Technical Manual

WARNINGS & PRECAUTIONS

1. DO NOT OPERATE MACHINE UNLESS YOU ARE THOROUGHLY FAMILIAR WITH CONTROLS AND FUNCTIONS.
2. DO NOT ALLOW ANY PART OF MACHINE TO CONTACT OR COME NEAR ELECTRICAL POWER LINES.
3. BE SURE HYDRAULIC AND AIR SYSTEMS ARE NOT PRESSURIZED BEFORE LOOSENING ANY CONNECTIONS OR PARTS.
4. DO NOT ATTEMPT TO MOVE MACHINE WITH OBSTRUCTED VISIBILITY.
5. DO NOT ATTEMPT TO MOVE A MACHINE WHICH IS IN A POTENTIALLY UNSTABLE CONDITION.
6. DO NOT WEAR LOOSE CLOTHING OR TIE STRINGS THAT COULD GET CAUGHT IN EQUIPMENT.
7. BE SURE HYDRAULIC RESERVOIR IS ALWAYS FILLED TO THE RECOMMENDED LEVELS WITH PROPER TYPE HYDRAULIC FLUID. DO NOT MIX DIFFERENT TYPES OF FLUID.
8. KEEP SAFETY SHIELDS AND GUARDS IN PLACE.
9. KEEP HANDS, CLOTHING, RAGS AND TOOLS AWAY FROM MOVING PARTS.
10. KEEP ALL PERSONNEL AWAY FROM HOLE WHILE DRILLING IS IN PROCESS.
11. WHEN NEAR RUNNING MACHINE FOR EXTENDED PERIODS, WEAR NOISE REDUCING EAR PROTECTORS.
12. WEAR PROTECTIVE HELMET, SAFETY SHOES AND GLASSES WHEN ON OR NEAR MACHINE.
13. DO NOT ATTEMPT LUBRICATION OR SERVICE WHILE MACHINE IS RUNNING.
14. LUBRICATE AND SERVICE RIG AS RECOMMENDED. USE RECOMMENDED LUBRICANTS.
15. WHEN MOVING, BE CERTAIN DRILL BIT AND JACKS CLEAR GROUND. MAKE TURNS GRADUALLY.
16. KEEP TRACKS CLEAR OF ROCKS AND OTHER OBJECTS.
17. KEEP WORK AREAS CLEAN AND CLEAR OF CUTTINGS, HAND TOOLS, AND OTHER OBJECTS.
18. PERIODICALLY INSPECT BELTS, CHAINS AND HOSES FOR INDICATION OF WEAR, LOOSENESS, CRACKING OR FRAYING.

RAISE MAST

⚠ WARNING

DO NOT RAISE MAST (DERRICK) UNDER OR CLOSE TO POWER LINES OR NEAR OVERHEAD WIRES.

Conditions: ENGINE STARTED

MACHINE LEVEL

TO RAISE MAST TO VERTICAL POSITION

A. Move MAST CONTROL (28) to RAISE position.

B. As mast approaches vertical position, slowly move MAST CONTROL (28) to CENTER (NEUTRAL) position.

C. Move MAST BASE LOCK CONTROL (27) to ENGAGE position. Visually check to be sure mast locks are completely engaged.

TO RAISE MAST FOR ANGLE DRILLING

NOTE

THE MAST CAN BE POSITIONED UP TO 25° ON SINGLE PASS RIGS AND UP TO 15° ON MULTIPLE PASS RIGS FROM THE VERTICAL POSITION IN 5° INCREMENTS.

A. Perform operations A, B, and C, under "TO RAISE MAST TO VERTICAL POSITION".

B. After visually checking to be sure MAST LOCK PINS are completely engaged and MAST HOIST CYLINDERS are pressurized to relief valve setting (2500 P.S.I) in the mast hoist mode, manually remove mast pivot shaft.

C. Align holes in the mast with holes in the machine "A" frame on both sides for the selected angle drilling position. It may be necessary to move MAST CONTROL (28) very slowly to RAISE or LOWER position to assist in aligning holes.

D Manually insert MAST PIVOT SHAFT in aligned holes and reinstall shaft lock bolts.

BREAKOUT BIT FROM HAMMERDRILL

Condition: DRILL BIT RETRACTED

A. Move PULLDOWN (40) slowly to UP position and observe HAMMERDRILL BIT as it comes up through drill deck guide bushing hole.

B. As the bit emerges a few inches above the drill deck, STOP the RETRACTION by moving PULLDOWN CONTROL (40) towards center (NEUTRAL) position.

C. When bit is high enough to permit bit breakout wrench insertion move PULLDOWN CONTROL (40) to center (NEUTRAL) position.

D. Insert proper BIT BREAKOUT WRENCH into mast base guide BUSHING HOLE.

E. Move PULLDOWN CONTROL (40) SLOWLY to DOWN position to locate bit into BIT BREAKOUT BASKET. Some ROTATION may be required for BIT SLOTS to align with BREAKOUT PLATE TABS.

F. With bit in basket for breakout, RAISE DRIVER SUB 1/8 to 1/4 inch off BIT SHOULDER. This prevents weight of tool plus weight of DRILL PIPE from being carried by DRIVER SUB THREADS.

G. Move CHAIN TONG CONTROL (18) to extend chain tong cylinder.

H. Manually attach CHAIN TONG to HAMMERDRILL.

I. Move CHAIN TONG CONTROL (18) to RETRACT position to break bit connection.

J. Manually remove CHAIN TONG from HAMMERDRILL and place in STOWED position.

K. Move ROTATION CONTROL (39) to CCW (COUNTERCLOCKWISE) position.

△ CAUTION

AS JOINT SCREWS APART, IT MAY BE NECESSARY TO SLOWLY MOVE THE PULLDOWN CONTROL (40) TO THE UP POSITION TO KEEP FROM JAMMING THE THREADS.

L. When threads are separated MOVE PULLDOWN (40) SLOWLY to UP POSITION to provide sufficient clearance to REMOVE BIT AND BIT BASKET. Move PULLDOWN (40) to NEUTRAL (CENTER) POSITION.

⚠ WARNING

NEVER RAISE THE TOP DRIVE UP AGAINST THE TOP OF THE MAST AT HIGH SPEED. THE IMPACT OF THE TOP DRIVE AGAINST THE TOP OF THE MAST COULD BREAK THE PULLDOWN CHAIN, WHICH WOULD ALLOW THE TOP DRIVE TO FALL.

△ CAUTION

NEVER MOVE PULLDOWN AND RIGHT TRACK CONTROL (40) OUT OF CENTER (NEUTRAL) POSITION WHILE BREAKOUT WRENCH IS SWUNG INTO DRILL STEM. MOTION OF TOP DRIVE WHILE BREAKOUT WRENCH IS IN USE COULD RESULT IN DAMAGE TO THE MAST BASE OR BREAKOUT WRENCH.

RETRACT DRILL BIT

Condition: HOLE DRILLED

DRILL BIT AT BOTTOM OF HOLE

A. After reaching the bottom of the hole, continue slow rotation (above 20 R.P.M) and move PULLDOWN ADJUSTMENT CONTROL (34) to give adequate but not excessive HOISTING FORCE.

B. Move PULLDOWN AND RIGHT TRACK CONTROL (40) slowly to UP position.

⚠ WARNING

SLOW RETRACTION RATE AS DRILL BIT NEARS THE SURFACE. HIGH SPEED IMPACT OF ROTARY HEAD WITH TOP OF MAST COULD BREAK THE PULLDOWN CHAIN, THEREBY ALLOWING THE ROTARY HEAD TO FALL.

C. Move BIT AIR CONTROL (38) to OFF position.

D. Move ROTATION AND LEFT TRACK CONTROL (39) to CENTER (NEUTRAL) position just before drill bit comes out of hole.

E. Move PULLDOWN AND RIGHT TRACK CONTROL (40) to CENTER (NEUTRAL) position.

△ CAUTION

VISUALLY CHECK TO BE SURE DRILL BIT IS WELL ABOVE SURFACE AND WILL PERMIT TRAMMING TO A NEW SITE.

UNLOAD PIPE FROM PIPE RACK INTO HOLE (OPTIONAL)

Conditions: TOP DRIVE HAS BEEN SEPARATED FROM DRILL STRING AFTER OPERATION BREAKOUT WITH DECK WRENCH OR BREAKOUT WRENCH. DRILL STRING (OR BIT STABILIZER) SUSPENDED FROM DECK WRENCH.

A. Move PULLDOWN AND RIGHT TRACK CONTROL (40) slowly toward UP position and observe bottom end of top drive as it raises up in the mast.

B. Move PULLDOWN AND RIGHT TRACK CONTROL (40) to CENTER (NEUTRAL) position when bottom of top drives clears the top of the section of pipe in the pipe rack.

NOTE

IT MAY BE CONVENIENT TO MARK THE MAST AND THE PULLDOWN CHAIN SO THAT THE TOP DRIVE CAN BE POSITIONED BY ALIGNING THE MARKS.

⚠ WARNING

NEVER RAISE THE TOP DRIVE UP AGAINST THE TOP OF THE MAST AT HIGH SPEED. THE IMPACT OF THE TOP DRIVE AGAINST THE TOP OF THE MAST COULD BREAK THE PULLDOWN CHAIN WHICH WOULD ALLOW THE TOP DRIVE TO FALL.

C. Be sure PULLDOWN ADJUSTMENT CONTROL (34) is in the DECREASE position to keep pulldown force to a minimum.

D. Move PIPE RACK INDEX PIN CONTROL (37) to RELEASE position to retract PIPE RACK INDEX LOCK PIN.

E. Move PIPE RACK CONTROL (26) to IN position.

F. LOCK PIPE RACK at desired pot location by moving pipe rack lock control (45).

G. With section of pipe in pipe rack positioned under the top drive, move ROTATION AND LEFT TRACK CONTROL (39) very slowly toward CW (CLOCKWISE) position. TOP DRIVE MUST ROTATE SLOWLY.

H. Move PULLDOWN AND RIGHT TRACK CONTROL (40) very slowly toward DOWN position and lower the top drive very slowly onto the section of pipe in the pipe rack while rotating.

△ CAUTION

WHEN MAKING UP JOINTS OF DRILL PIPE, STABILIZER, OR BIT, BE SURE THAT ALL THREADS AND SHOULDERS ARE CLEAN AND FREE OF PAINT, RUST, DIRT, OR FOREIGN MATERIAL, AND ARE PROPERLY LUBRICATED WITH THE CORRECT THREAD LUBRICANT. THREADS SHOULD BE MAINTAINED THROUGHOUT THE USE OF THE DRILL.

TROUBLESHOOTING

This material only covers the system as a whole and how the components interact. It does not cover the servicing of individual items.

PROBLEM	CAUSE
Cannot develop pulldown or right track pressure.	A. Pump Or Pump Compensator faulty. B. Pump Drive Faulty C. Proportional Valve Faulty
Cannot develop pulldown pressure but right track pressure is normal	A. Pulldown adjust valve is faulty B. Pulldown motor or gearbox faulty.
Cannot decrease pulldown pressure all other functions normal.	A. Remote compensator pilot check valve is stuck closed. B. Pulldown adjust valve is faulty. C. Compensator control system in pump faulty. D. Holdback on-off valve in OFF position.
Cannot develop right track pressure, other systems normal.	A. Remote compensator pilot check valve is stuck open and pulldown remote control is set for low pressure.
Cannot develop rotary or left track pressure.	A. Left Hand Pump or Pump Compensator faulty. B. Left Hand Pump drive faulty. C. Left Hand control cable inoperative, pump centered.
Brakes not releasing. (Setting)	A. Brake faulty. B. Pressure reducing valve faulty. C. Selector valves not shifting fully.
Breakout wrench does not function in proper sequence. (Close/Turn, Open/Turn)	A. Sequence valve on breakout wrench improperly set. Set the "CLOSE" sequence valve at 2000 P.S.I. Set the "OPEN" sequence valve to 1500 P.S.I. B. One or both of the sequence valves are faulty. C. Valve which selects breakout sequence is in wrong position.
Can not develop holdback pressure.	A. Main holdback relief valve faulty. B. Operator cab control relief valve faulty.