



# **Pipelayer LMI 4 System**

## User Manual

Updated: July 14, 2017

## User Manual

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## Warranty

Cranesmart Systems warrants to the purchaser of each new Cranesmart System that any part thereof which proves to be defective in material or workmanship within two (2) years from date of delivery will be repaired or replaced at no charge if the system is returned to us in Edmonton, Alberta with all freight charges prepaid. If a performance problem should occur, contact our office in Edmonton, Alberta at (888) 562-3222 or (780) 437-2986.

This warranty does not cover defects resulting from accident, alteration, improper use, or failure of the purchaser to follow normal operating procedures as outlined in this instruction manual.

### PLEASE NOTE:

- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- This device complies with part 15 of FCC rules, and Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.
- The display panel is a category 2 item as per IC and FCC radio certification.
- Opening the display panel voids the warranty.
- No components of the system are to be submerged in water.
- This warranty is in lieu of any warranty or merchantability and of all other warranties, expressed or implied, all of which are hereby excluded.
- The display panel operates at an input range of 12 - 24 VDC at 1 A
- The wireless transducers operate at 3.6 VDC at 30 mA (battery).

Cranesmart Systems shall in no event be liable for any special, indirect, or consequential damages whatsoever and neither assumes nor authorises any person to assume for it any other obligation or liability.

# 1. The User Interface

The new Cranesmart Pipelayer LMI 4 System utilizes a large full color touchscreen display panel, which is described generally, in this section. All information, parameters, menus and alarms are displayed and accessible directly via the touchscreen, with no need to use the hardware buttons located beneath the display. *(These buttons will be integrated in later versions of the system for extended functionality).*

**NOTE: The touchscreen does not respond to increasing pressure on its surface - to make a selection, use only light contact directly overtop the desired screen button to avoid potentially damaging the screen.**

## 1.1. The Home Screen

Illustrated below is the *Home Screen*, which is the main screen for normal operation. The system updates in real time, all the most important parameters of the system and displays them here for the operator. The elements of the display are labeled and explained on the following page.



1

### Menu Tabs

Across the top of the display are the *Menu Tabs* for accessing the main functions of the system. From left to right, the tabs represent these menus: Home / Configurations / Settings / Information / Permission Level / Brightness / Language. These tabs are visible and accessible at all times.

2

### Load Display

The primary section of the Home Screen shows the load information. Here, the current load on the hook is displayed in the chosen units of measurement, as well as the (programmed) maximum load allowed for the system. The current load as compared to the maximum is also displayed visually as a bar graph and percentage.

3

### Bypass Button

Pressing this button will shut off any audible alarm and dismiss any warning message for a period of 30 seconds. The display will show this time interval counting down, until the timer runs out completely and the alarm is reactivated. A more detailed description of the alarms and their displays are found in section 9: *Troubleshooting* (page 50)

4

### Clock

The upper right area of the screen shows the system clock. The time of day as well as the month day and year are displayed clearly for the operator. This information can be changed by pressing the screen directly over the clock display, which will open the Time and Date Screen (page 49).

5

### Secondary Parameters Display

Surrounding the load display are other important parameters being monitored by the system. Information related to the machine's boom (angle, overhang, and tip height) is located below the load display. Information related to the machine's level (pitch and roll) is located to the right of the load display. Pressing the area of the screen overtop each parameter shown will open an associated menu for that parameter, where certain values can be changed or displayed.

## 6 Alarm and Notification Bar

The lower section of the screen shows the Alarm and Notification Bar. As shown in the screenshot, the system pictured is experiencing no alarms and shows the default notification, 'Counterweight must be Fully Extended'. In case of an alarm, an associated message would be displayed in this area, with color changes to indicate the problem visually. Further description of the alarms and their displays are found in section 9: *Troubleshooting* (page 50).

## 1.2. The Menu Screens

Shown below is an example of a typical *Menu Screen*. Its various components are described on the following page.



1

**Banner Buttons**

Every listed item on a menu screen is shown overtop a blue 'banner button'. If the item is changeable or linked to a further submenu, pressing anywhere on its banner button will advance the display to show more associated options.

2

**Message Tabs**

Across the bottom of the menu screens are the various message tabs that display different kinds of information to the operator. The tabs in order from left to right are: Alarms / Warnings / Notifications.

3

**Page Indicator**

This symbol indicates that more menu items are available, but cannot all be displayed simultaneously. Pressing anywhere directly overtop this symbol will advance the display to the subsequent page(s) of the menu, until eventually cycling back to the first page.

4

**Back Button**

Pressing this button will re-open the previously viewed screen, making menu navigation faster and easier.



### 1.3. The Value Entry Screen

Shown below is an example of a typical *Value Entry Screen*. This is the format used for any instance where a numerical parameter must be set or changed. The various components of this screen are labeled and described below.



1

#### Value Window

The value in question will be displayed in this area, showing updates as they are made by pressing the keypad buttons.

2

#### Clear Button

Pressing this button will clear the Value Window, setting the value to 0.

3

**Delete Button**

Pressing the Delete Button will delete the last digit displayed in the Value Window.

4

**Keypad**

Press the keypad buttons to set the new value to be used, as displayed in the Value Window.

5

**Cancel and Accept Buttons**

Pressing the (red) Cancel Button will nullify any changes made on this screen and open the previous page displayed. The (green) Accept Button will confirm and save any changes made and open the previously displayed page.

## 2. Normal Operation

The Cranesmart LMI 4 Pipelayer interface was designed to present the user with all the most important, real-time information regarding the machine in use, for the safest and easiest possible operation. This section of the manual explains each parameter display of the Home Screen and other screens used during normal operation, how to view and change important settings, and the ways the system indicates potential danger.

**NOTE:** See the previous section 1: The User Interface (page 3) for explanations of the screen formats and common functions used throughout the system.

### 2.1. Load Indication

Shown below is the Home Screen, with the Load Indication area emphasised.



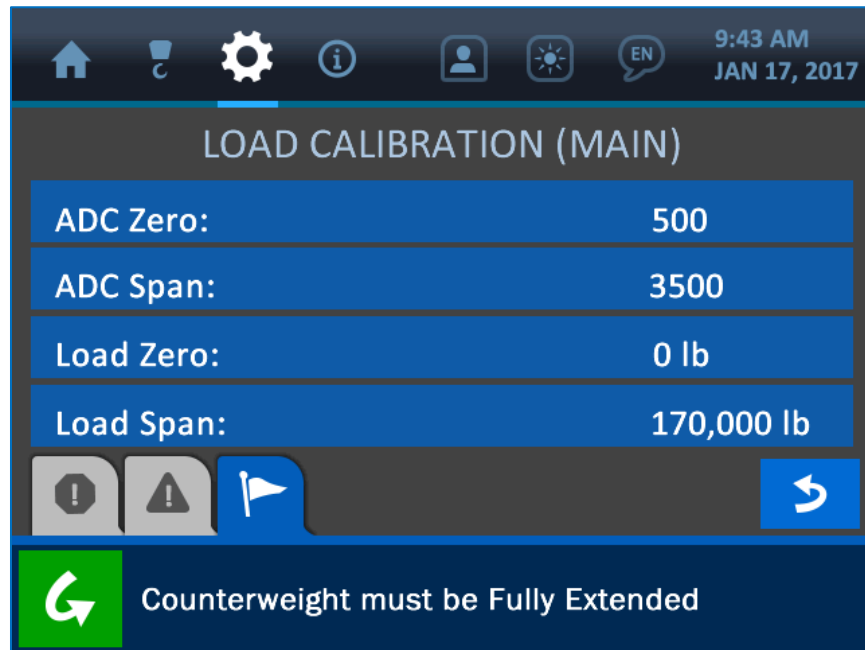
As shown in the previous screenshot, and the detail image below, the load is indicated by several factors at any given time. The current load on the hook is shown, as well as a bar graph and percentage indicating how close the current load is to the maximum capacity of the machine. This max load limit is set by a supervisor, and is shown below the bar graph as 'MAX CAPACITY'.



Pressing anywhere directly overtop the load indication section of the screen will open the Load Options Screen, as shown below. This menu screen offers 3 options for the load: Calibration, Limits, and Tare. These options are described on the following pages.



## Load Calibration



The Load Calibration Menu displays the current settings for the following parameters:

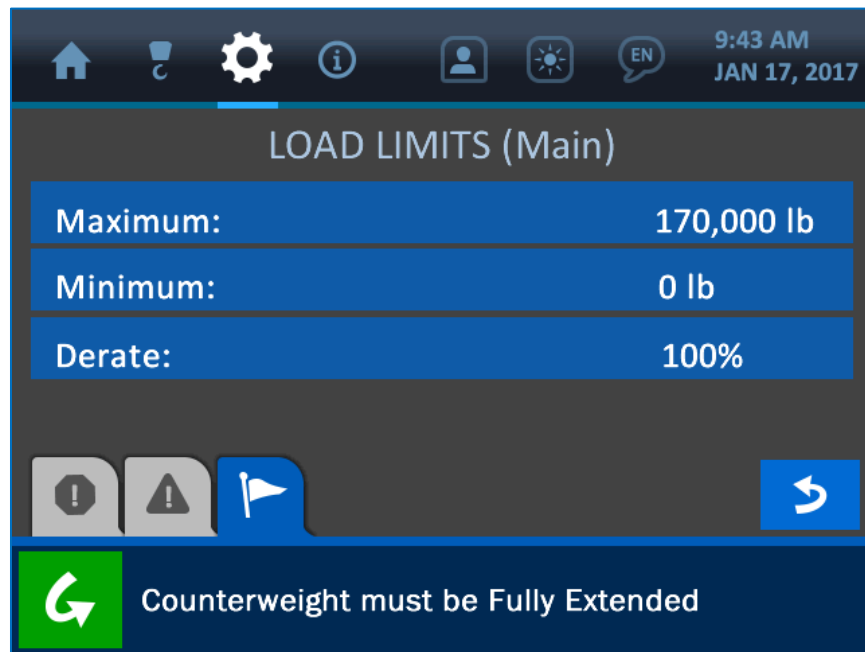
**ADC Zero:** indicates the system's Analog to Digital conversion value when there is no load on the hook

**ADC Span:** indicates the system's Analog to Digital conversion value when the maximum possible load is on the hook (before the system shows a load alarm)

**Load Zero:** indicates the displayed load value when there is no load on the hook

**Load Span:** indicates the displayed load value when there is a maximum load on the hook (before the system shows a load alarm)

## Load Limits



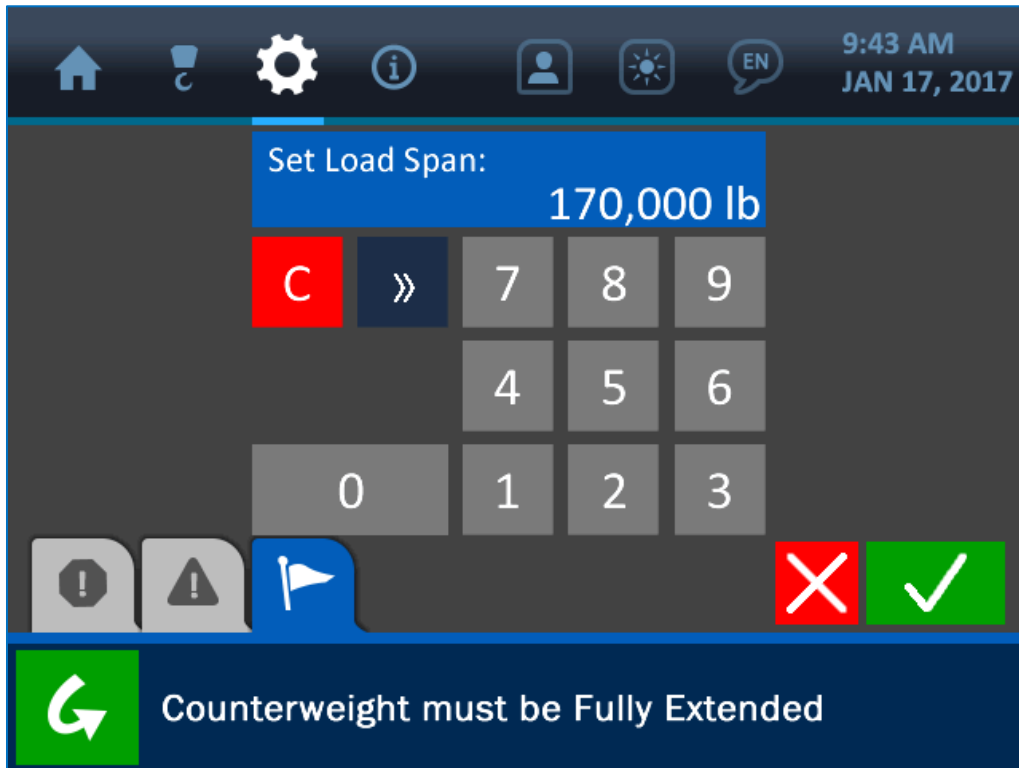
The Load Limits Menu displays the current settings for the following parameters:

**Maximum:** the current maximum load allowed before the system displays a load alarm condition

**Minimum:** the current minimum load value recognized by the system for proper display

**Derate:** this value indicates the capacity of the load chart that the system is set to recognize. If for example, the Derate value is set to 100%, the entire load chart itself used at full capacity. If the Derate value were to be set at 50%, the machine would be enabled to function at only half of its actual capacity before the system shows an alarm state.

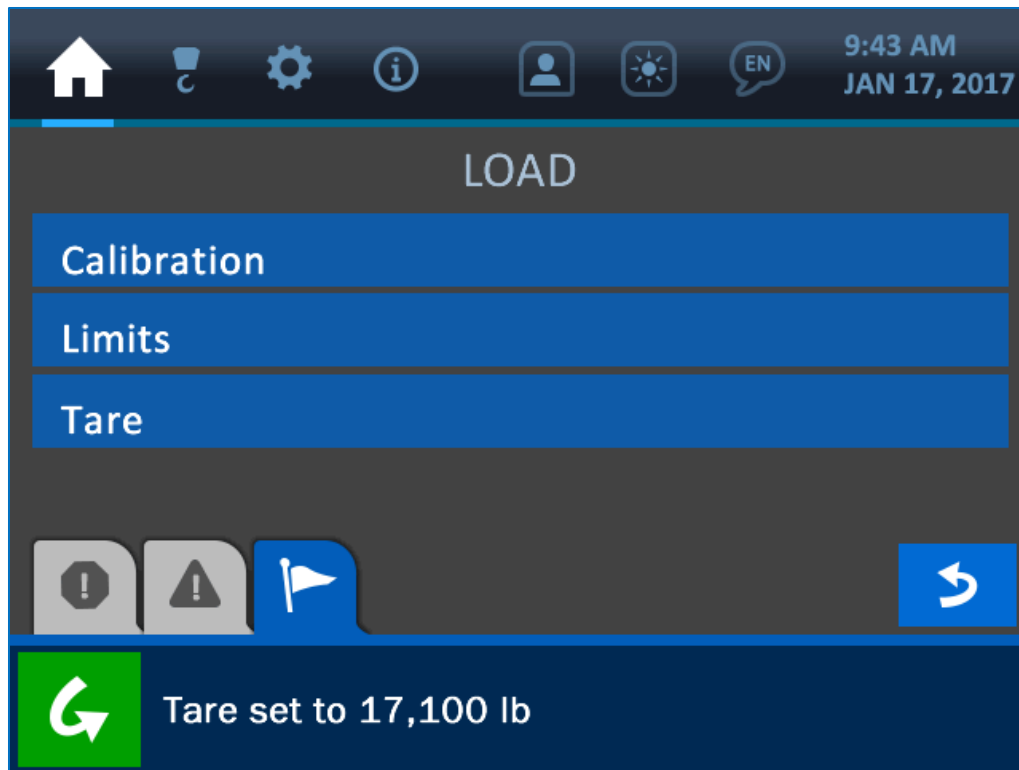
To edit any of the load parameter values, simply press the screen directly overtop the option to be changed to open the Value Entry Screen for that respective option.



Once the Value Entry Screen is opened, use the keypad to enter the desired value for the parameter, and press the (green) Accept Button to save the change.

**NOTE: See section 1.3: The Value Entry Screen (page 7) for a detailed description of how the value entry screens function.**

## Load Tare



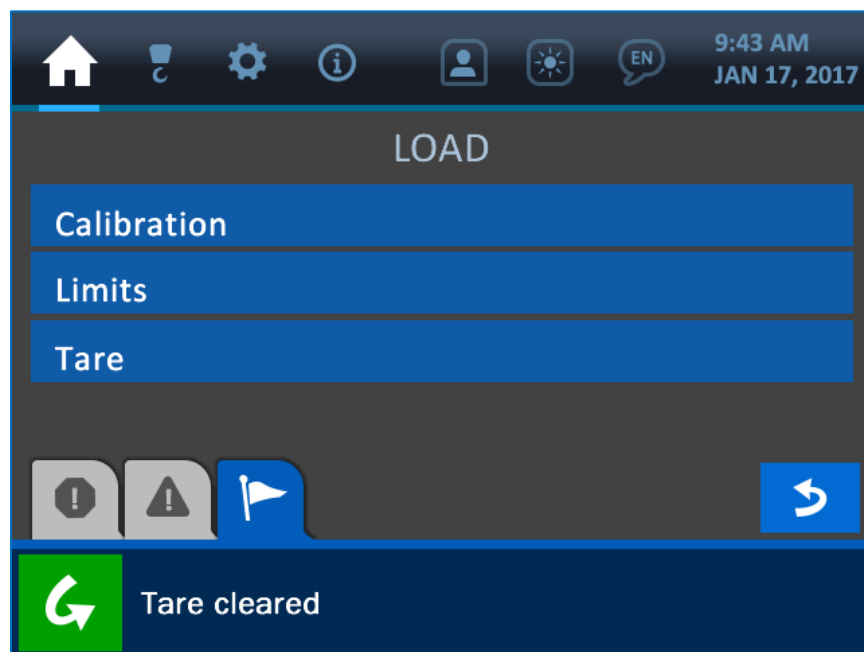
The Load Tare option enables an operator to set the current weight on the hook to zero. To do this, simply press the 'Tare' banner button on the Load Options Screen. For the example of this screenshot, the system shown is displaying in the Notification Bar (along the bottom of the screen) that the current load of 17,100 lb has been set to zero. This is further indicated by the following screenshot of the modified Home Screen – the current load shows 0 lb and the 'T' symbol shows that this zero load is the result of the Tare operation.





*Load Set to 0 by Tare Option*

To clear the tare set point, simply re-enter the Load Options screen, and press the Tare banner button again. The Notification Bar will indicate that the tare has been cleared, as shown in the screenshot below.



*Tare Option Cleared*

## 2.2. Angle Indication

Shown below is the Home Screen, with the Angle Indication area emphasised.



As illustrated above, the current boom angle is shown in degrees, to the resolution of 0.1°. Pressing anywhere directly overtop the angle indication section of the screen will open the Angle Options Screen, where angle calibration and limits options are available.

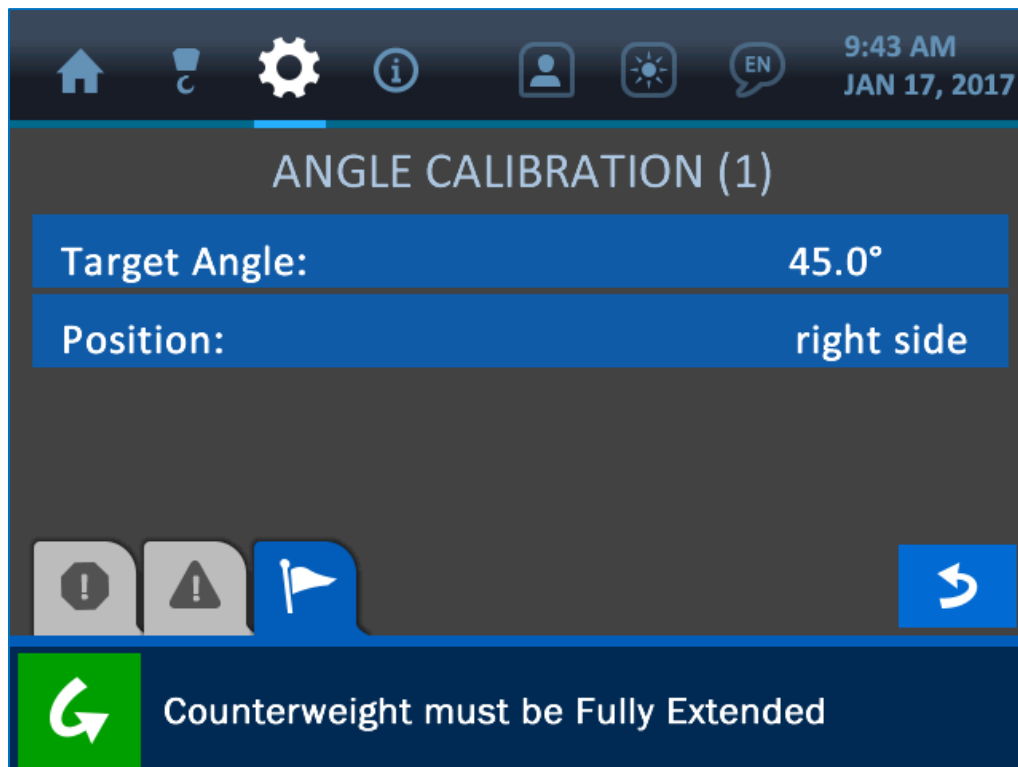


## Angle Calibration

The Angle Calibration Menu allows the operator to set a target angle and orientation for the angle transducer.

Concerning the Target Angle, set this value to what the system should be reading at a known boom angle. If the machine boom is currently at 0° but the system is displaying a different value, using the Target Angle Option will compensate for this discrepancy, by introducing an offset value in order to make the display more accurate.

**NOTE: The boom can be set to any angle, as long as that angle is known to be accurate by some other means (for example a level, applied to the boom horizontally or vertically). The resolution of the angle indicator is 1.0°.**



To change the target angle value, simply press the screen directly overtop the target angle option to enter the Value Entry Screen for this parameter.

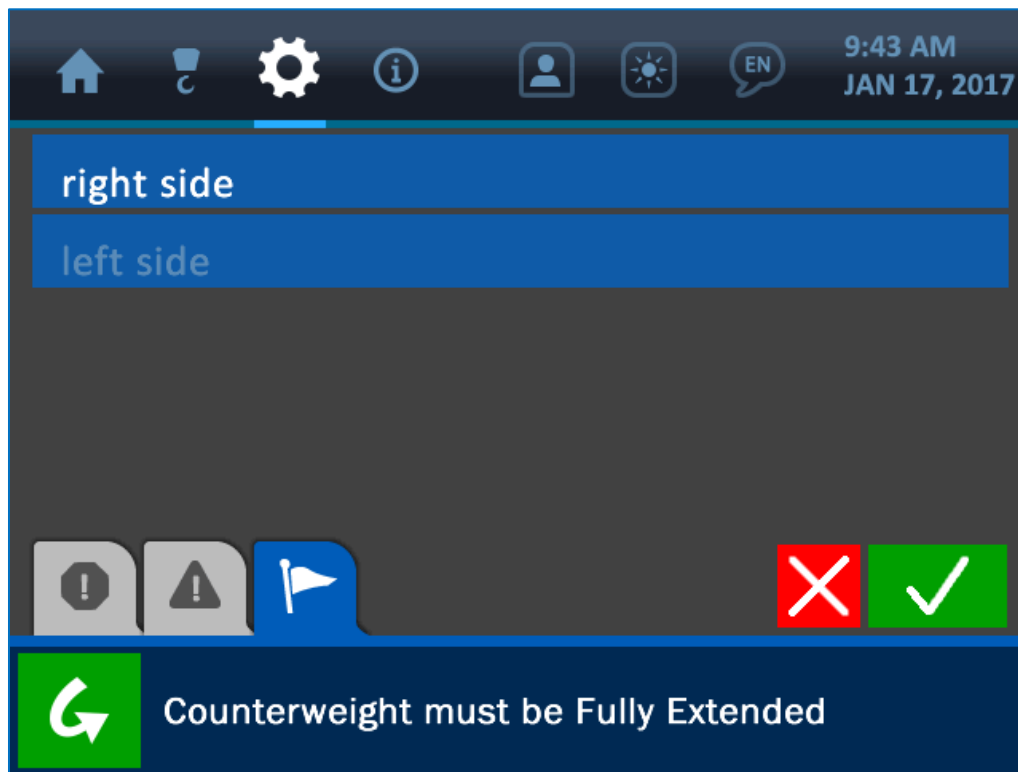


Once the Value Entry Screen is opened, use the keypad to enter the desired value for the parameter, and press the (green) Accept Button to save the change.

**NOTE: See section 1.3: The Value Entry Screen (page 7) for a detailed description of how the value entry screens function.**

The Position option simply ensures that the system displays the boom angle correctly by indicating which side of the boom the transducer is mounted on (in relation to the operator's viewpoint). As shown in the following screenshot, selecting this option will open a submenu, allowing the choice of either the left or right side of the boom.

Selecting either option for the orientation will automatically enter that selection into the system and return the user to the Angle Calibration Screen.



## Angle Limits

The Angle Limits Menu should initially show the default values for a Maximum of 180° and a Minimum of -180°. This simply ensures that the angle transducer is given its full potential range to operate in, though these values can be changed at any time to accommodate special circumstances of operation.



To change either of these values, simply press the screen directly overtop the desired limit value to open the Value Entry Screen, as shown below.



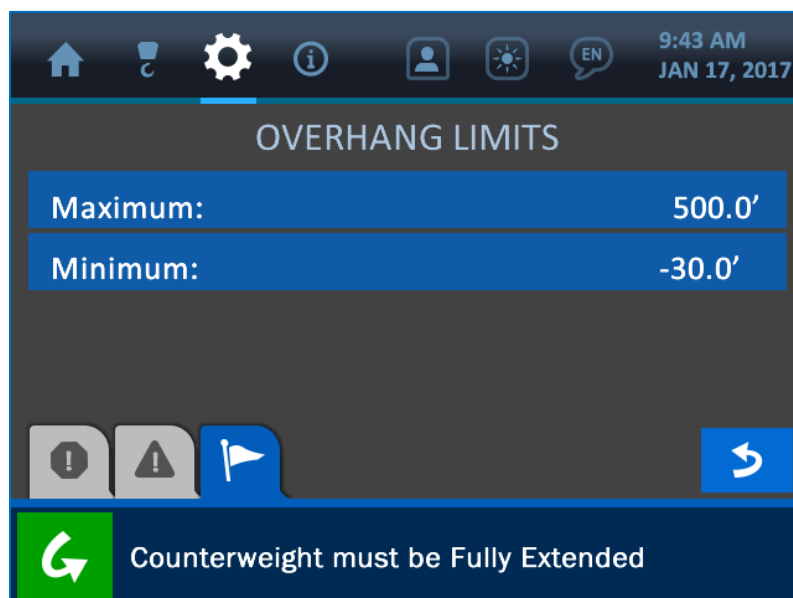
Once the Value Entry Screen is opened, use the keypad to enter the desired value for the parameter, and press the (green) Accept Button to save the change. **NOTE: See section 1.3: The Value Entry Screen (page 7) for a detailed description of how the value entry screens function.**

## 2.3. Overhang Indication

Shown below is the Home Screen, with the Overhang Indication area emphasised.



As illustrated above, the current overhang is shown in feet, to the resolution of 0.1 feet. Pressing anywhere directly overtop the overhang indication section of the screen will open the Overhang Limits Screen, as shown below.



The Overhang Limits are defined as a Maximum and Minimum value, according to the particular machine the system is installed on. These limits define how far the tip of the boom can extend from the machine base, and are factory-set but can be changed in the field as necessary by pressing the screen overtop either limit. This will open the Value Entry Screen, as shown below.



Once the Value Entry Screen is opened, use the keypad to enter the desired value for the parameter, and press the (green) Accept Button to save the change.

***NOTE: See section 1.3: The Value Entry Screen (page 7) for a detailed description of how the value entry screens function.***



## 2.4. Tip Height Indication

Shown below is the Home Screen, with the Tip Height Indication area emphasised.



As illustrated above, the current tip height is shown in feet, to the resolution of 0.1 feet. Pressing anywhere directly overtop the tip height indication section of the screen will open the Tip Height Limits Screen, as shown below.



The Tip Height Limits are defined as a Maximum and Minimum value, according to the particular machine the system is installed on, and define the range of height for the boom tip, from the ground. These values are factory-set but can be changed in the field as necessary, by pressing the screen overtop either limit. This will open the Value Entry Screen, as shown below.



Once the Value Entry Screen is opened, use the keypad to enter the desired value for the parameter, and press the (green) Accept Button to save the change.

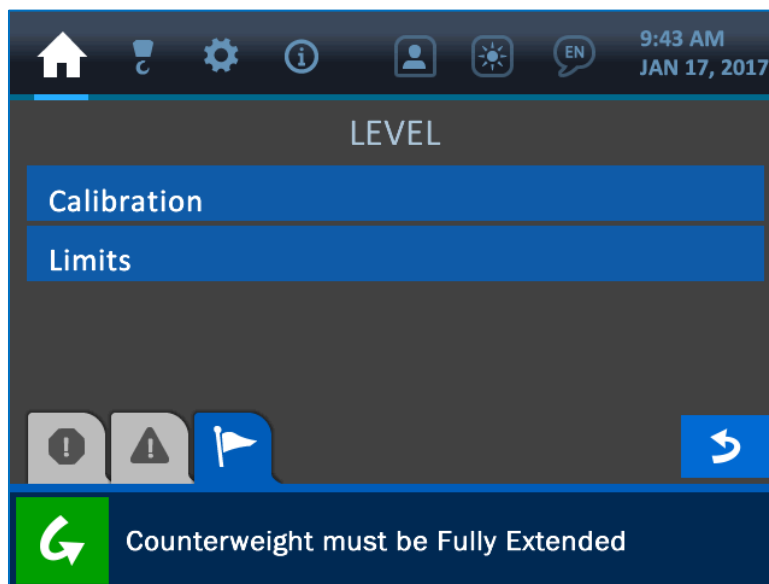
**NOTE: See section 1.3: The Value Entry Screen (page 7) for a detailed description of how the value entry screens function.**

## 2.5. Level Indication

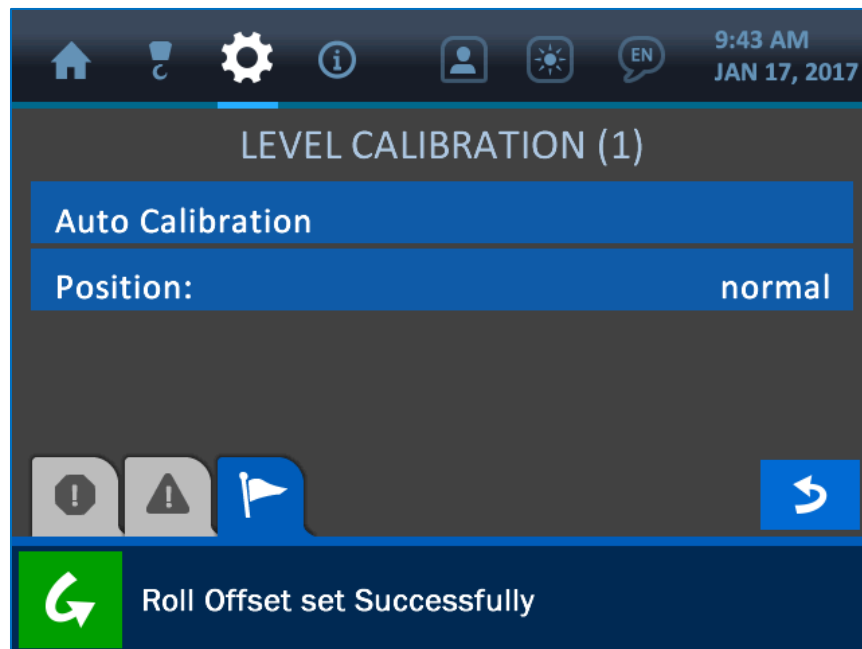
Shown below is the Home Screen, with the Level Indication (Pitch and Roll) area emphasised.



As illustrated above, the current machine pitch and roll values are shown in degrees, to the resolution of 0.1°. Pressing anywhere directly overtop either parameter will open the Level Options Screen, as shown below.



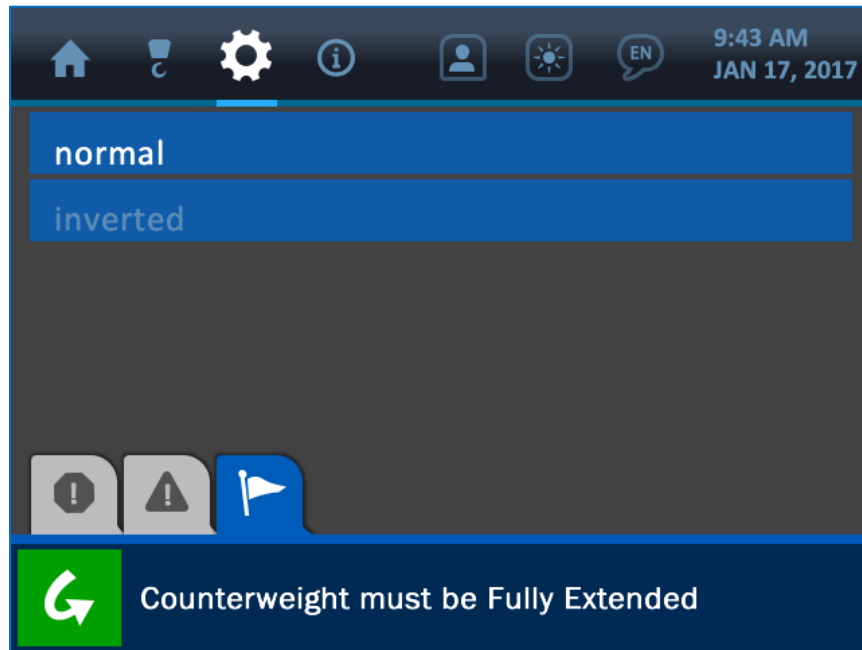
## Level Calibration



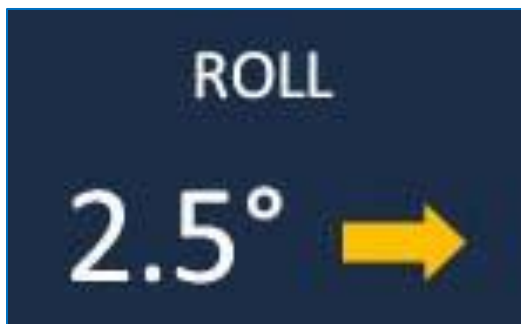
The first option listed in the Level Calibration Menu is 'Auto Calibration'. To use the automatic calibration method, position the machine so it is level (within 0.5°) and press the Auto Calibration Button. If calibration is successful, the message: 'Roll Offset set Successfully' will be displayed in the Notification Bar at the bottom of the screen, and the values for Pitch and Roll should display as 0.0° on the Home Screen. If calibration has failed, or if the level transducer has been disabled, the message: 'Level Transducer is Disabled' will be shown instead to indicate the problem.

***NOTE: If at any point, the machine is positioned more than 5.0° out of level (either pitch or roll) the system will enter an alarm state, and the load indication will only show the weight on the line alone, without accounting for angle limits.***

The 'Position' button on the Level Calibration Menu offers the option to either *normalize* or *invert* the roll orientation.



For example, if the *normal* option is selected, a machine roll to the right side of  $2.5^\circ$  (relative to the operator's viewpoint) would display as a roll value of  $2.5^\circ$  and an arrow pointing to the right. The *inverted* option would show the arrow pointing left, to indicate how much and in which direction the machine should move in order to re-establish a level position.



*'Normal' orientation of Roll parameter, showing a roll to the right side of  $2.5^\circ$*



*'Inverted' orientation of Roll parameter, showing a roll to the right side of  $2.5^\circ$*

## Level Limits



The Level Limits are defined as a Maximum and Minimum values for machine pitch and roll, according to the particular machine the system is installed on. These values are factory-set but can be changed in the field as necessary, by pressing the screen overtop any limit. This will open the Value Entry Screen, as shown below.

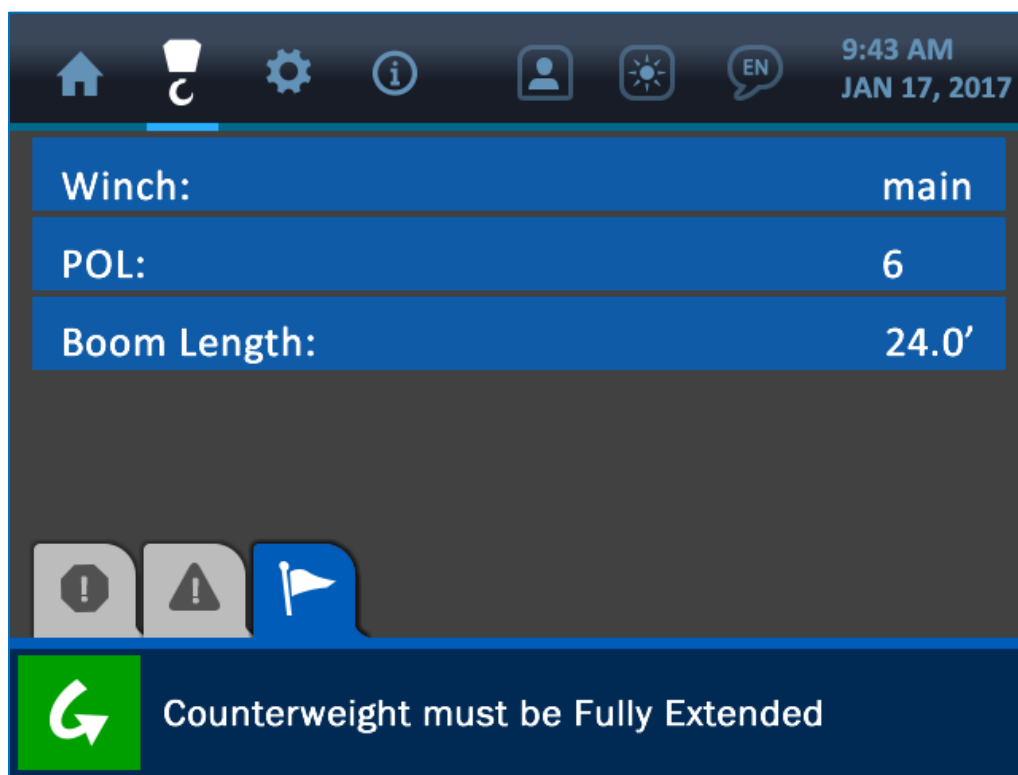


Once the Value Entry Screen is opened, use the keypad to enter the desired value for the parameter, and press the (green) Accept Button to save the change.

**NOTE: See section 1.3: The Value Entry Screen (page 7) for a detailed description of how the value entry screens function.**

### 3. The Configuration Menu

The Configuration Menu is symbolized by the boom hook icon at the top of the display, and can be accessed by pressing the screen directly overtop this icon. This menu shows the major parameters that vary with each pipelayer and are crucial to ensuring that the system's logic, displays and calculations will be accurate. This section describes these major parameters: Winch, POL (parts of line), and Boom Length.



**NOTE:** Typically, the winch and POL values are factory-set and cannot be changed without the assistance of a Cranesmart Service Technician. The Boom Length can be changed as needed, though this operation requires a supervisor permission code (see section 6.1: Entering the Permission Code - page 43, for an explanation of how to gain restricted system access).

### 3.1. Winch

The winch parameter indicates that the system is using the 'main' winch line. This parameter is factory-set and cannot be changed.

### 3.2. POL (Parts of Line)

The POL (Parts of Line) parameter is also factory-set, and cannot be changed by the user. This factor may vary with the pipelayer machine type.

### 3.3. Boom Length

The Boom Length parameter can only be changed once a supervisor permission code is entered (see section 6.1: *Entering the Permission Code* for an explanation of how to gain restricted system access). Once entered, this menu shows a list of available boom lengths to choose from. Press the button of the desired boom length, then press the (green) Accept Button to save the change and return to the Configuration Menu.





## 4. The Settings Menu

The Settings Menu is symbolized by the gear icon at the top of the display, and can be accessed by pressing the screen directly overtop this icon. This menu offers many important options to the operator for how the system functions and displays information. The Settings Menu Screen is shown below, and explanations of its various components follow.



### 4.1. Limits

The Limits Menu presents all the various parameters that can be adjusted to define what the machine's safe zones of operation are. As listed and shown on the following screenshot, these limit categories are: Load, Angle, Overhang, Tip Height and Level. Each of these limits is described in its respective section of this manual.



See the following sections for descriptions of each of the available limits, as listed below:

Load Limits – page 12

Angle Limits – page 19

Overhang Limits – page 21

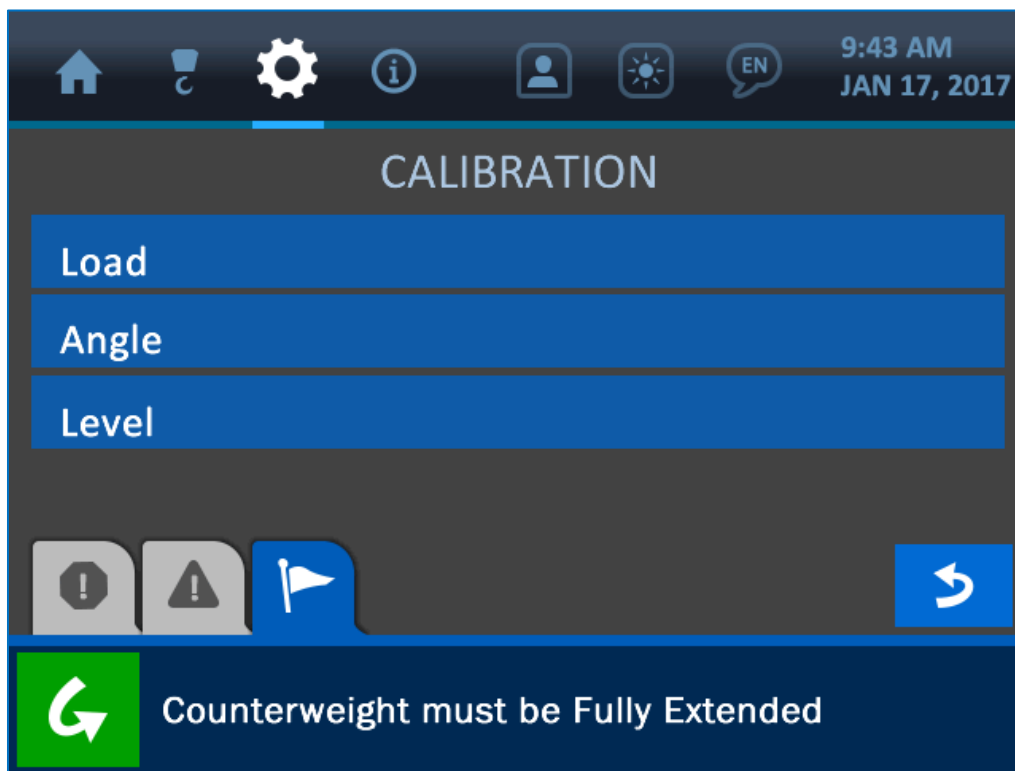
Tip Height Limits – page 23

Level Limits – page 28

**NOTE:** Many menus of the system can be navigated to in several different ways. See **Section 10.10: System Screen Flowchart (page 65)** for a screen map of the entire system.

## 4.2. Calibration

The Calibration Menu lists the system indicators that require proper adjustment for accurate operation. As listed and shown on the following screenshot, these indicators are: Load, Angle and Level. Each of these calibrations is described in its respective section of this manual.



See the following sections for descriptions of each of the system calibrations, as listed below:

Load Calibration – page 11

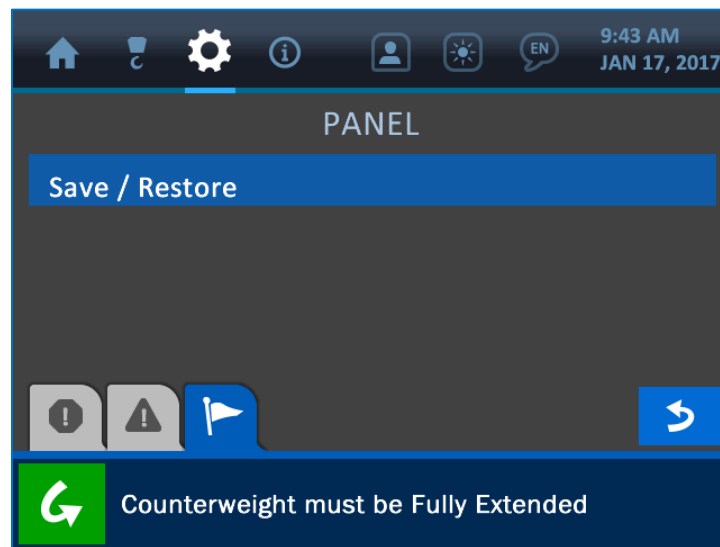
Angle Calibration – page 17

Level Calibration – page 26

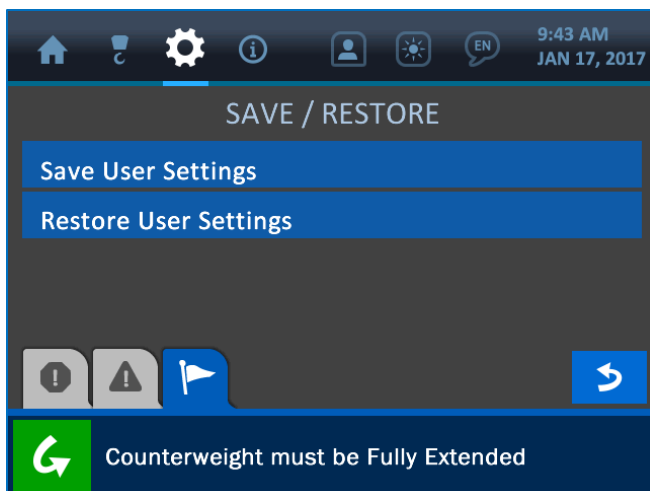
**NOTE: Many menus of the system can be navigated to in several different ways. See section 10.10: System Screen Flowchart (page 65) for a screen map of the entire system.**

### 4.3. Panel

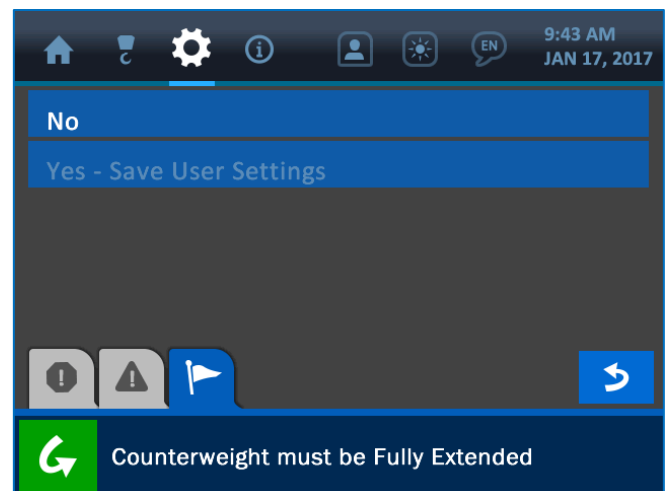
The Panel Menu offers the option to save all the current panel settings in the system, or restore the panel to a previous configuration.



Pressing the Save/Restore Button will open the Save/Restore Menu, where the operator can choose to save the current system settings, or restore previous ones. Pressing either button will prompt a confirmation screen to ensure the right selection has been made.



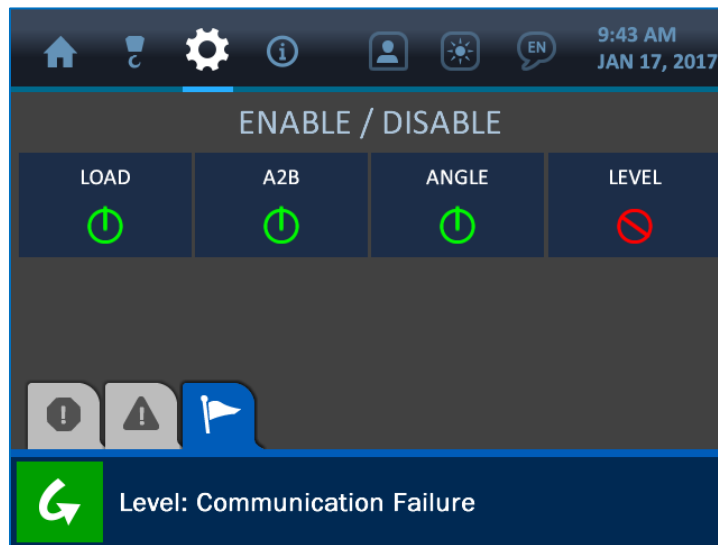
Select save current settings or restore previous ones



User is prompted to confirm the selection

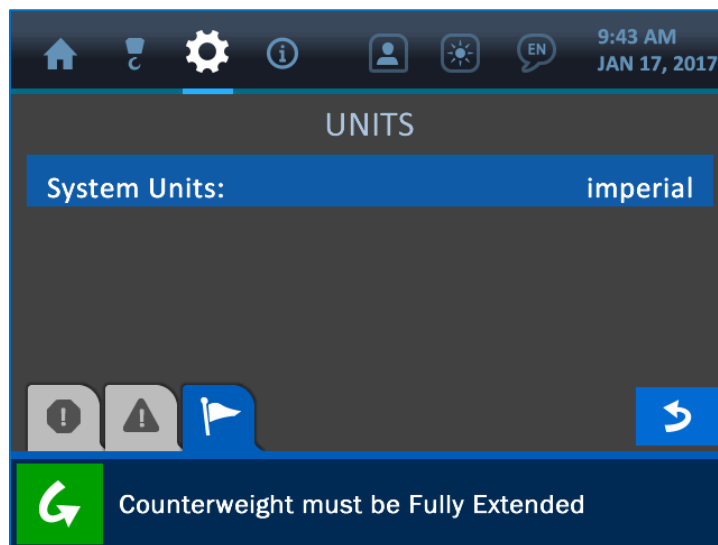
## 4.4. Enable/Disable

The Enable/Disable Screen offers the option to activate or deactivate the transducers of the system. Pressing the screen directly overtop any transducer shown here will toggle that unit's activation state, and indicate it with either a green 'Enabled' icon or a red 'Disabled' one.



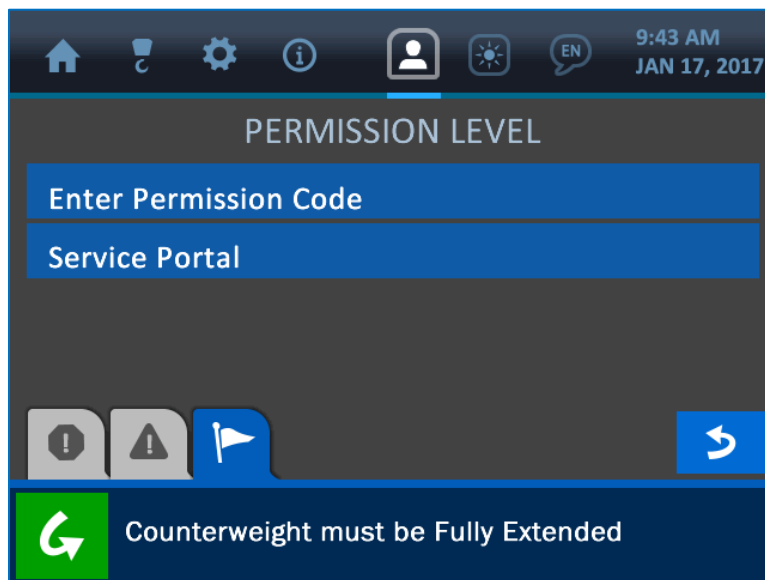
## 4.5. Units

From the Units Screen, the operator can change the system's units of display to either imperial or metric, as shown in the screenshot below.

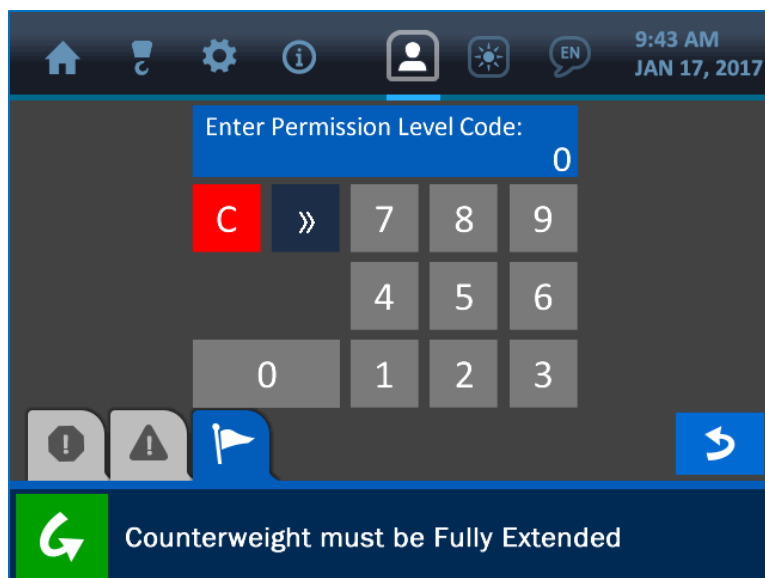


## 4.6. Permission Level

This menu offers options for accessing areas of the system that are meant to be controlled by a supervisor and restricted to the operator. Each system is programmed with a default permission code which can be customized as required. The Service Portal option shown here is reserved for the use by Cranesmart Service technicians.

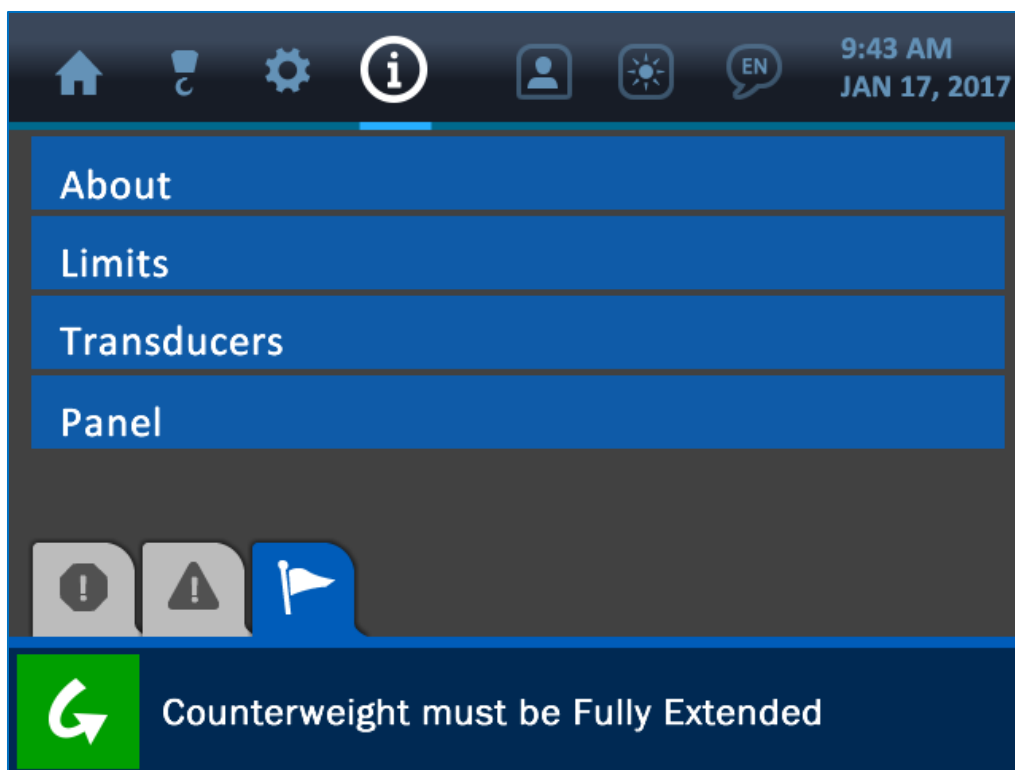


**NOTE:** See section 6: *The Permission Menu (page 42)* for a description of this part of the system.



## 5. The Information Menu

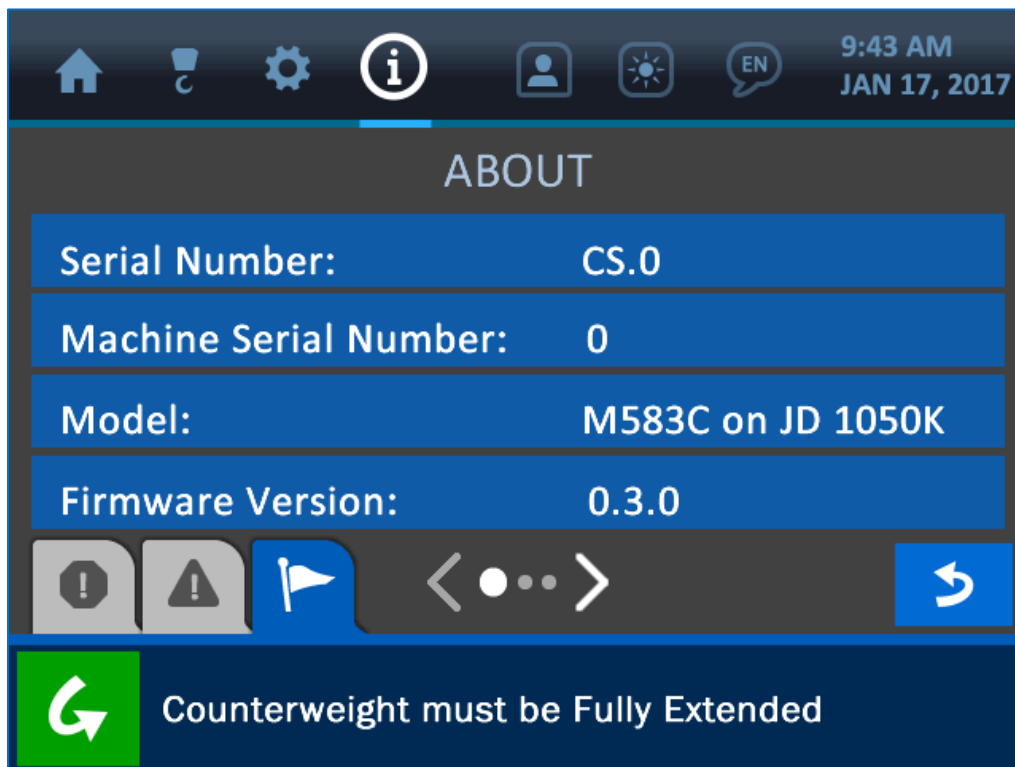
The Information Menu is symbolized by the encircled 'i' icon at the top of the display, and can be accessed by pressing the screen directly overtop this icon. This menu offers options for displaying important information about the system such as: serial number, machine number, firmware version, system limits, transducer communication status and much more. The Information Menu Screen is shown below, and explanations of its various components follow.



**NOTE: The displays in the Information Menu are for display purposes only. Other menus must be accessed to edit the settings and information found here.**

## 5.1. About

The About option shows information related to the initial setup of the system. The system serial number, machine serial number, machine model, firmware version, and compiler timestamp can all be found in this menu.



**NOTE:** Press the Page Indicator button (depicted by white arrows) at the bottom, center of the display to reveal a second page of options.

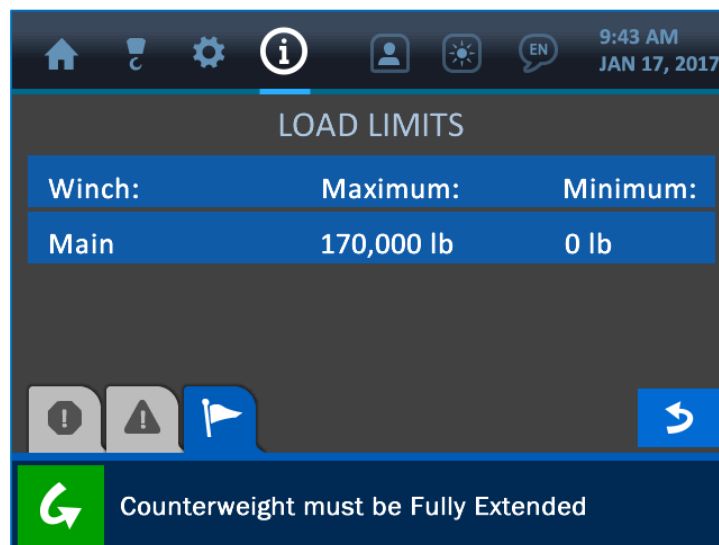


## 5.2. Limits

The Limits option offers displays of the set limits for all the major components, which are: load, angle, level and overhang/tip height.



Press the screen overtop any of the options to reveal the set limits of that parameter.



*Load Limits on display via the Information Menu*

### 5.3. Transducers

The Transducers option shows information related to the communication and signal strength between the display panel and the sensing components. Shown below is the Transducers Screen, with a description of its various components.



As illustrated, each block in the display represents a transducer. The component is named at the top-center, and the signal information is shown across the bottom.

**Packet Count:** This number increments with each packet received by the display panel from this transducer.

**Enable/Disable:** This icon indicates whether the component is active (green) or inactive (red)

**Battery:** This icon indicates the current strength of the component's battery. Full strength shows all green bars, while failing strength shows red bars.

**Signal Strength:** This icon indicates the strength of the component's communication signal. Full strength shows all green bars, while failing strength shows red bars.

## 5.4. Panel

The Panel option shows information related to the display panel's relay function, relay mode, and power settings, as shown in the screenshot below. The relay function is used (optionally) to limit or disable the machine in the case of an alarm. See section 6.2: *Supervisor Access Screens* (page 44) for more information on configuring the panel's relay function.

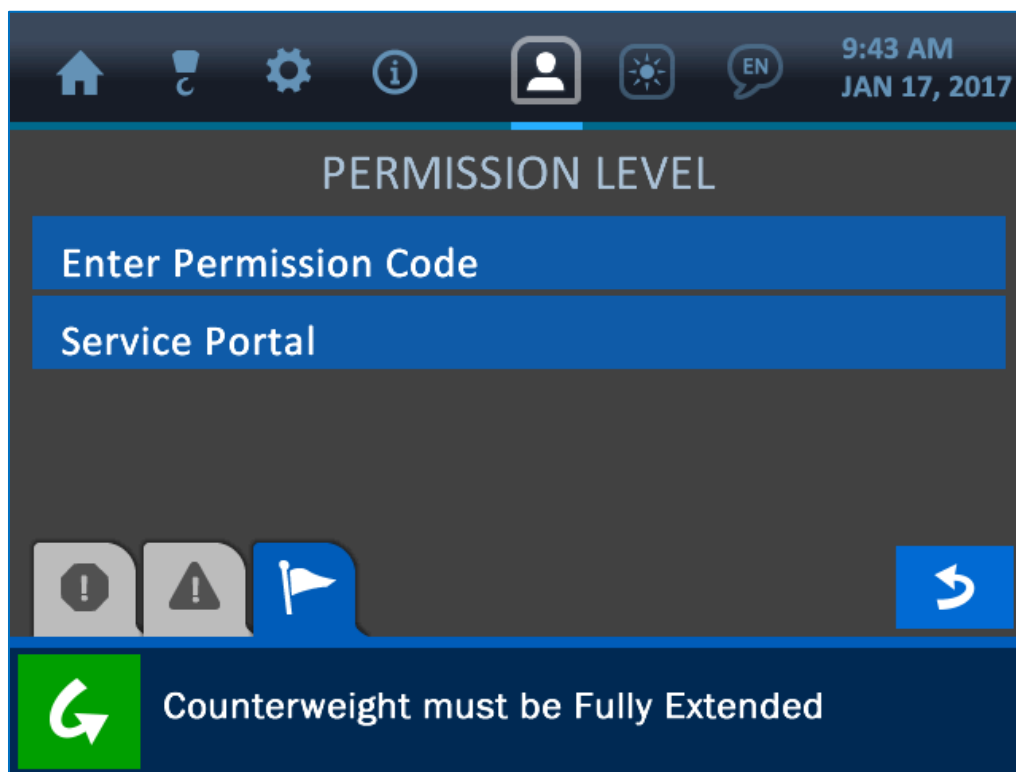
The screenshot shows the 'Panel Information' screen. At the top, there is a navigation bar with icons for Home, Help, Settings, Information (selected), User, Sun, and EN. The time and date are 9:43 AM and JAN 17, 2017. Below the navigation bar, the title 'PANEL INFORMATION' is displayed. The main content area shows four rows of information:

Relay Status:	OK
Relay Mode:	normally cold
Panel Voltage:	24.2 V
Backup Battery Voltage:	3.6 V

Below the information rows, there are four icons: a stop sign, a warning sign, a flag, and a refresh button. At the bottom, a green button with a left arrow is followed by the text 'Counterweight must be Fully Extended'.

## 6. The Permission Menu

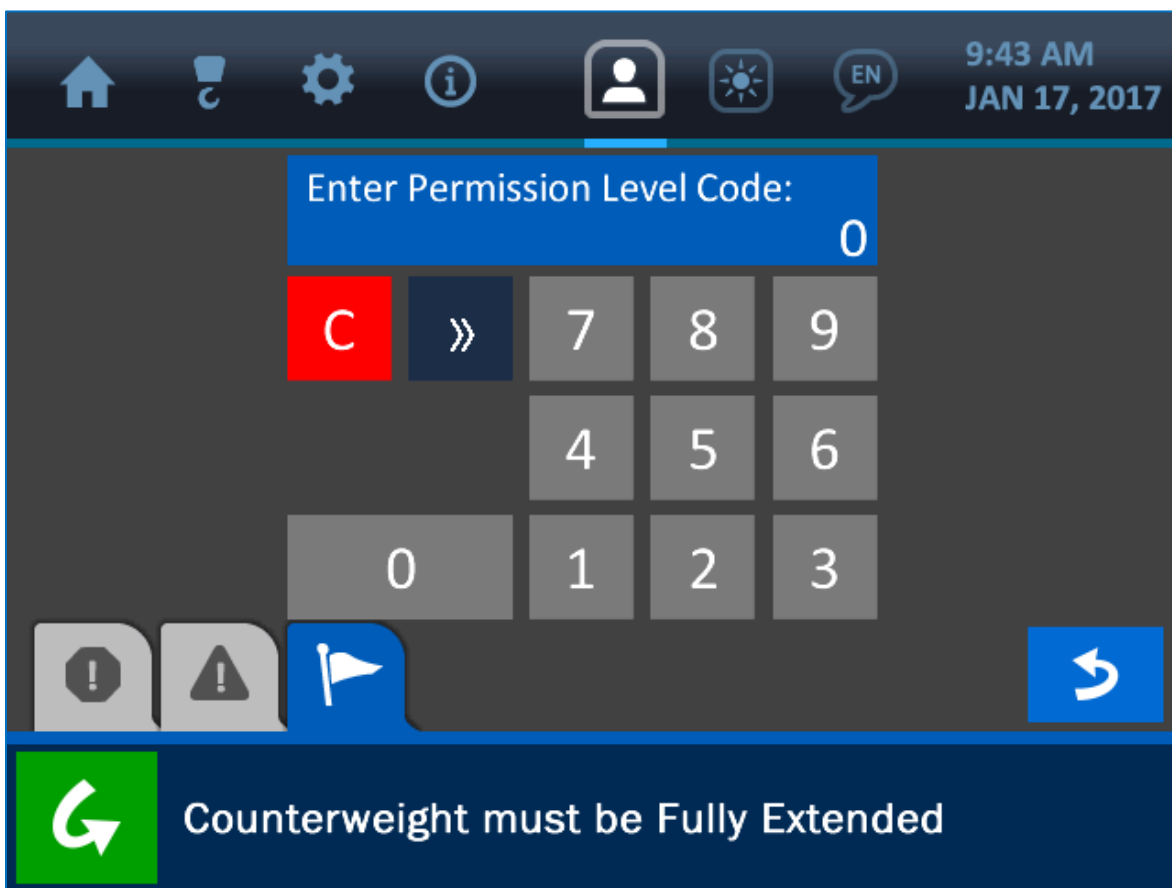
The Permission Menu is symbolized by the figure icon at the top of the display, and can be accessed by pressing the screen directly overtop this icon. This menu is used to enter restricted areas of the system. A *permission code* entered on the Permission Code Screen opens restricted areas to supervisors for safety control, and a *service code* via the Service Portal Screen is used for technical maintenance and adjustment. Codes are customized to each system and set in the factory, but can be changed at any time as necessary.



**NOTE:** Once a permission code is entered into the system, new options become available in many of the system's menus. The Supervisor Access Mode will be active until the user navigates back to the Home Screen, at which time normal access resumes. (See section 6.2: Supervisor Access Screens –page 44, for a description of the supervisor options).

## 6.1. Entering the Permission Level Code

To gain supervisor access to the system, press the 'Enter Permission Code' Button from the Permission Menu (symbolized by the figure icon at the top of the display). Then, enter the code via the keypad and press the (green) Accept Button to save the change to the system. To cancel this operation, simply press the (red) Cancel Button to return to the previous screen.



**NOTE:** See section 1.3: *The Value Entry Screen (page 7)* for a detailed description of how the value entry screens function.

## 6.2. Supervisor Access Screens

Once the supervisor access level is gained (by entering the correct Permission Code) the following listed screens are made available. As noted earlier, these screens will no longer be available once the user cancels the Supervisor Access Mode by re-entering the Home Screen.

### Settings Menu:

- **Locks:** The Locks Screen offers options for restricting operators from accessing various parts of the system.



## Settings / Panel Menu:

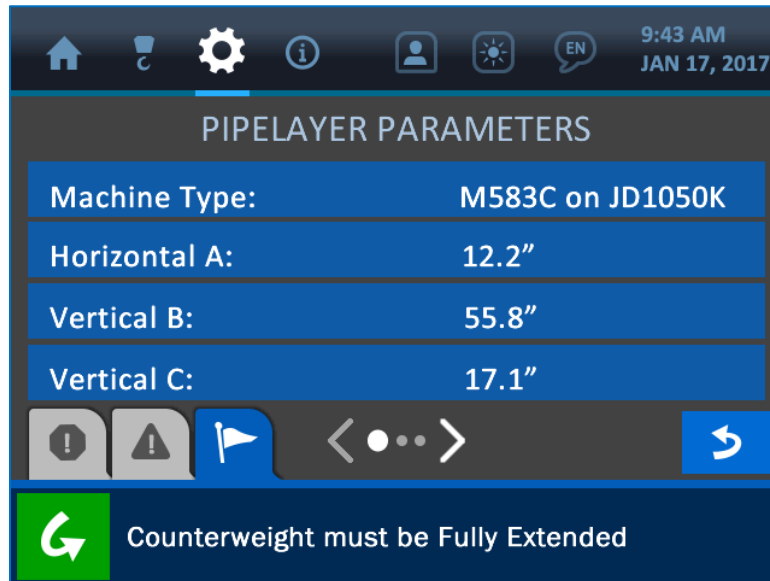
- **Relay:** The Relay Screen offers options for adjusting how the relay function (shutoff option) operates, including whether the shut off is normally hot or cold, and which components it will effect. For example, the panel can be configured to interrupt the winch up function to prevent the operator from damaging the pipelayer. Overload, A2B, Angle and Level can also be used to shut down the pipelayer in unsafe conditions.



- **Radio:** The Radio Screen is used to set the transducer IDs and frequency, to ensure they can properly communicate with the display panel.

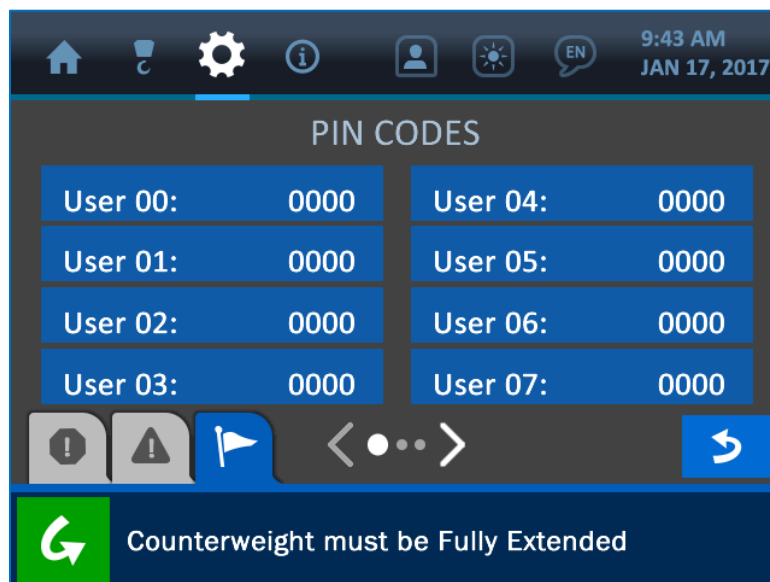


- **Parameters:** The Parameters Screen is used to set the machine properties and various dimensions so that the logic calculations are correct and able to display accurately. These values are pre-set in the factory, but can be changed as necessary.



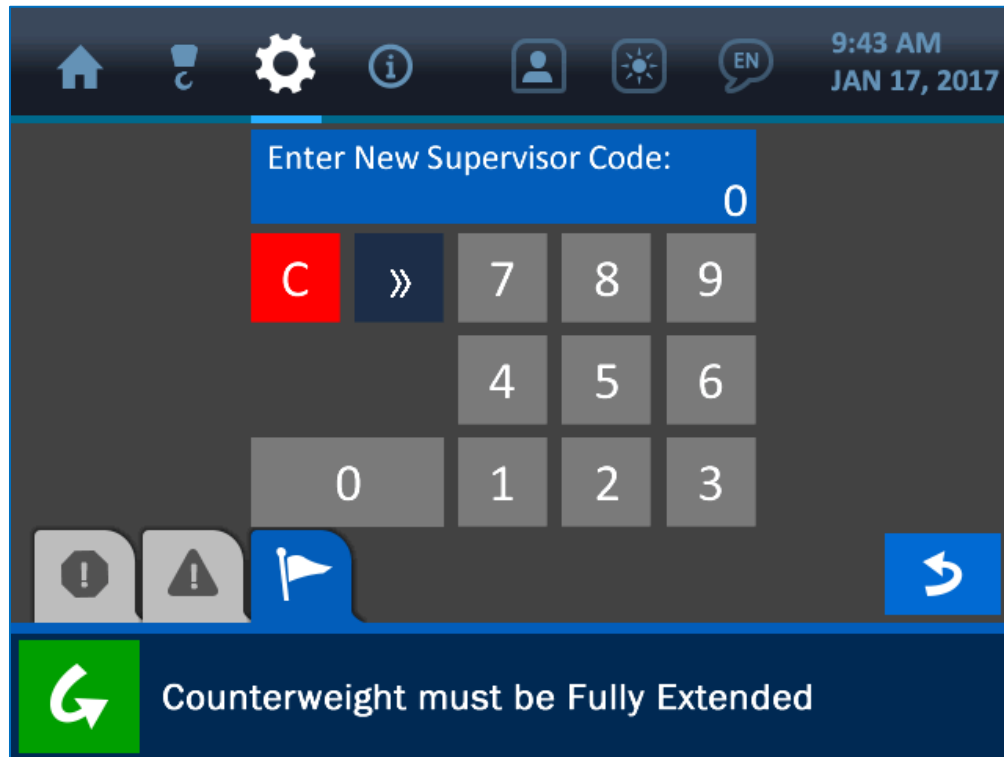
### Settings / Permission Menu:

- **Setup PIN Code:** This screen is used to set optional user access codes, in order to customize the system to each operator's preferences.





- **Change Supervisor Code:** Customize or change the supervisor code with this screen.



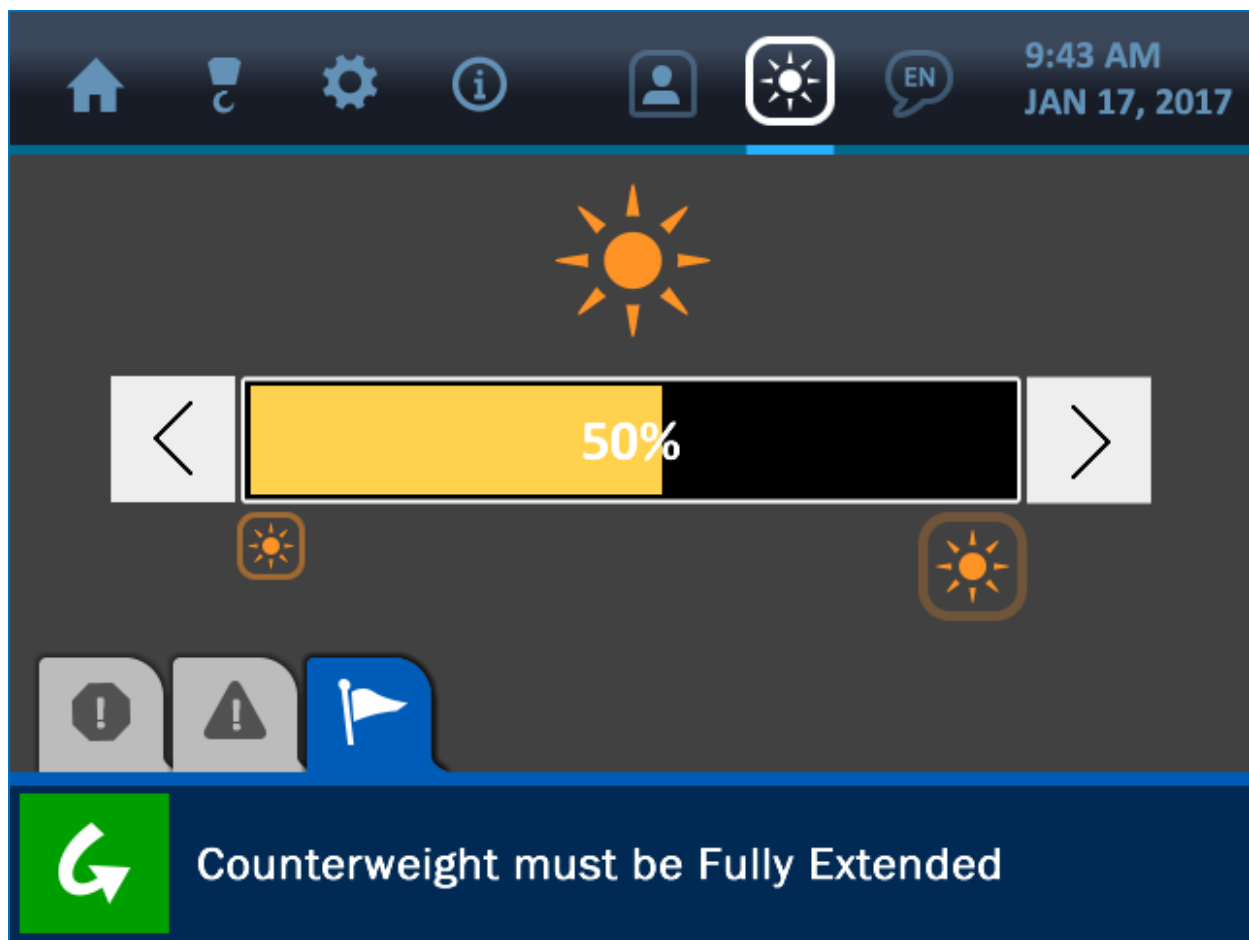
### Permission Menu:

- **Setup PIN Code** (see the description of this screen on the previous page).
- **Change Supervisor Code** (see the description of this screen above).

**NOTE:** See section 10.10: System Screen Flowchart (page 65) for a map that illustrates how all of all the system's main menus are connected.

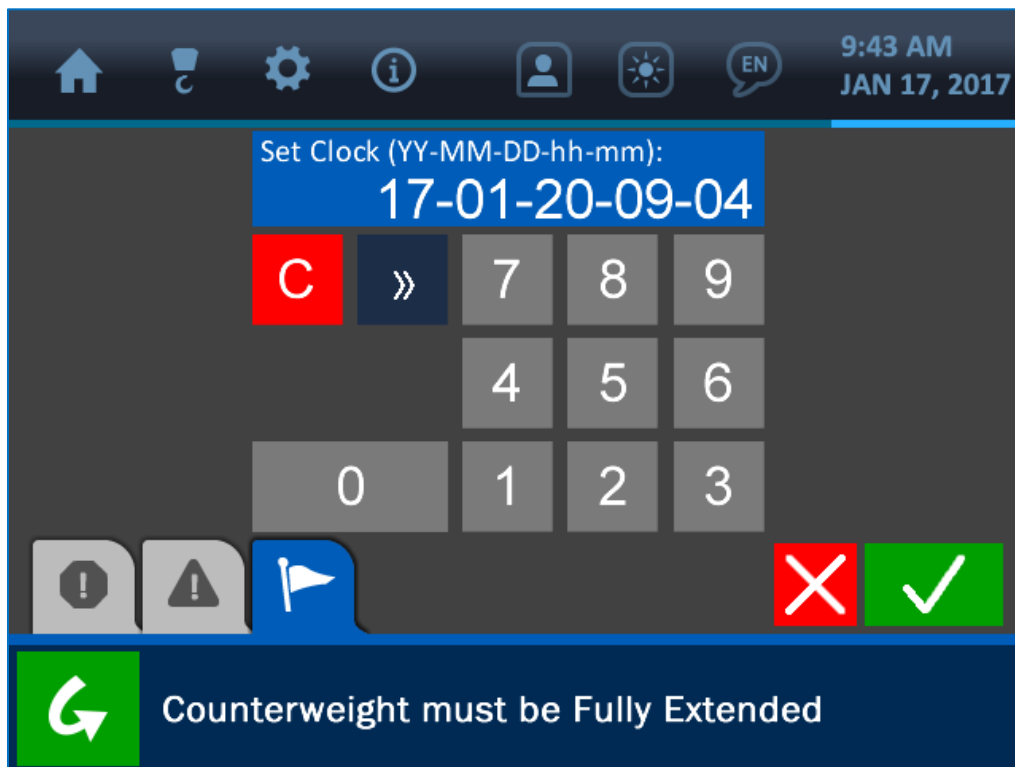
## 7. The LCD Brightness Screen

The LCD Brightness Screen is symbolized by the 'sun' icon at the top of the display, and can be accessed by pressing the screen directly overtop this icon. Use this option to adjust the screen's brightness for optimal display. Press directly overtop the percentage bar in the center of the screen, or press the arrow keys on either side of the percentage bar for finer adjustment.



## 8. The Time and Date Screen

Setting the correct time and date for the system is important for the accuracy of data logs, in case certain job information must be recalled or a machine needs to be serviced. The clock is backed up by a separate battery contained within the panel, eliminating the need to set this parameter each time the panel is powered off. The Time and Date Screen is shown and described below.



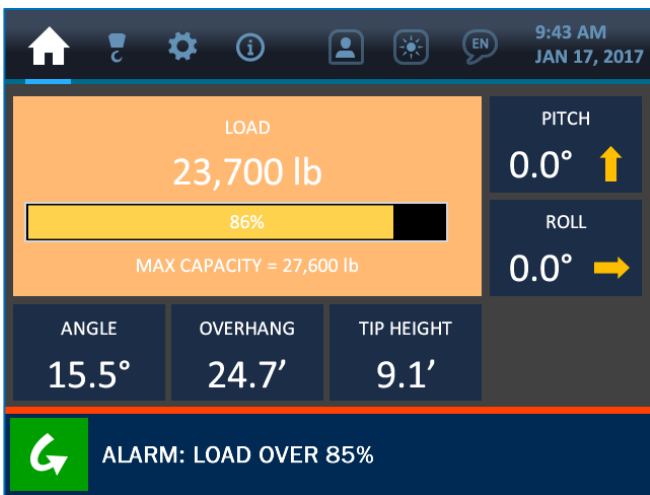
To change the date and time currently displayed, clear the display by pressing the (red) Clear Button. Enter the proper value via the keypad, according to this format: year – month – day – hour - minute. Once the display is correct, press the (green) Accept Button to save the change and return to the previous screen. **NOTE: See section 1.3: The Value Entry Screen (page 7) for a detailed description of how the value entry screens function.**

## 9. Troubleshooting

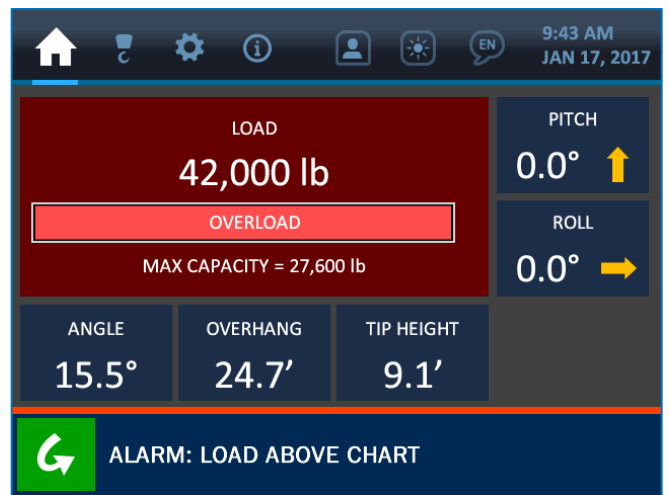
The Cranesmart Pipelayer System performs self-checks for system errors, exceeded limits and any equipment malfunctions. This section illustrates and briefly describes some examples of this.

### 9.1. Alarm and Warning Screens

The system will notify the operator of any unsafe condition via the built-in audible and visual alarms. A loud beep will sound from the display panel speaker, and an associate screen will show what error or unsafe condition has arisen. The alarms may be bypassed using the Bypass Button, located in the lower left corner of the display, which will silence the speaker for 30 seconds. However, the alarm state will persist until the error causing the alarm is corrected.



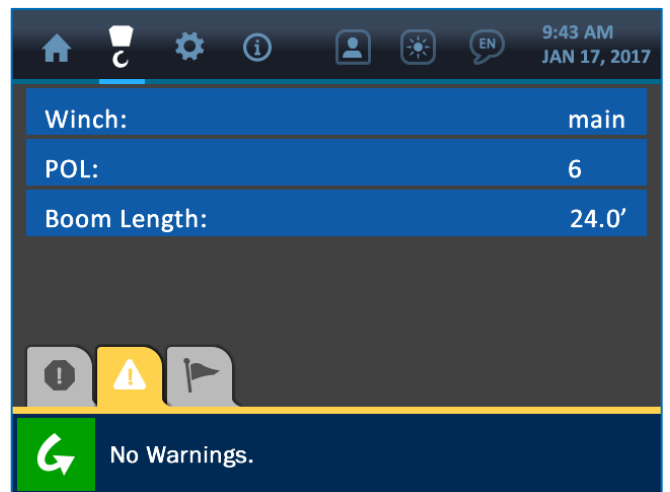
Load Warning Screen



Load Alarm Screen



Showing Component Communication Error



System showing no current alarms or warnings

**NOTE: Alarms will normally sound while the system components are being installed, and until there is a clear line of sight between the transducers and display panel. If alarms still sound after the components are properly installed, check the Transducer Stats Screen via the Information Menu (page 40) to ensure a clear signal is being received from all components. If an alarm still persists, please contact the Cranesmart Service Department at: (780) 437-2986.**

## 9.2. Replacing a Transducer Battery

Before replacing the batteries, call the Cranesmart Systems Service Department at (780) 437-2986, with the system serial number ready. The serial number can be found on the display panel or any transducer. Once it has been verified that a faulty battery is causing the error, follow the steps below.

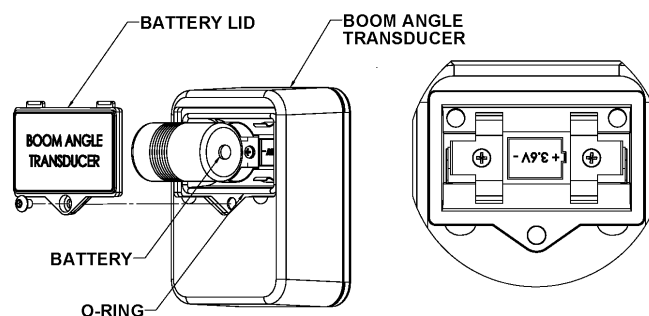
### Tools and Equipment needed for battery replacement:

- One Battery Replacement Kit (obtain a free battery replacement kit from Cranesmart Systems).
- The kit contains:
  - One 3.6 volt Lithium Ion D-cell Battery
  - One 1/8th Allen key
- Alternatively, a 3.6V lithium battery may be purchased from a battery supplier.

**NOTE: If it is humid, raining or snowing – DO NOT OPEN THE TRANSMITTER. Remove the transmitter and perform the battery replacement indoor or undercover.**

### To Replace the Battery:

1. Remove the cap screw from the battery compartment lid and remove the lid.
2. Remove the battery from the holder.
3. Insert the new battery according to the battery picture on the base of the battery clip.
4. Secure the lid.



## 10. Appendix

### 10.1. Load Pin Installation

#### Free rotation

Ensure that when the load pin is installed, it is able to rotate freely through a full 360°, without binding at all. This is an important factor in the accuracy of the load sensing, as unexpected forces on the pin can register as loads on the line.

#### Protection and care for the load pin

The transducer box is attached directly to the load pin, so care must be taken to ensure that there will be **no direct impacts** made on this end of the pin (during installation **do not hit the pin** to force it into alignment). If the blue transmitter case located on the load pin is in danger of receiving damage during normal operations, please call the Cranesmart Service Department at (780) 437-2986 for assistance.

#### Load pin radio

The Cranesmart System works by receiving radio signals from the load pin transducer box and displaying the readings on the display panel. It is important to keep a clear line-of-sight between the panel and the load pin transducer box.

## To Install the Load Pin:

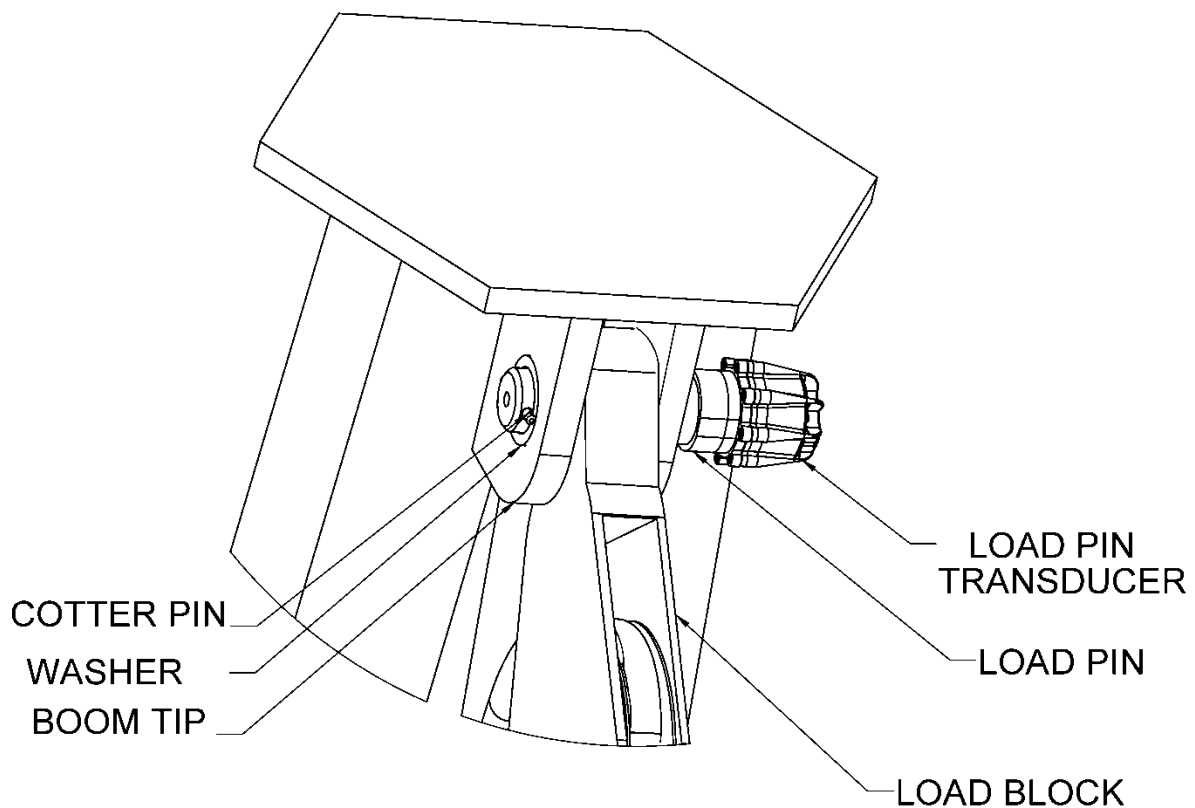
1. **Remove the existing pin**

2. **Install the Cranesmart System load pin**

The transducer box contains sensitive electronics. Do not use a hammer or any other object to strike the load pin into position during the installation procedure.

3. **Secure the load pin**

Secure the load pin by installing the cotter pin through the hole in the end of the pin. Use washers to secure the pin and keep it from moving from side to side as this would affect calibration.



4. **Check for free rotation of the load pin**

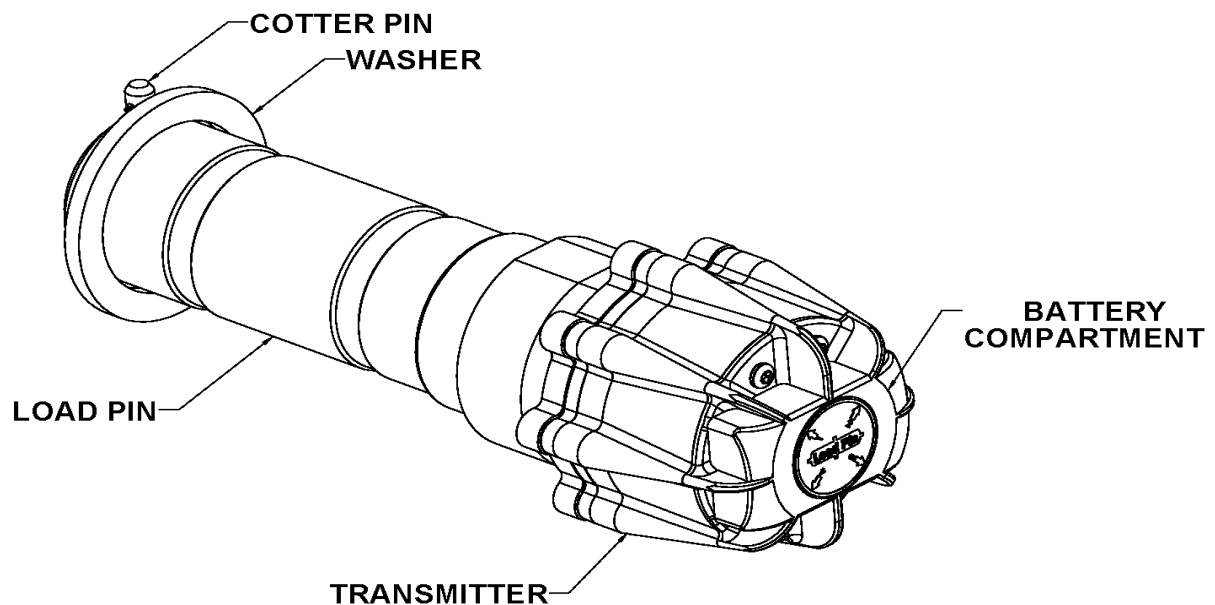
Once the pin is installed properly, check that it can move freely by rotating it 360°.

5. **Check for good signal strength on the display panel**

See section 5.3: *Transducers* (page 40) for instructions on using the Information Menu to check component signal strengths.

6. **Verify the load pin calibration**

Load pins are factory calibrated, but due to small differences in pipelayer boom ends, the calibration of each machine may require slight adjustment. Verify the calibration of the load pin by lifting a certified weight. If it is necessary to refine the load pin's calibration, refer to section 2.1: *Load Indication* (page 9).

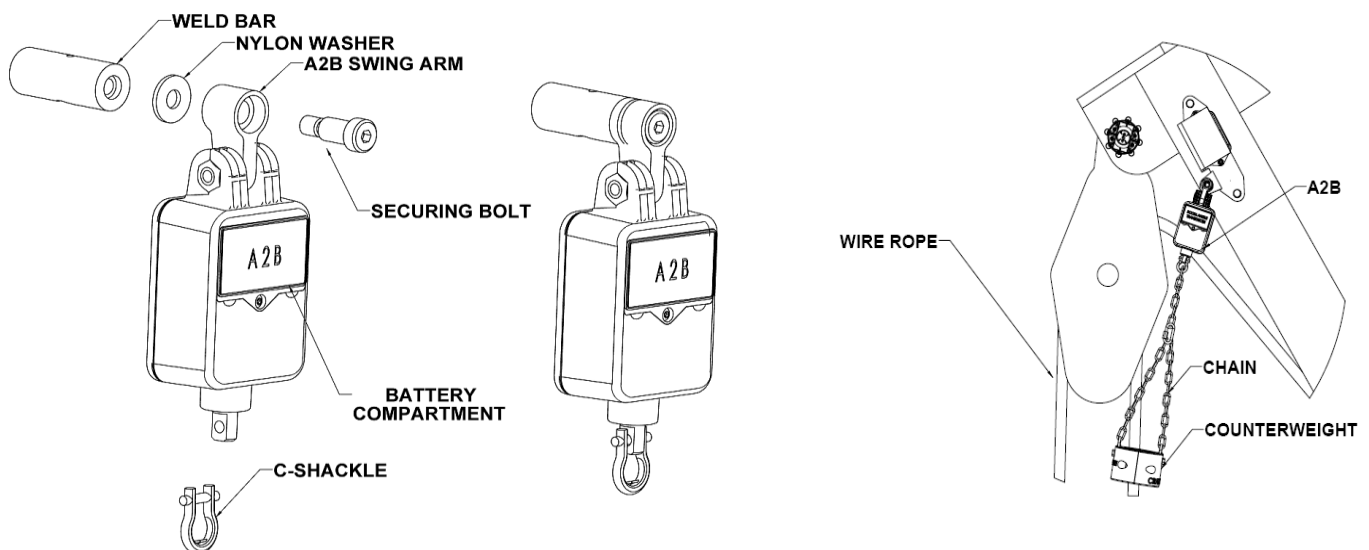




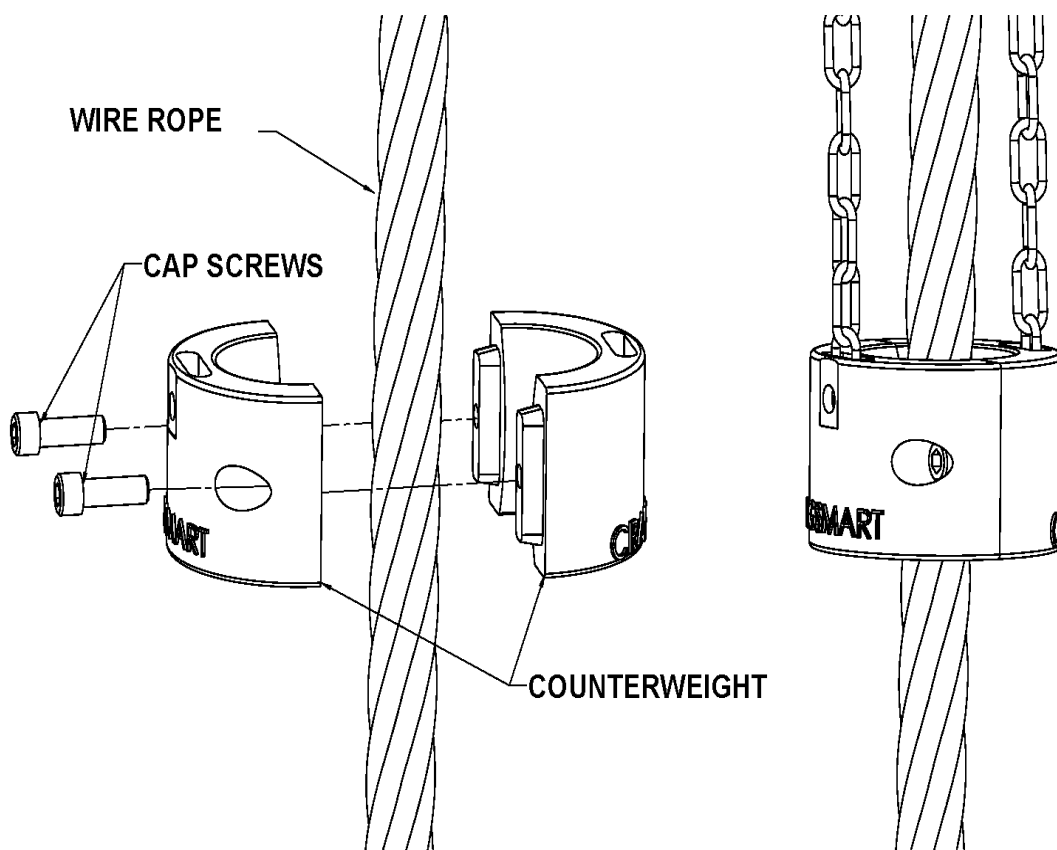
## 10.2. Anti-2-Block Installation (Optional)

The A2B transducer is designed to swivel and pivot so that it is always in an upright vertical position, in line with the wire rope – regardless of boom angle.

1. Weld the weld bar to the pipelayer. Ensure that the switch is mounted directly to the slowest moving line. The weld bar can be welded directly to the pipelayer or to an existing weld plate. (Both sides of the weld bar are identical).
2. Ensure that the mounted A2B transducer has a direct line-of-sight to the display panel and install the large securing bolt into the A2B swing arm.
3. Attach the A2B transducer to the weld bar. (Install the nylon washer between the bar and the swing arm).



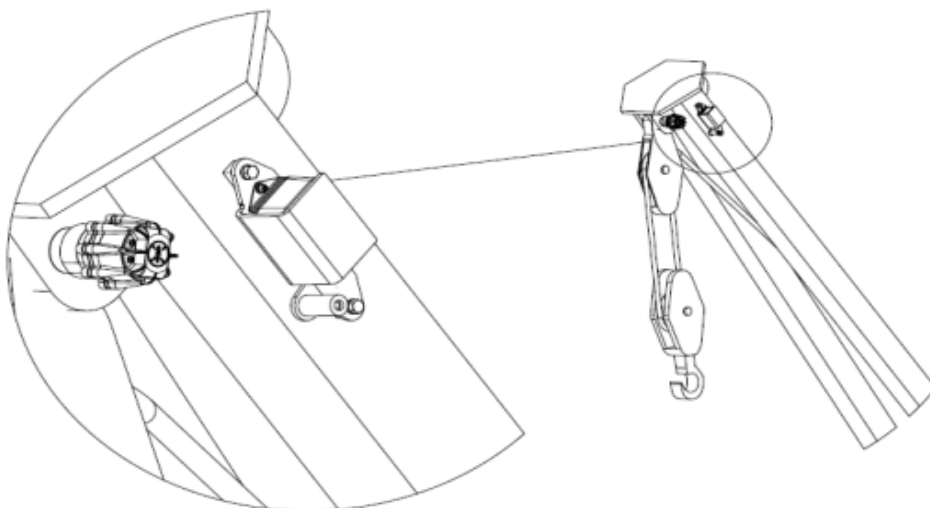
4. Attach the counterweight chain to the bottom of the A2B transmitter using the C-shackle supplied.
5. Assemble the counterweight around the slowest moving line, using the bolts provided.



### 10.3. Boom Angle Transducer Installation

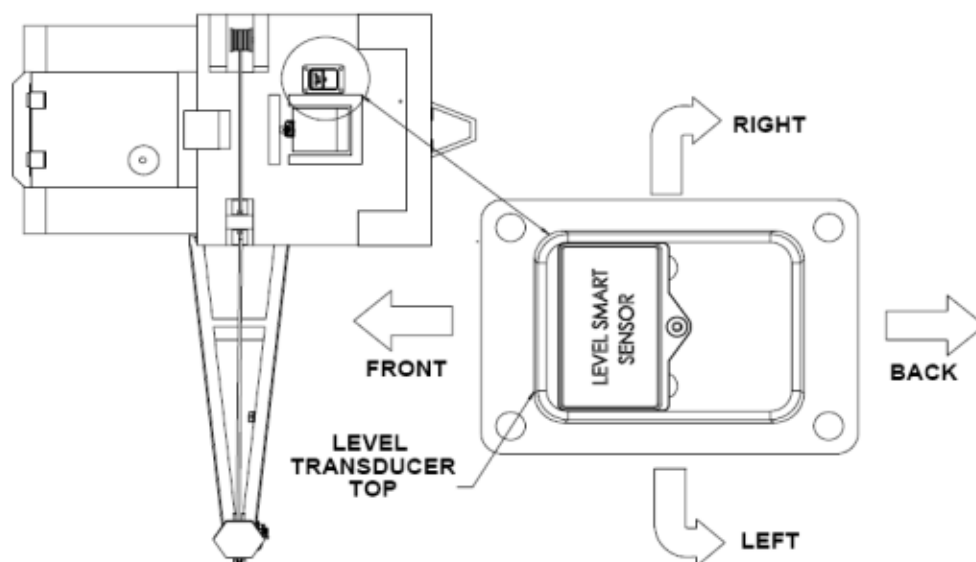
The boom angle transducer must maintain line-of-sight with the display panel in all boom positions. The transducer should be mounted on the side of the boom, preferably on the left as shown in the diagram below. The transducer cannot be installed on the top or bottom of the boom. Do not weld the transducer mounting plate permanently before testing, in case adjustments are required. Weld the weld bar to the pipelayer, and ensure that the switch is mounted directly to the slowest moving line. The weld bar can be welded directly to the pipelayer or to an existing weld plate. (Both sides of the weld bar are identical).

1. Remove the weld plate from the angle transducer
2. Align and mark the installation position. Use the illustration on the transducer label to position the transducer parallel (level) with the boom line.
3. Tack weld the weld plate before testing the system
4. Mount the transducer to the weld plate
5. Calibrate the boom angle transducer (see section 2.2: *Angle Indication* on page 16).



## 10.4. Level Transducer Installation

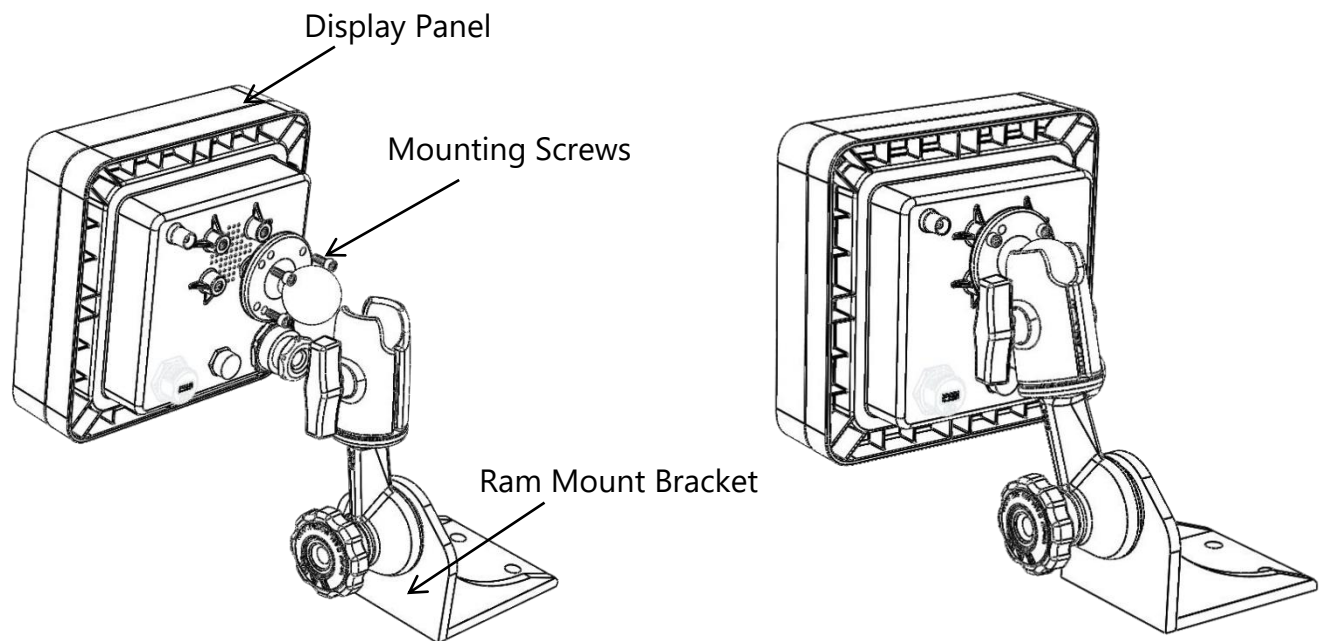
1. The level transducer should have a line-of-sight to the display panel.
2. The level transducer must be mounted with the label facing up. Make sure that the level transducer is not mounted in a position where it may suffer impact damage. Possible mounting locations are on top of the operator's cab or roll bar.
3. The level transducer should be made as level as possible but it is **not** critical that it be perfectly level. The unit will be calibrated after installation.
4. The correct mounting position of the level transducer is critical. The top of the level transducer must be aligned with the front of the pipelayer as shown in the diagram.
5. The pipelayer **must** be level during the calibration process.
6. **Do not** weld the weld plate with the level transducer attached.
7. Once the transducer is installed, see section 2.5: *Level Indication* (page 25) to calibrate the component.



## 10.5. Display Panel Installation

### Mounting the Display Panel

1. Mount the display panel to ensure the operator has an unobstructed view.
2. Align the ram mount bracket; mark and drill mounting holes using the mounting bracket as a guide.
3. Attach the bracket using the hardware provided.
4. Install the display panel to the bracket.



#### **NOTE:**

- ***The display panel can pivot horizontally or vertically by changing the position of the mounting bracket.***
- ***The panel should be mounted in the operator's field of view but not obstruct sight during a lift.***
- ***DO NOT PRESSURE WASH THE DISPLAY PANEL OR SUBMERGE IT IN WATER.***

## Wiring the Display Panel

Power to the display panel is supplied through the cable included in the kit, which plugs into the back of the panel. Refer to the wiring diagram on the following page.

1. Connect the red wire to a positive 12-24VDC (28VDC Max) terminal.
2. Connect the black wire to a good ground connection on the pipelayer.
3. *(Optional)*: Connect the white wire to an optional 'shut off' solenoid or to sound external horns. (Maximum output is 7.5 amps).

***NOTE: Ensure that a continuous 12-24VDC (28VDC max) is available to the panel at all times while the pipelayer is in operation. If the voltage drops below 10.5 VDC the panel will not function.***

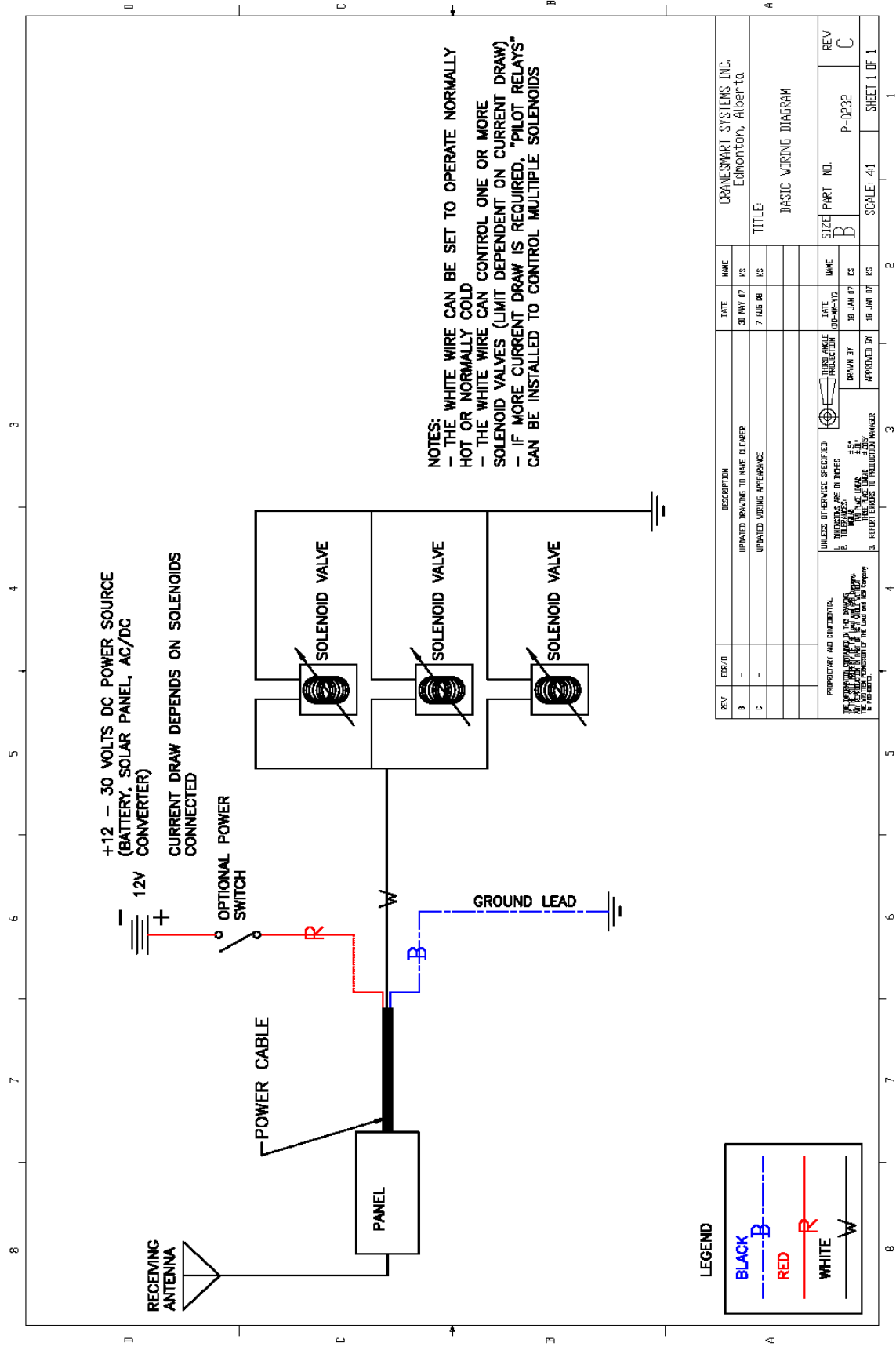
### 10.6. Alarm Shutoffs (White Wire)

The Pipelayer System is shipped with a three conductor wiring harness, which includes black, red, and white wires. The white wire may be used in conjunction with external alarm horns, lights, or shut-offs, if they are installed.

***NOTE:***

- ***When supplying power to the Cranesmart system (with 12 or 24 VDC) the white wire is normally hot (energized) with the supply voltage in a non-alarm condition. If the white wire will not be used for any of the above applications, please ensure that the exposed end of the wire remains sealed to prevent grounding and damage to the display panel.***

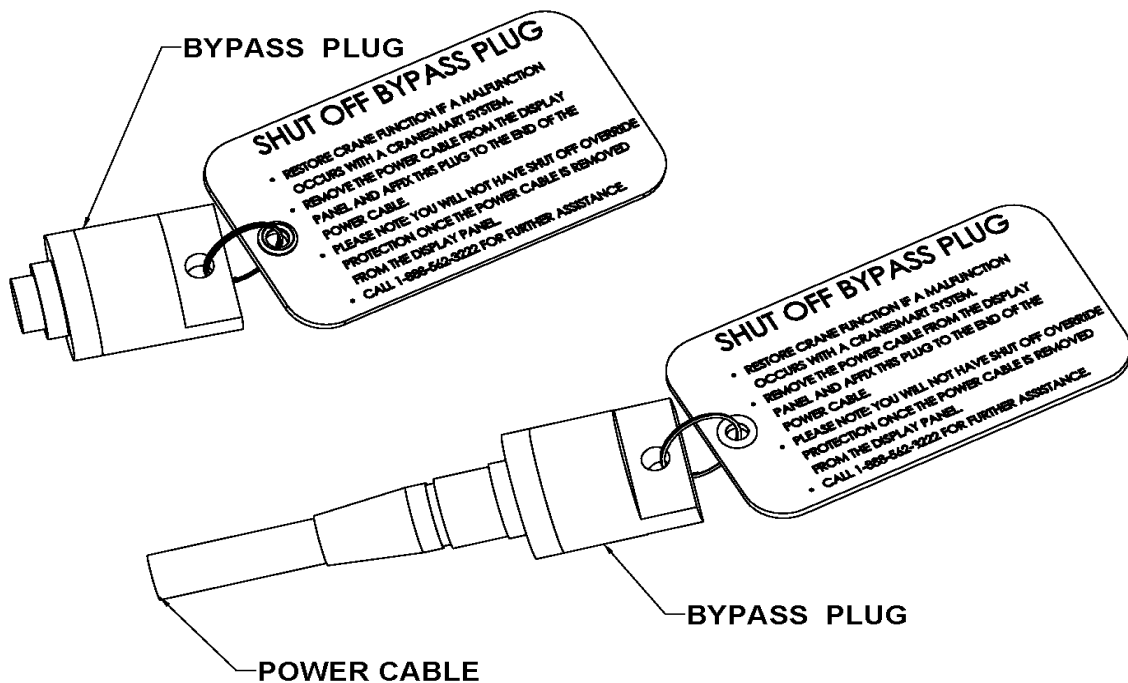
# 10.7. Display Panel Wiring Diagram



## 10.8. Shut-off Bypass Plug (optional – not included with visual / audible alarm only systems)

If the white output wire is used to trigger pipelayer 'shut-offs' and the Cranesmart System display panel is overcome by user damage or system malfunction, this wire can be by-passed using a by-pass plug included with the kit. When this plug is installed as follows, it will allow the function kick outs to be re-energized.

Remove the power cable from the back of the display panel by twisting the coupling ½ turn clockwise and pulling away from the panel. Insert the bypass plug into the end of the power cable (lower illustration) – not the panel – and turn the plug a half-turn clockwise. This will restore pipelayer functions; however, the Cranesmart System is no longer monitoring pipelayer functions at this point.





## 10.9. Initial System Setup

Once all the system components are installed and the display panel is mounted and wired, some settings within the display panel must be configured to ensure that the system is completely ready for operation. Use the following steps to complete the system setup:

1. The first step once installation is complete is to gain Supervisor Access to the system, by entering the Permission Level Code. (See section 6.1: *Entering the Permission Code* – page 43).
2. Once Supervisor Access Mode is active, the next step is to set the transducer IDs and frequencies.
  - a. First, enter the Radio Menu via this menu navigation: Settings>Panel>Radio
  - b. Enter the Radio Channel Menu and enter the proper system frequency
  - c. From the Radio Menu, enter the Set Transducer IDs Menu (shown below) and enter each component's ID number.





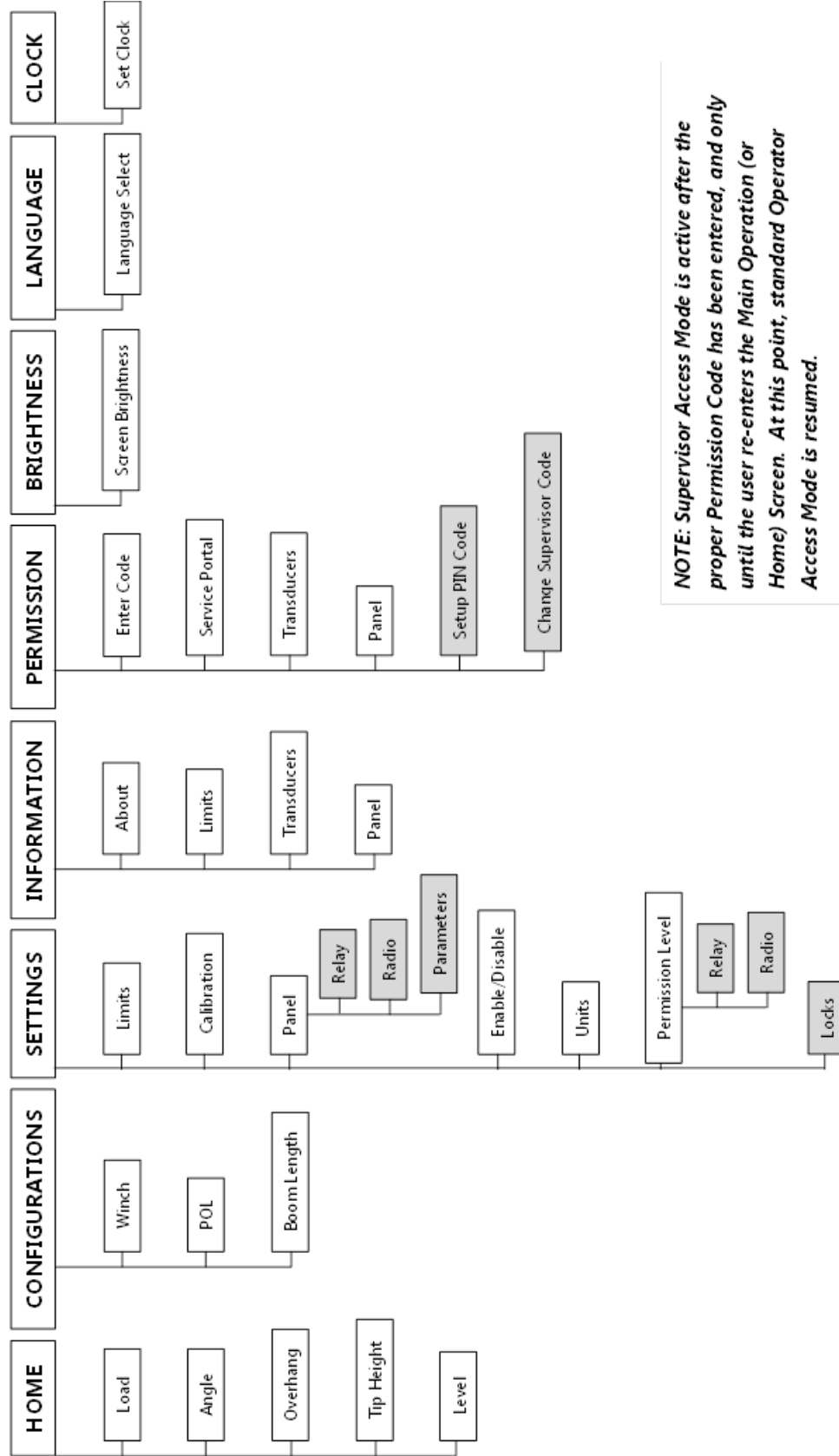
**NOTE:** See section 1.3: *The Value Entry Screen* (page 7) for a detailed description of how the value entry screens function.

3. Once the proper ID numbers are set, see section 5.3: *Transducers* (page 40) to ensure that the display panel is communicating effectively with each transducer in the system.
4. After ensuring that the system components are communicating successfully, the next step is to calibrate the system. Refer to the following sections of this manual to set the proper values for all components:
  - a. Load Calibration (see page 11)
  - b. Angle Calibration (see page 17)
  - c. Level Calibration (see page 26)

**At this point, the system is ready for normal operation. Please contact the Cranesmart Systems Service Department at (780) 437-2986 with any further questions or concerns.**

## 10.10. System Screen Flowchart

This illustration shows the basic layout of the system’s main menus and screens. The screens shaded in grey are the areas that are only available in Supervisor Access Mode, once the Permission Code has been entered. All other screens are available in standard Operator Access Mode.



**NOTE: Supervisor Access Mode is active after the proper Permission Code has been entered, and only until the user re-enters the Main Operation (or Home) Screen. At this point, standard Operator Access Mode is resumed.**