do not wear rings, wristwatches or loose fitting clothing when working on machinery. They could get caught on moving parts causing serious injury.
- Always wear a safety belt or harness when the danger of falling exists.
- Always have a second person to monitor the lifeline when working in confined spaces.
- Do not start an engine indoors unless adequate exhaust ventilators are provided and in operation.
- Never utilize the machine air or hydraulic systems for support when working on the machine. Deactivate or isolate the entire system prior to performing maintenance.
- Equipment should be parked on level ground at all times during machine servicing and periods of idleness.
- Cranes and hoists must be of sufficient capacity to lift the heavier components (gearcases, etc.) Always work within the limitations of the equipment being utilized.
- Be sure heavy items are properly rigged and supported from cranes or hoists before removing supporting members from the machine.
- Utilize guide lines or ropes to minimize the swing of suspended heavy components.
- Have sufficient service personnel available when removing or installing large heavy items to maintain control at all times.
- Always use safety stands in conjunction with hydraulic jacks or hoists. Do not rely on the jack or hoist to carry the load, they could fail.
- When disassembling a machine, be sure to use safety stands and adequate cribbing to prevent tipping or rollover of components.
- When using an oxy/acetylene torch, always wear welding goggles and gloves. Keep a charged fire extinguisher within reach. Be sure the acetylene and oxygen tanks are separated by a metal shield and are chained to the cart.
- Use pullers to remove bearings, bushings, gears, cylinder sleeves, etc. when applicable. Use hammers, punches and chisels only when absolutely necessary. Always be sure to wear safety glasses.
- Use extreme caution when using compressed air to dry parts. Use approved air blowguns, do not exceed 30 PSI (207 kPa), wear safety glasses or goggles and use proper shielding to protect everyone in the work area.
- Be sure to promptly reinstall safety devices, guards or shields after adjusting and/or servicing the machine.
- Protective eye goggles should be worn at all times when working on the air conditioning system. Work on the air conditioning system only in a well ventilated area.
- Wipe away excess lubricants around bearings and gears. Never lubricate parts in motion.
- Always wear approved rubber gloves, and use insulated hooks or tongs when handling trail cable.



**PROPEL MACHINERY**

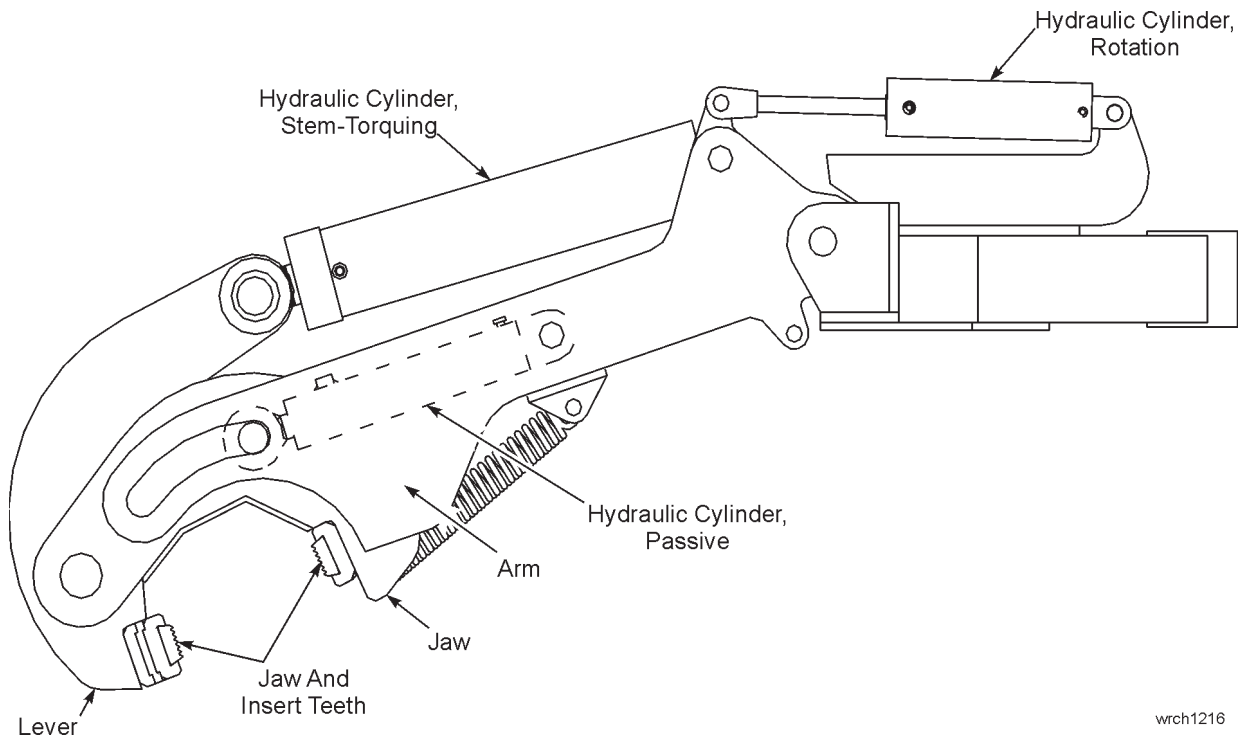
The propel system of this machine is a chainless hydraulic drive system which will allow the separate tracks to counter-rotate. This capability provides the machine with the capacity to turn completely around within its own length. Each track is driven by a hydraulic motor and a planetary gearbox equipped with a hydraulically released, spring activated brake. The machine is capable of 2 different propel speed ranges. The lower speed range is used for maneuvering in close spaces while the high speed range is used for tramping in open areas, over long distances.



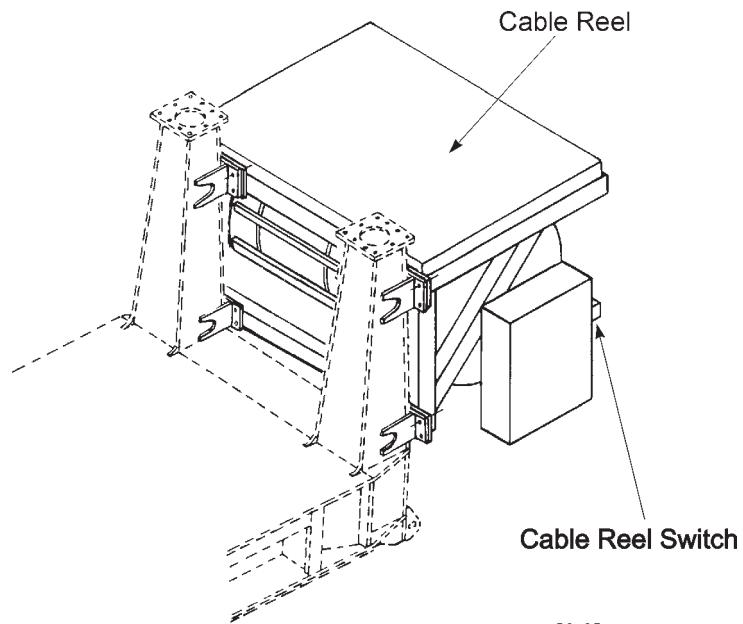
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### BREAKOUT WRENCH

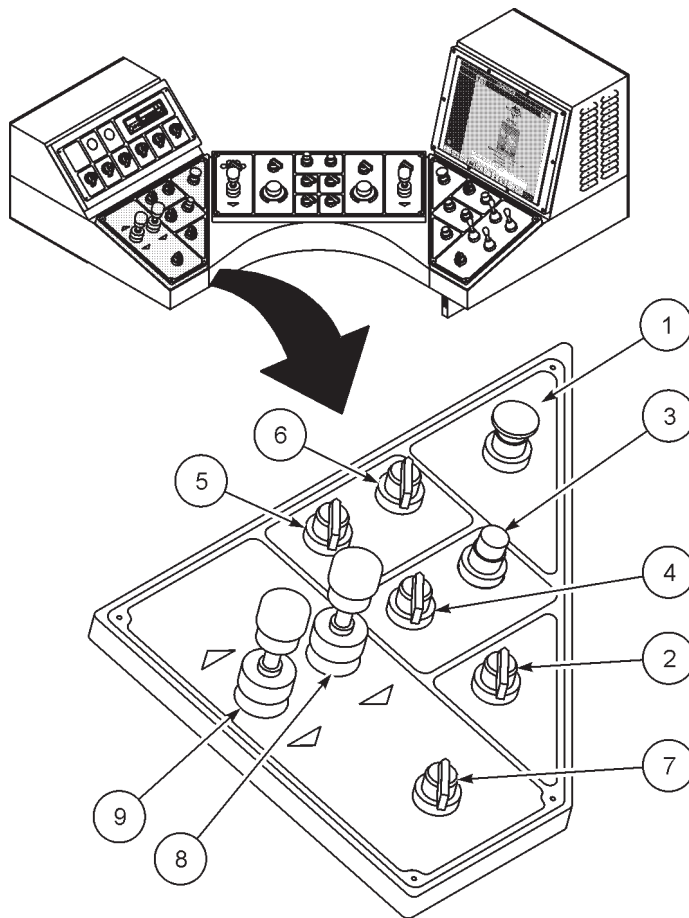


### CABLE REEL





## PROPEL CONTROL PANEL



1. Emergency Stop Pushbutton
2. Propel Speed Selector Switch
3. Compressor Stop Pushbutton
4. Compressor Vent/Drill Switch
5. HVAC Mode Selector Switch
6. HVAC Fan Speed Selector Switch
7. Operating Mode Selector Switch
8. Propel RH Crawler Joystick
9. Propel LH Crawler Joystick

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*Propel Control Panel - Overview*

### EMERGENCY STOP PUSH-BUTTON (Optional)

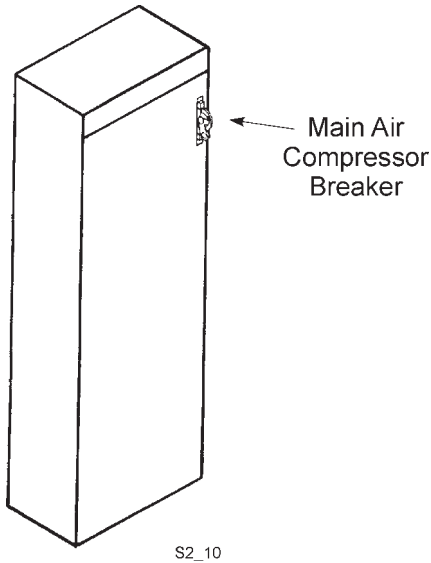
The emergency stop push-button (1) on the propel control panel is a large red mushroom head push-button switch. Pressing the emergency stop push-button will shut-down the air compressor, hydraulic systems and shut-off all controls. It will also simultaneously provide electrical and immediate mechanical braking. This button should therefore only be used if the operator intends the harshest braking for all motions.



**CAUTION: PRESSING THIS BUTTON WHEN ANY DRIVE IS IN MOTION MAY RESULT IN COMPONENT DAMAGE.**



**CONTROLS LOCATED ON LOW VOLTAGE START CABINET**

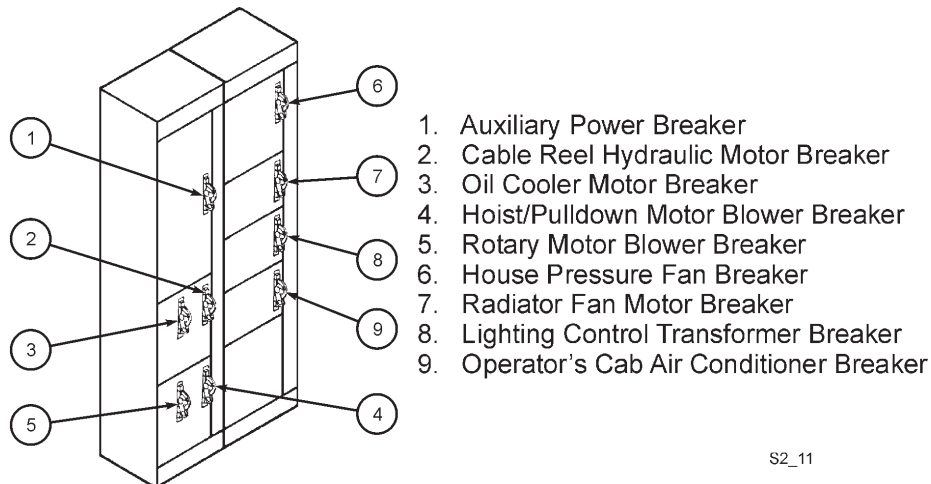


The low voltage start cabinet contains the breaker for the main compressor. Turning the breaker to the ON position will activate the compressor circuits, allowing the compressor to be started.

*Typical Low Voltage Start Cabinet*

**CONTROLS LOCATED ON LOW VOLTAGE CABINET**

The low voltage cabinet contains most of the breakers for the auxiliary equipment on the drill. Because of the variations of equipment supplied on a particular drill, a list of typical controls which might appear on the cabinet is shown in figure.



*Typical Low Voltage Cabinet*

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## **MACHINERY CHECK**

The following is a list of points and equipment that should be checked for proper operation immediately following start-up of the drill. If operating difficulties are not found during this procedure, they probably will not be noticed until some point in time at which the system or component will cease to function and cause serious damage to the machine.

1. Check the main air system for leaks.
2. Verify that the air compressor radiator fan is operating correctly. Check the coolant system for leaks.
3. Check for leaks in the hydraulic system.

## **BREAK-IN OF NEW COMPONENTS**

When a machine is new, is returned to service after a long period of storage, or is returned to service after major repairs, certain precautions must be taken upon initial start-up and for a time following the start-up. These precautions are necessary to insure that the full service life of the components is realized.

### **ROTARY DRIVE UNIT BREAK-IN**

Break-in of the rotary gear case is limited to reduced loading during the first 100 hours of operation and a complete oil change at the end of the break-in period.

This break-in period applies only to new gearcases or gearcases in which a new gear has been installed.

### **HOIST/PULLDOWN GEARCASE BREAK-IN**

Break-in for the hoist/pulldown gearcase is limited to reduced loading during the first 100 hours of operation and a complete oil change at the end of the break-in period.

The break-in period applies only to new gearcase or gearcases in which a new gear has been installed.

### **ELECTRIC MOTOR BREAK-IN**

Break-in of the rotary and hoist/pulldown motors is limited to reduced loading and inspection for the first 8 hours of operation. This break-in period is intended to spot any problems in the motors before they lead to serious damage to the motors or the machine. Inspection should include monitoring the motor temperature and listening for unusual noises which might indicate a problem. Inspection should also include verifying that all blower vents and intake openings are open.



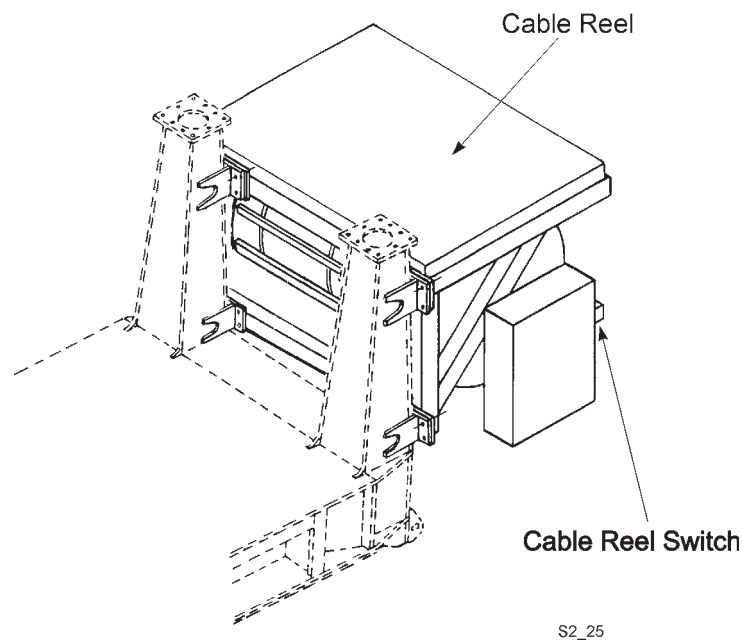
## CABLE REEL OPERATION

When the cable reel switch is in the AUTO position, is designed to pick up trail cable as the drill moves toward its power source. It is not designed to drag the trail cable over the ground.

The line pull is proportional to operating pressure. The correct line pull is when there is sufficient pull on the cable to wind it on the reel, but not too great to put unnecessary strain on the trail cable.

The line speed is dependent on the volume of hydraulic oil flowing through the system. The correct line speed is slightly faster than the travel speed of the drill.

To manually operate the cable reel, proceed as follows:



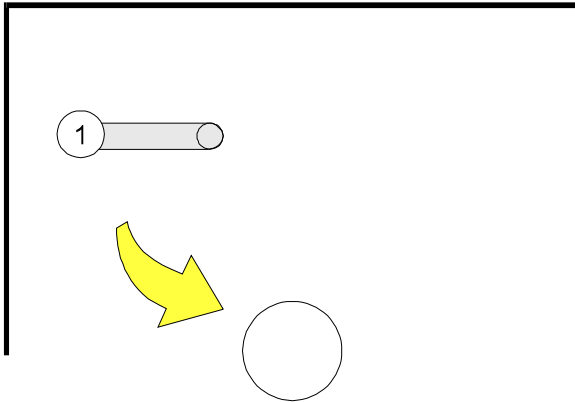
S2\_25

### *Cable Reel*

1. Start the main air compressor motor or turn ON the external cable reel switch. This will automatically start the cable reel hydraulic system motor. Allow the oil to circulate for about 5 minutes.
2. To spool the trail cable onto the reel, turn the cable reel switch to the REEL IN position.
3. To spool the trail cable off of the reel, turn the cable reel switch to the REEL OUT position.

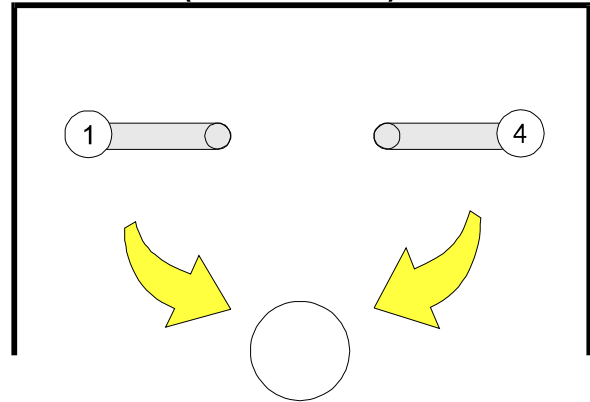


**1 PIPE RACK  
1 (STD. RACK)**



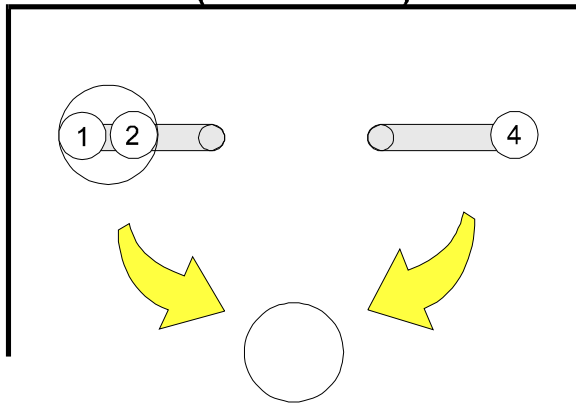
- A. Selector Switch in #1 Position
- B. Pull Joystick To Swing Out
- C. Push Joystick To Store Rack

**2 PIPE RACKS  
2 (STD. RACKS)**



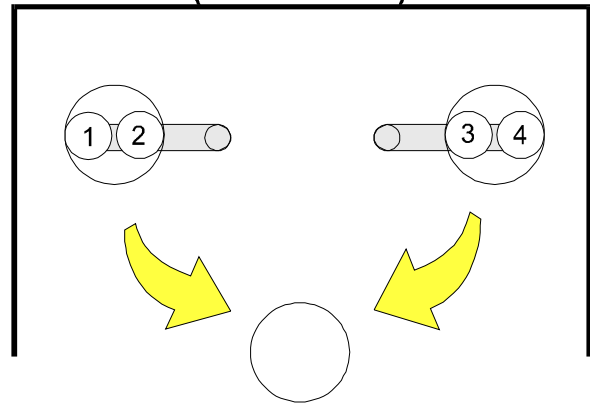
- A. Selector Switch In #1 Position - Left Rack or #4 Position - Right Rack
- B. Pull Joystick To Swing Out
- C. Push Joystick To Store Rack

**3 PIPE RACKS  
3 (STD. RACKS)**



- A. For Standard Rack Use Procedure For Right Rack of 2 Pipe Rack Arrangement
- B. For Carousel, Use Selector Switch In #1 Position
- C. Pull Joystick To Swing Carousel Out
- D. Push Joystick To Store Carousel
- E. To Rotate Carousel, Put Selector Switch In #2 Position
- F. Push Joystick To Rotate The Carousel In One Direction And Pull The Joystick To Rotate The Carousel In The Opposite Direction

**4 PIPE RACKS  
4 (STD. RACKS)**



- A. Carousel Operation Is Same As For Carousel For 3 Pipe Rack Arrangement
- B. Positions #1 And #4 Of The Selector Switch Control The Swing Out Of The Carousels
- C. Positions #2 And #3 Of The Selector Switch Control The Rotation Of The Carousels

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*Pipe Rack Operation*



## DRILL TOOL STRING DISASSEMBLY

The tool string is disassembled in reverse of assembly, that is the bit is removed first, then the drill pipe and lastly the stabilizer.

To remove the bit from the tool string, proceed as follows:

1. Raise the tool string 2 to 3 ft (0.6 to 0.9 m) above the drill deck. Install the bit basket in the hole in the drill deck.
2. Using the breakout wrench, break the joint between the stabilizer and the bit. After breaking the joint, use rotary power to disassemble the joint. Use a slight amount of hoist power to lift the tool string off of the bit to facilitate the disassembly.
3. Hoist the tool string 2 to 3 ft (0.6 to 0.9 m) off of the drill deck. Secure the rotary/pulldown unit and controls. Attach a lifting bell to the bit. Attach the auxiliary winch line to the lifting bell and lift the bit out of the bit basket.
4. After removing the bit, a new bit may be installed or the bit basket may be removed, allowing removal of the drill pipe.

To remove the drill pipe from the rotary drive unit, proceed as follows:

1. Lower the tool string until the slots on the upper end of the stabilizer are aligned with the tool wrench. Clamp the stabilizer in the tool wrench. Use the breakout wrench to break the joint between the stabilizer and the drill pipe. After breaking the joint, use the rotary unit to disassemble that joint completely. Raise the rotary/pulldown unit and drill pipe 2 to 3 ft (0.6 to 0.9 m).
2. Press the drill/propel control OFF push-button and set hoist brake. Go to the drill deck and clean the pocket of the pipe rack to be used of dirt, cuttings or any material that will interfere with the entrance of the pipe or the operation of the pipe rack gate controls. Verify that the gate controls are intact.
3. Clean and lubricate the threads and shoulder on the lower end of the pipe. This is to prevent rusting while stored in the pipe rack. After performing this function, return the controls to operating condition.
4. After selecting the pipe rack to be used by turning the pipe rack selector switch to #1 or #4, swing the pipe rack over the hole. Then return the joystick to the NEUTRAL position.
5. Slowly lower the rotary/pulldown unit and place the lower end of the pipe into the pipe rack pocket. Make sure that the pipe is seated firmly on the bottom of the pocket.



## ENDING THE HOLE

Once the finished hole depth is reached, normal drilling ceases. It is now necessary to ream the hole before preparing the drill to move to the next hole. Reaming the hole removes cuttings that have fallen to the bottom of the hole and also straightens and increases the diameter of the hole.

As the bit and tool string are cutting through the formation, the bit may tend to wander slightly. This wandering is due to the fact that the stabilizer cannot be exactly the same diameter of the bit or it would wear out quickly and create operation problems. The stabilizer tends to keep the bit on course, but it cannot keep the hole exactly straight. Reaming the hole straightens the hole and therefore increases the diameter of the hole slightly. Reaming the hole also removes any cuttings that are lodged in the hole. These cuttings must be removed or they will eventually fall to the bottom of the hole, reducing the drilling depth.

To complete the drilling procedure the hole is reamed as follows:

1. When the hole is drilled to the finished depth, leave the main air stream on and the rotary rheostat to the MINIMUM position and the motion activated. Return the hoist/pulldown rheostat to the "0" position and set the hoist brake. Allow the tool string to rotate and the air to bail the hole for a moment. This removes all of the cuttings in suspension from the hole.
2. Turn the hoist/pulldown speed selector switch to the LOW HOIST position and the hoist/pulldown rheostat in the HOIST direction while simultaneously releasing the hoist brake. Slowly hoist the tool string out of the hole. If resistance is met, or if vibration increases, return the hoist/pulldown rheostat to "0" position and set the hoist brake. Allow the obstruction to be removed by the bit before continuing. If the hole is very crooked (indicating a worn stabilizer) it may be necessary to repeat this procedure of hoisting, then stopping and allowing the bit to clear, many times before reaching the top of the hole. This procedure straightens the hole and allows the tool string to be removed.
3. Once the tool string has been removed and the hole reamed, it must now be cleaned out. Reaming the hole loosens cuttings that have become lodged in the side of the hole. These cuttings, and most of the cuttings generated during reaming will fall to the bottom of the hole. This filling of the hole may reduce the actual depth of the hole significantly, so it is necessary to remove these cuttings from the hole. To do this, release the hoist brake and turn the hoist/pulldown rheostat slowly in the pulldown mode.

Leave the air on and the tool string turning at 25-30 RPM. When the bit reaches the point where the cuttings have accumulated on the bottom of the hole, these cuttings will be forced out of the hole. When the cuttings have been cleaned out of the bottom of the hole, the bit will contact the undrilled formation at the bottom of the hole and stop penetrating. Once the flow of cuttings out of the hole stops and the tool string stops penetrating, the hole is clean.

4. After cleaning the hole the tool string may be raised to the top. Turning the hoist/pulldown rheostat control in the HOIST direction and the hoist/pulldown speed selector switch in the HOIST HIGH position will hoist the tool string.



9. Place hoist brake control in the RELEASE position.
10. On the operator's display terminal with operator's display showing, press keypad button F5 to turn on P.D.C. The readout above the F5 key will then read "PDC on."

After the above start-up procedure has been initiated the automatic controls will take over the actual drilling of the hole. Water injection (if so equipped) will be shut off at preset depth. When the total depth of the hole is reached, as preset, the tool string will be automatically hoisted and when the bit approaches the top of the hole, the control will stop the bit, shut off the air and set the hoist brake.

If problems arise in the P.D.C. functions, the system will have to be corrected by a qualified electrician. In most cases, if a malfunction occurs in the automated system, the automated system can be turned off and the drilling completed manually.

## PREPARING TO MOVE

Once the hole has been completed and the tool string removed from the hole, it is necessary to move the drill to the next hole location to prepare to drill the next hole. Preparing to move the drill consists of proper storage of the tool string, lowering the machine to the ground, and inspection of the machine and travel route prior to propelling.

To prepare the drill to move, proceed as follows:

1. Upon completion of the current hole, hoist the tool string from the hole. If using multiple pipe sections, remove and store all pipe necessary to remove the entire tool string from the hole. Turn off the dust control system and raise the dust curtains.
2. Clamp the stabilizer with the tool wrench to prevent movement of the tool string during propel.



**CAUTION:** Do not propel with the tool string in a position where it will be struck against the ground while propelling. Should the tool string hit the ground while propelling, damage to the machine and tool string will result.

3. Turn the automatic leveling switch to the RETRACT position to raise the jacks and lower the machine. Hold the switch in the RETRACT position until the jacks are fully retracted. Refer to the auto leveling screen on the operator's display terminal to verify all four jacks are fully retracted.

**NOTE:** If the machine is to be lowered manually, refer to steps 4, 5 and 6 and operator's display terminal screen auto leveling.

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