Technical Manual

Operating Precautions:

- Wear hearing protection when exposed to the following noise levels in excess of the period indicated:

  8 hours at 90 dBa
  4 hours at 95 dBa
  2 hours at 100 dBa
  1 hour at 105 dBa
  30 minutes at 110 dBa
  15 minutes at 115 dBa

- When in doubt about the noise level, wear approved hearing protection.
- Do not attempt to get on or off the machine while it is in operation. Notify the operator prior to any attempt to board/exit the machine.
- Do not move or operate the machine without first knowing the location and purpose of all personnel, test or support equipment, on or near the machine.
- Do not allow unauthorized personnel on board the machine while in operation.
- Use audible signals to warn of machine movements. A signal horn button is provided for this purpose.
- Do not propel until the travel route has been cleared of obstructions.
- Do not propel the machine on a slope greater than specified in the stability limits shown on the STABILITY CHART at the end of this section.
- Do not leave the rotary gearbox suspended in the air when leaving the machine unattended.
- Prevent trail cable from being dragged on the ground for long distances or at high speeds.
- Limit the amount of cable being dragged by the machine. Pulling too much cable will damage both the cable and the machine.

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20. Inspect the rotary gearcase for leaks, damaged lines, dirt accumulation and other damaged or missing parts. Check the lubricant level in the gearcase. 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 leaks, dirt accumulation and other damaged or missing parts. Check the lubricant level in the gearcase. 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

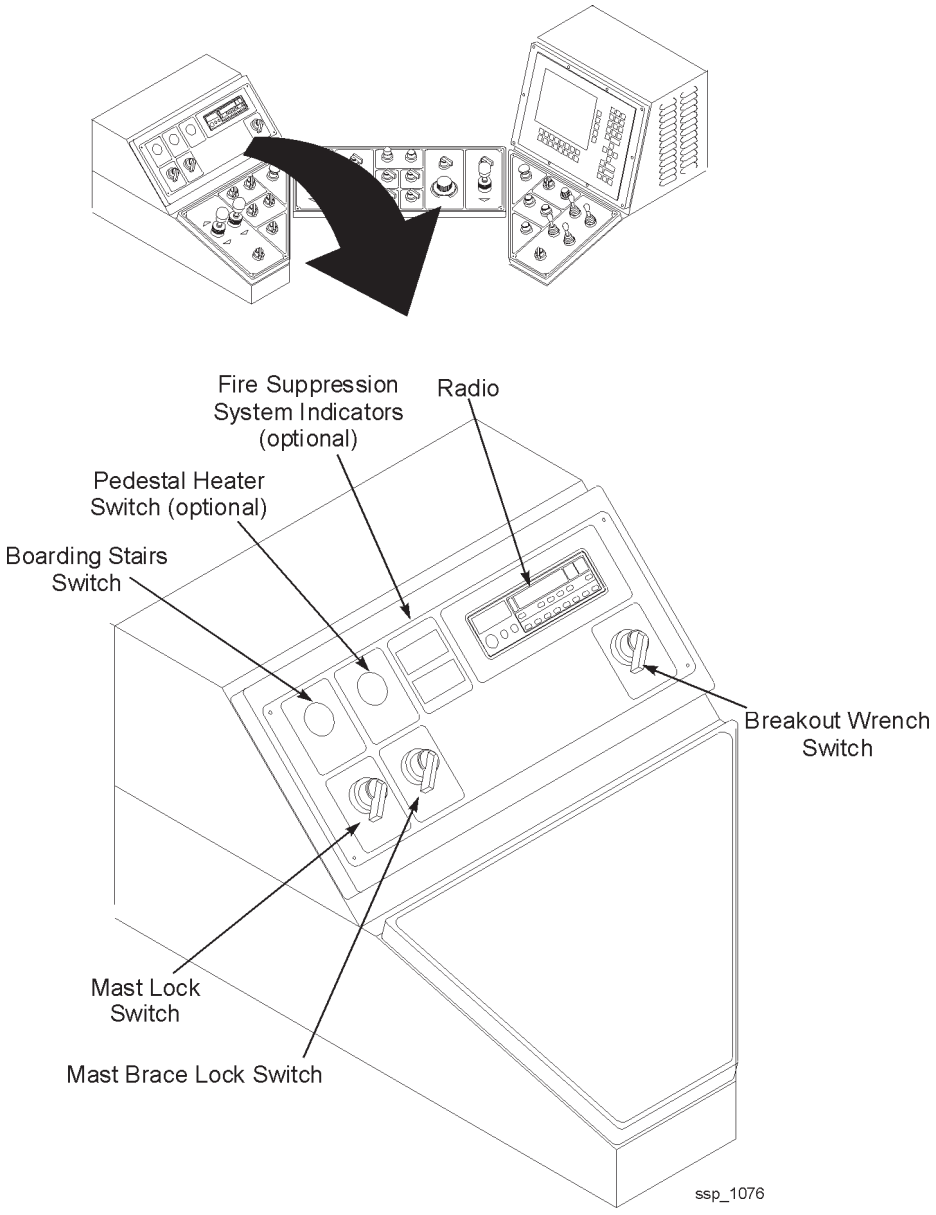
Most machines are equipped with automatic lubrication systems that lubricate most of the necessary points at regular intervals. These systems, although automatic, are not foolproof. Broken lines, dirty lubricant, faulty feeders, and a whole range of other problems can cause wearing parts to loose lubrication. 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.

The lube charts in Section 3 ~ *LUBRICATION* give the location and frequency of lubrication.

The lubricant used should be kept clean. If possible the lubricant should be supplied from a bulk lube truck. Be careful when adding lubricant to the automatic system to keep the pump and fill points clean.

When using a manual grease gun wipe each fitting and the grease gun fitting before injecting the lubricant. Use clean containers and funnels for lubricant transferring to the gearcases or reservoirs. Do not allow water to enter any gearcase, reservoir or container. Wipe off all fill caps before removing them.

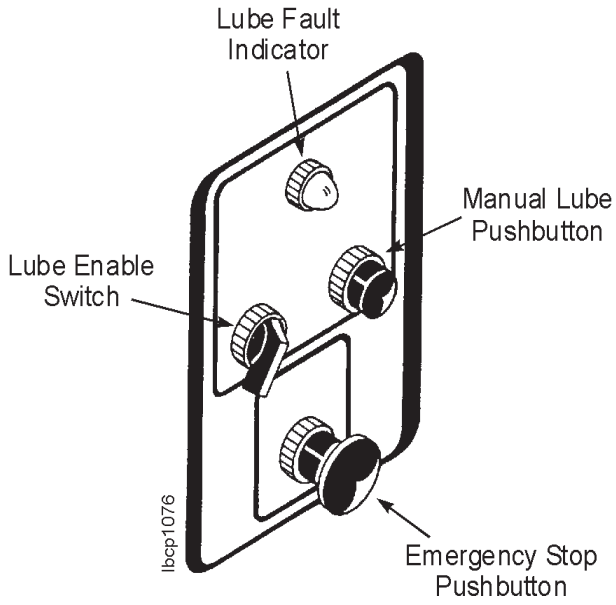
SELECTOR SWITCH PANEL



MAST BRACE LOCK SWITCH

The Mast brace lock switch is a three-position spring-return switch. Turning the switch to the LOCK position will extend the mast brace lock pin cylinder. Turning the switch to the UNLOCK position will retract the cylinder. For this switch to be operable, the hydraulic pump must be running and the mast/winch selector switch must be in the MAST position. This will allow the switch to function in the LOCK position. To function in the UNLOCK position, the rotary head assembly must be at the lower limit point.

The Lube control panel is located next to the lube pump station in the machinery house and contains the controls as shown.



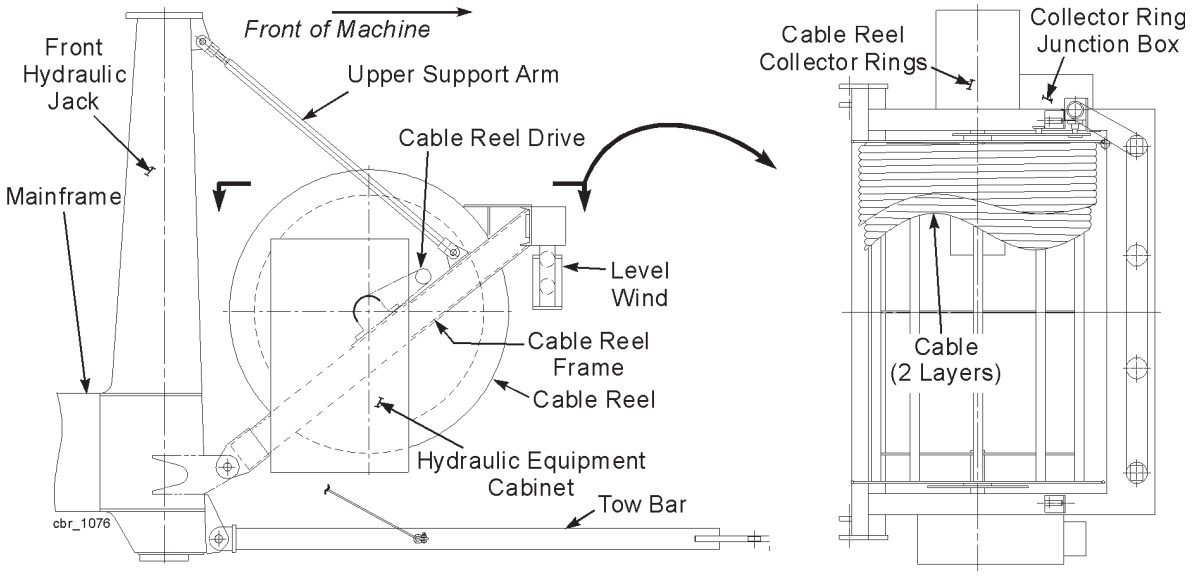
Lube Control Panel

CABLE REEL OPERATION

When the cable reel switch is in the AUTO position, it is designed to pick up trail cable as the machine 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:

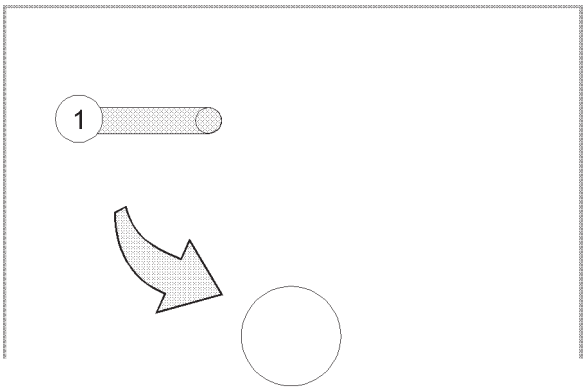
1. Turn ON the external cable reel switch. This will automatically start the cable reel hydraulic system motor. Allow the oil to circulate for about 5 minutes.

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.

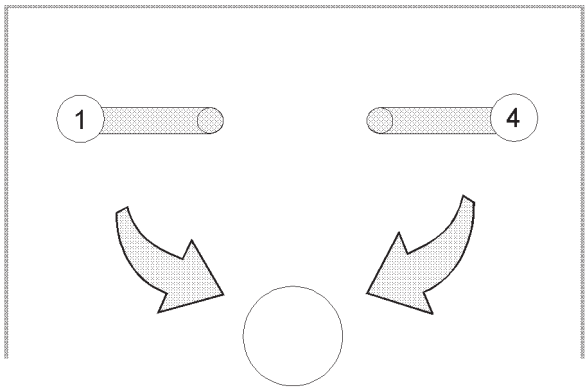
The general method of operating the pipe racks is as follows:

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.



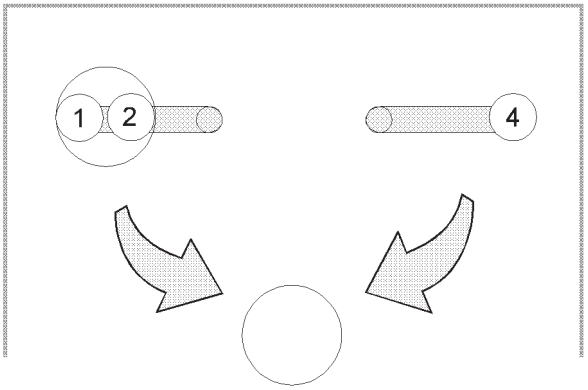
A. Selector Switch in #1 Position
B. Pull Joystick To Swing Out
C. Push Joystick To Store Rack

1 PIPE RACK



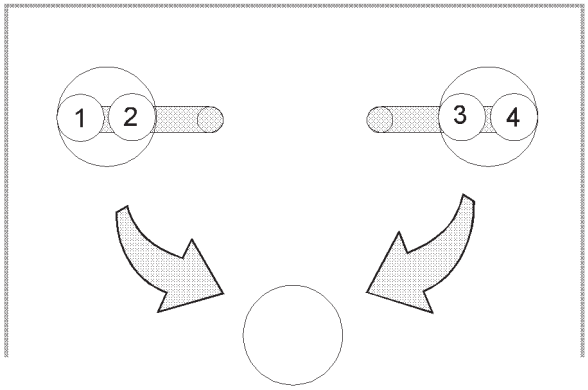
A. Selector Switch In #1 Position - Left Rack or #4 Position - Right Rack
B. Pull Joystick To Swing Out
C. Push Joystick To Store Rack

2 PIPE 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

3 PIPE 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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4 PIPE RACKS

DRILL TOOL STRING DISASSEMBLY

The tool string is disassembled in reverse of assembly; that is the bit is removed first, the drill pipe next and the stabilizer last. 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. Using 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 continue the operation.

4. After selecting the pipe rack to be used by turning the pipe rack selector switch to #l 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.

6. Quickly turn the rotary rheostat to the left (counterclockwise) to approximately one-half of full speed. The joint should break at the rotary coupling.

NOTE: If the joint does not break immediately, return the rotary rheostat to the zero position to reduce the chance of damaging the motor by stalling it.

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.