BenchMark Wireline Products
36220 FM 1093
P. O. BOX 850
Simonton,Texas 77476
Phone: 281.346.4300
Fax: 281.346.4301
benchmarkwireline.com

OPERATIONS AND MAINTENANCE MANUAL
WIRELINE WINCH OPERATORS PANEL

AMD2A040 and AMD2A050

BenchMark Wireline Products
36220 FM 1093
P. O. BOX 850
Simonton,Texas 77476
Phone: 281.346.4300
Fax: 281.346.4301
benchmarkwireline.com

TABLE OF CONTENTS

OBTAINING TECHNICAL ASSISTANCE

Call BenchMark Wireline Products Inc. at +1 281 346 4300
Or contact by email mail@benchmarkwireline.com
Or fax in request at +1 281 346 4301

Information in the form of user manuals and instructional videos are also available on our website www.benchmarkwireline.com

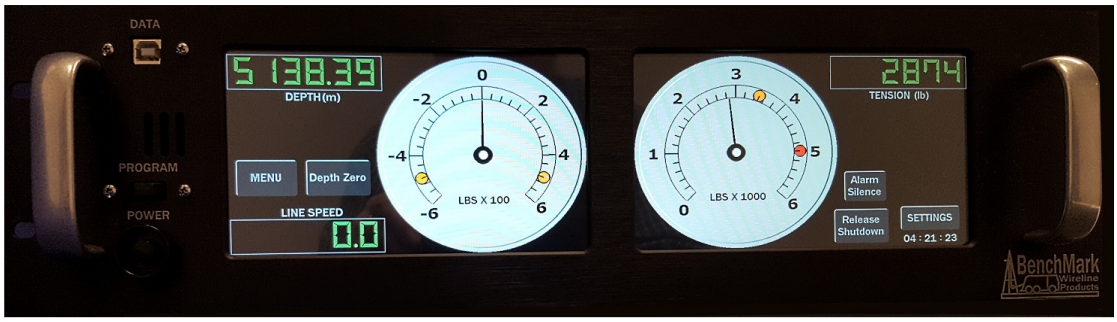
Parts can be ordered by email, phone, or fax

Equipment can be returned for repair and maintenance. Please notify us by Phone, email, or fax before sending any equipment.

To return equipment to BenchMark, ship it to:
BenchMark Wireline Products
36220 FM 1093
Simonton, Texas 77476
U.S.A.

BenchMark Wireline Products
36220 FM 1093
P. O. BOX 850
Simonton,Texas 77476
Phone: 281.346.4300
Fax: 281.346.4301
benchmarkwireline.com

1.0 INTRODUCTION



The new 40/50 series replace all previous 40 50 60 models

This New Generation Dual Display Winch Operators panel is designed to acquire depth, tension, CCL, and pressure from a wireline winch unit. Depth is displayed from data provided from an encoder mounted on a measuring device. The tension data is provided by a load pin. Depth and tension data can be stored in internal memory for playback at a later time. The panel can also be connected to a PC through a serial port for real time acquisition and playback of data.

The panel is controlled by a dedicated display system which includes an integral graphics processor and a touch screen display. The panel also includes a real time acquisition board dedicated to acquire encoder quadrature, and includes a variety of analog and digital data inputs. It continuously reads depth and tension input data every 10 milliseconds, and outputs data in quadrature (reconstructed), analog, or digital formats. The system is designed to operate on conventional automotive 12-24 VDC electrical power

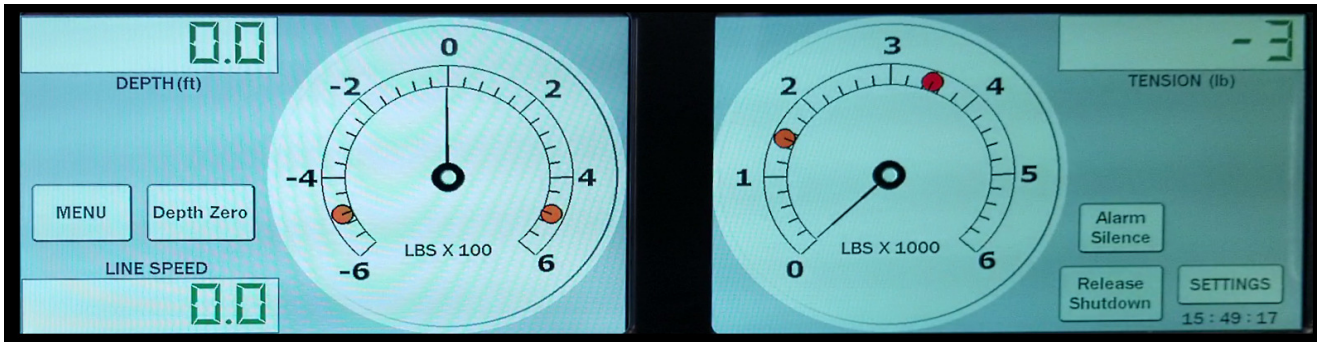
Some of the advantages of this new hardware and software are:

- Quick On/Off - No operating system (no drivers, boot up failures, etc.)
- Dual Capacitive Touch screen displays covered by strong glass
- Can be configured to operate with only one of the two screens in event of damage or failure
- Not affected by power loss - current data is stored in non-volatile memory
- Sunlight viewable with adjustable brightness and Day/Night screens
- Wide 70 degree view angle
- Both models contain all features of former 40-50-60 model panels
- New 40-50 models are functionally identical – only difference is form factor
- New operating system is purpose-built for this application and supersedes sensitive and sometimes unreliable Windows software
- Completely solid-state design with no moving or mechanical parts
- Standardized back panels that contain all possible Signal ID
- Operational redundancy allows it to operate on any one screen if necessary
- Field Reprogrammable software upgrades executable in minutes through USB
- Ergonomic display choices for operators
- Administrative password controlled lock-out of key functions
- English or metric display selection available
- Several alarms and automatic shutdown settings
- Password option to limit the settings that can be changed by user
- USB ports to provide access to log data using a PC
- RS232 interface for additional control and real time data outputs
- Internal data recorder which continually records depth, tension, line speed, date and time at 1 second intervals
- Acquisition system outputs = depth encoder, tension, magnetic mark, and ADC signals

2.0 QUICK START - INITIAL PANEL SETUP - JOB SETUP

Both the 40 and 50 panels contain the same functionality and readouts. The only difference is the form factor/shape which allows mounting the panel in different work environments.

The 2 display screens contain different information. The left or top screen displays Depth, Line Speed and Differential Tension. The right or bottom shows Total Tension and has options for setting-up the panel. Should there be a screen malfunction; either panel can quickly be reset to display all necessary readouts on either display screen.



The left screen on the 40 is the same as the top screen on the 50 – the right on the 40 is the same as the bottom on the 50.

Values are presented in both Digital and Analog formats.

Note – when menu selections are made or values entered in the screens, they are **automatically saved** in the system. The **Back Button** navigates back to previous screens.

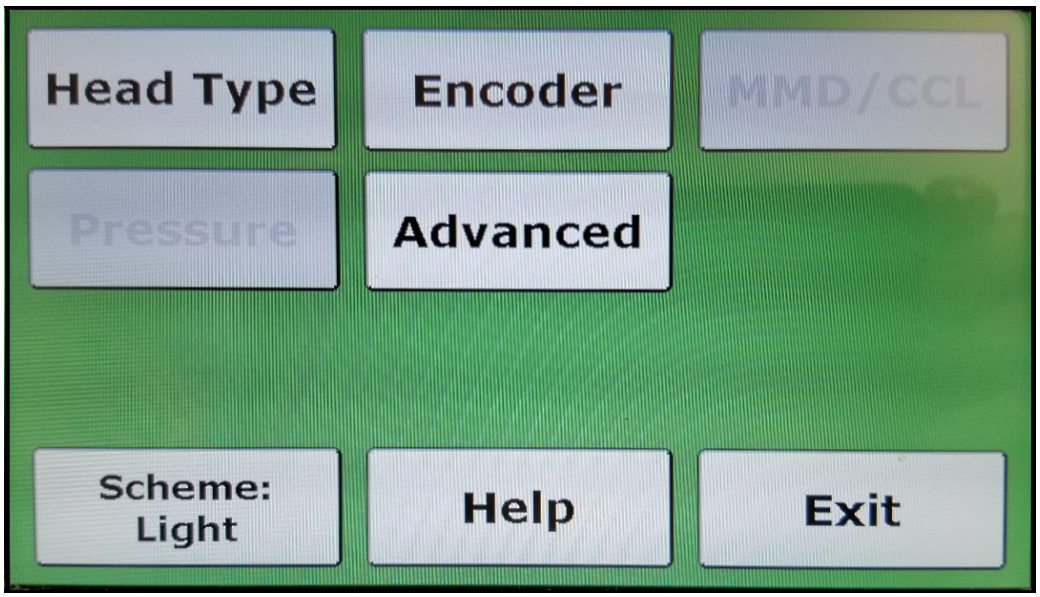
2.1 PANEL SETUP

Initially, the panel should be set up for the equipment on the truck. Access to these settings may be controlled by an administrative password. The setup selections are on the right screen on the 40 panel and on the bottom screen on the 50 panel.

The 40 panel was used as an example in this training manual.

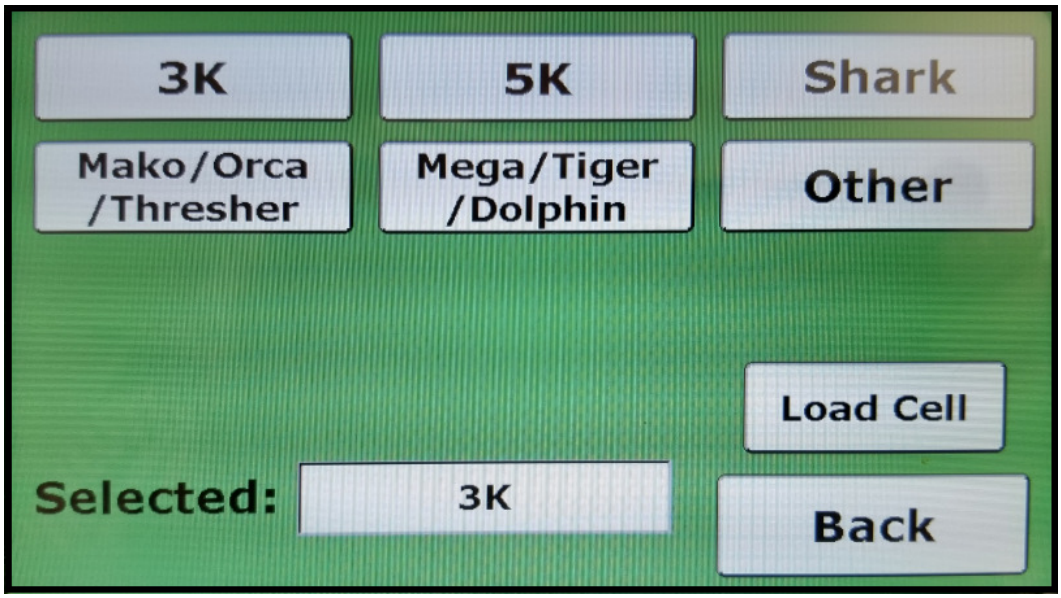
Click the right/bottom screen **Settings** button.

2.1.1 Select Head Type.

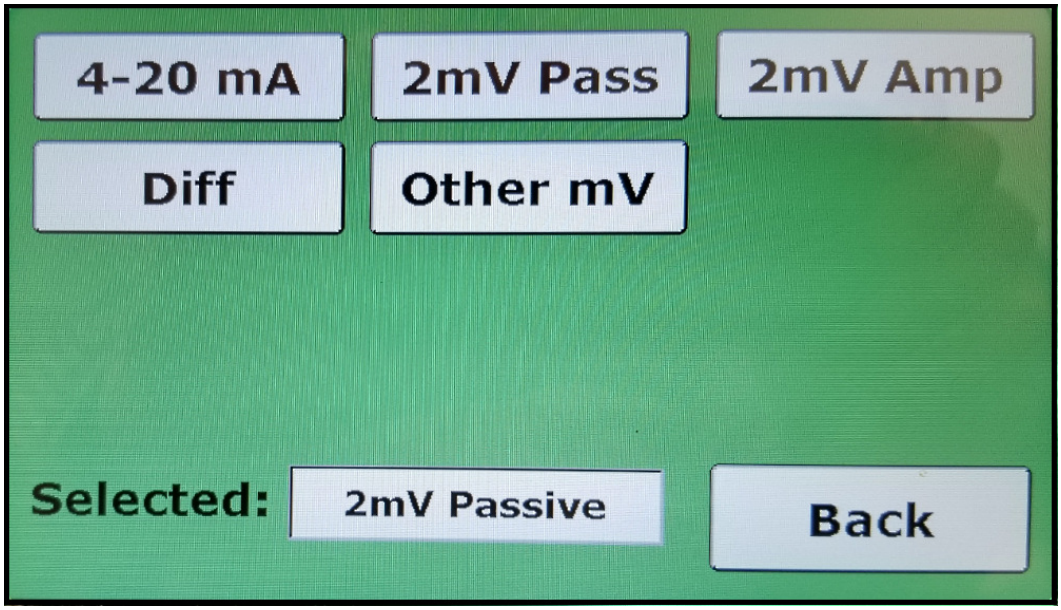


2.1.2 Then Select the Measuring Head,

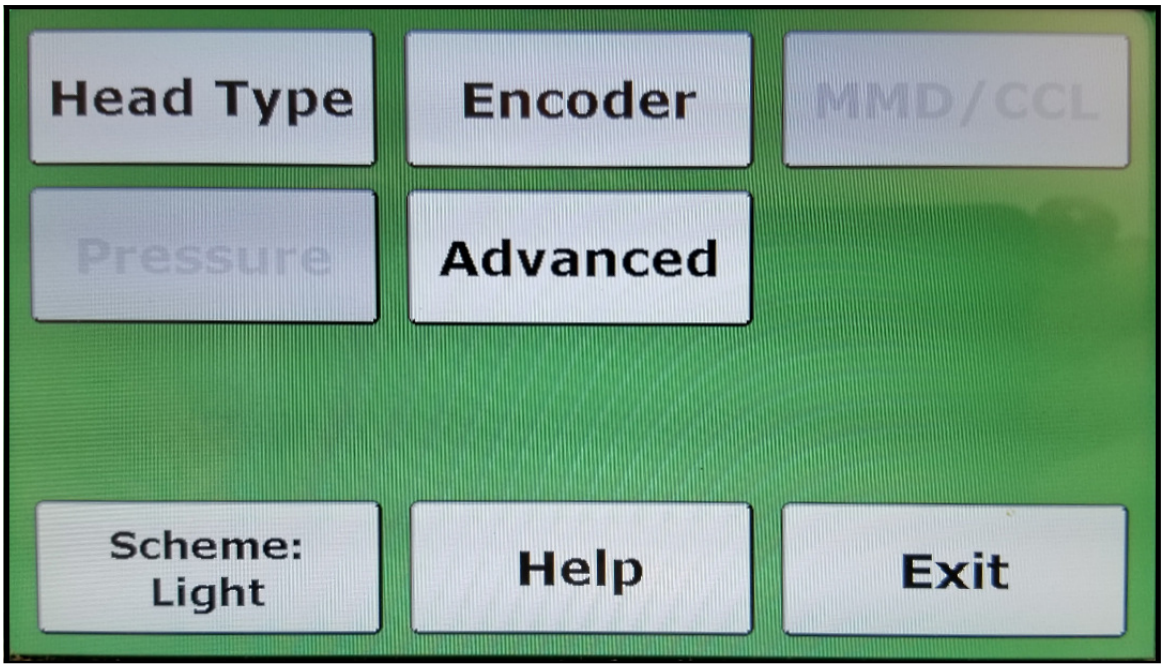
NOTE - With this selection, all following parameters will match the head chosen.



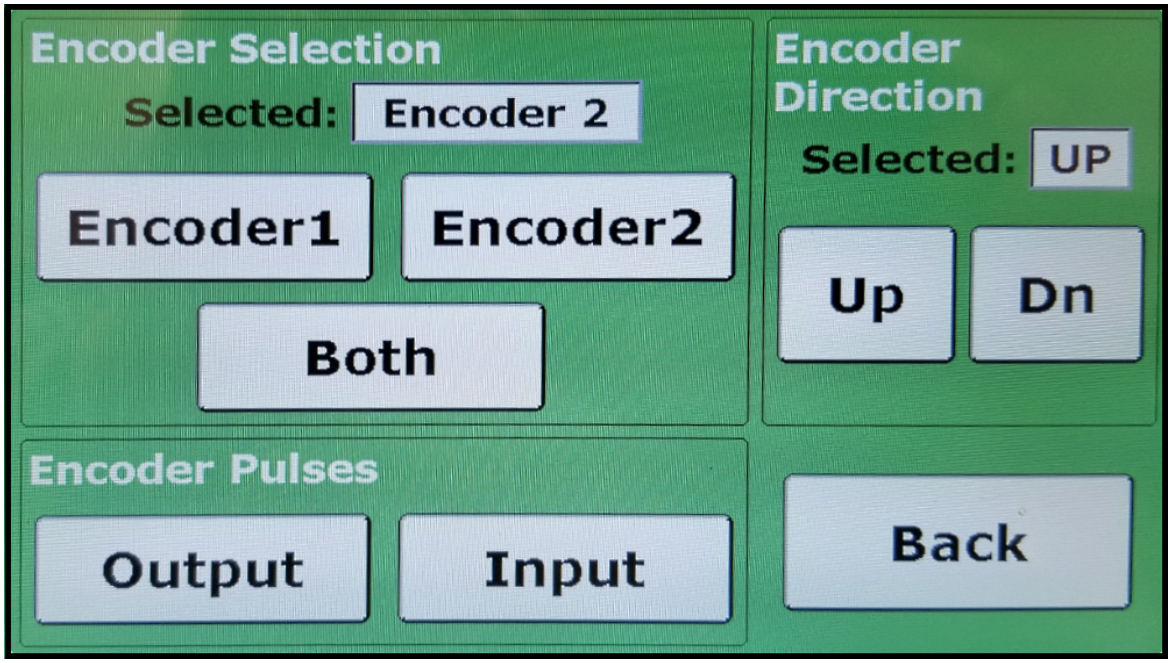
2.1.3 Press the Load Cell button and select the load cell type and press the **Back** button 2 times.



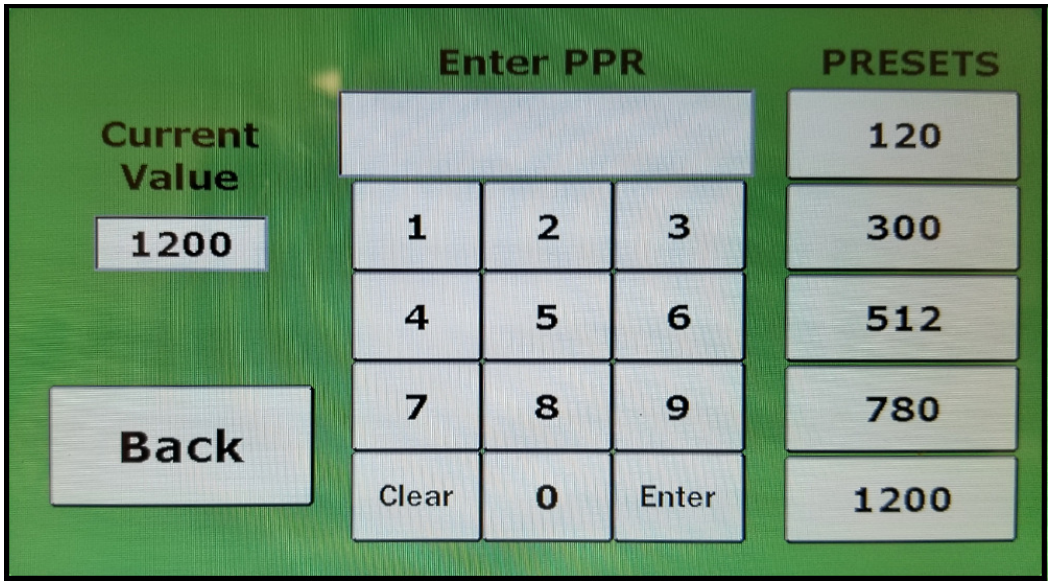
2.1.4 Press the Encoder button.



2.1.5 Select Encoder parameters. You can set parameters for 1 encoder, 2 separate encoders or set both at the same time.

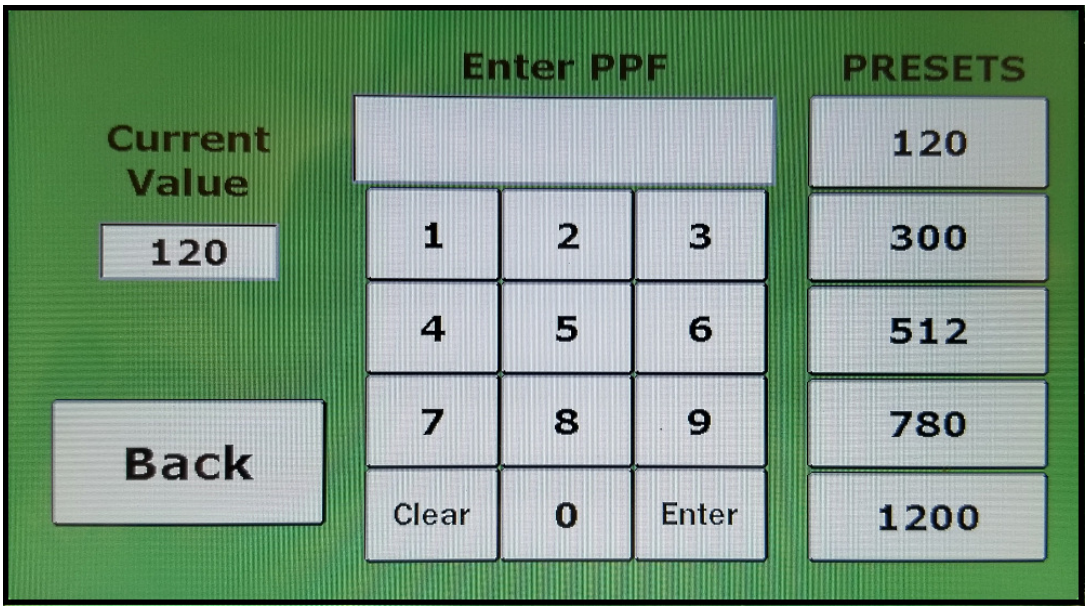


2.1.6 PPR - Then select Input for input pulse settings. The default is 1200 ppr or pulses per revolution on the head.



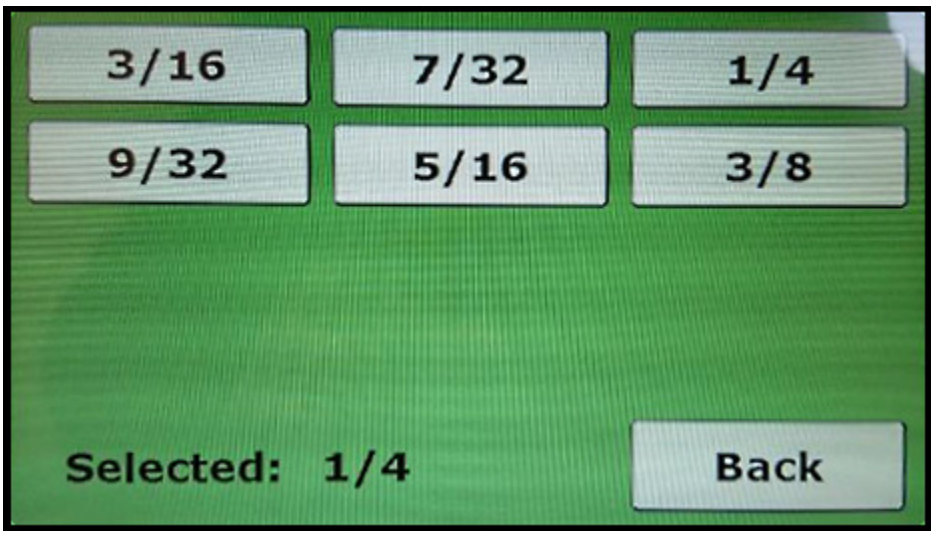
2.1.7 PPF - If you are using an acquisition system like Warrior, you would additionally set Encoder Output Pulses to allow the panel and the acquisition systems to sync with each other.

Select Settings, Encoder and then **Encoder Pulses Output**. This selects the encoder pulses to the acquisition system and is measured in PPF or Pulses Per Foot and not Per Revolution. Through this synchronization process, you input the necessary PPF value to match the acquisition system. Then select Back and Exit. The panel is now setup.



Then press Back 2 times and then Exit. The base configuration for the head has been established and can be changed as needed.

2.1.8 Line Size – Next the line size on the reel needs to be inputted into the system. On the left or top panel, select **Menu** and then **Line Size**. Note the line size choices displayed are determined by the Head Type that was chosen in the Panel Setup. Choose the correct size, select Back and Exit.



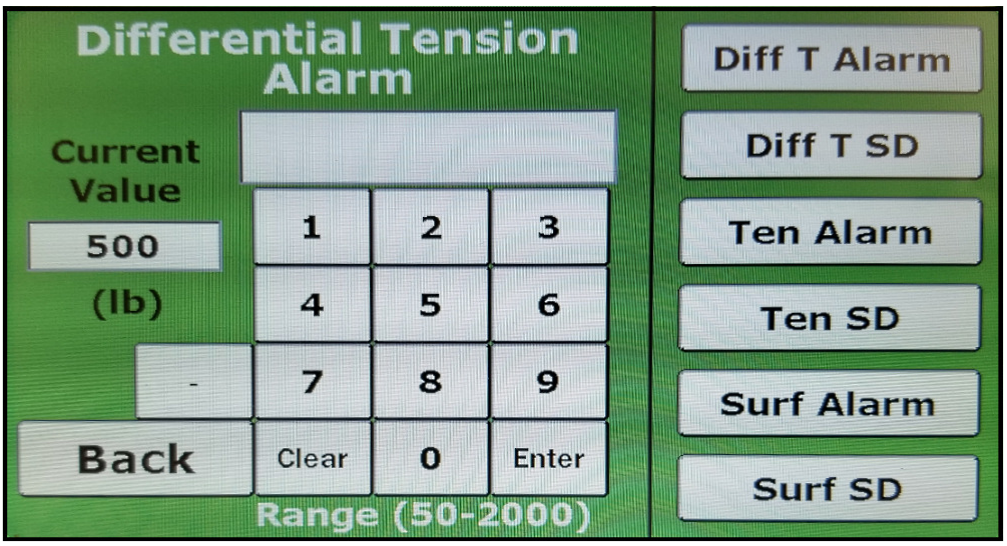
Note – once the panel has been setup for your equipment, a password protected Administrator screen allow you to **lock those parameters** so that they can't be changed during operations.

2.2.1 JOB SETUP

First setup **Alarm** values. On the **left screen press Menu, then Alarms.**

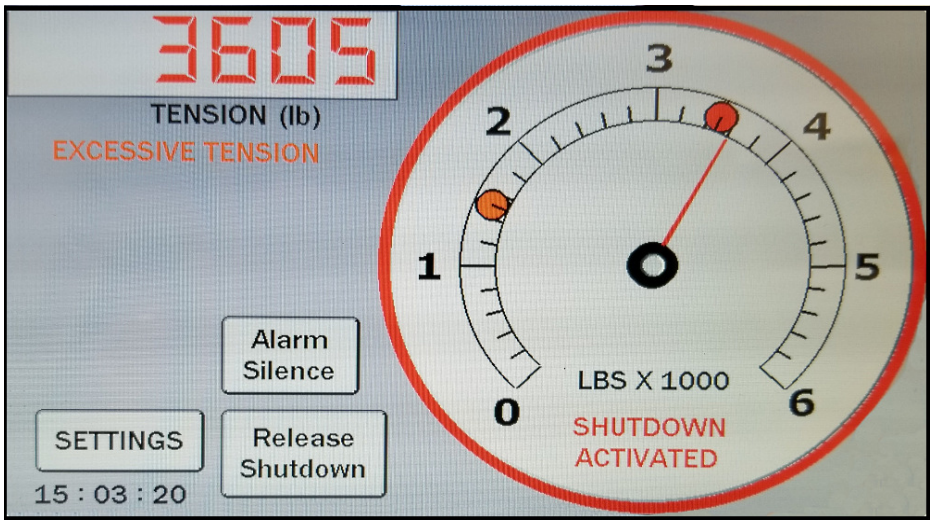
Alarms and Shutdown parameters can be set at this screen. These values appear **digitally** and also as **Yellow and Red dots** on the dials showing the upper and lower limits chosen**.**

Set Differential Tension, Total Tension and Surface Alarm and Shutdown parameters on this screen.



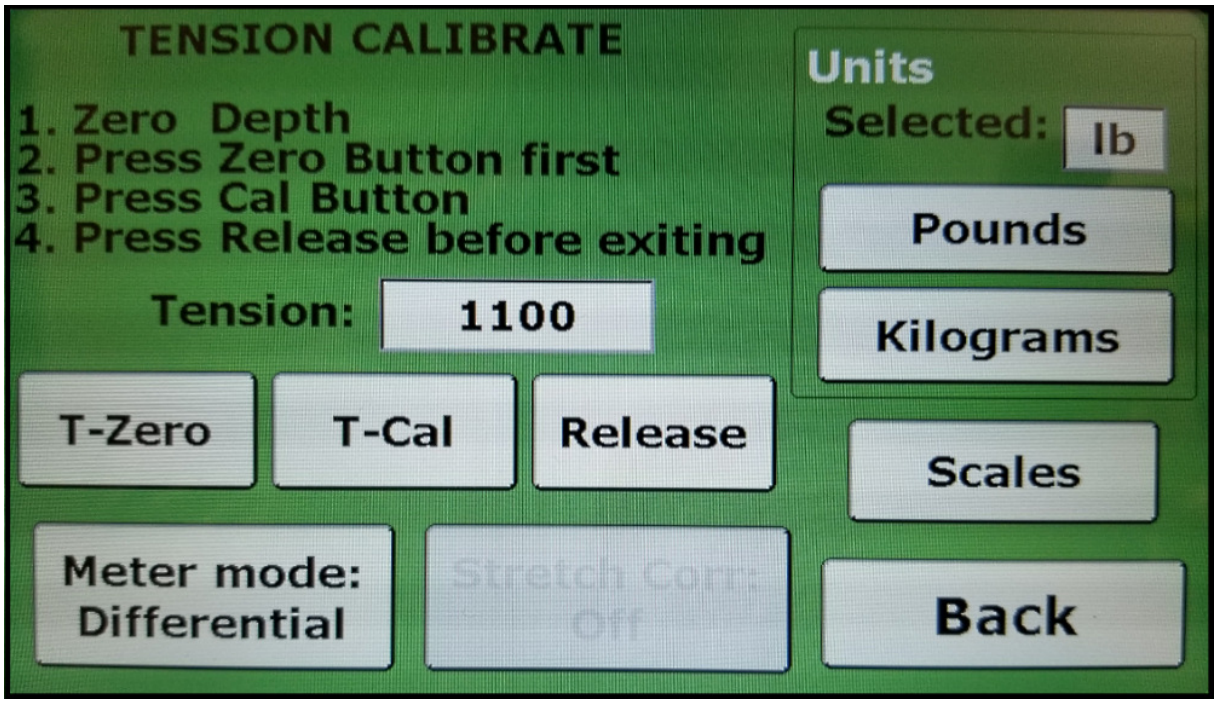
2.2.2 Warning situations show **Yellow** visual alerts on the panel.

For **Shutdown events, RED** visual alerts are vividly displayed on the screen**…Red digital readout numbers, Red dial about the gauge, Red flashing "SHUTDOWN ACTIVATED" message as well an audible Alarm, which can be silenced.**



Tension – The panel is capable of displaying Total Tension, Differential Tension and Incremental Tension

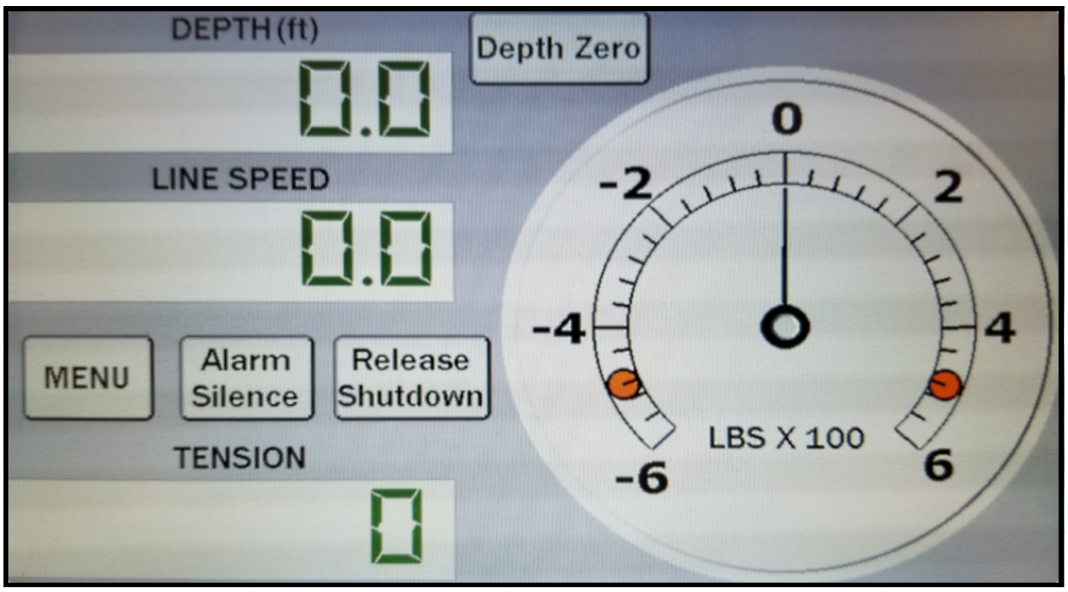
2.2.3 Next Calibrate Tension. This calibration is between the panel and your acquisition system, Warrior etc. Go through the 3 steps of T-Zero, T-Cal and Release.



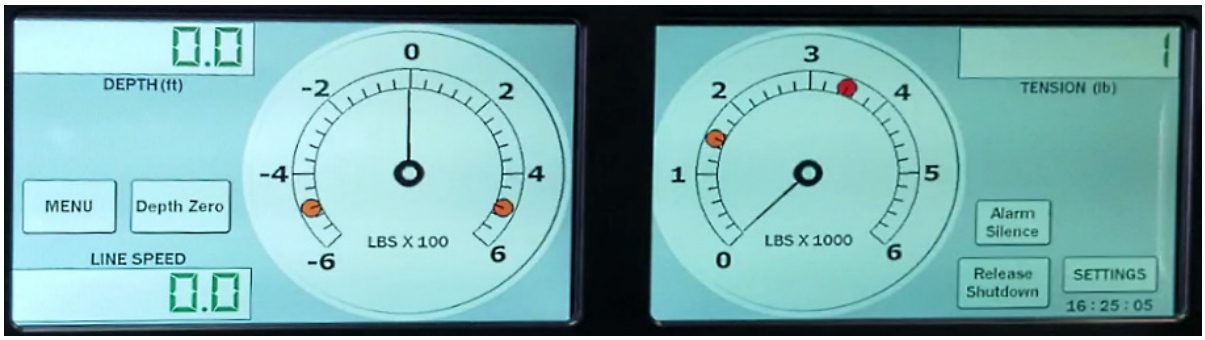
Then on the left screen of the Panel, make sure that **Depth is set to Zero** and you're ready to begin.

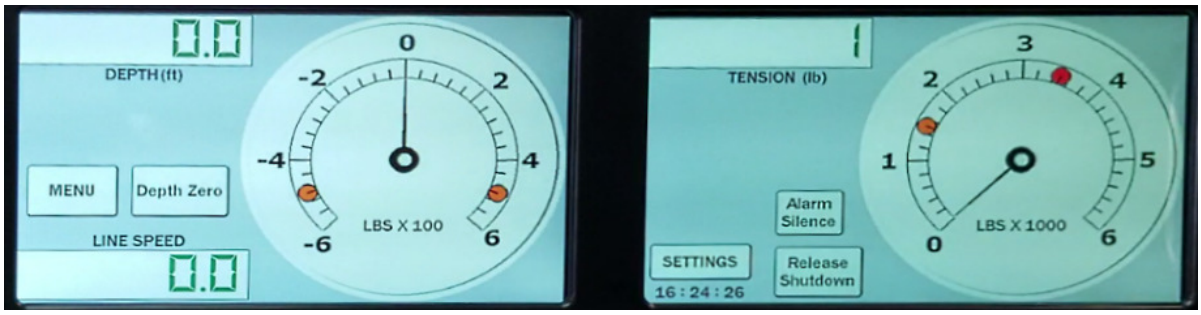
2.3.1 Screen Damage – In the event of screen damage, total control can be switched to the other screen. All critical functions can be monitored and controlled from a single screen to provide operational redundancy.

On the functioning screen press Menu, Help, Admin, Backup and this will switch all functions to the working screen. Pres Back 2 times and all panel functions will be visible on one screen. Press Exit and the new display will show Depth, Line Speed, Total Tension, Differential Tension all on one screen. This would allow continued operation while waiting for a repair.



2.3.2 Screen Customization – the positioning of gauges and readouts can be customized for user ease. See the samples below.





3.0 SOFTWARE FEATURES AND COMMANDS

3.1 FEATURE DESCRIPTION

Note – The Left Screen on the 40 is the same as the Top Screen on the 50
The Right Screen on the 40 is the same as the Bottom Screen on the 50
Some of the Features and Benefits of this new panel is:

Graphical meters - can be set to different scales and units

Differential Tension Meter

- +/- 90 lb/kg
- +/- 300 lb/kg
- +/- 600 lb/kg
- +/- 900 lb/kg

Total Tension Meter

- 0-1200 lb/kg
- 0-2400 lb/kg
- 0-3600 lb/kg
- 0-6000 lb/kg
- 0-8400 lb/kg
- 0-9600 lb/kg
- 0-12000 lb/kg
- 0-18000 lb/kg
- 0-20000 lb/kg

Administrator Locks - Supervisor can set a custom PIN number to access controls. Supervisor can lock the following settings to keep the operator from changing settings

- Head Type
- Line Size
- Encoder Selection
- Encoder Direction
- Encoder Input Pulse Rate
- Acquisition Output Pulse Rate
- Stretch Correction
- Tension Units
- Depth Units
- Backup Sync
- File system
- Menu buttons while winch is moving

Backup Depth Sync - This system works with the ALS9A250 Backup Depth/Drum Counter panel. The Main panel connects to this Backup panel Via CAN interface. Once connected the operator or supervisor can select a Window of 25, 50, or 100 feet

to compare main and backup depth. If the difference between the 2 depths exceeds this window an Alarm is sounded and the message “CHECK BACKUP SETTINGS” is displayed on the main screen.

- When enabled the winch panel will display both backup depth and drum counts on the main screen below the TENSION reading.
- The operator has the ability to ZERO backup depth and drum counts via the main operator panel.

Backup Sync Lock – This is designed to compare and flag depth discrepancies using BackUp that normally would not occur unless incorrect values were entered into the system when it was set up. The tolerance level is user definable. When enabled operators are forced to use the feature. This feature can be disabled.

Menu Linespeed Lock - This system allows the Supervisor to disable the MENU and SETTINGS button on the main screen while the winch is in motion. This allows the Supervisor to ensure that the operator is not in the menus while running the winch.

File System Lock -This allows the Supervisor to ensure that internal Log Files cannot be deleted without authorization. While enabled the internal log files can be viewed and downloaded but cannot be removed from internal storage.

All other locks - The remaining locks simple disable their respective buttons in the menu system. Selecting these lock will ensure that settings that the supervisor feels should not be changed are protected.

Backup Mode - Allows fully functionality with the use of a single screen. This new panel allows for either screen to contain Depth, Tension, Line Speed, and Differential Tension in the even that 1 of the screens get damaged. To enable this feature the operator will got into either MENU or SETTINGS, then select HELP, then ADMIN. On the right there is a selection of Normal and Backup. When Backup is selected the Menu system will now enable all buttons on a single screen and the main display will be changed to display the previously mentioned data.

Alarm and Shutdown Indicators - All tension alarms and shutdowns are now displayed on their respective gauges. Yellow dots represent alarm settings, and red dots represent shutdown settings.

Shutdown Disable - This feature allows customers who don’t use the shutdown relay, or want to temporarily disable the relay, to do so on command. When enabled the shutdown relay will no longer be triggered and the message “SHUTDOWN DISABLED” will display within the total tension gauge. Disabling shutdowns does not affect the shutdown indication on the tension gauge.

Coated E-Line Support - This panel is currently supporting the .350 DATALINE, and

.359 ECOSEAL lines

Real Time Clock - The current panel time is displayed on the main screen below the settings button.

Depth Offsets – As measuring wheels age, grooves worn in the wheels can change measurements. The Depth Offset setting allows operators to apply a correction factor for wheels to allow for wheel wear. On the Left Screen Press Depth, then Dep Adj

Menu Speed Lock – This feature locks out any Menu button access if there is any depth movement. This prevents the operator from pressing a button that might foul the job. It helps avoid distractions while the job is running.

File System Lock – This disables the ability for people other than the one with administrative access to delete log files. You can view, import them and create files with them but not delete them.

Remote Viewing – This system allows users to remotely monitor and control well activities from a centralized operator location. Additionally, with the use of cameras and for safety purposes a safe distance can be maintained from a high hazard operational area.

Shutdown Disable – This allows for the temporary disabling of equipment shutdown capability during times of startup or testing where values would exceed the thresholds that would normally trigger a shut down.

Alarms and Shutdown Settings -

- Over tension alarm and auto shutdown
- Delta tension (set down or pickup) alarm and auto shutdown
- Approaching surface alarm
- Load pin zero & calibrate controls
- Built-in stretch correction algorithms
- Password option to limit the settings that can be changed by user

Ergonomics – The panel also allows switching between a dark and light background on the display screen plus screen brightness control.

3.2 SOFTWARE FEATURES GUIDE

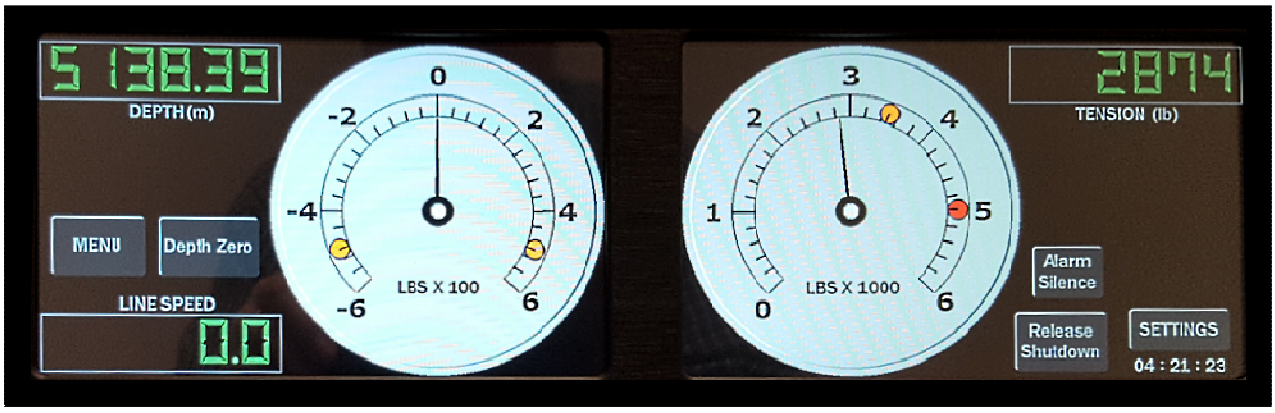
Main Displays

The above configuration is the default display of the AMD2A040. The display contains Depth, Tension and Line Speed, as well as current time in the lower right corner. The left screen contains the differential tension meter which can be set in either Differential or Incremental mode. The yellow dots indicate differential tension alarm settings. The Depth Zero button will set depth to 0, but can be pressed again to see the previous depth.

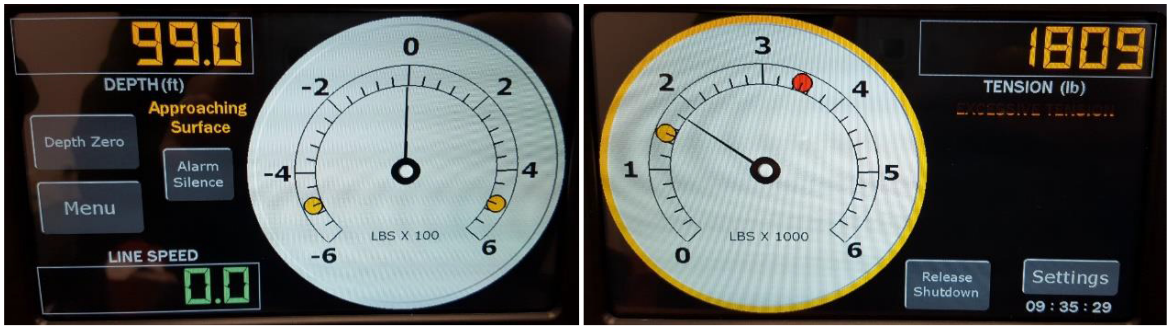
The right screen contains the tension value and the Total Tension meter which contains indicators for both Total Tension Alarm and Total Tension Shutdown.

Dark Screen or Light Screen Display

Depending on the working environment and operator preferences, the panels can be setup with either a dark background or light background screen.



3.3 DISPLAY ALERTS



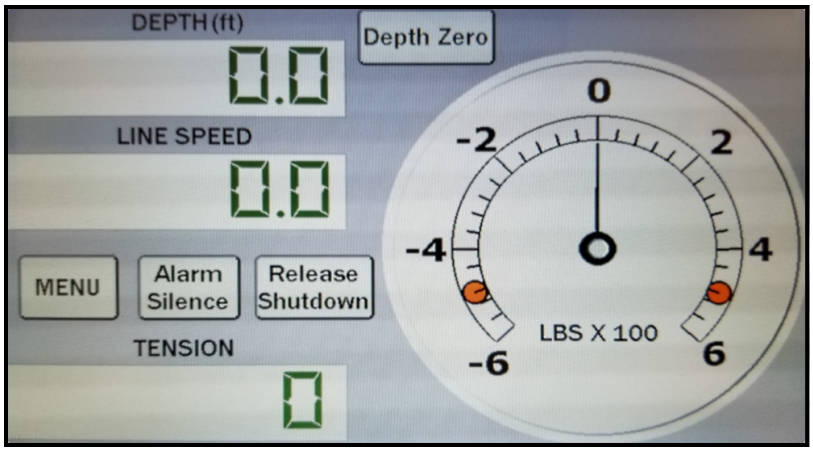
Both Displays have dynamic alerts that are displayed above. The alarms and shutdowns will enable visual cues to the operator.

The approaching surface alarm will change the depth display to Alert Yellow and flash an Approaching Surface message.

Both Tension Gauges have color changing bezels to alert the operator that an alarm has been initiated. The right screen will display an Excessive Tension message when the Total Tension alarm is initiated.

The right screen will also change both the digital display and the bezel to RED if the shutdown condition is met, as well as display a Shutdown message as shown.

3.4 BACKUP MODE (Can be selected in the Admin Menu)

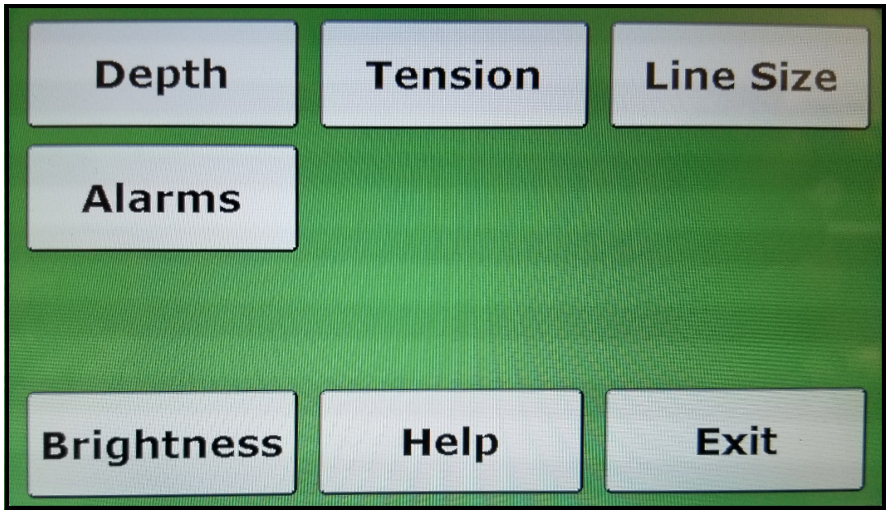


Both Displays are capable of running independently as shown. This allows the operator to continue work in the event of a damaged display or error. This mode allows the operator to see Depth, Tension, Line Speed, and Differential tension all on one screen.

It also changes the menu system to display all menus on a single screen.

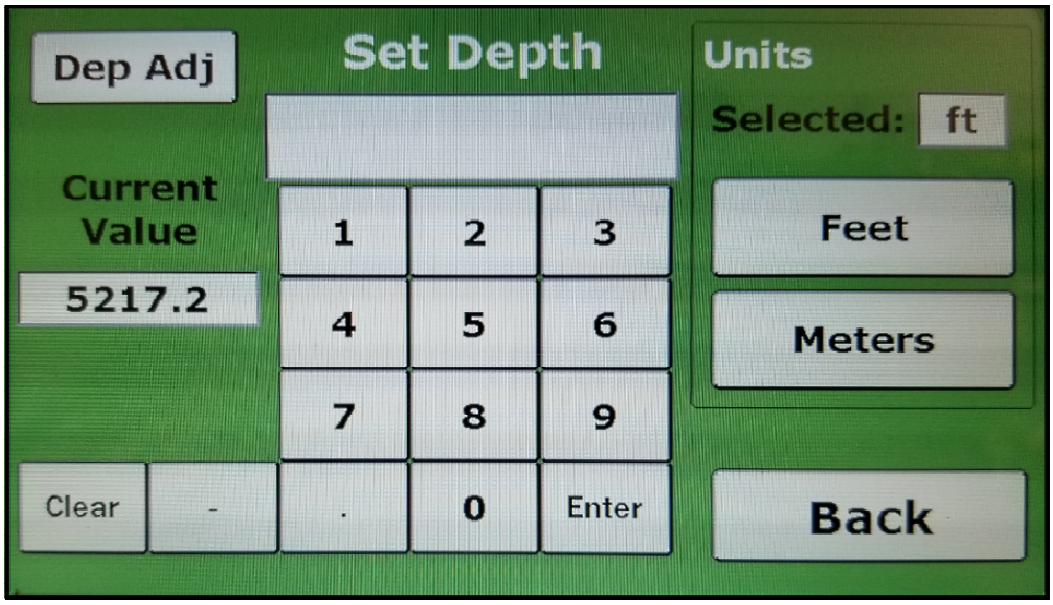
3.5 LEFT SCREEN MENUS

When in normal mode the Left Screen Menu is intended to include the menus that would be changed most often. See the following screens.

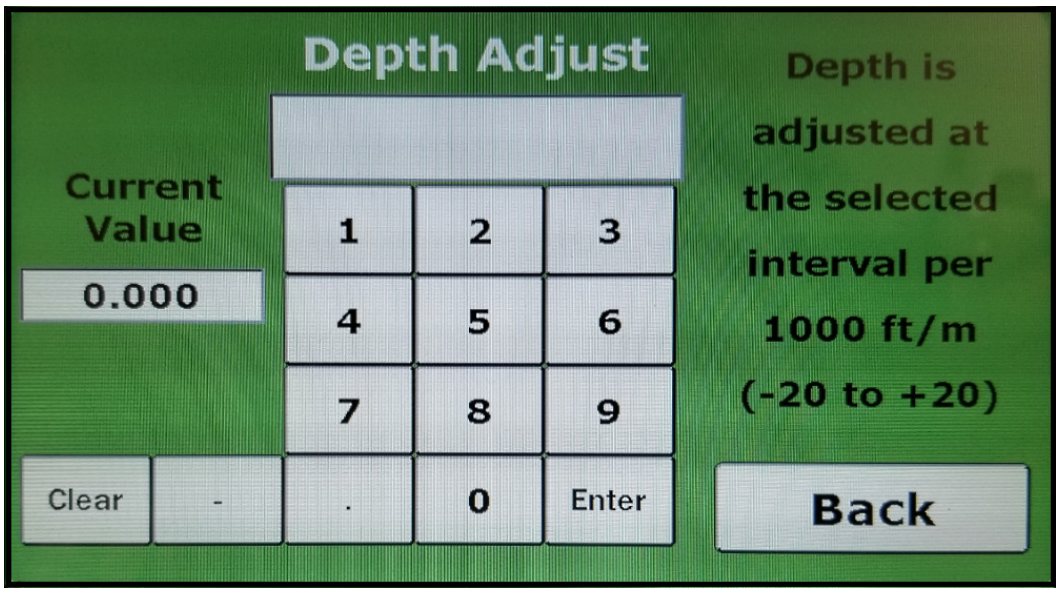


In this Menu you can select any of the above settings to change. Brightness will toggle the panel to a higher brightness mode for sunlight readability. The Help menu is available in both the Left and Right Menus.

3.6 LEFT SCREEN SUB MENUS - DEPTH MENU

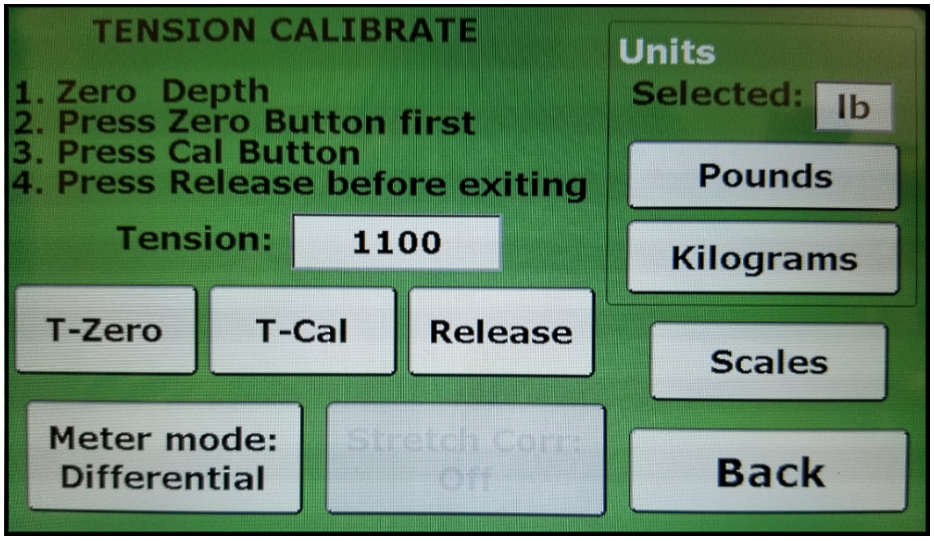


This menu is where the Operator can set the system depth.

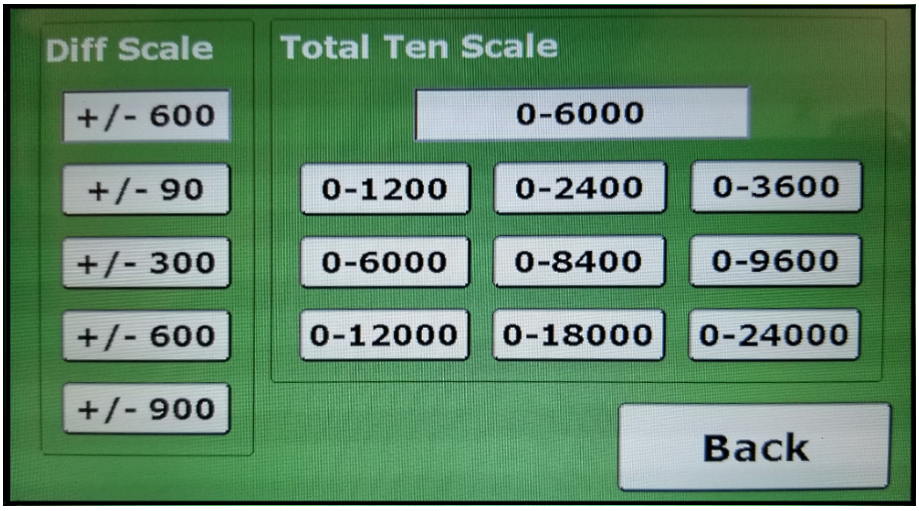


This is a Depth shim setting that can be used to correct for wheel wear compared to a known depth. It is selected from the above Depth Menu.

3.7 TENSION MENU



The Tension menu is where the Operator can Calibrate Tension, select the left meter setting between differential and incremental tension, set units, enable/disable stretch correction, and set the scale values for both meters.



This menu is selected via the Tension menu and is used to set the scales displayed on both Meters.

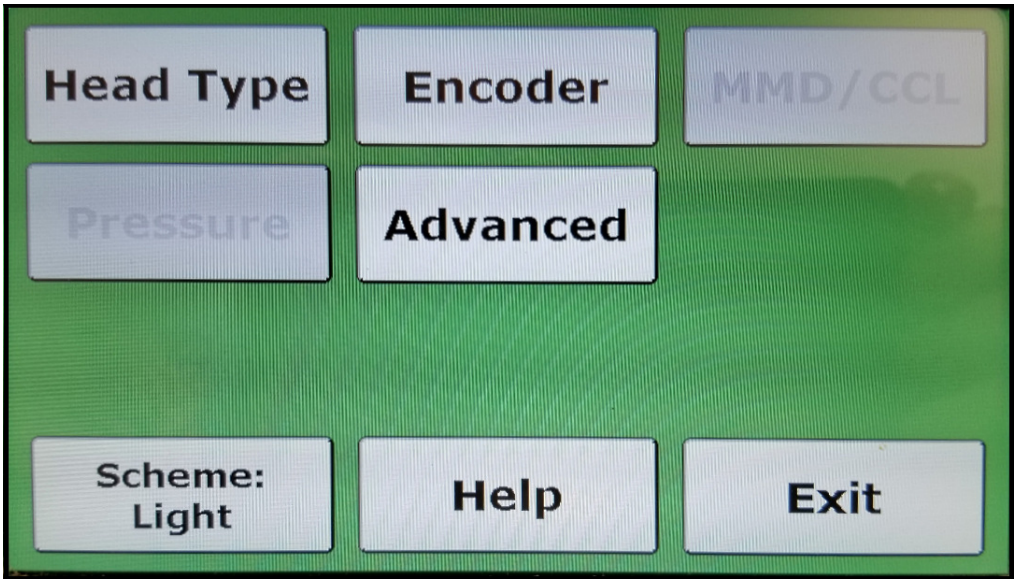
3.8 LINE SIZE

This is the standard line selection menu and is dependent on the Head Type selected.

3.9 ALARMS

These four menus are selected by pressing the correlating menu button on the right hand side. The operator sets these values and the Dynamic Display alerts are automatically adjusted.

3.10 RIGHT SCREEN MENUS

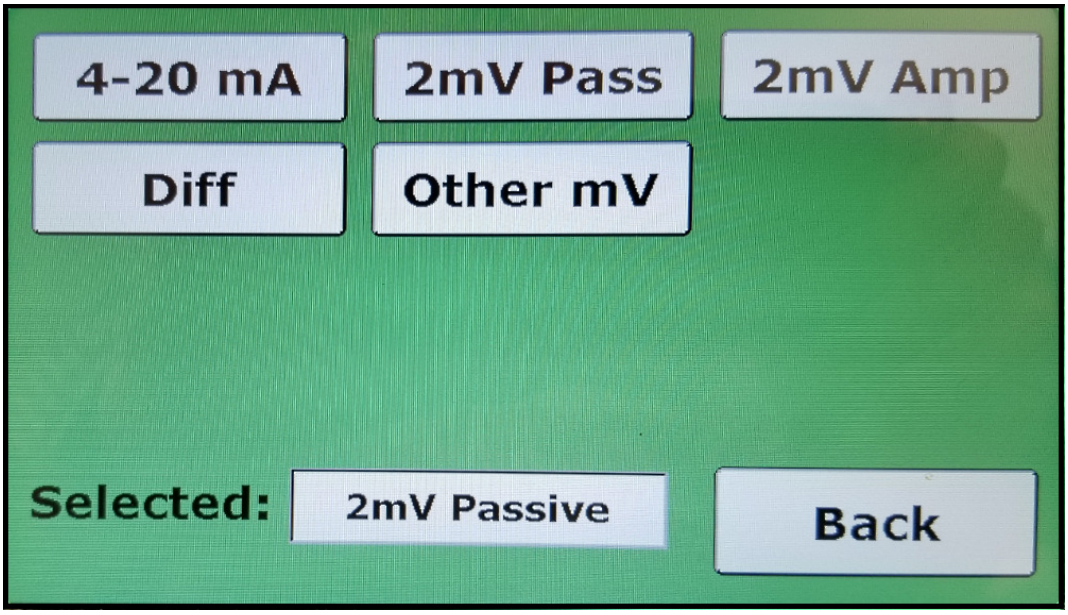


The right screen menus contain items that would not be frequently adjusted. Head Type and Encoder settings are currently all that is available with more features to come.

3.11 HEAD TYPE

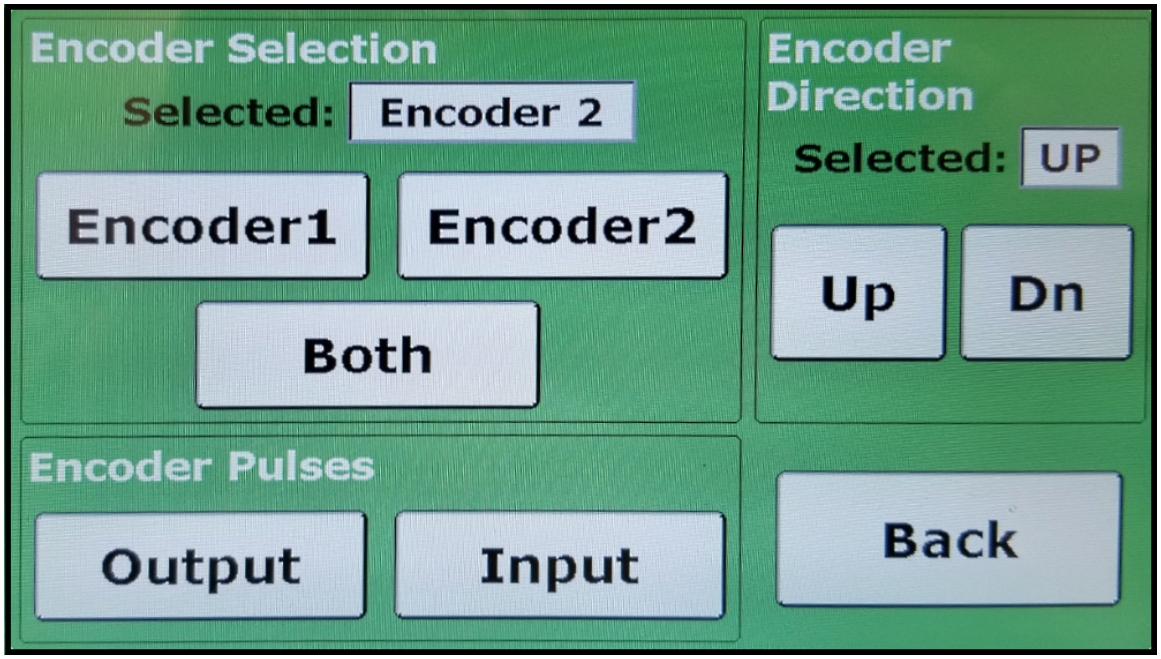
This panel is capable of both Wireline and Slickline, requiring the operator to select the measuring head the system will be reading.

3.12 LOAD CELL



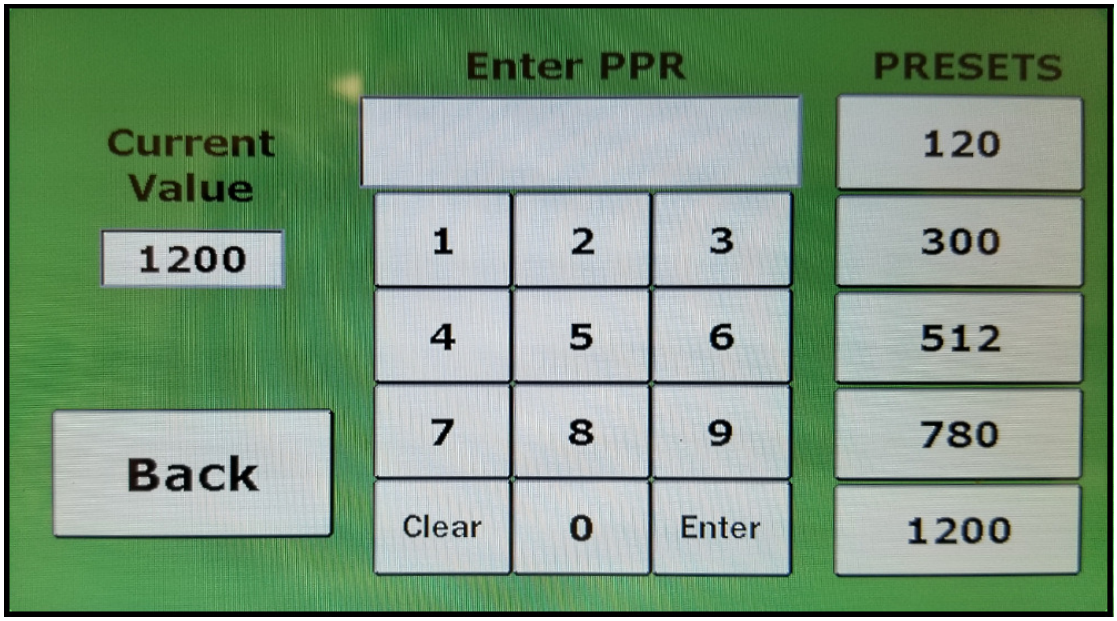
This panel also allows for many different Load Cell types and can be changed in this menu. An option to have 2 different load cells will be available in the future.

3.13 ENCODER



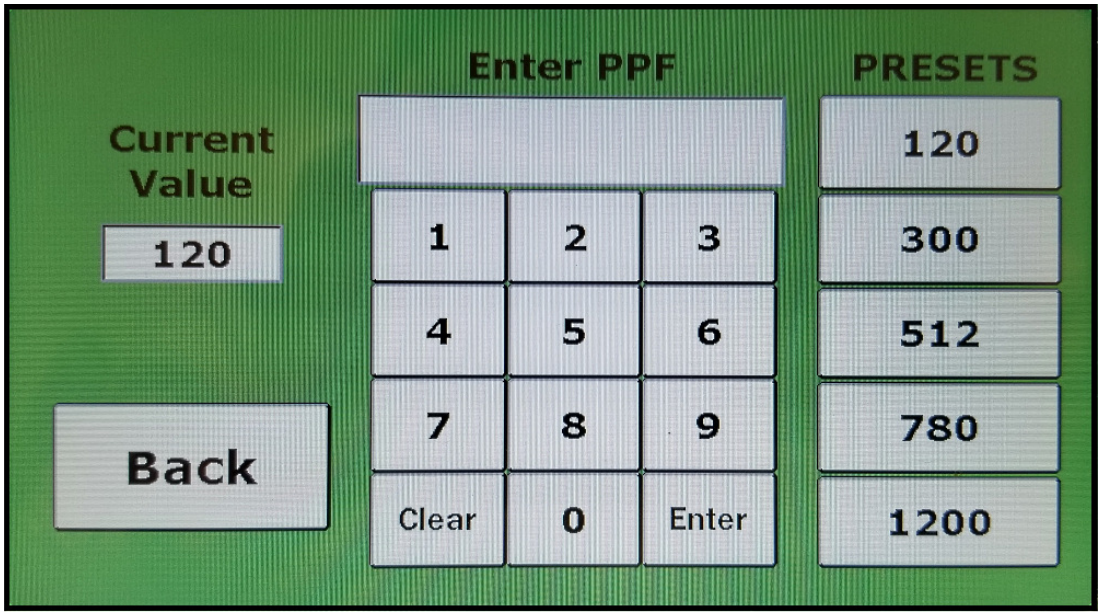
This menu allows the operator to select between encoders, and select depth units, as well as set the Optical Encoder incoming and outgoing pulse rates.

3.14 ENCODER INPUT



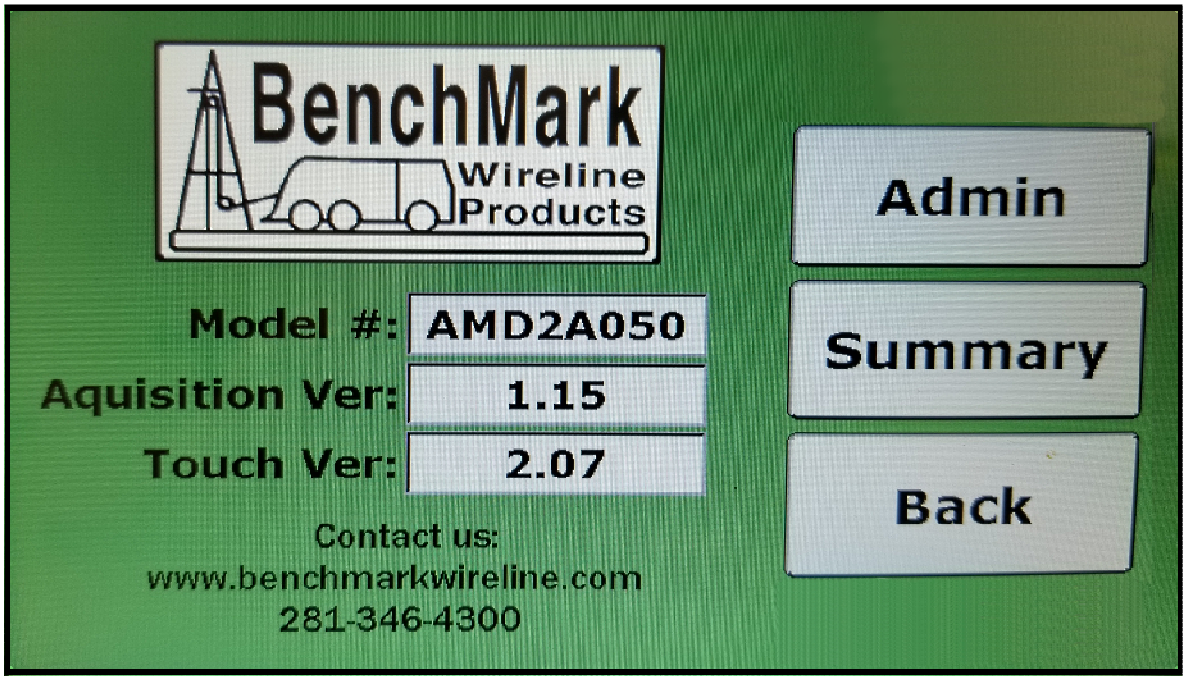
This menu is to set the Encoder Pulse rate to match the Encoder on the measuring head. The operator can select from a list of common BenchMark pulse rates on the right, or enter a new value manually.

3.15 ENCODER OUTPUT



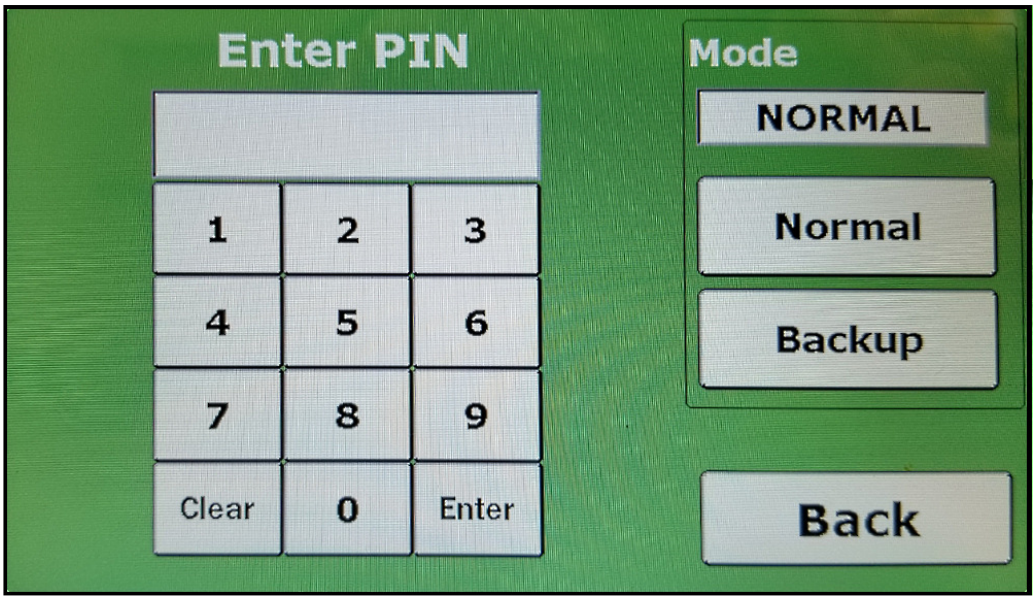
This menu is to select the output pulses that will be sent to a logging system such as Warrior.

3.16 OTHER MENUS – HELP



The help menu allows the operator to see the model number, software versions for troubleshooting, and contact information for BenchMark Wireline Products. It also contains the buttons to get to Admin controls and Summary.

3.17 ADMIN



The Admin menu is a new feature introduced in this panel. It allows the operator to get to the Backup Mode Select, but also allows the Supervisor to have additional control over the panel which was not available in previous versions. The default PIN is 00000 and can be set to a custom value once inside the ADMIN system.

3.17 ADMIN cont'd

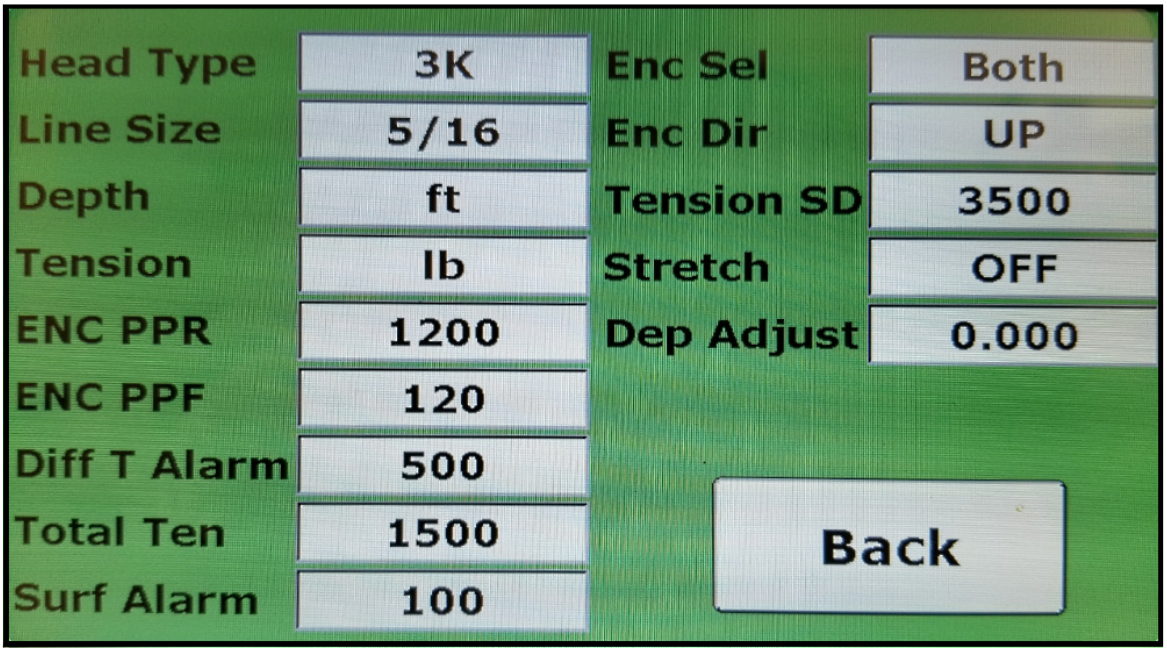
The Administrator controls are very simple, and allow the Supervisor to block the operator from changing settings in the list above. It also contains a lock which will not allow the panel to go into the Menu when the line is moving. It requires the operator to stop before making any adjustments.

3.18 SET PIN

This menu allows the Supervisor to set a unique PIN between 4 and 8 digits long. The

current PIN is displayed at the bottom of the screen. If the PIN is lost the Supervisor may contact BenchMark for instructions to access the system.

3.19 SUMMARY



This is a quick way to see all current settings in the panel, and can be accessed via the HELP menu which is available on both displays.

4.0 SOFTWARE UPDATES

Because the new panels are not MS Windows based, and use purpose-built software designed specifically to operate this panel, the size of the operating software files is very small compared with the previous design.

Therefore, update files are small and can be easily downloaded from the BenchMarkWireline.com website.

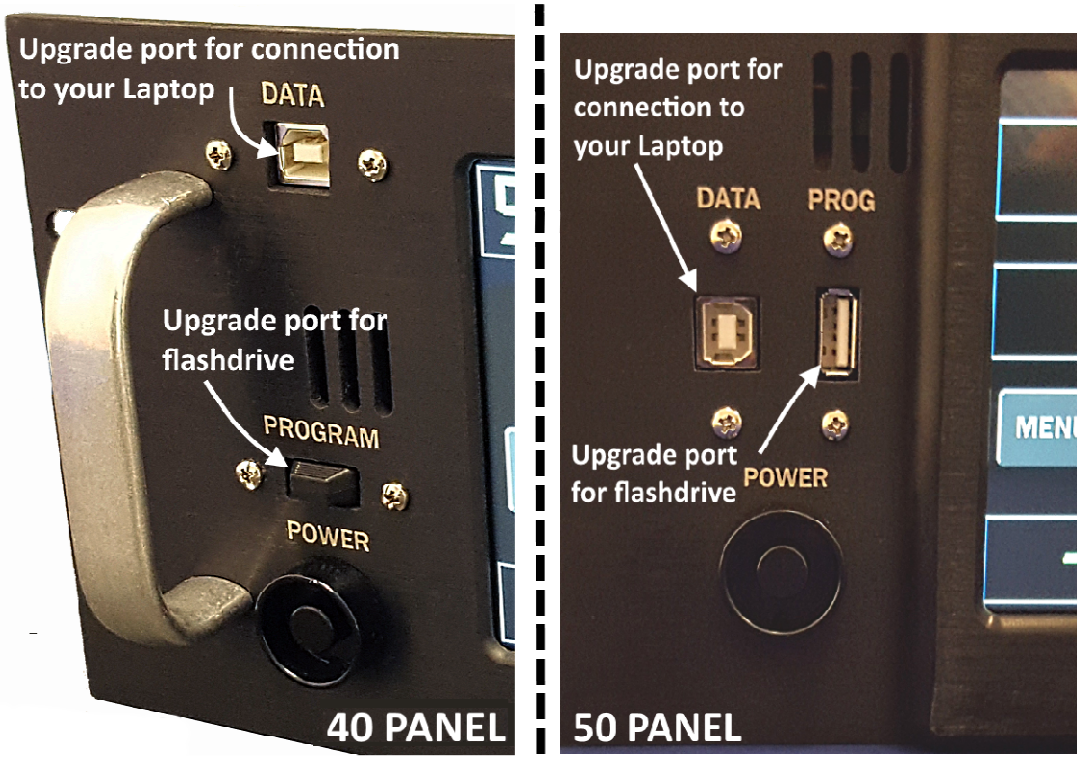
Depending on the update method chosen, some files may need to be saved in a particular way.

Panel upgrades include upgrades to the main board and to the two screens. The Data and Program ports on the front of the panel are for board upgrades. For screen upgrades use the USB slots the sides of the panels. Each screen has its own USB slot and they need to be upgraded individually.

There are 2 methods for upgrading the software on boards in the panel.

4.1.1 Panel Board Upgrade - The USB Cable Method – you can use a laptop to handle the upgrades. You would download a utility provided by Benchmark which would walk you through the upgrade process. The actual software upgrade file would normally be downloaded directly from the BenchMarkWireline.com website.

Use the USB cable provided to connect the panel data port to the laptop. The utility information and controls over the upgrade process.



Instructions for updating Acquisition Board :(You will need a PC for this step)

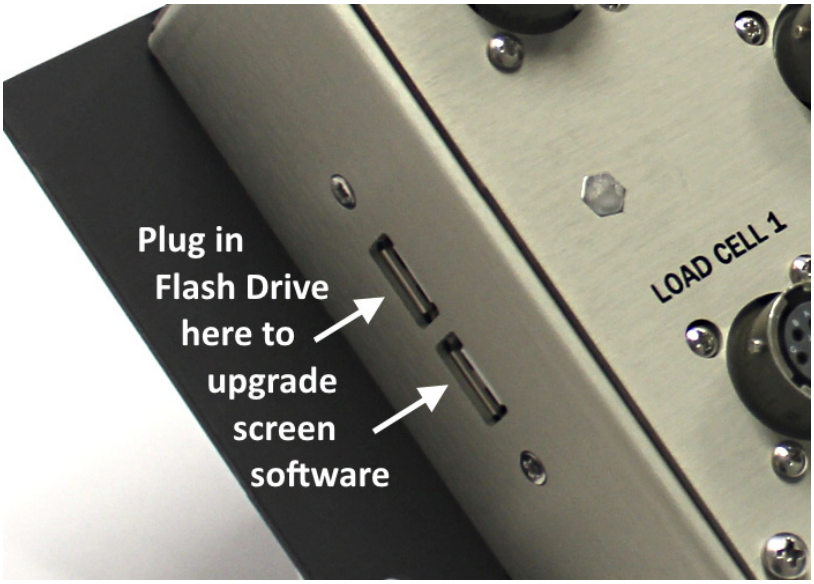
1. Download and install from the BenchMarkWireline.com website or Copy the BenchMark Updater program to a PC that will be used to program the panel.
2. Copy the file 2A0X0V1_XX.hex (XX=latest version) to a known location.
3. Connect the panel to the laptop with the supplied USB A to B cable (This would be the DATA port on the FRONT of the panel)
4. Double click on the BenchMark Updater program on the laptop to run the program.
5. Select BROWSE and select the 2A0X0V1_XX.hex file that you have saved.
6. Click the START/RUN button and select YES in the pop up window.
7. The panel will automatically install the software. When the installation finishes you will unplug the cable and be prompted to RESTART the PANEL.

4.1.2 Panel Board Upgrade – The Flash Drive Method – for this method you would download the software upgrade files from the BenchMarkWireline.com website. The files would need to be downloaded and then saved in specifically named folder on a flash drive. Note…when choosing a flash drive, if you use one that has an LED light it will flash when the files are being copied, which will simplify the upgrade process. Also, though you may choose to have additional files saved on the flash drive when you perform the upgrade, but to make the process rock solid with no opportunity for corruption or confusion, you may choose to save the update file to an empty totally clean flash drive. Remove the plastic cover from the "Program" port on the panel.

1. Download the upgrade files on to a PC. Insert the empty USB drive into the PC and create a new folder named ams2000
2. Copy the file 2A0X01_XX.hex into this new folder and rename it ams2000.hex
(The folder name and file inside the USB flash drive will have the same name ams2000)
3. Turn off the panel and insert this Flash drive into the front Flash USB type A port labeled PROGRAM
4. Power on the panel. If the Flash drive in use has a built in LED, it will begin to flash and will stop flashing once finished. A Flash drive that does not have an LED will also work, but will not have any indication of progress. This method takes approx. 15 mins to complete. If you are using a Flash drive without an LED it is recommended to leave it programming for at least 20 mins.
5. Once complete, power off the panel, remove the drive, and turn on the panel. The new Acquisition version can be verified in the help menu.

4.1.3 Screen Upgrade – Flash Drive Needed - the screens are upgraded separately from the main board in the panel. Screens are upgraded one at a time. This method only allows using the Flash Drive upgrade method. The upgrades are downloaded to a PC and can be saved to the Flash Drive like in the board upgrade method.

While one screen is being upgraded, the other will be dark.



Instructions for updating screens

1. Copy the file AMD2APROG.hex to an empty Flash drive.
2. With the power off insert the drive into the top Flash port on the side of the panel.
3. Power on the panel and wait for the screen to boot (approx. 1 min)
4. Turn off the panel and move the drive to the bottom Flash port on the side of the panel.

5. Repeat step 3 and remove the Flash drive.
6. Both Displays should now be updated.

Note – these upgrade procedures are identical for both the 40 and 50 panels. The ports are in different places but the board, screens and process is the same.

4.2 Software Version

SOFTWARE VERSION

Check the company website to view the Most Recent Version of the Panel Software

http://benchmarkwireline.com/support.html

5.0 SPARE PARTS

RECOMMENDED SPARES LIST - 40/50 SERIES PANELS

We recommend that all customers stock the quantity indicated in the '**QTY**' column. **IF** you are in a remote location or prefer having immediate availability of all spares, we recommend that you stock at least one of each item.

NOTE – BenchMark may not always have all spares in stock all the time.

AMD2A040 WINCH PANEL SPARE PARTS LIST

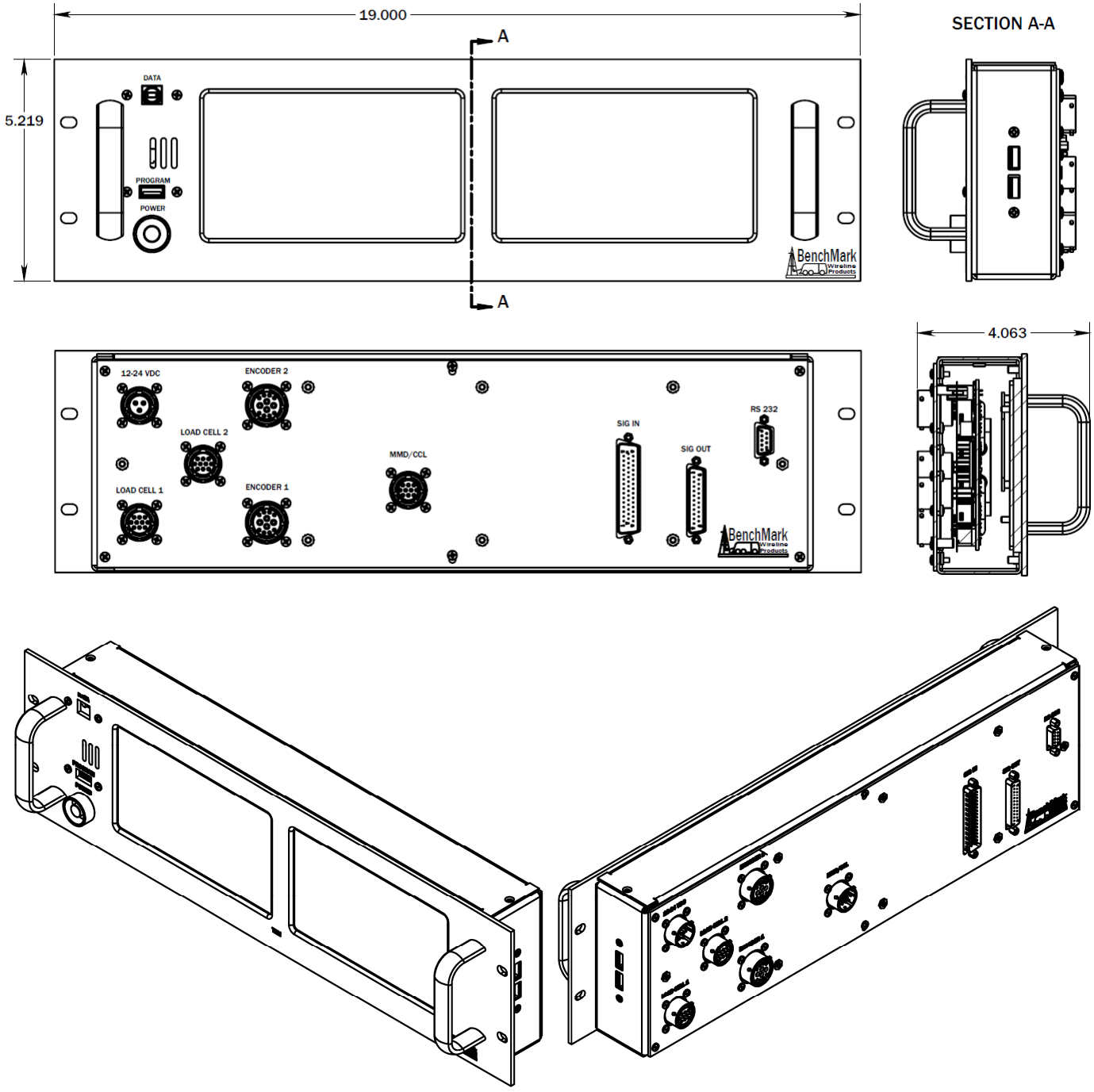
P/N	DESCRIPTION	QTY
AM2KP134	PC BOARD AMS2K ACQUISITION BOARD	1
AMD2A100	PCB ASSY DISPLAY 7IN SCREEN AMD2A102 PNL	2
AMD2A101	PCB ASSY MD21040 CONN BRD	1
40813	DISPLAY 7IN TFT 800X480 SUNREADABLE 24 BIT RGB WITH CAPACITIVE TOUCH SCREEN	2

AMD2A050 WINCH PANEL SPARE PARTS LIST

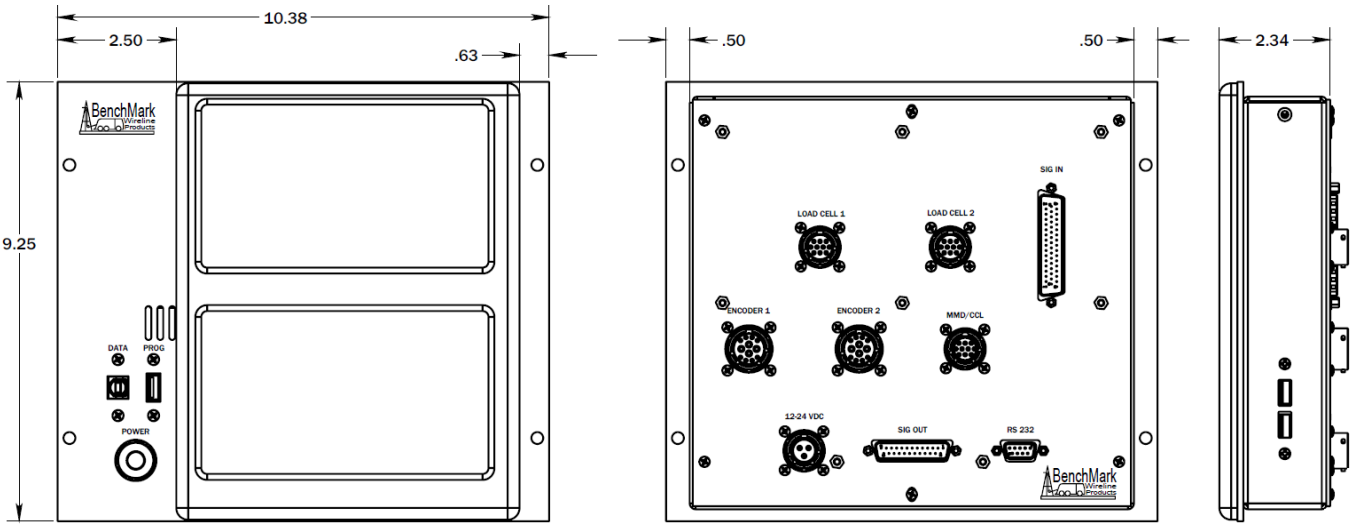
P/N	DESCRIPTION	QTY
AM2KP134	PC BOARD AMS2K ACQUISITION BOARD	1
AMD2A100	PCB ASSY DISPLAY 7IN SCREEN AMD2A102 PNL	2
AMD2A102	PCB ASSY MD21050 CONN BRD	1
40813	DISPLAY 7IN TFT 800X480 SUNREADABLE 24 BIT RGB WITH CAPACITIVE TOUCH SCREEN	2

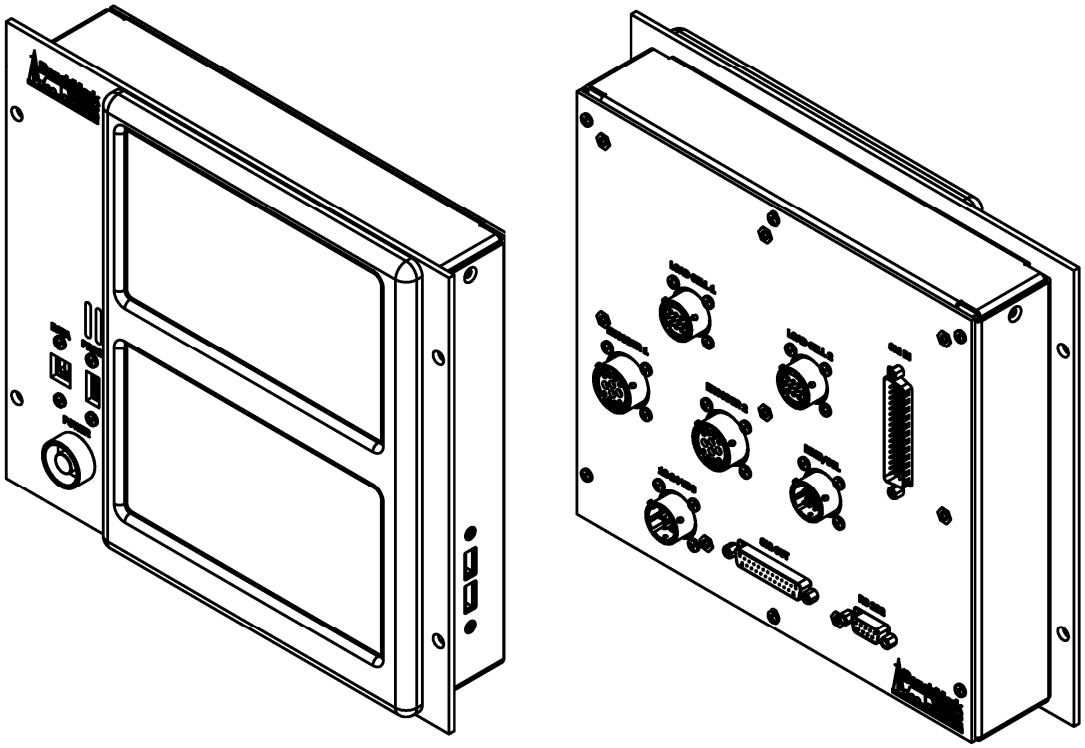
6.0 SPECIFICATONS

6.1 DIMENSIONS - AMD2A040 OPERATORS PANEL

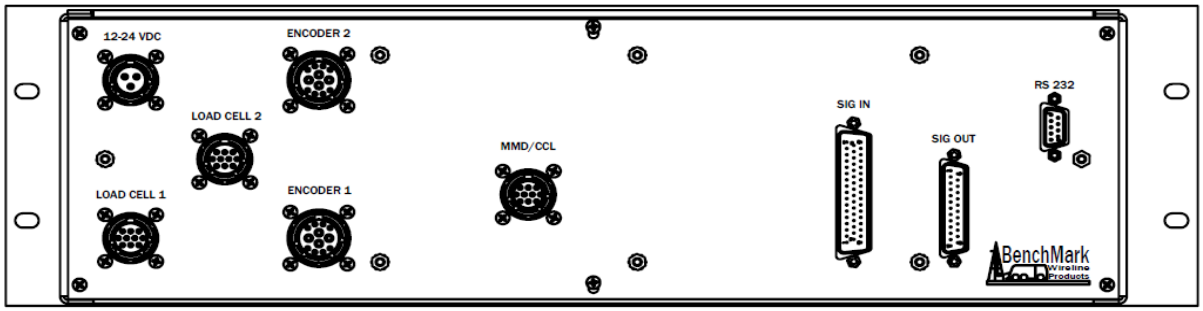


6.2 DIMENSIONS - AMD2A050 OPERATORS PANEL





6.3 BACK PANEL – PINOUT CONNECTORS FOR 40 & 50 PANELS



Note – This Connector Pin out Information Applies To Both The 40 And 50 Panels

Encoder 1 and 2 - KPT02E14-12S

Pin	Signal
A	Phase A
B	Phase B
C	Phase A\
E	Phase B\
J	+5-15vdc
L	GND

Load Cell 1 and 2 – KPT02E12-10S

Pin	Signal
A	SIG+
B	GND
C	EX+ (10VDC)
E	SIG-
F	SHUNT CAL (JUMPER POSITION)
G	SHUNT CAL (JUMPER POSITION)

6.3 BACK PANEL – CONNECTOR PIN OUTS FOR 40 & 50 PANELS cont'd

25 pin D Connector

PIN	SIGNAL
1	GND
2	1A OUTPUT
3	1B OUTPUT
4	RELAY 2 COM
5	+5VDC
6	OVER TENSION RELAY 1 NO
7	OVER TENSION RELAY 1 COM
8	OVER TENSION RELAY 1 NC
9	0-10.0VDC TENSION OUTPUT
10	MMD OUT
11	MMD OUT GND
12	4-20MA TENSION OUTPUT
13	TENSION OUTPUT GND
14	1A\ OUTPUT
15	1B\ OUTPUT
16	2A OUTOUT
17	2B OUTPUT
18	2A\ OUTPUT
19	2B\ OUTPUT
20	RELAY 2 NO
21	GND
22	RELAY 2 NC
23	CAN HI
24	CAN LO
25	CAN GND

Power Connector – KPT02E12-3P

PIN	SIGNAL
A	+12-24VDC
B	+12-24VDC GND

6.3 BACK PANEL – CONNECTOR PIN OUTS FOR 40 & 50 PANELS cont'd

MMD/CCL Connector

Pin	Signal
C	Weak Mark
D	Weak Mark\
E	+15vdc
F	GND
G	Strong Mark\
H	Strong Mark

RS232

Pin	Signal
2	Transmit
3	Receive
5	GND
9	+5vdc

50 Pin Signal In Connector

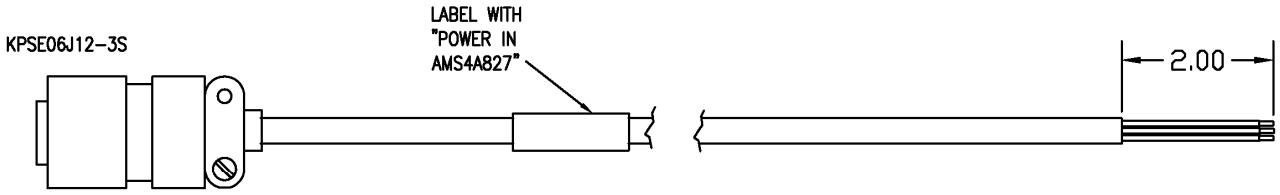
Pin	Signal
1	+5vdc
2	GND
3	ENCODER 1A
4	ENCODER 1B
5	ENCODER 1A\
6	ENCODER 1B\
7	+5VDC
8	GND
9	ENCODER 2A
10	ENCODER 2B
11	ENCODER 2A\
12	ENCODER 2B\
13	LOAD PIN1 EX+
14	LOAD PIN1 EX-
15	LOAD PIN1 SIGNAL+
16	LOAD PIN1 SIGNAL-
17	SHUNT CAL1 HI/LO

6.3 BACK PANEL – CONNECTOR PIN OUTS FOR 40 & 50 PANELS cont'd

18	LOAD PIN2 EX+
19	LOAD PIN2 EX-
20	NO CONNECTION
21	4-20MA INPUT 1
22	4-20MA INPUT 2
23	4-20MA INPUT 3
24	4-20MA INPUT 4
25	GND
26	GND
27	GND
28	ENCODER 3A
29	ENCODER 3B
30	GND
31	GND
32	SHUNT CAL2 HI/LO
33	0-1.50VDC SIGNAL
34	GND
35	-15VDC
36	+15VDC
37	GND
38	+15VDC
39	STRONG MARK
40	STRONG MARK\
41	NO CONNECTION
42	SHUNT CAL2 HI/LO
43	MMD SIGNAL OUT
44	LOAD PIN2 SIGNAL-
45	LOAD PIN2 SIGNAL+
46	+5VDC
47	+24VDC
48	+24VDC
49	+24VDC
50	+24VDC

7.0 CABLES

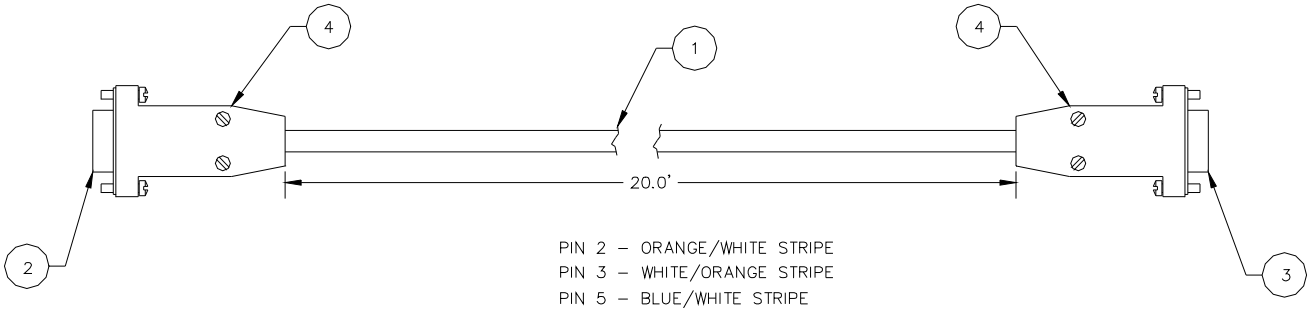
7.1 AMS4A827 CABLE ASSEMBLY - DC POWER IN



PIN A: CONTACT + RED
PIN B: CONTACT – BLACK
PIN C: CONTACT – GREEN

LINE	PART	DESCRIPTION	QTY
PARENT:	**AMS4A827-15**	CABLE ASSY POWER IN 3 SOCKET	
1	AMS4P177	CONN KPSE06J12-3S OR KPT06J12-3S STR PLUG 3 SOCKETS	1
2	AMS4P222	CABLE 20/4C ALPHA 25154 BLACK SHIELDED 0.28 OD	15
3	AMS7P063	BUSHING #9779-513-6 AMPHENOL	1

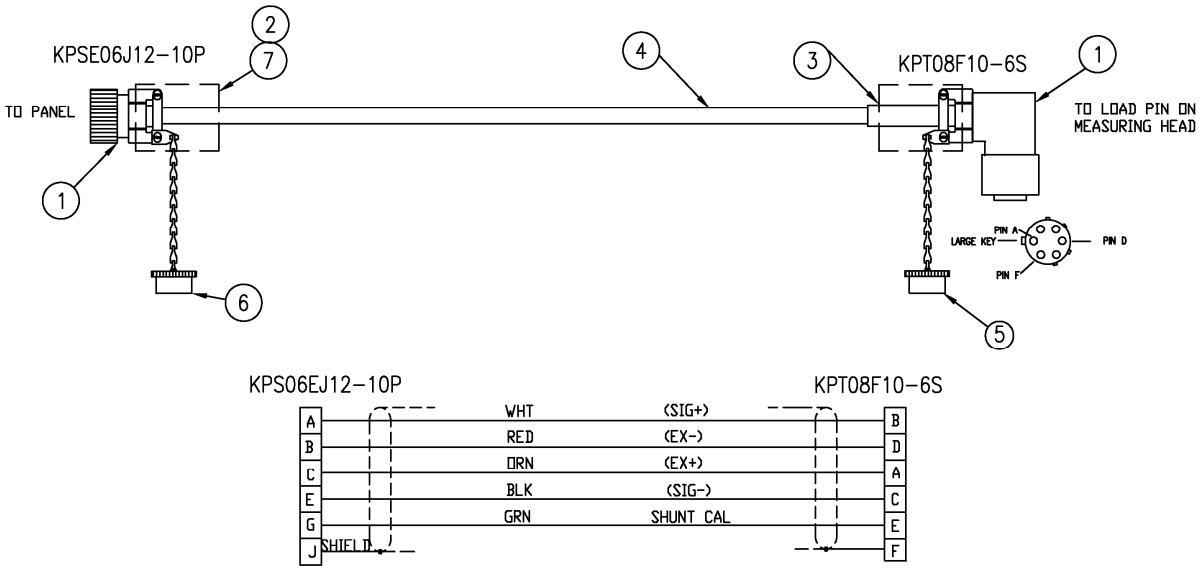
7.2 AMS7A024 CABLE ASSEMBLY - RS232



PIN 2 – TXD
PIN 3 – RXD
PIN 5 - GND

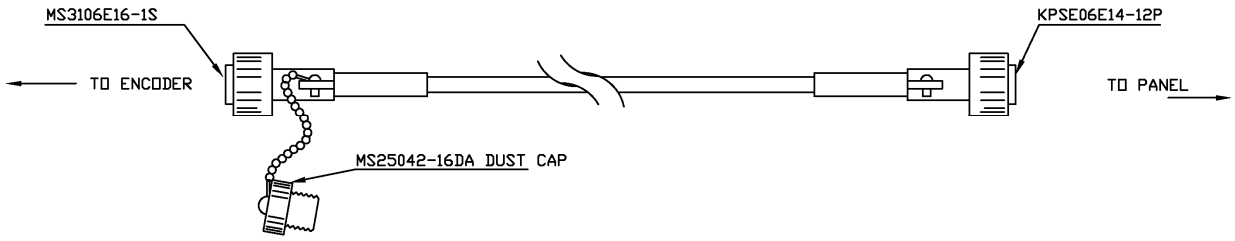
PART	DESCRIPTION	QTY
AMS7P062	CABLE 24/2P STNDED PE/PVC	20
AMS7P016	CONN DE-9P	1
AMS7P015	CONN DE-9S	1
AMS7P067	CONNECTOR AMP CABLE CLAMP	2

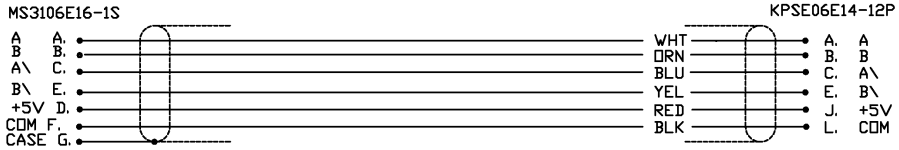
7.3 AMS8A013B CABLE ASSEMBLY - RT ANGLE TENSION IN



PART	DESCRIPTION	QTY
ALS8A013-20	CABLE ASSY TENSION LV INPUT TO PANEL	1
AMS4P181	CONN KPSE06J12-10P OR KPT06J12-10P STR PLUG 10 PINS TENSION PANEL END	1
AM5KP238	CONN KPT08F10-6S RT ANGLE PLUG W/STRAIN RELIEF OR EQUIVALENT LOAD CELL END	1
ACMU1P88	TUBING SHRINK 1.00 ADH LINED 3:1 BLACK 3.00"	1
AMS4P221	CABLE 20/8C ALPHA 25468 BLACK SHIELDED 0.31OD	20 FT
AM5KP059	DUST CAP KPT8010C CANNON MS3180-10CA	1
AM5KP070	DUST CAP KPT8012C CANNON MS3180-12CA	1
AMS7P063	BUSHING #9779-513-6 AMPHENOL	1
AMS4P209	TUBING SHRINK 0.75 ADH LINED 3:1 BLACK	1 INCH

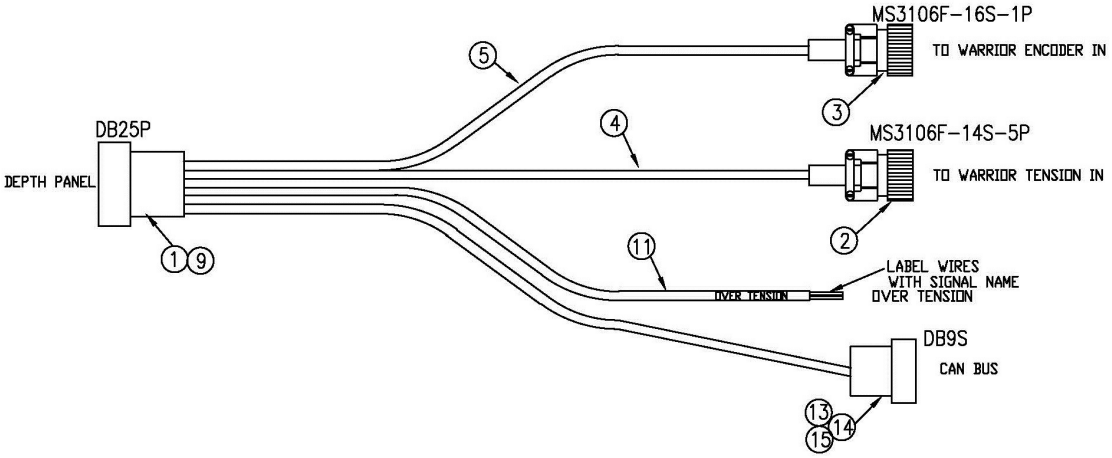
7.4 AMS4A150A CABLE ASSEMBLY - CABLE ASSY ENCODER

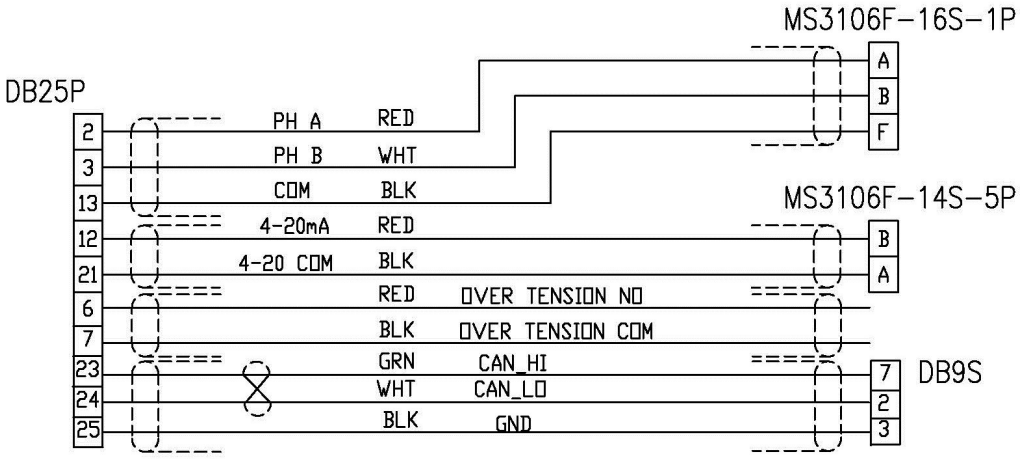




PART	DESCRIPTION	QTY
AMS4A150-20	CABLE ASSY ENCODER TO PANEL PANEL	1
AMS4P184	CONN MS3106F16S-1S 7 SOCKETS ENCODER END	1
AMS4P182	CONN KPSE06J14-12P OR KPT06J14-12P STR PLUG 12 PINS PANEL END	1
AMS4P221	CABLE 20/8C ALPHA 25468 BLACK SHIELDED 0.31OD	20 FT
AM5KP113	DUST CAP MS25042-16DA ENCODER END	1
AMS7P063	BUSHING #9779-513-6 AMPHENOL	2
ACMU1P88	TUBING SHRINK 1.00 ADH LINED 3:1 BLACK 2 @ 3"	2

7.5 AMS4A917 CABLE ASSEMBLY - DB25 OUT TO WARRIOR





PART	DESCRIPTION	QTY
AMS4A917-15	CABLE ASSY DEPTH PNL DB25 OUT TO WARRIOR	1
AMS4P165	CONN DB25P CRIMP AMP USED WITH PIN 205089-1	1
AMS4P185	CONN MS3106F14S-5P 5 PINS TO WARRIOR	1
AMS4P183	CONN MS3106F16S-1P TO WARRIOR	1
AMS4P164	CONN DB9S CRIMP USED WITH SOCKET 205090-1	9
ACMU1P83	CABLE 2C ALPHA 2412C SPIRAL SHIELD	15 FT

ACMU1P83	CABLE 2C ALPHA 2412C SPIRAL SHIELD	15 FT
AMS7P093	CABLE 22/2P BELDEN 8723 SHIELDED (500 FT SPOOL)	15 FT
AMS7P093	CABLE 22/2P BELDEN 8723 SHIELDED (500 FT SPOOL)	15 FT
AMS4P167	PIN AMP M39029/64-369 USED WITH 205162-1	25
AMS7P063	BUSHING #9779-513-6 AMPHENOL	2
ACMU1P88	TUBING SHRINK 1.00 ADH LINED 3:1 BLACK 2 @ 3"	2
AMS4P462	CONN BACKSHELL DB-25 METAL 0.525 OD CABLE MAX	1
AMS4P464	CONN BACKSHELL DB-9 METAL 0.400 OD CABLE MAX	1
AM5KA034	BUSHING #9779-513-4 AMPHENOL	2