BUCYRUS®

49HR

BLAST HOLE DRILL

OPERATOR'S MANUAL

Manual No.
10293
SN: 141172

Bucyrus International, Inc.
1100 Milwaukee Ave. • P.O.Box 500 • South Milwaukee, Wisconsin 53172-0500 USA

SAFETY PRECAUTIONS

General Precautions:

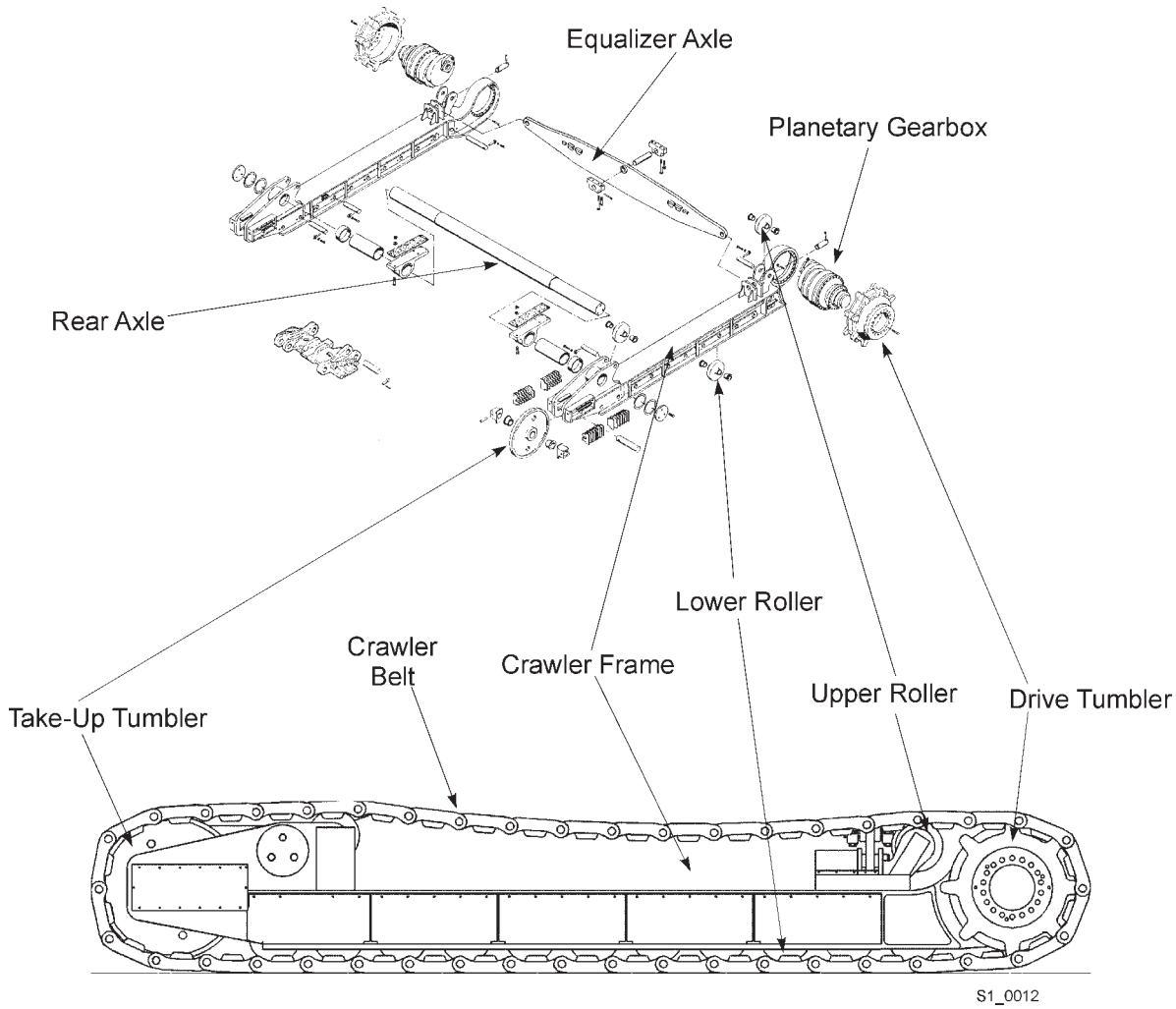
- The employment of qualified maintenance personnel, through a scheduled maintenance program, is the best way to minimize machine downtime and maximize productivity of equipment.
- Keep hands, feet, and clothing away from rotating parts.
- Wear a hard hat, safety shoes and protective lenses at all times.
- 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

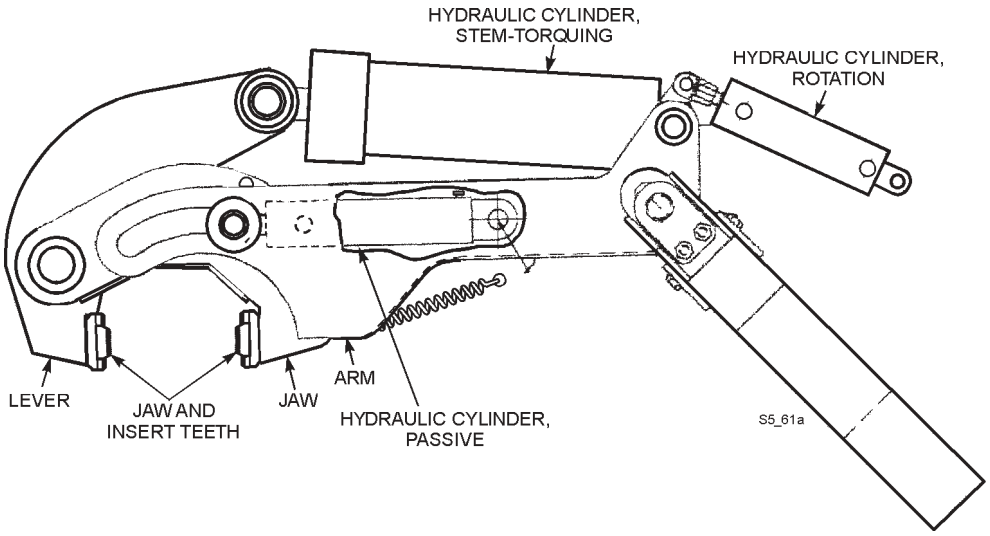
This machine is designed and constructed to provide efficient service under the most severe conditions. It is built to the highest possible standards and will provide trouble free operation if properly maintained.

PROPEL MACHINERY

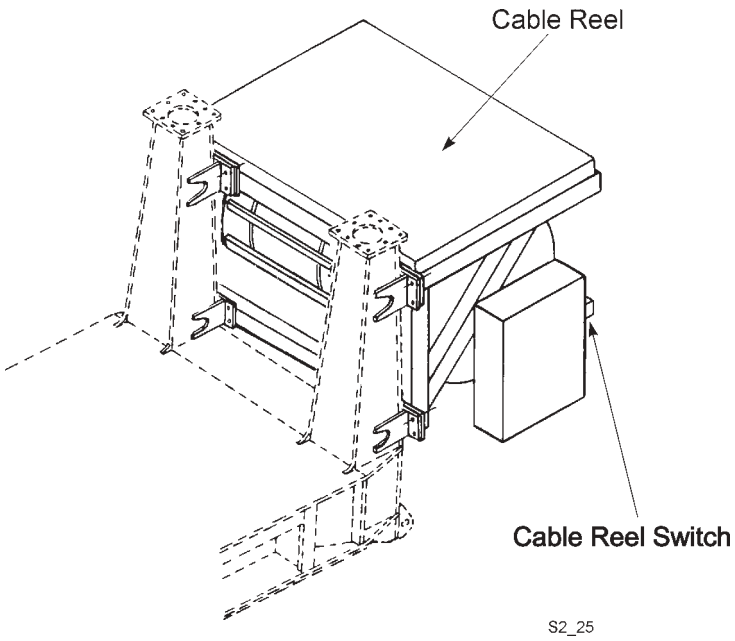
The propel system on this machine is a chainless hydraulic drive system which will allow the separate tracks to counter-rotate. This capability provides the machine with the capacity to turn completely around within it's own length. Each track is driven by a hydraulic motor and a planetary gearbox equipped 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 tramming in open areas, over long distances.



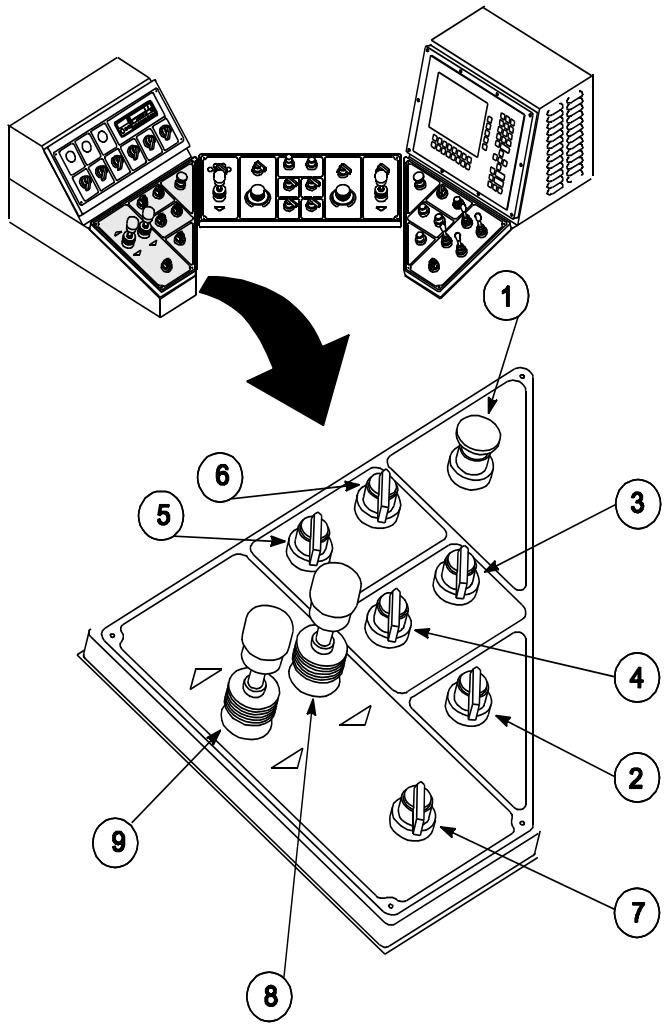
BREAKOUT WRENCH



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 Joyswitch
9. Propel LH Crawler Joyswitch

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.

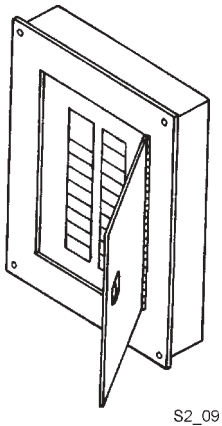
MACHINERY HOUSE CONTROLS

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.



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.

lubricant leaks. Be certain that the upper gate is closed and that the rack is in the stored position.

18. Inspect the guide bushing for excessive wear or dirt accumulation. Also inspect the retainer lugs to be sure they are intact. Do not operate the machine without both retainer lugs intact and securely welded to the deck.

19. Inspect the tool string for excessive wear, dirt accumulation, bent pipe and secure joints. The bit cones and bearing should be in good condition. Manually turn the cones to make sure they turn freely.

20. Inspect the rotary gear case for lubricant leaks, damaged lines, dirt accumulation and other damaged or missing parts. Check the lubricant level in the gearbox. Fill to the recommended level with an approved gear lubricant. Check the rotary motor ventilation inlets for leaves, paper, rags, etc. blocking the flow of air.

21. Inspect the rotary drive unit for excessive wear or dirt accumulation. Inspect the guide rollers for proper adjustment and excessive wear. Check for loose or missing bolts and bent or cracked structural members.

22. Inspect the pulldown unit for excessive wear or dirt accumulation. Inspect the rack pinions for excessive wear, proper lubrication, and tight retainer bolts. Inspect the guide rollers for proper adjustment and excessive wear.

23. Inspect the pulldown gearcase for lubricant leaks, dirt accumulation and other damaged or missing parts. Check the lubricant level in the gearbox. Fill to recommended level with an approved gear lubricant . Check the pulldown motor ventilation inlets for leaves, papers, rags, etc. blocking the flow of air.

24. Check the hoist brake for proper operation.

25. Check the dust or chip deflector for loose or missing parts, excessive wear or dirt accumulation. The deflector should seal around the drill pipe securely.

26. If the machine is equipped with a fire suppression system, perform any applicable checks or inspection as described in the fire suppression system owner's manual.

PRESTART LUBRICATION

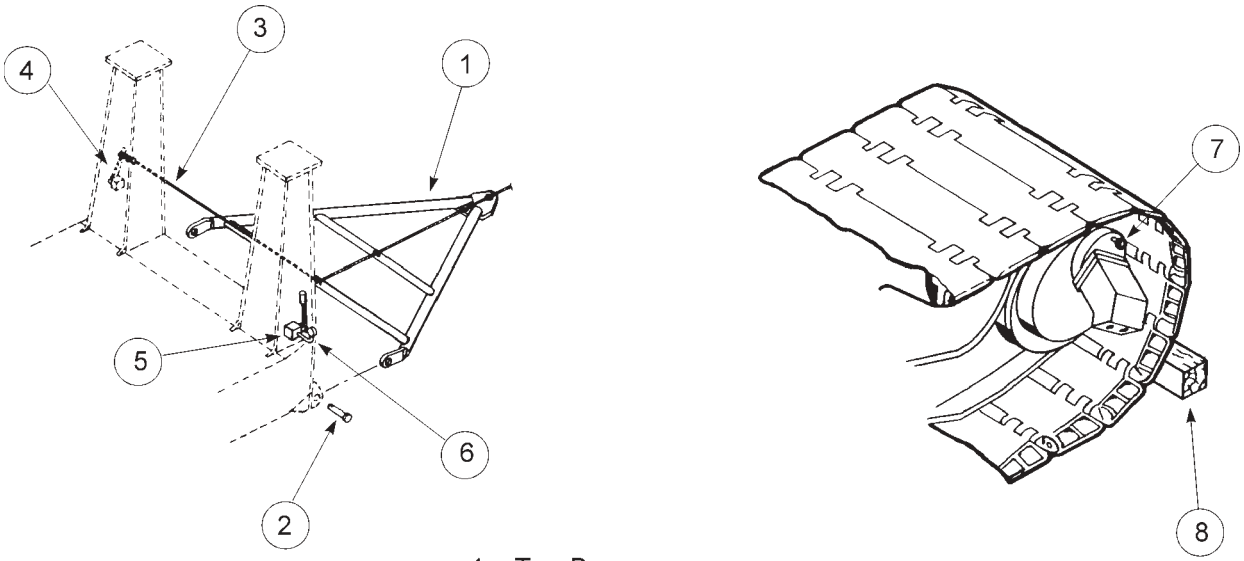
Lubrication is an extremely important job. Most drills come equipped with automatic lubrication systems that lubricate most of the necessary points at regular intervals. These systems, although automatic, are not foolproof. Broken lines, dirty lubricant, faulty feeders, and a whole range of other problems can cause wearing parts to loose lubrication. For this reason, it is important that all lubrication points be inspected every shift to verify that they are receiving lubrication. Also, there are several points for lubrication that either need lubrication very infrequently, or are not possible to pipe into the automatic system. These points will need lubrication applied manually.

TOWING PROCEDURE

CAUTION: Be sure crawlers are securely blocked before disengaging gearbox clutch for towing.

1. Secure the machine by blocking crawlers.

2. Secure the tow bar to the towing vehicle.



1. Tow Bar
2. Tow Bar Pin
3. Lanyard
4. Safety Valve
5. Hand Pump
6. Hydraulic Pressure Gauge
7. Gearbox Disengaging Knob
8. Blocking

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TOWING PROCEDURE

3. Fasten a lanyard to the towing safety valve lever. The valve is mounted to the left front jack casing. Run the lanyard down the casing, along the tow bar and secure it to the towing vehicle. If during towing the tow bar should come loose from either the drill or the towing vehicle, the lanyard will trip the safety valve and set the drill propel brakes.

4. Disconnect the drive tumbler gearbox from the propel motor as follows:

    a. Ensure that the propel pump controls are in neutral position

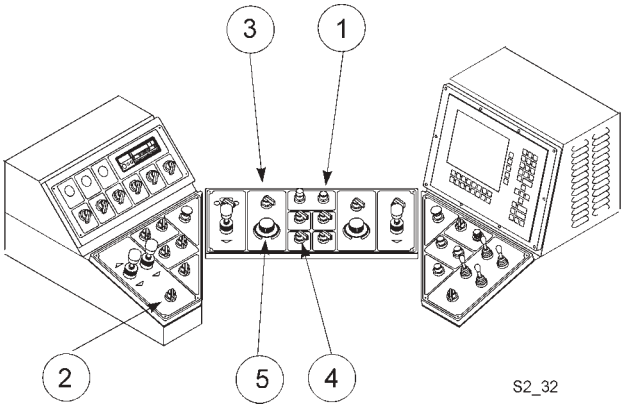
    b. Loosen shifter lever lock screw

    c. Pull out shifter lever to disengage clutch

    d. Tighten shifter lever lock screw

PULLDOWN MACHINERY OPERATION

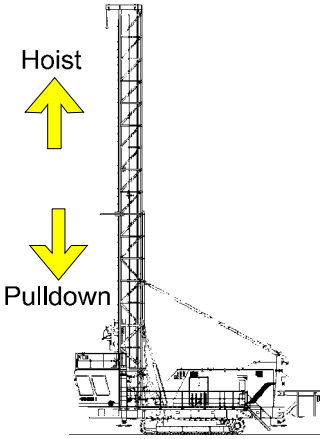
Use of the pulldown machinery is necessary during the tool handling and the drilling procedures. The pulldown machinery supplies power to either raise or lower the rotary/pulldown unit. Power is supplied to the pulldown gearbox by an electric motor.



1. Drill/Propel “ON” Pushbutton
2. Operating Mode Selector Switch
3. Hoist/Pulldown Speed Selector Switch
4. Hoist Brake Switch
5. Hoist/Pulldown Rheostat

HOIST/PULLDOWN CONTROLS

To operate the hoist/pulldown machinery proceed as follows;



1. Move the operating mode selector switch to the DRILL position.

2. Turn the hoist/pulldown selector switch to either PULLDOWN, HOIST HIGH, HOIST LOW, or PIPE RACK/JOINT.

For this procedure, turn the switch to the PULLDOWN position.

For a review of each switch position, refer to HOIST/PULLDOWN SPEED SELECTOR SWITCH.

3. Press the drill/propel control ON push-button. “Pulldown” readout will show on the operator’s display terminal operator’s display screen.

4. Turn the hoist brake switch to the RELEASE position. “Head Brake Released” will appear on operator’s display terminal operator’s display screen.

5. Rotate the hoist/pulldown rheostat in the hoist direction to hoist the rotary/pulldown unit. The farther the rheostat is turned to the right the faster the unit will be raised.

6. Rotate the pulldown force rheostat in the pulldown direction to lower the rotary/pulldown unit. The farther the rheostat is turned to the left the faster the unit will be lowered.

There is no provision made for holding the pipe stationary in the rack while the joint is tightened. If the joint does not tighten using the above procedure it may be necessary to apply a small amount of hoist power to the rotary/pulldown unit to lift it slightly to remove the pressure from the drill threads.

CAUTION: Do not lift the drill pipe. Lift the rotary/pulldown unit only enough to relieve the pressure on the threads. Lifting the unit enough to lift the pipe will not only put pressure on the other side of the threads, but may also allow the pipe rack upper gate to open. Should the joint uncouple at this point, the drill pipe may fall out of the rack, causing death, serious injury or serious machine damage.

If the pipe joint does not make up by relieving the weight of the drive unit from the threads it will be necessary to inspect and/or repair the threads on the rotary coupling and the drill pipe. Inspect the threads for rough surfaces and burrs and apply a liberal coat of thread compound to them. The threads should have a smooth finish and no burrs or dirt that will hinder joint make-up. The joint shoulders should also be clean and smooth and should have compound applied.

After cleaning and repairing the threads, try making the joint again. If the joint cannot be made, either the drill pipe or the coupling is defective. Replace the pipe or coupling as necessary.

8. Once the joint is made up between the coupling and the pipe, the pipe is now ready to be lifted out of the pipe rack pocket. Lift the pipe approximately a foot above the top of the pocket to allow the pipe rack to swing out of the way. Set the hoist brake.

9. Once the pipe has been lifted clear of the pipe rack, swing the pipe rack to the STORED position by lifting and pushing the joystick forward to the STORED position.

NOTE: Verify that the upper gate on the pipe rack is open before retracting the pipe rack. Retracting the pipe rack with the gate closed will cause damage to the pipe rack.

10. Once the pipe rack has been stored the pipe should be cleaned out using the bailing air. Remove all personnel from the area and turn on the bailing air for a moment. After cleaning the pipe, clean and lubricate the threads and shoulder on the lower end of the pipe and the upper end of the stabilizer.

CAUTION: Before working around the tool string set the hoist brake. Depress the drill/propel control OFF push-button.

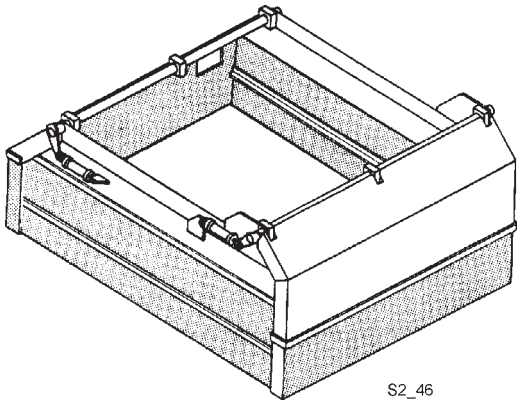
11. Release the hoist brake and lower the rotary/pulldown unit until the drill pipe is approximately 1 foot above the upper end of the stabilizer. Reset the hoist brake.

12. Turn the rotary rheostat clockwise until the drill pipe begins to turn at approximately 5 RPM as shown on operator’s display terminal operator’s display screen. Release the hoist brake and carefully lower the rotary drive unit until the drill pipe contacts the stabilizer. Allow the rotary drive unit to continue to lower under gravity while the drill pipe is threading onto the stabilizer.

DUST SUPPRESSION SYSTEM OPERATION

Most drills are equipped with some sort of dust control system. This system may be either a dry type filter or a water injection system. Dust control is necessary to contain the dust generated by drilling from escaping to the environment. All machines are equipped with dust control curtains and dust seal to contain the dust around the drill hole as standard equipment. The dust seal must be adjusted to the pipe angle when angle hole drilling.

There are two ways to suppress dust generation or prevent the escape of the dust to the atmosphere. The two methods cannot be used at the same time as they are not compatible. One method to suppress the generation of dust is to inject water into the main air stream as it passes to the bit. The water serves to conglomerate the dust particles into larger particles that may be treated as cuttings.



Dust Curtain Enclosure

The other method to suppress the dust is to contain the dust in the dust curtain enclosure. Then draw off the lighter particles, and filter them out of the air before returning the air to the atmosphere. The filtering is done by a filter unit, which forces the dust laden air through filters where the dust is removed. In the filter system, the dust must remain dry as wet material will plug the filters.

NOTE: When the machine is equipped with a dry-type dust filter system, the air for cleaning the filters is drawn from the bailing air system. Air pressure to the dry-type dust filter must be maintained at 40 PSI (276 kPa) to insure proper cleaning of the filter elements.

may or may not exceed the safety valve setting and cause the main air compressor to overheat. If the safety valve opens when the hole is plugged, continue to attempt to free the tool string. The safety valve will close when the plug has been removed. If the compressor overheats and shuts down continue to attempt to free the tool string without the compressor. Allow the compressor to cool for a few minutes and restart it. Continue this procedure until the tool string is free.

If the material plugging the hole is large it will be necessary to try and force the material back into position enough to let the bit go past, and then try and redrill through the plug. Large material is indicated when the tool string experiences severe vibration when being hoisted. To free the tool string apply maximum hoist power. If the plug does not clear itself within a few moments lower the tool string a few feet if possible and try again.

If the plug does not clear itself after repeated attempts at clearing it, there are two options available. The tool string can be abandoned immediately without further trial or an attempt to drill through the plug using the top of the bit can be made. In either case the hole being drilled will have to be abandoned. In the first case the cost of the abandoned tool string is known, while in the second case a gamble is being taken as the bit and stabilizer will almost certainly have to be scrapped and there is no guarantee that the rest of the drill pipe will be recovered. If it is decided to abandon the tool string, attempt to unscrew a section of pipe to recover some of the tool string. If this cannot be done, lower the tool string to the bottom of the hole and then, using a suitable burning torch, cut the drill pipe at ground level. It will be necessary to move over an existing hole to remove the stub of pipe from the rotary drive unit.

CAUTION: Before cutting the drill pipe verify that the main air compressor is shut down. Burning the pipe with the main air compressor running may cause a fire or explosion as hot slag is introduced to the main air stream or may cause hot material to be blown back onto the torch operator.

If an attempt is to be made to free the drill string by drilling with the top of the bit, apply only enough hoist pressure to keep the vibration and rotary motor load levels in an acceptable range. Vary the hoist pressure by alternately placing the hoist/pulldown selector in the hoist and neutral positions. Vary the rotary speed to help reduce vibration. Drilling through a large block with the top of the bit can be a lengthy procedure and it is important to prevent damage to the rest of the machine. Once the tool string is free, check the bit and stabilizer as well as the drill pipe for damage. Replace components and move to a new location for the hole. Do not try and drill the same hole again as this will almost certainly cause the tool string to become stuck again.

WET OR STICKY FORMATIONS

Drilling in wet or sticky formations presents three possible problem areas. The three problems that may be encountered are coating of the hole and pipe with material, conglomeration of the material into pieces too large to remove with the bailing air stream and caving of the hole. Either of these problems may be present, or any combination of the three may be present at the same time.

the exact same orientation as before losing the tools. When the tools are recovered, clean the pipe and bit as detailed in the first procedure of this section and return to drilling.

If the tool string has uncoupled and the upper end of the lost tool string is below ground level, there are two methods of recovering the lost tools. One method is to attempt to make the joint using the drill pipe still connect to the rotary drive unit. The other method is to use special equipment (not supplied by Bucyrus) to recover the tools.

If the top of the lost tool string is not reachable from ground level, very gently lower the remaining tool string until it contacts the tools in the hole. Using very slow rotary speed and low torque, attempt to re-make the joint. If the joint can be made, very gently raise the tools to a position where the top of the recovered tools can be clamped in the tool wrench. Rebreak the joint and inspect the threads on both sections of pipe. Repair the threads if necessary before continuing. When the tool string is repaired, remove the bit and clean both it and the drill pipe to remove any dirt that may have entered while the joint was uncoupled.

If the joint cannot be made using the above procedures, or if the pipe has been broken or been damaged to an extent that it cannot be handled normally, it will be necessary to use special equipment and techniques to continue drilling or recover the lost tools. It is not within the scope of this manual to detail the procedures necessary to handle broken or lost tools, and the use of these tools should be described by the manufacturer.

CAUTION: WHEN PERFORMING SPECIAL PROCEDURES NOT DETAILED IN THIS MANUAL, ALWAYS FOLLOW THE RECOMMENDATIONS OF THE TOOL MANUFACTURER AND PRUDENT SAFETY GUIDELINES. FAILURE TO FOLLOW SAFE PROCEDURES MAY RESULT IN THE DEATH OR SERIOUS INJURY OF PERSONNEL OR SERIOUS DAMAGE TO THE MACHINE.