

# Operation Manual

**BD60, BD80 & BD95**



Final: November 25, 2015

## **Corporate Philosophy and Mission**

Barbco Inc. and its president, Jim Barbera are dedicated to not only the success of the organization but also to the growth and fulfillment of its employees and the surrounding community. To do both requires the company to be the “best that it can possibly be”. To achieve this end, Barbco recognizes that all members of the company must be focused on a common mission and set of shared goals. Thus in September 1990 the company established the following Mission Statement and Goals

### **Mission Statement**

Barbco Inc. is dedicated to instilling in all segments of its organization a commitment to the production of high quality earth boring equipment and accessories. We seek to be recognized as the leader in our industry in terms of quality products, customer service, innovation, and serving the needs of earth boring contractors throughout the world supported by a management philosophy which seeks employee satisfaction and involvement, customer loyalty, and maximization of productivity and profitability.

#### **Goal 1      A Commitment to Quality which**

Develops a quality focus to consistently provide our customers with products and services which meet or exceed their expectations as to reliability, construction, precision and aesthetics.

#### **Goal 2      A Commitment to Service which**

Develops an organizational philosophy which is based on the concept that “We will Do whatever it takes” to provide quality service to our customers in the most efficient and effective manner.

#### **Goal 3      A Commitment to Innovation which**

Provides an organizational focus on creativity, encouraging the development of procedures and process which add value to our products and services.

#### **Goal 4      A Commitment to Related Activities which**

Expands into areas which complement our basic operations and strengthen our communities.

#### **Goal 5      A Commitment to Employee Development which**

Creates an organizational culture that recognizes the value of the individual employee, regardless of function, in the overall success of the company, and to provide all employees with opportunities for career development and education.

#### **Goal 6      A Commitment to Profitability and Growth which**

Expands the company in a controlled manner, enabling it to build earnings and a strong capital base so as to maximize its value to shareholders.

## **Introduction**

### **Manufacturer's Statement**

The information contained in this operation manual is necessary for the safe and proper setup, operation, maintenance, and servicing of your Barbco Horizontal Directional Drill.

Barbco Inc. has a long tradition of offering the best quality and most efficient to operate underground installation equipment in the world. Read and understand this manual completely before you use the Rig and keep it with the unit at all times for quick reference.

The equipment described in this manual is subject to change. Barbco Inc. reserves the right to change equipment at any time as part of normal product improvement. Some improvements may have been made after this manual was printed. For the latest information on your equipment, contact Barbco Inc.

The illustrations contained in this manual are intended to clarify explanations in the text. The illustrations may look slightly different from your unit, but this has been allowed only if it does not fundamentally change the factual information. Some optional equipment may be illustrated that your machine is not equipped with.

### **How to Reach Us**

If you encounter a circumstance that is not covered in this manual, Barbco's service department will be happy to assist you. Barbco's office hours are 8:00 AM–5:00 PM, Monday through Friday. Barbco's office is located in Canton, Ohio.

### **Barbco Corporate Headquarters, Canton, Ohio**

- Main Office.....(330) 488 - 9400
- Toll Free.....(800) 448 – 8934
- Fax .....(330) 488 – 2022

To place an order for spare parts, you can call either of the above numbers. Parts department hours are Monday through Friday, 8:00 AM–5:00 PM (Eastern Time). Orders can also be accepted via fax, 24 hours a day. Next day service must be called in by 3:00 PM.

If you call the factory for spare parts or service, have the model number and serial number of the machine. See ID tag located at the rear of the machine. Write the serial number of your machine in the space provided below.



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## **SAFETY RULES**

The “Safety Rules” section of this manual provides safety rules for pre-start up, setup and operation of the horizontal directional drill. It is written for operators, ground crew and maintenance people.

 This is the safety symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.


 **DANGER!** Indicates an imminently hazardous situation which if not avoided, **WILL** result in death or serious injury.


 **WARNING!** Indicates a potentially hazardous situation which if not avoided, **COULD** result in death or serious injury.


 **CAUTION!** Indicates a potentially hazardous situation which if not avoided, **MAY** result in minor or moderate injury.


**CAUTION!** Used without the safety alert symbol indicates a potentially hazardous situation which if not avoided, may result in property damage.

### **Pre-Start Up Safety**

 **WARNING!** NEVER arrive at work or work on, around, or near machinery when you are under the influence of drugs or alcohol. Beware of over the counter drugs, many contain specific warnings about operating machinery after taking medication.


 **WARNING!** Don't bring personal problems to work. In an office setting a personal problem may be annoying to co-workers, but at the work site it can be deadly. The people around you depend on you for their safety.

 **WARNING!** Do not operate the machinery unless you have read and understand the unit's operation manual. Lack of understanding proper operating procedures could result in unsafe operation. Operation manuals are issued with each new unit. If you haven't seen a copy, ask your supervisor for one. Replacements are available from Barbco Inc.


 **WARNING!** Do not operate this unit until you have checked all systems. Visually inspect the machine daily. All safety equipment, shields, and decals must be in place and in good condition. If any are missing, incomplete, or damaged, they must be replaced or repaired.

## **Operation Safety – Operators**


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 **WARNING! Only qualified operators are allowed to operate the unit.** A “qualified operator” is defined as someone who meets the following criteria:


- a. Is at least 18 years old
- b. Is physically and mentally capable
- c. Has been trained in the operation and maintenance of the equipment
- d. Has demonstrated capabilities, to a supervisor to operate and maintain the equipment
- e. Can perform assigned duties in a reliable manner
- f. Understands the controls and functions of this Barbco drill


 **WARNING!** You are responsible for the safety of all people in the operational area of the machine. You must understand the operation of the machine and the safety rules so safe actions will be taken in unexpected circumstances.

 **WARNING! INJURY HAZARD!** Wear protective clothing when operating the machine.

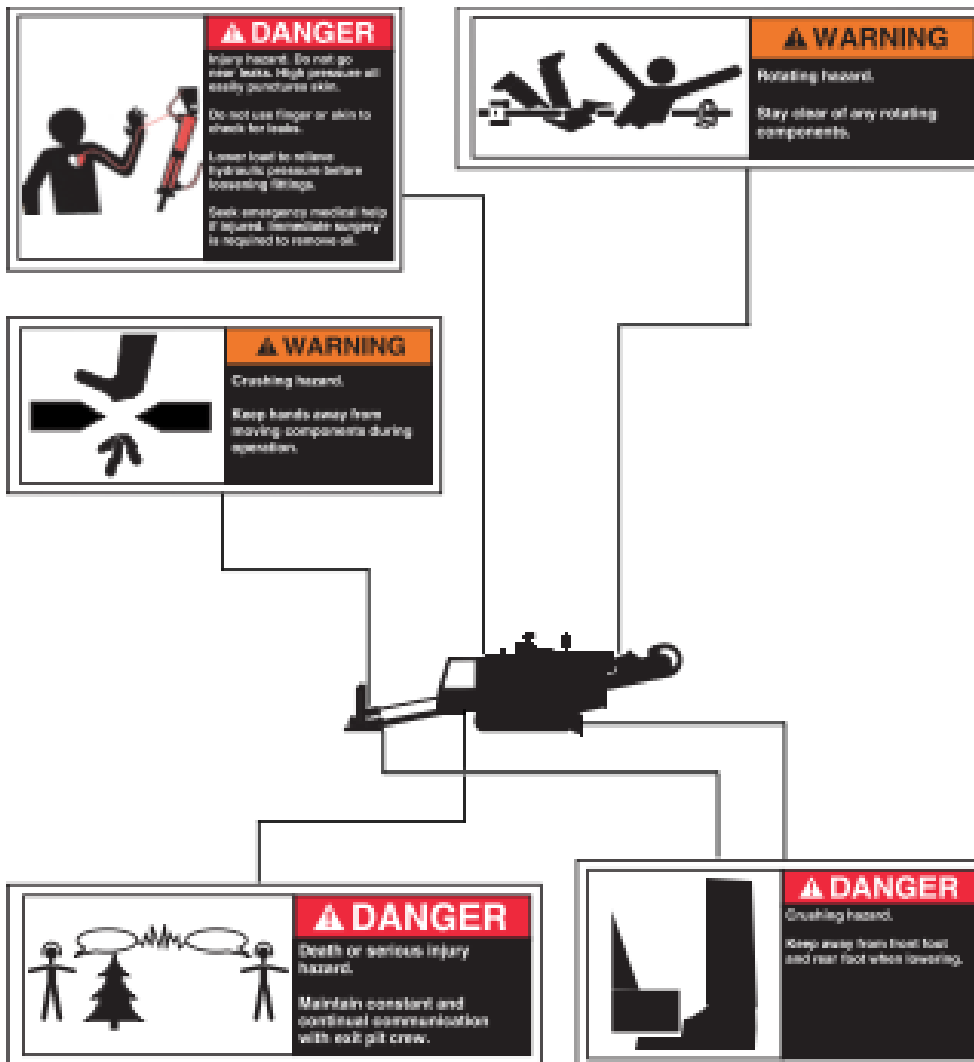
 **WARNING! INJURY HAZARD!** Close and lock all covers, shields, and service flaps during operation.

 **DANGER! ELECTOCUTION HAZARD!** Do not allow contact with a live power line. This is always dangerous and will be deadly. If the drill becomes energized, anyone or anything that is electrically connected to the drill will also be energized! **Crane will extend up to 23 feet!**

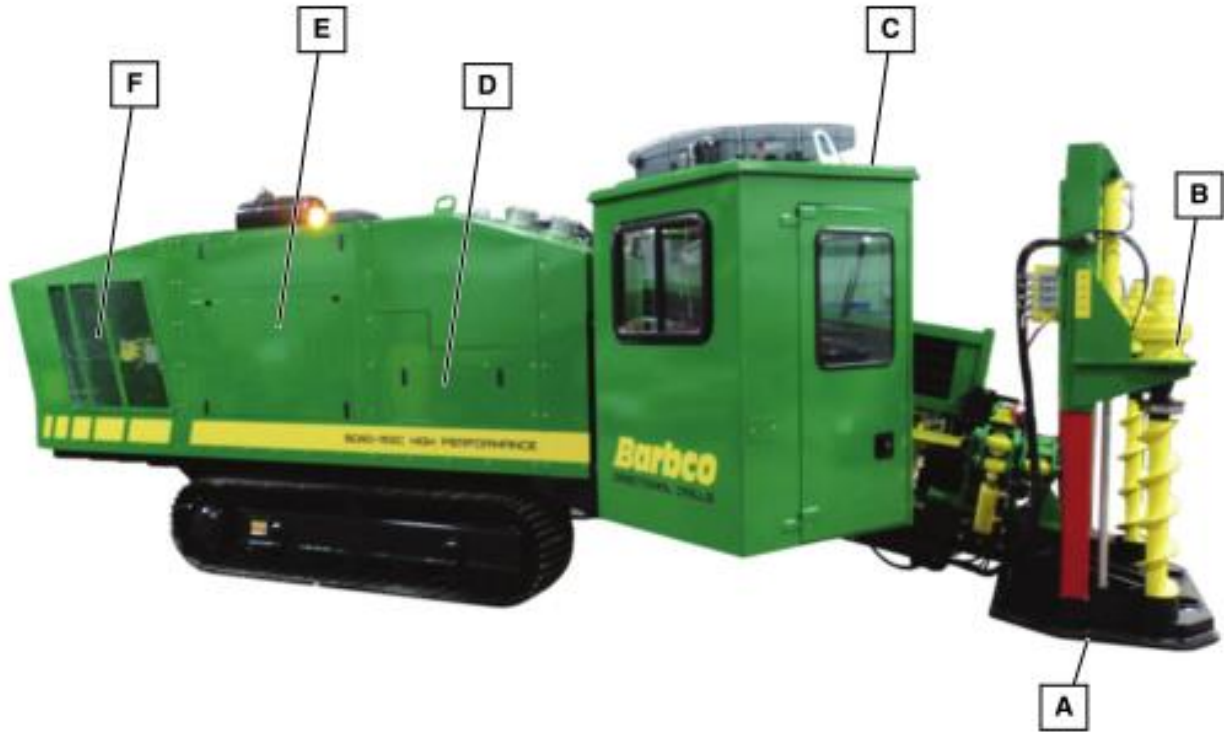
 **DANGER! ELECTOCUTION HAZARD! Use extreme caution around high voltage!** High voltage makes conductors out of materials that would normally not conduct! Wood, paper, fiberglass, nylon, tires and dirt will conduct current from the 8000 volts to ground that is commonly found in residential areas. Higher voltages are typical at transmission lines.

 **DANGER! CRUSHING HAZARD!** Never lift a load of rods over personnel. The load may shift or fall.

## DECALS



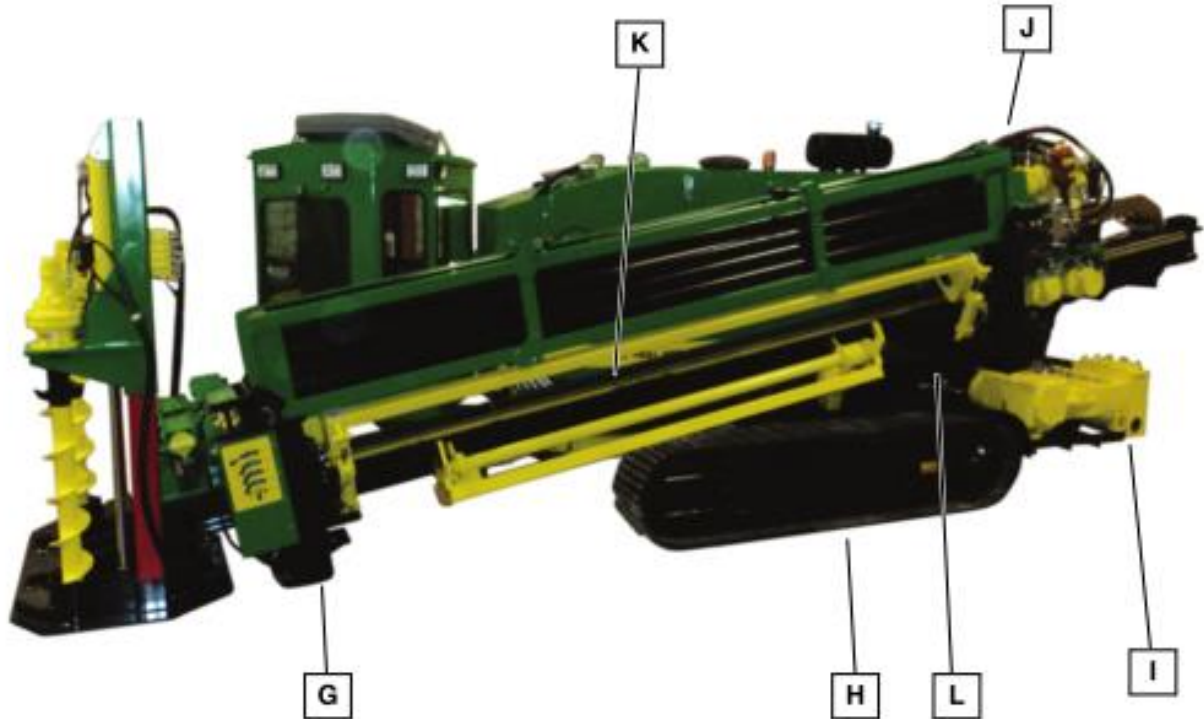
## **MAJOR COMPONENT DESCRIPTION**



## **DESCRIPTION OF MAJOR MACHINE COMPONENTS**

- A. **FRONT FOOT:** Stabilizer, brace during pullback
- B. **AUGER DRIVE:** Front anchoring system
- C. **CAB:** Area for all drilling operation with climate control
- D. **VALVE COMPARTMENT:** Housing hydraulic valves and manifolds
- E. **ENGINE COMPARTMENT:** Housing engine and pump drive assembly
- F. **COOLING COMPARTMENT:** Housing of oil/ water coolers





**G. AUTOMATIC ROD LOADER:** Feeds the spindle rod as needed during the drilling process

**H. UNDER CARRIAGE:** Steel tracks for transport into rough terrain

**I. DRILLING FLUID PUMP:** Supplies fluid flow down hole during drilling process

**J. MAIN CARRIAGE:** Provides thrust and rotation during drilling process

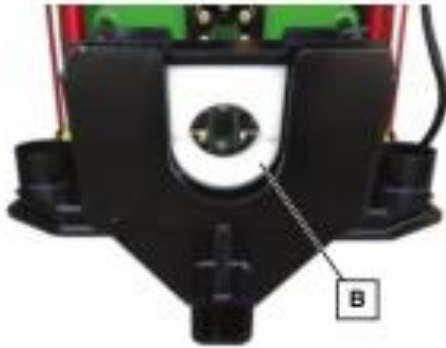
**K. BEAM:** Guide rail for main carriage assembly

**L. REAR BLADE:** Stabilizer, brace during drilling process

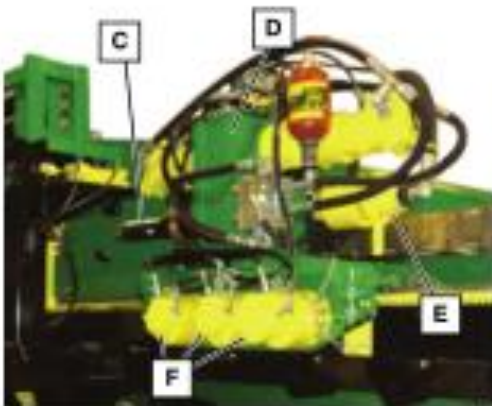
## MINOR COMPONENT DESCRIPTION



**A – GUIDE RING:** Guides the drill string through the breakout assembly for easier line up when clamping and breaking connections.



**B – FRONT EXTENDABLE ROD GUIDE:** Provides rod support during a hard steer.

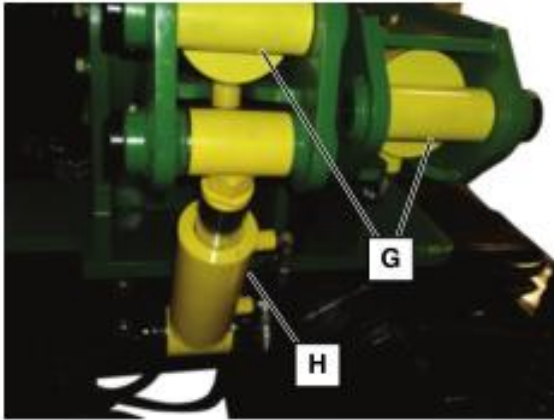


**C – MAIN SPINDLE:** Crossover adapters for drill rod connections are available. Main spindle size, 4" API right hand pin thread.

**D – ROTARY BOX:** Custom multiple input torque increaser, including thrust and pullback bearing housings.

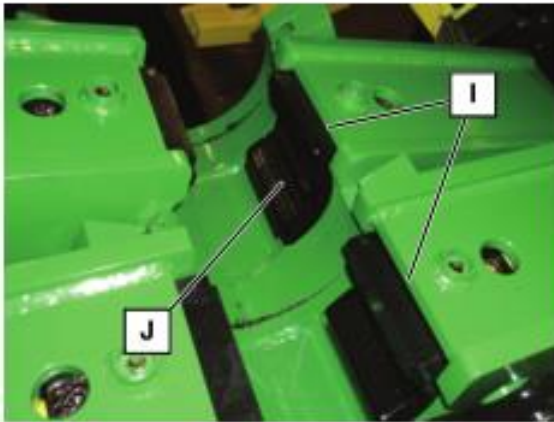
**E – MUD SWIVEL:** Easy to secure, large fluid capacity.

**F – THRUST MOTORS:** Supply thrust and pullback force during operation.



**G – CLAMP CYLINDERS:** Provides clamping force against drill string during make up or breaking out of tool joints.

**H – ROD BREAKOUT CYLINDER:** Provides rotary force during make up or breaking out of tool joints.

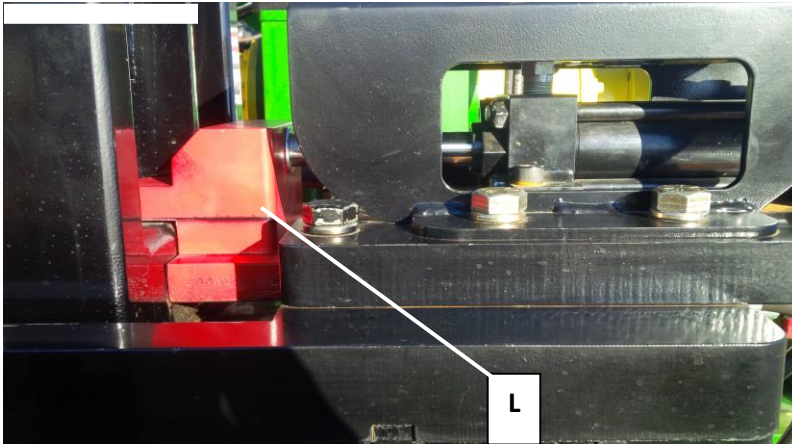


**I – CLAMP JAWS:** Replaceable assemblies that hold die inserts for grabbing tool joints.

**J – DIE INSERTS:** Replaceable inserts that grab the tool joint.



**K – ROD LOADER MANUAL OVERRIDES:** Hydraulic levers that activate loader functions.

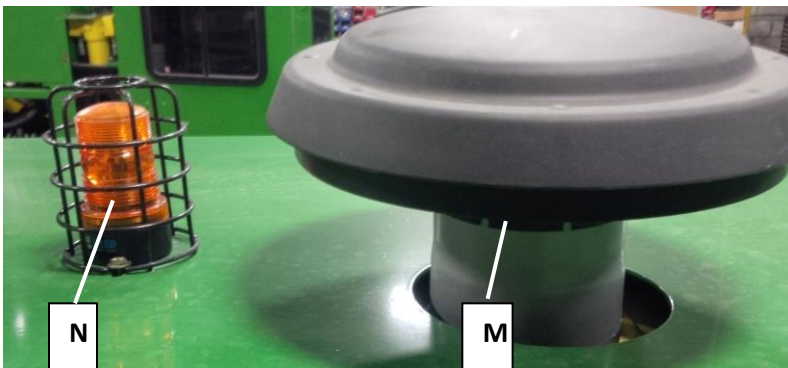


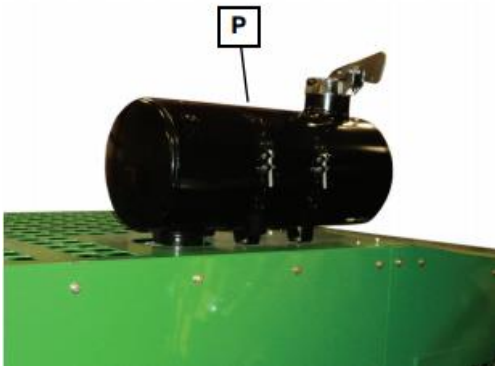
**L – ROD BASKET HOLD DOWN:**

Secures basket to rod loader assembly during use. Four pieces, one on each corner.

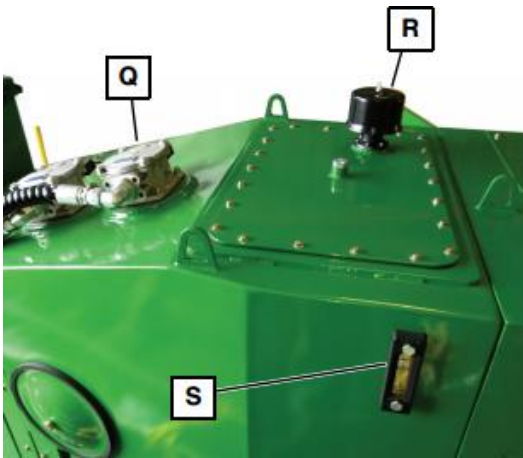
**M – AIR CLEANER HAT:** Engine air inlet that keeps large contaminants out of air inlet.

**N – BEACON:** Safety light, always **ON** if power is on the rig.





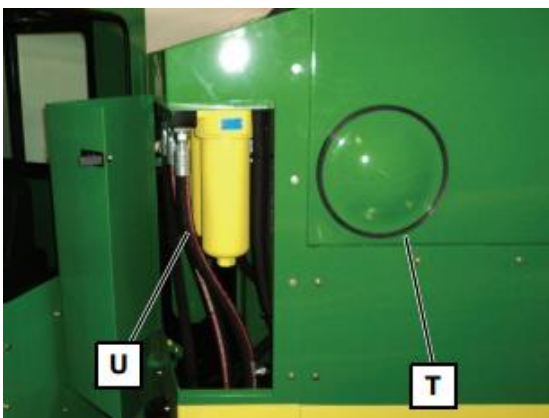
P – **EXHAUST**: Engine exhaust with flapper/rain cap  
Q – **TANK RETURN FILTERS**: Tank top filter cleaning hydraulic oil returning to tank.



R – **FILTER BREATHER**: Provides fill point and allows tank to vent as oil level is raised and lowered.

S – **HYDRAULIC SIGHT GAUGE**: Visual inspection of hydraulic oil level.

T – **CLEANOUT COVER**: Provides access into hydraulic tank during service.



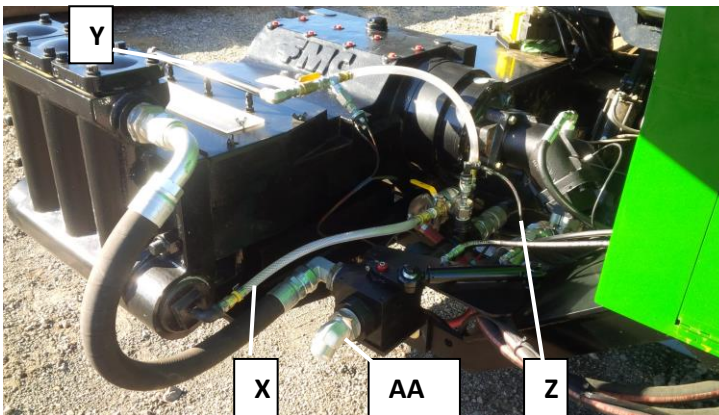
U – **HIGH PRESSURE FILTERS**: Cleaning hydraulic oil in the thrust and rotation loops





**V – ANTIFREEZE SYSTEM:** Storage tank provides the ability to inject antifreeze and winterize the pumping system. **NOTE:** It is best if you flush system with fresh water before winterizing.

**W – MEDIA INLET:** Inlet from mixing system to high pressure pump.



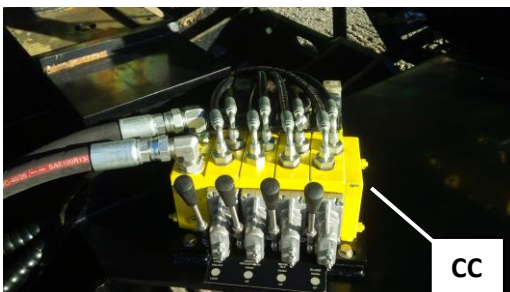
**X – HIGH PRESSURE MUD PUMP:** Primary pressure source of drilling fluid.

**Y – LINER WASH SYSTEM:** Storage of coolant/lubricant which protects the ceramic pistons. Turn ON and OFF from inside the cab.

**Z – ELECTRICAL MUD PRESSURE TRANSDUCER:** Displays pressure on drillers screen during operation.

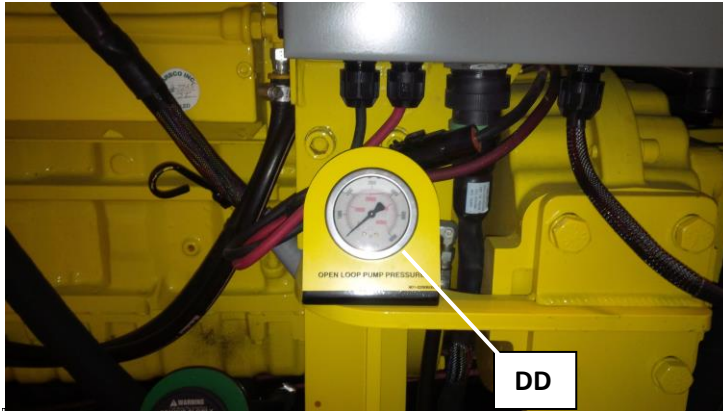


**AA – MUD DUMP VALVE:** Provides operator the ability to release the pressure in the drill string prior to breaking tool joints. **NOTE:** when the breakout clamp is closed the auto mud cycle will start. The mud pump will turn OFF and the mud dump will open.



**BB – DIESEL FUEL FILL:** Access point for adding fuel.

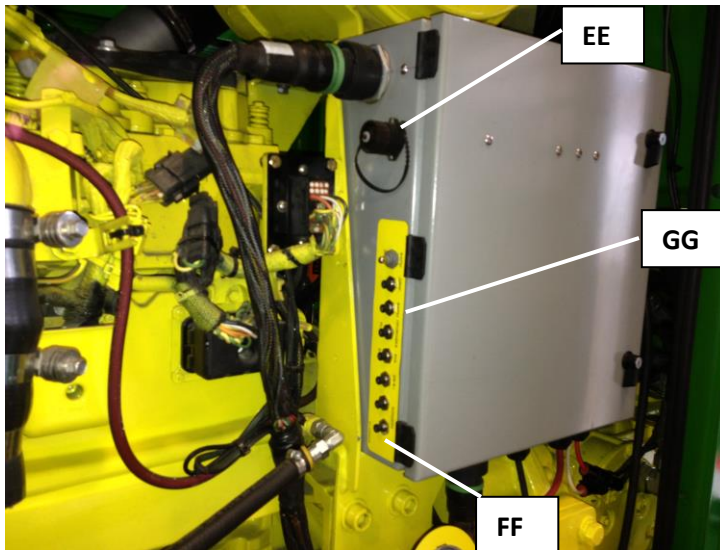
**CC – SETUP VALVE:** Manual override levers for all setup functions. Identification placard provided just below the handles.



**DD – PRESSURE GAUGE:** Shows pressure in the open loop circuit located inside the engine compartment.

**EE – WIRELESS REMOTE TETHER**

**CONNECTION:** Provides power to remote if battery pack fails.



**FF – LIGHT SWITCH:** Engine compartment work lights located in the engine compartment.

**GG – MAIN CIRCUIT BREAKERS:** Individual re-sellable pop out type circuit breakers.

**HH – ENGINE CONTROL COMPARTMENT:** Located at rear of machine. Houses “Cat” instrument panel and wireless travel remote.



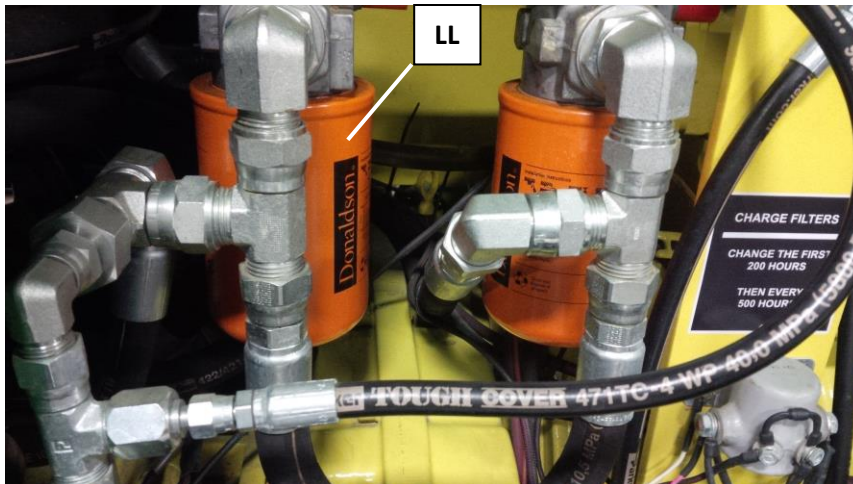
**⚠ WARNING!** Keep door closed during operation as pre-circulation of air flow will limit cooling.



**II – BATTERY DISCONNECT:** Disengages all power to drill unit. Must be OFF when not in use.

**JJ – E STOP:** Kills engine. Only power supply will still remain if pushed. Additional E stop located in cab.

**KK – BATTERY CHARGE LUGS:** 12VDC Charging station when battery is low.



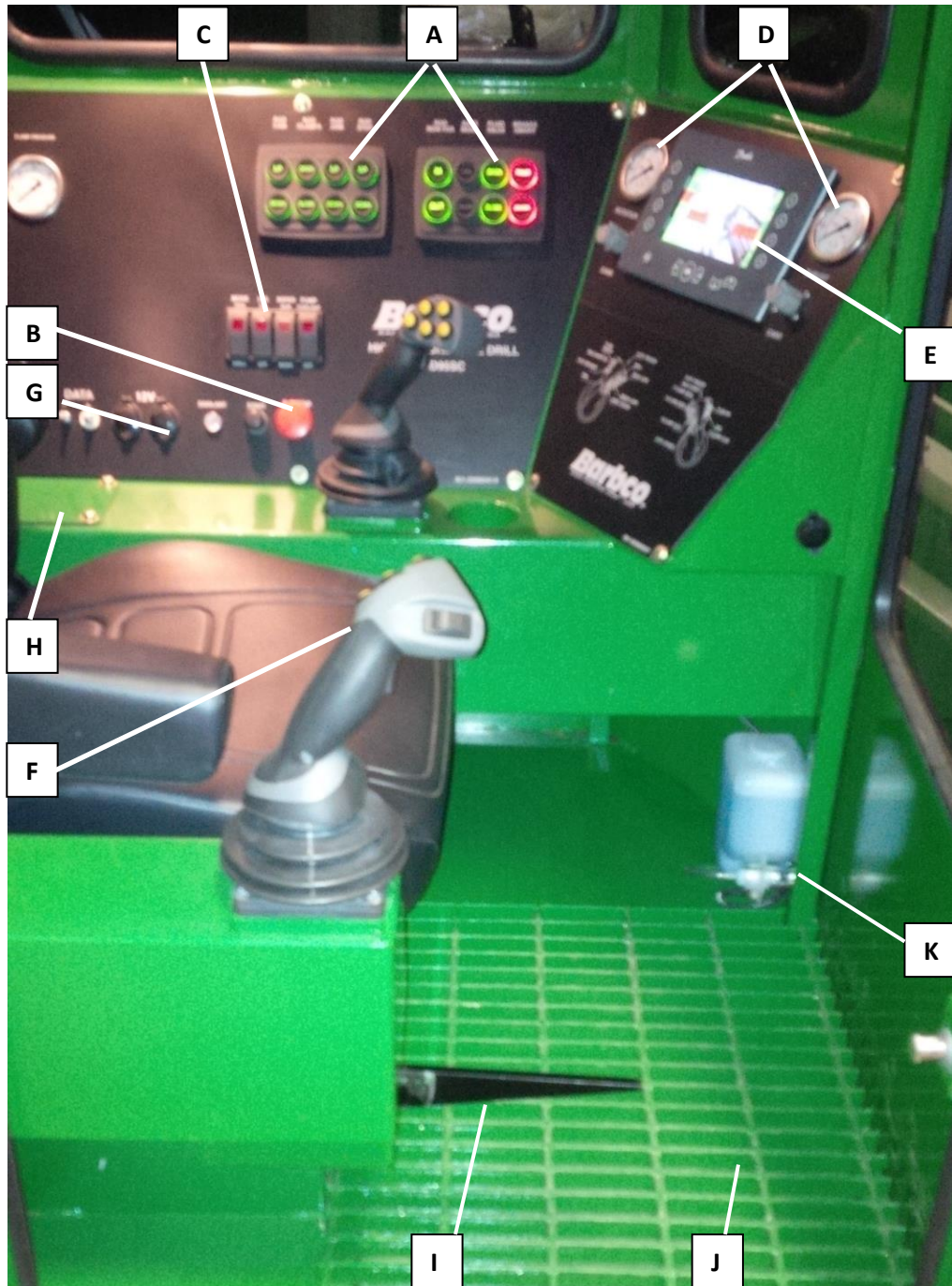
**LL – FUEL FILTER AND WATER SEPARATOR:** Located in the engine compartment. Refer to maintenance service instructions.



**MM – TOOL BOX:** Storage area for wireless travel remote.



## **CAB CONTROLS DESCRIPTIONS**



**A – KEY PADS:** Setup rod loader and auxiliary functions. Refer to key pad descriptions.

**B – MAIN ENGINE START/E- STOP:** Push to start button will only work if E-Stops are OUT and keys in ON position with disconnect ON.

**C – FUNCTION SWITCHES:**

- 1- **MODE-** All functions inside the cab will be live when switch is in the drill position. All functions inside the cab will be disabled and the remote will be active in the Travel position.
- 2- **LIGHTS-** Operates all exterior work lights.
- 3- **WINDSHIELD WIPE/WASH-** Switch operates both wiper and the wash pump.
- 4- **COOLANT-** Turns the liner wash system for the mud pump ON/OFF. The liner wash will help keep the ceramic pistons cool and lubricated. Blue LED light must be ON when coolant switch is on. If the blue light goes OFF then the pump isn't flowing fluid and must be turned OFF to prevent damage.


**D – HYDRAULIC DRILL GAUGES:** Backup hydraulic gauges that display thrust/pullback psi and rotary psi.

**E – DISPLAY:** Operators info screen. Refer to OPERATORS DISPLAY description.

**F - JOYSTICKS:** Thrust and rotation controls, breakout, loader, mud controls all located on joysticks to keep operator running more efficiently. **NOTE:** Joystick configuration option in override screen.

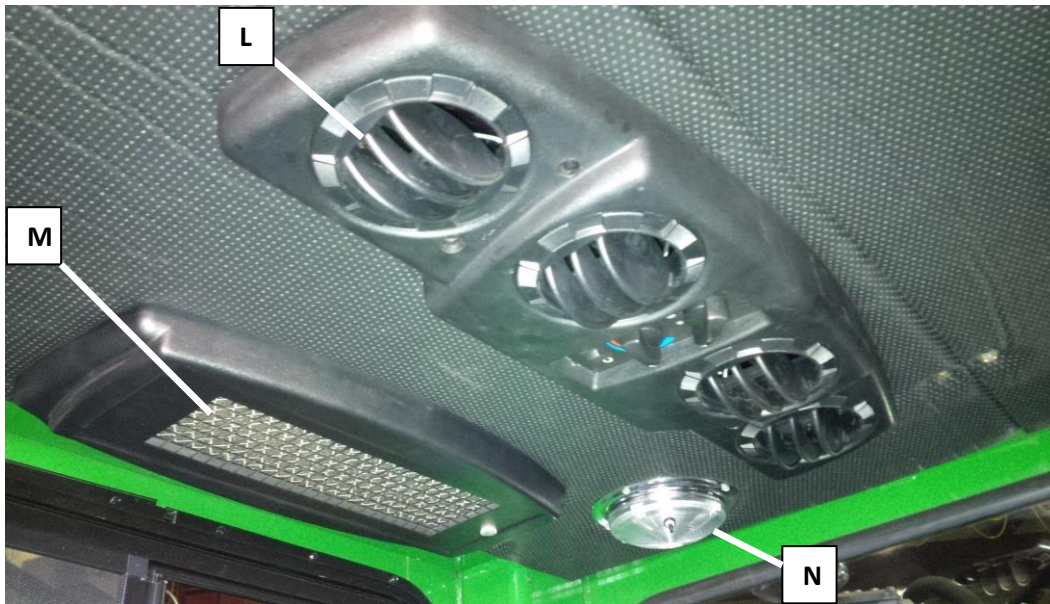
**G – 12VDC POWER SUPPLY:** Auxiliary power supply

**H – WIRE LINE DATE:** Terminals under arm rest

**I - DEADMAN LEVER:** Must be UP to operate. Shuts all drilling functions OFF when down.  **WARNING!** Never leave Deadman UP when outside the cab.

**J – REMOVABLE CAB FLOOR:** Tray can be removed for easy cleaning.

**K – WINDSHIED FLUID RESIVOIR:** Stores fluid to clean windshield.



**L – A/C AND HEAT CONTROLS:** Self- contained climate control system.

**M – FILTER:** Washable screen to filter air through climate control system.

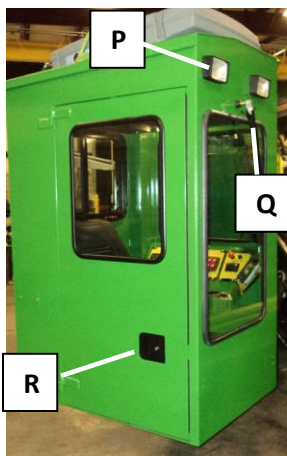
**N – DOME LIGHT:** Cab inside lighting switch located on lens cover on light.

**O- FIRE EXTINGUISHER:** ABC type

**P – WORK LIGHTS:** Illuminate job site. Switch located on main start panel.

**Q – WINDSHIELD WIPER ASSEMBLY:** Keep visibility during drilling.

**R – DOOR OPEN LOCK:** Provides ability to keep door open. Push handle to release.



## **KEY PAD DESCRIPTIONS**

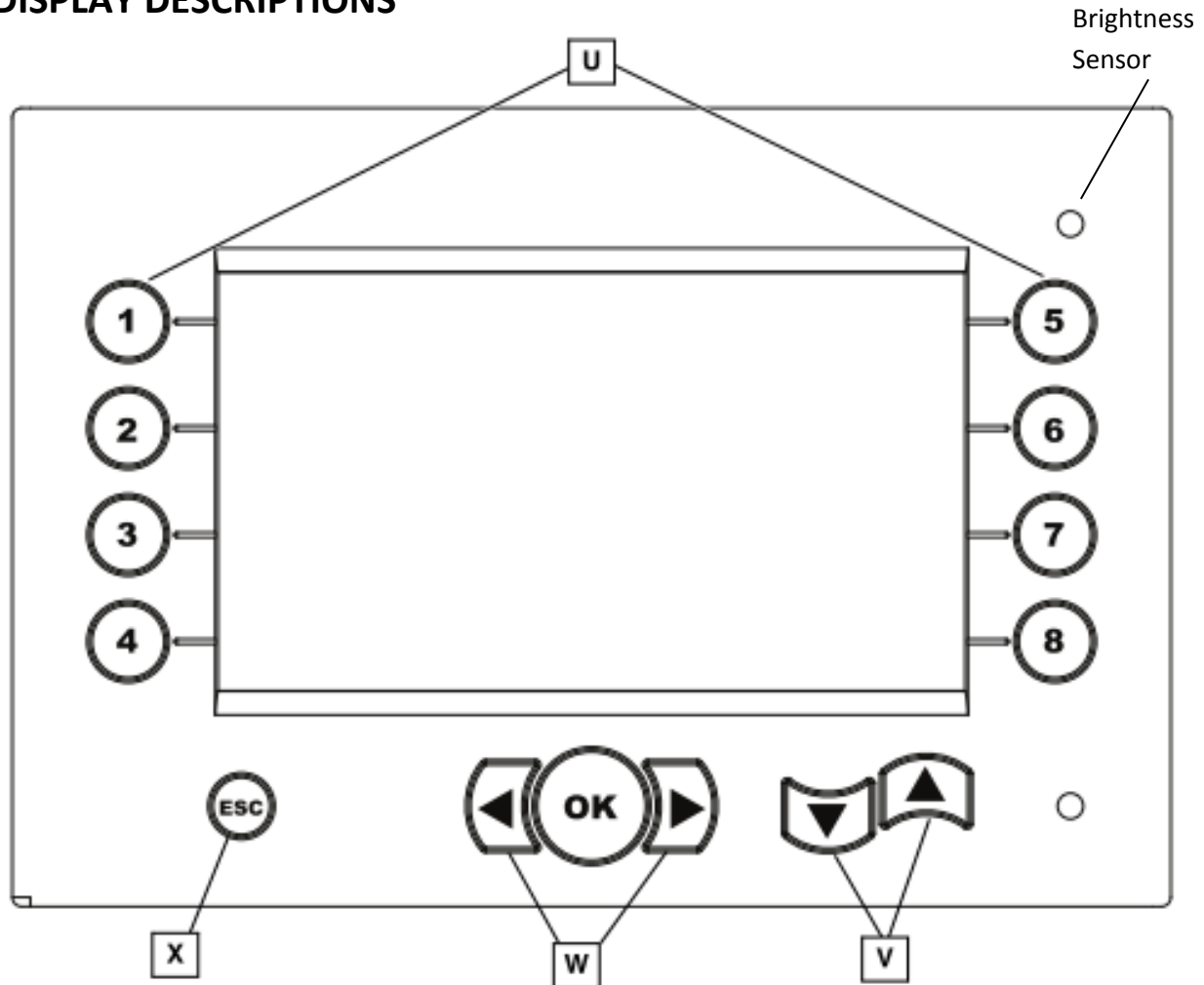
Selected buttons or “ON” buttons will turn from red to green.

**NOTE:** Placement of switches are subject to change.





## DISPLAY DESCRIPTIONS



**NOTE:** Placement of switches are subject to change.

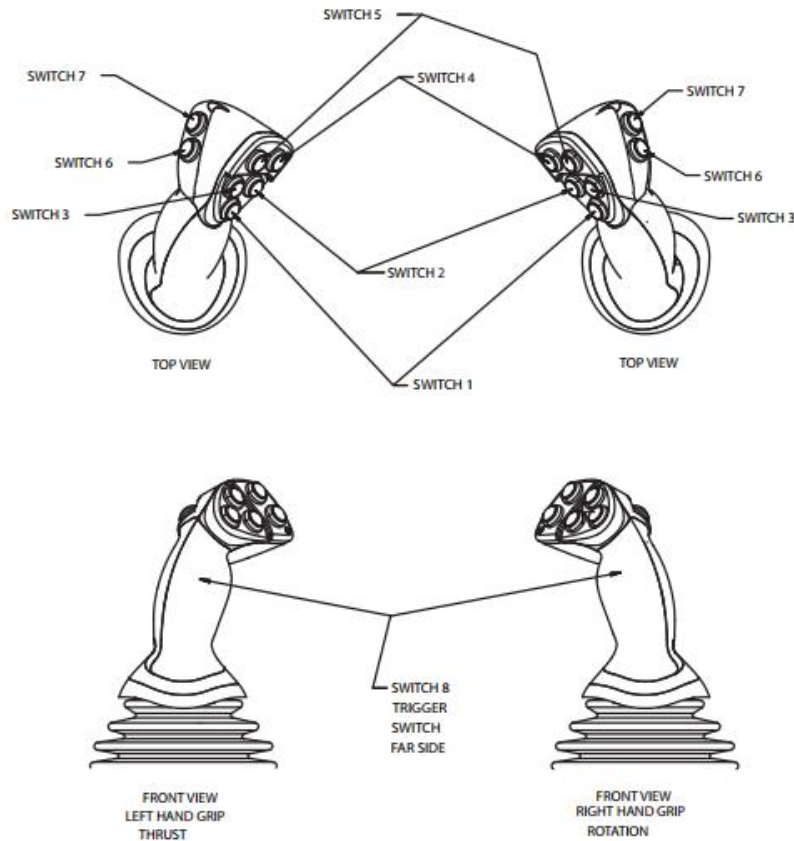
**U** - Buttons 1-8 to Select Items on Screen Push the Button Beside the Item you Wish to View

**V** - Allow Operator to Increase or Decrease Values Selected

**W** - To Toggle Throughout All Pages on Screen

**X** - Takes you Back to the Drillers Page

## JOYSTICK DESCRIPTIONS



### LEFT

1. Park Loader Automatically
2. Break Out Joint
3. Decrease Engine RPM
4. Make Up Joint
5. Increase Engine RPM
6. Apply Grease
7. Mud On/ Off
8. Auto Ream Lock

### RIGHT

1. Start Loader Automatically
2. Rear Clamp Closed
3. Front Clamp Closed
4. Rear Clamp Open
5. Front Clamp Open
6. Drilling Fluid Decrease
7. Drilling Fluid Increase
8. Auto Ream Lock/ Hi Thrust.

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## **MAG PROX SENSORS**

**MS4** – Rod loader arm down position sensor. Indicates the position of the loader arm during the auto load/unload cycle. De-energize thrust when MS4 is active and the L2 laser zone is off.

**MS5** – Front Clamp Sensors, limits the forward and reverse thrust when off. Keeping the operator from damaging the breakout clamps

**MS6** –Rear Clamp Sensor, limits the forward and reverse thrust when off. Keeping the operator from damaging the breakout clamps

**MS7** – Beam Tilt (trap). This sensor will stop the beam when it is in the horizontal position. Its main purpose is to keep the back of the beam from colliding with the mud pump assembly.

**MS8** - Cab Position sensor, de-energizes thrust when on. Cab must be in the out position to operate the carriage.

**MS9** – Crain Position de-energize thrust when off to protect from colliding with the crane.

**MS10** – Loader Cam sensor, watches the position of the rod loader cam arm.

**MS11** – Loader Rod Lift sensor, watches the position of the rod being lifted into the basket. One sensor located on front pedestal and one located on the rear pedestal wired in series.

**MS12** – Rod Loader Arm up position sensor, indicates the position of the loader arm during the auto load/unload cycle.

**MS16** – Rod loader arm center position sensor. Indicates the position of the loader arm when it's lined up with the cam during the auto load/ unload cycle.

## **PRESSURE TRANSDUCERS**

**PT1** – Forward Rotation, needed to display pressure on drillers screen during forward rotation only. Also needed for rotation limiter set point. No Auto Ream if PT1 fault is present.

**PT2** – Reverse Rotation, needed to display pressure on drillers screen during reverse rotation only.

**PT3** –Thrust, needed to display pressure on drillers screen during forward thrust only. Also needed for forward thrust limiter set point. No Auto Ream if PT3 fault is present.

**PT4** - Thrust, needed to display pressure on drillers screen during reverse thrust only. Also needed for reverse thrust limiter set point. No Auto Ream if PT4 fault is present.

**PT5** – Auto Rod Loader, reads pressures during the auto load and unload functions. No Auto Loader functions if PT5 fault is present.

**PT6** – Oil temp and pressure in the oil cooler inlet line.

## **OTHER SENSORS**

**Rotation Speed sensor-** Displays the rotary RPM on the drillers screen.

**Mud pump speed sensor-** Allows mud GPM to display on drillers screen.

**Loader Cam Spring Switch-** watches the rod when it enters into the cam during the rod loader cycle. Two switches, one on either end wired in series.

**Carriage Laser-** *(see rod loader operation)*

**L1** - Forward Carriage Stop - Disables any Auto Mode Function and de-energizes Forward Thrust.

**L2** - Carriage Load Position -Disables High Thrust Speed when high. Also turns on the Video allowing the operator to see the spinal on the Drillers Display. Carriage position for Auto Loader to work.

**L3** - Rear Carriage Stop - Disables any Auto Mode Function and de-energizes Reverse Thrust.

**L13-** Flags the operator to position the rod when using the auto unload program.

**L14-** Flags the operator when the carriage spindle clears the rod when using the auto unload program



## SCREEN DESCRIPTIONS

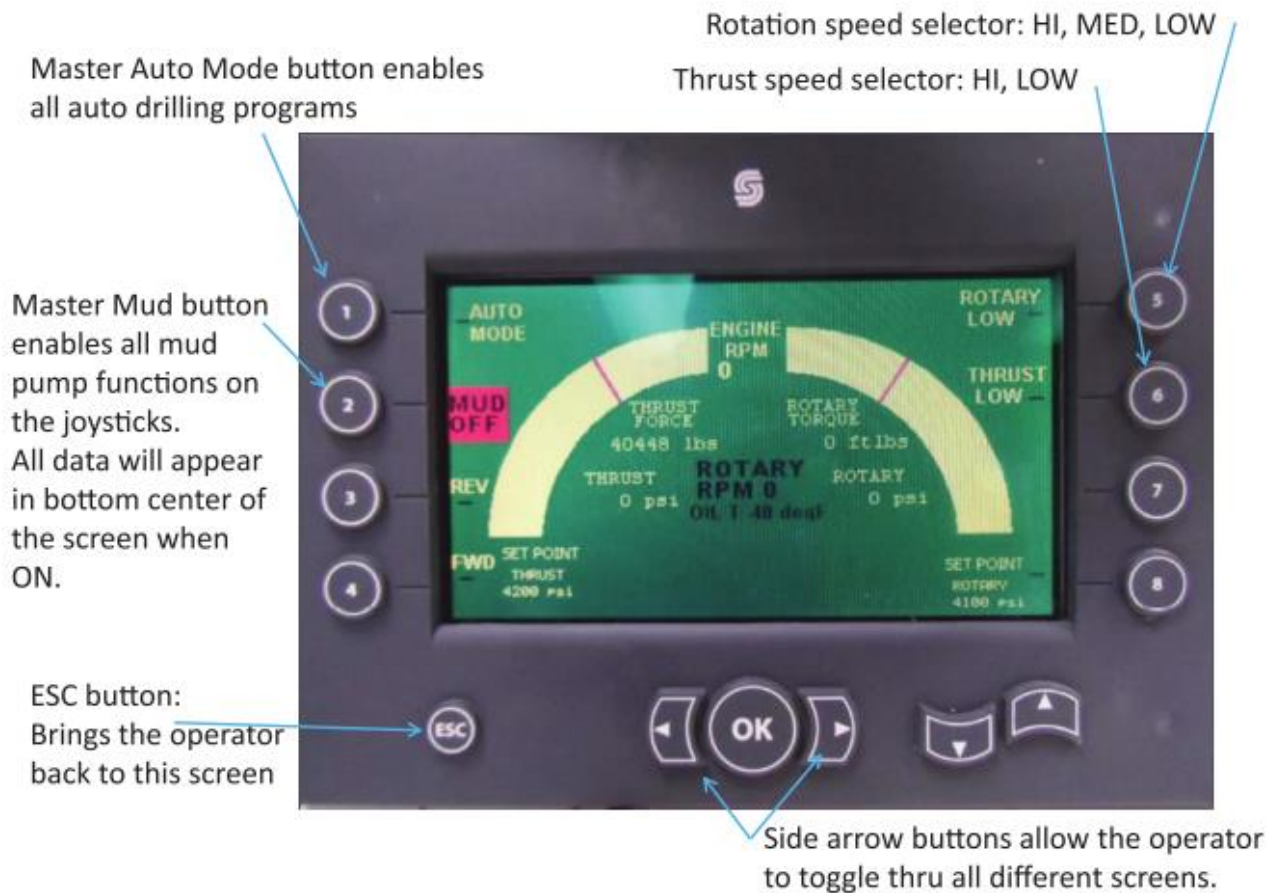
### Engine Data Screen

This screen will stay on for determined time frame every time engine is started. Fuel icon will flash RED when low fuel is present on the drillers screen.



## Drillers Screen

This is the main drilling screen. All drilling operations run through this screen. All pressure limiter settings and drilling pressures are displayed during operation.

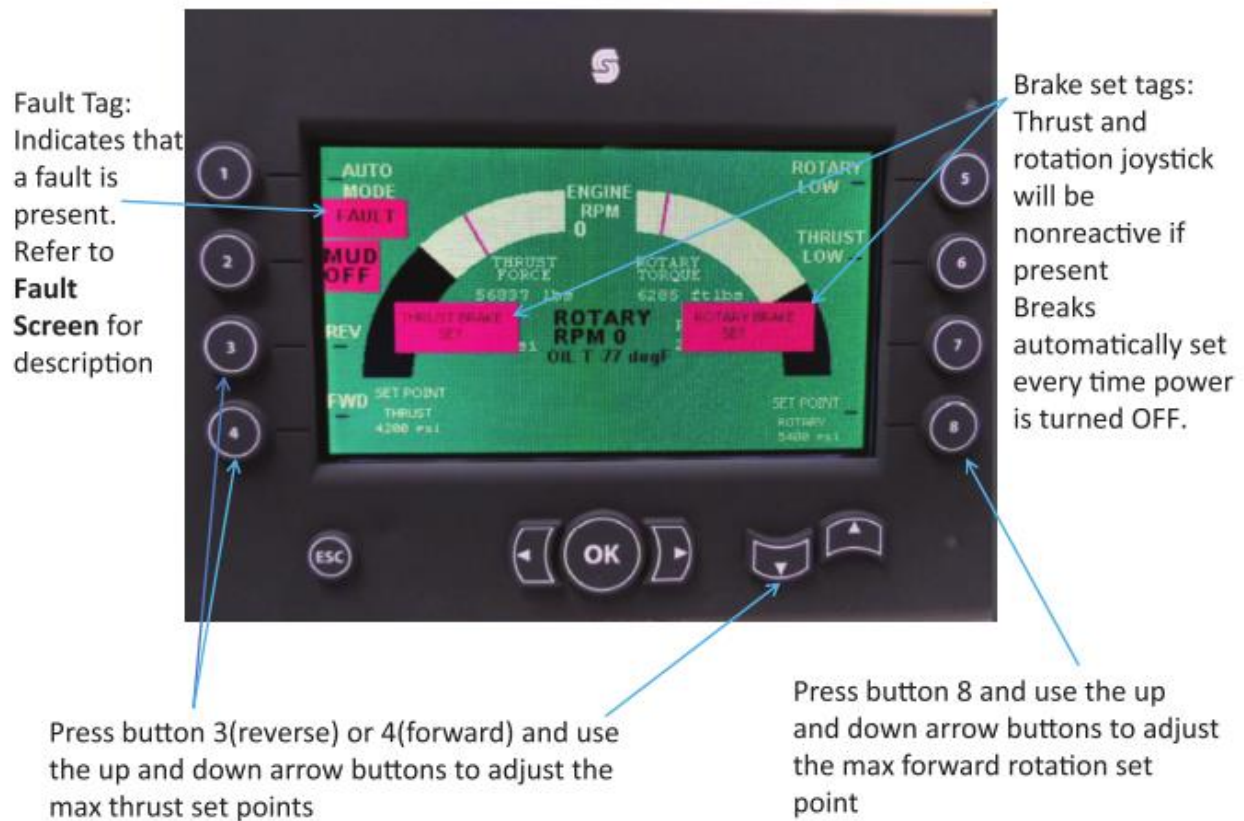


## Drillers Screen (continued)



Thrust and Rotary Bar Scale:  
Bar turns black as resistance increases.  
Red line indicates current max set point.  
Bar will turn red as set point is approached.

## Drillers Screen (continued)



## Override Screen

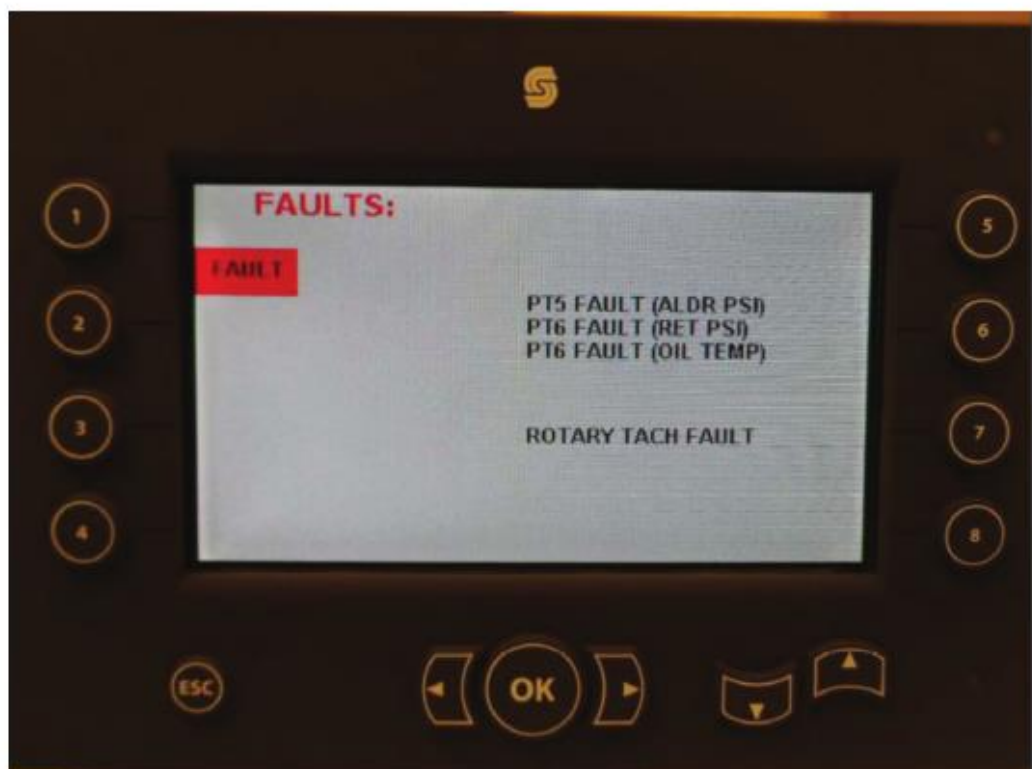


ESC button will take you to the Drillers screen.

Push the OK button to disable/enable the selected item.

Push up or down arrow buttons to scroll thru each item

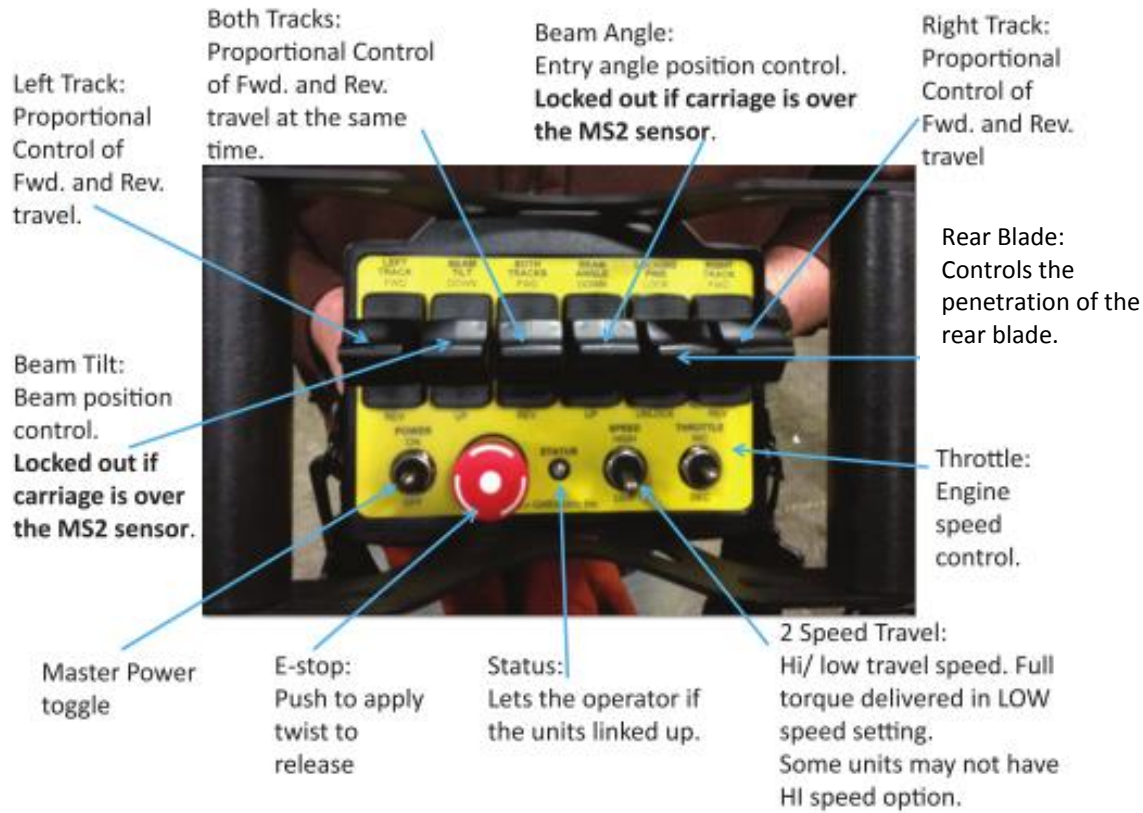
## **Fault Screen**



All faults will appear on this screen including  
Pressure transducers, tach's and filter service information as well.



## Wireless Travel Remote Descriptions



**NOTE:** Placement of switches are subject to change.

## OPERATION

### Start Up Procedure

**⚠ WARNING!** Do not operate this unit until you have checked all systems. Visually inspect the machine daily. All safety equipment, shields and decals must be in place and in good condition. If any are missing, incomplete, or damaged, they must be replaced or repaired.

The following information shows the operator the steps required before start up to ensure maximum machine performance.

1. Visually inspect hydraulic oil level in the reservoir
2. Check engine coolant level. Engine oil level and pump drive oil level

### START UP PROCEDURES:

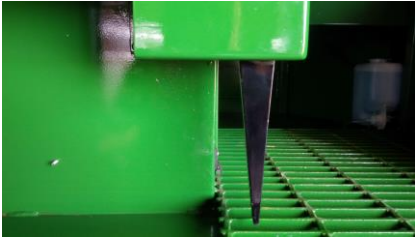
The following procedures must be done at each start up.

1. Clear directional drill of all personnel and spectators with the exception of the operator.
2. Turn the battery switch ON. (Beacon lights will come on and flash until battery switch is in the OFF position).
3. Turn and pull out all E-Stops, in cab and on CAT instrument panel.





Deadman in cab must be in the down position.



4. Turn ignition switch to ON position, BUT DO NOT CRANK ENGINE.
5. On the instrument panel you will see blinking lights.  
Red lights (2) on: Oil pressure gauge  
Red lights (2) on: Fuel level  
Red lights (2) on: Charge level
6. When lights stop blinking, continue to hold and turn ignition switch to crank engine until started, then let go.
7. When lights stop blinking on the Cat instrument panel, push and hold the “push to start” button in the cab until the engine is started then let go.

## **Shutdown Procedure**

When machine work is finished, these shutdown procedures must be followed:

1. Return engine throttle to **idle** position.
2. Allow engine to idle for 5 minutes to cool down.
3. Turn ignition switch to the **OFF** position.
4. Remove key from ignition switch.
5. Turn battery switch to the **OFF** position. (Beacon Lights- OFF)



## **Operation Modes**

Drill Mode- All functions inside the cab will be live when switch is in the Drill position and the Deadman's in the Up position.

Travel Mode- All functions inside the cab will be disabled.

## Wireless Travel Remote Activation



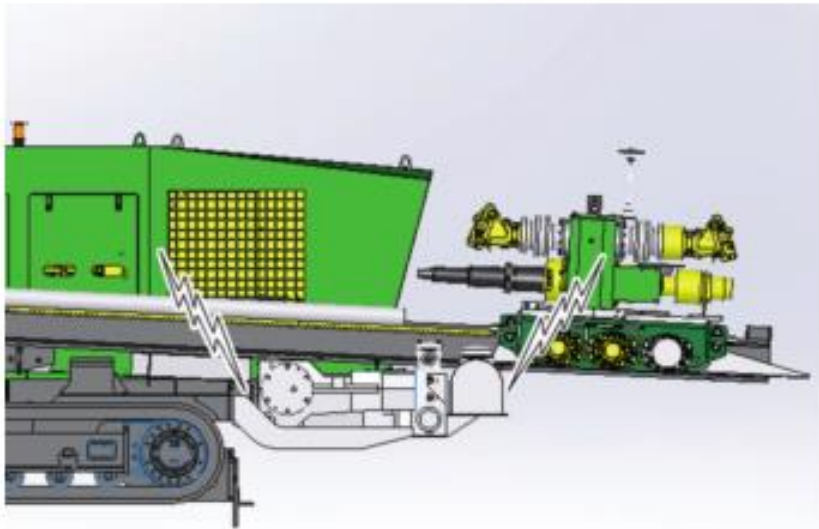
### Blue Indicator Light

1. Push the mode switch into the **Travel** position
2. Push the ON/OFF toggle on the remote to the **ON** position. Fast flashing blue light will appear on remote.
3. Push in the E Stop on the remote, then quickly release it. Blue light will begin to flash slowly as the remote is linked up with the receiver.
4. Start the unit. Refer to **Start up Procedures**.
5. Remote pendant is live and ready for operation. (Refer to **Wireless Travel Remote Description**).


## **Cradle Angle Procedure**

This procedure is for determining the initial penetration angle. If steeper beam angle is needed, the entry angle cradle can be adjusted to a different position. To safely adjust the beam angle constant communication is required between the Operator and Crew Member.

 **CAUTION! POTENTIAL CRASH HAZARD!**



**BEAM ENTRY ANGLE IN SECOND POSITION**

 **DANGER! INJURY HAZARD!** Keep the crew member in sight during this entire procedure and maintain visual contact.

## Hydraulic Pin Type - Using the Wireless Travel Remote



1. Refer to **Wireless Travel Remote Descriptions**.



**ATTENTION!** Unit will shut down if the operator falls or the transmitter is held on its side.



2. To change the angle, lift the front foot off the ground. By pushing the beam tilt paddle.

3. Push the cradle lock lever on the set up valve to the unlock position and hold momentarily.

**CAUTION!** Locking pins must retract. Visual inspect before proceeding to next step.

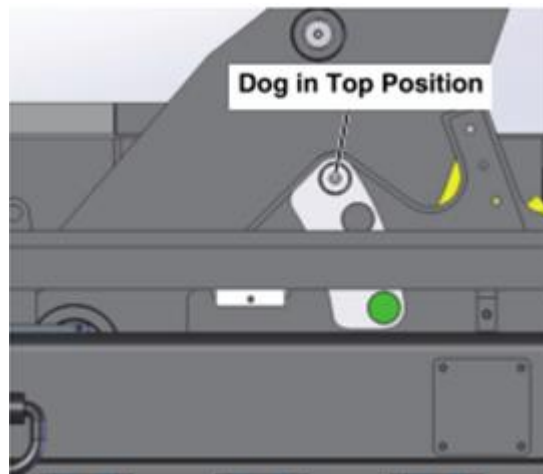
NOTE: If locking pins didn't retract quickly, push the entry angle position paddle in the appropriate direction to line up the pin hole. This will remove side load from the locking pins. Repeat step 3.

4. Push the entry angle position paddle in the appropriate direction to achieve desired entry angle position. Make sure the front foot is off the ground and hydraulic hoses are not being pulled or stretched.

**CAUTION!** Visually inspect to see if the holes are lined up correctly.

5. Push the cradle lock paddle to the lock position and hold momentarily.
6. Push the beam tilt paddle to lower the front foot to the ground.

**CAUTION!** Visually inspect to be sure that locking pin is engaged completely.



## **LOADING / UNLOADING**

Prior to transport check and observe all local, state and federal highway laws and restrictions.

The following steps must be used when loading and unloading the Drill:

Always use a guide when loading and unloading.



**WARNING!** Never transport Drill with Rod Basket in place.



**CAUTION!** Do not attempt to tow the drill. Crawler drives are equipped with spring brakes.



**Loading:** The beam is to be horizontal in the lowest entry angle position and secured in the beam trap (travel position). The carriage is to be located between the main pivot and the beam trap.



#### **CARRIAGE POSITION DURING TRANSPORT:**

1. Set ramps on level ground. Make sure they have traction and are stable.

**⚠ WARNING! TIPPING HAZARD!** Use a guide when loading or unloading to prevent tipping when driving on ramps.

2. When loaded, place front and rear foot down.
3. Shut machine OFF and remove key.
4. Turn battery switch OFF.
5. Secure the machine to the trailer with tie downs before traveling.



## **Unloading:**

1. Unsecure machine from trailer.
2. Set ramps on level ground.
3. Start the machine (refer to Start up Procedures).
4. Raise front foot and rear foot to unload and repeat step 1 in loading.
5. Always go slowly when backing down the ramp. As the machine moves down the ramp, the weight will shift from the front of the track to the rear causing the machine to pivot.



**CAUTION!** The front and back of the drill can bottom out on the trailer.

## WORK SITE SET UP

Before the setup process can begin, the following primary safety considerations must be addressed:

**⚠ DANGER! INJURY HAZARD!** Read the Setting Up Safety Section before setting up the work site.

**⚠ WARNING! TIPPING HAZARD!** Horizontal directional drills are capable of rolling over. Use caution when working on side hills or banks.

1. Set up Directional Drill on level, or closest to level ground as possible.
2. If work site setup requires the use of track blocks, drive Drill Crawlers up on track blocks. Secure machine to track blocks.
3. Using the Beam Tilt Switch, let down the front of the main beam until the front foot is flat on ground. (Refer to Front Foot Procedure)
4. Determine cradle angle. To set cradle angle refer to Cradle Procedure.

**⚠ DANGER! CRUSHING AND PINCHING HAZARD!** Keep clear of pinch points. Keep clear of front foot and rear foot when lowering.

5. Position the rear foot down completely to anchor the drill.
6. Stake front foot down. (Refer to Front Foot Procedure).
7. Rotate cab to drill position.

**⚠ DANGER! UNDERGROUND UTILITY HAZARD!** Install proper safety strike alert system if unit is not



CAB IN DRILL POSITION

## **FRONT FOOT PROCEDURE**

Follow this procedure when you set up the front foot of the Horizontal Directional Drill before drilling begins.

**⚠ DANGER! CRUSHING AND PINCHING HAZARD!** Keep clear of pinch points, front foot and auger.

1. Lower the front foot until it contacts the ground.
2. DO NOT increase ground pressure to the point of raising crawler off the ground.
3. Make all grounding connections to auxiliary safety specific equipment as needed.
4. Stake front foot down through stake pockets, or use auger drive if supplied.



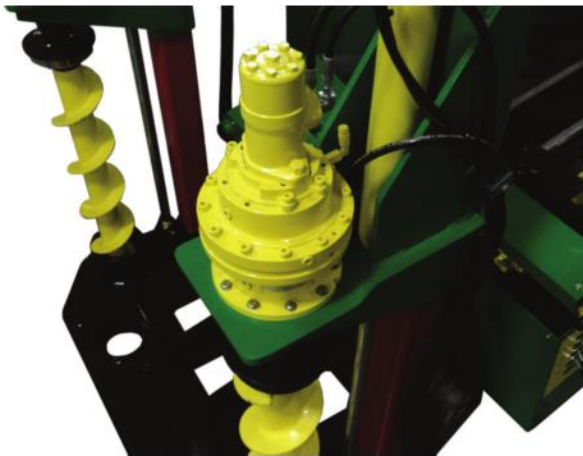
## AUGER STAKING PROCEDURE

Auger Installation:

1. Increase engine to mid throttle.
2. Using the auger staking control valve levers individually, raise the auger staking assemblies to full height.




3. Install the auger into the guide ring of the front foot and align the drive adapter and auger hex.
4. Lower the staking assembly onto auger hex and install the locking pin and retainer pin.



**DANGER!** ROTATING HAZARD! Stay clear of rotating auger.



**DANGER!** CRUSHING AND PINCHING HAZARD! Keep clear at pinch points and auger.

 **WARNING!** ELECTROCUTION HAZARD! CALL BEFORE YOU DIG! Locate all underground utilities where you have to cross them. This includes hazards such as gas, water, sewer, fiber optic cables, etc. If in doubt, have utility company shut OFF before starting underground work.

5. Activate the auger staking control valve levers individually, lower and rotate (clockwise). This may require some speed adjustment to either the lowering or relating functions.
6. Continue this procedure until the auger staking assembly is completely lowered.
7. DO NOT continue excessive auger rotation as this will result in inadequate anchoring of the front foot.


Auger Removal:

1. Increase engine to mid throttle.

 **DANGER!** ROTATING HAZARD! Stay clear of rotating auger.

 **DANGER!** CRUSHING AND PINCHING HAZARD! Keep clear of pinch points and auger.

2. Using the auger staking control valve lowers individually. Simultaneously raise and rotate the auger (counterclockwise) out at the ground.
3. Raise the auger staking assembly to its full height.
4. DO NOT remove augers until prior to machine transport.

 **CAUTION!** INJURY HAZARD! Do not remove augers over open holes, this could result in difficult work site teardown. Remove augers only after machine is off work site, but prior to transport.

## MUD PUMP PROCEDURE

**Master switch** on the drillers screen activates the mud pump functions on the joysticks. Push the master ON/OFF button (#2) beside the “Mud OFF” icon on the drillers screen. “Mud Ready” will appear and all mud related functions on the joystick will be activated.



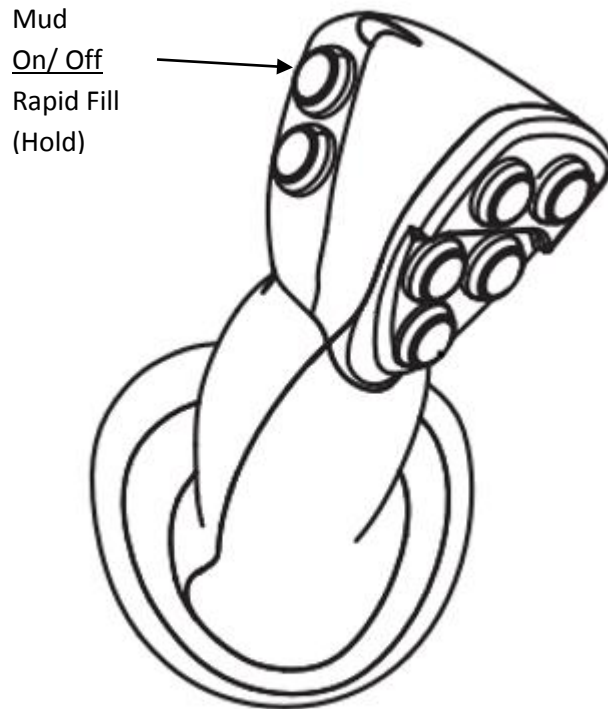
Drilling fluid pressure and flow are displayed on the drillers screen when pump is ON.





## Turning the Mud Pump ON

Push the switch on LT joystick to toggle pump from Ready to ON.



TOP VIEW

Rapid fill feature will kick the mud pump to 80% to fill the drill string. Push and hold the mud ON/OFF switch to rapid fill.

GPM setting can be raised or lowered by moving the roller on the right joystick. Rolling the switch forward will increase the GPM setting. Roll the switch in reverse and the GPM will decrease.

## **CRANE OPERATION**

Crane is equipped with a wireless crane remote that controls all functions. For the crane only the E-Stop will only shut down the pendant. Turn OFF the wireless crane remote when not in use to prolong battery life. Tether connection is included as backup if battery power is poor.



1. Push the crane **ON** key pad to activate the hydraulic power to the unit.
2. Push the ON/OFF toggle to the ON position on the pendant. Blue light will blink fast.
3. Push the E-Stop in, then quickly back out to link up the receiver. Blue light will blink slowly. Pendant is live.
4. Select a function and push the toggle in desired direction.
5. Slowly pull the proportional trigger in as the toggle in Step 4 is held. Function will operate. The further you pull in the trigger, the faster that function will work.
6. Turn pendant to the **OFF** position after operation.

## ROD LOADER OPERATION

The rod loader is a controlled bottom feed system that allows the operator to quickly add or remove drill stem to and from the rod basket.

This is a complete automatic system as the operator can cycle rod with the push of one button. The loader can also be operated manually, one function at a time from the cab via the Key Pad (see Key Pad Functions) or from the side of the machine with the manual hydraulic levers.

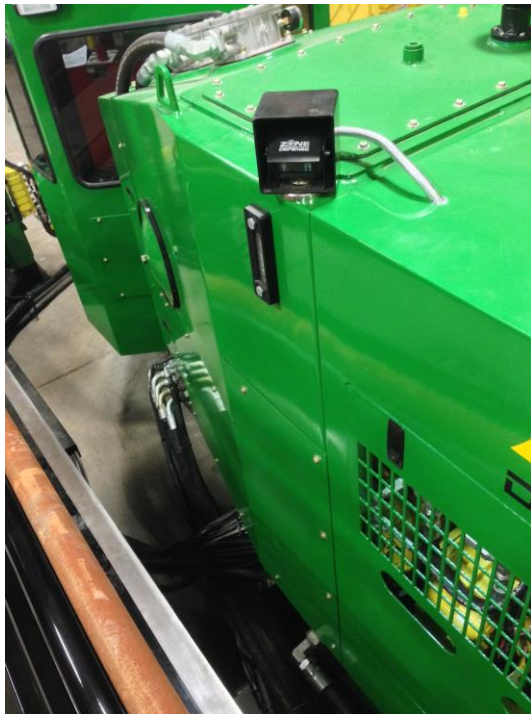


**Requirements to operate the Loader automatically-** The Automatic function of the rod loader will not work unless the below criteria is met.

- 1- Carriage Load Position LS2 Zone must be active. Note- the camera image will automatically appear when this zone is active.
- 2- The PT5 Pressure transducer must be operational and not faulted.
- 3- Prox Sensor MS4 must be active. This means the Loader Arm must be in the down position (see *Prox Sensor*).



**ATTENTION-** Independent keypad functions are always live. Any rod loader key pad function pushed will terminate an active Auto Rod Loader program.



**Camera-** The camera screen will automatically appear on the display when the tool joint is between the two breakout clamps. This is the loading zone required for the Loader to work automatically.

The Camera screen can be turned on/ off by pushing the OK button.

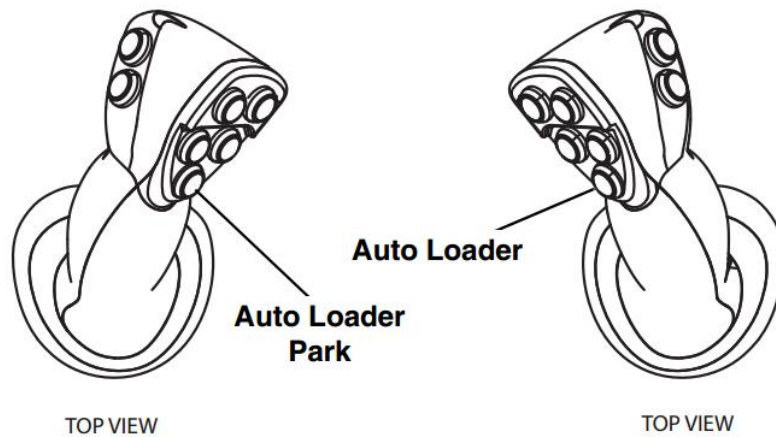
**Preparing to use the Auto Loader-** To get started a mode must be selected by pushing one of the two options on the key pad “Load” or “Unload”. The selection will appear in the bottom left hand corner of the camera screen and the key pad will stop flashing.

The program will begin and the loader will start a sequence of movements and prepare itself to Load/ Unload based on the mode selected. The program will watch this cycle and stop if a rod gets jammed up for any reason. The selected key pad mode button will then turn red.

The Program will stay in the selected mode until the operator changes it or the drill is turned off.







**The right joystick-** The “Auto Loader” button on the right joystick brings the loader arm up in front of the spindle to either load or unload a rod.

This button must be held in until the arm comes up and stops. If during this time the operator see a problem he can release the button and the program will pause. To continue press and hold the button again.

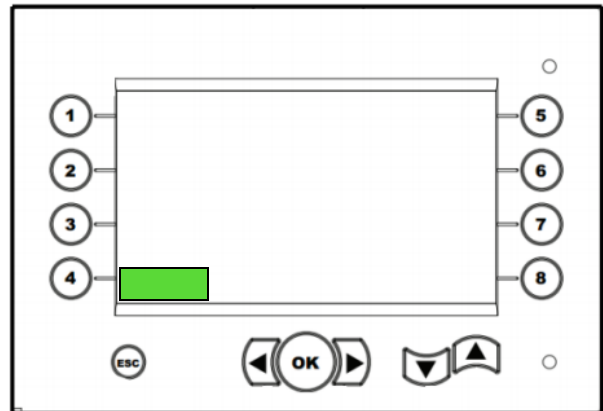
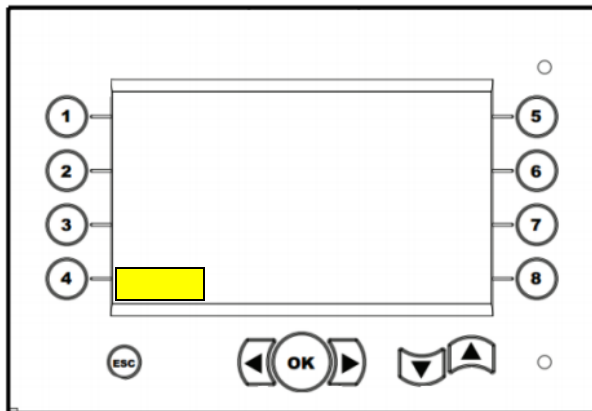
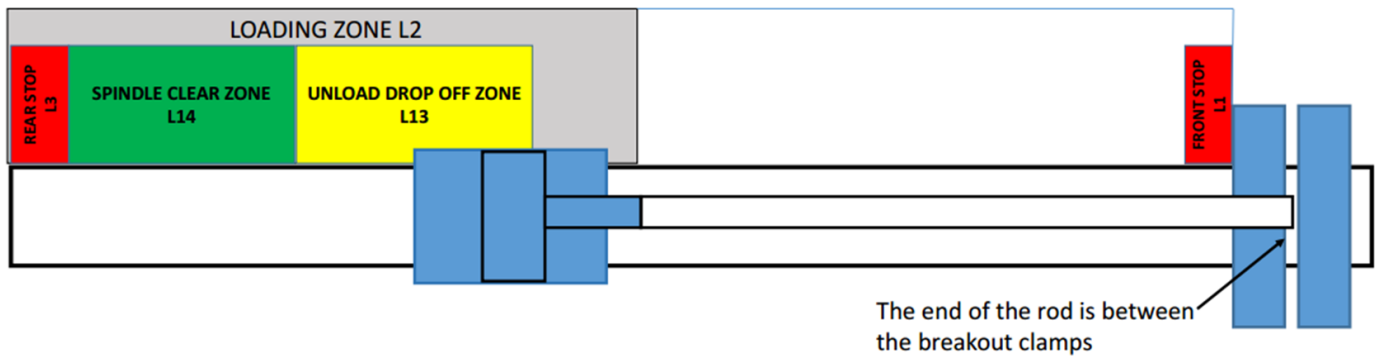
**The left joystick-** The “Auto Loader Park” button on the left joystick lowers the loader arm from in front of the spindle.

This button will park the loader arm when it’s pushed and released. If during this time the operator see a problem he can push the button again and the program will pause. To continue press the button again.



**The Laser and what it does-** The Laser tracks the movement of the carriage. This allows protection when the loader is functioning automatically from a collision with the spindle.

The view below shows the loading zones in relation to the drill stem attached to the carriage.



The laser zone icons are identified on the display screen as shown. They will change automatically as the carriage moves up and down the beam. *See Laser Zones.*

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## Program Sequences

### A- Load mode Sequences.

L13 (carriage position) must be active when pressing joystick RSW1 “auto load” button. The loader icon on the bottom left side of the display will turn green when L13 laser zone is active, letting the operator know he’s in position to start auto load.

NOTE: if operator lets off the button during the “Auto Load” program, the program will pause and it will resume if he holds it in

- a. Push button and hold in joystick R SW1.
- b. Loader Arm- (up) is energized until it reaches switch MS16. Switch will turn on and Loader Arm will stop.
- c. Rod Clamp- (clamp) is energized until the pressure transducer reaches X psi. Then it will stop.
- d. Loader Arm- (up) is energized until the MS12 switch is active. Then it will stop.
- e. Pause program.

During this time the operator will thrust fwd. and make up to the rod onto the spindle and the rod held in the breakout clamps.

### Park

L13 (carriage position) must be ignored when pressing joystick LSW1 “Park to load” button.

NOTE: the operator does not need to hold in the LSW1 button. Press it again and the program will pause.

- a. Push button joystick L SW1 to resume program.
- b. *Block out fwd. thrust*
- c. Rod Clamp- (unclamp) is energized until the pressure transducer reaches X psi. Then it will stop.
- d. *Ignore MS16 sensor*
- e. Loader Arm- (down) is energized until it reaches MS4 sensor. Switch will turn on and loader arm will stop.
- f. Rod lift- (up) is energized until the MS11 sensor is active. Then it will stops.
- g. Rod Cam- (up) is energized until the MS10 sensor is active. Then it will stop.
- h. Rod lift- (down), is energized until the MS11 sensor is active. Then it will stop.
- i. Rod Cam- (down) is energized until the MS10 sensor is active. Then it will stop.
- J. end program

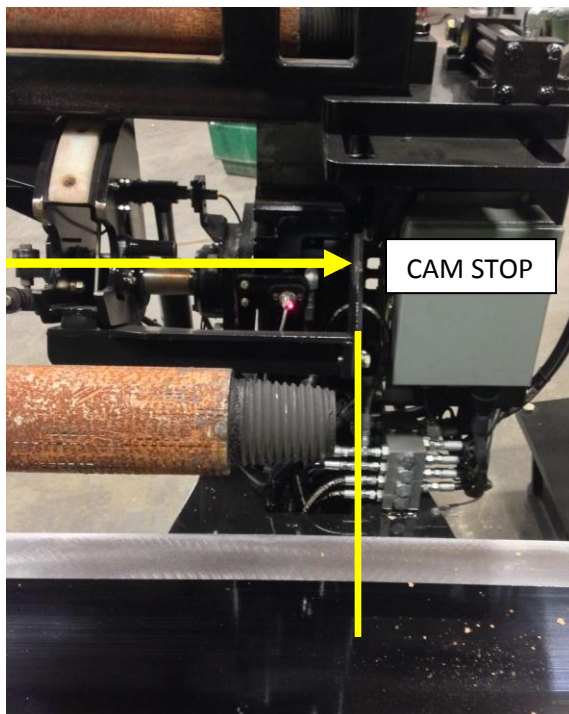
## B- Unload mode.

L13 (carriage position) must be ignored when pressing joystick RSW1 “Auto Unload” button.

NOTE: if operator lets off the RSW1 button during the “Auto Unload” program, the program will pause and it will resume if he presses it in again.

- a. Push and hold in joystick R SW1.
- c. *Ignore L13 laser zone.*
- D. Loader Arm- (up) is energized until the MS12 is active. Then it will stop.
- E. Rod Clamp- (clamp) is energized until the pressure transducer reaches X psi. Then it will stop.
- f. Pause program

During this time the operator will break the tool joint in between the breakout clamps. Break the rear joint at the spindle, unthread about 50% and start pulling the rod back.



Drag the rod back through the loader arm until the L14 drop off zone is active and the rod is in position to cycle into the loader cam. A yellow icon will appear on the display.



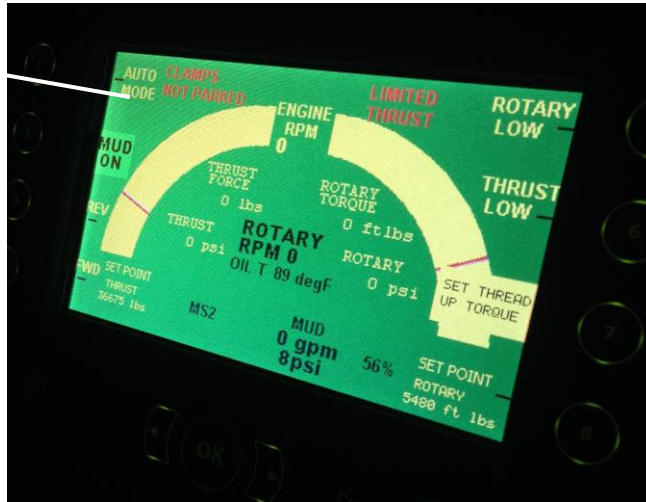
Unthread the tool joint at the spindle and back up the carriage leaving the rod in the loader arm. The L13 zone will turn green on the display. The spindle is now clear.

L13 (carriage position) must be active when pressing joystick LSW1 “Park to Unload” button. The operator does not need to hold in the LSW1 button. Press it again and the program will pause.

- a. Push button joystick L SW1 to resume program
- b. *Block out fwd. thrust*
- c. Rod Clamp- (clamp) is energized until the pressure transducer reaches X psi. Then it will stop.
- d. Loader Arm- (down) is energized until it reaches the MS16 sensor. Switch will turn on and Loader Arm will stop.
- e. *Ignore the carriage position L13 as the operator may start down the beam.*
- f. *Allow fwd. thrust*
- g. Rod Clamp- (unclamp) is energized until the pressure transducer reaches X psi. Then it will stop.
- h. Loader Arm- (down) is energized until the MS4 sensor turns on, then it will stop.
- i. Rod Cam- (up) is energized until the MS10 sensor turns on, then it will stop.
- j. Rod Lift- (up) is energized until MS11 sensor is active. Then it stops
- k. Rod Cam- (down) is energized until the MS10 sensor is active. Then it stops
- l. Rod Lift- (down), is energized until the MS11 sensor is active. Then it stops
- m. End program

## AUTO REAM OPERATION

MASTER SWITCH



**Auto Ream function set up** is done thru the drillers display. The Master switch must be on.

- 1- Turn ON Auto Ream by pushing the #5 button on the display. The Icon will start Blinking on the display in yellow. Set up screen will come up.
- 2- The rotation and thrust max set points will appear. The operator will have the option to adjust these maximums by using the up and down buttons, then hit OK or if no adjustment is needed push the OK button.
- 3- The normal screen will reappear and the Auto Ream icon will continue blinking on the display in yellow.
- 4- The operator will begin drilling. Placing the joystick(s) in the desired position to achieve the output speed for the drilling conditions.
- 5- Operator will pull trigger(s) on the joystick(s) L or R SW8 respective to function. Locking in the speeds, determined by the locations of each joystick. Operator can choose one or both drilling functions to lock in as desired.

**Start the program** will allow drilling functions at desired speed up to the predetermined pressure limit set points and continue at them if necessary.

Program will monitor the Rotary Tach Sensor as it automatically reduces the thrust command to maintain the rotation speed.

### What terminates the program-

- 1- If L1 and L3 laser zone comes on the program will terminate.
- 2- If one of the joysticks is moved.
- 3- If rod loader arm sensor MS4 turns on.
- 4- If any switch is presses except the Mud ramp up or down.

***Barbco.***

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***Barbco*** INC.

**Manufacturing Horizontal Earth Boring Machines  
Tunnel Equipment • Directional Drills • Tooling**

315 Pekin Road., S.E. • East Canton, Ohio 44730-9462  
Phone: 330-488-9400 • Toll Free 1-800-448-8934 • Fax 330-488-2022  
email: [info@barbco.com](mailto:info@barbco.com) • Web Site: [www.barbco.com](http://www.barbco.com)