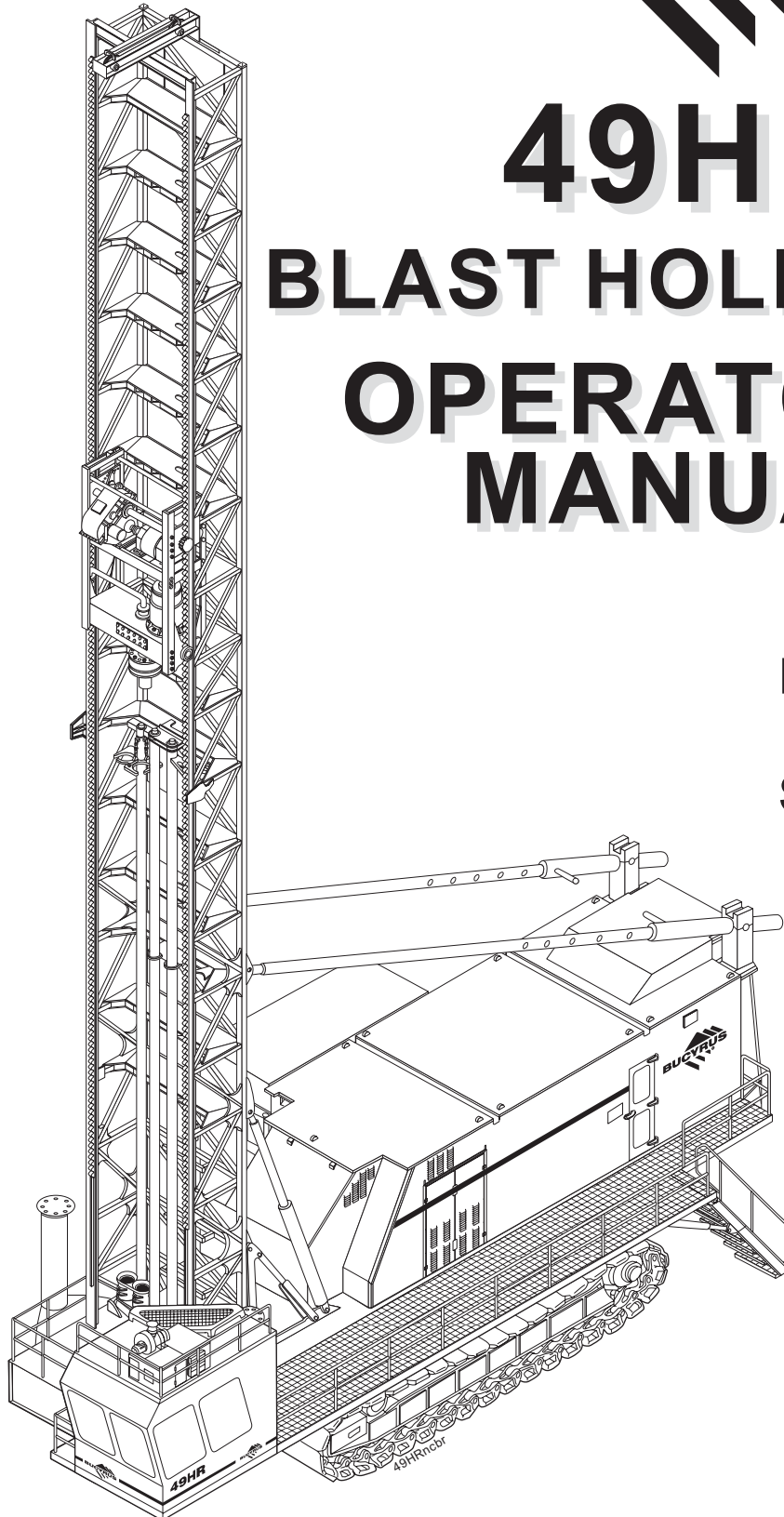




# 49HR BLAST HOLE DRILL OPERATOR'S MANUAL

Manual No.  
**10380**  
SN: 141199



141199mc.cdr Pg. 2

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## SAFETY PRECAUTIONS

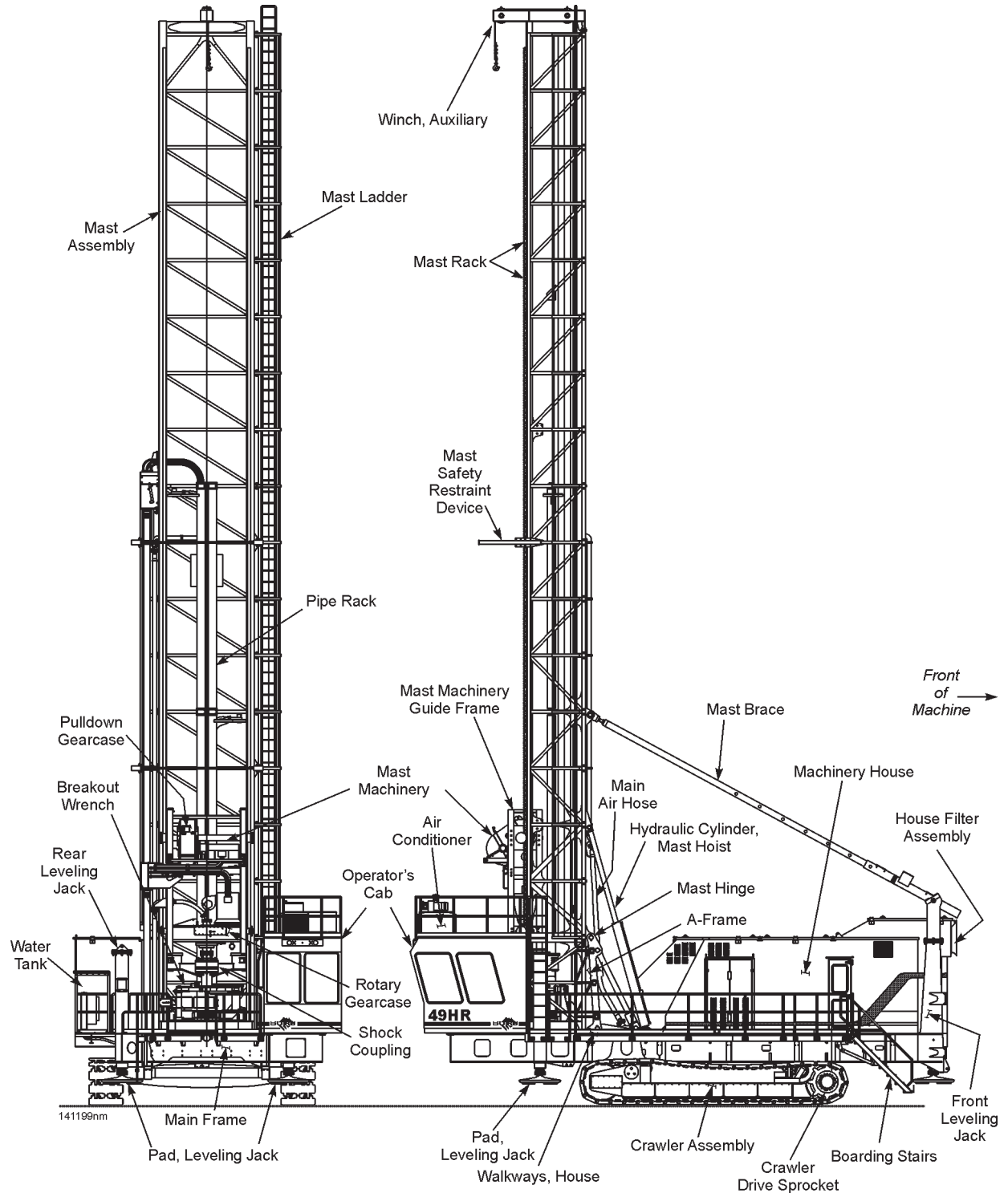
### *General Precautions:*

- The employment of qualified maintenance personnel, through a scheduled maintenance program, is the best way to minimize machine downtime and maximize productivity of equipment.
- Keep hands, feet, and clothing away from rotating parts.
- Wear a hard hat, safety shoes and protective lenses at all times.
- Replace any and all safety and warning placards if they are defaced or removed from the machine.
- Think before you act. Carelessness is one luxury the service man cannot afford.
- Excessive or repeated skin contact with sealants or solvents may cause skin irritation. In case of skin contact refer to the Material Safety Data Sheet (MSDS) for that material and the suggested method of cleanup.
- Inspect safety catches (keepers) on all hoist hooks. Do not take a chance, the load could slip off of the hook if they are not functioning properly.
- If a heavy item begins to fall, let it fall, don't try to catch it.
- Keep your work area organized and clean. Wipe up oil or spills of any kind immediately. Keep tools and parts off of the ground. Eliminate the possibility of a fall, slipping or tripping.
- Floors, walkways and stairways must be clean and dry. After fluid draining operations be sure all spillage is cleaned up.
- Electrical cords and wet metal floors make a dangerous combination.
- Regularly inspect for any loose bolts or locking devices and properly secure them.
- Use extreme caution while working near any electrical lines or equipment whether it be high or low voltage. Never attempt electrical repairs unless you are qualified.
- Check limit switches for proper operation.
- After servicing, be sure all tools, parts or servicing equipment are removed from the machine and secured in an appropriate storage area.
- Mechanical Brakes are designed for use as static holding brakes only. Use as a motion (dynamic) brake in emergency situations only.
- Use proper interior and exterior lighting.
- Install and maintain proper grounding and ground fault protection systems.
- Perform functional tests of all safety circuits.
- Allow electrical inspection and maintenance to be performed only by a qualified electrician.
- Use extreme caution when working around drilled holes.



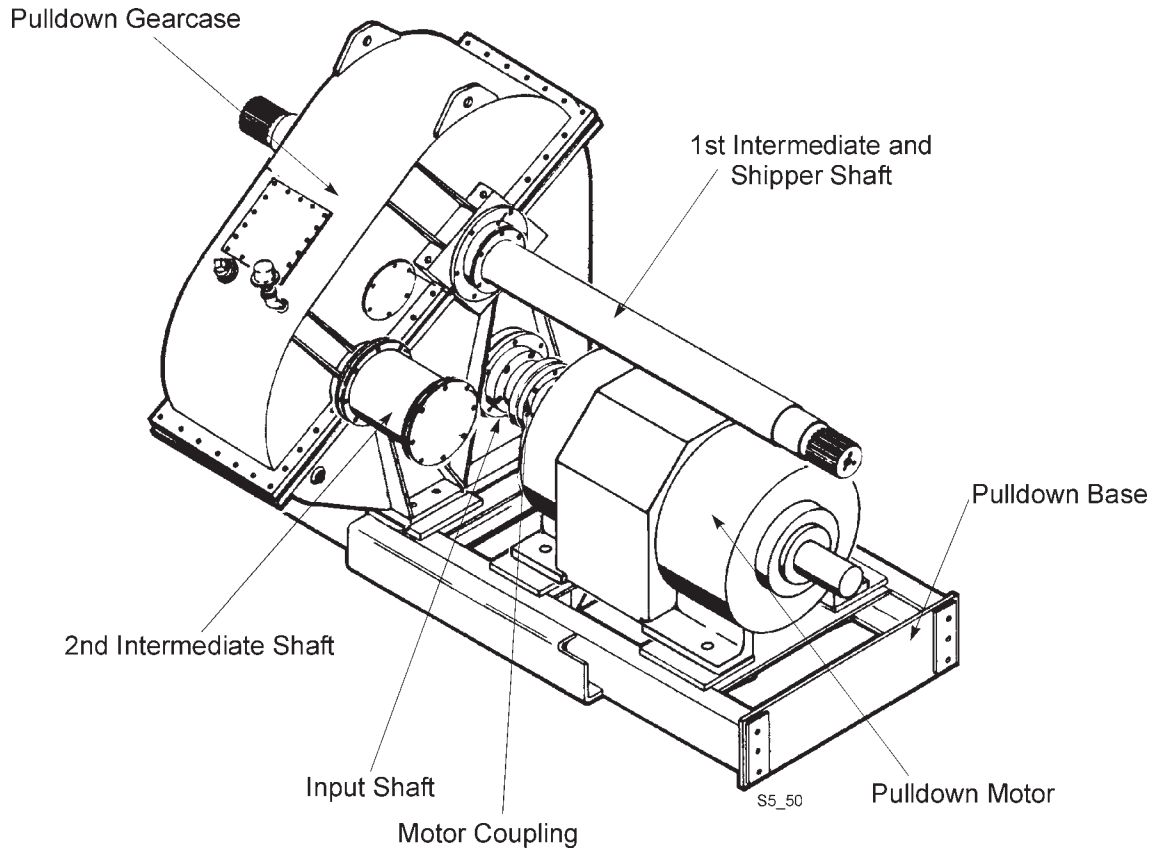
**MACHINE OVERVIEW**

This machine is designed and constructed to provide efficient service under the most severe conditions. It is built to the highest possible standards and will provide trouble free operation if properly maintained.





**PULLDOWN GEARCASE**





**TOOL WRENCH SWITCH**

The tool wrench switch (12) is a three-position spring return switch. Turning the switch to the EXTEND position will cause the tool wrench to extend to clamp the drill pipe. Turning the switch to the RETRACT position will retract the wrench, releasing the drill pipe. This switch is functional whenever the hydraulic pumps are running.

**DUST CURTAIN SWITCH**

The dust curtain switch (13) is a three-position switch. Turning the switch to the UP position will raise the dust curtains. Turning it to the LOWER position will lower the dust curtains.

In the AUTO position, the curtains are raised automatically when the operating mode selector switch on the propel control panel is in the PRIMARY PROPEL, SECONDARY PROPEL, or REMOTE PROPEL position. The curtains are not lowered automatically, but must be lowered by moving the switch to the LOWER position.

**BIT VIEW HATCH SWITCH**

This is a two-position switch (14) that is used to move the hatch for viewing the drill bit on the ground. Moving the switch to the CLOSE position will close the hatch. Turning the switch to the OPEN position will open the hatch.

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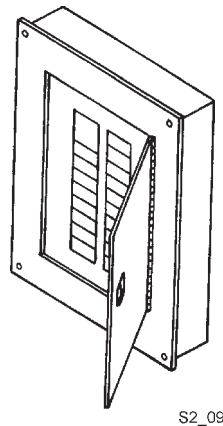
## MACHINERY HOUSE CONTROLS

**NOTE:** The controls shown on the following illustrations are typical of the controls on a machine. Because of the variations of controls that can be supplied for customers needs, be sure to become acquainted with the controls on the cabinets of your machine. All controls will be identified with nameplates.

### LIGHTING LOAD CENTER

The lighting load center is located on the right side of the front wall of the machinery house.

The lighting load center contains the breakers to control the interior and exterior lights and various auxiliary functions.



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### LIGHTING LOAD CENTER

Each breaker is labeled as to its particular function on any particular machine.

The controls are three-position lever operated circuit breakers. Moving the lever in one direction (ON) will close the circuit, while moving it in the opposite direction (OFF) will open the circuit. The center position is the tripped position. The breaker may be reset by moving the lever to the OFF position and then back to the ON position.

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## START-UP

Start-up of the drill is not a difficult operation, but it is very important. Improper start-up could cause various safety and operating difficulties as well as damage to the machine. Following the step-by-step procedure listed below to start the machine will help reduce the possibility of accidental injury or machine damage.

### MACHINE START UP

**NOTE:** THE MACHINE IS TO BE STARTED ONLY AFTER THE PRESTART INSPECTION AND LUBRICATION AS DETAILED EARLIER IN THIS SECTION, HAVE BEEN COMPLETED.

1. Go into the operator's cab and verify that all controls on the operator's console are in the off or neutral position. Be sure that the EMERGENCY STOP push-button is in the pulled-up position.

**NOTE:** ON SOME MACHINES THERE ARE TWO OR MORE EMERGENCY STOP PUSH-BUTTONS. BE SURE THESE PUSH-BUTTONS ARE IN THE PULLED-UP POSITION.

2. Go to the machinery house to the low voltage start cabinet. Turn on the main compressor breaker.
3. On the low voltage cabinet turn all the breakers to the ON position.
4. On the programmable controller cabinet verify that the lockout control push-button is in the RELEASED position. Turn the house pressurization fan switch to the desired operating position. Verify that the operator's display terminal power supply, PLC input and PLC output breakers are in the ON position,
5. Press the air compressor start push-button on the programmable controller cabinet to start the main compressor.

**NOTE:** If the ambient temperature is below 32°F (0°C), the machine will normally use special fluids in the hydraulic system and/or heaters for the system.

When the machine is shutdown, temporarily or for an extended time, power should be left on the machine to maintain heater operation. If power is removed at shutdown, the machine fluids should be warmed to at least 32°F (0°C) before attempting to start the machine.





## PIPE RACK OPERATION

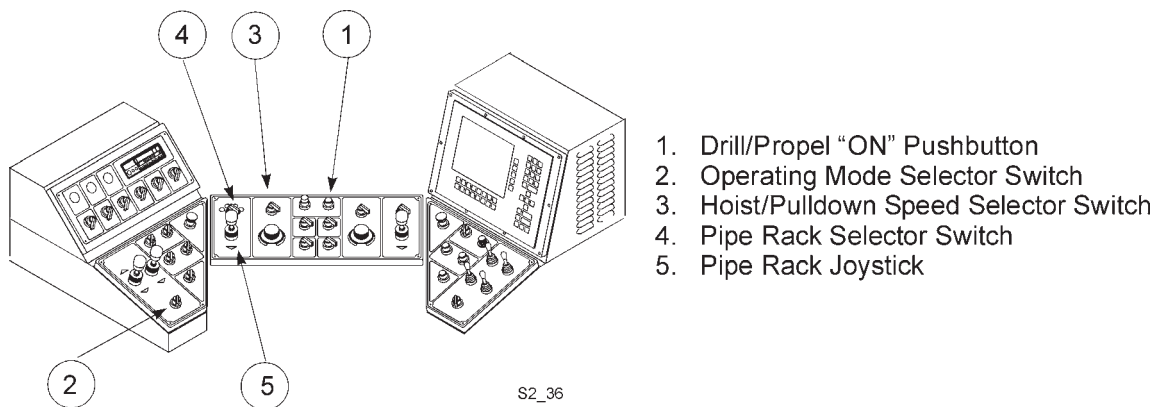
The machine can be equipped with 1 to 4 pipe racks and depending upon the number of pipe racks the pipe rack configuration and operation will be different.

On a machine with one pipe rack, the rack will be on a swing out arm and will be in #1 position .

On a machine with two pipe racks, the racks will be on swing out arms and will be in #1 and #4 positions.

On a machine with three pipe racks, two pipe racks will be located on a carousel that swings out and then is rotated. This carousel houses pipe racks in #1 and #2 positions as shown. The third pipe rack is a swing out rack that will be in #4 position.

On a machine with four pipe racks, there are two swing out carousels with two racks in each carousel. The carousels rotate to make each rack available for use. The left carousel houses racks #1 and #2 and the right carousel racks #3 and #4.



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### PIPE RACK OPERATING CONTROLS

The general method of operating the pipe racks is as follows:

1. Place the operating mode selector switch in the DRILL position. The main air compressor must be energized.
2. Verify that the operating mode selector switch is in the DRILL position and that the hoist/pulldown speed selector switch is in the PIPE RACK/JOINT position.
3. Select the desired pipe rack.
4. Lift and move the pipe rack joystick, located on the main control panel, out of neutral to perform the desired operation.



## BREAKOUT WRENCH OPERATION



**CAUTION:** When working with the breakout wrench it is important that the hoist brake be set, the drill/propel control OFF push-button be depressed to prevent operation of the hoist or rotary controls. Failure to follow this caution may lead to the controls being energized while personnel are in the area, leading to the death or serious injury of those personnel.

Operation of the breakout wrench is necessary anytime a pipe joint, except the joint at the rotary coupling, must be broken. This includes removing the bit or stabilizer, or separating two sections of pipe.

To break a joint with the breakout wrench, proceed as follows:

1. If a pipe joint between pipe sections or between the stabilizer and the pipe is to be broken, align the slots in the lower pipe to be broken with the tool wrench jaws. Close the tool wrench by turning the tool wrench control switch to the EXTEND position. Make sure the lower tool is held securely by the tool wrench and that the slots in the tool are aligned with the tool wrench jaws.



**CAUTION:** All personnel should be removed from the drill deck when operating the breakout wrench.

2. To break the joint, turn and hold the breakout wrench switch to the EXTEND position. The jaws of the breakout wrench should grip the upper tool and turn it while the lower tool is held stationary by the tool wrench. Release the breakout wrench switch.
3. Once the joint has broken, repeat the cycle 2-3 times to loosen the joint sufficiently to allow the rotary unit to finish disassembly.
4. Turn and hold the breakout wrench switch in the RETRACT position until the breakout wrench releases the upper section of pipe and moves away from the pipe.
5. Using the rotary unit, continue disassembly of the joint. Refer to the appropriate topic for exact operating procedures.



**CAUTION:** The joint must uncouple freely while using the rotary unit. If the joint does not uncouple freely, repeat the procedure using the breakout wrench until it does. Constantly observe the joint between the rotary coupling and the first section of pipe when running the rotary motion in reverse. If this joint begins to uncouple, stop the rotary motion immediately and retighten the joint. If this joint uncouples the pipe will fall, possibly causing death or serious injury to personnel.

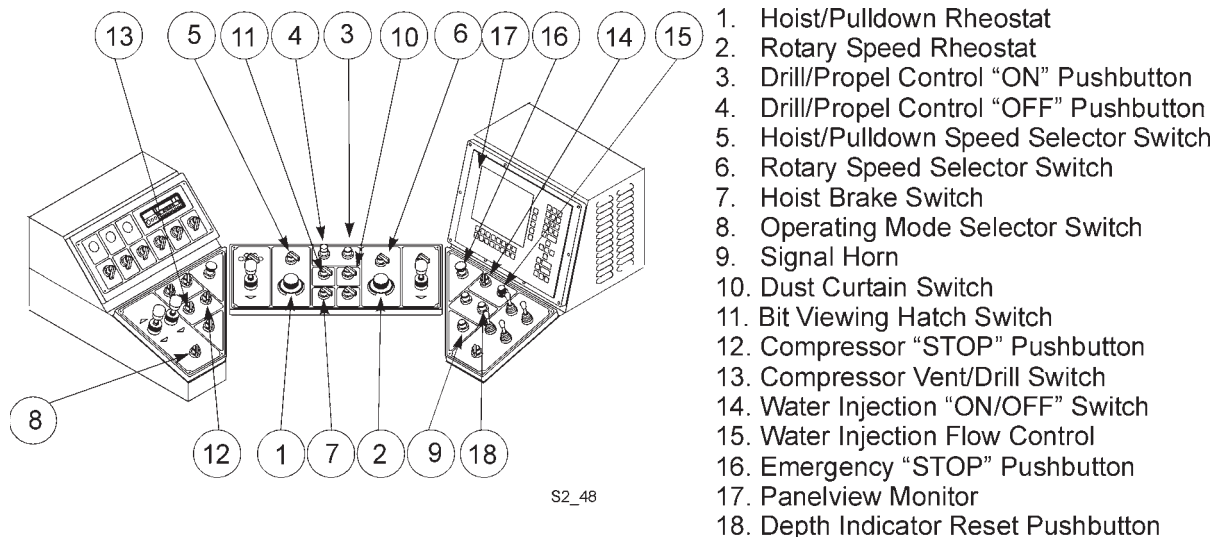
6. If the lower tool is the bit, secure the bit with the bit basket as described in the topic BIT REMOVAL. Operate the breakout wrench as described above, except that the lower tool (bit) is secured by the bit basket, not the tool wrench.



## DRILLING

### VERTICAL DRILLING

Once the drill has been inspected and started, positioned, leveled, and the tool string assembled, it is now ready to begin drilling. There are two methods of drilling, vertical drilling and angle drilling. Vertical drilling is, as the name implies, drilling a vertical hole. Angle drilling is drilling the hole at some angle from vertical (up to 30 degrees). This section of the Operator's Manual details the procedures involved in the drilling of vertical holes.



### CONTROLS UTILIZED WHILE DRILLING

The actual drilling procedure involves three main sections:

1. Starting the hole (collaring)
2. Drilling the hole
3. Cleaning or reaming the hole

Many types of formations are found in mining areas. Formations that are drilled may range from a wet clay to solid taconite. Each formation, and the parts of the hole within each formation, requires drilling techniques, expressly for that formation. A hole drilled through fragmented limestone is not drilled the same way that a hole is drilled through consolidated taconite. For this reason it is important that the operator not only become familiar with the basic drilling procedures and the specific machine being operated, but that he also become familiar with the formation being drilled.

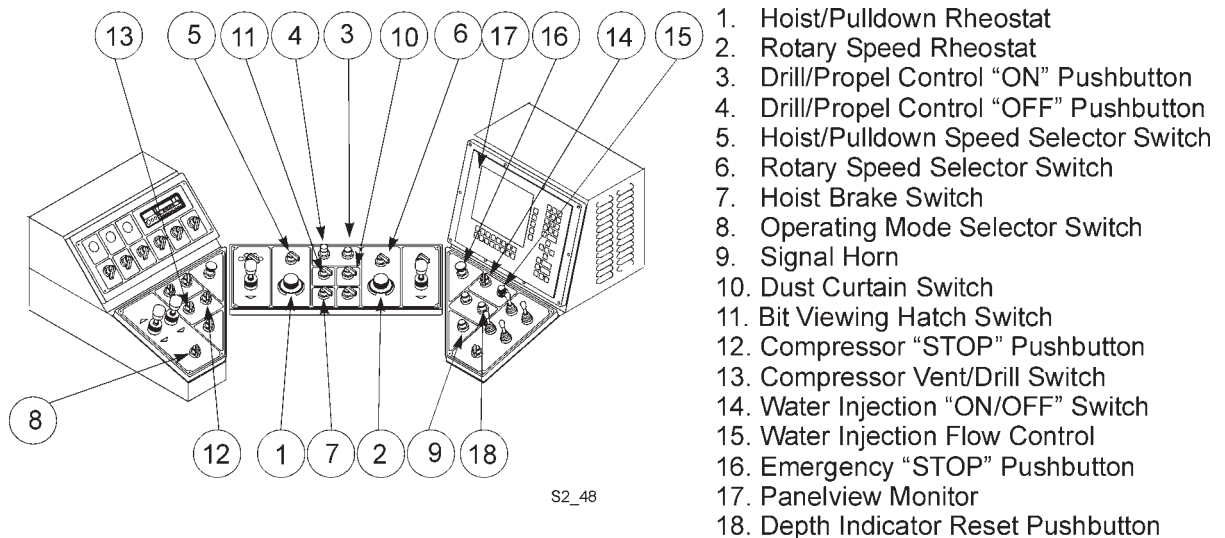


When drilling an angle hole, monitoring of the system indicators such as the drilling air pressure, the rotary load and the machine vibration, becomes more critical than when drilling a vertical hole. The reason these monitors become more important is the fact that an angle hole will tend to wander downward as the hole is being drilled. This wandering is due to the drill steel assuming a natural camber as it is being extended past the guide bushing. This camber is unavoidable and becomes worse as the angle of the hole approaches 30 degrees.

The force of gravity continually acts upon the tool string causing it to bend downward. This downward bending is known as the camber of the drill pipe. This camber causes the hole to be drilled with a gradual bend in it. This causes the drill pipe to contact the side of the hole, increasing the load on the rotary motor. This also tends to inhibit the bailing of the hole since the cuttings are not flowing vertically. The flow of the bailing air (and suspended cuttings) must be diverted around the points that the drill pipe is resting on the side of the hole. This contributes to the increased air pressures needed to drill an angle hole. The vibration of the tool string will be increased while drilling at an angle, due to the tool string resting on the side of the hole, rather than on the bottom.

## PROGRAMMED DRILL CONTROL DRILLING

P.D.C. drilling is similar to normal drilling in that the machine must be positioned, leveled and set-up manually by the operator. The actual drilling operation will be controlled by the automated system. To start the automated system use the following start-up sequence.



### PROGRAMMED DRILL CONTROLS UTILIZED

1. Make sure the hoist/pulldown rheostat and the rotary rheostat are in the "0" position.
2. Verify that the desired drilling depths, collaring depth, and wet hole depth have been set per P.D.C. operating parameters screen on operator's display terminal.

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