V**5** System **Universal**

User Manual

Updated: Aug 21, 2023

Cranesmart Systems

V5 System - User Manual

Updated: Aug 21, 2023

Contents

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/manufacturing facility in Edmonton, Alberta at (888) 562-3222 or (780) 437-2986 (Address: 4908 97 St NW, Edmonton, AB T6E 5S1).

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
- 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 30mA (battery).
- All Cranesmart devices are FCC compliant and are labeled clearly as such.
- All Cranesmart devices have an IP rating: 68, and an operable temperature range of: -40°C to 60°C (-40°F to 140°F).
  - ***WARNING:*** *OPENING THE DISPLAY PANEL VOIDS THE WARRANTY.*
  - ***WARNING:*** *NO COMPONENTS OF THE SYSTEM ARE TO BE SUBMERGED IN WATER.*
  - ***WARNING:*** *DO NOT PRESSURE-WASH CRANESMART COMPONENTS. DIRECT APPLICATION OF HIGH-PRESSURE WATER CAN BREAK SEALS AND LEAD TO MOISTURE DAMAGE.*
  - ***WARNING:*** *POTENTIAL ELECTROSTATIC CHARGING HAZARD: USE A DAMP CLOTH ONLY TO WIPE CLEAN THE EXTERIORS OF COMPONENTS.*

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

Important Safety Information

All of Cranesmart Systems' load cells and support hardware have been designed and tested to have a minimum 5 to 1 safety factor and to meet or exceed the guidelines, standards and certification requirements set forth by more than 30 legislative bodies worldwide including API, ABS, DNV, ASME an OSHA.

All Cranesmart load cells and support hardware are to be considered 'Critical Path' components. Loads imposed on these components should never exceed the maximum rated capacity shown on the load cell. The rated capacity applies only to uniform direct tension loading (straight-line pull). Off-axis loading, bending, side loading, two-blocking and shock loads should be avoided. Damages caused by such situations are not covered by the Cranesmart Systems warranty.

Inspection for damage, deterioration, cracks and corrosion on all load bearing components should be conducted pre-use, weekly, monthly, quarterly or annually, depending upon crane usage. Load bearing components showing damage, deterioration, cracks or corrosion should be removed from service. If the crane is two-blocked or side loaded, the load cell and links should be visually inspected immediately. Continued use of damaged components may result in catastrophic failure and personal injury.

Unless authorized by the factory in writing, modifications such as cutting, welding or permanently attaching other material to any load cell, pin, link or part thereof will void the warranty. Do not repair, alter, rework, or reshape any load bearing component by welding, heating, grinding or bending. Do not engrave or mark into the steel body of the load cell as this may affect the integrity of the load cell, this action will void the warranty, and may result in a costly replacement of the steel body.

Regular Inspections

We recommend that all load components regularly undergo routine visual inspection as noted above. We also recommend that a qualified inspector, using industry standard techniques such as Ultrasonic Testing and/or Dye Penetrate Testing, annually inspect the load components. These tests are to be preformed in conjunction with the inspection frequencies and guidelines as mandated by the applicable regulatory bodies.

NOTE: Do not disassemble the load cell by removing the plastic covers during testing. Disassembly will require the cell to be returned to the factory for calibration and testing.

If any issues arise, contact the Cranesmart Systems main office @ 780-437-2986 and ask for the service department. Please have the component serial number(s) readily available.

NOTE: The Cranesmart System is designed for and intended to be used as an operator safety aid for cranes, pipelayers and similar load lifting machinery. Operational parameters such as: load weight, boom angle, anti-2-block status, level indication, (and others) are monitored by the system and displayed clearly for the operator in order to make working conditions safer, and operations more accurate and efficient. This manual has been written in the effort to explain the most pertinent details of this system and its use.

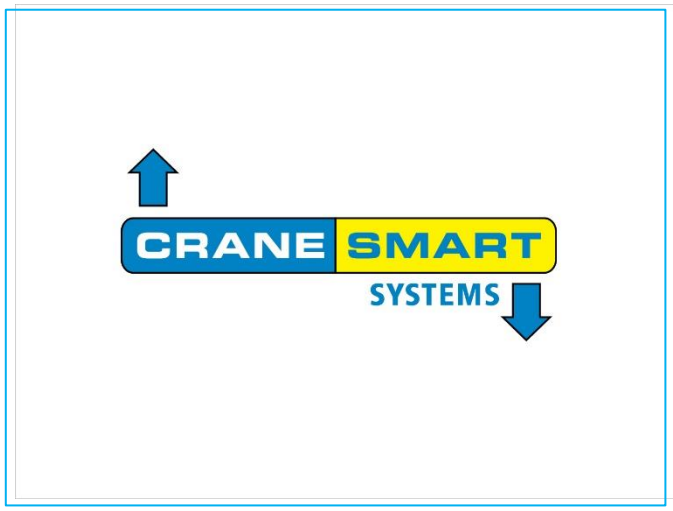
1. The User Interface

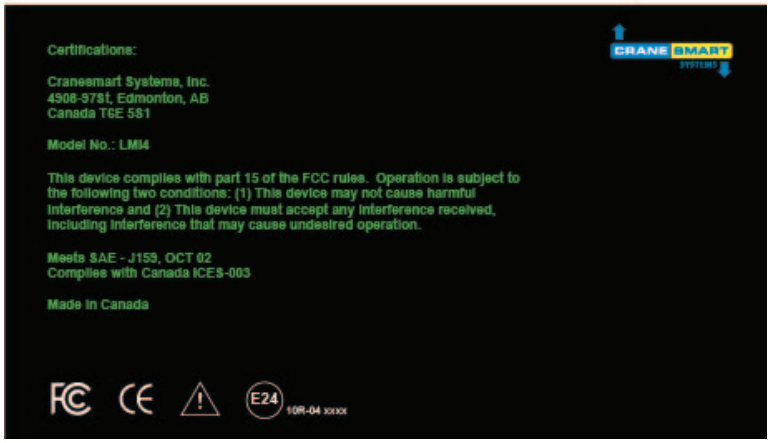
The new Cranesmart System utilizes a large full color touchscreen display panel, which is generally described in this section. All information, parameters, menus and alarms are displayed and accessible directly via the touchscreen.

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

1.1. The Startup Screens

Illustrated below are the Startup Screens, which are displayed immediately upon powering the system. First pictured will be the Cranesmart Logo, followed by a certification screen, then a quick system diagnostics checklist. Once the system is fully initialized, the main user interface will appear.





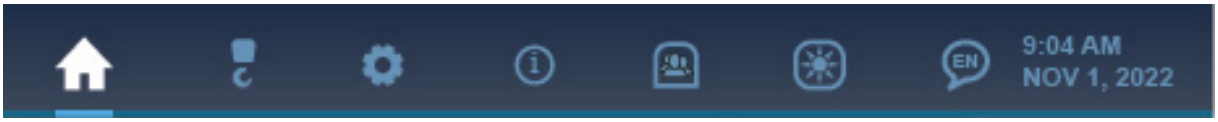
NOTE:
If you have purchased a NON-LMI system, the display will boot into the home screen. This is where you will see any primary and secondary tiles of components active in the system.You may begin to use your Cranesmart System.

If you purchase an LMI system the display will boot into the configuration screen. See "The Configuration Menu" section. After the proper setup of the configuration menu, the home Icon must be pressed to begin using your Cranesmart System.

1.2 Understanding the user interface

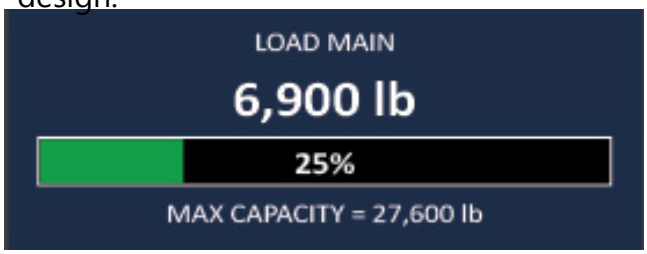
The **Menu bar** allows for navigation by tapping the respective Icons.

In order from left to right the respective icons are: Home, configurations, settings, information, permission, brightness, language and date and time selection. Date and time will only be accessible in supervisor mode (see the permissions code section on how to access the supervisor levels)



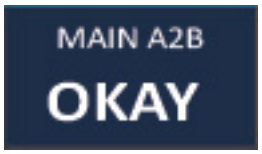
Primary Parameter Tile

The primary parameter tile is the large tile that takes up the majority of the screen. Typically the parameter displayed will be the load but can be other information depending on your system design.



Secondary parameter tile

Beneath the load display are other important parameters being monitored by the system, these include: A2B status, boom angle and machine pitch / roll. 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.



Bypass Tile

Pressing this tile 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 can be found in the Troubleshooting section of this manual.

Page Selection Arrows

Back Tile

Use this button to return to the previous screen

C**ancel/Accept Tiles**

Use these buttons to confirm or cancel a selection

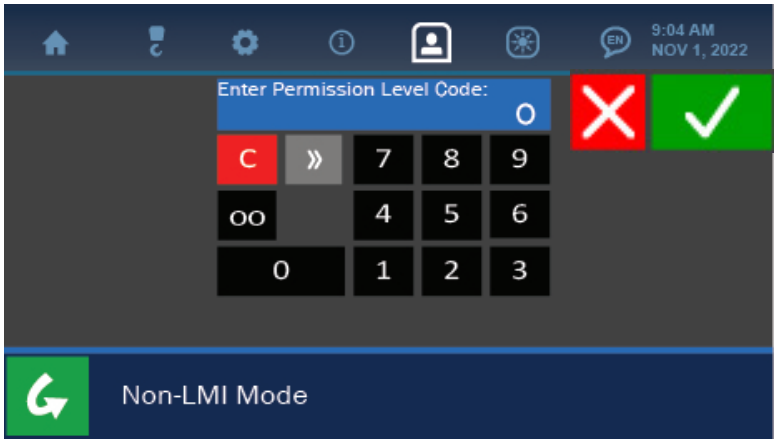
Alarm Notification Bar

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, 'Non-LMI Mode'. In case of an alarm, an associated message would be displayed in this area with color changes to indicate the problem visually. Touching the notification bar will change between alarm, warning and notifications. Further description of the alarms and their displays can be found in the Troubleshooting section of this manual.

Banner Tiles
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 the banner button will advance the display to show more associated options.

Value Entry Screen This is an example screen for changing values. To clear the value press the red C Icon and to delete the last digit entered press the grey double arrow icon. To enter the value select the green checkmark or X to cancel

As shown in the screenshot, the system pictured is experiencing no alarms and shows the default notification, 'Non-LMI Mode'. For an LMI system in a non alarm state,the current load chart title will be displayed.



1.3 The Home Screen

Below is the Home Screen and is the main display for normal operation. The system updates the data from the transmitters and displays it in real time. The elements of the display are labeled and explained on the following page.

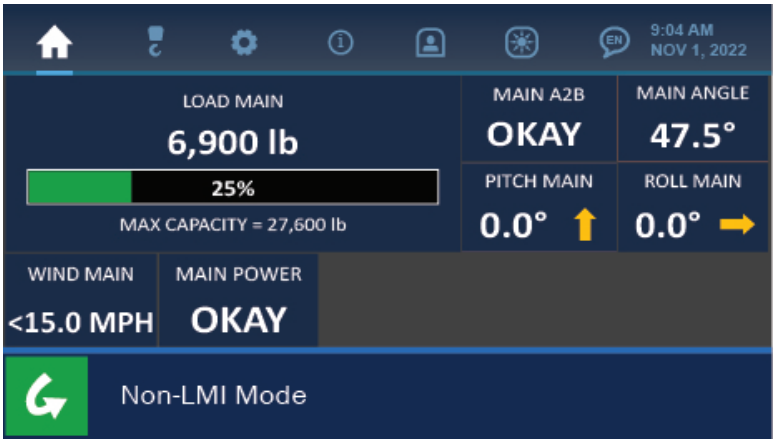
2. Normal Operation

The Cranesmart interface is modular in design. This allows the client the option of having a very basic Anti-2-Block only (NON LMI) system to a more complicated Load Moment System (LMI). This section will explain possible parameter tiles on the screen, how to view the information, and the ways the system indicates potential danger.

NOTE: See 'Understanding The User Interface' section for explanations of the screen tiles. For LMI systems once you have addressed the configuration of the crane you must press the home icon to activate the outputs of the panel. (White/green wire). This also is a condition of Non LMI systems whose components have been disabled

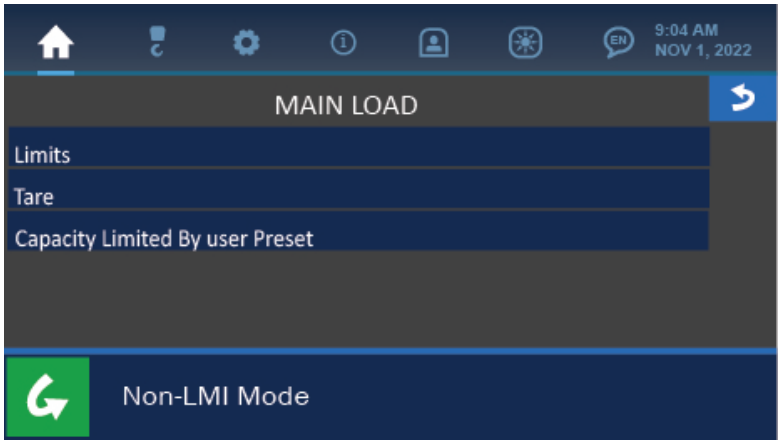
2.1. Load Indication

Below is the Home Screen, with the Load Indication Tile emphasized.

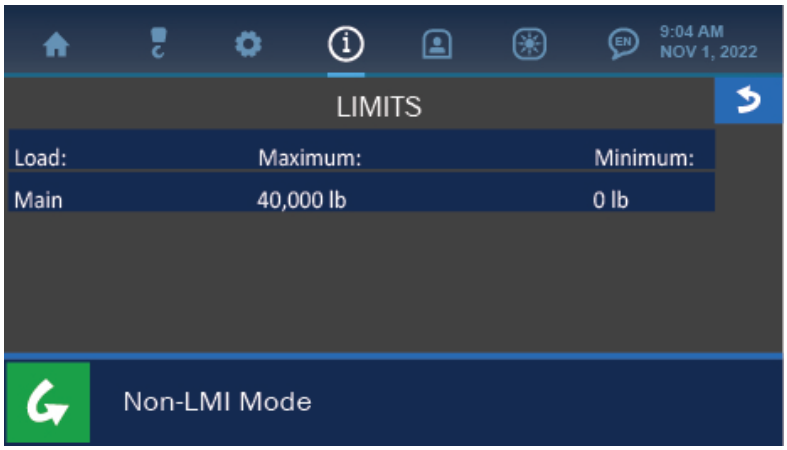


As shown below, a load is indicated. Current load on the hook is shown, as well as a bar graph with percentage indicating how close the load is to the maximum capacity. See Load Limits section on setting this value.

Pressing anywhere directly overtop the Load Indication Tile will open the Load Menu, as shown below. This menu offers the following options for the load: Limits, and Tare. These options are described on the following pages.



Load Limits



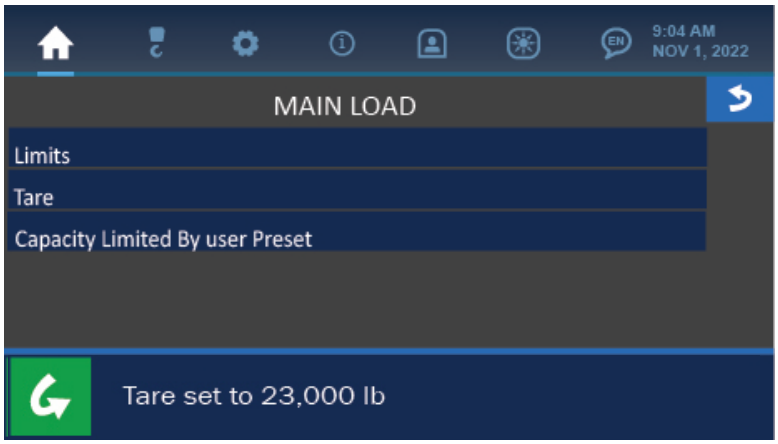
The Load Limits Menu displays the current settings for the following parameters:

Maximum: The maximum load value before the system displays an alarm.

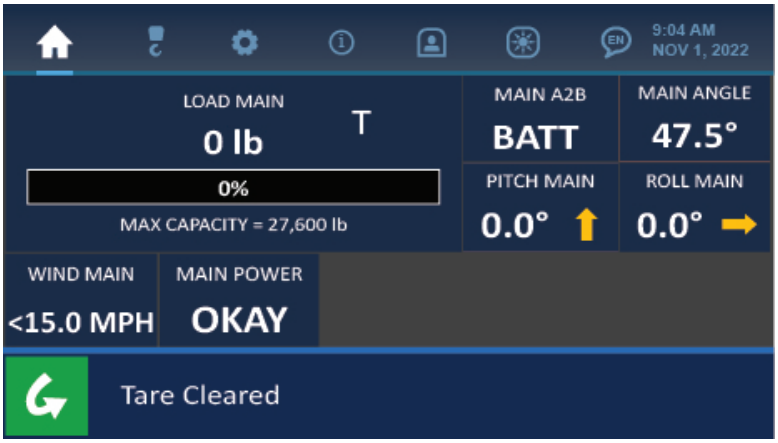
Minimum: The minimum load value before the system shows an alarm.

Non LMI Mode-Limits can be used so the system alarms when the load is outside of the established parameter. **LMI Mode**-Limits can be used to override the load chart to a lesser value. When left at factory defaults, the load chart will limit the crane.

Load Tare

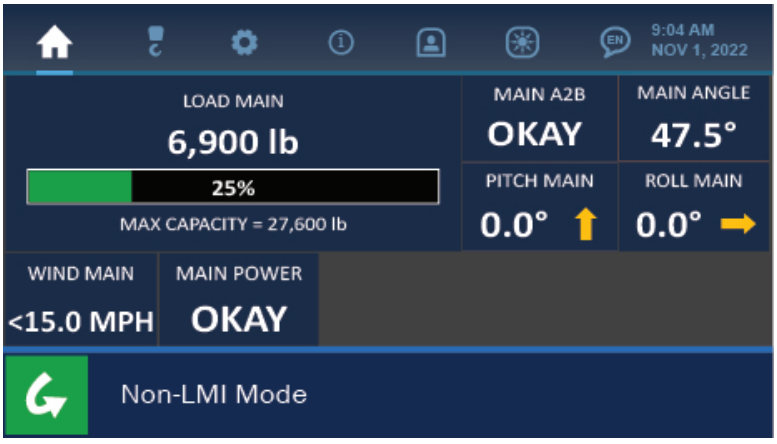


The Load Tare option enables an operator to set the current weight on the hook to zero. Press the Tare Banner Tile in the Load Menu. Tared weight is indicated when the current load shows 0 lb and a T is beside. The T indicates that the zero-load is the result of the tare. To remove it follow the same steps.



2.2. Anti-2-Block Indication

Below is the Home Screen, with the Anti-2-Block Indication Tile emphasized.

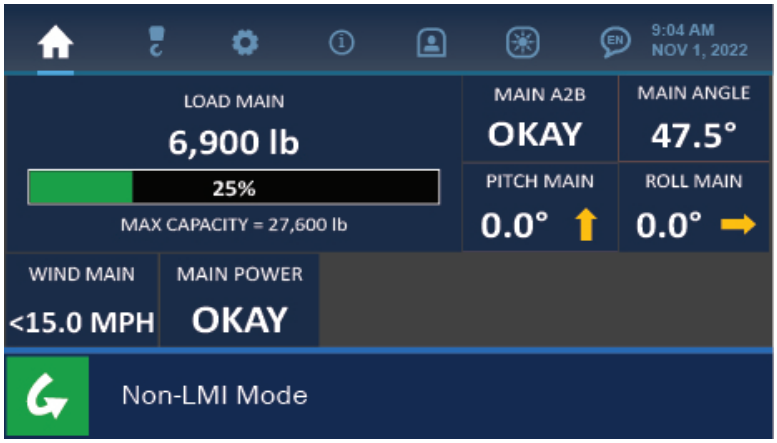


Illustrated above, the A2B status reads 'OKAY', indicating the transducer is operating normally. In a 2-block situation, the A2B status will display this state shown below. An associated alarm message will also display in the Alarm and Notification Bar along the bottom of the screen.

NOTE: See the 'Troubleshooting' section of this manual for more information on various alarm states and displays.

2.3. Angle Indication

Below is the Home Screen, with the Angle Indication Tile emphasized.



The current boom angle is shown in 0.5° increments.

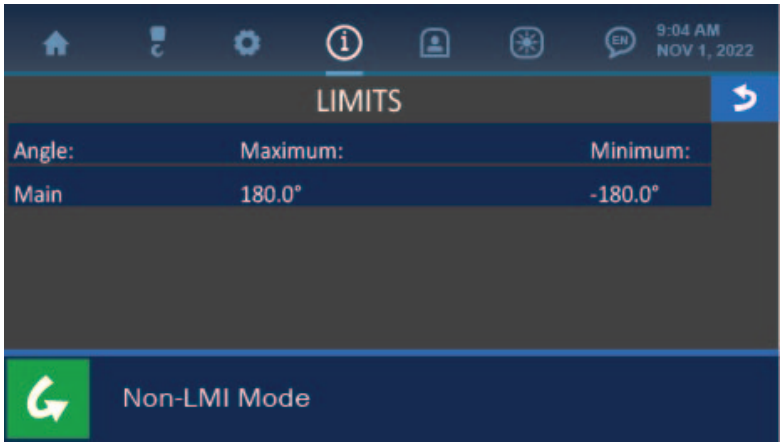
Pressing overtop the Angle Indication Tile will open the Angle Menu, where angle limits can be viewed

Angle Limits

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

Maximum: The maximum angle value before the system displays an alarm.
Minimum: The minimum angle value before the system shows an alarm.

Non LMI Mode-Limits can be used so the system alarms when a value is outside of the established parameter. **LMI Mode**-Limits can be used to override the load chart to a lesser value. When left at factory defaults, the load chart will limit the crane.



2.4. Boom Length Indication

Shown below is the Home Screen, with the Boom Length Indication Tile emphasized.

The current boom length, radius and tip height measurements can be shown with a resolution of 0.1. Pressing directly overtop the Boom Length Tile will open the Limits Menu, where boom length, radius & tip height limits can be viewed.

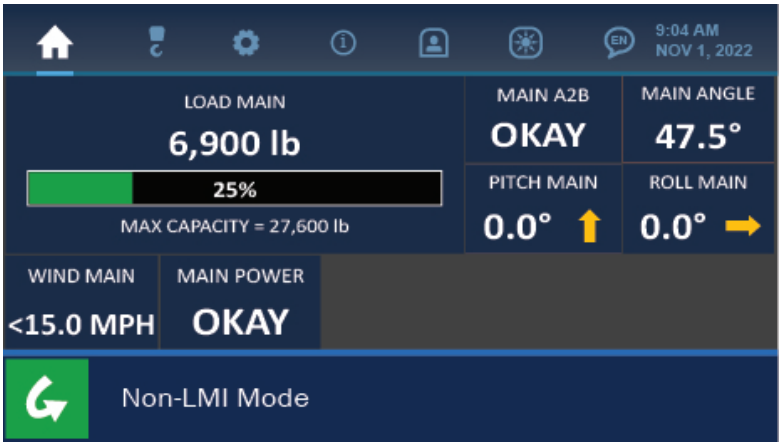
Boom length, radius and tip height limits Menu displays the current settings for the following parameters:

Maximum: The maximum value before the system displays an alarm.
Minimum: The minimum value before the system shows an alarm.

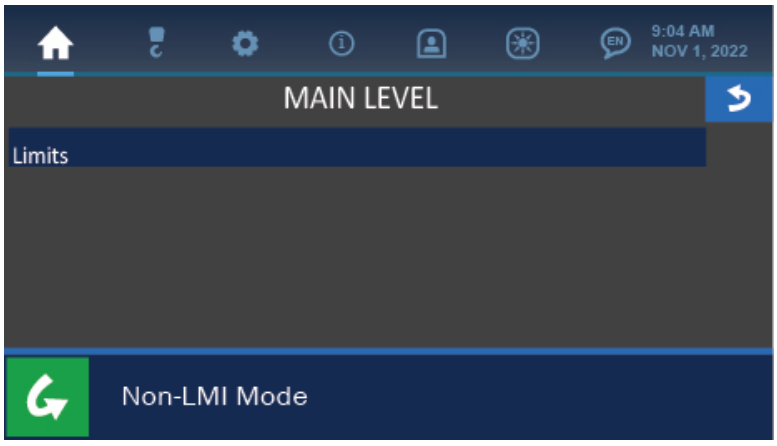
Non LMI Mode-Limits can be used so the system alarms when a value is outside of the established parameter. **LMI Mode**-Limits can be used to override the load chart to a lesser value. When left at factory defaults, the load chart will limit the crane.

2.5. Level Indication

Below is the Home Screen, with the Level Indication Tiles (Pitch and Roll) emphasized.



The current level (Pitch & Roll) is shown in 0.5° increments.
Pressing overtop of either Pitch or Roll Tile will open the Level Menu, where level limits can be viewed.



Level Limits

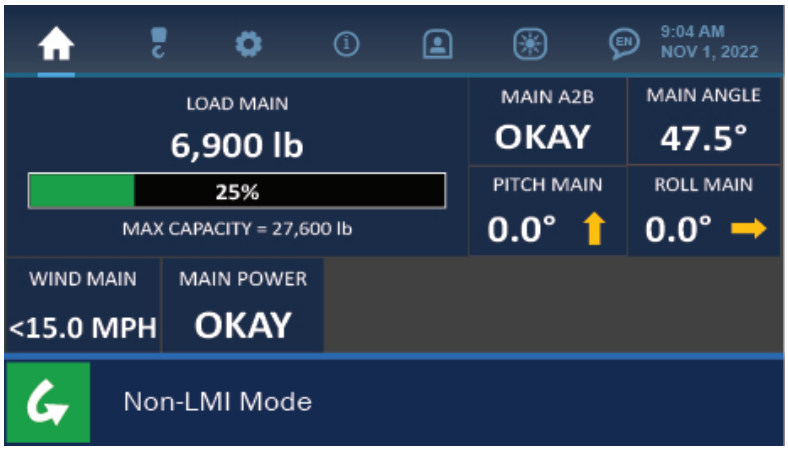
The Level limits Menu displays the current settings for the following parameters:

Maximum: The maximum value before the system displays an alarm.
Minimum: The minimum value before the system shows an alarm.

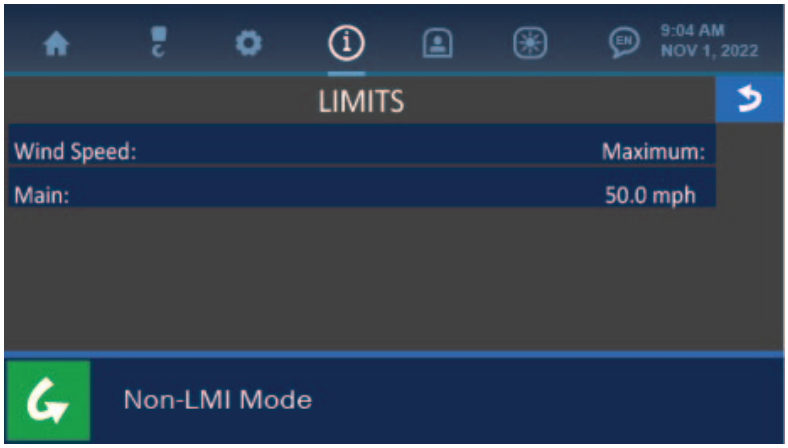
Non LMI Mode-Limits can be used so the system alarms when a value is outside of the established parameter. **LMI Mode**-Limits can be used to override the load chart to a lesser value. When left at factory defaults, the load chart will limit the crane.

2.6. Wind Speed and Temperature Indication

Below is the Home Screen, with the Wind Speed & Temperature Tiles emphasized. Temperature Tile is an additional feature tied to the windspeed. It is a tile that can appear if enabled and in the display.



The current Wind Speed is shown in 0.1mph increments. The current temperature is shown in 0.1 degree increments. Pressing overtop of the Wind Speed Tile will open the Wind Speed Menu, where level limits can be viewed. Pressing overtop of the Temperature tile will change the units from Fahrenheit to Celsius



The Wind Speed limits Menu displays the current settings for the following parameters:

Maximum: The maximum value before the system displays an alarm.

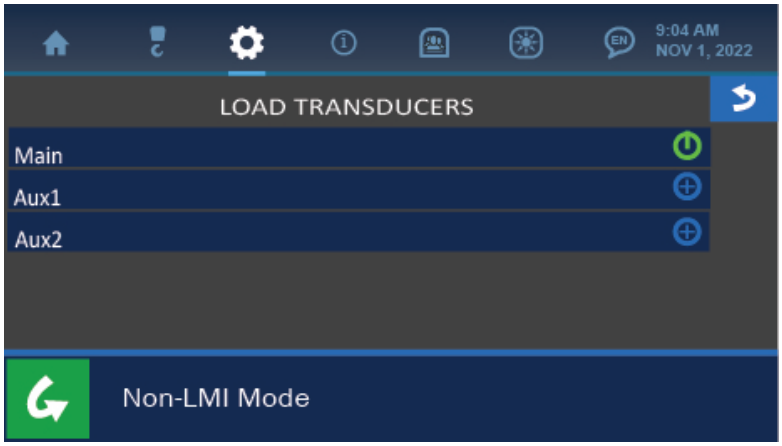
Non LMI Mode-Limits can be used so the system alarms when a value is outside of the established parameter. **LMI Mode**-Limits can be used to override the load chart to a lesser value. When left at factory defaults, the load chart will limit the crane.

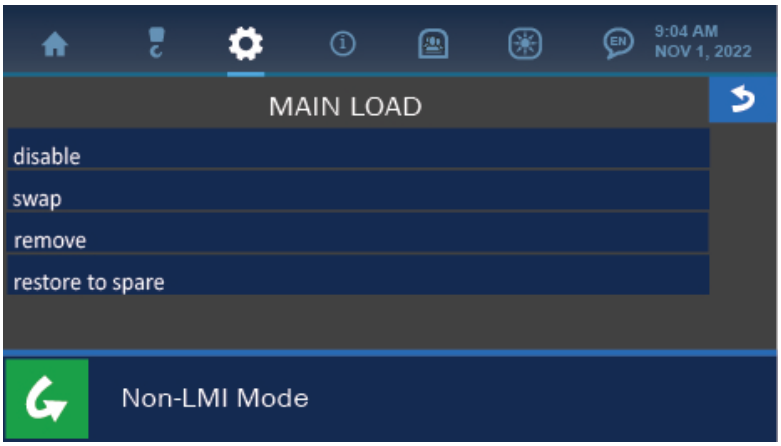
NOTE: See "Understanding The User Interface' section of this manual for more information on the Value Entry Screen.

2.7. Adding a Spare Transducer

The display panel allows for spare components to be added to the system quickly and easily. First, enter the user permission code to gain access to the required menus for this operation. (see the section: *Entering the Permission Level Code* of this manual).

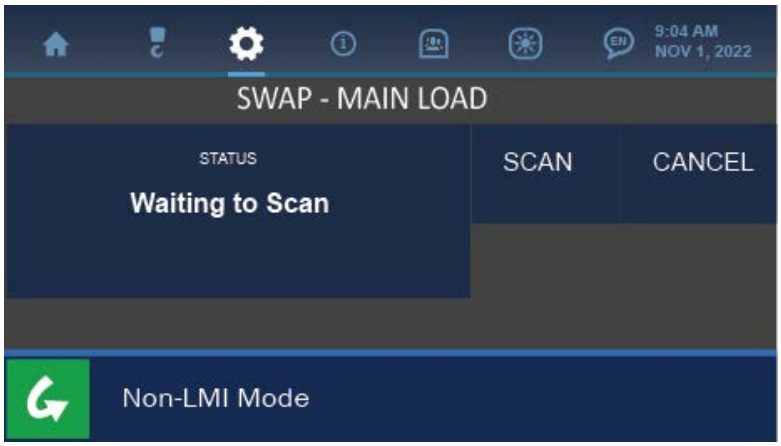
Select the transducer type to open further options for the component. From the transducer menu, an inactive component can be added to the system, or an already active component can be disabled, swapped or removed.

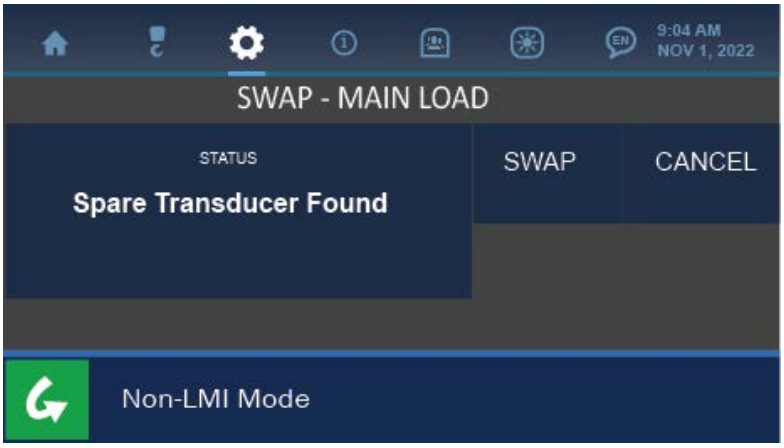




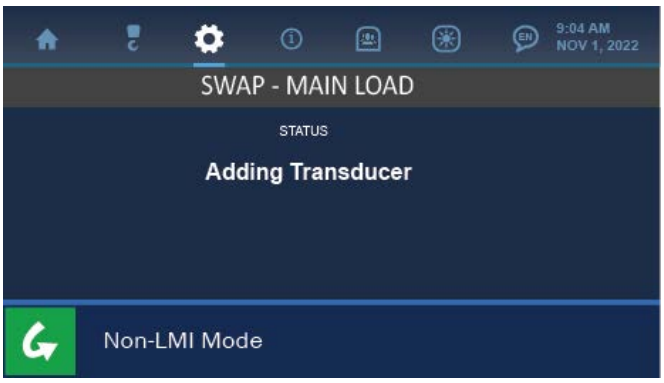
The ***disable*** function will keep a component's ID number registered in the system and assigned to that particular transducer but will not accept communications from it. A disabled transducer will not trigger system alarms as it is unable to send signals to the display panel. The ***swap*** function will disable one component and enable another in its place. The ***remove*** function will completely ignore communication from a component and reassign its ID number to another component when necessary.

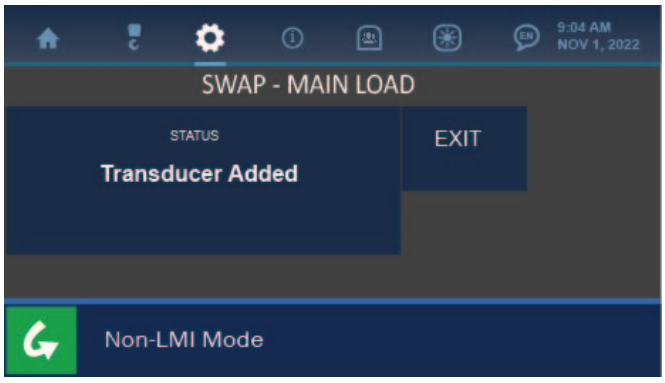
Once a new component is selected to be added or swapped for another, the system will prompt the user to initiate a scan for a new transducer. Press the 'Scan' button to start the process.





Once found, the message: 'Spare Transducer Found' will be displayed. Press the 'Swap' button to complete the operation. The system will then perform the replacement, while displaying accompanying messages on the screen. All calibration and identification assignment will also be handled automatically within the system.





After the new transducer has been added to the system, press the 'Exit' button to return to normal operation.

2.8. Using the USB Functions (Alarm Event Logging and Upgrading the System Firmware)

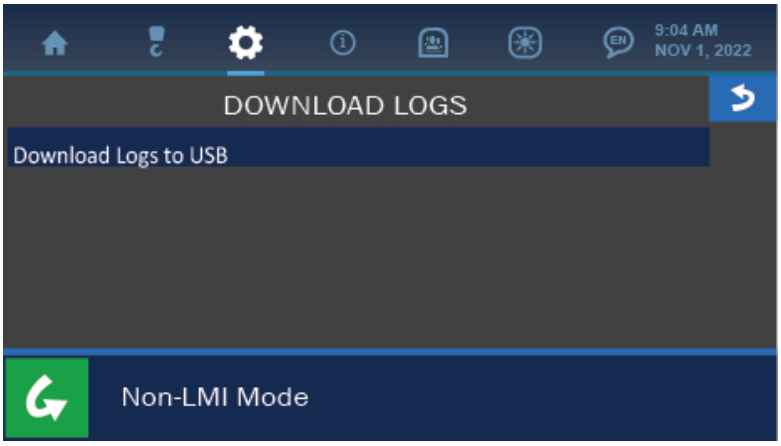
The USB port, found at the back of the panel can be used to access alarm event logs as well as upgrade the system firmware. An empty, FAT formatted USB drive not larger than 32GB can be used. All USB functions are found in the Supervisor permission level. (See the section: entering the permission level code)

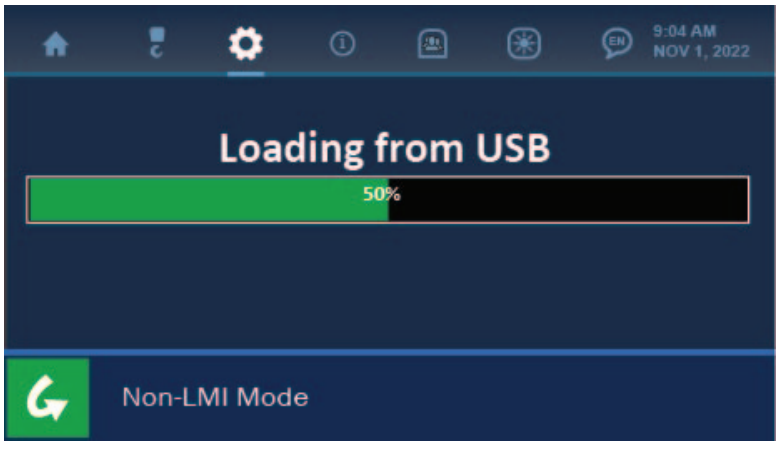
Alarm Logging

Insert the proper USB drive into the panel. Enter the Supervisor Permission Code to access the data logging option.

Next, navigate to the Logs Menu (screenshot shown below) by entering: Settings / Panel / Logs. Select the option 'Download to USB'. There are two choices. Select the most applicable option to begin downloading logs to the USB drive. This may take several minutes, depending on how many logs are being downloaded.

NOTE: While logs are being downloaded to the USB drive, the display panel's functionality is limited and will not operate as an LMI or system component.

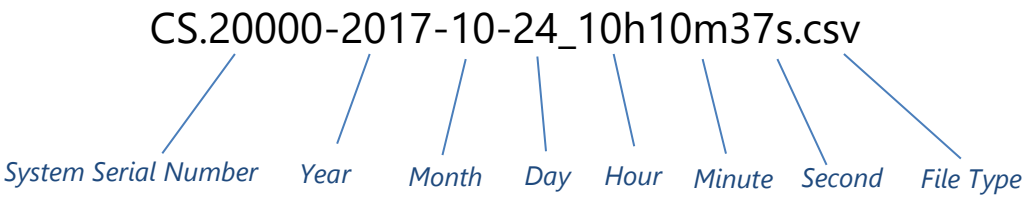




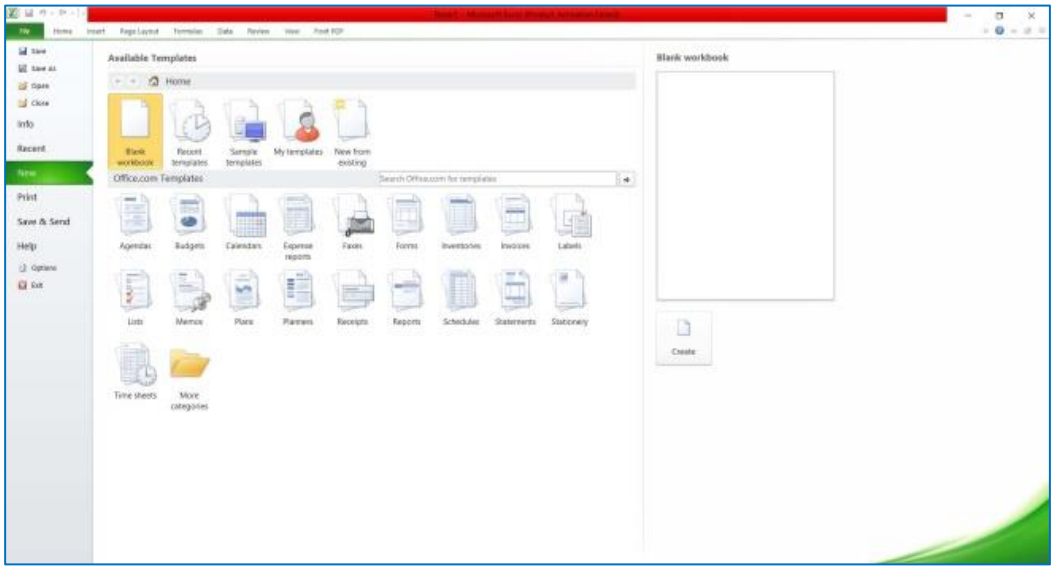
Once finished, the system will indicate that the download is complete and the USB drive can be safely removed from the display panel.

Viewing the Alarm Logs

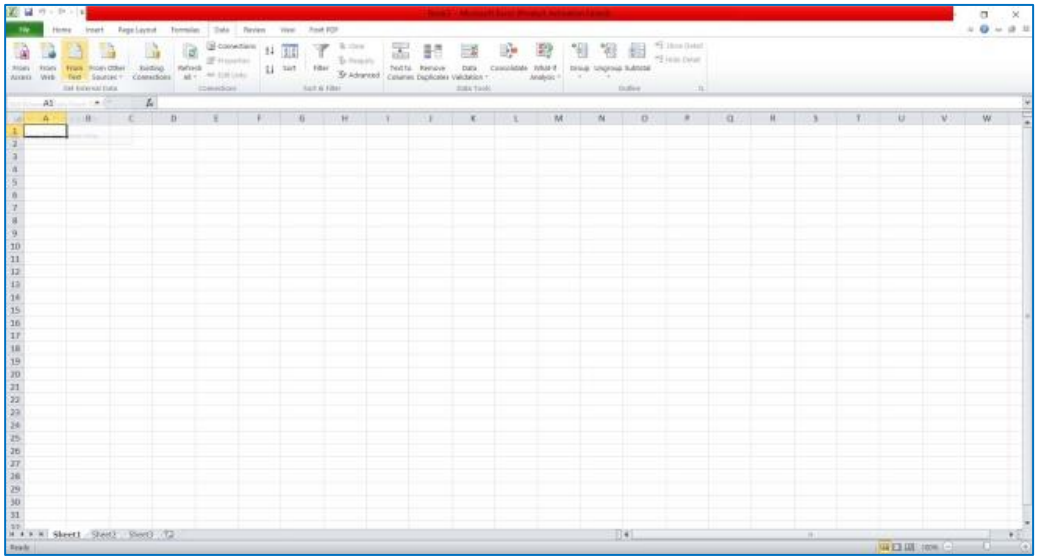
The downloaded logs will be saved to the USB drive with the following naming format:



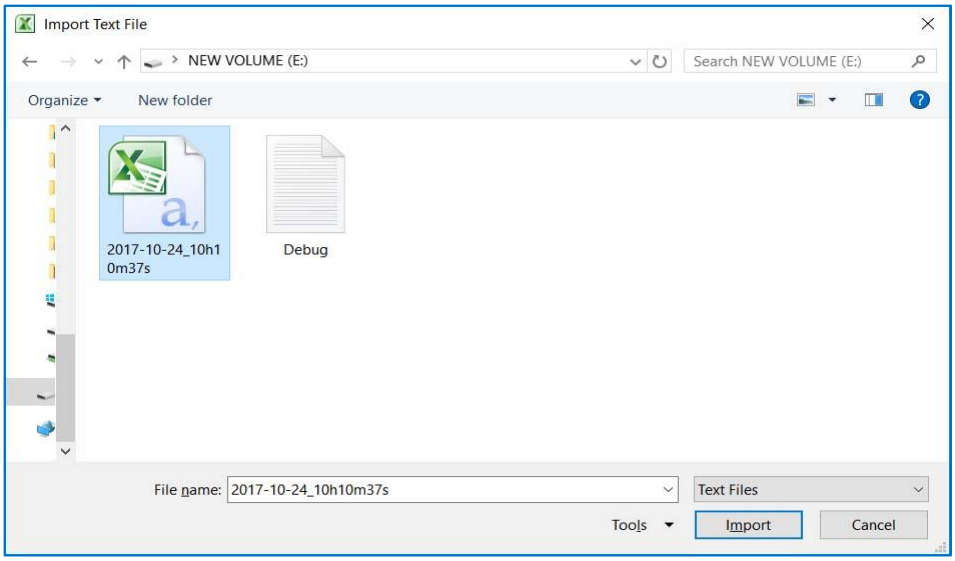
To view the log, insert the USB drive into a computer, open Microsoft Excel and create a new workbook, as shown in the screenshot below.



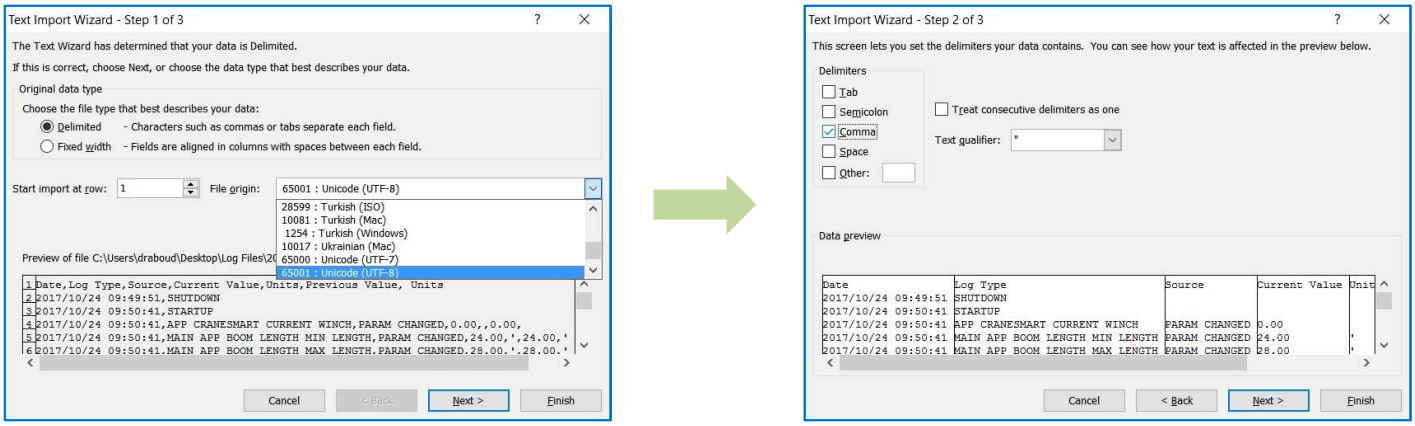
From the new workbook interface, click to open the 'Data' tab located along the top of the menu bar. Then, from the 'Get External Data' section of the 'Data' tab, click the option *From Text*.



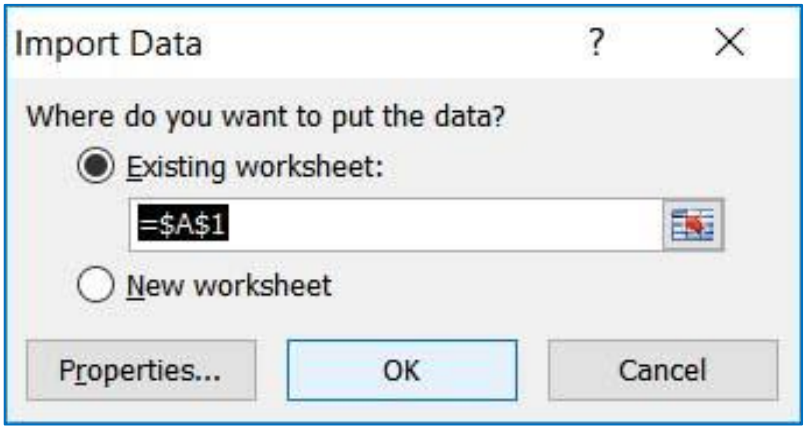
Upon selection, an 'Import Text File' window will open, allowing the user to navigate to the log files on the USB drive. Select the appropriate csv file and click 'Import'.



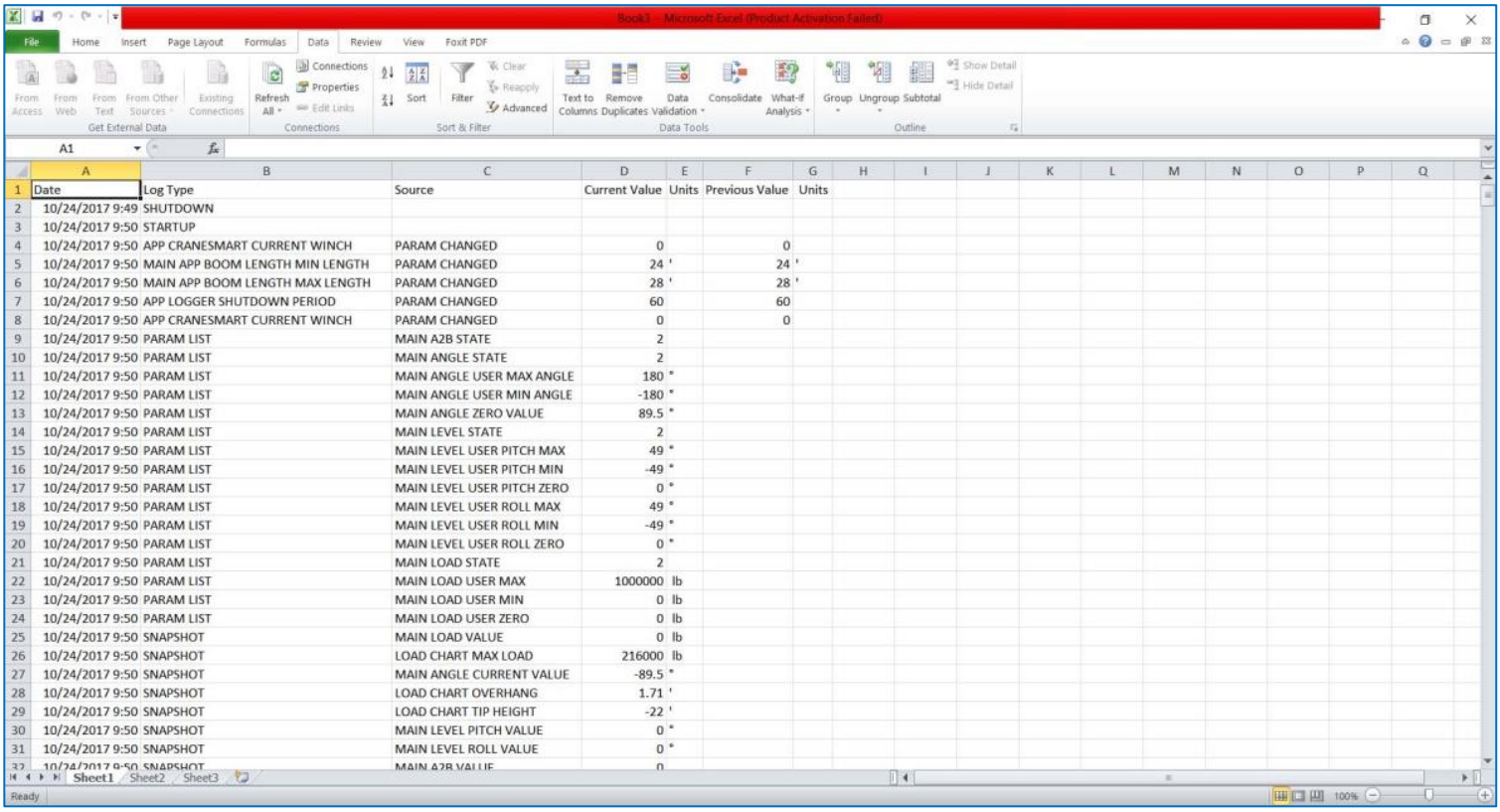
At this point, a 'Text Import Wizard' will be displayed, allowing for various options and customization of the data. From the 'File origin' dropdown box, select the option '65001: Unicode (UTF-8)' and click the 'Next' button. Then, deselect the 'Tab' option in the 'Delimiters' section and select the 'Comma' option. Click 'Finish' to close the wizard.



The program will open one final dialogue box, asking where the data should be placed. The default setting of 'Existing worksheet: =A1' is appropriate – simply click 'OK' to close the dialogue box and view a spreadsheet of the saved logs.



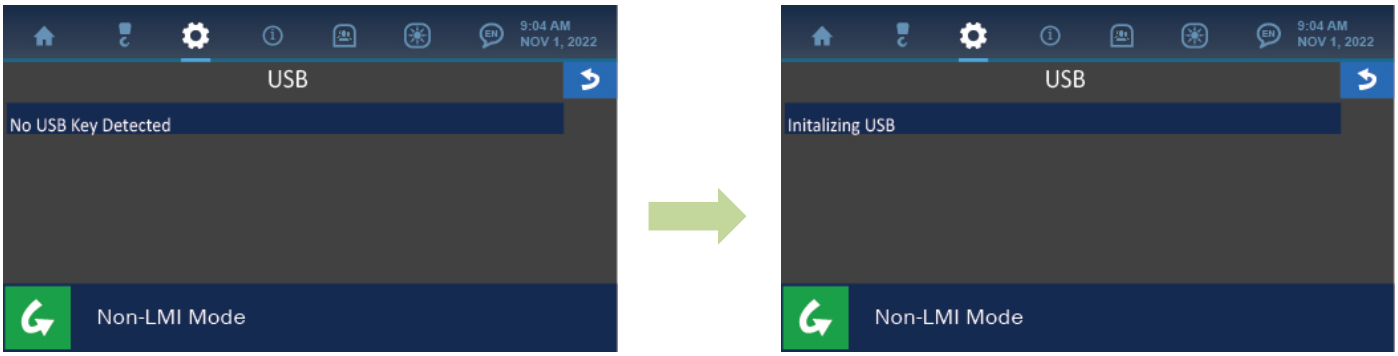
The logs will now be displayed as a detailed and columned list, marked by a timestamp (left column) and describing qualities such as: parameter changes, transducer output values, alarms and limits breached, bypass button presses and start-up / shutdown points.



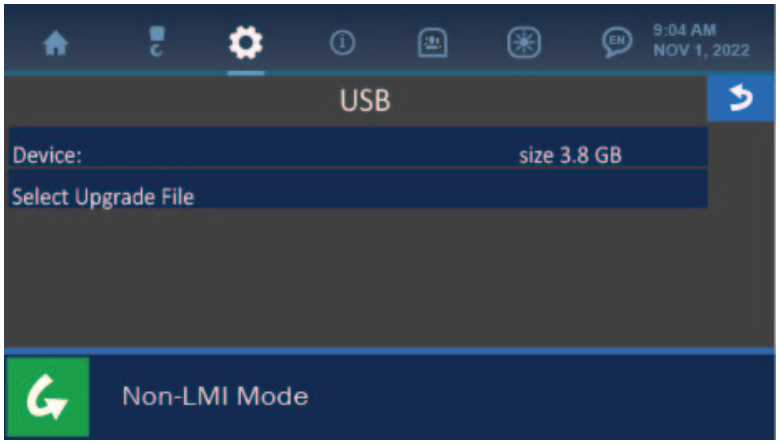
Date	Log Type	Source	Current Value	Units	Previous Value	Units
10/24/2017 9:49	SHUTDOWN					
10/24/2017 9:50	STARTUP					
10/24/2017 9:50	APP CRANESMART CURRENT WINCH	PARAM CHANGED	0		0	
10/24/2017 9:50	MAIN APP BOOM LENGTH MIN LENGTH	PARAM CHANGED	24	'	24	'
10/24/2017 9:50	MAIN APP BOOM LENGTH MAX LENGTH	PARAM CHANGED	28	'	28	'
10/24/2017 9:50	APP LOGGER SHUTDOWN PERIOD	PARAM CHANGED	60		60	
10/24/2017 9:50	APP CRANESMART CURRENT WINCH	PARAM CHANGED	0		0	
10/24/2017 9:50	PARAM LIST	MAIN A2B STATE	2			
10/24/2017 9:50	PARAM LIST	MAIN ANGLE STATE	2			
10/24/2017 9:50	PARAM LIST	MAIN ANGLE USER MAX ANGLE	180	°		
10/24/2017 9:50	PARAM LIST	MAIN ANGLE USER MIN ANGLE	-180	°		
10/24/2017 9:50	PARAM LIST	MAIN ANGLE ZERO VALUE	89.5	°		
10/24/2017 9:50	PARAM LIST	MAIN LEVEL STATE	2			
10/24/2017 9:50	PARAM LIST	MAIN LEVEL USER PITCH MAX	49	°		
10/24/2017 9:50	PARAM LIST	MAIN LEVEL USER PITCH MIN	-49	°		
10/24/2017 9:50	PARAM LIST	MAIN LEVEL USER PITCH ZERO	0	°		
10/24/2017 9:50	PARAM LIST	MAIN LEVEL USER ROLL MAX	49	°		
10/24/2017 9:50	PARAM LIST	MAIN LEVEL USER ROLL MIN	-49	°		
10/24/2017 9:50	PARAM LIST	MAIN LEVEL USER ROLL ZERO	0	°		
10/24/2017 9:50	PARAM LIST	MAIN LOAD STATE	2			
10/24/2017 9:50	PARAM LIST	MAIN LOAD USER MAX	1000000	lb		
10/24/2017 9:50	PARAM LIST	MAIN LOAD USER MIN	0	lb		
10/24/2017 9:50	PARAM LIST	MAIN LOAD USER ZERO	0	lb		
10/24/2017 9:50	SNAPSHOT	MAIN LOAD VALUE	0	lb		
10/24/2017 9:50	SNAPSHOT	LOAD CHART MAX LOAD	216000	lb		
10/24/2017 9:50	SNAPSHOT	MAIN ANGLE CURRENT VALUE	-89.5	°		
10/24/2017 9:50	SNAPSHOT	LOAD CHART OVERHANG	1.71	'		
10/24/2017 9:50	SNAPSHOT	LOAD CHART TIP HEIGHT	-22	'		
10/24/2017 9:50	SNAPSHOT	MAIN LEVEL PITCH VALUE	0	°		
10/24/2017 9:50	SNAPSHOT	MAIN LEVEL ROLL VALUE	0	°		
10/24/2017 9:50	SNAPSHOT	MAIN A2B VALUE	0			

Upgrading the System Firmware

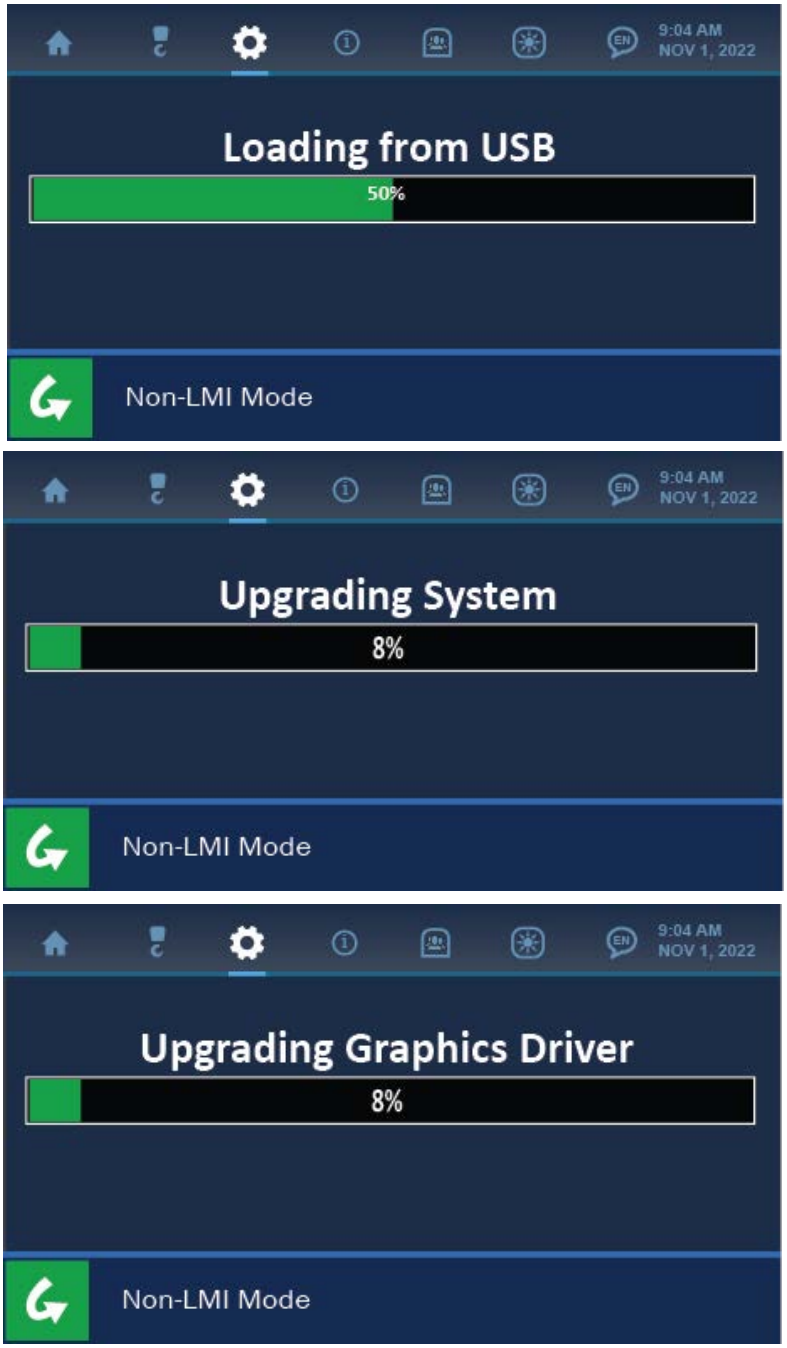
To upgrade the system firmware, first ensure that the USB drive to be used is FAT formatted, and that the appropriate *Upgrade.bin* file is located in its root directory. Then, enter the Supervisor Permission Code to gain access to the USB Menu in the system (see the section: *Entering the Permission Level Code* of this manual).



Next, enter the USB Menu, by entering: Settings / Panel / USB. Before a USB drive is inserted into the display panel, the USB Screen will indicate that there is no device detected. Once a USB drive is inserted, the status will change to 'initializing', and will display various parameters once the contents of the drive have been read by the system. As shown in the following screenshot, these include: the device name, disk size, and the version of the available upgrade.



To upgrade the system firmware, simply press the screen directly overtop the upgrade version number. The system will prompt the user to confirm the upgrade, then will display the following progress screens:



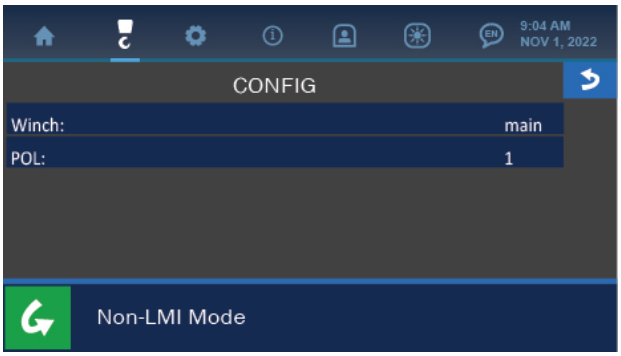
Depending on what kind of upgrade is being installed, the update may take up to 15 minutes. Once the upgrade is complete, the system will restart, run a diagnostic routine and return to normal functioning. At this point, the system will be upgraded and the USB drive can be safely removed from the display panel.

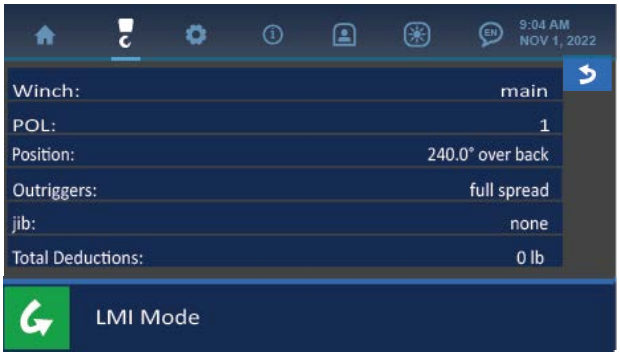
3. The Configuration Menu

The Configuration Menu is symbolized by the hook icon at the top of the display and can be accessed by pressing it. This section describes major parameters such as: Winch and POL (parts of line). These parameters are for Both LMI and Non LMI systems. Outrigger Settings, Jib Position, and Total Load Capacity Deductions are available in LMI only systems.

NOTE: When starting the panel with any disabled components you must acknowledge the condition

NOTE: Additional parameters under configuration that are only accessible in an LMI system are shown in the second figure.





NOTE: The parameters are factory-set, if you find there is a parameter missing or cannot be changed please contact a Cranesmart Service Technician.

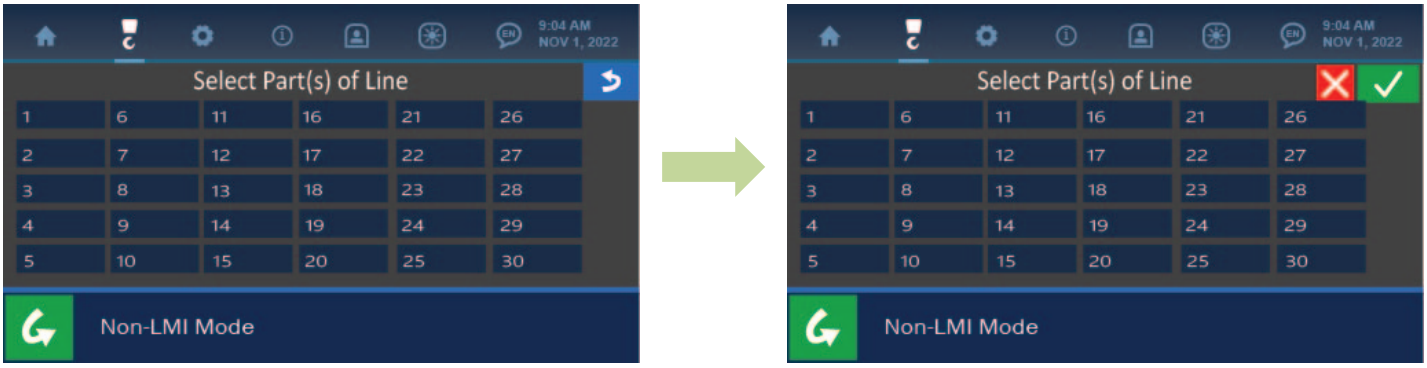
3.1. Winch

The winch parameter indicates that the system is using the 'main' winch line.

3.2. POL (Parts of Line)

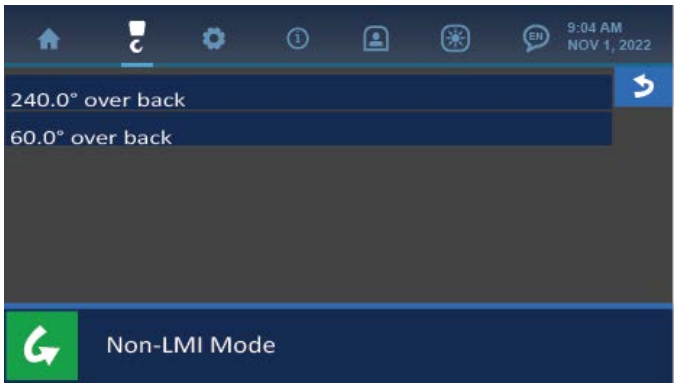
The POL (Parts of Line) can be changed by simply selecting a new value from the POL menu. Once selected, the system will prompt for confirmation that the parameter should be changed. Press the green 'Check' button to accept the change.

NOTE: The LMI system limits the parts of line to the number provided at purchase.



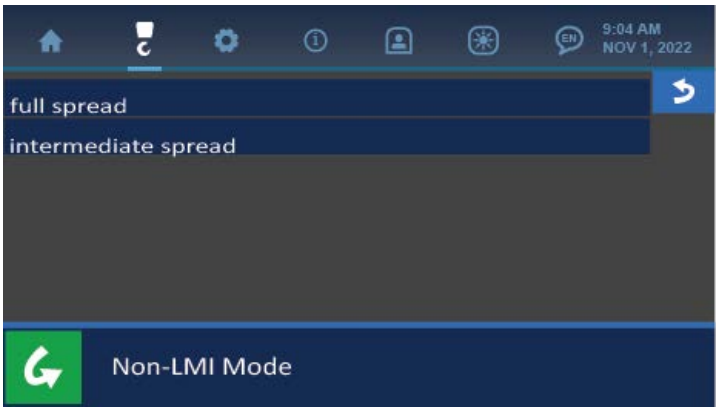
3.3. Position-(LMI only)

The Position Menu offers options. Select the appropriate setting by pressing directly overtop the desired value and press the green 'Check' button after the system prompts for confirmation of the change.



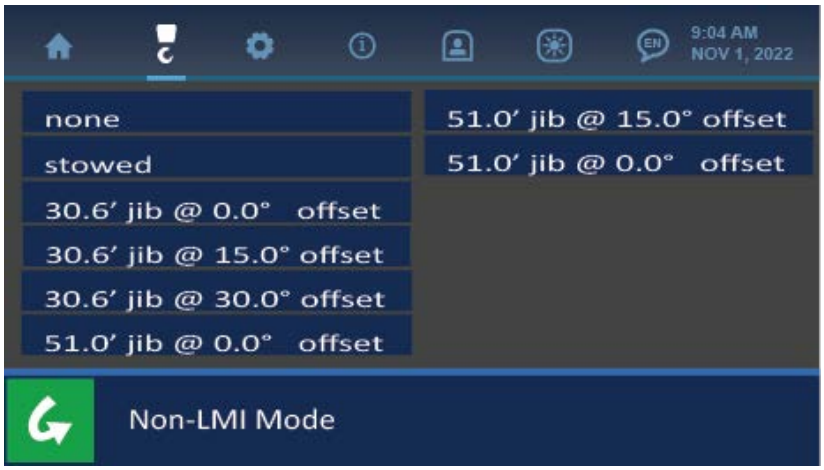
3.4. Outriggers-(LMI only)

The Outriggers Menu offers two settings: full or intermediate spread. Either setting can be enabled by simply pressing directly overtop the desired configuration and confirming the change in the system.



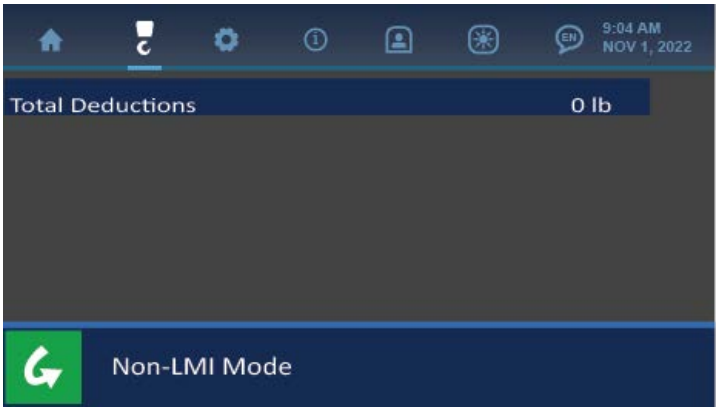
3.5. Jib-(LMI only)

The Jib Menu offers various options for the Jib setting – any of which can be selected via this screen by pressing directly overtop the desired value. The system will prompt the user to confirm the change before adjusting the value to that selected.



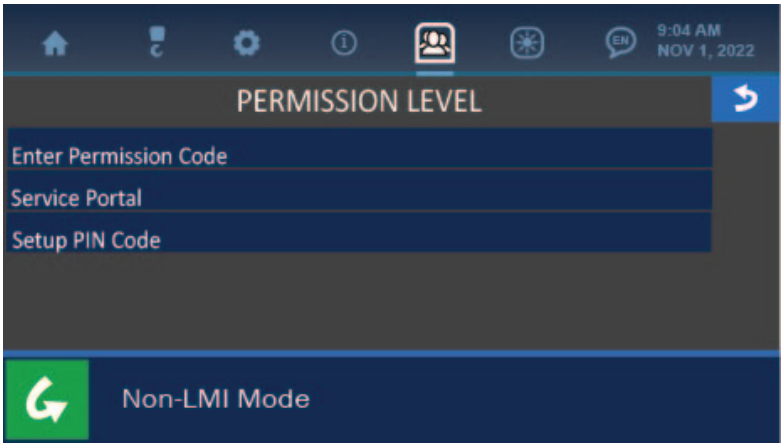
3.6. Total Deductions-(LMI only)

The Total Deductions Screen shows the total weight that the full load chart is reduced by, given the current system parameters. This value is affected by settings such as: the jib, the outrigger spread, etc.



4. The Permission Menu

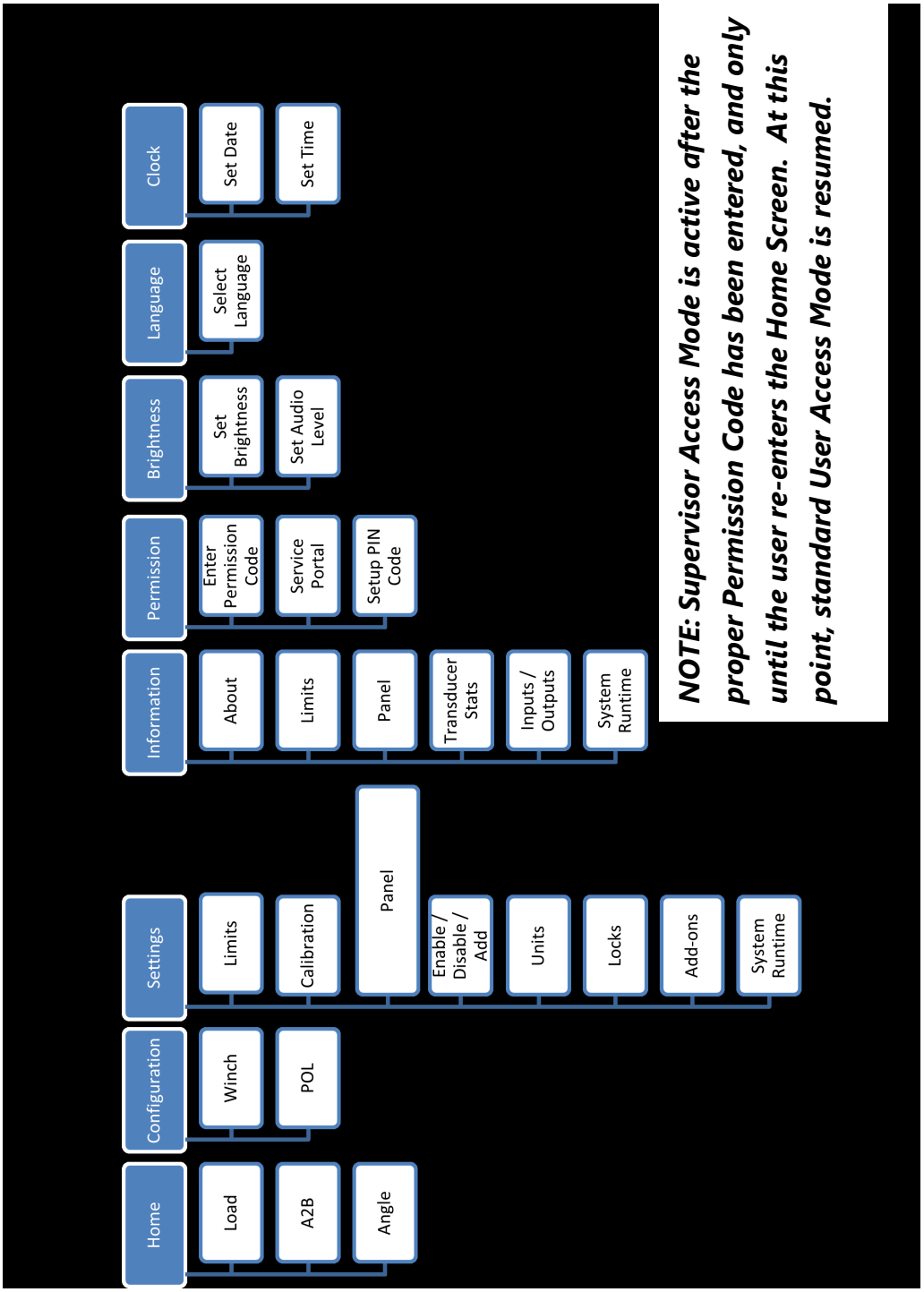
The Permission Menu is symbolized by the figure icon at the top of the display and can be accessed by pressing the screen directly overtop this icon. This menu is used to enter restricted areas of the system. A Supervisor Permission Code entered on the Permission Code Screen opens restricted areas to supervisors for safety control. A Service Code via the Service Portal Screen is used for technical maintenance and adjustment. The default Supervisor Permission Code from the factory is: 111, but can be customized to each system and changed at any time. ***NOTE: For the sake of this manual, the supervisor access level of this menu is shown. Normal user access will have less options available than those shown for this description.***



Once a permission code is entered into the system, a Supervisor Mode is enabled and new options become available in many of the system's menus. Refer to the following page for a visual layout of which screens are available in each mode. The Supervisor Access Mode will be active until the user navigates back to the Home Screen, at which time normal access resumes. (Refer to the *Supervisor Access Screens* section of this manual for a description of the supervisor options).

4.1. System Screen Flowchart

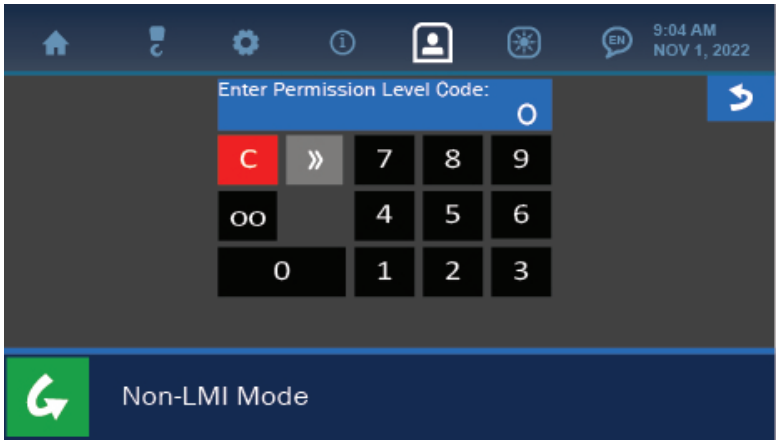
This illustration shows the basic layout of the system's main menus and screens. The screens shaded in grey are the areas that are only available in Supervisor Access Mode, once the code has been entered. All other screens are available in standard Operator Access Mode.



4.2. 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: The default Supervisor Permission Code from the factory is: 111, however this code can be customized to each system and changed at any time.



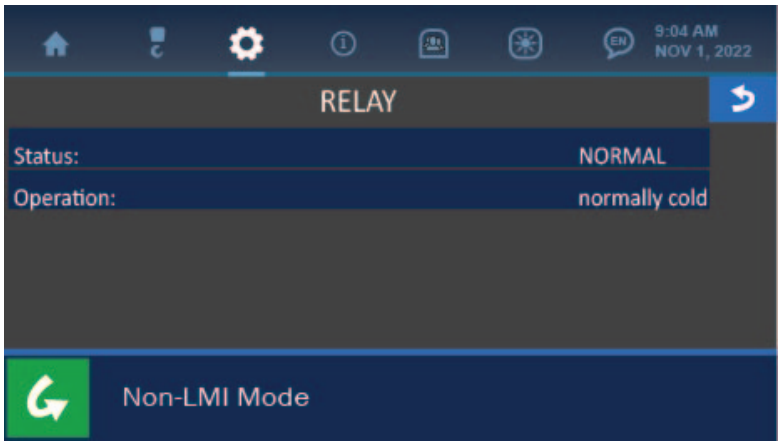
NOTE: See "Understanding The User Interface' section of this manual for more information on The Value Entry Screen.

4.3. Supervisor Access Screens

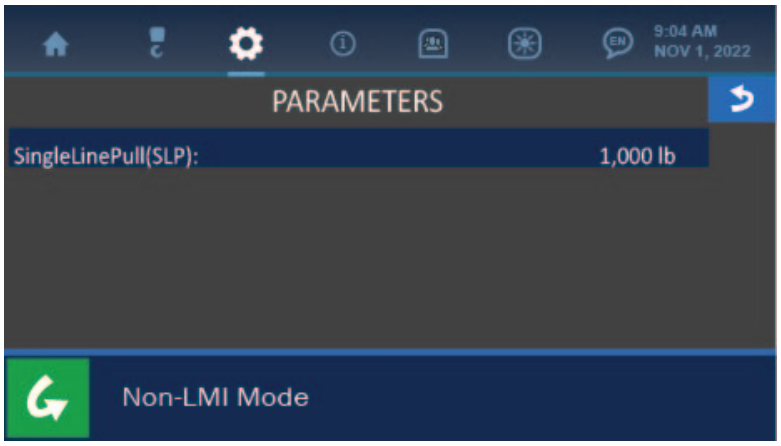
Once the supervisor access level is gained (by entering the correct Permission Code) the Permission Menu symbol will be changed to reflect the new setting, and the following listed screens will now be made available. ***NOTE: As noted earlier, these screens will no longer be available once the user cancels the Supervisor Access Mode by re-entering the Home Screen.***

Settings / Panel Menu:

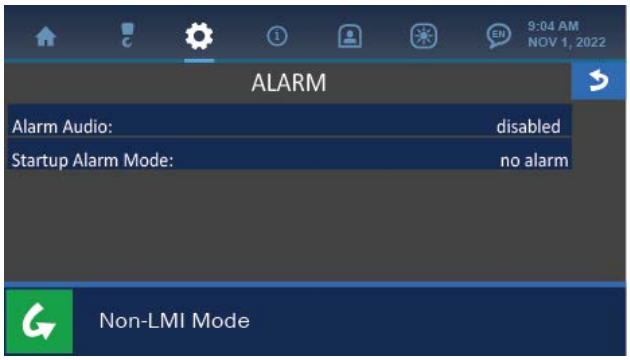
- **Relay:** The Relay Screen offers options for adjusting how the relay function (shutoff option) operates, including whether the shut off is normally hot or cold, and which components it will affect. For example, the panel can be configured to interrupt the winch up function to prevent the operator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

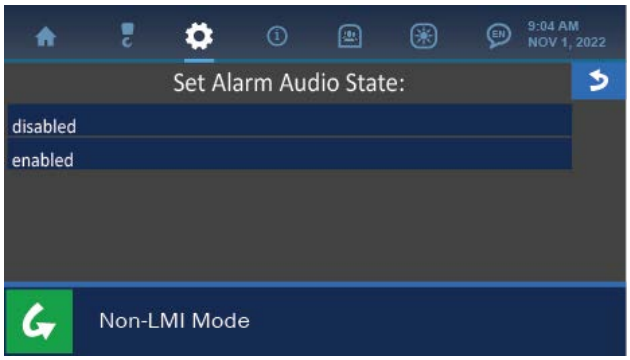


- **Parameters:** The Parameters Menu is used to set the single line load cell pull so that the logic calculations are correct and able to display accurately. These values are pre-set in the factory but can be changed in the field as necessary.



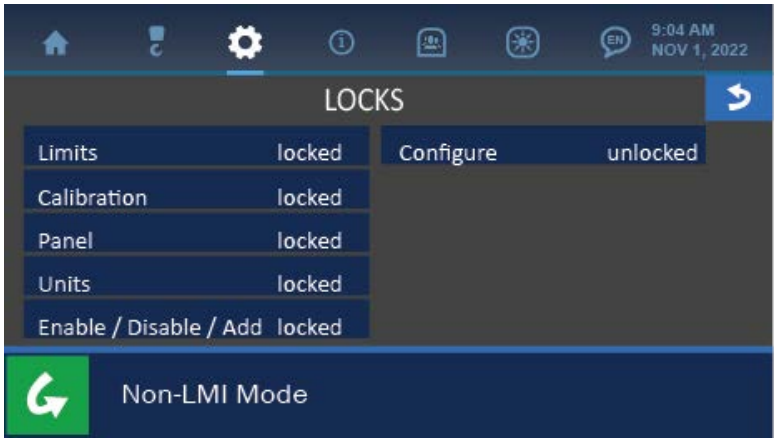
- **Audio:** The Audio Screen is used to either enable or disable the alarm sound. Pressing the Banner Button will open the Audio State Submenu, where either state can be selected and saved into the system.





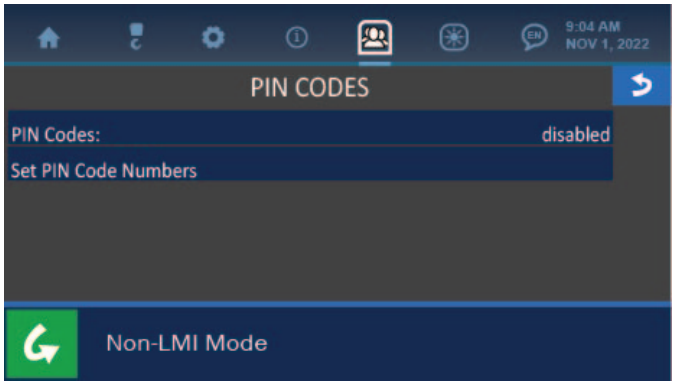
Settings Menu:

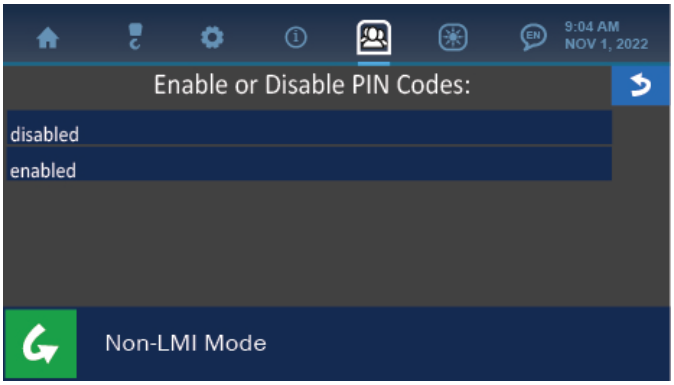
- **Locks:** The Locks Menu offers options for restricting operators from accessing various parts of the system.

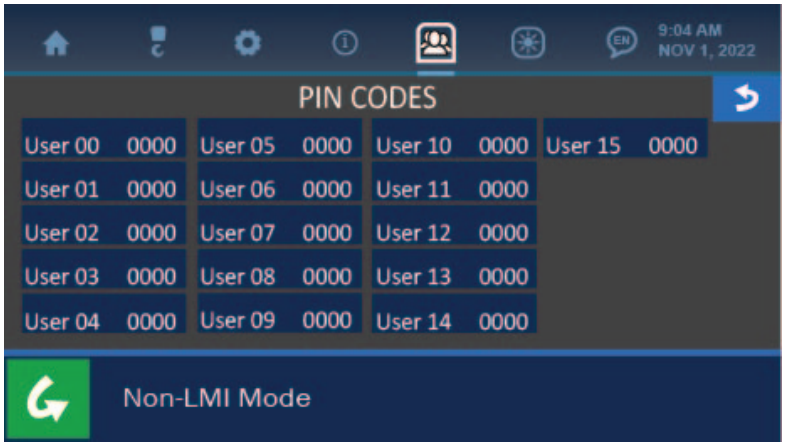


Permission Menu:

- **Setup PIN Code:** This screen is used to set optional user access codes, in order to customize and track each operator's access to the system. First, enable the feature by pressing the Enable Banner Button, then press the 'Set PIN Code Numbers' button to enter the codes themselves.

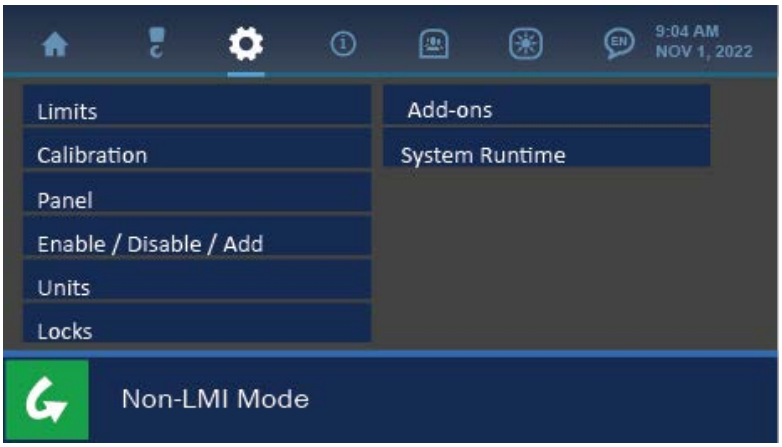






5. The Settings Menu

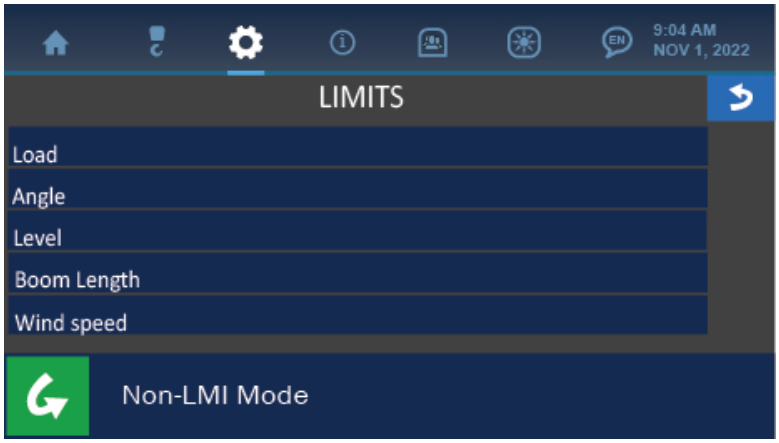
The Settings Menu is symbolized by the gear icon at the top of the display and can be accessed by pressing the screen directly overtop this icon. This menu offers many important options to the operator for how the system functions and displays information. The Settings Menu is shown below, and explanations of its various components follow. ***NOTE: For the sake of this manual, the supervisor access level of this menu is shown. Normal user access will have less options available than those shown for this description.(see supervisor access)***



5.1. Limits

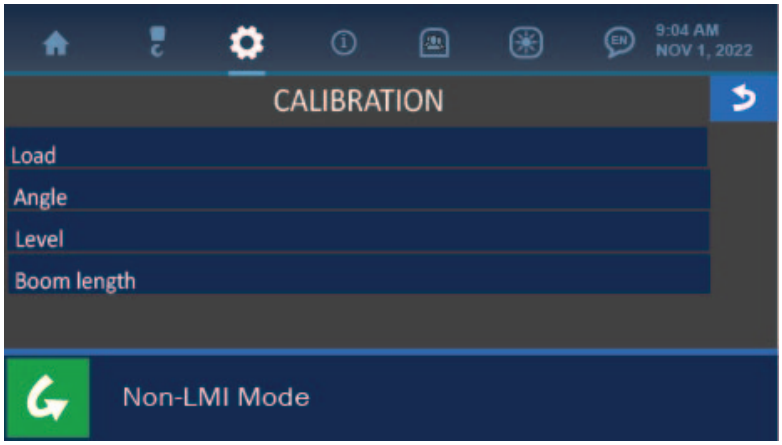
The Limits Menu presents all the various parameters that can be adjusted to define what the machine's safe zones of operation are. As listed and shown on the following screenshot.

These limit categories are: Load, Angle and Level. For more information on each of the listed limits see *The Normal Operation* section of this manual. To change the limit, select the settings. Then select clear data, input new data and save the changes.

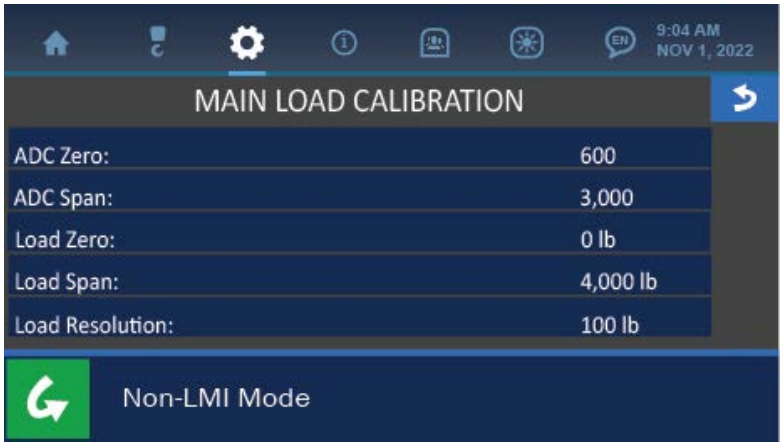


5.2. Calibration

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.



Load Calibration



The Load Calibration Menu is accessible only after the Supervisor Permission Code has been entered (see the section *Entering the Permission Level Code* of this manual). Once made accessible, this 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. ***(NOTE: This value cannot be directly changed).***

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). ***(NOTE: This value cannot be directly changed).***

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)

To change the 'Load Zero' or 'Load Span' values, simply press the screen directly overtop the target option to enter the Value Entry screen for this parameter.

Values are factory set and can be adjusted in the field as necessary

NOTE: See "Understanding The User Interface' section of this manual for more information on the Value Entry Screen.

Derate:(LMI(only) 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 is 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.

Angle Calibration

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

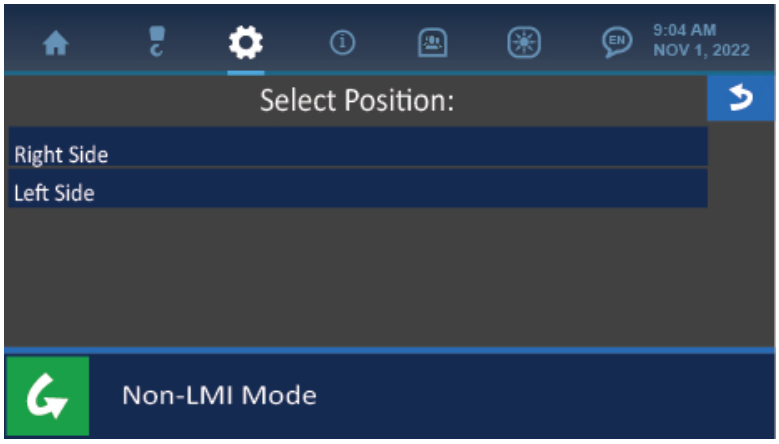
Concerning the Target Angle, set this value to what the system should be reading at a known boom angle. If the machine boom is currently at 0° but the system is displaying a different value, using the Target Angle Option will compensate for this discrepancy, by introducing an offset value in order to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

NOTE: See "Understanding The User Interface' section of this manual for more information on the Value Entry Screen.

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.

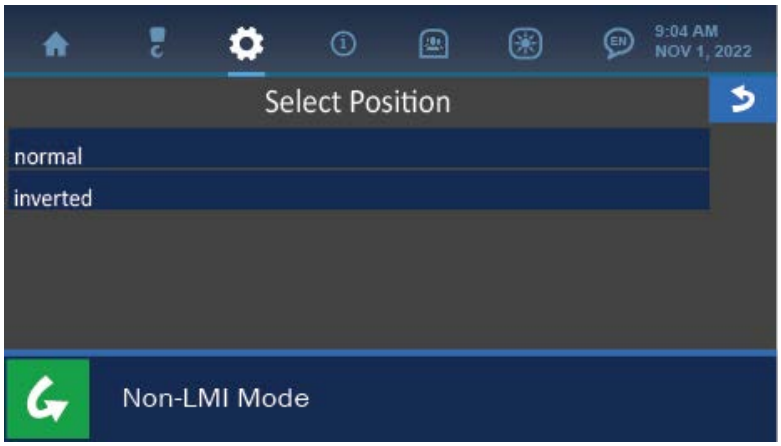


Level Calibration

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

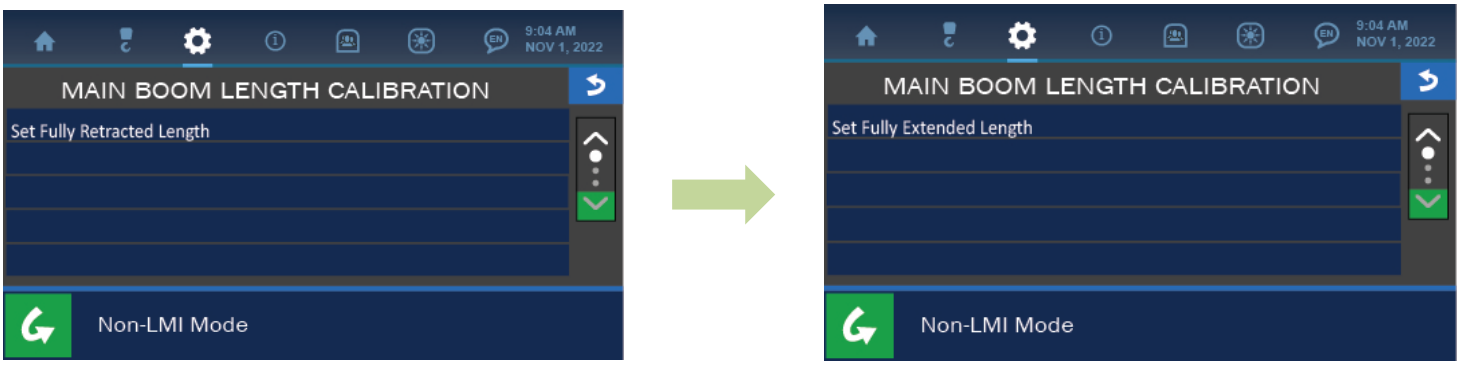
NOTE: If at any point, the machine is positioned more than 5.0° out of level (either pitch or roll) the system will enter an alarm state, and the load indication will only show the weight on the line alone, without accounting for angle limits. **(Pipelayer only)**

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° (relative to the operator's viewpoint) would display as a roll value of 2.5° 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.

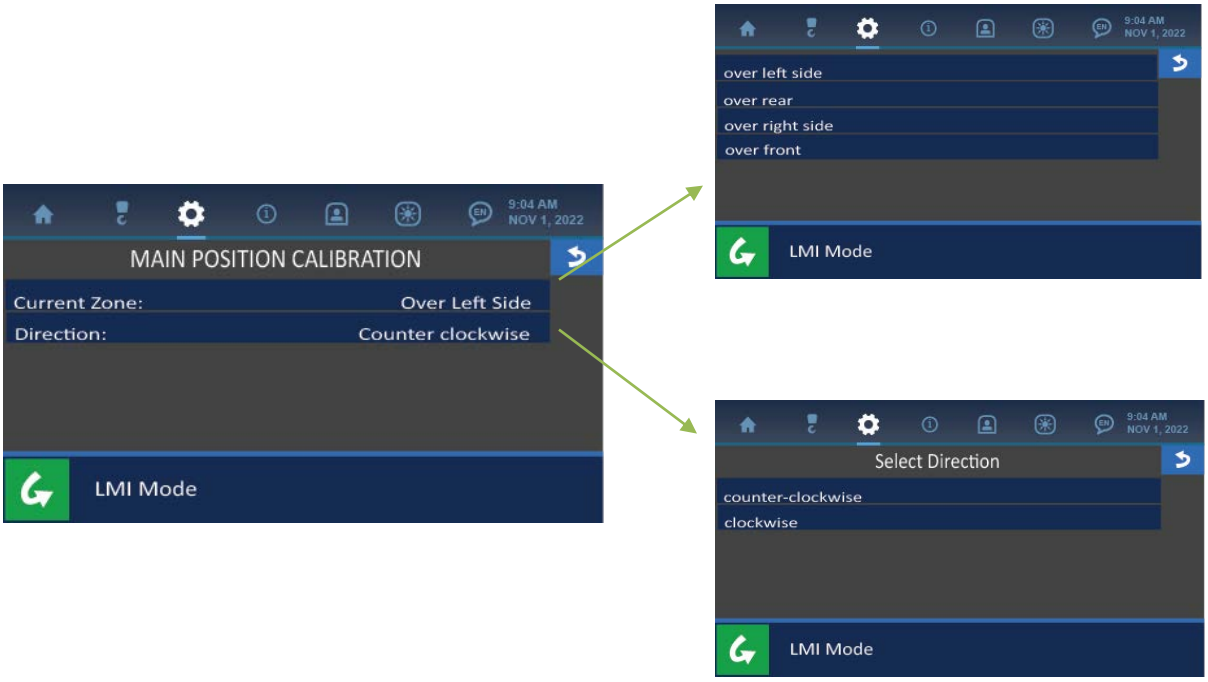
Boom Length Calibration



To calibrate the boom length of the machine, first ensure that the boom is fully retracted. Once retracted, press the 'Set Fully Retracted' button. Then, fully extend the boom and press the 'Set Fully Extended button'. Use the arrow keys to page down from retracted to extended. The system is now calibrated for the specific boom length of the machine.

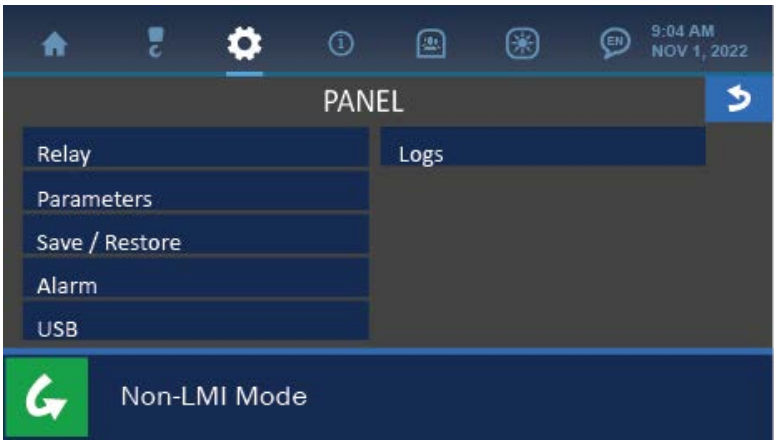
Boom Direction Transducer (BDT) Calibration

To calibrate the BDT, open the 'Position' menu from the Settings screen. Select the option 'Current Zone' and choose the appropriate zone from the menu. Next, rotate the boom into the next zone in either direction and ensure that the panel updated the zone properly. If the display shows the incorrect zone, navigate back to the 'Main Position Calibration' screen and select the 'Direction' option. Change the direction from the current one in use, and rotate the boom again to confirm correct orientation.



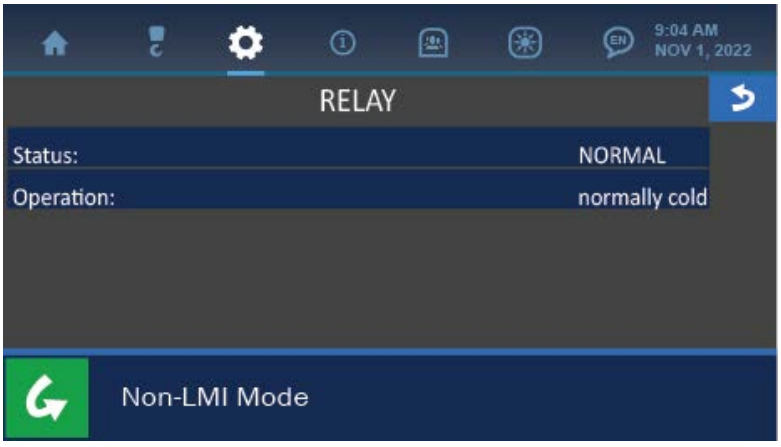
5.3. Panel

The Panel Menu offers the options to: adjust the relay settings, machine type parameters, save or restore the panel and system settings, adjust the alarm startup mode, and enter the USB and logging options.



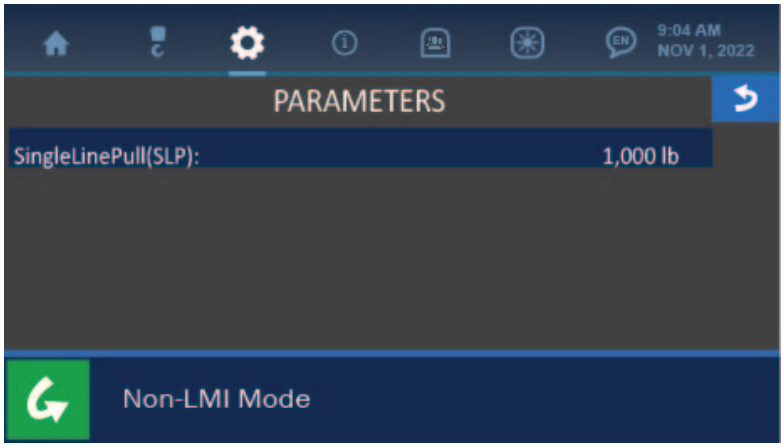
Relay

The Relay Menu allows a supervisor to check on the relay status, adjust the operation mode (normally cold or normally hot) and select which components are controlled by the relay function.



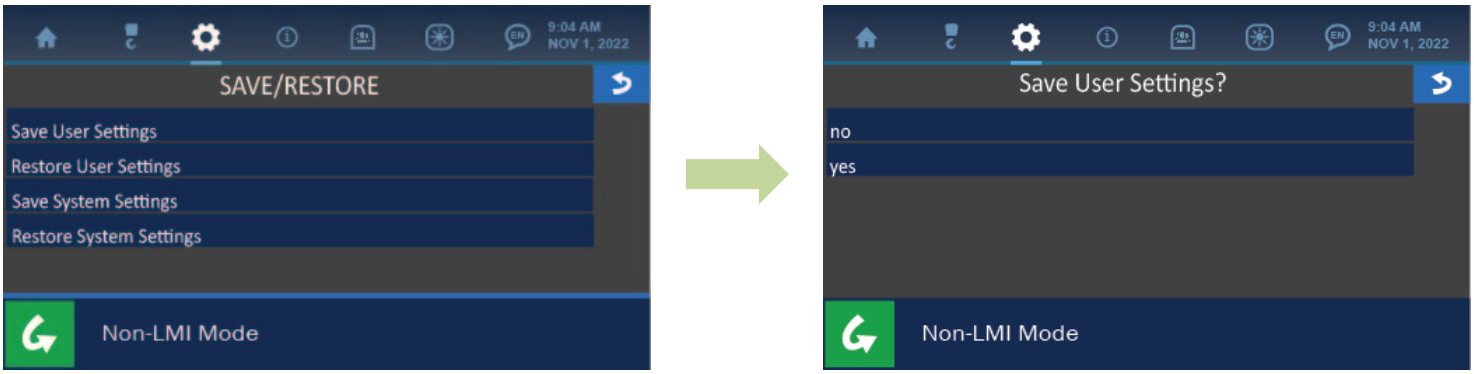
Parameters

The Parameters Menu allows a supervisor to adjust the single line pull parameter of the machine in use.



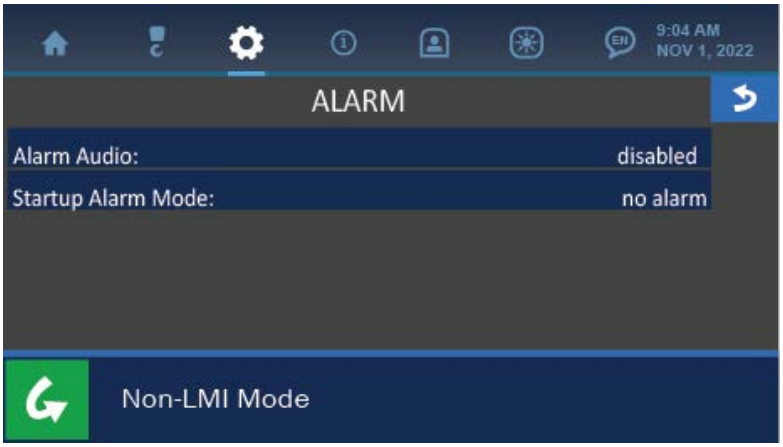
Save / Restore

From the Save/Restore Menu, 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.



Audio

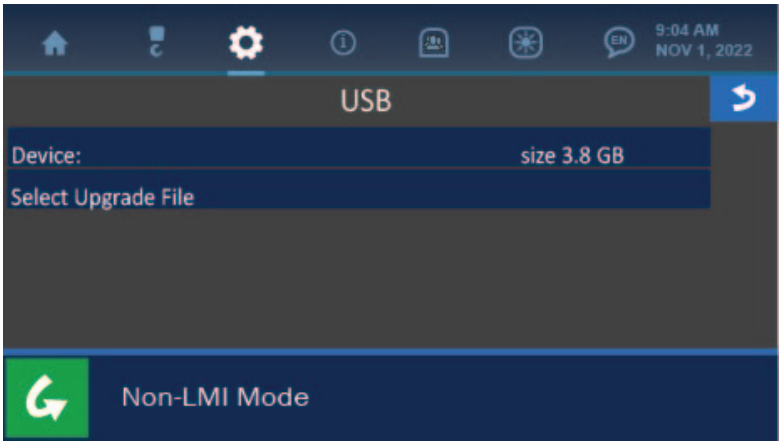
The Audio Menu allows the supervisor to enable or disable the alarm audio.



USB

The USB Menu allows the supervisor to update the system firmware, via a USB drive.

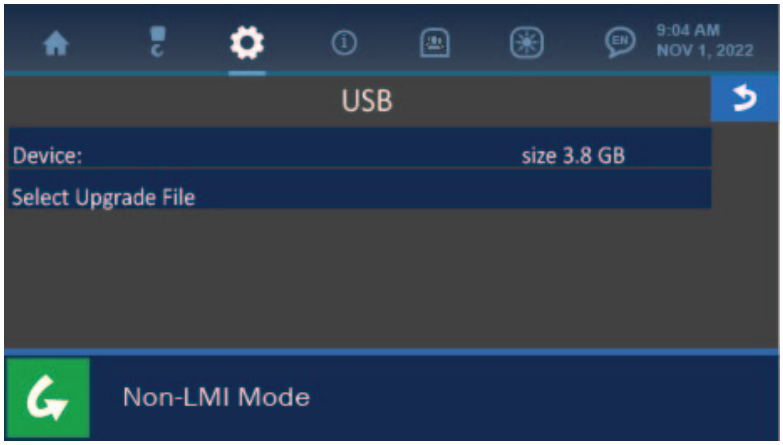
NOTE: See the section: 'Upgrading the System Firmware' of this manual for more information on using this function.



Logs

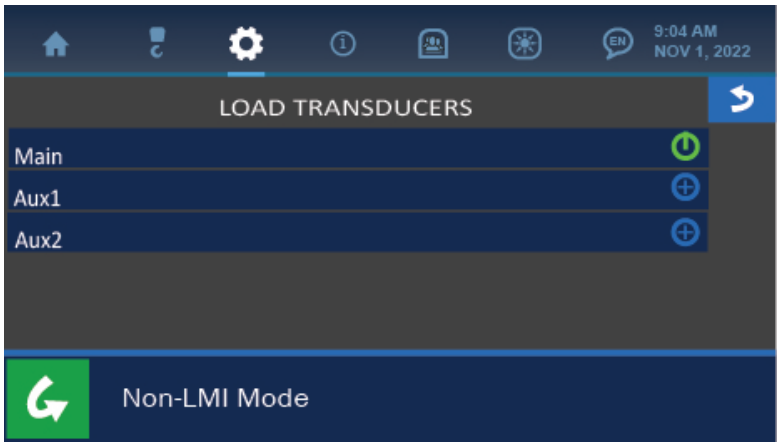
The Logs Menu allows the supervisor to download the systems logged data to a USB drive. The screenshot below shows the default display when no USB drive is detected.

NOTE: See the section: 'Using the USB Functions' of this manual for more information.



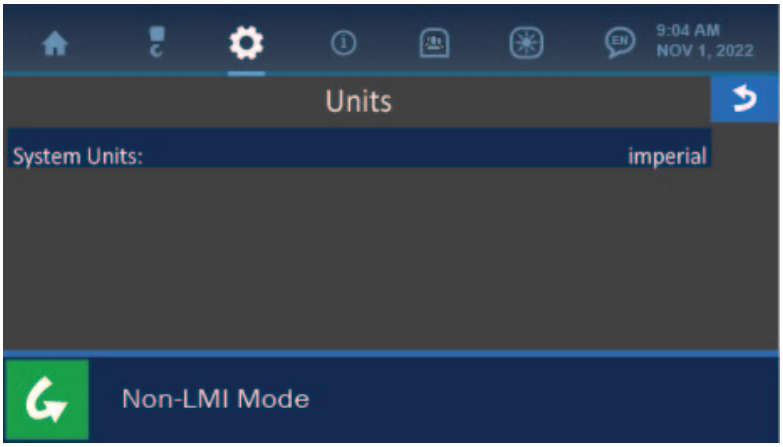
5.4. Enable / Disable / Add

This menu is used to add or remove components from the system and active display. Simply select which transducer to affect, and either activate or deactivate it.



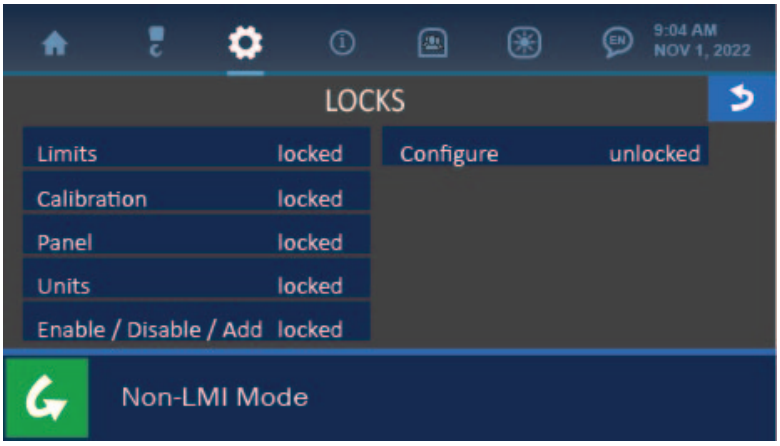
5.5. Units

This menu is used to toggle between metric and imperial units for the parameter display.



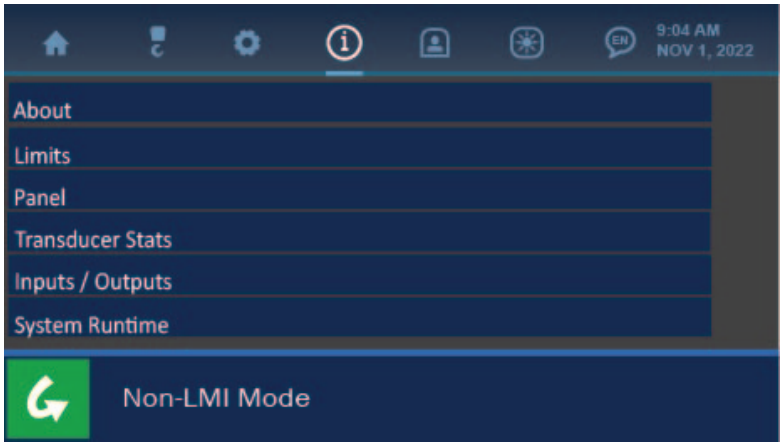
5.6. Locks

The locks are used to restrict user access to certain features. When a feature is locked is restricts accessibility. When a feature is unlocked it grants additional accessibility.



6. The Information Menu

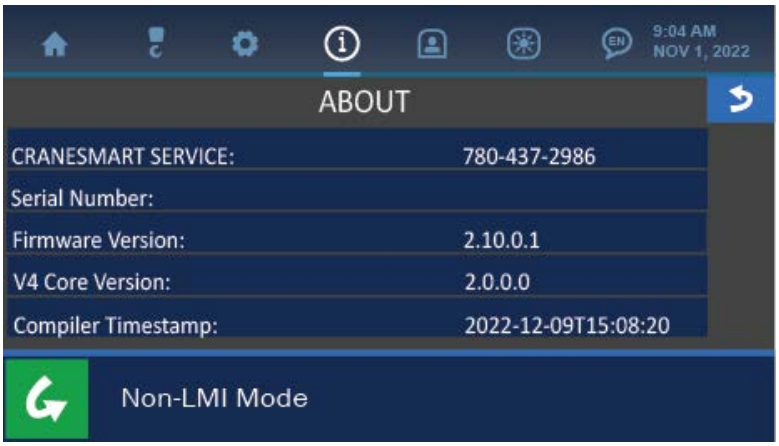
The Information Menu is symbolized by the encircled 'i' icon at the top of the display, and can be accessed by pressing the screen directly overtop this icon. This menu offers options for displaying important information about the system such as: serial number, machine number, firmware version, system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

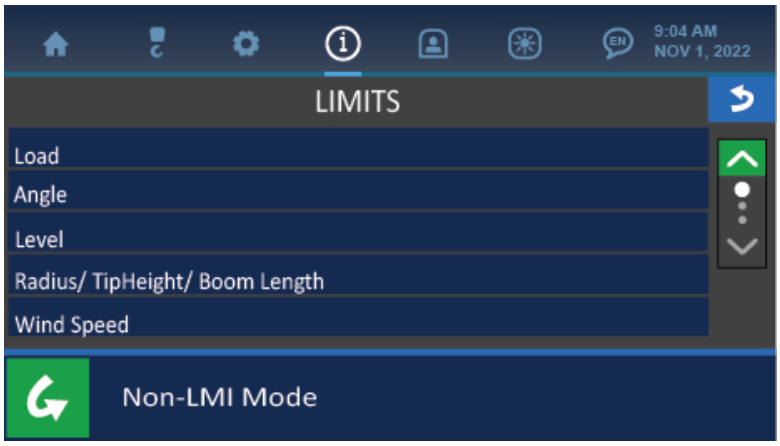
6.1. About

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.

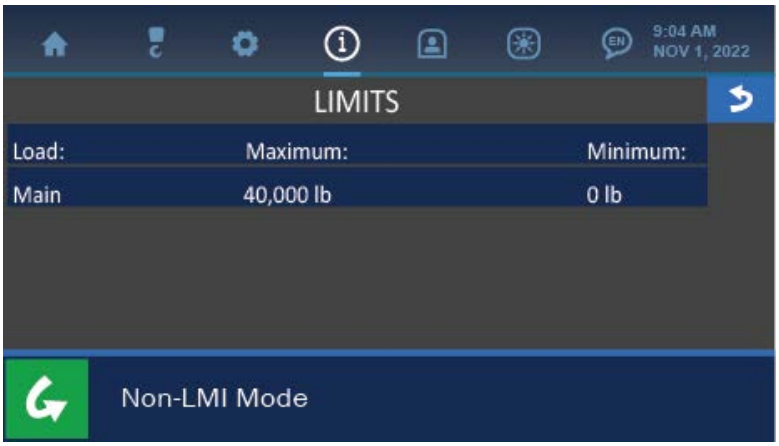


6.2. Limits

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.



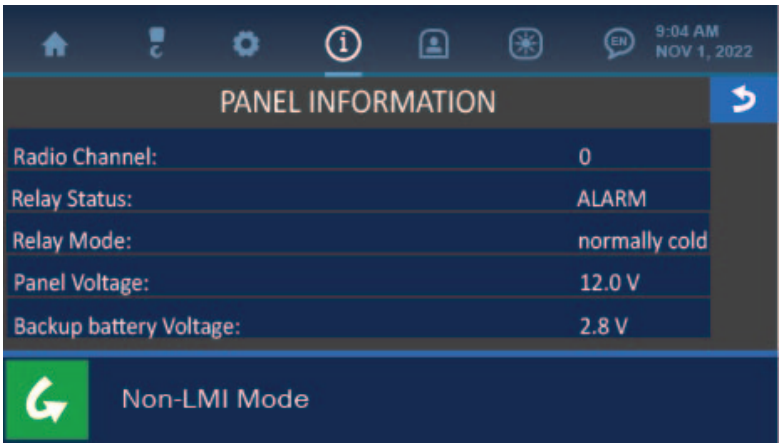
6.3. Transducer Stats – Radio

This screen will show you the status of each transducer active in the system

This screen can be used to troubleshoot radio signal.
See the troubleshooting section of this manual for more details.

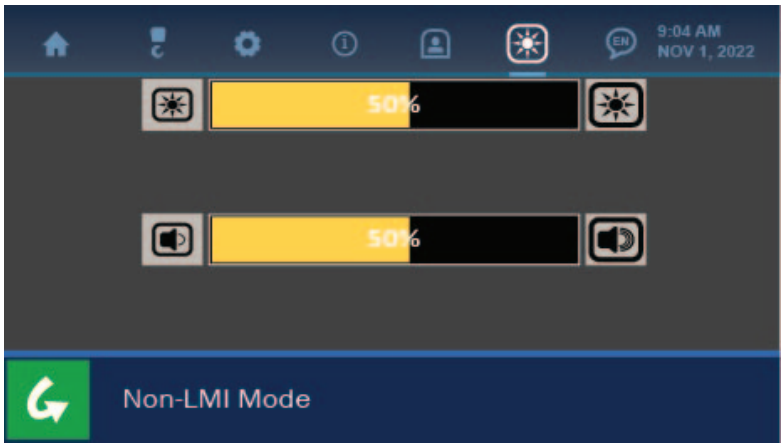
6.4. Panel

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 the *Supervisor Access Screens* section of this manual for more information on configuring the panel's relay function.



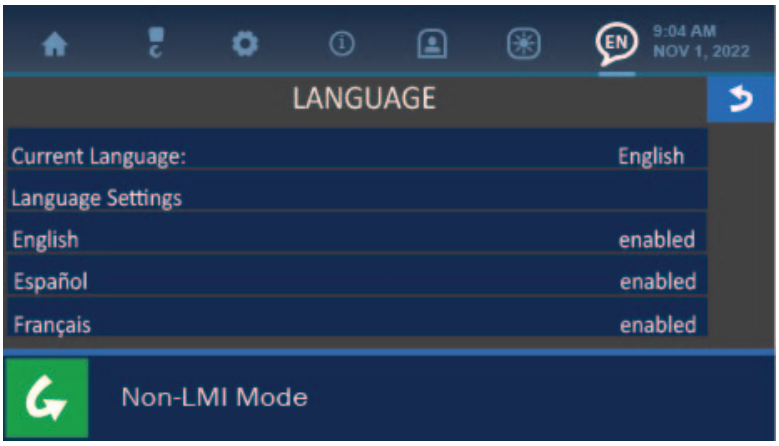
7. The LCD Brightness and Audio Menu

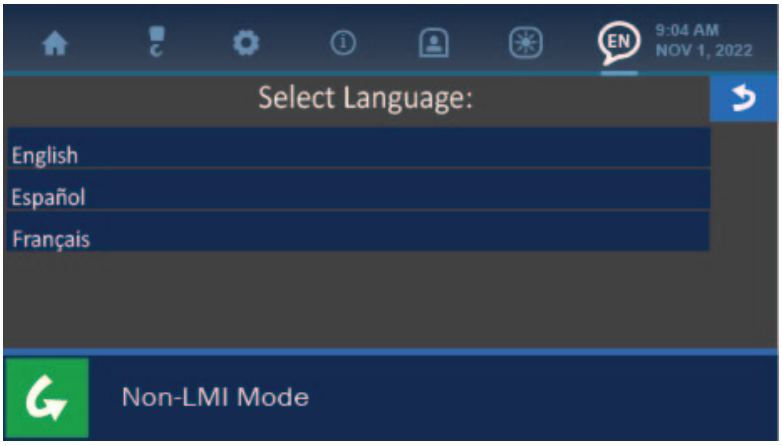
The LCD Brightness and Audio Screen is symbolized by the 'sun' icon at the top of the display, and can be accessed by pressing the screen directly overtop this icon. Use this menu to adjust the screen's brightness and the system sound for optimal display and performance. Press directly overtop the percentage bars in the center of the screen, or press the increment / decrement buttons on either side of the bars to fine tune the adjustment of either parameter.



8. The Language Menu

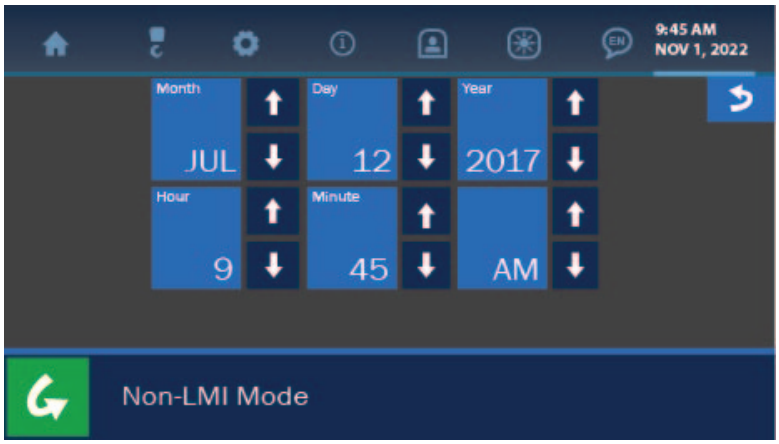
The Language Menu is symbolized by the figure icon at the top of the display.
This allows the operator to select a language. Currently it can be toggled between English and Spanish. Additional languages may be available in the LMI version of the system or upon request. Please contact us for more information.





9. The Time and Date Menu

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.



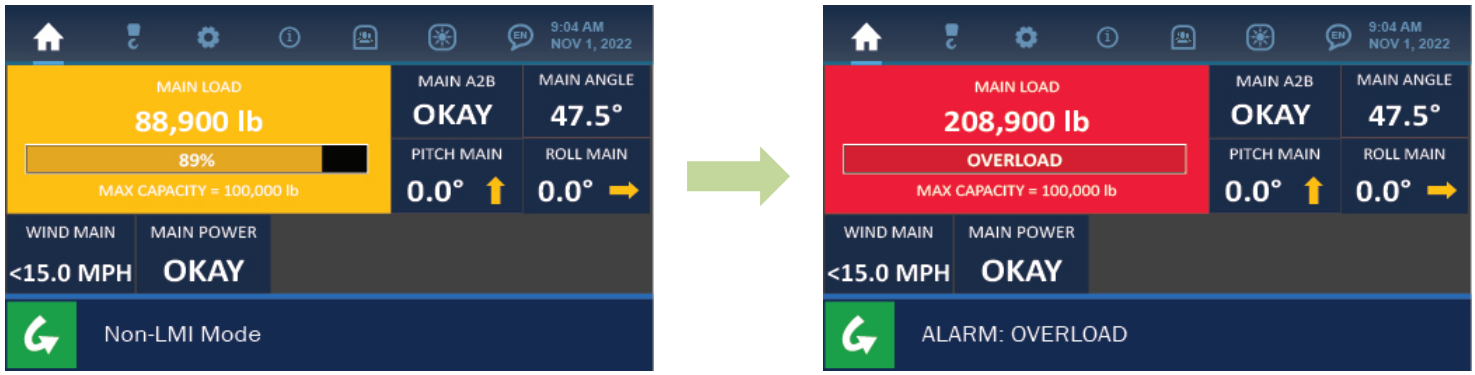
To change the date and time currently displayed, use the up/down arrows beside the year – month – day – hour - minute. Once the display is correct, press the (green) 'Accept' button to save the change and return to the previous screen. ***NOTE: See "Understanding The User Interface' section of this manual for more information on the Value Entry Screen.***

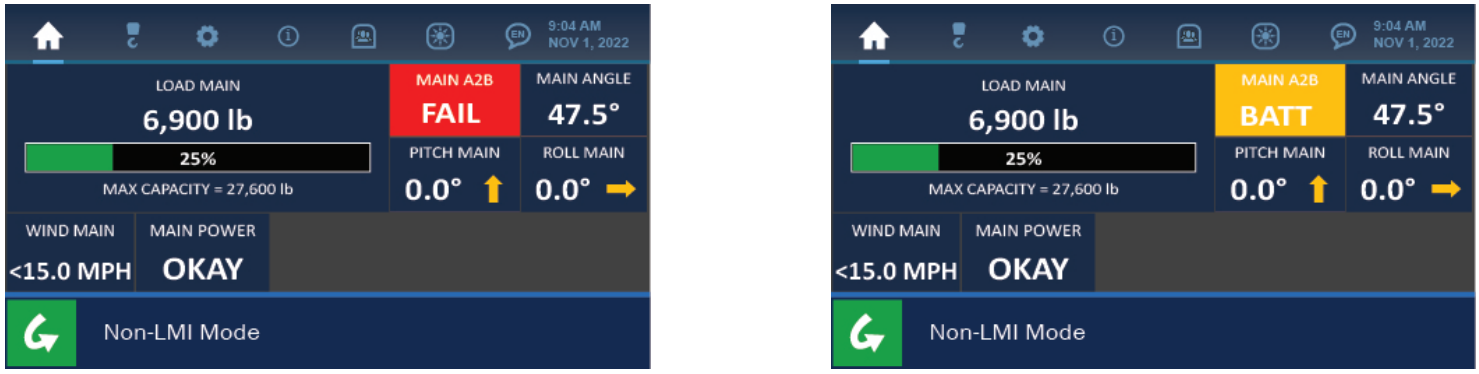
10. Troubleshooting

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

10.1. 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.





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 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.

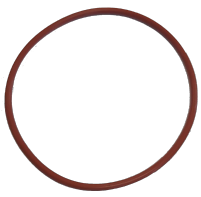
10.2. Replacing a Transducer Battery

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.

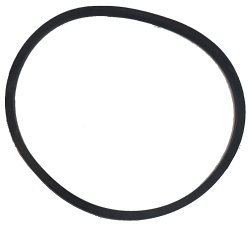
- **NOTES: If it is humid, raining or snowing – DO NOT OPEN THE TRANSMITTER. Remove the transmitter and perform the battery replacement indoor or undercover.**
- **A 3.6V Lithium battery can be purchased from a local battery store for use with the load cell. Use the existing system battery for size matching.**
- **If purchasing a new battery, the O-ring will need to be reused. Use grease as per the instructions below, when installing the o-ring.**
- **The rectangular black O-ring is for transducer lids with 1 screw**
- **Legacy Load Cells uses a gasket to seal. Obtain gasket maker (silicone) form a local supplier. After you've removed the cover clean all surfaces of gasket material. Apply gasket maker to the cover while avoiding screw holes. Refer to instruction below for guidance on battery replacement.**

Battery Kit Contents

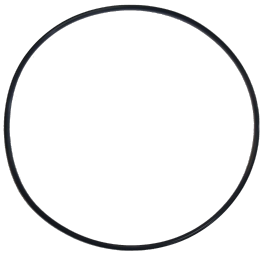
- (1)3.6 volt lithium ion D-cell battery
- (1)O-Ring Tx Battery Lid Square (rectangular)
- (1)O-Ring Tx Battery Lid Square (red)
- (1)O-Ring 15k/25k Cell Boat
- (1)O-Ring 40/50k Load Cell
- (1)O-Ring 80k cell boat
- (1)1/8" Hex Key
- (1)5/32" Hex key
- (1)Grease, 6g Battery Kit



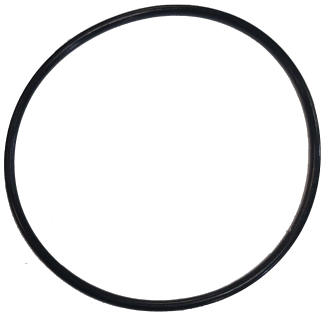
This O-ring is red and is used for all transducers with a lid that takes 4 screws.



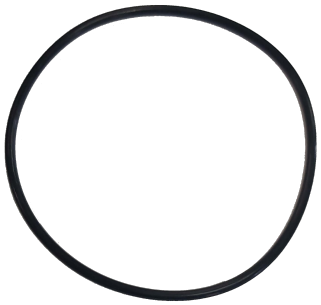
This O-ring is Black and square. It is used for all transducers with a single screw on the lid



This O-ring is the middle size and thinest of the O rings. it is used for load cells in the 7.5k-25k capacity range



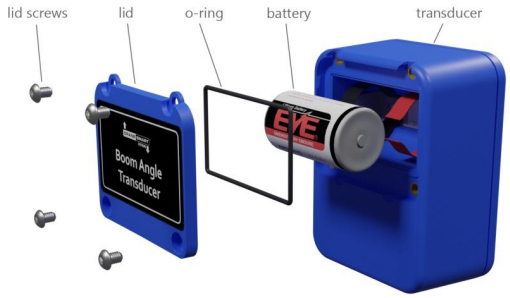
This O-ring is the same diameter as the other largest O ring. The thickness of this ring is slightly smaller than example 5 with dimensions of 4 x 1/8. This is used in load cells in the 40k-50k capacity range.



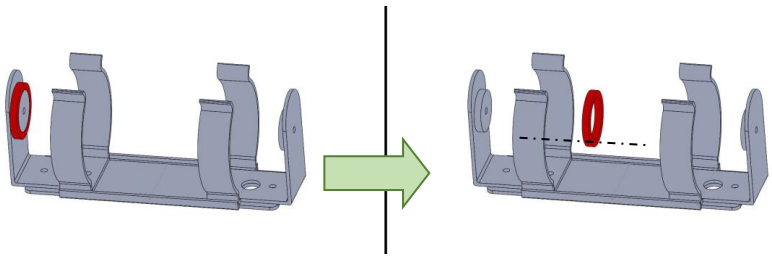
This O ring is the largest of the O-rings. Similar visually to example 4. The dimensions of this O ring are 4.125 x 1/8. This is used in load cells with 80k capacity and higher.

To Replace the Battery:

1. Remove the screws from the battery compartment lid and remove the lid. *Take care not to lose the screws*
2. Remove the battery from the holder and wait for 30 seconds – 1 minute before installing the new battery.
3. Insert the new battery according to the battery picture on the base of the battery clip.
4. Make sure that the replacement O-ring (see below) is well greased and has not been damaged. If there is insufficient grease or damage this will affect the seal.
5. Replace battery compartment lid and secure with screw.



For both sealing methods: remove the positive terminal battery washer to accommodate the recent change in battery type.



11. Appendix

11.1. Installation Instructions

Guidelines

Read these instructions before beginning installation.

If the power available is not 12 - 24 (28VDC Maximum) Cranesmart Systems can supply the necessary converters. Please call our sales department at (888) 562-3222 or (780) 437-2986.

- Have the necessary tools available.
- Mount the transducers - load cell, angle transducer, A2B switch, etc.
- Mount the panel, alarm hub and antenna.
- Test the system.

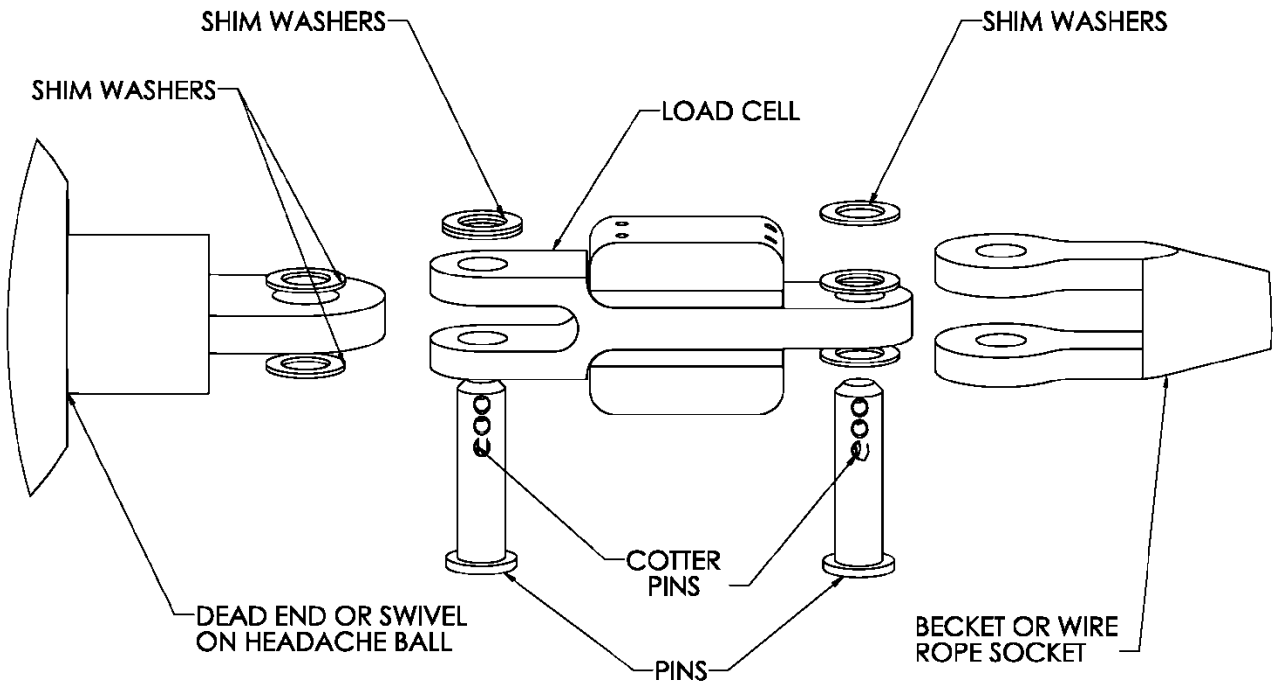
Tools Required

- Man basket (if the boom cannot be lowered) – to reach the boom, rooster sheave and/or jib.
- Pliers – for removing and bending cotter pins.
- Electric drill with drill bits.
- Welder – for attaching weld plate to boom/jib tips, if installing A2B or angle systems (not required for load cell installation).
- Wire crimping tools – for the display panel power and ground connections.
- Screwdrivers and/or socket set.
- Anti-seize compound for bolts and threaded pins to ensure the components can be disassembled and/or removed if necessary.

11.2. Load Cell Link Installation A

(Male/Female Load Cell Installation – 7.5K/15K/25K)

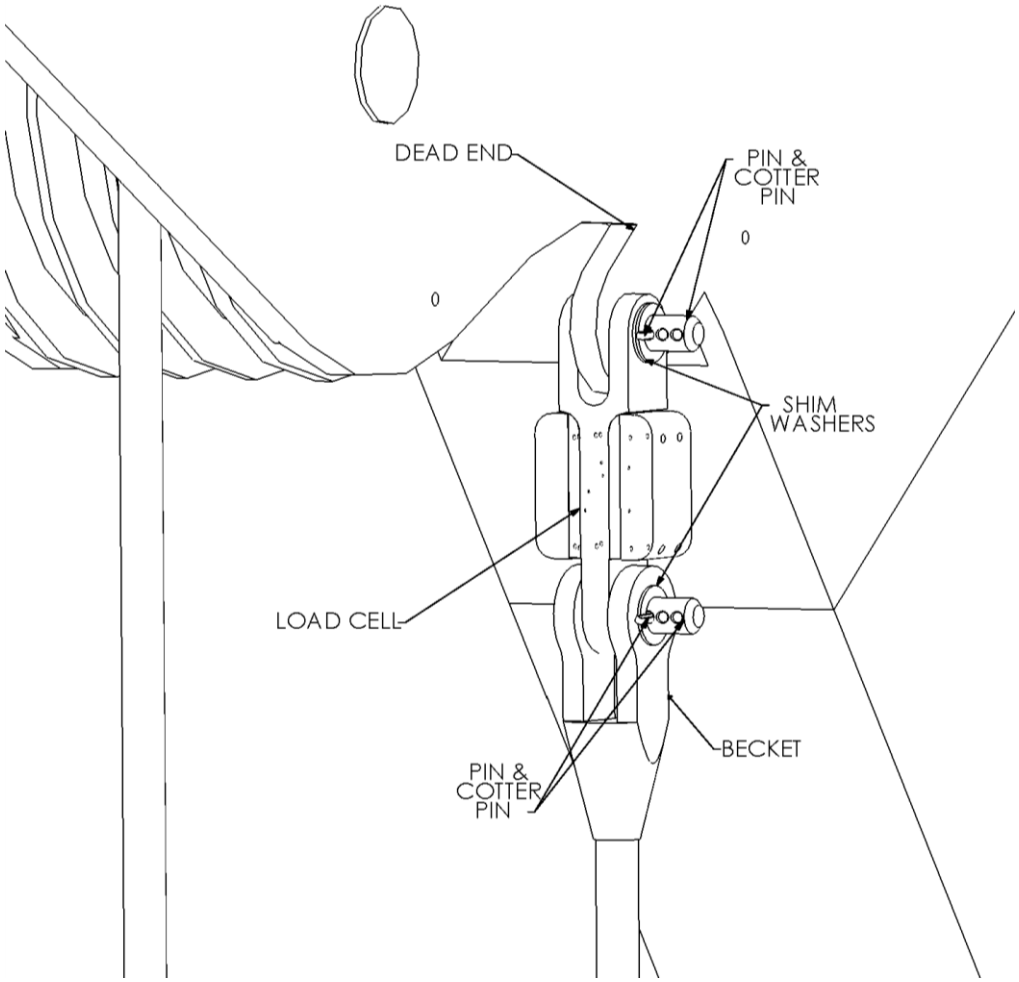
1. Pin the blue (main) load cell between the wire rope socket (becket) and the dead end on the main boom of the crane.
2. Pin the yellow load cell (Aux 1) between the wire rope socket (becket) and the headache ball or the auxiliary sheave (rooster) on the crane's boom tip. (Orange is for the Aux. 2 winch, if applicable.)



11.3. Load Cell Link Installation B

(Male/Female 7.5K/15K/25K Load Cell Link Placement Dead-End for Multiple Parts-Of-Line)

NOTE: Ensure the load cell does not contact the boom or rigging at any angle when pinned in place.



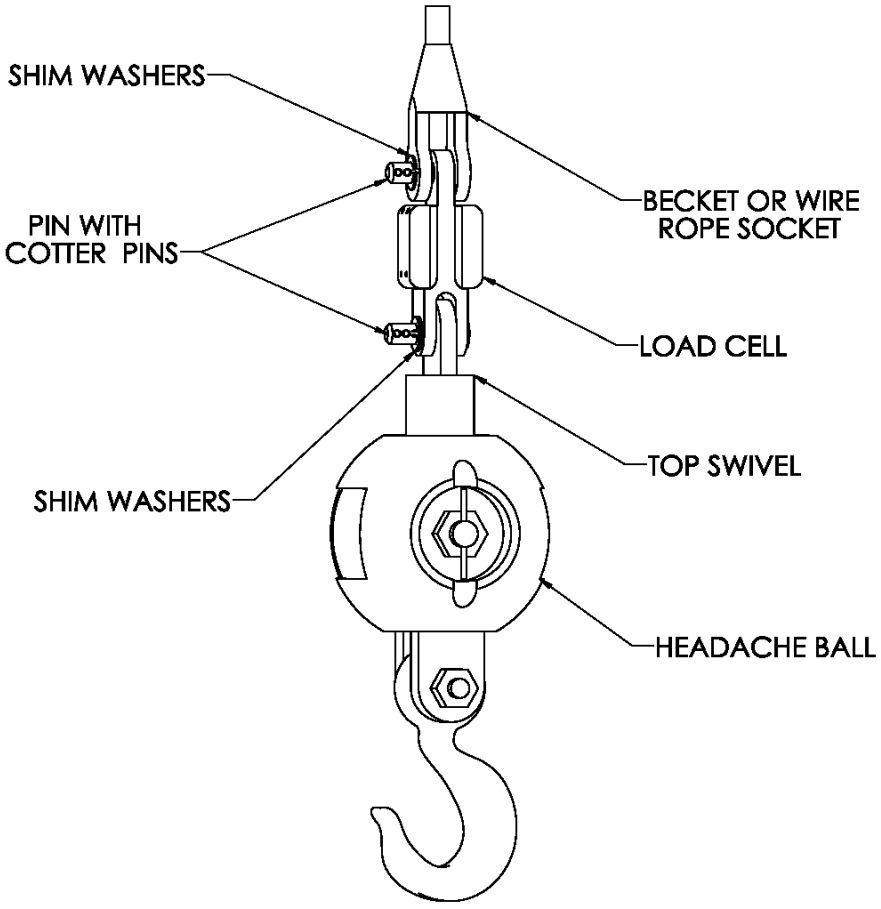
11.4. Load Cell Link Installation C

(Male/Female 7.5K/15K/25K Load Cell Link Placement on Headache Ball for Single Part-Of-Line)

Pin the load cell link between the wire rope (wedge) socket and the 'headache ball' or hook block as illustrated below.

The system is factory calibrated. To address any questions, please call the Cranesmart Systems sales department at (780) 437-2986.

NOTE: Custom links are available to help fit the load cell on the ball, if necessary.



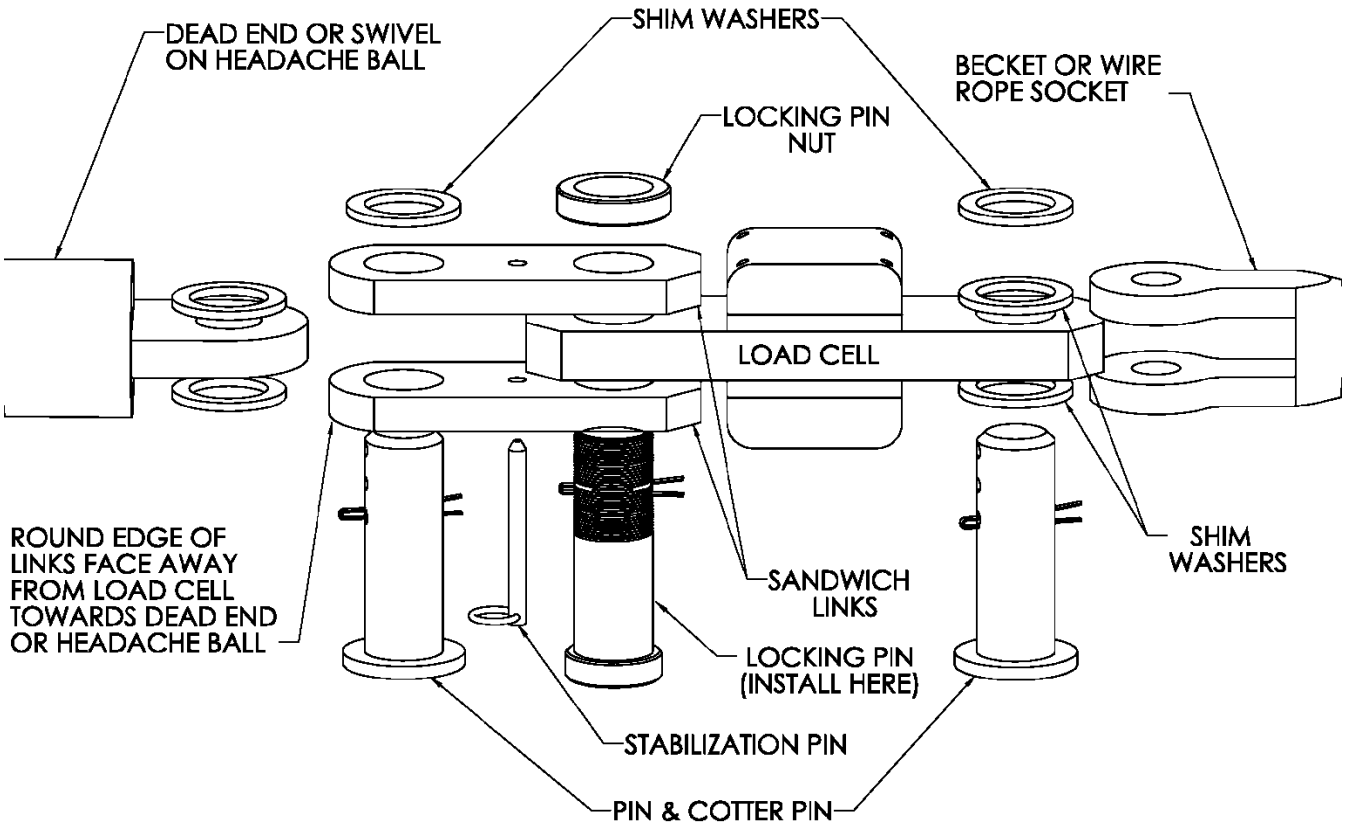
11.5. Load Cell Link Installation D

(Male/Male 40K/50K/80K Flat Link Load Cell Link Installation)

Sandwich Link Stabilization Pin – Male/Male flat link load cells only

The sandwich link stabilization pin prevents the sandwich link from folding against, and damaging the load cell when the headache ball or hook block is laid on the ground or during a two-blocking. Ensure that this pin is securely in place. Also ensure that the locking threaded centre pin and the stabilization pins are located in place as illustrated below.

NOTE: Ensure the load cell does not contact the boom or rigging at any angle when pinned in place.

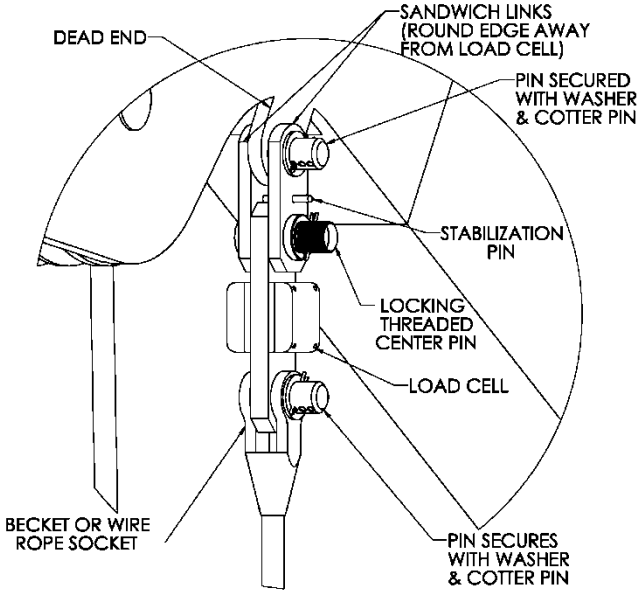


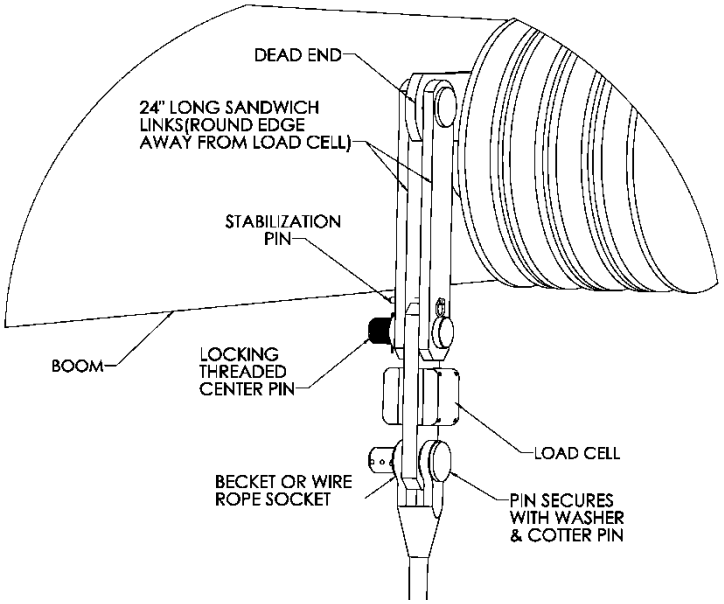
11.6. Load Cell Link Installation E

(Male/Male 40K/50K/80K Load Cell Link Placement on Boom Tip Dead-End for Multiple Parts-Of-Line)

The drawings below show the standard sandwich link installation and the optional 24" long sandwich link installation. Use the sandwich links to pin the load cell link between the wire rope socket (becket) and the dead-end boom tip as illustrated below. Place the locking threaded centre pin (important) and the stabilization pin as illustrated below.

NOTE: Each system is factory calibrated. Please call the Cranesmart Systems sales department at (780) 437-2986 for assistance and/or further information.

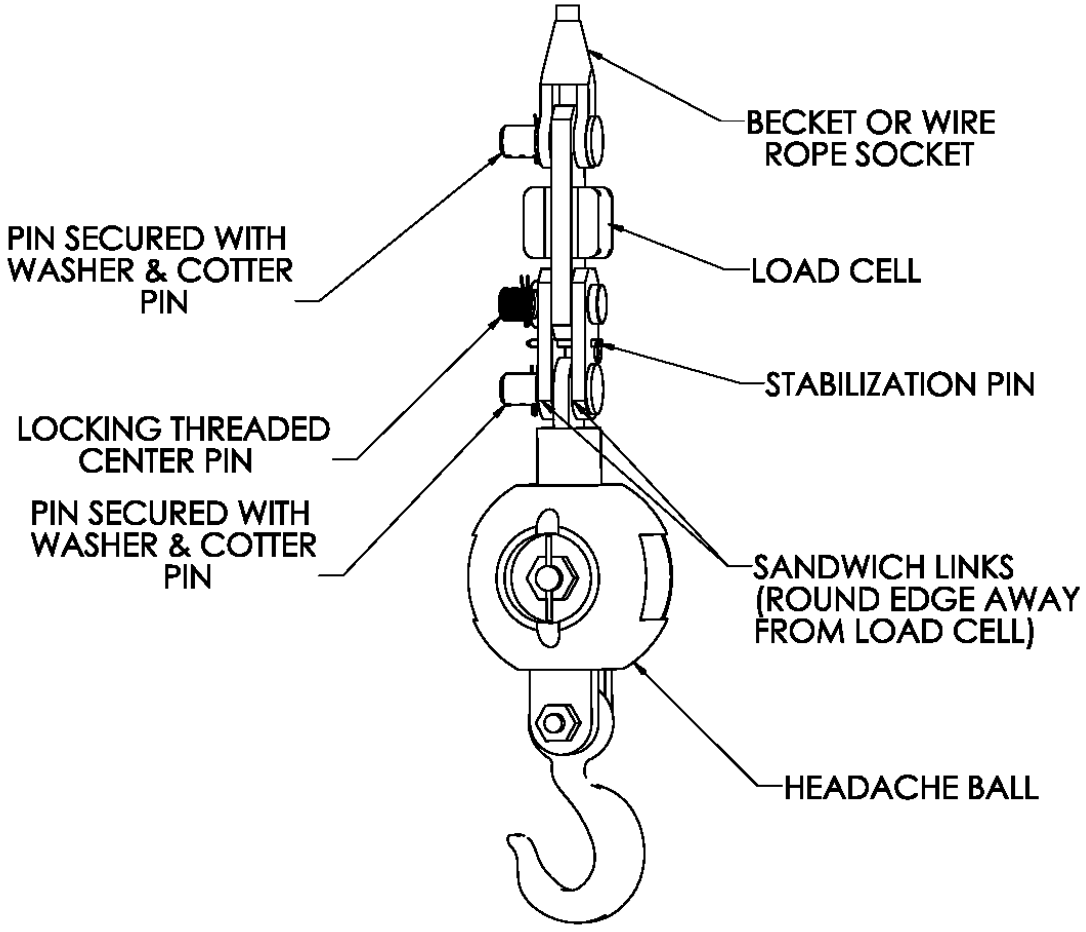




11.7. Load Cell Link Installation F

(Male/Male 40K/50K/80K Load Cell Link Placement on Headache Ball for Single Part-Of-Line)

Pin the load cell link between the wire rope (wedge) socket and the 'headache ball' or hook block as illustrated below. Place the locking threaded centre pin and the stabilization pin as illustrated below.

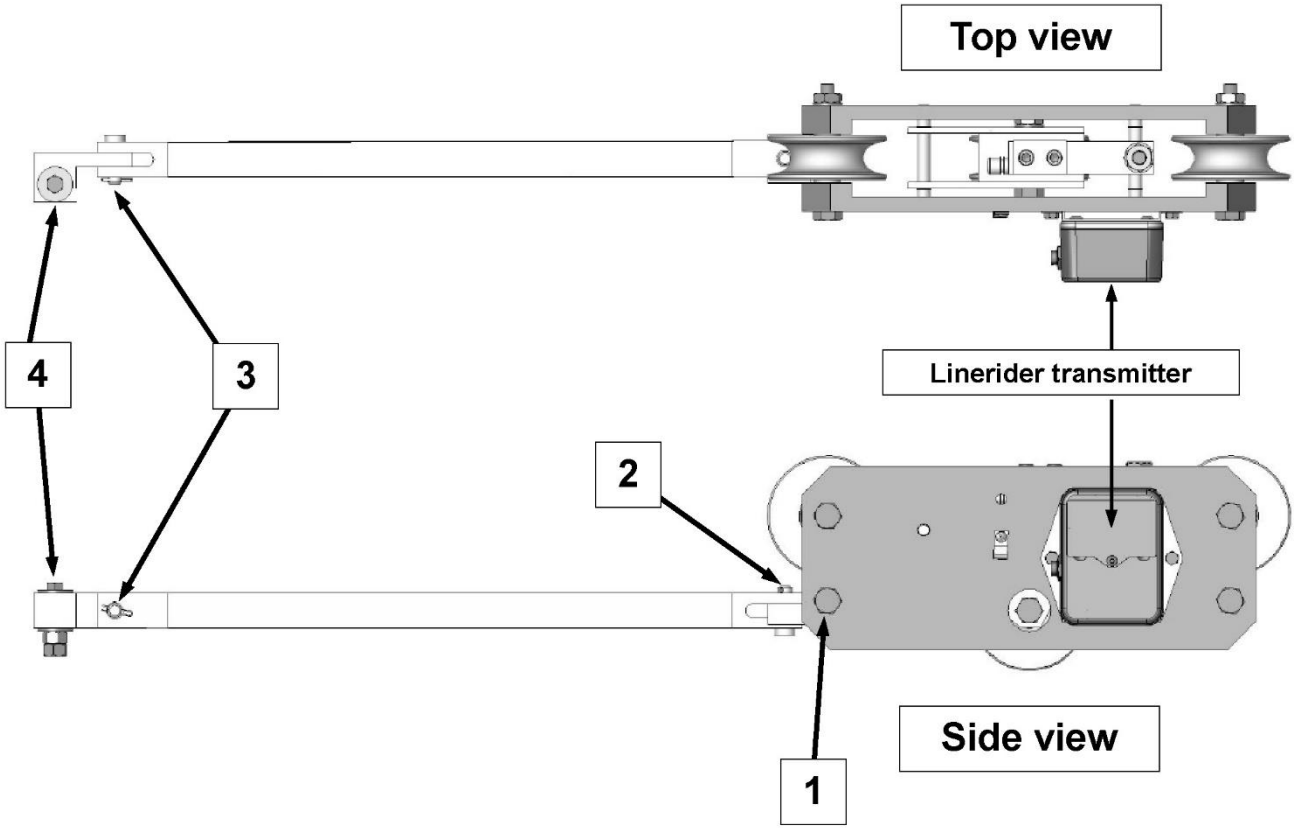


11.8. Radio Linerider Installation

The linerider installation will vary, depending on the type of crane boom it's being installed on. Follow the instructions below for hydraulic or lattice style boom installation.

The linerider is attached to a swing arm mounting bracket (included with kit) as shown in the illustration. The swing arm assembly has four joints:

1. Vertical movement at the attachment point to the linerider
2. Horizontal movement of the swing arm
3. Vertical movement of the swing arm
4. Swivels horizontally around the mounting bolt



Linerider and swing arm assembly

11.9. Hydraulic Boom Linerider Installation

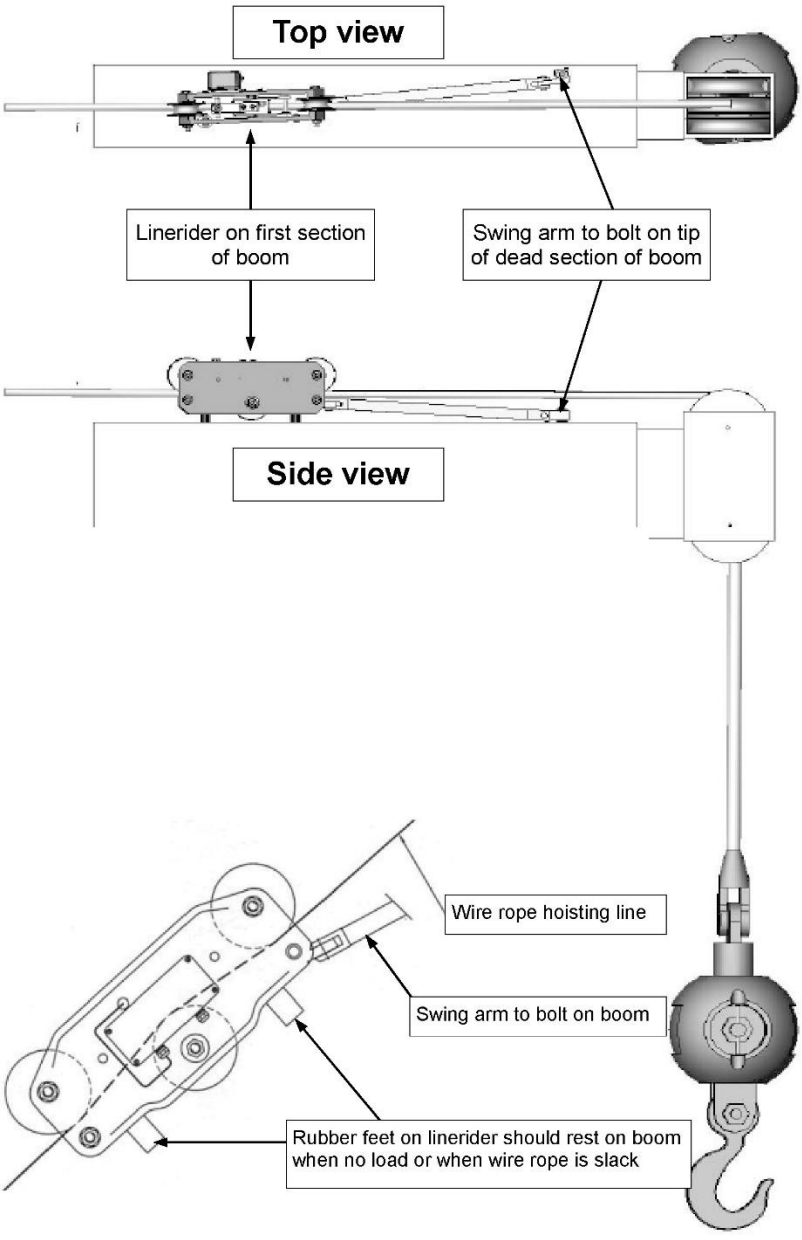
NOTE: The linerider should be located on the top of the boom and as close to the dead-end section of the boom tip as possible (see the illustration below).

1. Affix the bolt at the tip of the base section (dead section) of the hydraulic boom as illustrated to the right. Select a location so that the swing arm angle with respect to the boom will not exceed 30° during normal operation of the crane. The linerider should be located on the top of the boom and as close to the tip of the base (or non-moving) section as possible.

2. Attach the swing arm to the bolt.

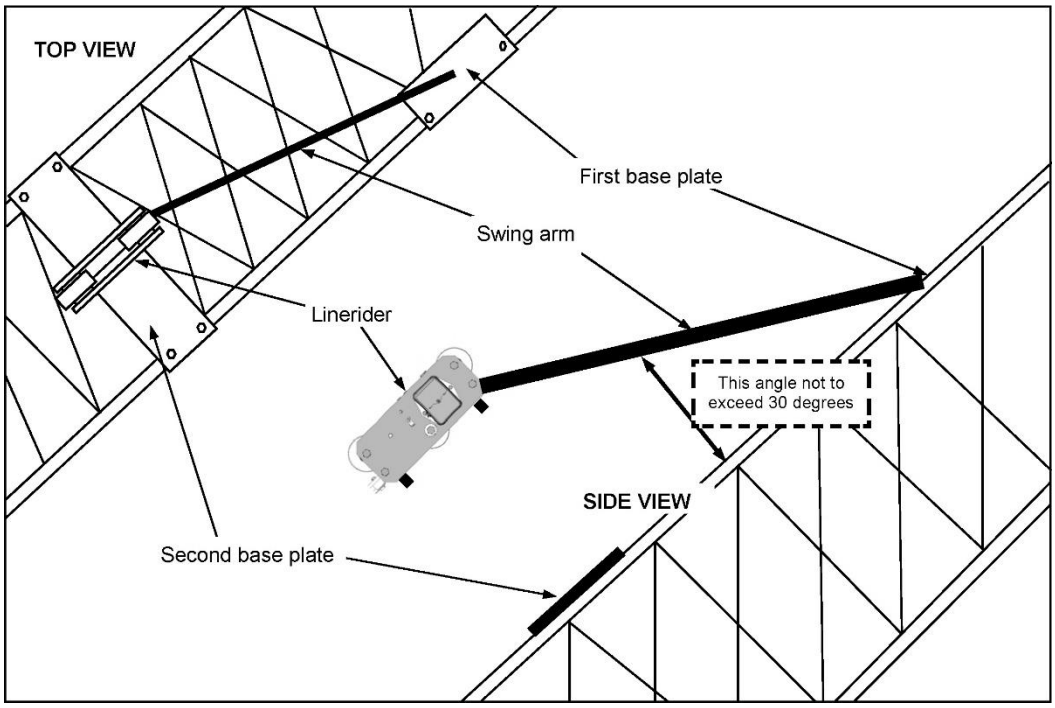
3. Run the hoist line through the linerider (see the section *Installing the Wire Rope Through the Linerider* of this manual).

4. Check to ensure that the linerider has freedom of movement from side to side.



11.10. Lattice Boom Linerider Installation

NOTE: The linerider should be located on the top of the boom and as close to the boom tip as possible.



1. Select a location that the swing arm angle with respect to the boom will not exceed 30°. The linerider should be mounted as close to the lattice boom tip as possible.

2. Construct two base plates. The size of the base plates will be specific to the lattice structure and the plate location.

3. The first base plate will be attached to the boom with the swing arm bolt affixed to the center of the base plate.

4. The second base plate will be attached to the boom so that it supports the linerider when not in use.

5. Affix the swing arm bolt to the center of the first base plate.

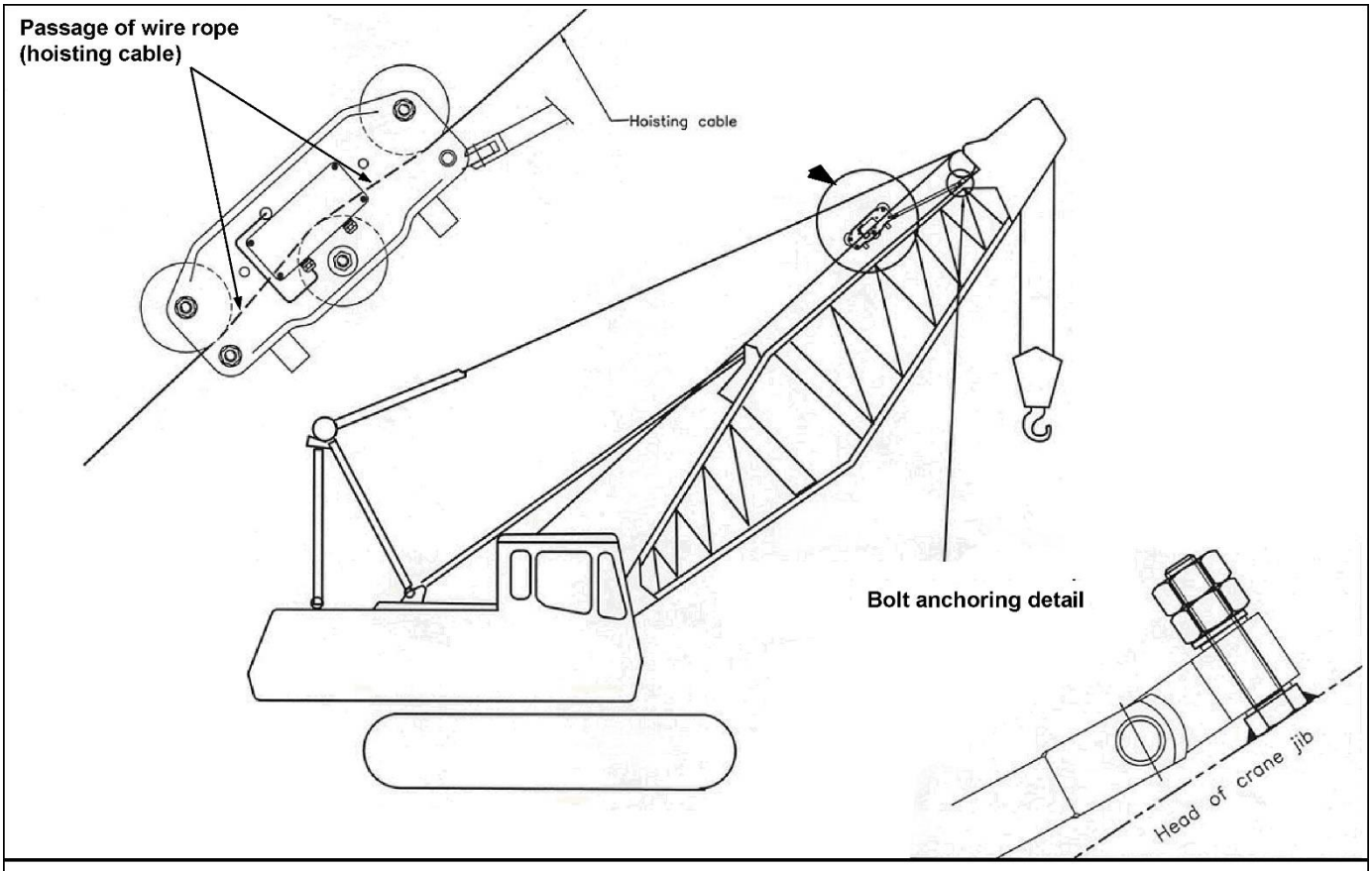
6. Affix the first base plate to the selected location on the lattice boom.

7. Attach the swing arm to the bolt.

8. Run the wire rope (hoisting line) through the linerider (see the section *Installing the Wire Rope Through the Linerider* of this manual).

9. Ensure freedom of movement from side to side.

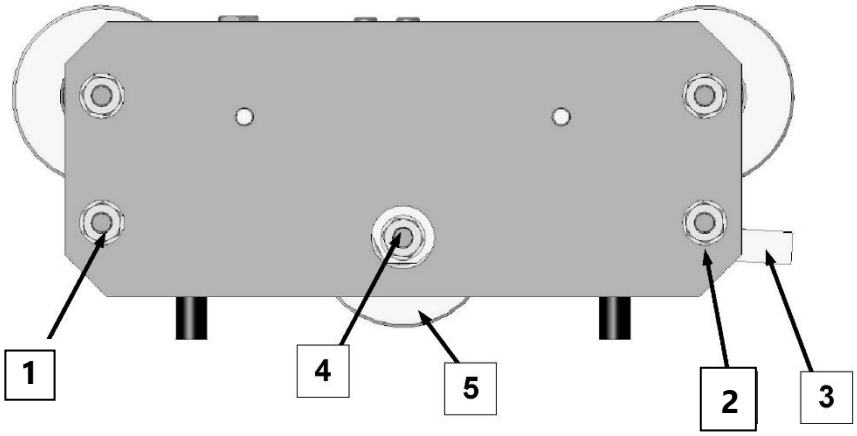
10. Attach the second base plate to the boom so the linerider's rubber feet will touch the plate when there is no load (wire rope is slack).

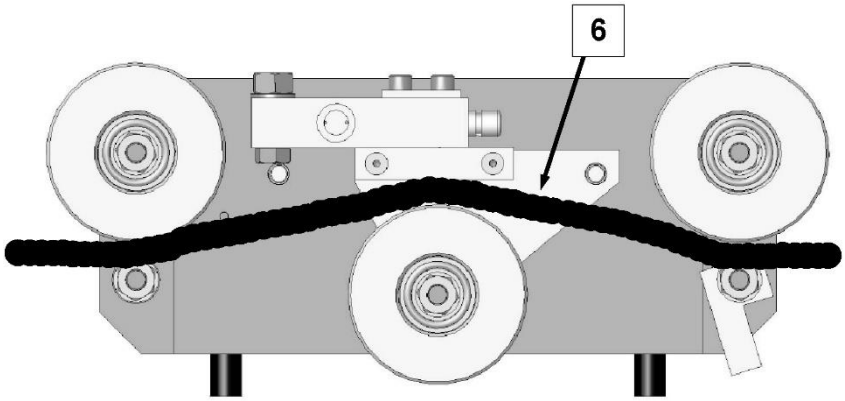


Linerider Mounting on Lattice Boom Tip

11.11. Installing the Wire Rope Through the Linerider

1. With the linerider positioned as illustrated, remove the free axle (at bottom left of the linerider).
2. Remove the anchoring axle (at bottom right of the linerider).
3. Remove the anchor component with sleeve.
4. Remove the measurement pulley axle (at the left center of the linerider).
5. Remove the pulley with its sleeve.
6. Pass and position the wire rope (hoisting cable) as illustrated.
7. Reassemble the linerider in reverse order to the above disassembly steps.





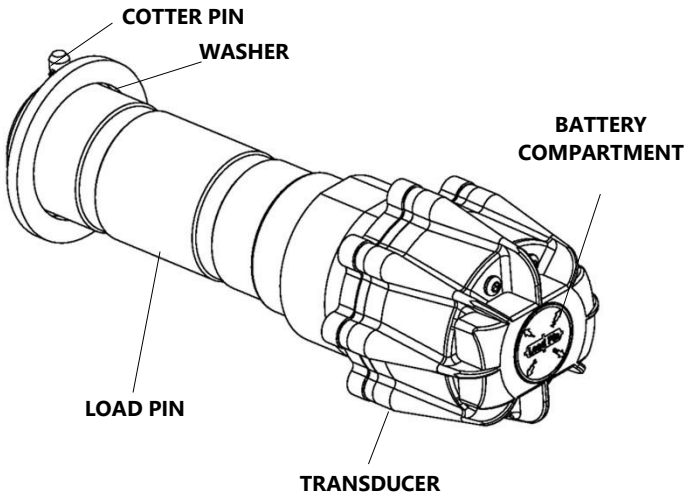
11.12. Load Pin Installation

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 directly.



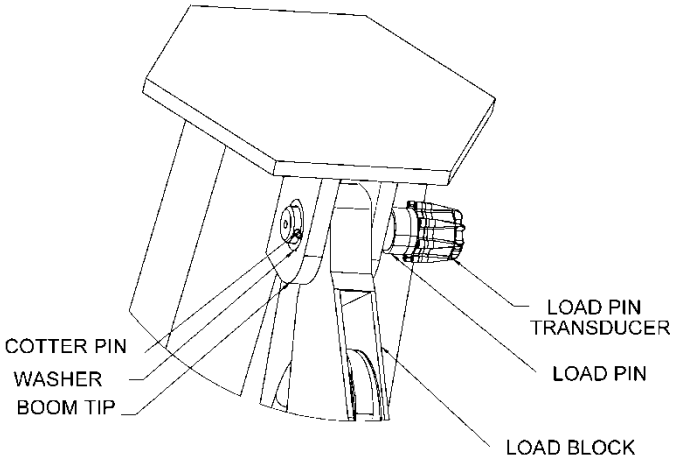
3. **Align the hammer jig against the load pin plate**

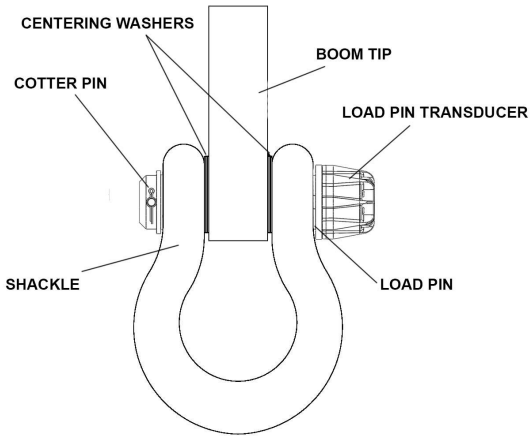
   Place the jig to fit around the transducer box and against the load pin plate, then hammer the red end of the jig until the pin is in place.

4. **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.

NOTE: The hammer jig is only used for larger sized load pins.





5. **Check for free rotation of the load pin**
   Once the pin is installed properly, check that it can move freely by rotating it 360°.

6. **Check for good signal strength on the display panel**
   See the Information Menu section of this manual for instructions on checking the component signal strengths.

7. **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 the Load Indication section of this manual.

8. **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.

11.13. Radio Cable Reel with Boom Angle Measurement

The Cable Reel measures boom length and boom angle and is commonly purchased as part of the LMI (Load Moment Indicator) system for hydraulic cranes. The drum is attached to a fixed position on the base boom section of the crane and the end of the cable is anchored to the tip section of the boom. The number of revolutions the drum makes calculates length. The cable reel then transmits the boom length to the display panel. There are two sizes of drums: a small drum, 15" in diameter, suitable for crane booms with a hydraulic extension spanning up to 100ft, and a large drum (32" diameter) suitable for crane booms with a hydraulic extension spanning up to 200 ft.

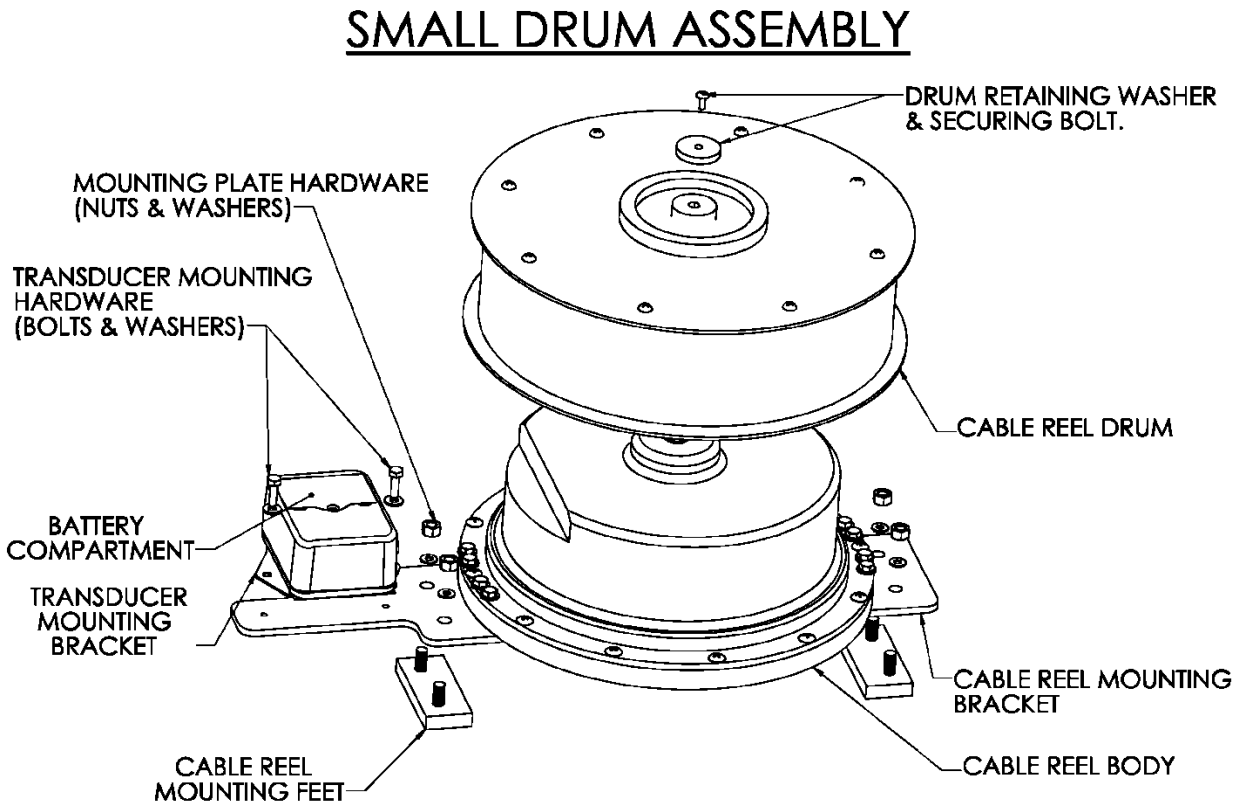
Cable Reel Warning

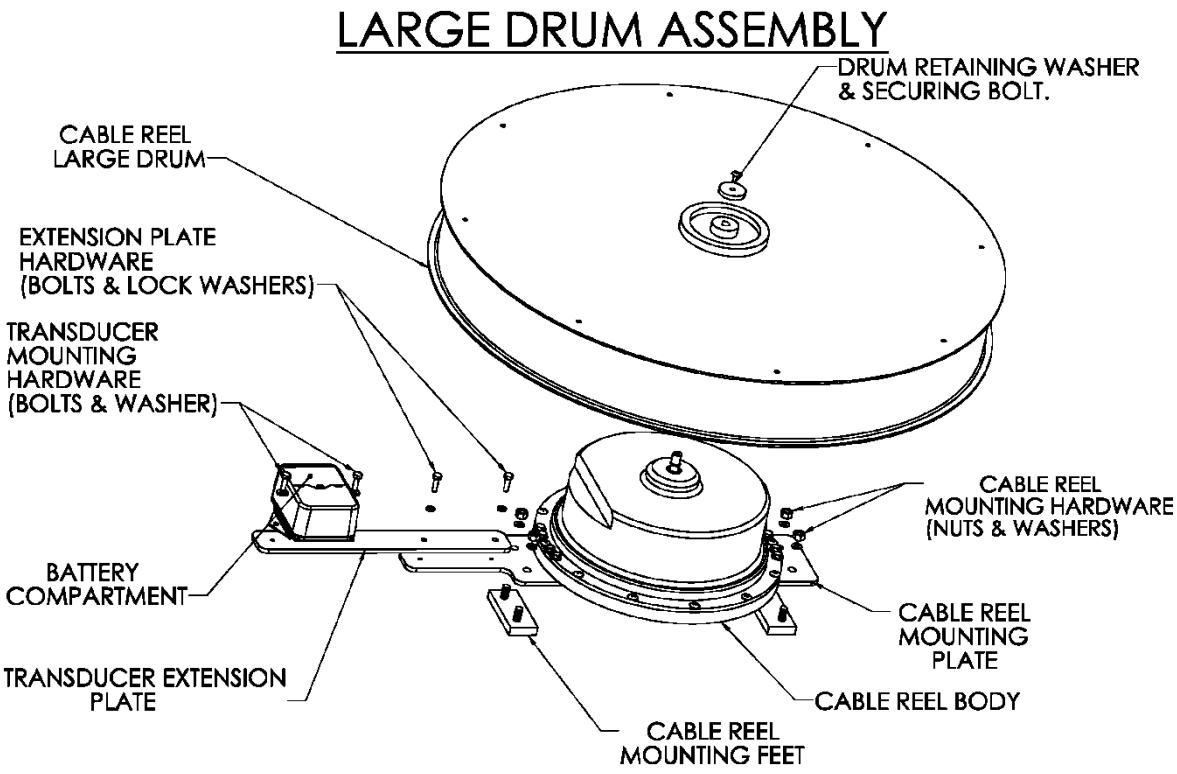
The spring in this cable reel is capable of 24 revolutions before the spring will not return to its neutral positions. This makes it seem like the reel is losing tension.

When Initially extending the boom with cable reel installed CARE MUST BE TAKEN TO AVOID EXCEEDING 24 REVOLUTIONS. EXCEEDING THIS MAXIMUM WILL LEAD TO A NON WARRANTY REPAIR.

You may mark the drum to help identify when a revolution has happened.
If there is more boom then cable please contact Cranesmart Service Department for instructions

Cable Reel Assembly





NOTES:

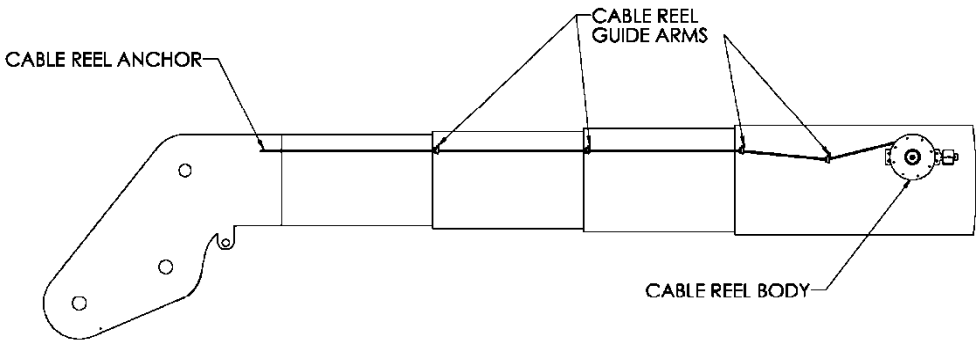
- ***The cable reel assembly should not come in contact with the cradle rest or other obstructions while the crane is in use or being put away.***

- ***The cable reel transducer must have an unobstructed line of sight back to the display panel's antenna.***

- ***Orient the mounting bracket so that the transducer is closer to the receiver's antenna.***

Cable Reel Installation

The cable reel is set up for use on the left side of the boom but it can be installed on either the left or right side of the boom. The drawing below shows standard left side boom installation with the cable spooling off the drum from the top. If mounting the cable reel on the right side of the boom, the cable will spool off the drum from the bottom, and the orientation of the (blue) transducer must be adjusted. Always ensure that the labels on the transmitter box are right side up and that the connector is at the bottom of the case. If this is not done the boom angle will not function properly.



Installation of Mounting Feet

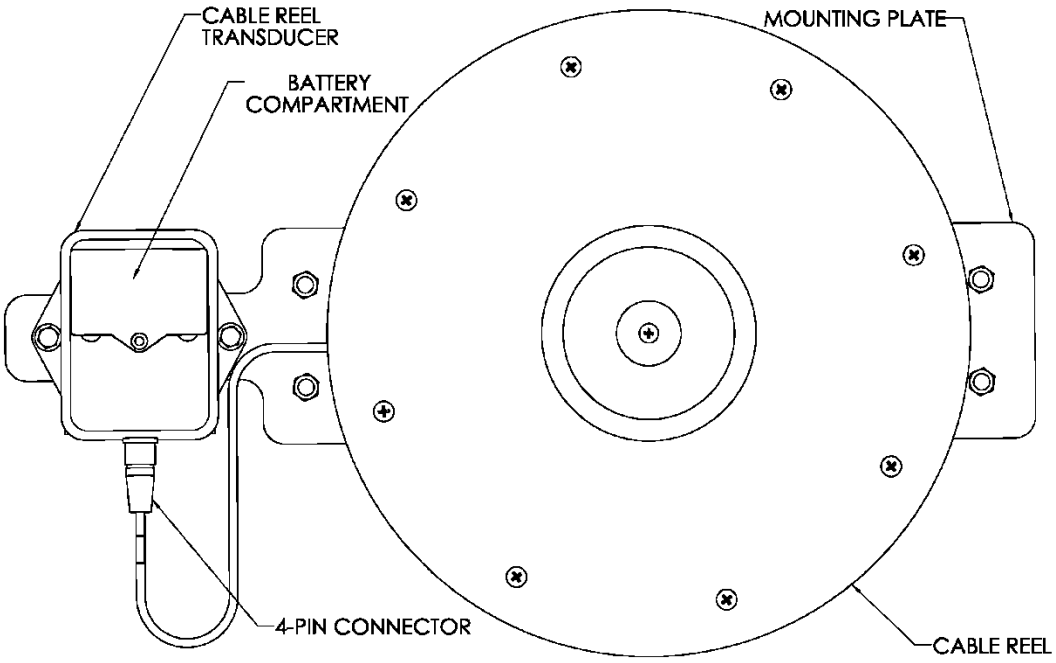
1. Locate and mark a position on the boom at least 10 ft back from the tip of the base section.
2. The mounting feet are pre-attached to the 'Mounting Feet Template'.
3. Using the template as a guide, tack weld the feet to the boom.
4. Remove the template and save the hardware, it will be needed later to finish the installation.
5. Temporarily install the cable reel assembly to verify correct positioning of the mounting feet before completing the welds.
6. Remove the cable reel assembly
7. Complete the welds

NOTES:

- ***Do not weld mounting feet with cable reel assembly attached. The cable reel body and transducer have static sensitive components and can be damaged by close proximity welding.***
- ***If painting the mounting feet ensure that the threads do not get paint in them.***

Small Cable Reel Installation

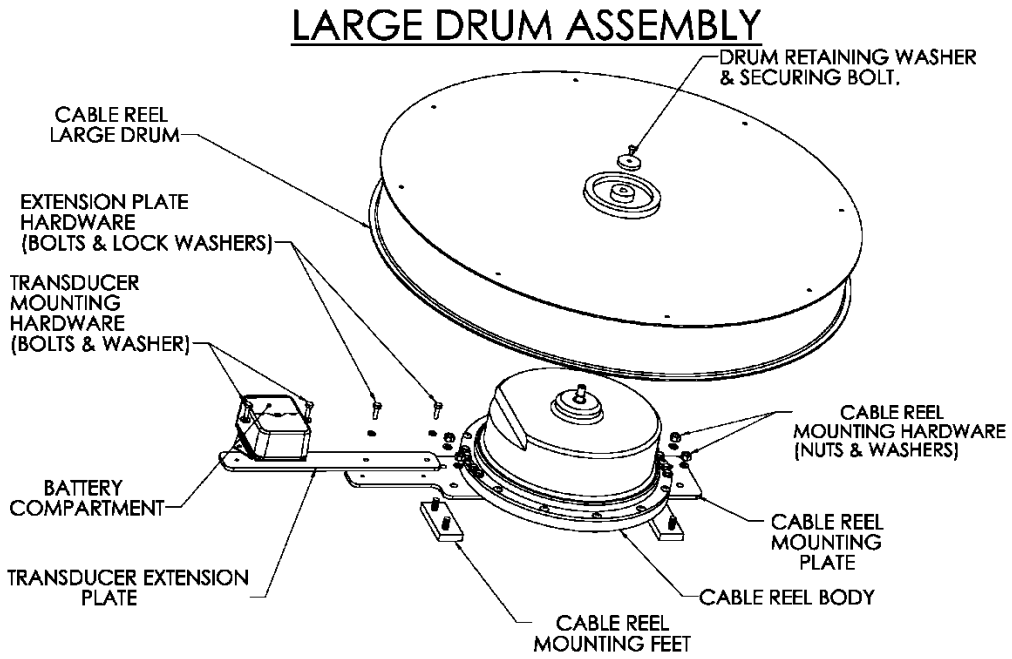
The small cable reel will arrive from the factory fully assembled and ready to install.



1. Lift the cable reel assembly on to the mounting feet.
2. Using the supplied hardware bolt the mounting plate to the mounting feet.
3. Attach the 4-pin connector to the cable reel transducer.
4. To complete the installation, continue to the *Installing Guides and Anchor* section of this manual.

Large Cable Reel Installation

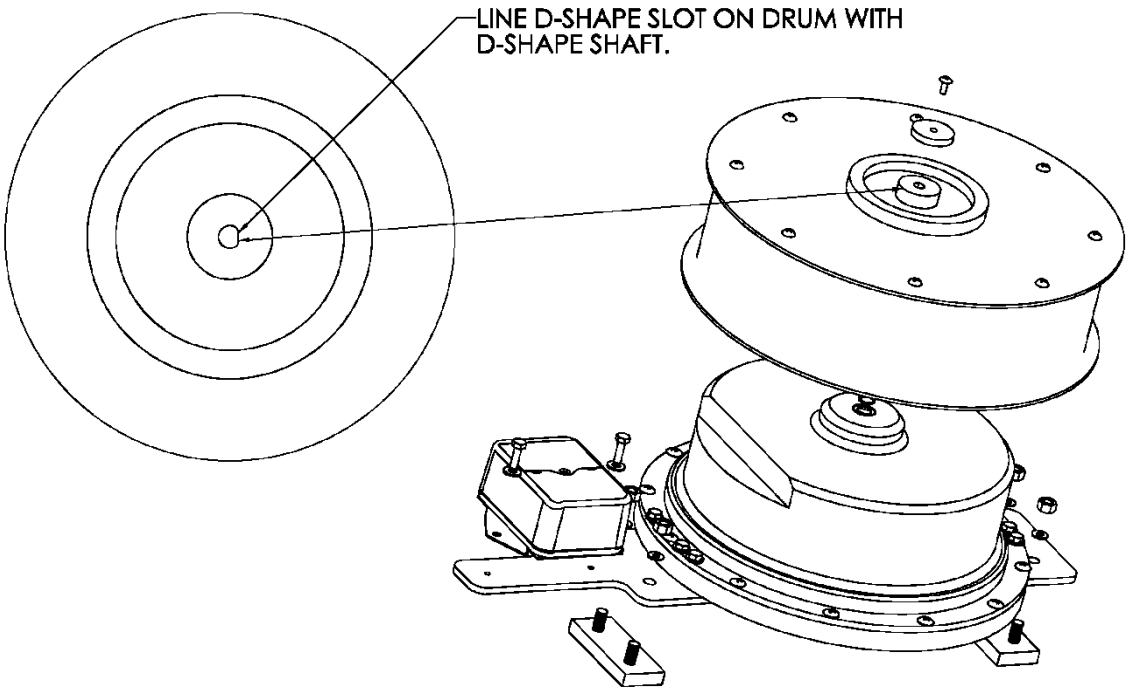
The large cable reel will arrive from the factory partially disassembled. The drum will be packaged separate from the cable reel body assembly and the cable reel transducer will be mounted to a separate transducer extension plate.



1. Use the supplied hardware to bolt the transducer extension plate with the transducer in place as shown in diagram.
2. Lift the cable reel assembly on to the mounting feet.
3. Using the supplied hardware bolt the mounting plate to the mounting feet.
4. Attach the 4-pin connector to the cable reel transducer.
5. Strain relief the signal cable to prevent it from being damaged.
6. Attach the drum using the following instructions.

Cable Reel Drum Installation

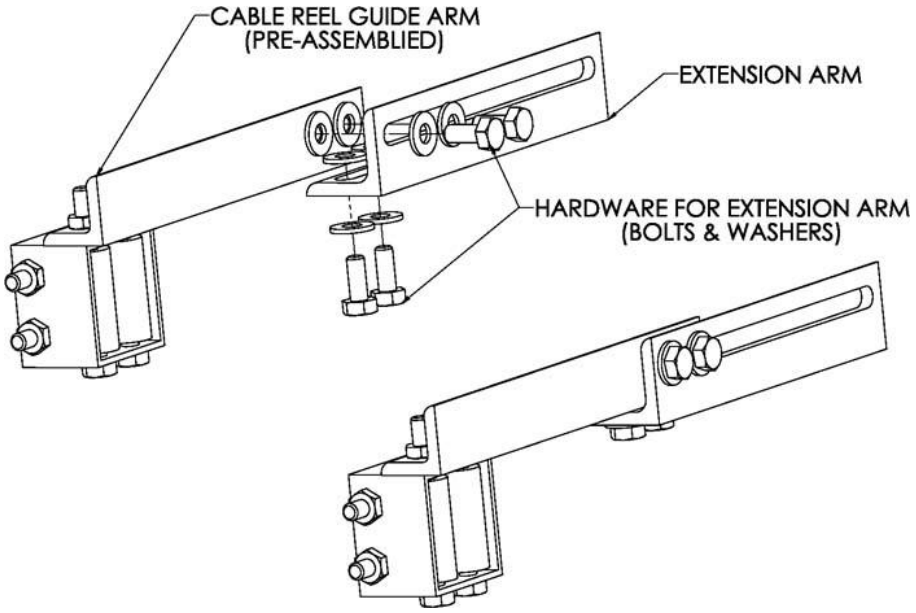
Use the following instructions to install either the small or the large drum to the cable reel body assembly.

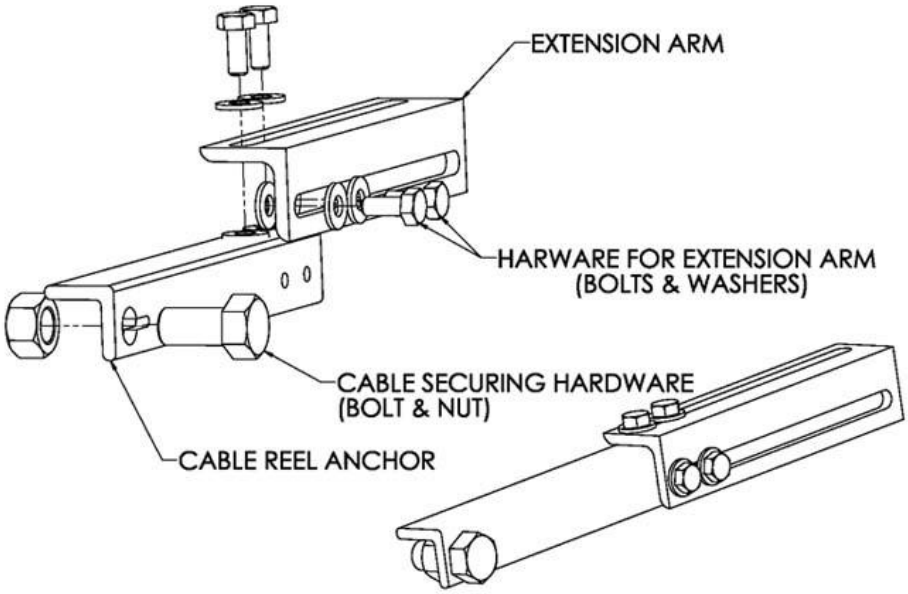


1. With the label facing outwards lift the drum and place on the shaft. The top of the shaft and the hole in the drum are D-shaped so they can only be installed one way.
2. Install the drum-retaining washer and secure with bolt.
3. Apply a small amount of thread lock to the threads before tightening the retaining bolt. This will prevent the bolt from backing off.

Installing the Guides and Anchor

The anchor and guide arms may need to be modified (shortened) to accommodate your installation of the cable reel.





1. The first guide is to be mounted up the boom, 2-4 feet away from the drum. Position it vertically to allow the cable to pass through the guide. It should be horizontally aligned with the middle of the drum in order to allow for proper water run-off. The cable should move back and forth in the guide. The cable should not be forced to one side.
2. The next guide should be welded at the end of the main boom section in the same alignment as the first.
3. Weld a guide at the end of each moving section of the crane.
4. Weld the anchor to the tip of the boom. Allow for 6-12 inches of space between the last guide and anchor.
5. Spin the cable drum in the direction of the payout this is indicated by the arrows on the drum. Spin 2 revolutions for the small 19" drum and 5 revolutions for the large 32" drum (this pre-loads the spring allowing for proper tension during extension and retraction of the cable reel drum).
6. Run the cable through the roller guides. Be careful not to let go the cable under tension as it may cause internal damage to the system.

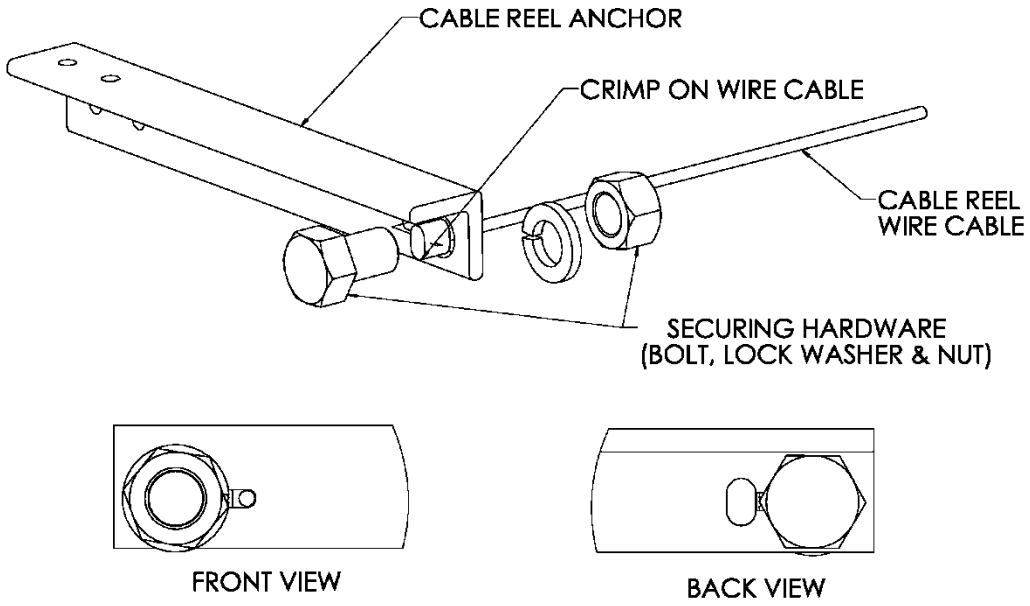
NOTES:

- ***Installation for non-proportional boom cranes must have the anchor at the tip of the boom***

- ***For a proportional boom crane, you can secure the cable to the tip of the first moving section but this will affect the resolution of the cable reel.***

Terminating the Cable at the Anchor

The cable reel anchor design allows the operator to remove the cable from the boom quickly and easily.



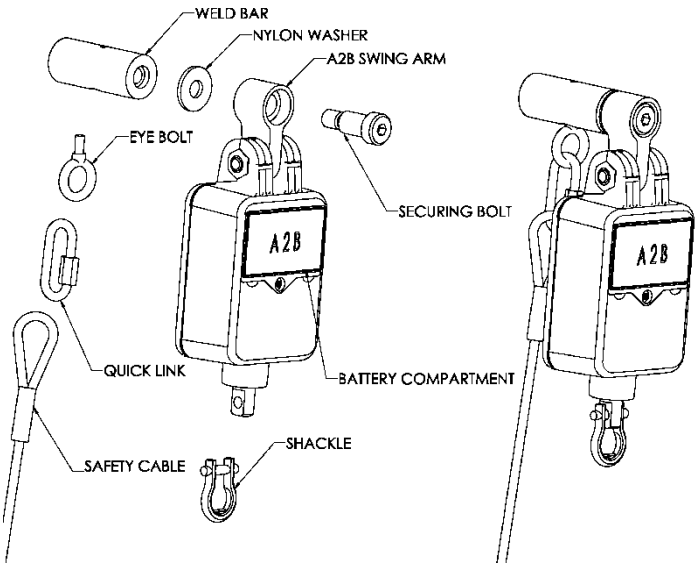
1. Slide crimped cable end through the keyhole opening in the anchor.
2. Install the retaining bolt, lock washer and nut to secure the cable in the keyhole opening.

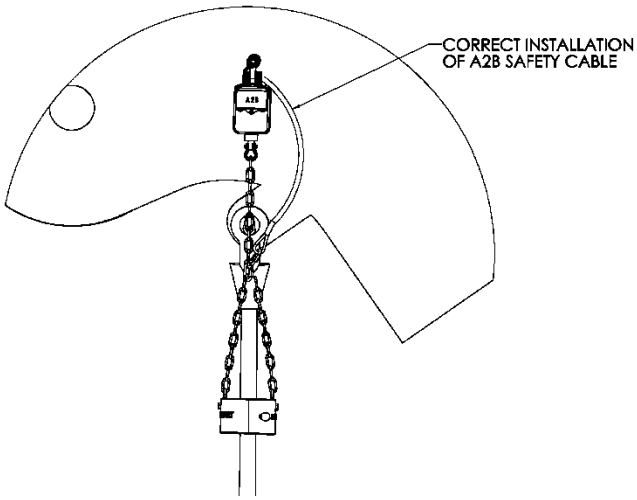
NOTE: ***When removing the cable from the anchor do not allow the cable to spin back freely as this may damage the internal workings of the cable reel.***

11.14. Anti-2-Block Installation

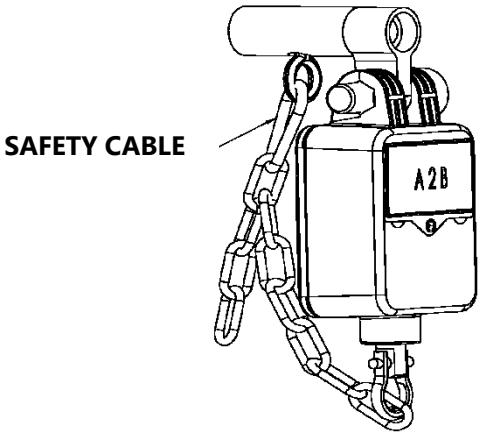
The switch is designed to swivel and pivot to track with the wire rope in relation to the boom angle.

1. Weld the weld bar to the crane. Ensure the switch is mounted directly above the dead-end or the slowest speed line. The weld bar can be welded directly to the crane or to an existing Cranesmart weld plate. (Both ends of the weld bar are identical).
2. Ensure that the mounted A2B switch will have an unobstructed line-of-sight to the receiver panel antenna. Install the large shoulder bolt into the A2B swing arm.
3. Attach the A2B switch to the bar. (Install the nylon bushing between the bar and the swing arm).
4. Attach the two-piece counterweight to the dead-end line or the slowest speed line.
5. Use the shackle (bottom of A2B switch) to install the chain to the A2B switch.
6. Counterweight Safety Cable: This Safety Cable is used to secure the counterweight so that it will not fall down the wire rope in the case of severe damage to the A2B. See drawing for proper installation.

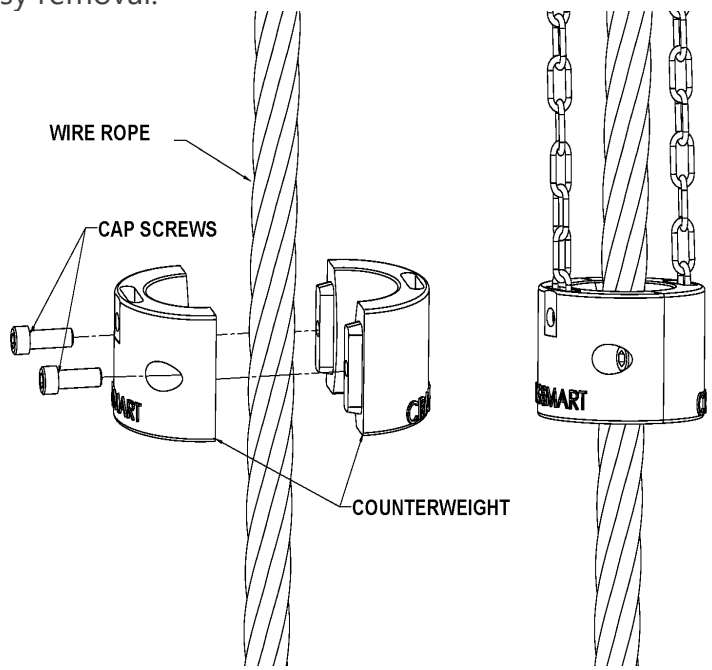




NOTE: Ensure the A2B switch can move freely without contacting the boom, the sheaves, bracing struts or any other equipment such as a swing away jib extension. The Eyebolt on the weld bar is used with the red clip for storage and transportation on mobile cranes. When transporting the crane, it is advised that the weight is hung using this method, in order to remove tension from the counterweight chain.



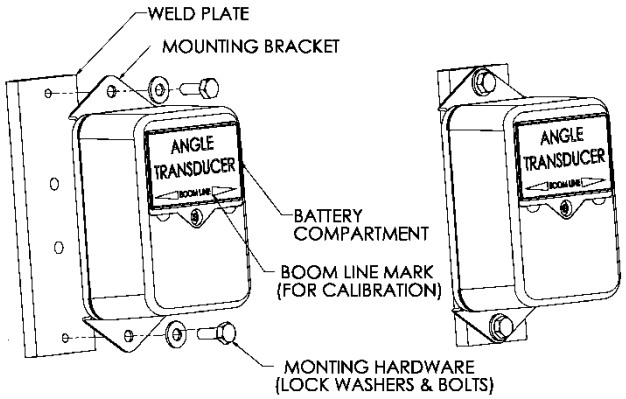
1. Attach the counterweight chain to the bottom of the A2B transmitter using the shackle supplied.
2. Assemble the counterweight around the cable, as shown in the illustration.
3. Bolt the two counterweight halves together using the cap screws. The cap screws are coated with oil but it is suggested that anti-seize compound be used on the bolts to allow for easy removal.

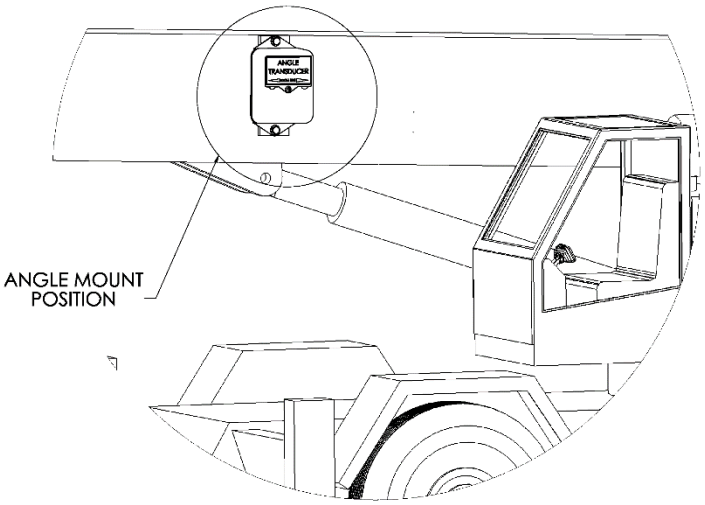


11.15. Boom Angle Transducer Installation

The boom angle transducer can be mounted on either side of the boom. The transducer cannot be installed on the top or bottom of the boom and must be installed in the orientation shown in the diagram below. Do not weld permanently before testing in case adjustments are needed.

1. Remove the weld plate from the angle transducer.
2. Align and mark the installation position. Position the transducer to be 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. Verify operation
6. Raise the boom to a minimum angle of 45° and return it to level. (This will set the transducer for the proper side of the boom before calibration).
7. Remove the transducer to finalize the welding
8. Repeat steps 4-6





11.16. Windspeed Transducer Installation

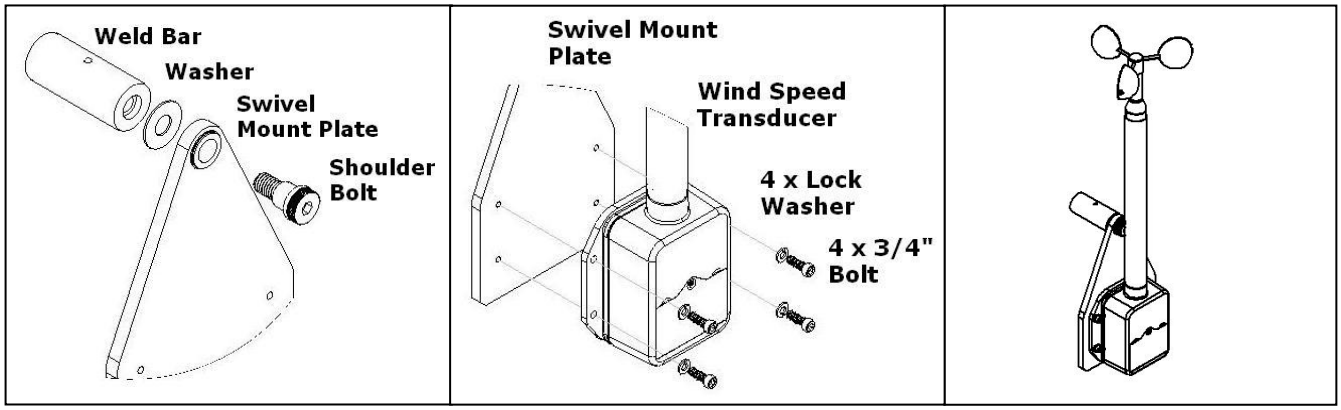
The wind speed transducer is designed to swivel so that it is always in an upright, vertical position, regardless of the boom angle.

Tools Required

- 5/16" hex key (included)
- 3/16" hex key (included)
- Welder

Wind Speed Installation Procedure

1. Remove the shoulder bolt from the weld bar and swivel mount plate.
2. Tack weld the weld bar to the crane. The weld bar can be welded directly to the crane or to an existing Cranesmart weld plate. (Both ends of the weld bar are identical).
3. Attach the wind speed swivel mount plate to the weld bar using the shoulder bolt and washer. Use a 5/16" hex key to tighten the bolt.
4. Attach the wind speed transducer to the swivel mount plate using the provided hex key bolts and lock washers. Use a 3/16" hex key to tighten all bolts.
5. Ensure that there is enough clearance for the wind speed transducer to swing freely. Finish welding the weld bar to the crane.

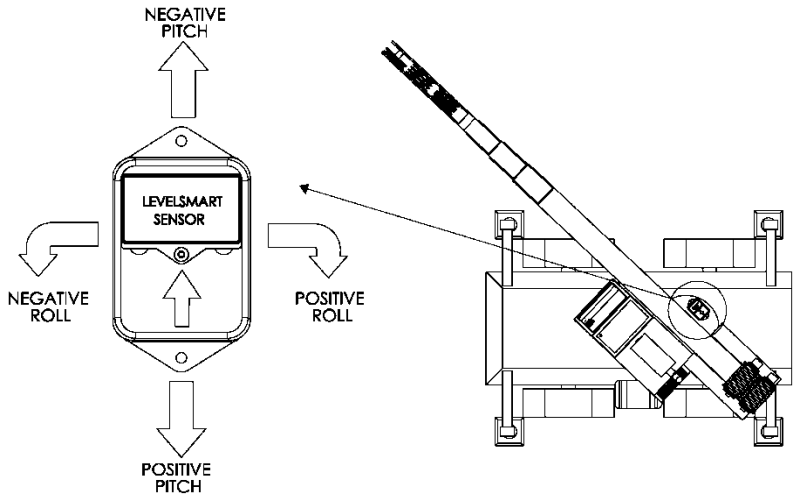


11.17. Level Transducer Installation Type A

(Measuring Machine Tilt (Roll))

This installation is typically used in marine applications where the crane is on a ship or a barge and it allows the user to observe actual tilt based on the direction of the boom.

1. The level transducer should have a clear line of sight to the Cranesmart system's antenna and be kept free of all obstructions.
2. The level transducer must be mounted onto a part of the crane that rotates along with the boom, but does not change with the boom angle. The label must be facing up and the directional arrow should point along the boom towards the tip.
3. Make sure that the transducer is not mounted in a position where it might be stepped on or in a position where it may suffer impact damage. Possible mounting locations are on top of the turret or on the operator's cab if it rotates with the boom.
4. The mounting position needs to be stable during operation as vibration may cause the unit to jitter.
5. The transducer should be made as level as possible but it is **NOT** critical that it be perfectly level, as the unit can be calibrated after installation. (See the *Level Calibration* section of this manual).
6. Verify communication with the receiver panel before permanently mounting the transducer (see the *Transducers* section of this manual).
7. The crane **MUST** be level during the calibration process.
8. **DO NOT** weld the weld plate with the level transducer attached.

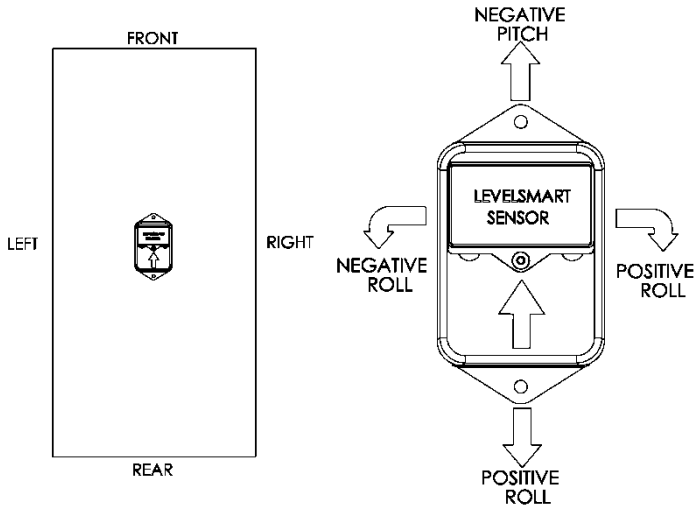


11.18. Level Transducer Installation Type B

(Measuring Grade and Super Elevation / Ship List (Roll) and Trip (Pitch))

This installation should be used for locomotive cranes (grade and super elevation) or ship and barge applications where the user wants the Cranesmart system to indicate if the **ship** is listing (rolling) or trimming (pitching)

1. The level transducer should have a clear line of sight to the Cranesmart system's antenna and be kept free of all obstructions.
2. The transducer can be mounted to the deck (label facing up) or onto a post. The higher the level transducer is from the deck, the better the radio transmission will be.
3. The correct mounting position of the level transducer is critical. The label must be facing up and the directional arrow should point towards the front of the car or ship. Refer to the diagram below.
4. The mounting position needs to be stable during operation as vibration may cause the unit to jitter.
5. The level transducer should be made as level as possible but it is **NOT** critical that it be perfectly level as the unit can be calibrated after installation. (See the *Level Calibration* section of this manual).
6. Verify communication with receiver panel before permanently mounting the transducer (see the *Transducers* section of this manual).
7. The barge deck **MUST** be level during the calibration process.
8. **DO NOT** weld the weld plate with the level transducer attached.

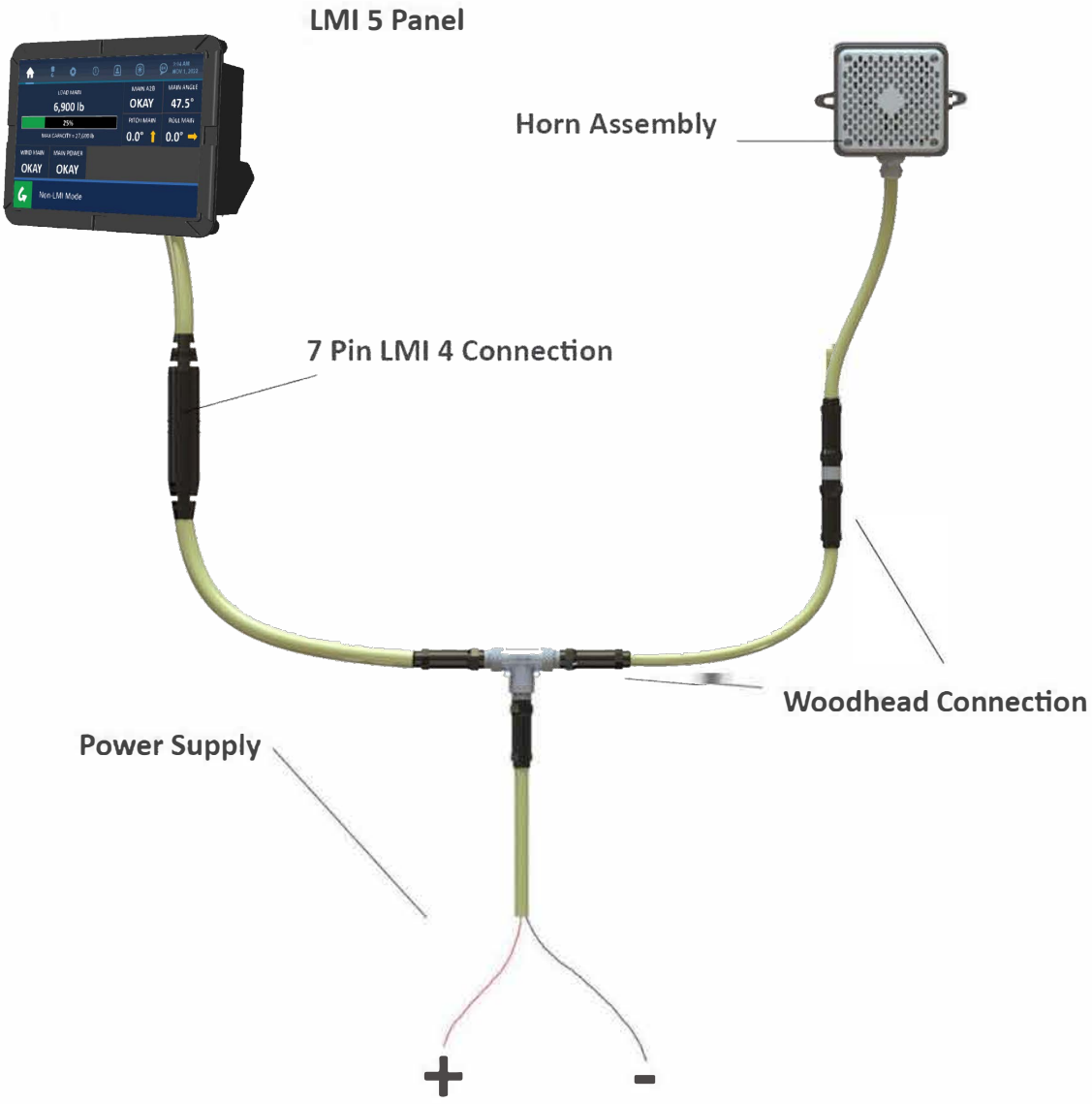


Refer to this table for application terminology

Default	Roll	Pitch
Locomotive Crane	Super Elevation	Grade
Ship/Barge	Listing	Trimming

11.19 Display Panel, Horn Assembly and Power Configuration

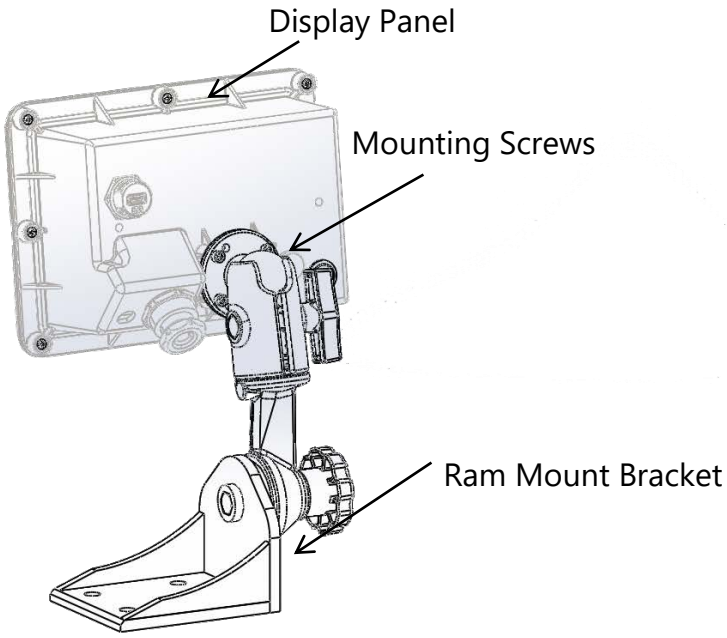
The diagram below shows the proper configuration for the display panel, horn and power source for the system. The power source should be 12-24VDC (28VDC Max).

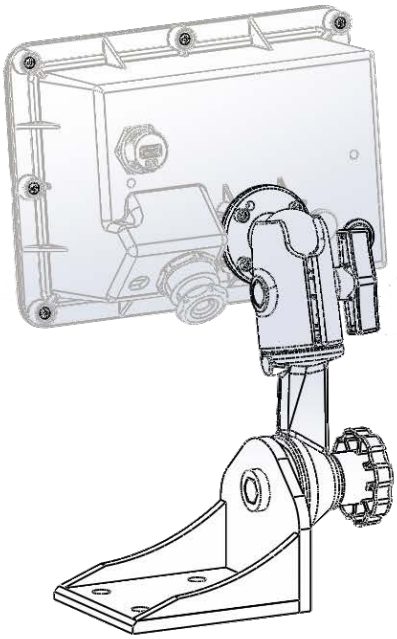


11.20. Display Panel Installation

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.
5. Mount the ram mount bracket to an appropriate place within the cab, using the 3/8" bolts provided.





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 machine.

3. *(Optional):* Connect the white wire to an optional 'shut off' solenoid or to sound external horns. (Maximum output is 1.25 amps).

4. (Optional) secondary output. Connect the green wire to an optional 'shut off' solenoid or to sound external horns. (maximum output is 1.25 amps).

5. Earth Ground is not needed in this application. Tape off and do not use.

NOTES:

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

- ***When attaching the power cable to the panel, align the plug and gently push it into the receptacle, then slide the plug neck back towards the panel and turn it clockwise half a turn to tighten. The plug is keyed and will require alignment of the housing as well as the pins.***

- ***If the power cable is cut to shorten it for installation, it will be noticed that two extra wires are contained inside the insulation. The purple and blue wires are only used in other applications (for RS485 communication).***

- ***If the current draw on the white wire exceeds 1.25 amp. A relay will be required to switch power for the valves or horn.***

11.21. Alarm Shutoffs (White Wire)

The Cranesmart system will be shipped with a seven-conductor wiring harness which consists of a black, a red, and a white wire. The white wire may be used in conjunction with external alarm horns, lights, or shut-offs (if installed).

- When supplying power to the Cranesmart System with +12 VDC, the white wire is normally hot (energized) with a +12 VDC in a non-alarm condition. If the white wire is not to be used for any of the purposes listed above, ensure that its exposed end remains sealed to prevent grounding and damage to the display panel.

- When supplying power to the Cranesmart System with +24 VDC, the white wire is normally hot (energized) with a +24 VDC in a non-alarm condition. If the white wire is not to be used for any of the purposes listed above, ensure that its exposed end remains sealed to prevent grounding and damage to the display panel.

Secondary Output

Systems are supplied with a second output (green wire). It provides either a 12VDC or 24VDC in normal condition, 0VDC in alarm condition and has a current limitation of 1.5amps.

By default, Is tied to the same alarms as the white wire. However, can be reprogramed to operate using different logic. Exmple High boom angle. Please contact Cranesmart System service for assistance

11.22 Basic Wiring Diagram

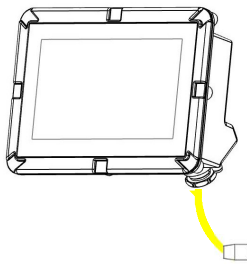
6 | 5 | 4 | 3 | 2 | 1

A

B

C

LMI5
9005-0013

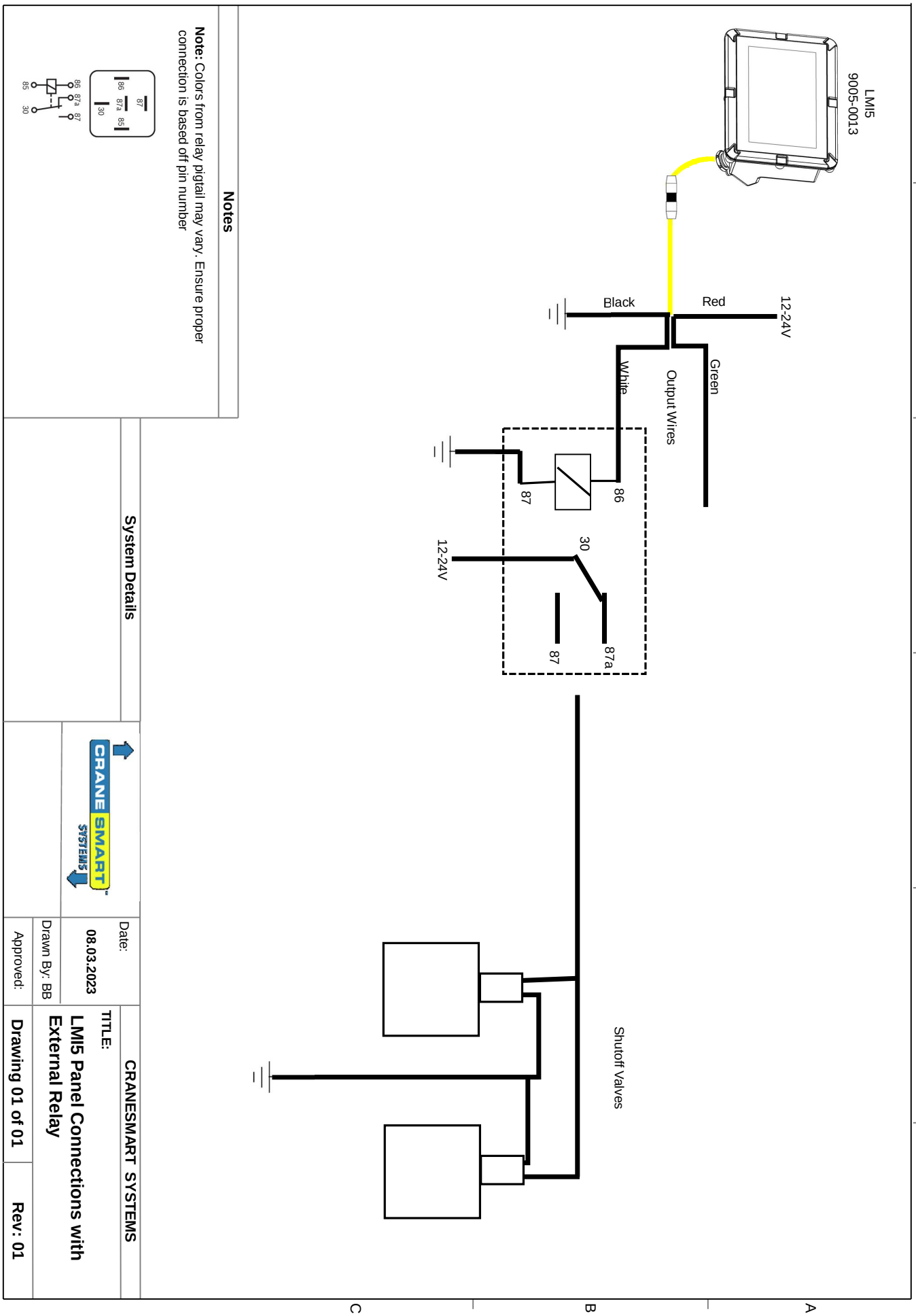


Red - System Power
Black - System Gnd
White - Voltage Output #1 (1.25A Max)
Green - Voltage Output #2 (1.25A Max)

Note: If output needed exceeds the 1.25A Max use of an external relay will be needed for the system to operate correctly.

Notes	System Details		Date: 08.03.2023	CRANESMART SYSTEMS
		CRANE SMART SYSTEMS	Drawn By: BB	TITLE: LMI5 Panel Connections
			Approved:	Drawing 01 of 01 / Rev: 01

11.23 Basic Wiring Diagram with Relay



11.24. Power Converters

A power converter is needed to convert AC voltage to DC for the display panel. Cranesmart power converters change 110/220V AC to 12/24VDC, depending on the application. If a power converter is needed it will be discussed at the time of purchase.

11.25. Hazardous Area Options (TBD)

In Class 1 Division 2 (C1D2) applications the Cranesmart system will wire identically to the basic wiring diagram – the only difference being that the panel has a pigtail with a C1D2 connector on the end. The connector will mate with the corresponding C1D2 on a power cable or the serial cable coming from the Alarm Hub. Use a set of tongue-in-groove pliers to fully tighten the connection, to ensure that the power cannot be accidentally loosened or disconnected by hand.

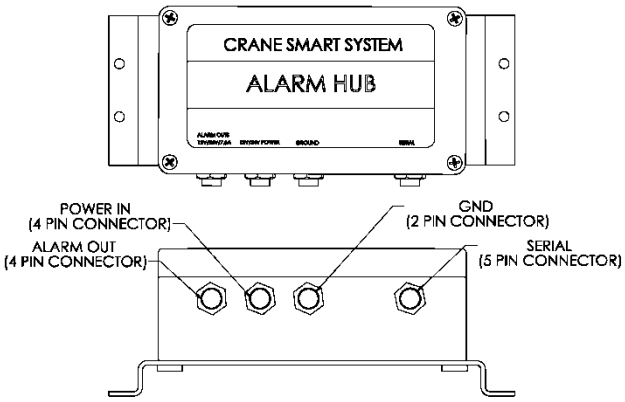
11.26. Alarm Hub Installation

When used with the alarm hub, the panel has the ability to control 4 separate outputs. These outputs can be set normally hot or normally cold. The alarms that control the outputs of the alarm hub are specified at the time of purchase.

The standard alarm hub comes supplied with the following cables:

- 4-pin alarm output cable
- 4-pin power cable, the ends of the cable are twisted together
- 2-pin ground
- 5-pin serial cable to connect the panel to the alarm hub.

1. Locate a position to mount the alarm hub where the operator can reach the wiring, if necessary.
2. Align the position mark and drill holes using the alarm hub mounting bracket holes as a guide.
3. Bolt the alarm hub in place.



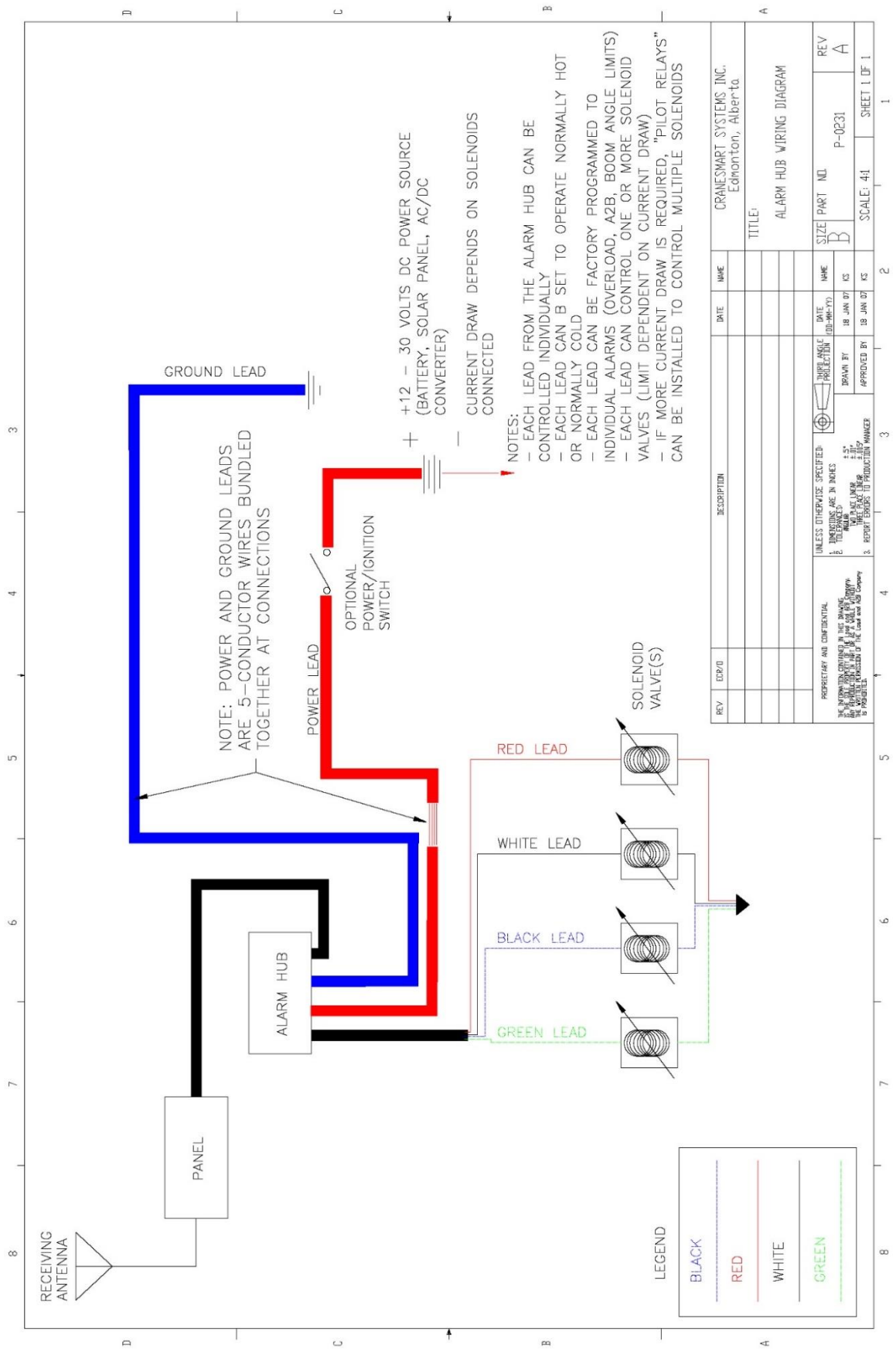
Wiring the Alarm Hub

1. Attach the black wire to electrical ground.
2. Attach the red wire to power 12-24Vdc.
3. Attach the serial cable from the alarm hub to the panel.
4. Use the custom insert as a guide to wire the alarm outputs.
5. Test to ensure that the outputs control the proper alarms.

NOTES:

- ***The length of cable and the position of the panel will limit the mounting location of the alarm hub.***
- ***The plug is keyed to ensure a proper connection.***
- ***When a Cranesmart system is programmed for use with an alarm hub, the alarm hub must be present and working or the display will indicate an error. The alarm hub is crucial in this case, as power to the display panel is routed through it.***

11.27. Display Panel Wiring Diagram



11.28. Antenna Installation

There are currently two types of antennas; installation and placement depend on the length and type of crane boom.

1. External Mount – for cranes with cabs.
2. Marine – for marine cranes with cabs.

NOTES:

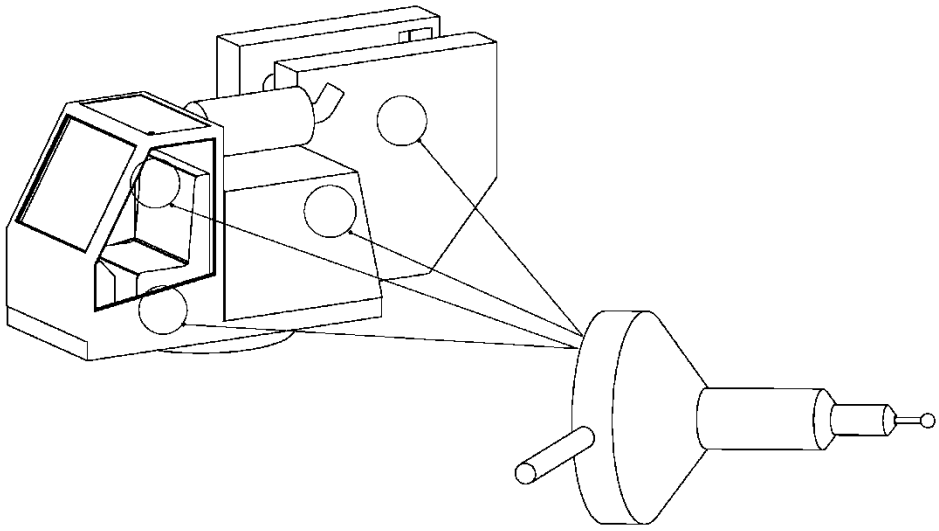
- ***Ensure that the lines of sight between the load cells, anti-2-block, switches, angle transducers and the antenna are not obstructed.***

- ***Do not let the antenna touch glass or metal.***

Antenna Installation Type A (Inside Operator Cab)

When the display panel is mounted inside the cab of the crane, use the external magnetic mount antenna. This antenna will be included in the system packaging. Installation varies between cranes, but the following can be used as a guideline.

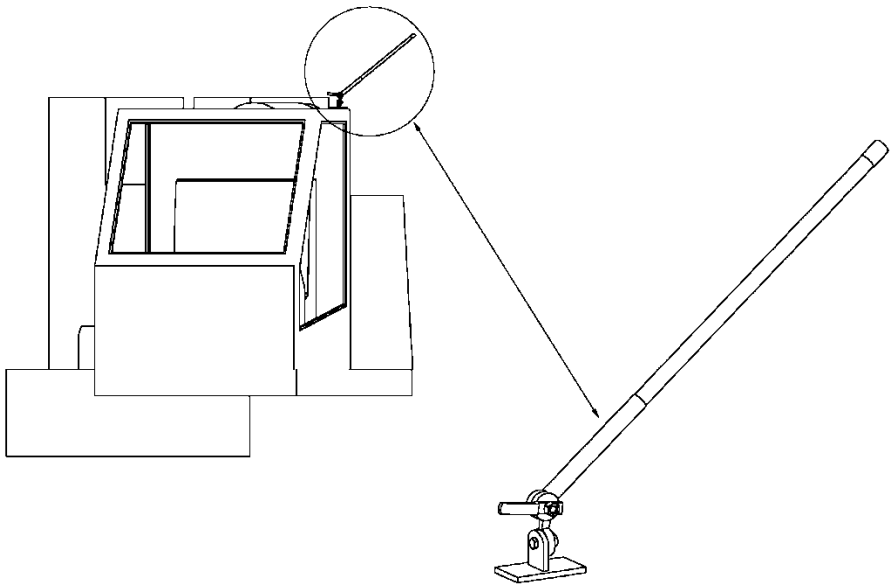
For optimum performance, the antenna should be installed horizontally as shown below but it will work in a vertical orientation also. To confirm the best position for the antenna, check the signal quality while moving it around (see the *Transducers* section of this manual).



Antenna Installation Type B (Marine Installation)

When the Cranesmart system is used on a crane with a cab in a marine environment, use the external marine antenna included in the kit. Installation varies between cranes, but the following can be used as a guideline.

For optimum performance, the antenna should be installed at a 45° angle as shown below. Determine the best position for the antenna by checking the signal quality on the signal display screen (see the *Transducers* section of this manual) while changing the angle, etc.



11.29. Shut-Off Bypass Plug

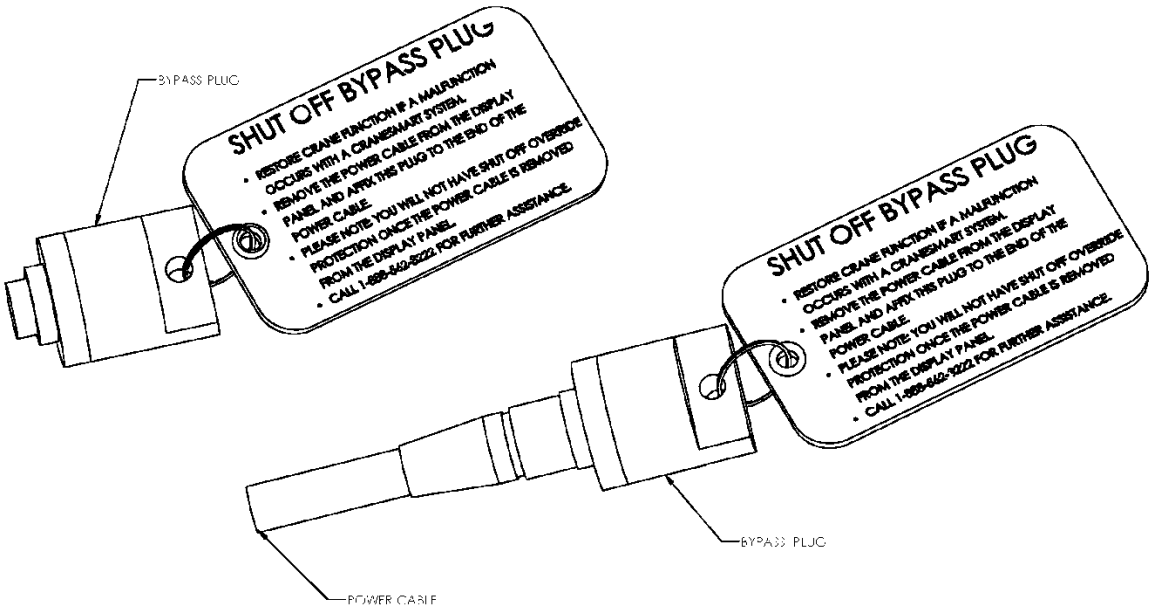
Not all systems require a shut-off bypass plug. The bypass plug is only required with systems that are using shut-off functions and only if those solenoids are normally hot (energized).

If the Cranesmart system was installed using the white output wire to control crane shut-offs (kick outs) and is overcome by damage or system malfunction, this wire can be bypassed using a bypass plug included with the kit. When this plug is installed as follows, it will allow the function kick outs to be re-energised.

1. Remove the power cable from the back of the display panel by twisting the coupling a half turn clockwise and pull it away from the panel.

2. Insert the bypass plug into the end of the power cable (lower illustration) – not the panel – and turn the plug a half turn clockwise.

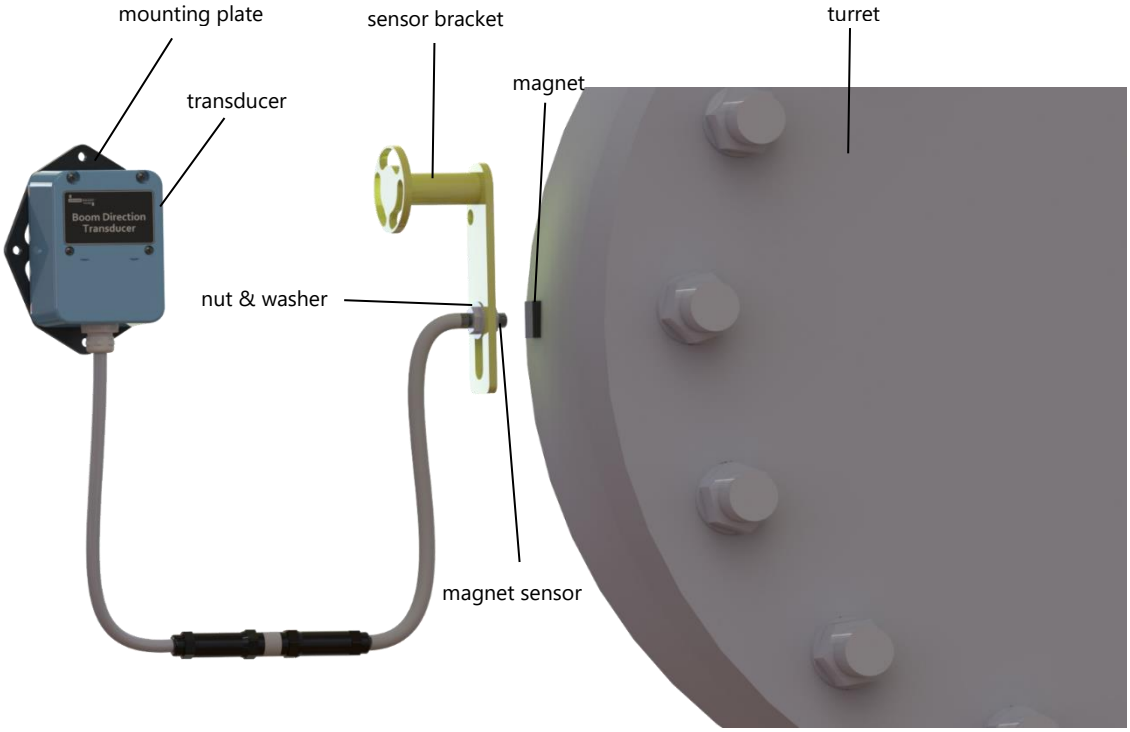
NOTE: While this will restore crane functions, the Cranesmart system will no longer be monitoring crane functions.

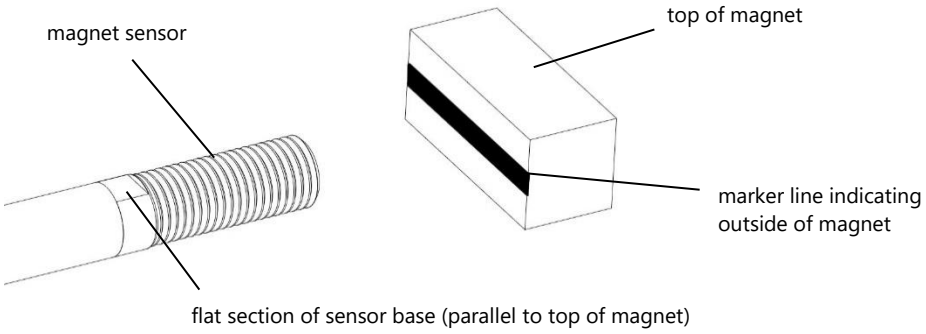


11.30. Boom Direction Transducer (BDT) Installation

To ensure proper operation of the BDT, the following installation requirements must be satisfied:

- bolt/weld the transducer mounting plate to a secure location near the turret (remove the transducer before welding).
- magnets attached to the turret must be at least 2 inches apart.
- distance between the end of the magnet sensor and each magnet on the turret must not exceed 1 inch.
- ensure that the flat section of the sensor base is parallel to the tops of the magnets, and the marker line of the magnet is facing outward (see illustration below).





Once installation is complete, refer to the *Boom Direction Transducer (BDT) Calibration* section of this manual to complete the component setup.