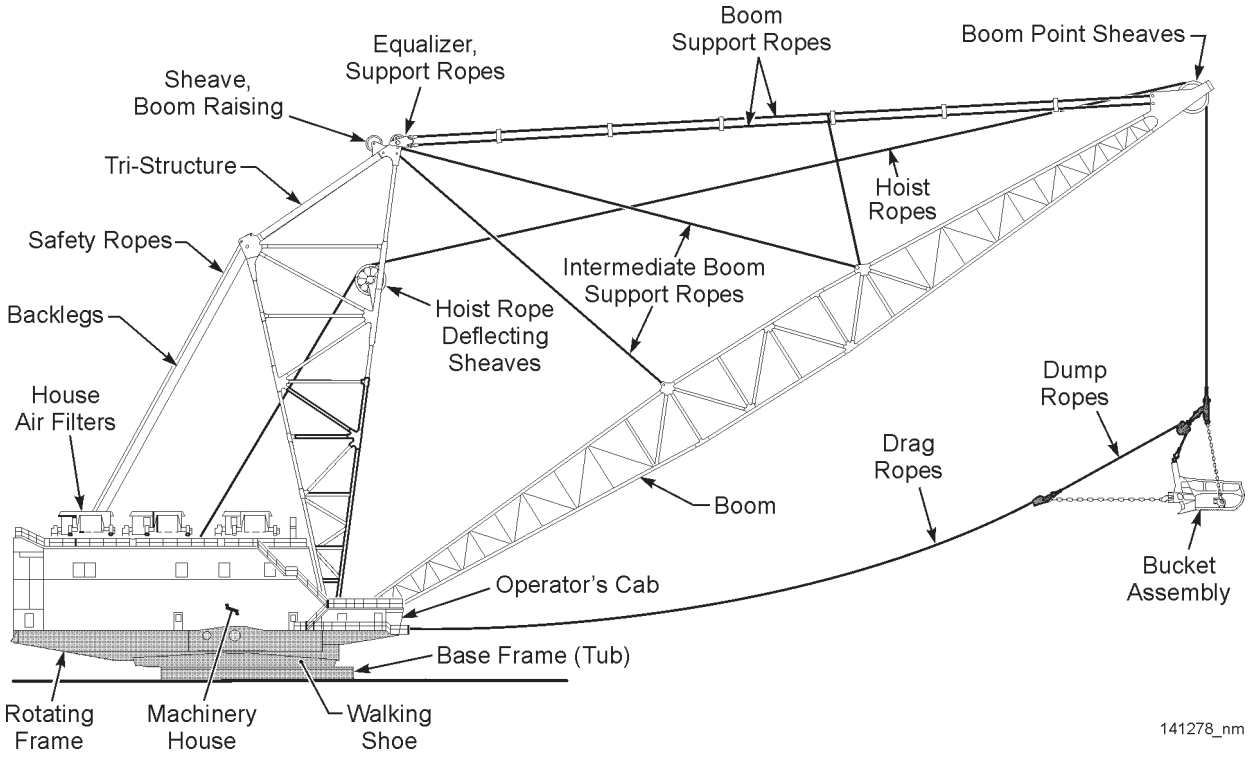
Technical Manual

MACHINE OVERVIEW

The following diagram identifies major components of the Dragline. The following are the four major areas of this machine:

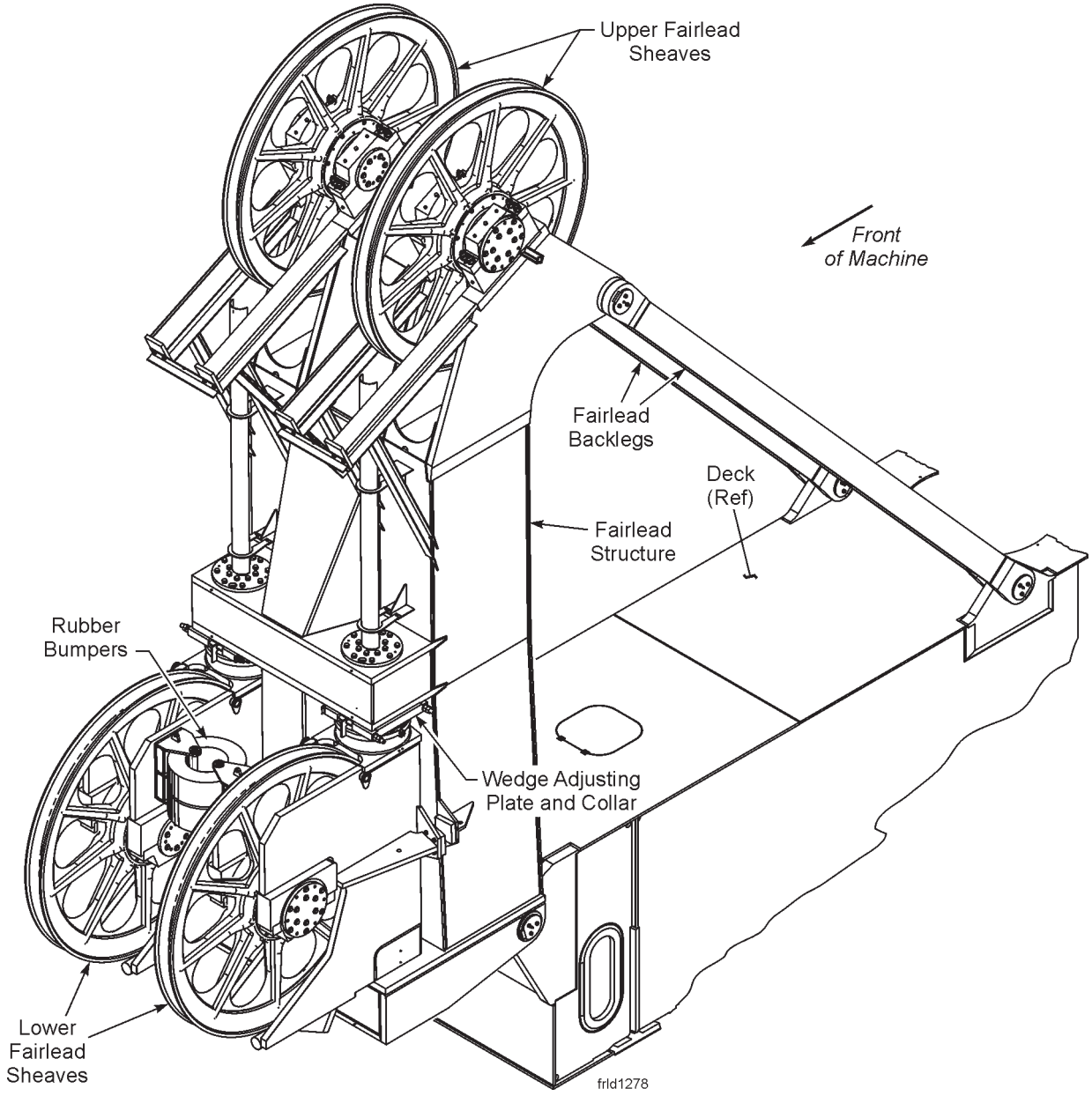
- Base Frame
- Rotating Deck
- External Structures
- Bucket and Boom



Nomenclature

FAIRLEAD

The Fairlead Assembly ensures the smooth operation of the drag ropes from the Bucket to the Drag Drum.



Fairlead Assembly

The indicators on the lower portion of the screen area are indicators and sensors which indicate the functionality of the operator display and its interface with the machine's PLC controller. They have no effect on machine operational use.

All the machine controls can be found on the Operator's Display Panel touch sensitive screen or the left and right Control Consoles of the operator's seat.

OPERATOR'S SEAT ADJUSTMENTS

WEIGHT ADJUSTMENT:

- The air suspension has automatic pneumatic weight adjustment up to 280 Lbs.
- Sit in the seat.
- Push down on the actuator lever located in the front of the suspension and hold until all the air is released from the suspension.
- Briefly lift up all the way on the actuator lever (2-3 seconds) and release. The compressor should stay on until the suspension has filled to the proper weight range. This may need to be repeated until the compressor automatically stays on.

HEIGHT ADJUSTMENT:

- The seat height can be adjusted up or down.
- Without taking your weight off the seat adjust the height.
- To increase the height, lift the actuator lever all the way and hold until the desired height is achieved. Once you have achieved the maximum height, the seat will stop increasing in height. This height will be higher than the normal maximum height, due to the ability to over inflate the suspension bladder. After releasing the lever the suspension will deflate slightly and lower the height to the maximum level. This will happen in about 2-3 seconds from the time of the over inflation of the bladder.
- To lower the height, push down on the actuating lever and hold until the air has released to the point of achieving the level of the desired height. The lowest level of the suspension is at the point when all the air is released and you will not have any suspension cushioning at that level. To increase the height to a point where you will have suspension cushioning, follow the above height increase directions.

The normal machine stop sequence is as follows:

- The operator needs to position the bucket in a zero energy state.
- The operator shuts down the Hoist, Drag, or Propel and Swing.
- The operator will press the Control Stop. The Control Stop pushbutton is located on the right armrest of the operator's chair as well as the right main PLC cabinet.
- The AFE's are turned off by the PLC.
- Drive Power Contactors are de-energized automatically.
- The Choppers are turned on by the PLC for 10 Seconds to discharge the DC bus.
- Motor blowers, MRC cooling, Swing oil cooling continue to run until their temperature sensors tell them to stop or 15 minutes. This is automatically controlled by the PLC.
- An Emergency stop will mechanically brake all motions. The AFE's will be then be turned off by the PLC.
- Drive Power Contactors will be de-energized automatically.
- The PLC will discharge the DC Bus with bleed resistors.

SIBAS RACKS

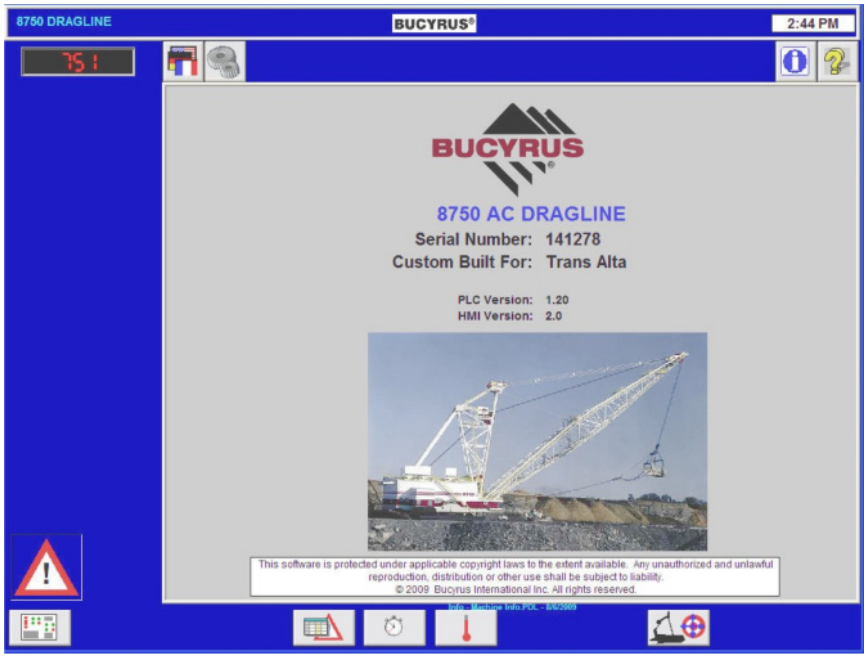
Each Sibas rack has a DPC (Drive Power Contactor) interlock relay. One contact is monitored by the PLC. The other is hardwired into the Drive Power Contactor Trip circuit. This is wired to the direct trip circuit of the Drive power contactors to provide the <80 ms total trip time.

Loss of any of the Sibas interlocks will cause the PLC to generate an emergency type stop - mechanical braking of motions, full inverter and AFE gate block. The loss of Sibas interlock will cause the DPC contactors to trip. At the same time the PLC will reset the logic to open all of the DPC contactors. The Sibas interlock opens with a Sibas fault and with crowbar firing.

CAUTION: Any DPC contactor opening under fault conditions will cause the PLC to generate an Emergency type stop. All DPC contactors will then be opened.

OPERATOR'S DISPLAY SCREENS

The operator's display screens are used to provide the operator with an interface to the machine and its functional areas. From this informational display the operator can make inputs that effect machine operation, monitor systems and make system adjustments. Through a series of display screens the operator will receive pertinent fault data to identify potential problems and prevent machine damage. The following pages contain a series of typical display screens.



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Title Screen

There are transfer switches in MRC1 and MRC3 to switch the motor connections. The transfer switches are motor driven switches. The switches are controlled and monitored by the PLC. The operator dig/propel switch and all of the transfer switches must be in the same mode for either the drag or propel to start. The PLC will generate a transfer switch fault if they are not in the proper mode.

The normal method of transfer is to have the motions stopped with the brake set prior to changing the transfer switch.

If the drag is moving when a transfer is called for the drag will electrically brake to 5% speed, set the brakes and turn off the drag drives and then start the transfer.

If propel is moving when a transfer is requested the propel will generate an auto park command. This will bring the shoes to top dead center, set the propel brakes, and turn off the drives.

The transfer switches will only change state if the drives are off. The MRC drive system requires a reset to change from modes.

The propel system can control each side of the machine independently. There is a propel encoder calibrate screen that enables independent shoe movement.

There are several areas in the shoe movement that require different reference values.

The first is shoe set down, which is between 80 and 90 degrees. At this time the shoes should be slowed to a value about 30%.

The next area of reference control is for soft tub set down. This is between 180 and 270 degrees. The reference should be reduced to about 20% to allow the tub to set down softly.

The shoes will come off the ground between 260 and 280 degrees. When the shoes are off the ground the reference can be released to 100% so that the shoes can move at high speed over the top portion of the cycle.

AUTO PARK

Auto Park is the method of bringing both shoes to Top Dead Center (TDC) and setting the brakes. The operator can initiate Auto Park any time. The operator must keep the joystick in the propel direction. When either shoe reaches 340 degrees the shoe synchronization is turned off, reference is clamped to 15%. When each shoe reaches 350 degrees their references are linearly reduced to about 2% at 359 degrees. When each shoe reaches 359 degrees their brakes are told to set. When both brakes are set the propel motion is turned off.

WATER COOLING SYSTEM - DRIVE MODULES

The Drive cooling system is composed of two systems, one for each side of the machine.

Each system is a closed system with a pump, an expansion tank and pressure transducers for suction and discharge in a self contained modular unit. This also includes isolation valves and ports for filling and purging the system.

There are two radiators for each side, for a total of four on the machine

The MRC modules require the cooling system to be in operation whenever they are ready to operate.

The drive cooling system will be started first when starting the machine.

The pump and radiator motors are controlled by the PLC in the MCC. The PLC monitors the status of the MCC cubicles. Faults that will be generated and annunciated are Overload or Earth Leakage, Disconnect and Control fault. The Control fault for the pumps will generate a complete machine emergency stop. If either side has a problem the entire machine must be stopped. The control faults for the radiators will generate an entire machine delayed shutdown.

Suction and discharge pressures are also monitored by the PLC. The pressures will determine the status of the water cooling system.

A healthy system with pump OFF suction pressure is to be 15-20 PSI (103-138 kPa). Discharge pressure is to be 13-18 PSI (90-124 kPa).

A healthy system with pump ON suction pressure is to be 10-15 PSI (69-103 kPa). Discharge pressure is to be 73-78 PSI (503-538 kPa).

If the system caution level suction pressure is below 10 PSI (69 kPa), this is annunciated only.

If the system fault level suction pressure is below 3 PSI (21 kPa) or discharge pressure is below 60 PSI (414 kPa), the system must be stopped and the problems resolved.

Radiator Fans will be turned on and off via temperature monitoring in the Motion Regulator Cabinets. They will be turned on when water temperature is above 40°C (104°F) and turned off when below 35°C (95°F).

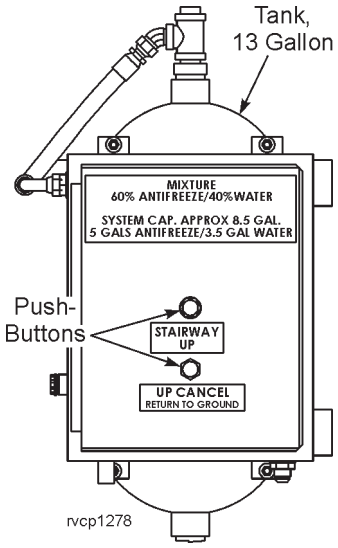
To lower the stairs:

Release the lever and press the UP CANCEL pushbutton on the control panel. The stairway will return to ground.

To raise the stairs:

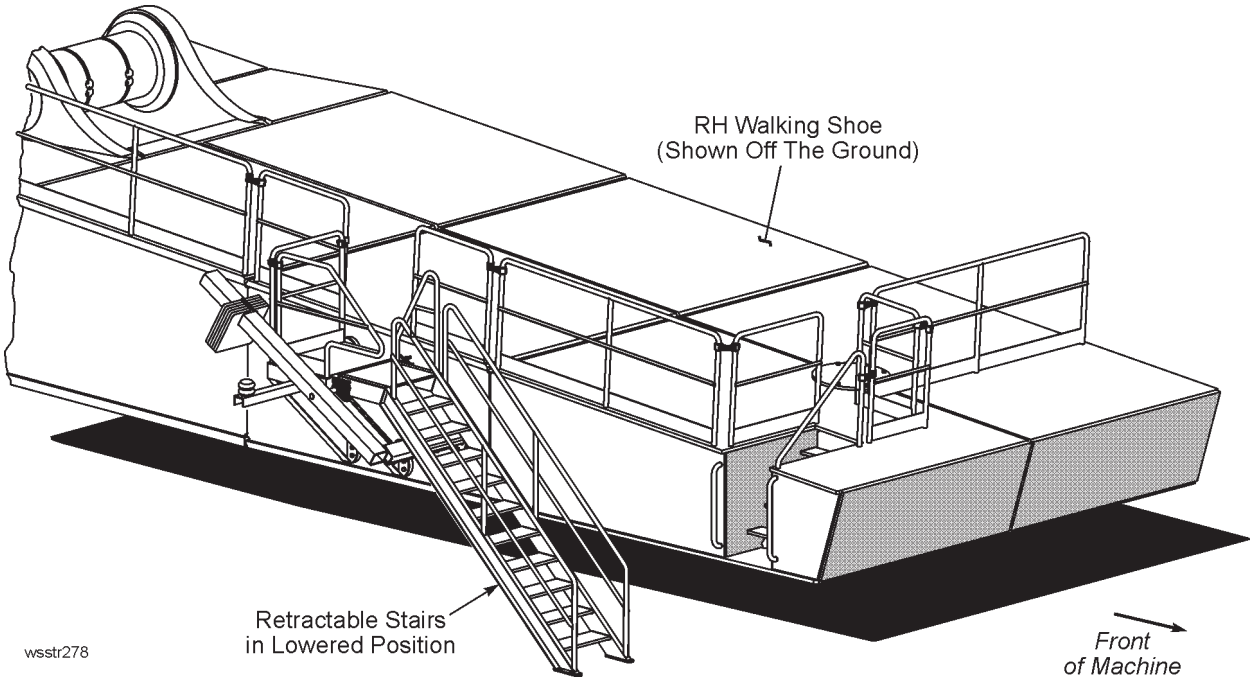
Press the STAIRWAY UP pushbutton. Ensure the stairs are latched and secured in place by the coupler.

NOTE: The stairs must be in their raised and latched position to enable the operator's controls.



RETRACTABLE STAIRS - RH WALKING SHOE

The right walking shoe is equipped with retractable boarding stairs which allow easy access when the shoes are in their raised position.



Retractable Stairs