



Operation, Calibration, and Troubleshooting Manual For Greer LMI System With MG6 Computer & Insight Display For Broderon



® by



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Part 1: Overview and Operation

1. Introduction

The Greer LMI System with MG6 Computer & Insight Display is an aid to crane operation. It is hereinafter referred to as the "system".

Do not use this system without a properly trained operator. The operator must be knowledgeable in safety guidelines, crane capacity information, and the crane manufacturer's specifications.

This manual describes the setup, operation, calibration, and troubleshooting of the system. Please read, understand, and follow the contents and instructions contained in this manual.



IMPROPER INSTALLATION OF THIS SYSTEM MAY RESULT IN SYSTEM MALFUNCTION!

2. Technical Support

For technical support specifically relating to the Greer LMI System, please contact the Greer/TWG Service Department:

Phone: (918) 298-8300

Email: service@dovertwg.com

Address: 11135 S James Ave, Jenks, OK, 74037

3. Outline of Operation

The system is an aid to crane operation. Crane functions are monitored by a variety of sensors.

The system compares the load suspended below the boom head to the crane capacity chart stored within the computer's memory.

At approach to overload, the system sends audible and visual warning signals. The system is configured to cause function kick-out by interrupting a signal to a dump valve.

The system is designed to:

- Calculate and display load weight
- Calculate and display maximum capacity
- Calculate and display indicated load relative to the maximum rated capacity
- Warn of approaching overload for each crane configuration
- Notify the operator when the crane has been two-blocked
- Notify the operator and stop certain boom motions when the crane is overloaded

3.1 System Components

- Insight Display Unit
- MG6 Computer Unit
- Pressure Transducers (Qty. 2)
- Reeling Drum Assembly, with Extension and Angle Sensors
- Anti-Two-Block Switches (Not supplied by Greer)
- Cables
- Audible Alarm (Might not be supplied by Greer)
- Outtrigger Position Switches (Not supplied by Greer)
- Operation/Calibration/Troubleshooting Manual

3.1.1 Insight Display Unit

The Insight display unit translates data received from the computer and displays the indicated load and percent of rated capacity. Warnings and alarms activate when capacity limits are approached or exceeded, or when a two-block condition is encountered.

The display unit provides the operator with:

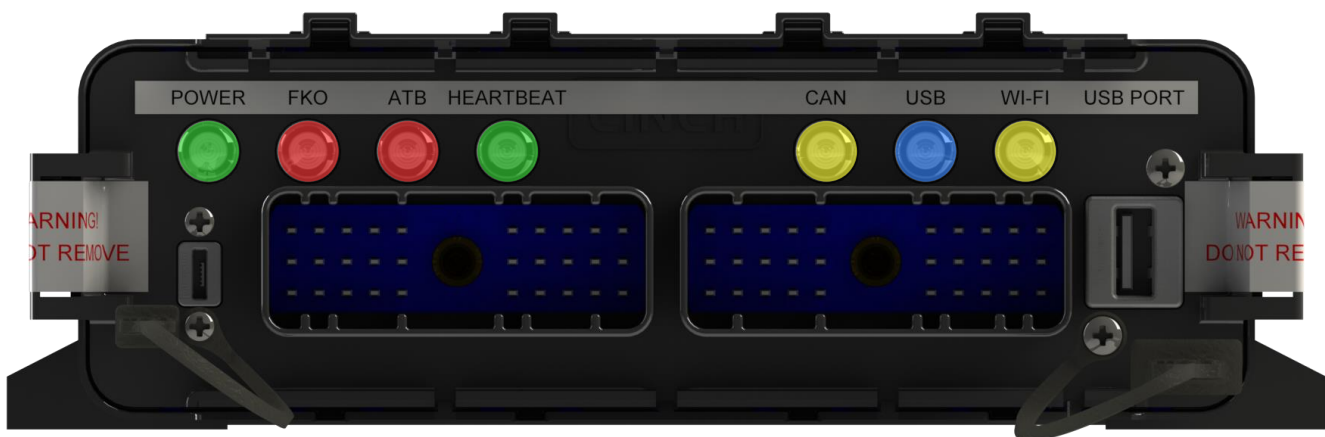
- Rated Capacity
- Indicated Load
- Bar graph representation of Indicated Load vs. Rated Capacity
- Radius of the Load
- Boom Angle
- Main Boom Length

3.1.2 MG6 Computer Unit

The MG6 Computer is the center of the system. It reads the sensors, controls computations and disconnect functions, and communicates with the display. The computer uses the pressure sensors' readings, along with the angle and length sensors, to determine the indicated load, load relative to maximum capacity, warn of approaching overloads, and detect two-block conditions. A duty file containing information defining the physical characteristics of the crane is loaded in the computer.

The front panel of the MG6 Computer contains the following:

1. Electrical Connectors (Qty. 2)
2. USB Port, with dust cover
3. LED Indicators
4. Micro-USB Port, with dust cover (For Use by Greer/TWG Service Technicians Only)



3.1.3 Pressure Transducers

There are two pressure transducers which measure pressure in the boom lift cylinder. One transducer measures the rod-side pressure and one transducer measures the piston-side pressure.

The pressure transducers used with the MG6 Computer system are located outside of the computer enclosure. Each is connected to the computer by a cable and communicates using CAN J1939.

Each transducer is calibrated by the manufacturer and may be replaced independently from the computer.

3.1.4 Reeling Drum Assembly

The reeling drum assembly measures the extended length of the telescoping sections of the boom. It consists of the reeling drum and reeling drum cable, the boom angle sensor, and the extension sensor.

3.1.5 Boom Angle Sensor

The boom angle is measured by a potentiometer/pendulum assembly. It provides a voltage proportional to boom angle. This sensor is mounted inside the reeling drum assembly.

3.1.6 Extension Sensor

The extension sensor provides a voltage proportional to the extension of the boom. The extension sensor is mounted inside the cable reeling drum assembly.

3.1.7 Anti-Two-Block (ATB)

The anti-two-block (ATB) switch is used to detect a two-block condition. The ATB switch monitors the approach of the hook block or overhaul ball to the boom head. The switch is held in the normal position until the hook block or overhaul ball raises an arm that is mounted to the boom head. When the arm is raised it opens the switch. The resultant switch open signal is sent to the computer via the reeling drum. This results in the ATB alarm operating and a function kick-out will occur.

3.1.8 Function Kick-Out (FKO)

Electrically-operated hydraulic solenoids disconnect the control lever functions for boom down, boom swing, telescope out, and hoist up when an overload or ATB alarm condition occurs.

3.1.9 Reeling Drum Reel-Off Cable

The reeling drum reel-off cable allows the extension sensor to measure the length of the boom. The cable also provides power and a path for the two-block signal. It connects to the reeling drum assembly.

3.1.10 Outrigger Position Sensing (If Equipped)

This alarm alerts the operator, audibly and visually, when the selected outrigger position does not match the detected outrigger position.

- On models with oblique (aka “A-Frame”) outriggers, the system detects whether all four outriggers are fully deployed.
- On models with Out-and-Down outriggers, the system only detects the horizontal position of the outriggers. It does not detect whether the outriggers are up or down.

4. System Power Up Self-Test

Immediately following system power up, the system performs a self-test which verifies that the computer, display console, cables, and sensors are working properly. The test lasts for approximately 10 seconds. During this time, crane motions are disabled by the system function kick-out.



When the display shows the following warning message, read it and press any key to continue.



Following the warning message, the system will go to the Configuration Menu. See the section **Configuration Menu**.

5. Configuration Selection

5.1 Crane Configuration and System Setup

The crane configuration defines the physical setup of the crane. The system setup defines the load parameters for each configuration. The data for these calculations are contained in the duty file which is loaded in the crane's computer.

Configuration selection is required upon system power up and any time the system goes into normal operating mode. Configuration selection can also be changed at any time by accessing the Configuration Menu from the Home Screen.

The Configuration Menu displays the current setup of the system and allow the operator to choose the configuration.

5.2 Accessing Configuration Menu From the Home Screen

5.2.1 Accessing Configuration Menu With Configuration Button

The Configuration Menu may be accessed from the Home Screen by pressing the **Configuration** button.



5.2.2 Accessing Configuration Menu From The Main Menu

The Configuration Menu can also be accessed by pressing the **Main Menu** Button and selecting **Configuration**.



5.3 Configuration Menu

The operator must use the Configuration Menu to set up the LMI system to reflect the crane's actual configuration. The stages for selection may include the following:

1. Chassis
2. Erected Attachment
3. Stowed Attachment
4. Parts of Line



THE DISPLAYED LOAD AND CAPACITY ARE BASED UPON THE CURRENT SELECTED POINT OF LIFT. NEITHER THE GREER LMI SYSTEM, NOR THE CRANE CAPACITY CHART ALLOWS FOR LIFTING FROM MORE THAN ONE HOOK AT A TIME.

5.3.1 Current Configuration Information

Note: *If the system is being configured for the first time after power-up or entering normal operating mode from another mode, the system will not show this screen and will proceed to the first available configuration selection stage.*

The current configuration of the crane is shown in the center of the screen, listing the current setup for:

- Chassis
- Erected Jib
- Stowed Jib
- Parts of Line
- Duty - This displays the setup code for the current configuration

Press the **Edit** button to edit the configuration. Press **Back** to return the previous screen or **X** to exit to the Home Screen.



5.3.2 Chassis

The currently-configured option is highlighted with a white border. To select a Chassis option, press the button next to the option, or press **OK** to select the option that is highlighted with a white border. Once a selection is made, the screen will proceed to the next stage.



5.3.3 Erected Attachment

The currently-configured option is highlighted with a white border. To select an Erected Attachment option, press the button next to the option, or press **OK** to select the option that is highlighted with a white border. Once a selection is made, the screen will proceed to the next stage.



5.3.4 Stowed Attachment

The currently-configured option is highlighted with a white border. To select a Stowed Attachment option, press the button next to the option, or press **OK** to select the option that is highlighted with a white border. Once a selection is made, the screen will proceed to the next stage.

Note: If no stowed attachment options are available, this screen will not appear and will skip to the next available screen.



5.3.5 Parts of Line

The current number of parts of line is displayed in the middle of the screen. To change the parts of line, press the “-” or “+” buttons until the correct number is reached. Then, press **OK** or **Next**.

Note: Some configurations allow only a single part-of-line operation. In these cases, the parts-of-line selection phase will be skipped, and the parts-of-line will be set to one (1).

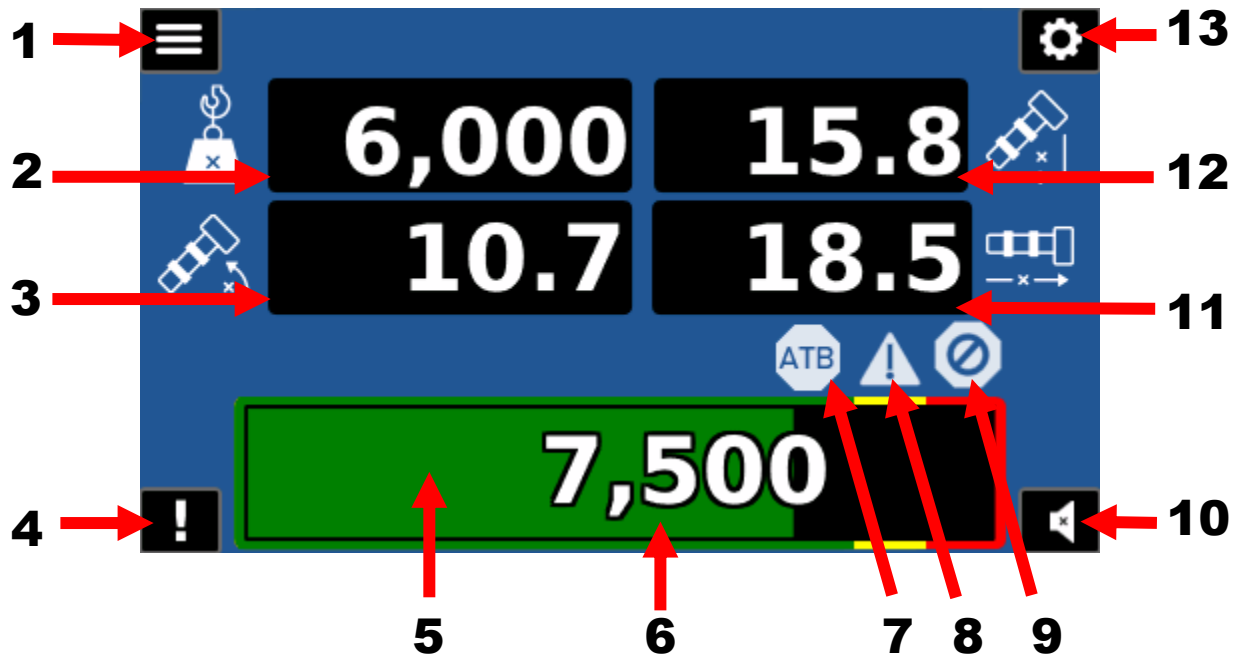
Note: If an erected jib or searcher hook is selected, this option will not be available.



5.3.1 After Configuration is Complete

Once all of the selections have been entered, the system will exit the Configuration Menu and proceed to the Home Screen.

6. The Home Screen



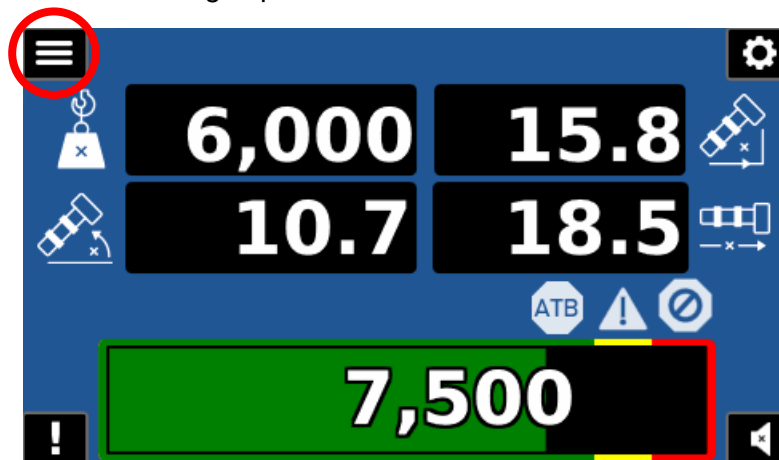
1. **Main Menu Button** – Opens the Main Menu, giving access to the Configuration, Info, Brightness, Calibration, and Legacy Menus.
2. **Indicated Load Window** – Displays total load, including slings, etc. suspended below the lifting point.
3. **Boom Angle Window** – Displays the angle of the main boom in degrees relative to horizontal.
4. **Fault Codes Button** – Pressing this button displays fault codes, if any are present. If the system has any internal faults, the Fault Codes Button (exclamation point) will turn red.
5. **Bar Graph** – Displays the indicated load as a percent of the rated capacity of the current configuration of the machine.
6. **Rated Capacity** – Displays the rated capacity of the machine in the current configuration.
7. **ATB Indicator** – This indicator will turn red when there is an ATB alarm.
8. **Pre-Warning Indicator** – This indicator will turn yellow when there is a pre-alarm for load at 90% of rated capacity.
9. **Overload/Fault Indicator** – This indicator will turn red when there is an overload or fault.
10. **Cancel Alarm Button** – Used to cancel audible alarms.
11. **Boom Length Window** – Displays the length of the main boom.
12. **Load Radius Window** – Displays the radius of the load.
13. **Configuration Button** – Brings up the Configuration Menu.



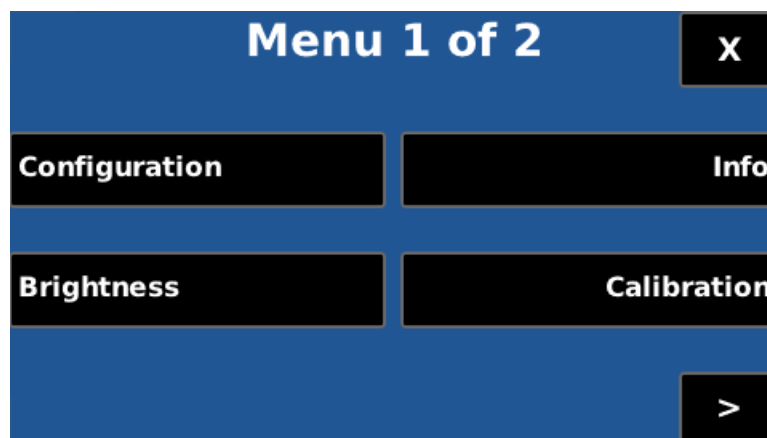
THE OPERATOR MUST SELECT THE CORRECT CRANE CONFIGURATION FOR EACH SETUP CONFIGURATION CHANGE. INACCURATE OR NON-SELECTION OF THE APPROPRIATE CONFIGURATION WILL RESULT IN INCORRECT CALCULATIONS AND READINGS OF THE INDICATED LOAD WEIGHT AND PERCENT OF RATED CAPACITY. PLEASE REFER TO THE SECTION “CONFIGURATION SELECTION”.

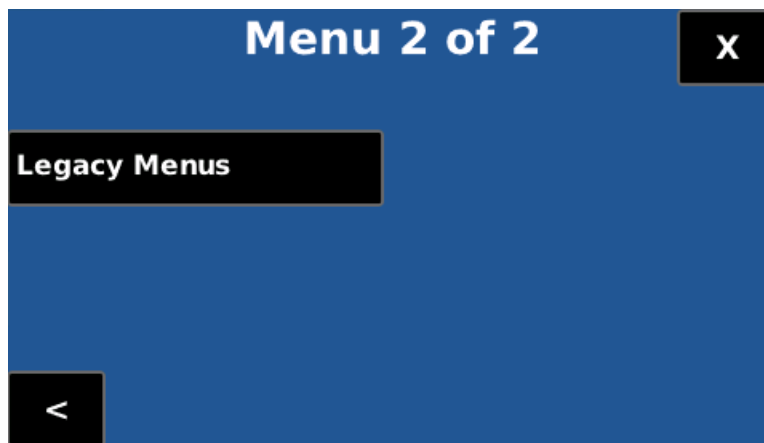
6.1 Main Menu Button

Pressing the **Main Menu** button brings up the Main Menu.

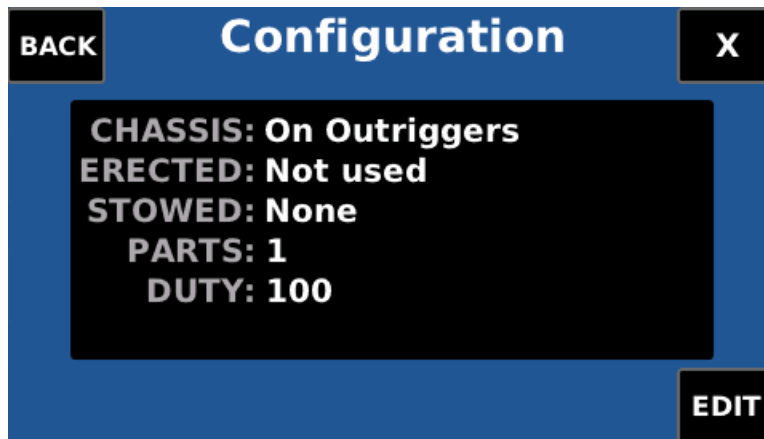


The Main Menu allows the operator to access the Configuration Menu, Info Menu, Brightness Menu, Calibration Menu, and Legacy Menus. Press one of the labeled buttons to enter the respective menu. Press the “<” or “>” buttons to navigate to the previous or next menu page. Press the **X** button to return to the Home Screen.





6.1.1 Configuration Menu

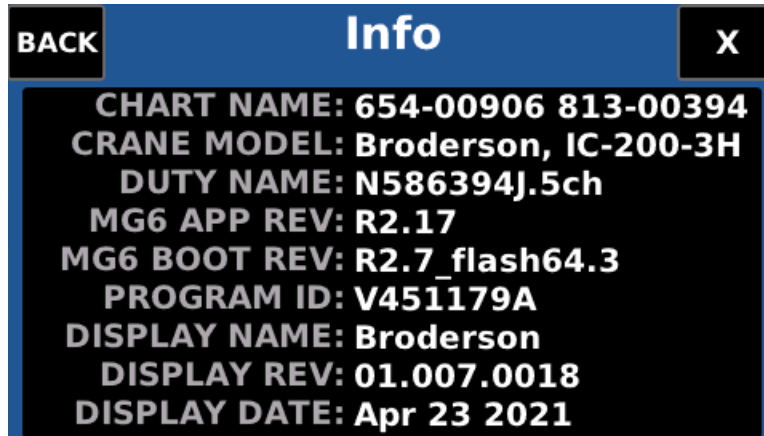


The current configuration of the crane is shown in the center of the screen, listing the current setup for:

- Chassis
- Erected Jib
- Stowed Jib
- Parts of Line
- Duty - This displays the setup code for the current configuration

Press **Back** to return to the Main Menu or **X** to exit to the Home Screen. Press the **Edit** button to edit the configuration. Refer to the section **Configuration Selection**.

6.1.2 Info Menu



The window shows information regarding:

- Chart Name
- Crane Model
- Duty Name
- MG6 App Revision
- MG6 Boot Revision
- Program ID
- Display Name
- Display Revision
- Display Date

Ensure that the crane model, chart name, and duty file match the machine.

Press **Back** to return to the Main Menu or **X** to exit to the Home Screen.

6.1.3 Brightness Menu

Press the “-” and “+” buttons to adjust the lightness or darkness of the display area. After the desired brightness is reached, press **Back** to return to the Main Menu or **X** to exit to the Home Screen.



6.1.4 Calibration Menu

This menu is used for system calibration. Refer to the section **Calibration Mode**.

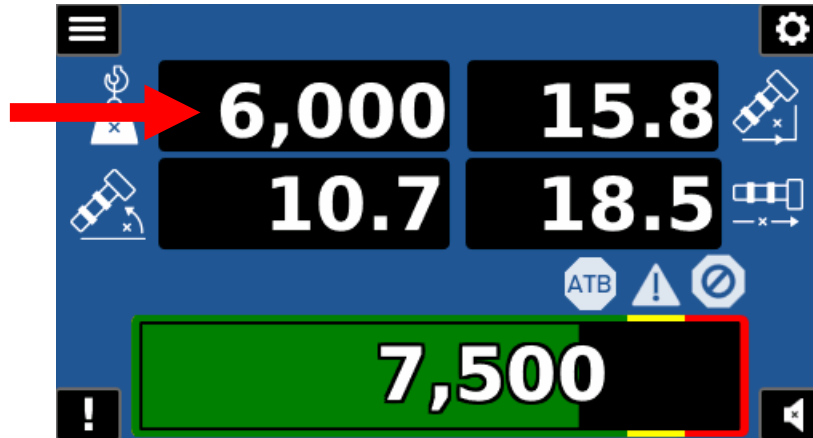


6.1.5 Legacy Menus

This menu is used to update the software and download data logs.

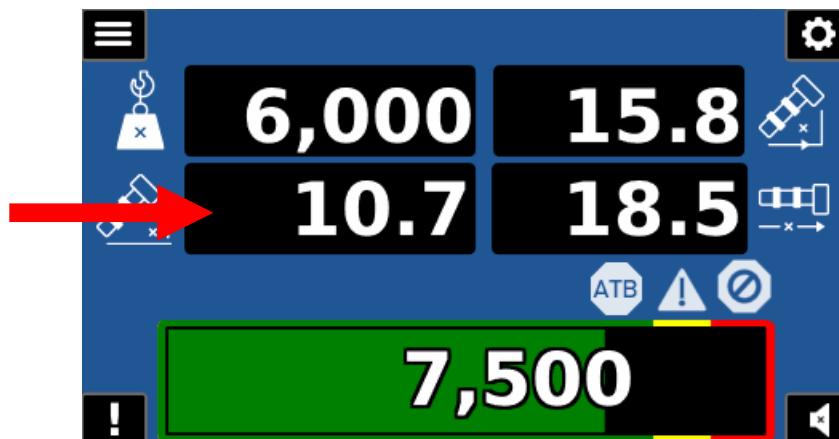
6.2 Indicated Load Window

The **Indicated Load** window displays the total load, including slings, etc., suspended below the lifting point.



6.3 Boom Angle Window

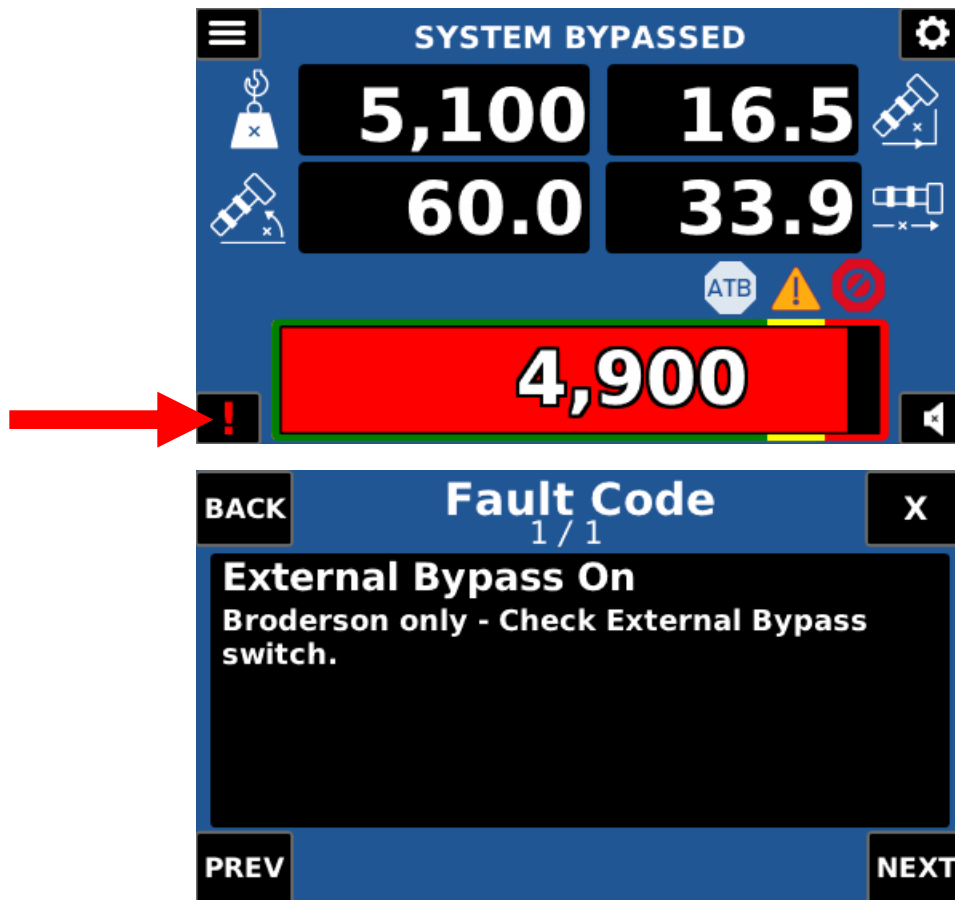
The **Boom Angle** window displays the angle of the main boom in degrees relative to horizontal.



6.4 Fault Codes Button

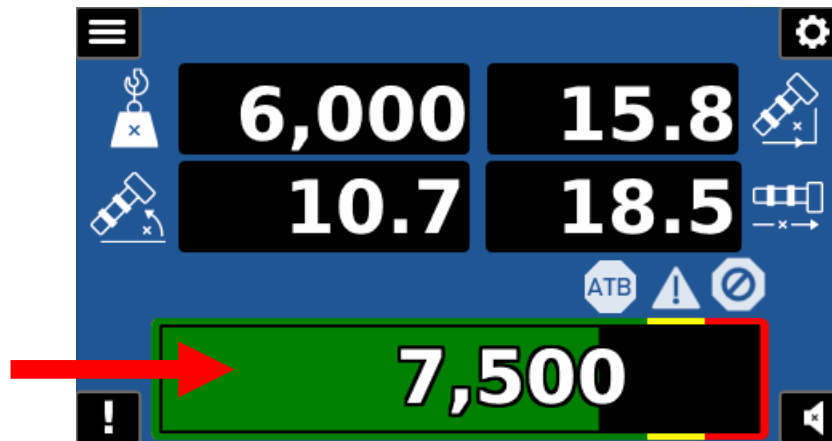
If the system has any internal faults, the Fault Codes button will turn red. Pressing the **Fault Codes** button brings up the fault codes menu. Information regarding any warnings or alarms will be displayed in this window. The specific fault messages can be viewed by pressing the **PREV** or **NEXT** buttons.

For a list of faults and information about how to resolve them, see the section **Fault Reporting and Fault Codes**.



6.5 Bar Graph

The **Bar Graph** displays the indicated load as a percent of the rated capacity of the current configuration of the machine. The indicated load relative to the maximum rated capacity is displayed as a bar which progresses to the right as the load increases.



6.6 Rated Capacity

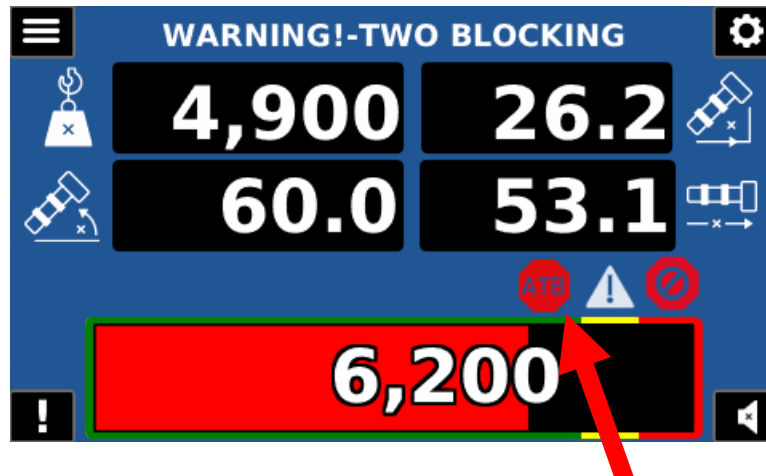
The **Rated Capacity** displays the maximum rated capacity of the machine in the current configuration.



6.7 Anti-Two-Block (ATB) Indicator

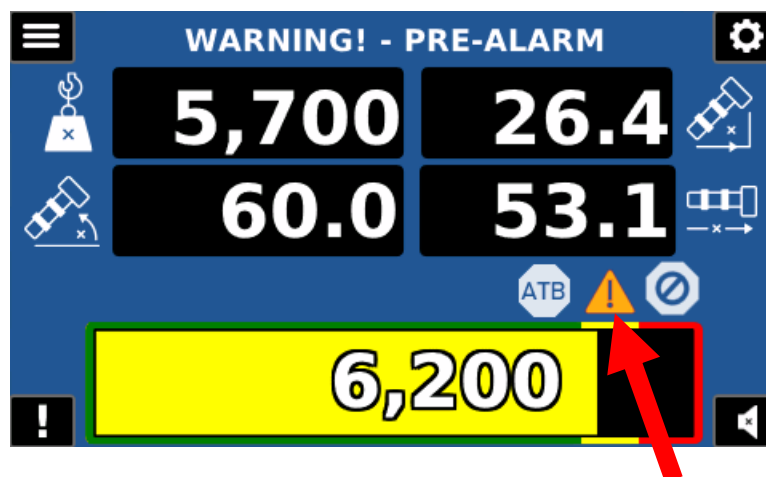
The **Anti-Two-Block (ATB)** indicator will turn red when the ATB limit switch detects an approach to a two-block condition. The screen will flash the warning message “WARNING! TWO-BLOCKING” in the top center of the screen and the audible alarm will sound continuously. The system will cause a function kick-out, disabling the Hoist Up, Boom Extend, Boom Down, and Swing functions.

Note: Swing functions may not be disabled on some crane models.



6.8 Pre-Warning Indicator

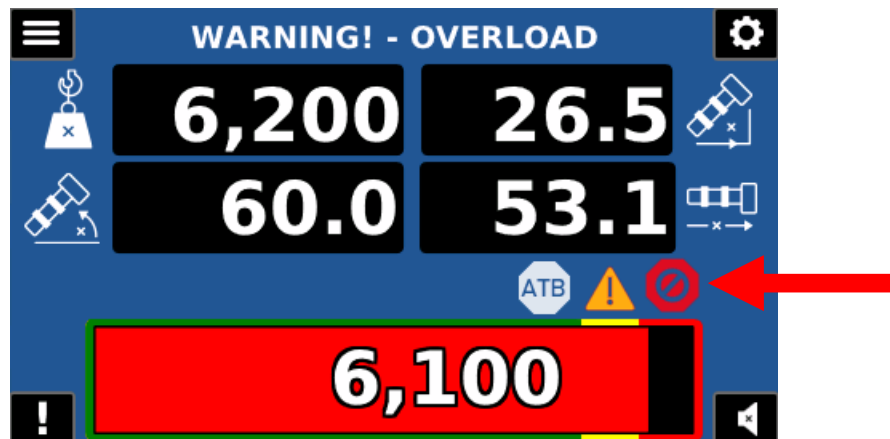
The **Pre-Warning Indicator** will turn yellow when the hook load reaches 90% of the rated maximum capacity and an audible alarm will sound intermittently. The screen will flash the message “WARNING! – PRE-ALARM” in the top center of the screen.



6.9 Overload/Fault Indicator

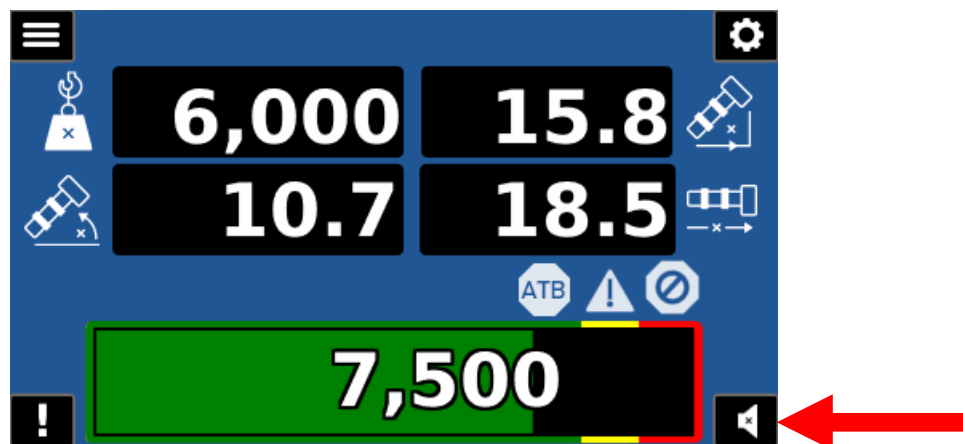
When the load reaches or exceeds 100% of the rated maximum capacity, the **Overload/Fault Indicator** will turn red along with yellow Pre-Warning Indicator. An alarm will sound continuously. The message “WARNING! – OVERLOAD” will flash in the top center of the screen and the function kick-out will disable Hoist Up, Boom Extend, Boom Down, and Swing Functions. Crane motions (boom extend, boom down, swing, and hoist up) are cut in order to prevent damage to the crane and the endangerment of persons near the lifting area.

Note: Swing functions may not be disabled on some crane models.



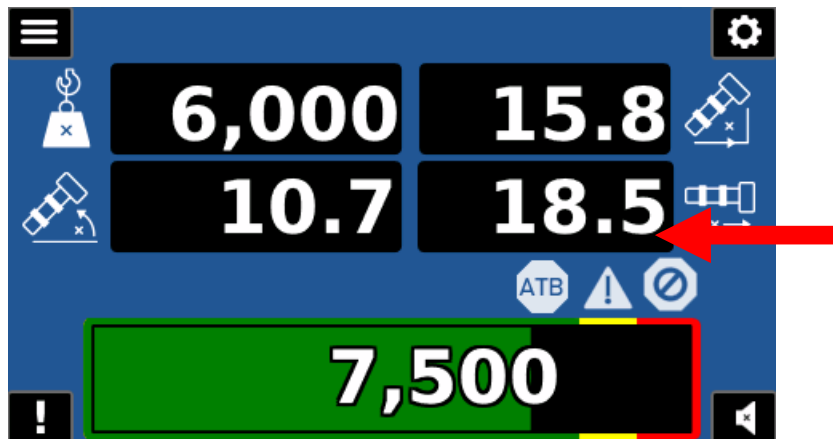
6.10 Cancel Alarm Button

The **Cancel Alarm** button is used to silence the audible alarm generated by an overload, ATB Alarm, or outrigger position sensing mismatch. The audible alarm remains cancelled until the condition causing the alarm has been resolved. See the section **Cancel Alarm Button**.



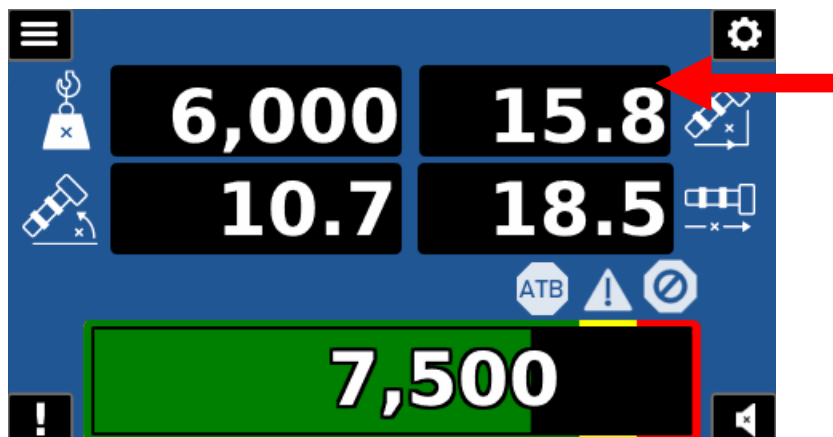
6.11 Boom Length Window

The **Boom Length** window displays the length of the main boom.



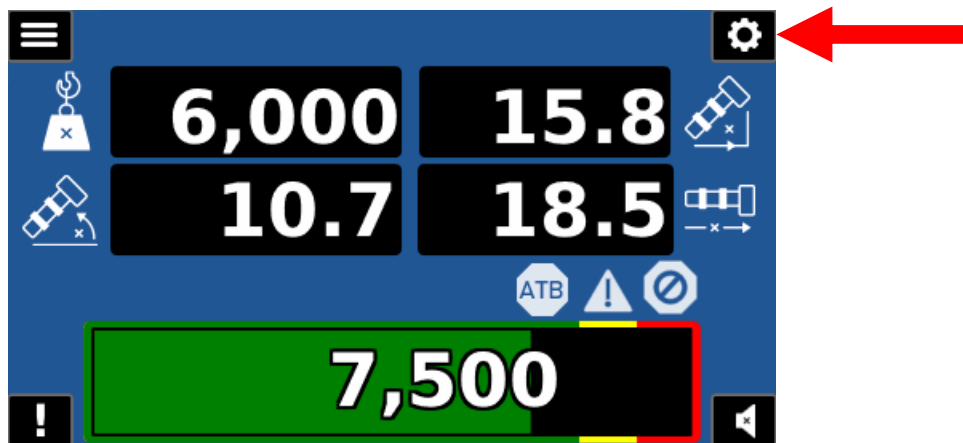
6.12 Load Radius Window

The **Load Radius** window displays the radius of the main boom.



6.13 Configuration Button

The **Configuration** button accesses the configuration display screen which allows the operator to configure the system to match the current setup of the crane. See the section **Configuration Menu**.



6.14 Outrigger Position Sensing (If Equipped)

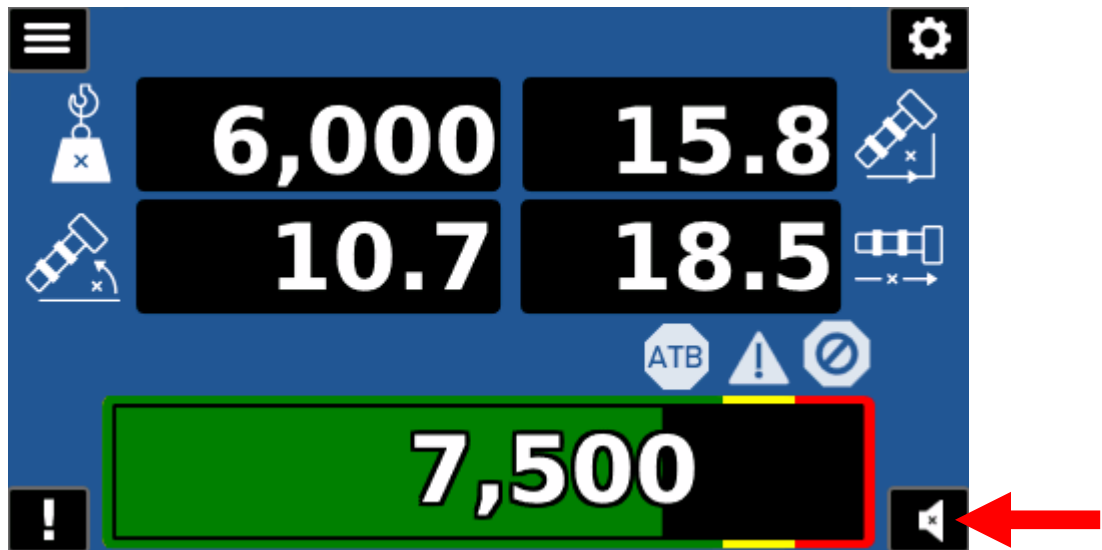
The operator will be warned if the selected outrigger position does not match the detected outrigger position. The Yellow Pre-Alarm Indicator and Red Overload/Fault Indicator will be illuminated if the 12 volts from the crane outrigger signal is not received while in the outrigger configuration. A light on the crane instrument panel will also illuminate. If this occurs, check the crane outrigger switches and contact Broderson.

6.15 Boom Topped Down Warning

A **Boom Topped Down** warning may occur with a boom angle below 3 degrees and with a load less than approximately 50 lbs. The **Overload/Fault Indicator** will turn red and the audible alarm will sound continuously. The message **"BOOM TOPPED DOWN"** will flash in the top center of the screen. FKO will occur.

This is to notify the operator that the system may not be detecting the load correctly. To resume operation, raise the boom angle above 3 degrees.

7. Cancel Alarm Button



The **Cancel Alarm** button is used to silence the audible alarm. Press this button to cancel an audible alarm from an:

- Overload
- ATB Alarm
- Outrigger Position Sensing Mismatch

The audible alarm remains cancelled until the condition which caused the alarm has been resolved.



THE CANCEL ALARM BUTTON SHOULD BE USED WITH CAUTION. AUTOMATIC AUDIBLE ALARMS ARE PROGRAMMED AS A WARNING AGAINST OVERLOAD, TWO BLOCK DANGERS, AND HAZARDOUS TIPPING CONDITIONS. THESE ALARMS ARE TEMPORARILY SILENCED WHEN THIS OPTION IS ACTIVATED.

8. System Care & Maintenance

It is recommended that the following system checks be carried out when using the Greer LMI System with MG6 Computer and Insight Display.

Check the following items prior to each shift or crane operation:

- Reeling Drum - Reel-Off Cable to boom tip
- Reeling Drum - Reel-to-Computer Cable
- Hydraulic connections
- Anti-Two-Block Switch
- Checking the two-block warning signals and cutout of machine motions.

Perform the following check at least once a month:

- Load Test

More detailed descriptions of the tests are included in the following sections.

8.1 Checking the Reeling Drum Reel-Off Cable

1. Carefully examine the reel-off cable for damage.
2. Fully extend and retract the boom. Ensure the reeling drum cable extends and retracts without sagging or erratic movements. Ensure that the reel-off cable is smoothly fed on and off the extension reel without drooping along the boom or jumping, especially as the boom is telescoped in.



THE EXTENSION REEL SETTING IS FACTORY SET. IF THE REEL-OFF CABLE HAS BEEN BROKEN, CALL GREER/TWG SERVICE. DO NOT ATTEMPT TO REPAIR A BREAK IN THE REEL-OFF CABLE WITHOUT CONSULTING WITH A SERVICE REPRESENTATIVE.

8.2 Checking the Reel-to-Computer Cable

The reel-to-computer cable exits from the reeling drum and runs down the boom and around its pivot to the computer. Ensure that the cable is free from damage. If this cable has been damaged in any way, it should be carefully tested and may need to be replaced to ensure accurate transmission of signals. If it has been damaged, contact Greer/TWG Service for more information.

8.3 Checking the Hydraulic Pressure Sensor Connections

The two hydraulic pressure transducers, separate from the computer, measure the pressure within each side of the boom lift cylinder. The pressure transducers are connected to the boom lift cylinder valve block – either directly, or by two flexible hoses.

If the pressure transducers are connected directly, ensure there are no leaks. Check for oil drips with the boom in the down position. Do not turn counterclockwise if checking tightness with a wrench.

If the pressure transducers are connected to the valve block by hoses, the hoses are subject to the full hydraulic pressure contained within the upper and lower sides of the boom lift cylinder. Ensure that there are no hydraulic leaks at either connection end of both hoses. Check for signs of wear or damage along the length of each hose.



DO NOT CHECK FOR HYDRAULIC LEAKS WITH HANDS. IF A MIST OF HYDRAULIC OIL IS NOTICED AROUND A LINE OR COMPONENT, USE CARDBOARD OR OTHER MATERIAL TO CHECK FOR THE LOCATION OF THE LEAK. HIGH PRESSURE FLUID LEAKING FROM SMALL HOLES CAN BE ALMOST INVISIBLE, YET HAVE ENOUGH FORCE TO PENETRATE SKIN. IF INJURED BY ESCAPING FLUID, SEE A DOCTOR AT ONCE. SERIOUS REACTION OR INFECTION CAN OCCUR.

8.4 Checking the Two-Block Warning Signals and Cutout of Machine Motions

The following test activates the Anti-Two-Block warning signals and the valve controlling cut out of crane motions to ensure proper operation. Use this test procedure to ensure the Anti-Two-Block warning signals and the function kick-out are working properly. Ensure no pre-existing alarm conditions are active when performing this test.

- Ensure the Anti-Two-Block parts are undamaged and correctly connected.
- Ensure the Anti-Two-Block switch is secure on its mounting.
- Ensure all the electrical cable and connectors are free from damage and correctly connected.



BEFORE PERFORMING THIS TEST, POWER THE CRANE OFF AND THEN BACK ON AGAIN TO ENSURE THAT THERE IS NOT AN EXISTING TWO BLOCK WARNING OR FUNCTION KICK-OUT.

DO NOT PRESS THE CANCEL ALARM BUTTON TO DISABLE THE AUDIBLE ALARM DURING THIS TEST. DO NOT WINCH THE HOOK BLOCK INTO THE BOOM TIP, IN CASE THE SYSTEM DOES NOT CAUSE A FUNCTION KICK-OUT.

DURING THIS TEST, OPERATE THE CRANE MOTIONS WITH EXTREME CAUTION.



ENSURE THE CONFIGURATION MENU IDENTIFIES THE CORRECT CONFIGURATION FOR THE CURRENT OPERATION. IF IN DOUBT, SET UP THE CONFIGURATON AGAIN FOLLOWING THE STEPS OUTLINED IN THE SECTION “CONFIGURATION SELECTION”.

8.4.1 Two-Block Signals and Function Kick-Out Test Procedure

1. Ensure that power to the crane has been removed. Place the Anti-Two-Block switch in the tripped position. Wedge, clamp, tie, or otherwise immobilize the switch in the tripped position.
2. Power up the crane.
3. Check that the hoist up, boom down, and boom extend motions are disabled. Audible and visual alarms on the operator’s display should become active.
4. Remove power to the crane.
5. De-activate the Anti-Two-Block switch by returning it to the normal position.

NOTE: *This action should disable the audible and visual alarms on the operator’s display and activate the boom motions.*

8.5 Load Test

It is recommended that a load test be performed monthly. Performing a load test is the best method to identify a possible problem in the System. The accuracy of the load test is dependent upon accurate operation of all sensors and correct crane configuration selection.



ENSURE THE CONFIGURATION CODE NUMBER IN THE CONFIGURATION MENU IDENTIFIES THE CORRECT CONFIGURATION FOR THE CURRENT OPERATION. IF IN DOUBT, SET UP THE CONFIGURATON AGAIN FOLLOWING THE STEPS OUTLINED IN THE SECTION “CONFIGURATION SELECTION”.

8.5.1 Load Test Procedure

1. Select a known weight of at least 20% of Maximum Rated Capacity for the current configuration.
2. Calculate the weight of the total load, including the slings and hook block.
3. Lift the weight and record the load weight displayed on the operator's display console.
4. The load weight on the display must read 0-10% higher than the actual total load that was lifted. For example, when lifting 5000 lbs, the load reading on the display should read between 5000-5500 lbs. It is never acceptable for the display to indicate less than the total load.



A LOAD READING ON THE OPERATOR'S DISPLAY CONSOLE THAT FALLS OUTSIDE OF THIS RANGE MAY INDICATE A SENSOR PROBLEM. IF THIS OCCURS, CONTACT GREER/TWG SERVICE.

Part 2: Calibration

9. Calibration Overview and Preparation

It is necessary to zero and span the angle and extension sensors so the computer can measure the length and angle of the boom and calculate load. The System is calibrated using the Operator's Display Console. The calibration procedure ensures the sensors, cables, and hydraulic connections are correctly installed and adjusted.

Note: The pressure transducers are pre-calibrated by the manufacturer.

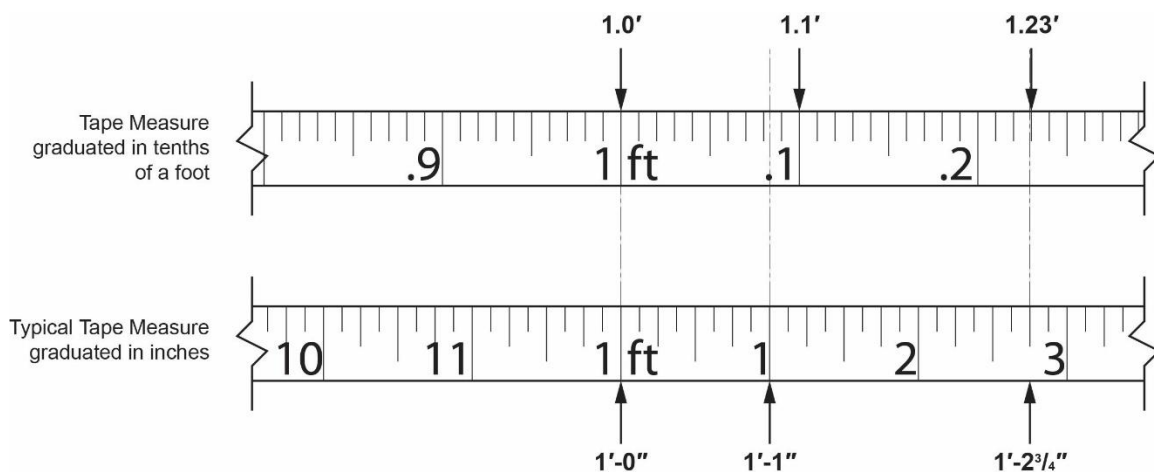


OBSERVE SAFE PRACTICES AT ALL TIMES. ENSURE THE CRANE CAPACITY LIMITATIONS ARE UNDERSTOOD AND THE CRANE CAPACITY PLATE IS FOLLOWED. DO NOT EXCEED THE MANUFACTURER'S SPECIFIED LIFTING LIMITATIONS.

Required Tools:

- 1/4" Nut Driver or T15 Torx driver
- Digital level calibrated and accurate to 0.1°
- 100 ft measuring tape – fiber type graduated in tenths of feet
- Digital multimeter capable of measuring to three decimal places

NOTE: Low-cost analog multimeters are not appropriate; their input impedance may give inaccurate readings.



10. Identifying the System Configuration

10.1 A2407xx-Series Reeling Drums

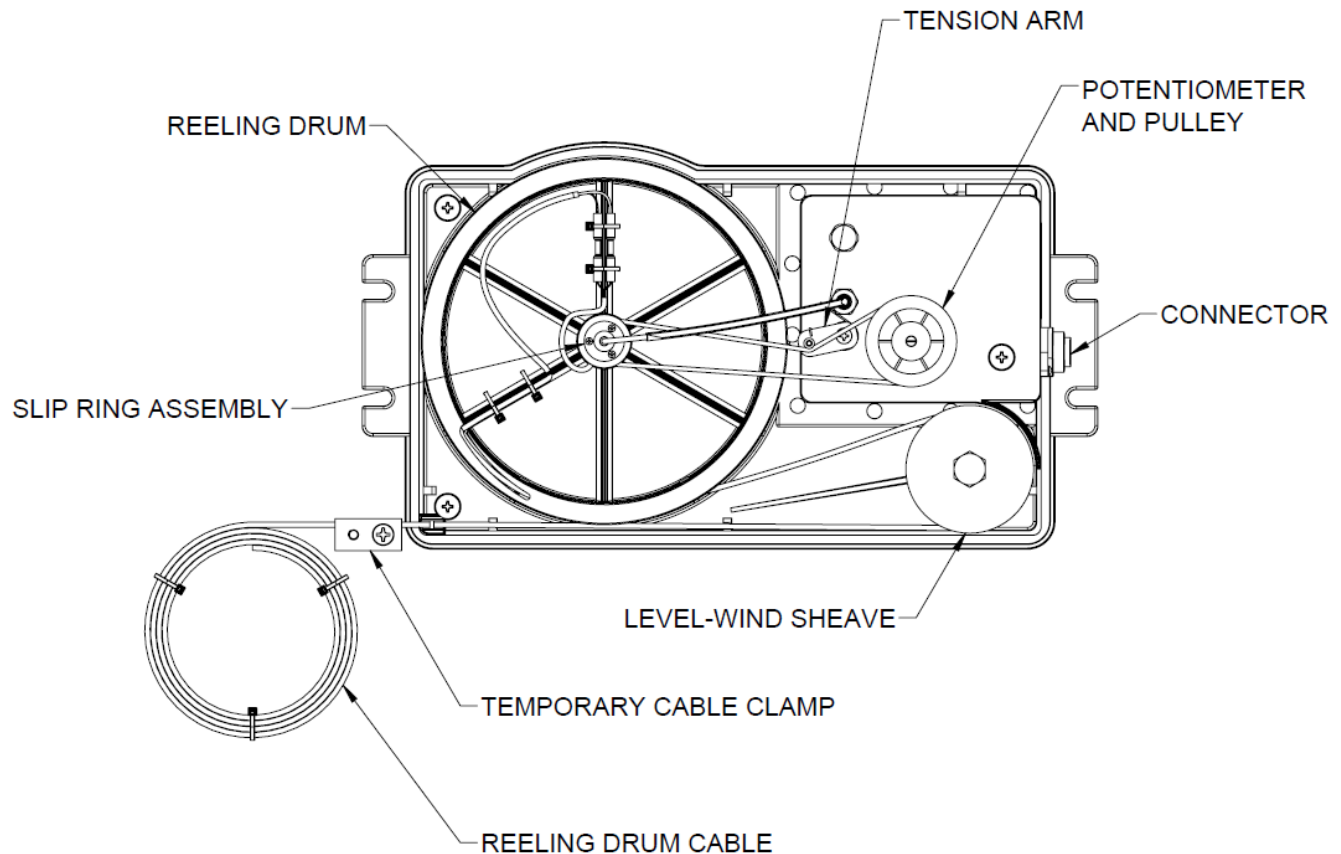
The A2407xx-series reeling drum assemblies are used on cranes with boom spans of 35 feet or less. The reel is mounted to the side of the boom and provides storage for the reeling drum cable and the angle and length sensors.

The reeling drum cable carries the anti-two-block signal back to the reeling drum assembly.

The cable must be stored on the reeling drum in a single layer to preserve the accuracy of the length measurement. The level-wind sheave ensures the reeling drum cable is stored in a single layer.

The angle and length sensors are housed in a sealed enclosure inside the reeling drum assembly to protect them from the elements.

NOTE: Do NOT remove the temporary cable clamp until the cable is connected to the crane. If removed early, the cable can snap back into the housing and damage the unit.



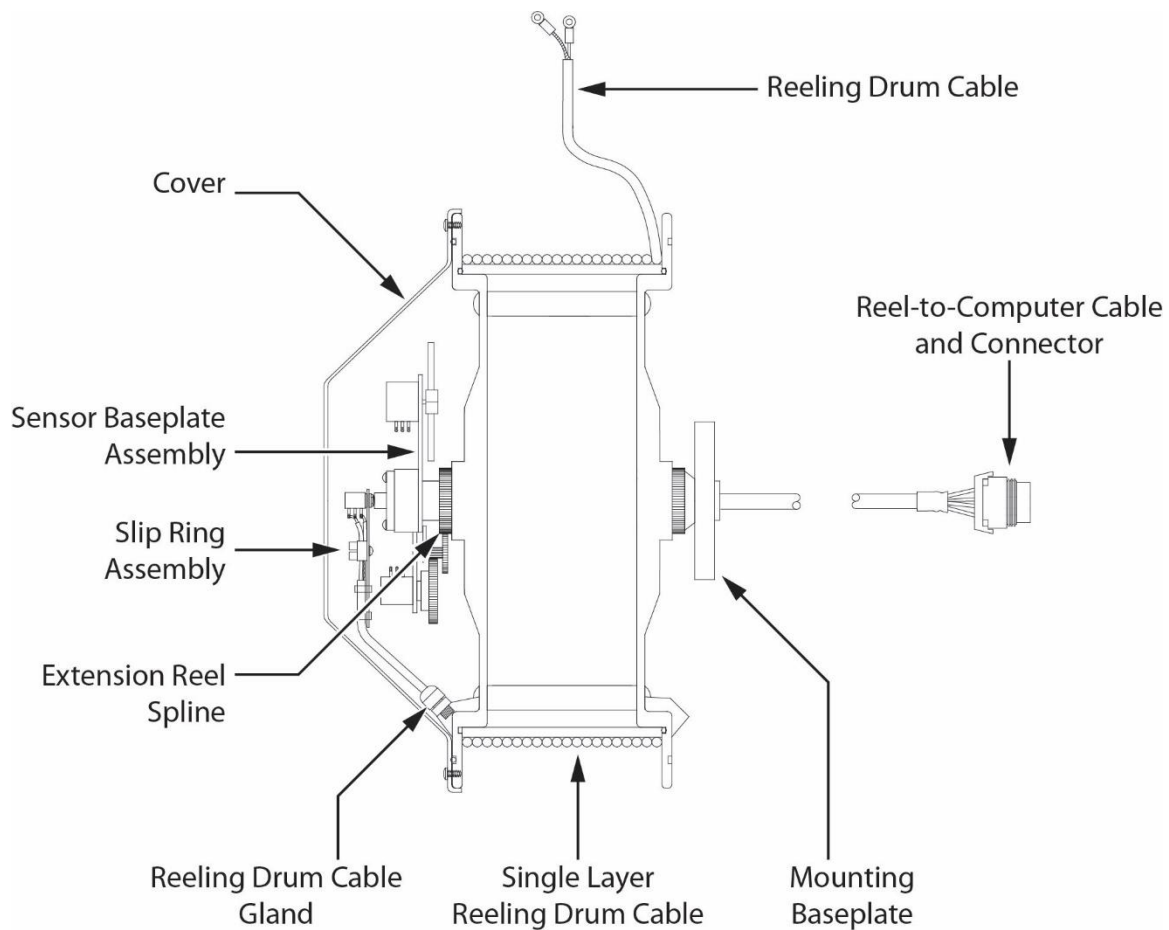
10.2 A2406xx-Series Reeling Drums

The A2406xx-series reeling drums are used on cranes with boom spans of up to 90 feet, such as the IC200 and larger cranes. This reeling drum is approximately 14" in diameter and is installed on the side of the boom. The reel provides storage for the reeling drum cable and contains the angle and length sensors.

The reeling drum cable carries the anti-two-block signal back to the reeling drum assembly.

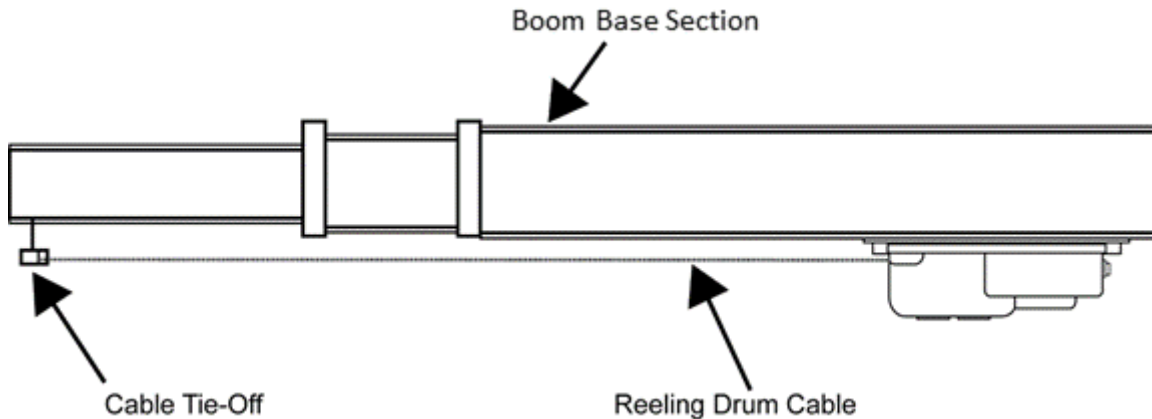
The cable must be stored on the reeling drum in a single layer to preserve the accuracy of the length measurement.

The reeling drum also houses the angle and length sensors.



11. Pre-Calibration Instructions for Different Configurations

11.1 Systems with the A2407xx-Series Reeling Drums



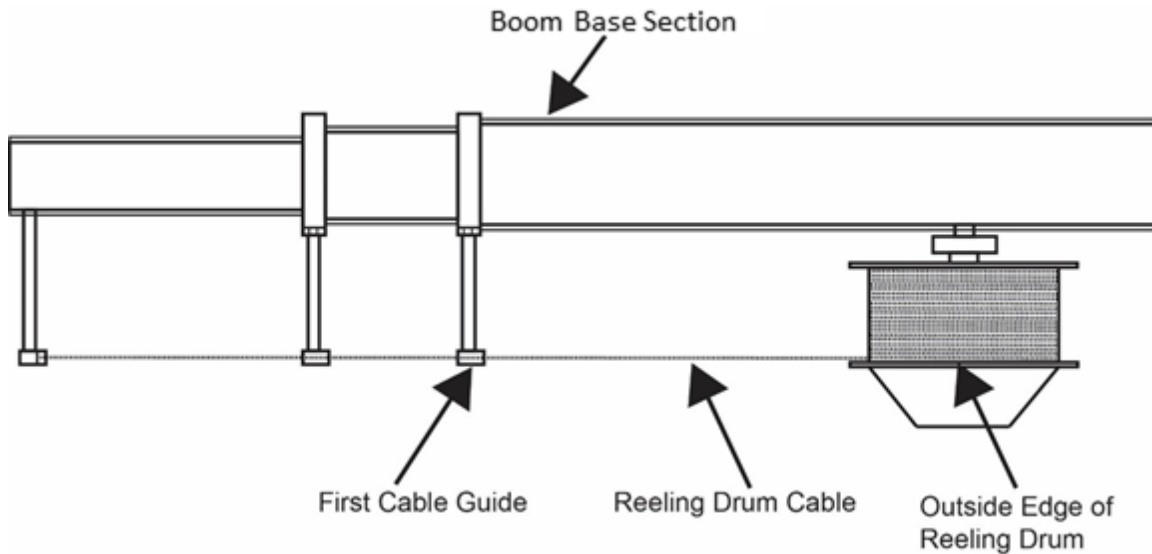
11.1.1 Replacing the Reeling Drum

1. Position the crane on firm, level, ground with outriggers properly extended and set.
2. Fully retract the boom.
3. Place the digital level on the boom and adjust the boom until the digital level reads 0.0°.
4. Remove the reeling drum cable from the tie-off and remove the 4 bolts from the existing reeling drum. Remove the reeling drum from the boom.
5. Install the new reeling drum using the existing mounting holes.

Note: Do NOT remove the temporary cable clamp until the cable is connected to the crane. If removed early, the cable can snap back into the housing and damage the unit.

6. Pull the reeling drum cable out and attach the loop to the cable tie-off.
7. Remove the temporary cable clamp.
8. The reeling drum is pre-tensioned and is ready for calibration.

11.2 Systems with the A2406xx-Series Reeling Drums



11.2.1 Replacing the Reeling Drum

1. Position the crane on firm, level ground with outriggers properly extended and set.
2. Fully retract the boom.
3. Place the digital level on the boom and adjust the boom until the digital level reads 0.0°.
4. Remove the existing reeling drum cable from the tie-off and remove the reeling drum from the boom.
5. Install the new reeling drum using the existing hardware and mounting location.

11.2.2 Pre-Tensioning the Reeling Drum

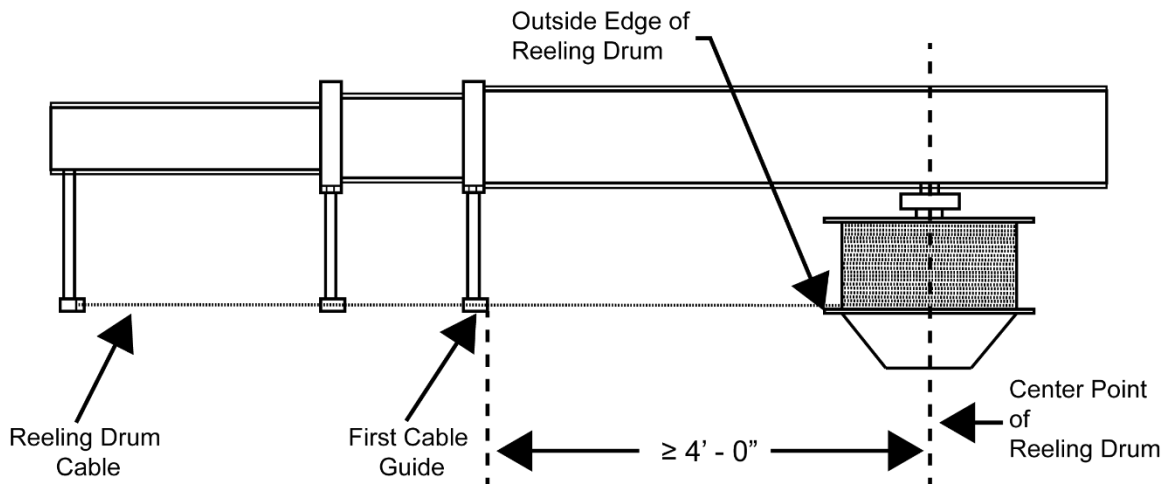
1. With the boom fully retracted and the new reeling drum installed, slowly rotate the reeling drum clockwise until a “click” is heard.
2. Slowly rotate the reeling drum counterclockwise five (5) complete rotations.

NOTE: A temporary marker can be placed on the reeling drum to help facilitate the rotation count.

3. Pre-tensioning of the reeling drum is now complete.

11.2.3 Installing the Anti-Two-Block Cable

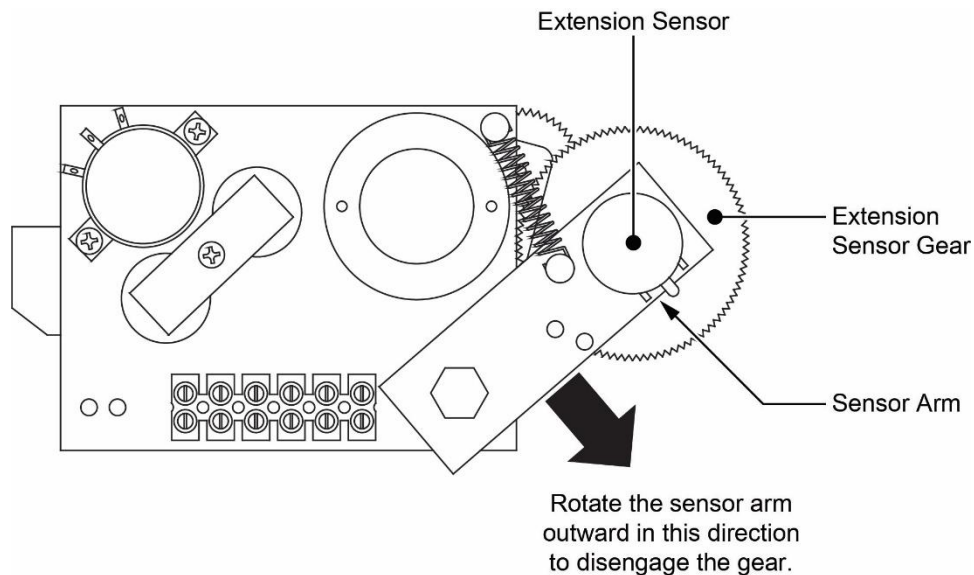
1. Before attaching the new reeling drum cable to the tie-off post, ensure the existing cable guides achieve proper placement of the first cable wrap.
2. Ensure the distance between the first cable guide is at least 4' from the center point of the reeling drum. The inside edge of the first cable guide must align with the outside edge of the reeling drum.



Note: The reeling drum cable path to the boom head through the cable guides to the tie-off post may follow a straight line parallel to the boom, as shown. Alternatively, the reeling drum cable may curve toward the boom depending on the placement of the cable guides in the latter segments of the boom.

11.2.4 Adjusting the Extension Sensor

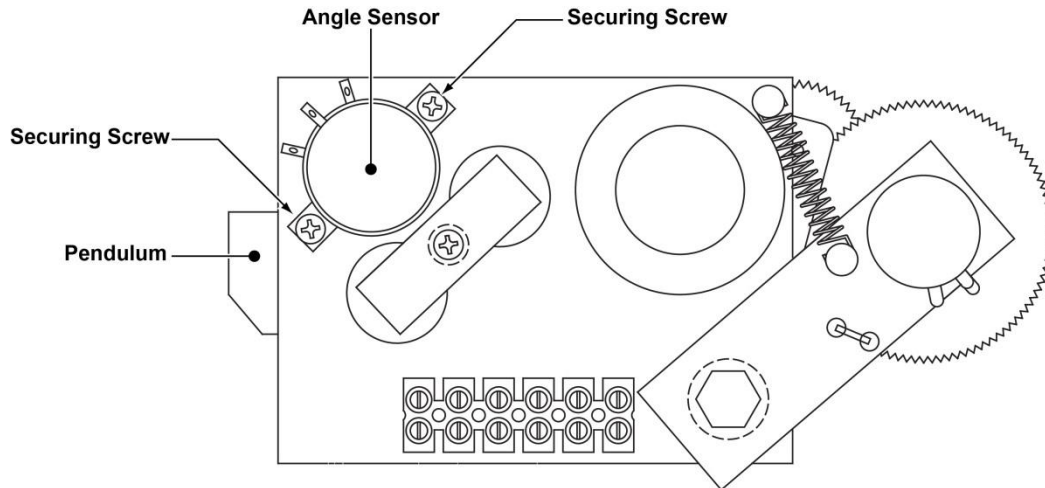
1. With the boom fully retracted, push the extension sensor arm down to disengage the gear.



2. While holding the gear in this position, rotate the extension sensor clockwise until the end of the potentiometer travel is reached.
3. Rotate the sensor a 1/2-turn counter-clockwise to establish the proper starting point.

NOTE: Confirm by checking the voltage. Refer to the section **Reeling Drum Voltage Checks** (Refer to the section for A2406xx-series reeling drums).

11.2.5 Adjusting the Angle Sensor



1. With the boom at 0.0°, check the voltage of the angle sensor. Refer to the section **Reeling Drum Voltage Checks** (Refer to the section for A2406xx-series reeling drums).
2. If the voltage is incorrect, loosen the securing screws and rotate the angle sensor until the desired voltage reading is attained.
3. The reeling drum is pre-tensioned and is ready for calibration.

12. Calibration Mode

1. Ensure that the duty file and crane model match the machine. Check the Info Menu, accessible through the Main Menu from the Home Screen. Refer to the section **Info Menu**.
2. Ensure the boom is fully retracted and set to 0.0°. Use a calibrated digital level.
3. Turn the System On and go through the configuration setup. Ensure all options on the machine are shown in the Configuration Menu. Refer to the section **Configuration Selection**.

12.1 Entering Calibration Mode

1. To enter Calibration Mode, the display must be in “Normal Operating” mode.
2. Press the Main Menu Button.



3. In the Main Menu, press the **Calibration** button.



4. The display prompts you to enter the Passcode. Enter the Passcode: 1, 4, 3, 2.



5. The system will enter Calibration Mode.

12.2 Angle Zero Routine

1. Access the **Zero Angle** screen. It should be the first screen after entering Calibration Mode.
2. Ensure the boom is at 0.0°.
3. Press the **Zero** button.
4. The window in the center of the screen should read 0.0.



5. The angle zero routine is complete.

12.3 Extension Zero Routine

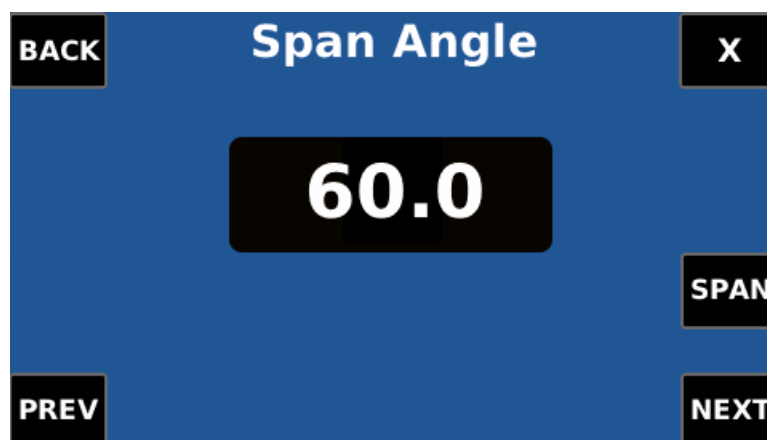
1. Press the **Next** button to access the **Zero Extension** screen.
2. Ensure the boom is completely retracted.
3. Press the **Zero** button.
4. The window in the center of the screen should read 0.0.



5. The extension zero routine is complete.

12.4 Angle Span Routine

1. Press the **Next** button to access the **Span Angle** screen.
2. Raise the boom to exactly 60.0° as shown with the calibrated digital level.
3. With the boom at exactly 60.0°, press the **Span** button.
4. The window in the center of the screen should read 60.0.



5. The angle span routine is now complete.

12.5 Extension Span Routine

1. Press the **Next** button to access the **Span Extension** screen.
2. The window will read the current boom length (retracted length).



3. Fully extend the boom until you hear the cylinder bottom out. The screen will display **Trim**.



4. Press the **Trim** button.
5. The window in the center of the screen will show the proper boom length. The Extension Span routine is now complete.

Note: The retracted and extended boom lengths can be found in the crane operation manual dimensional drawings. Boom length is from heel pin to lower sheave pin.

12.6 Rodside Offset Routine

1. Press the **Next** button to access the **Rod Offset** screen.
2. The window in the center of the screen will likely read 0. The current load is displayed below the window.

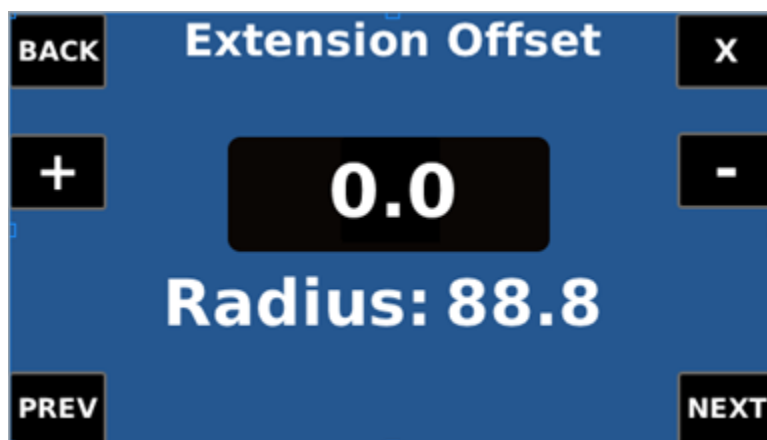


3. Press the “+” and “-” arrows to adjust the offset until the load reads 0.

12.7 Calibrating the Extension Offset

Note: The Extension Offset screen will only appear if a jib is erected

1. Press the **Next** button to access the **Extension Offset** screen. The Extension Offset can be used to make an adjustment to the radius when a jib is erected.
2. The window in the center of the screen will likely read 0. The current radius is displayed below the window.



3. Press the “+” and “-” arrows to adjust the offset until the desired radius is reached. Use a tape measure to find the actual load radius.

12.8 Calibrating the Load Offset

1. Press the **Next** button to access the **Load Offset** screen. The Load Offset can be used to make an adjustment that applies to all loads. For example, a load offset could be used to add 100 lbs to all load readings.
2. The window in the center of the screen will likely read 0. The current load is displayed below the window.



3. Press the "+" and "-" arrows to adjust the offset until the desired load is reached.
4. Press the **Next** button to return to the Home Screen.

12.9 After the Calibration Routine

1. Set up the machine and attach a tape measure, graduated in tenths of a foot, to the centerline of rotation.
2. With the boom horizontal and fully retracted, measure the load radius with the empty hook hanging and compare to what is displayed on the operator's display console. The display should read within +0.5 ft.
3. Repeat the test at full extension and record the results.
4. Raise the boom to 60° and measure the radius with the boom fully retracted and fully extended. The display should be within +0.5 ft.
5. Place the machine on outriggers.
6. Attach a known weight between 500 lbs and 1000 lbs. Check and read the load at full extension between 45° and 60°. The display should indicate the weight of the load, load handling equipment, and hook weight within 0-10% over the actual load.
7. If the machine does not pass these tests, do not place the machine back into service. Contact BMC or Greer/TWG Service for further instructions.

Part 3: Troubleshooting

13. Troubleshooting Introduction

This manual provides general information and methods for isolating problems that may happen during operation. Service personnel should have previous training and experience in the procedure for setup and operation of this system. Some problems may require replacing or returning parts to the factory for servicing.

Tools necessary:

- Tool kit consisting of wrenches and screwdrivers (flat and Phillips')
- Digital level accurate to 0.1°
- 150-200 ft tape measure graduated in tenths of a foot
- Digital multimeter

NOTE: *Low-cost analog multimeters are not appropriate; their input impedance may give inaccurate readings.*

14. Fault Reporting and Fault Codes

System fault codes provide a way to locate and assess problems within the system. The system performs a brief self-test each time it is powered on. Many fault conditions are detected without a system self-test.

When the system detects a fault, the Fault Codes Button will turn red. When a more serious fault is detected, the message “WARNING: SYSTEM OUT OF SERVICE” will flash in the top center of the screen.

To view the faults, press the Fault Code Button.



Press the **Prev** and **Next** arrows to scroll between error codes.



Many times, the error can be located using the general definition. However, a more detailed code definition may be required for diagnosis. The following section lists the possible faults and troubleshooting actions to resolve them.

14.1 Troubleshooting Fault Codes

14.1.1 Fault Codes for Multiple Faults

If the displayed fault code is not listed in the tables below, it could be a combination of multiple other fault codes. The displayed fault code is the sum of all the fault codes in the group (A, B, C, or D) that have been detected.

EXAMPLE: Fault code A015 indicates that faults A001, A002, A004, and A008 have been detected.

EXAMPLE: Fault code B024 indicates that faults B008 and B016 have been detected.

14.1.2 Group “A” Fault Codes

Group “A” fault codes represent faults detected for analog sensors.

NOTE: Check and repair “B” and “C” group faults before proceeding to group “A” faults.

The following chart lists the possible fault codes in the left column and the actions to take in the right column. If the displayed fault code is not listed here, see section **Fault Codes for Multiple Faults**.

Group A Fault Codes		
Fault Code	Description	Action
A000	No Fault Found	None
A001	Piston Transducer Range Error	Call for Service.
A002	Rod Transducer Range Error	Call for Service.
A004	Extension sensor out of range. Boom Extension value is not valid.	Adjust and calibrate extension sensor. Refer to Extension Zero Routine , Extension Span Routine , and Reeling Drum Voltage Checks . 1. Inspect the cabling and connections from the computer to the reeling drum. 2. Inspect the reeling drum cable for damage. 3. Remove the reeling drum cover to verify operation of the reeling drum.
A008	Angle sensor out of range. Boom Angle value is not valid.	Adjust and calibrate angle sensor. Refer to Angle Zero Routine , Angle Span Routine , and Reeling Drum Voltage Checks . 1. Inspect the cabling and connections from the computer to the reeling drum. 2. Remove the reeling drum cover and verify operation of the reeling drum.
A016	Swing Sensor Error	Call for Service.
A032	Temperature Sensor Error	Call for Service.

14.1.3 Group “B” Fault Codes

Group “B” fault codes represent faults detected for internal analog functions and power feeds to the function kickout and anti-two-block switches.

The following chart lists the possible fault codes in the left column and the actions to take in the right column. If the displayed fault code is not listed here, see section **Fault Codes for Multiple Faults**.

Group B Fault Codes		
Fault Code	Description	Action
B000	No Fault Found	None
B001	Piston transducer not responding.	Check CAN J1939 Wiring. Reseat pressure transducer cable.
B002	Rod transducer not responding.	Check CAN J1939 Wiring. Reseat pressure transducer cable.
B008	Bad ATB Feed. Error thrown if the ATB Feed status is not read correctly or goes out.	Check ATB cable system for shorts and to ensure that no connections are loose. Refer to Checking the Reeling Drum Cable for troubleshooting information. 1. Inspect the cabling and connections from the computer to the reeling drum. 2. Inspect the reeling drum cable from the reeling drum to boom tip and the anti-two-block switch connections. 3. Verify electrical signals for the two-block drive and signal within the reeling drum. Refer to Reeling Drum Voltage Checks .
B016	Bad FKO Feed. Error thrown if the FKO Feed status is not read correctly or goes out.	A Function Kick-Out wiring problem is usually caused by a fuse or crane circuit breaker failure. Check crane power and FKO fuse. Check the cables/wiring for shorts and to ensure that no connections are loose. For instructions to reset the MG6 Computer's circuit breaker, refer to section Function Kickout Fuse .
B032	External Bypass On	Check the External Bypass switch.

14.1.4 Group “C” Fault Codes

Group “C” fault codes represent faults detected for internal computer memories.

The following chart lists the possible fault codes in the left column and the actions to take in the right column. If the displayed fault code is not listed here, see section **Fault Codes for Multiple Faults**.

Group C Fault Codes		
Fault Code	Description	Action
C000	No Fault Found	None
C001	Bad Duty File. Program Checksum Error.	Call for service.
C002	Bad Duty ROM Checksum. Duty File Checksum Error.	Call for service.
C004	Bad RAM Test. RAM is corrupt.	Call for service.
C008	Bad Personality File Checksum. Personality file checksum error.	Call for service.
C016	Bad SEEPROM test. Serial EEPROM is corrupted.	Call for service.

14.1.5 Group “D” Fault Codes

Group “D” fault codes represent faults detected for capacity chart selection.

NOTE: Check and repair “B” and “C” group faults before proceeding to group “D” faults.

The following chart lists the possible fault codes in the left column and the actions to take in the right column. If the displayed fault code is not listed here, see section **Fault Codes for Multiple Faults**.

Group D Fault Codes		
Fault Code	Description	Action
D000	No Fault Found	None
D001	No duty found. If the duty file doesn't have the valid ID number or the file currently being used is a generic file, this error will occur.	Update the computer with the correct program & duty file.
D002	Bad extension match. If the current length value doesn't have a chart associated with it, this error will occur.	Boom length is out of range for selected chart. Check crane setup, boom length and extension.
D004	Bad swing match. If there is no chart available for the current swing/slew area defined (i.e. no 360° chart), this error will occur.	Swing to correct working area to select chart. Check swing sensor zero position.
D008	Bad interlocks. Interlocks are used for stowed jib deductions. If there are no defined interlocks for a stowed jib option in the chart, this error will occur.	Call for service.

15. Problems Not Reported by Fault Code System

This section addresses problems that are not reported by the computer fault code system.

15.1 Anti-Two-Block Alarm (ATB)

The purpose of this section is to help diagnose ATB alarm problems. For detailed information, schematic, and voltages, refer to **Anti-Two-Block Function Overview**.

PROBLEM:

- *The Anti-Two-Block alarm is continuously ON. Operating the switch at the boom head does not deactivate the alarm.*

This problem suggests an open circuit between the computer ATB input and the ATB switch, or an open circuit between the computer ATB feed and the ATB switch. Check the reeling drum cable for damage. Ensure the two-block switch is correctly connected. Check the slip-ring and wiring inside the extension reel. Check the reel-to-computer cable. Check the connectors.

PROBLEM:

- *The Anti-Two-Block alarm is continuously OFF (safe). Operating the switch at the boom head, by lifting the ATB weight does not activate the alarm.*

This problem suggests a short circuit between the computer ATB input and the computer ATB feed somewhere between the computer and the ATB switch. Check the reeling drum cable for damage. Ensure the two-block switch is correctly connected. Check the slip-ring and wiring inside the extension reel. Check the reel-to-computer cable. Check the connectors.

15.2 Displayed Load or Radius Errors

The purpose of this section is to help diagnose load and radius errors. Load or radius errors can cause early or late tripping of overload alarms. Accuracy of load is governed by the radius accuracy, and the extension, angle, and pressure sensors. Accuracy of radius (unloaded) is governed by the extension and angle sensors.

Ensure there are no system faults before continuing.

15.2.1 Check Boom Extension

1. Ensure the boom is fully retracted.
2. Ensure the reeling drum cable is correctly layered as a single layer across the extension reel surface. Any stacking of the cable will cause extension errors. This will cause the System to exceed the 0.5 ft tolerance allowed by the computer for boom mode selection. If the reeling drum cable is stacking on the reel, refer to **Checking Reeling Drum Cable Layering**.

3. Check the zero of the extension sensor with the boom fully retracted. Enter the Calibration Mode and go to the **Zero Extension** screen to view the extension value in feet. The value of extension must be between -0.2 and +0.2, with the boom fully retracted. If the extension value is incorrect, follow the procedure in **Extension Zero Routine**. Fully telescope the boom and ensure the displayed boom length value matches the maximum length of the boom. If the length value is incorrect, follow the Extension Span procedure in **Extension Span Routine**.

15.2.2 Check Main Boom Radius

NOTE: The required accuracy of taped radius measurements is within 0.1 feet. When taking radius measurements use a good quality tape that does not stretch. The tape should be graduated in feet and tenths of a foot. Always measure between the swing center of the crane and the hook line, using a single part of line.

1. Fully retract the boom and ensure the crane configuration is correctly set up.
2. Raise the boom to about 45° and measure the radius. The measured radius must match the displayed radius within -0/+10%. If it does not match, refer to **Angle Zero Routine**.
3. Raise the boom to a high angle (at least 70°) and measure the angle with the calibrated digital level. Ensure the displayed angle matches the level reading within 0.2°. If the displayed angle is incorrect, follow the angle span calibration procedure in **Angle Span Routine**.

15.2.3 Check Boom Angle

NOTE: The required accuracy of measured angles is within 0.2°. When taking boom angle measurements use a good quality calibrated digital level. Many levels are only accurate at 0° (level). Ensure the digital level is securely mounted to the boom.

1. Fully retract the boom.
2. Using a calibrated digital level, set the boom to 0° (zero) and ensure the displayed boom angle value is 0.0°. If the angle value is not 0.0°, refer to **Angle Zero Routine**.
3. Raise the boom to a high angle (at least 70°) and measure the angle with the calibrated digital level. Ensure the displayed angle matches the level reading within 0.2°. If the displayed angle is incorrect, refer to **Angle Zero Routine**.

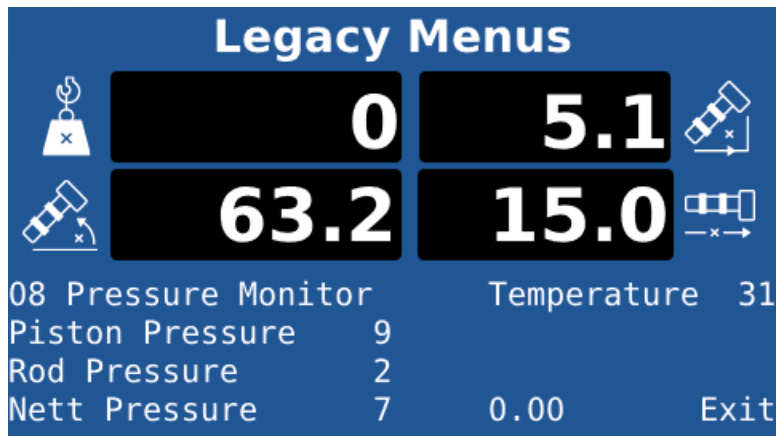
Note: The retracted and extended boom lengths can be found in the crane operation manual dimensional drawings. Boom length is from heel pin to lower sheave pin.

15.2.4 Check Pressure Transducers

There are two pressure transducers installed as part of the system. Both pressure transducers are mounted outside the computer unit. One is connected to the piston side of the boom lift cylinder; the other is connected to the rod side of the boom lift cylinder.

The pressure transducer located on the piston side is subject to the hydraulic pressure needed to support the weight of the boom, any attachments, and the load. The pressure transducer on the rod side monitors the pressure necessary to control the down motion of the boom. The computer unit uses this information (along with other sensors such as extension, length, and angle), to compute the weight of the suspended load. Each pressure transducer is calibrated by the manufacturer. Pressure transducers can be individually replaced.

1. Lower the boom until the boom lift cylinder is fully retracted and on its stop.
2. Loosen the hydraulic connections to the pressure transducer to ensure zero pressure is present on the sensors.
3. Enter the **Legacy Menus** and press **Menu Up** or **Menu Down** to access **Pressure Monitor**. The item number may vary based on how many other options are available for a particular crane. In this example it is number 8. Press the **Pressure Monitor** button to view both sensor pressures and net pressure.
4. Check the pressure values of both sensors. The pressure values should be between 0 and +10 psi. If not, replace any pressure transducer out of tolerance.
5. Check the net pressure values of the sensors. This should be between -10 and +10 psi. If not, replace any pressure transducer out of tolerance.



NOTICE!

BOTH PRESSURE TRANSDUCERS ARE PRE-CALIBRATED FROM THE FACTORY AND ARE SUPPLIED SEPARATELY FROM THE COMPUTER. THE MG6 PRESSURE TRANSDUCERS CAN BE INDEPENDENTLY REPLACED.

16. MG6 Computer Unit Overview

The computer unit is the center of the system. It reads the sensors, controls computations and disconnect functions, and communicates with the display.



The front panel of the MG6 Computer contains the following:

1. Electrical Connectors (Qty. 2)
2. USB Port, with dust cover
3. LED Indicators
4. Micro-USB Port, with dust cover (For Use by Greer/TWG Service Technicians Only)

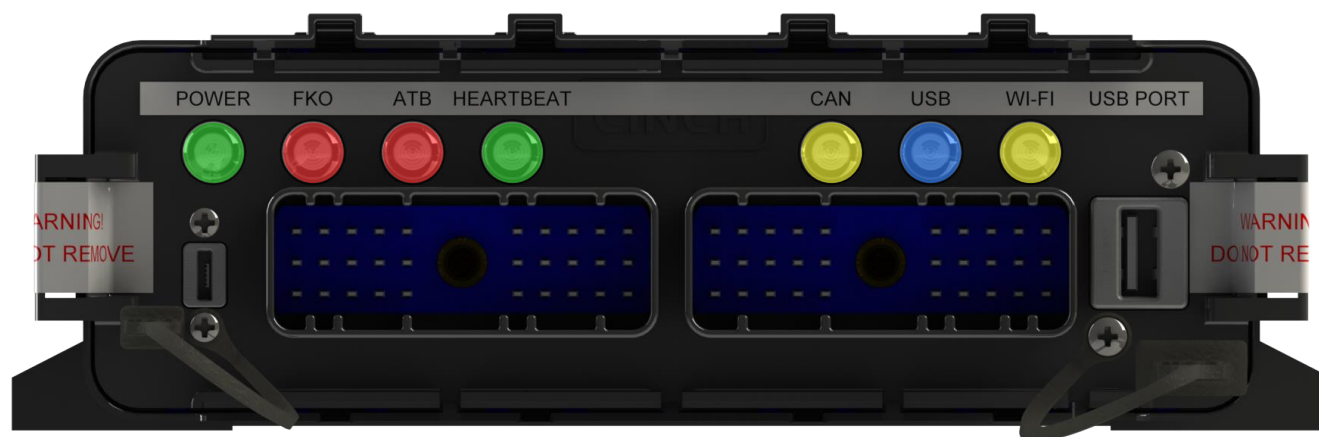
NOTICE: THE MG6 COMPUTER IS NOT SERVICEABLE EXCEPT BY GREER/TWG SERVICE TECHNICIANS.

IF THERE IS A PROBLEM THAT REQUIRES SERVICING THE MG6 COMPUTER, CONTACT GREER/TWG SERVICE AND SEND IT IN FOR REPAIR.

DO NOT ATTEMPT TO SERVICE THE COMPUTER YOURSELF. DO NOT ATTEMPT TO OPEN THE COMPUTER ENCLOSURE AND DO NOT REMOVE THE WARNING LABELS AFFIXED TO THE LATCHES ON EACH SIDE OF THE COMPUTER. DOING SO COULD VOID YOUR COMPUTER'S WARRANTY.

16.1 LED Status Indicators

The front panel of the MG6 Computer contains a row of LED indicators for checking computer operation.



The table below describes the behavior of the LEDs if the system is operating normally. If an LED is not lighting when it should, there may be a problem with the system. Contact Greer/TWG Service if this occurs.

LED Status Indicators		
LED Label	Color	Signification
Power	Green	Lights (Solid) when the computer is powered
FKO	Red	Lights (Solid) when the system is in Function Kick Out (FKO)
ATB	Red	Lights (Solid) when the Anti-Two-Block (ATB) alarm is active
Heartbeat	Green	Lights (Blinking) when the computer is running a program
CAN	Yellow	Lights (Blinking) when there is communication on the CANBus
USB	Blue	Lights (Solid) when a USB stick is inserted into the USB Port Lights (Blinking) when data is being transferred through the USB Port
Wi-Fi	Yellow	Notice: Wi-Fi is not currently supported. At this time, the light does not signify anything.

16.2 Function Kickout Fuse

The MG6 Computer contains a 5 amp resettable circuit breaker. The circuit breaker protects the function kickout circuit and relay contacts, if a short circuit occurs across the crane kickout solenoids.

If the system displays error code B016, which indicates that the function kickout power feed is missing, remove power to the computer. This will reset the circuit breaker.

NOTE: Ensure any electrical shorts which may have caused the circuit breaker to trip have been removed, before re-applying power.

16.3 Replacing the Computer Unit

16.3.1 Computer Removal

1. Disconnect all electrical connectors at the computer unit.
2. Remove the hardware securing the computer to its mounting surface.

16.3.2 Computer Installation

Note: The new computer must have the proper program and duty file installed. An incorrect program and/or duty file will cause incorrect geometry and load readings.

1. Secure the computer unit to the mounting surface with the mounting hardware.
2. Ensure the electrical connections face downward.
3. Connect all electrical connectors.
4. To calibrate the new computer unit, refer to **Part 2: Calibration**.

16.4 Replacing the Pressure Transducers

16.4.1 Pressure Transducer Removal

1. Lower the boom until the boom lift cylinder is completely retracted and on its stop, or the boom is firmly in the boom rest.
2. Relieve hydraulic pressure by cycling the control valve with the crane off.
3. Disconnect the pressure transducer hydraulic connections.



THE PRESSURE TRANSDUCERS CONNECT DIRECTLY TO THE BOOM LIFT CYLINDER. DO NOT OPERATE THE CRANE UNLESS THE TRANSDUCERS HAVE BEEN PROPERLY REPLACED, OR THE HYDRAULIC CONNECTIONS ARE PROPERLY CAPPED.

16.4.2 Pressure Transducer Installation

1. Remove the protective caps from the hydraulic ports.
2. Connect the piston-side pressure transducer to the piston pressure port.
3. Connect the rod-side pressure transducer to the rod pressure port.

17. Insight Display Console Problems

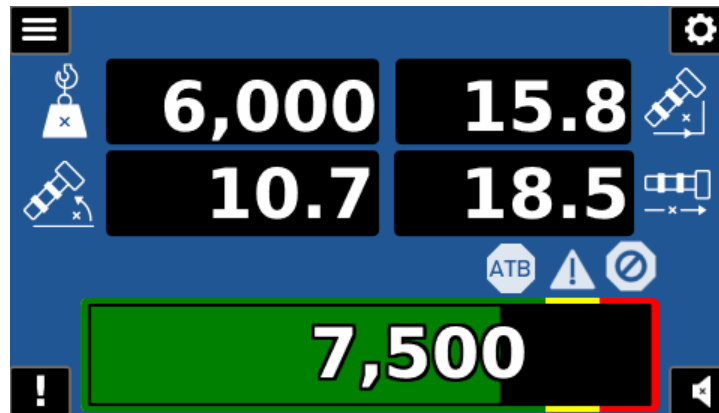
Display console problems can be difficult to isolate due to the interaction between the display and the computer unit. Failure of either unit or the cabling connecting the units can cause a malfunction.

To solve problems using the display indications, observe the display at power up and through the self-test. Use the following chart to help with the diagnosis:

Problem	Action
There are no display indications in any of the windows when the power is turned on. Or a "No Communications" message appears.	Refer to LED Status Indicators .
The display unit does not cycle through the self-test. The data in the display windows appears jumbled with missing segments.	Replace the display unit.

18. Insight Display Console Overview

The Insight Display console allows the user to see the crane values and crane configuration selection. The display also provides calibration functions used for testing and fault diagnosis.



18.1 Checking the Display Console

When operated under extreme conditions the console can become damaged. The damage is not always apparent. To help identify subtle faults that are sometimes difficult to find, please review the following sections.

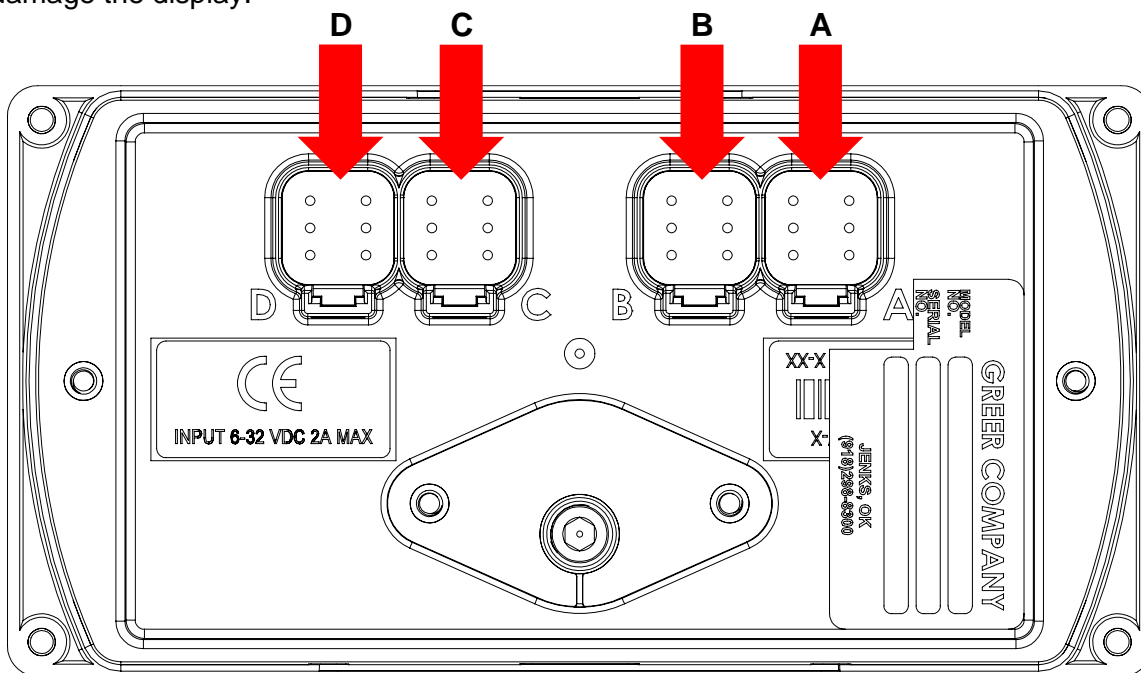
18.2 Unresponsive Buttons

Not all button options are available for use at all times. It is important to verify that the non-responsive button is:

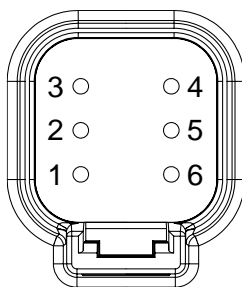
- Programmed to respond during the operation of the system.
- Being pressed in the center; pressing the button at one end may not activate the switch underneath.
- Not damaged or has a surface that is worn which may cause the switch underneath to operate improperly. In this case, refer to **Replacing the Display Console**.

18.3 Connectors

There are four Deutsch DT-series 6-pin connectors on the rear of the Insight Display. The display interface cable from the computer plugs into Connector B. Typically, the Insight Display is shipped with plugs inserted into connectors A, C, and D, because they prevent a user from plugging the display cable into the wrong connector. Be careful to not plug a cable into the wrong connector, because this could damage the display.



Typical Connector Pin Locations



Connector B Wiring	
Position	Signal
1	Battery
2	CAN1 H
3	CAN1 L
4	Open-Drain Digital Output
5	Ignition Input
6	Ground

18.4 Horn

Ensure the horn is connected to the wiring harness via the two-pin Deutsch connector.

18.5 Ingress Protection Rating

The display console conforms to IP67 in protection against dust and water, when correctly installed.

18.6 Replacing the Display Console

18.6.1 Removal

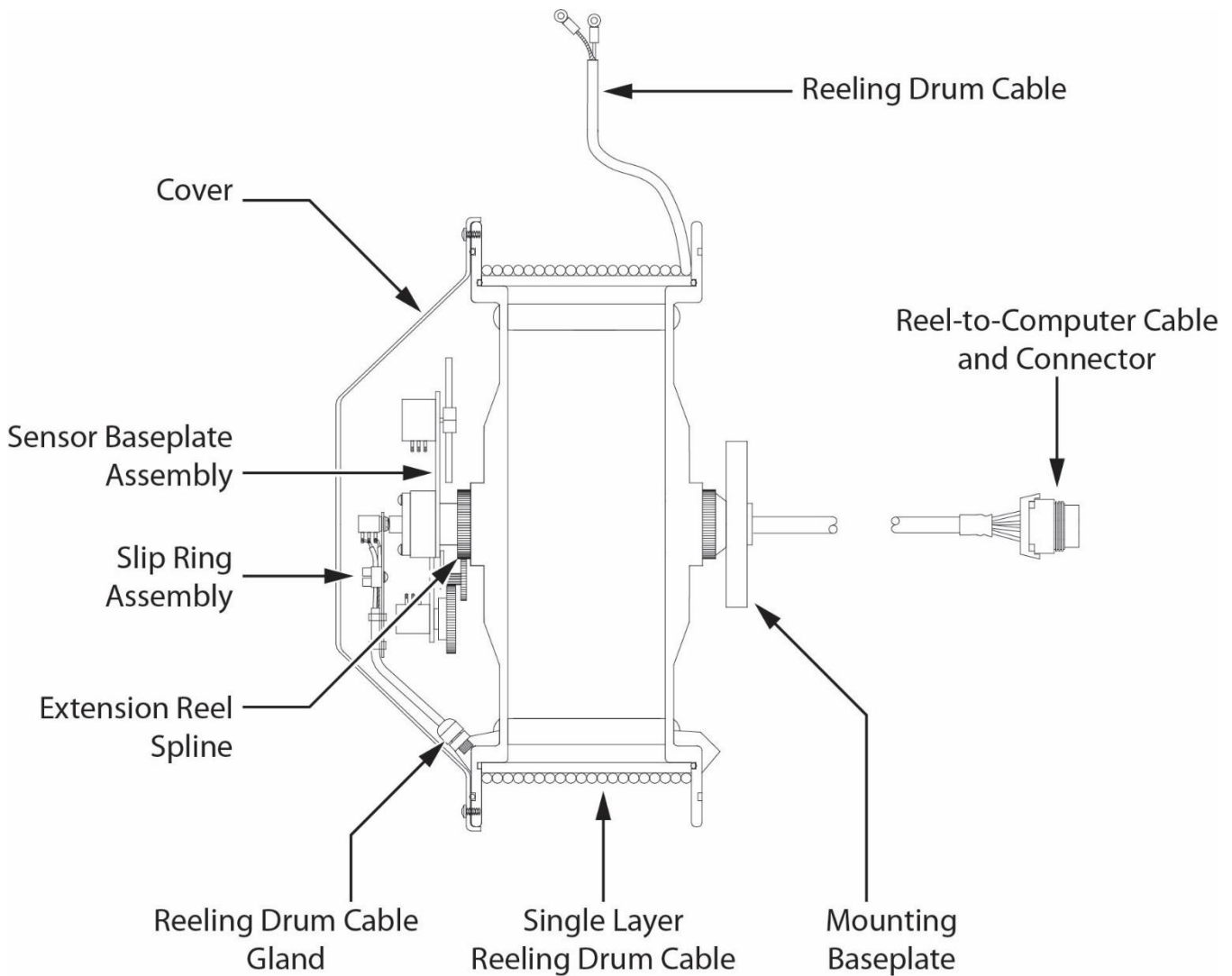
1. Disconnect the electrical cable from the rear of the display console.
2. Loosen the knob of the RAM mount and remove the display.
3. Remove the two screws attaching the ball mount to the display.

18.6.2 Installation

1. Install the ball mount to the new display using the two screws.
2. Place the ball mount into the RAM mount and tighten the knob to tighten the mount.
3. Connect the electrical cable to the rear of the display.

19. Reeling Drum Overview (For A2406xx-Series Reeling Drums)

The primary operation of the reeling drum is to measure the extension of the telescoping sections of the main boom. The reeling drum also includes an angle sensor to measure the main boom angle along with an electrical slip-ring which transfers the two-block signal from the reeling drum cable to the system computer. It is important that the setup and maintenance of these devices is properly carried out per the procedures in this manual. Incorrect maintenance can result in system calculation errors.

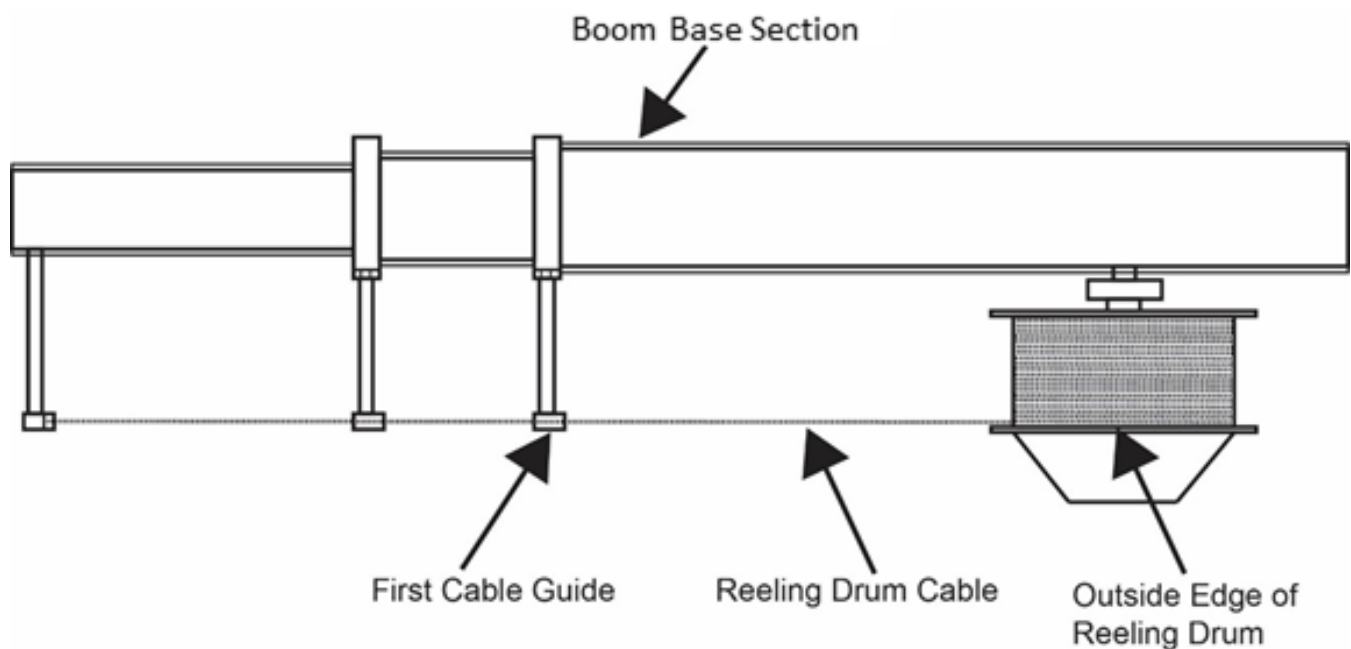


19.1 Checking Reeling Drum Cable Layering

The extension reel is designed to provide accurate measurement of boom extension. To provide accurate measurement, the reeling drum cable must form a single flat layer across the surface of the extension reel as the boom is telescoped in and out. Any stacking of the cable will cause extension errors as the boom retracts.

1. Telescope the boom fully out and then fully in.
2. Ensure the reeling drum cable forms a flat single layer across the surface of the extension reel, with each successive turn of cable lying next to the last.

NOTE: If any stacking or build up of the cable occurs, ensure the first cable guide at the top of the boom root section is correctly aligned with the outside edge of the extension reel. Clean the reeling drum cable and lubricate it with a silicone spray.



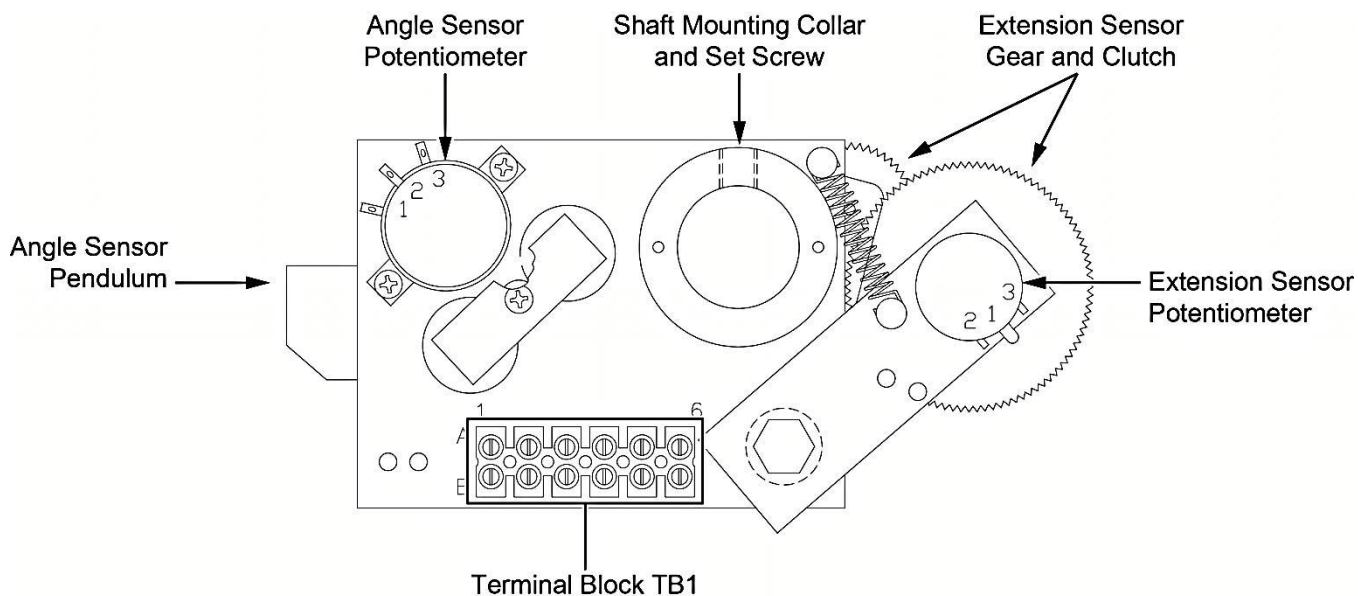
REELING DRUM VIEWED FROM ABOVE

19.2 Sensor Baseplate Assembly

The sensor baseplate assembly supports and connects the extension and angle sensors. It also supports the anti-two-block switch signal and signal cable to the computer.

Electrical or mechanical failure of either the angle sensor or the extension sensor potentiometers cannot be repaired in the field. The angle sensor pendulum is factory set on the potentiometer shaft and the extension potentiometer gear contains a protection clutch which is difficult to replace in the field. In the event of failure of either item, replace the entire sensor baseplate assembly.

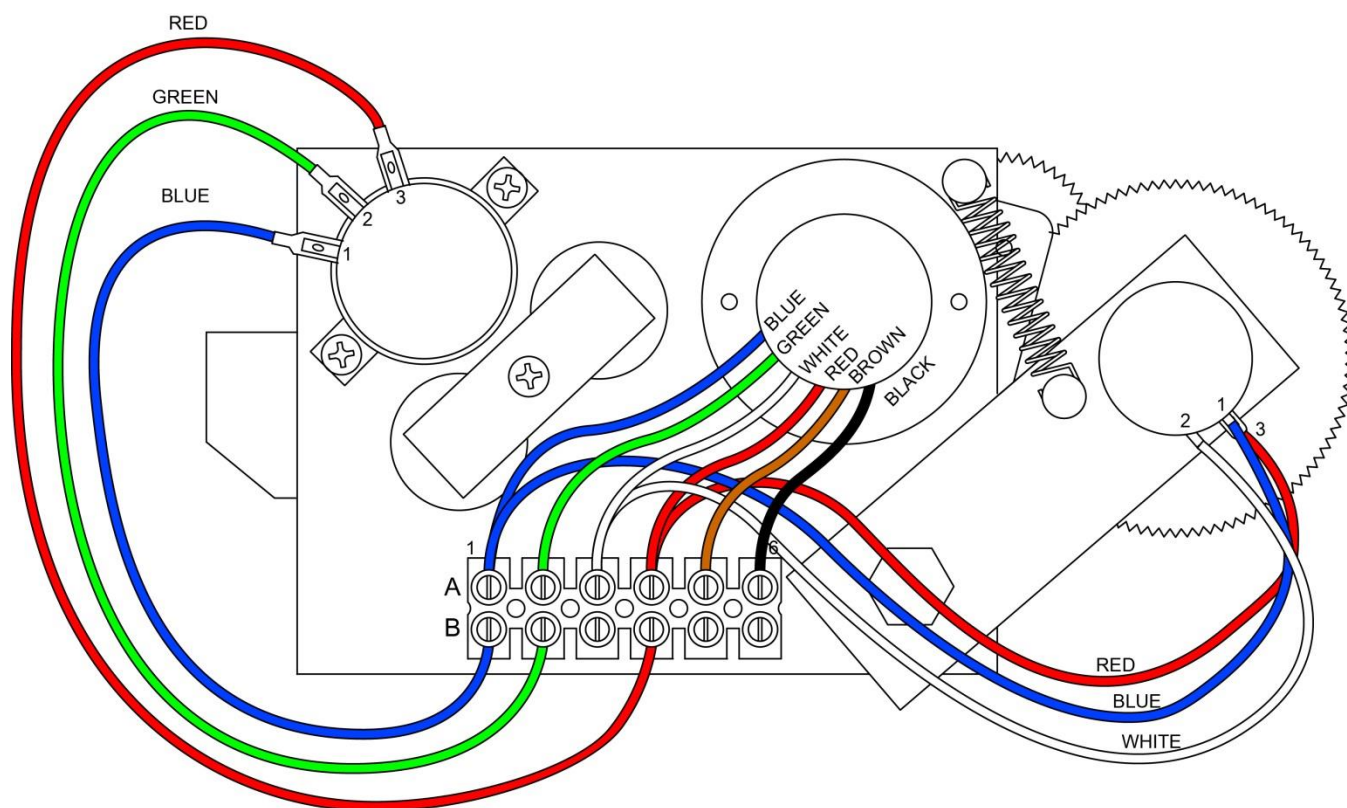
The terminal block (TB1) mounted on the assembly provides wiring connection for all internal parts of the reeling drum and Reel-to-Computer cable. Most electrical diagnoses of the boom sensors can be made at this terminal block.



19.3 Reeling Drum Voltage Checks

If problems occur with the two-block alarm operation, angle, or extension sensor, refer to the following chart. Follow the Boom Position/Action column before performing any voltage checks. Measure all voltages with a digital voltmeter set to DC volts range.

SIGNAL	BOOM POSITION/ ACTION	VOLTAGE		VOLTMETER CONNECTION	
		MIN	MAX	RED (+)	BLACK (-)
SENSOR DRIVE	-	+4.7V	+5.3V	RED (TB1/4)	BLUE (TB1/1)
ANGLE SENSOR OUTPUT	0 degrees	0.4V	0.6V	GREEN (TB1/2)	BLUE (TB1/1)
EXTENSION SENSOR OUTPUT	0 ft. FULL RETRACTED	0.15V	0.35V	WHITE (TB1/3)	BLUE (TB1/1)
TWO-BLOCK DRIVE	ATB WEIGHT DOWN	5.5V	7.5V	BLACK (TB1/6)	BLUE (TB1/1)
	ATB WEIGHT UP	9.5V	10.5V	BLACK (TB1/6)	BLUE (TB1/1)
TWO-BLOCK SIGNAL	ATB WEIGHT DOWN	5.5V	7.5V	BROWN (TB1/5)	BLUE (TB1/1)
	ATB WEIGHT UP	0V	2V	BROWN (TB1/5)	BLUE (TB1/1)



19.4 Anti-Two-Block Function Overview

The computer supplies a protected positive feed to the Anti-Two-Block switches at the boom/jib head via the extension reel signal cable, slip-ring, and reel-to-computer cable. With the Anti-Two-Block trip arm hanging freely on the switch, the proximity switch is closed and the signal return to the computer is high. When the arm is lifted by the hook block, the switch contact is opened, and the computer will sense a low signal input from the ATB signal return.

Since the computer checks the protected feed voltage internally, the system is capable of detecting a short circuit of the feed (or the ATB signal return when the switch is closed) to the crane chassis. Fault codes are defined in **Fault Reporting and Fault Codes**.

Most problems with the ATB circuit may be identified through inspection of cables, switches, and the reeling drum. Damage to these parts may result in continuous or intermittent ATB alarms.

19.5 Checking the Reeling Drum Cable

The outer braid of the cable carries the Anti-Two-Block feed to the switches. If the cable sheath is damaged, this may cause a short circuit to the boom/chassis and indicate a fault code of "B008" (Refer to **Group "B" Fault Codes**). The same fault code will be indicated if the ATB switch is closed and the inner core of the cable is shorted to the chassis at some point in the wiring.

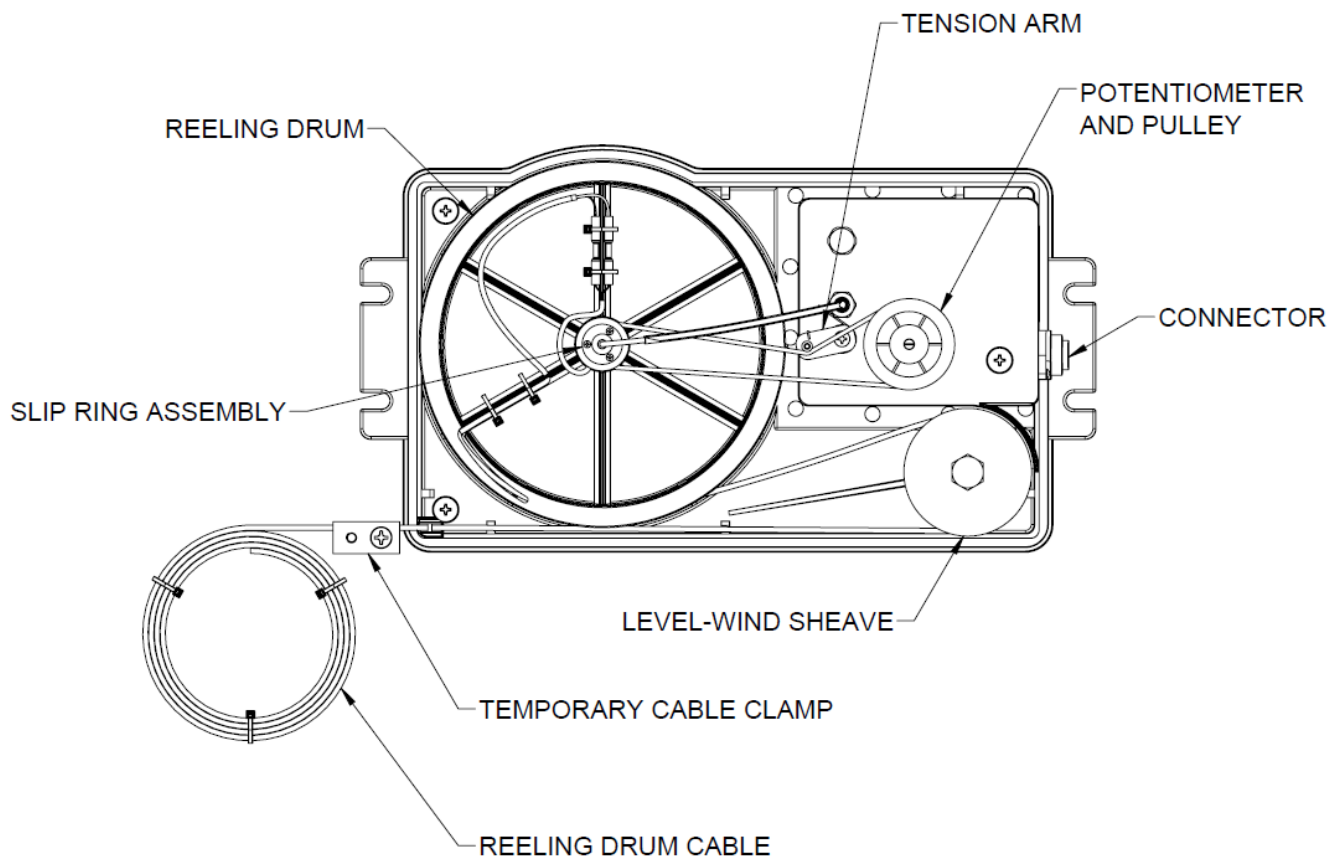
1. Carefully inspect the reeling drum cable for wear.
2. Check for signs of damage to the outer sheath of the cable.
3. Check for any signs of severe "kinking" or crushing of the cable.

20. Reeling Drum Overview (For A2407xx-Series Reeling Drums)

The A2407xx-series reeling drum assemblies are used on cranes with boom spans of 35 feet or less. The reeling drum cable provides a circuit to the tip of the boom for the anti-two-block signal. The reel provides storage for the reeling drum cable and contains the angle and length sensors.

The reeling drum cable is stored on a single layer on the reeling drum. The level-wind sheave ensures the cable winds in one layer on the drum.

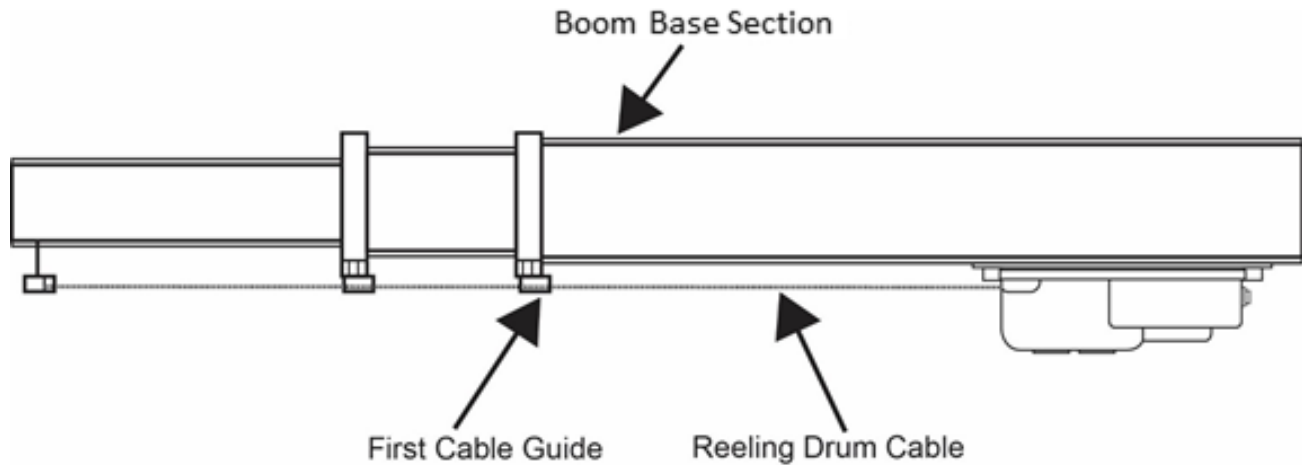
Sensors for extension and angle of the boom are housed in a sealed enclosure inside the reeling drum. The sensors can be accessed from the back side of the reel after the access cover is removed.



20.1 Checking the Reeling Drum Cable Layering

The extension reel is designed to provide accurate measurement of boom extension. To provide accurate measurement, the reeling drum cable forms a single flat layer across the surface of the extension reel as the boom is telescoped in and out through the aid of the level wind sheave. Any stacking of the cable will cause extension errors as the boom retracts.

1. Carefully inspect the reeling drum cable for wear.
2. Check for signs of damage to the outer sheath of the cable.
3. Check for any signs of severe “kinking” or crushing of the cable.



REELING DRUM VIEWED FROM ABOVE

20.1 Anti-Two-Block Function Overview

The computer supplies a protected positive feed to the Anti-Two-Block switches at the boom/jib head via the extension reel signal cable, slip-ring, and reel-to-computer cable. With the Anti-Two-Block trip arm hanging freely, the proximity switch is closed and the signal return to the computer is high. When the arm is lifted by the hook block, the switch contact is opened, and the computer will sense a low signal input from the ATB signal return.

Since the computer checks the protected feed voltage internally, the system is capable of detecting a short circuit of the feed (or the ATB signal return when the switch is closed) to the crane chassis. Fault codes are defined in **Fault Reporting and Fault Codes**.

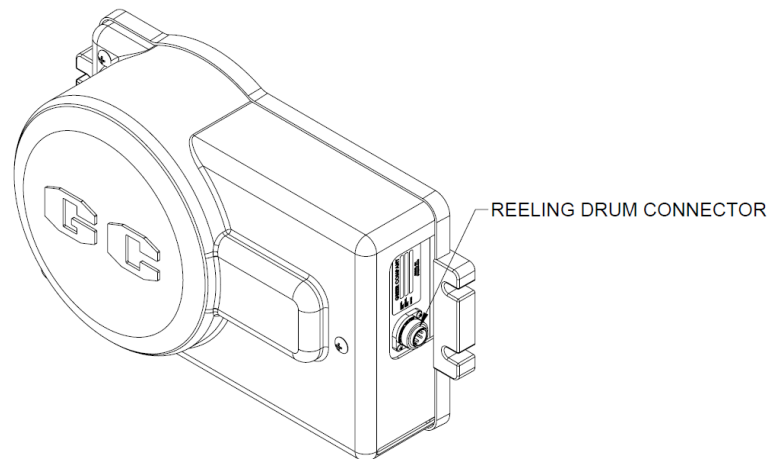
Most problems with the ATB circuit may be identified through inspection of cables, switches, and the reeling drum. Damage to these parts may result in continuous or intermittent ATB alarms.

20.2 Reeling Drum Voltage Checks

Sometimes voltage signals from the sensors need to be measured as indicated by system fault codes. The voltage signals on the A2407xx-series Reeling Drum cannot be measured from inside the reeling drum assembly. They can be checked by temporarily installing an X240702 Diagnostic Cable (available from TWG), in-line between the reeling drum and its normal connecting cable, then measuring voltages from the test contacts on the X240702 cable. After the troubleshooting is complete, remove the X240702 Diagnostic Cable and reconnect the normal cable to the reeling drum.

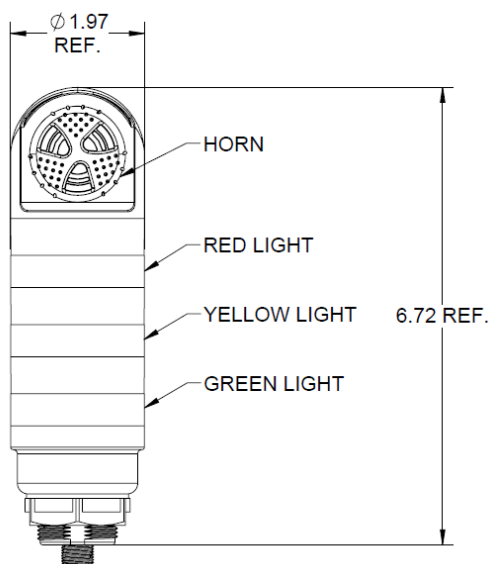
If problems occur with the two-block alarm operation, angle, or extension sensor, refer to the following chart. Follow the Boom Position/Action column before performing any voltage checks. Measure all voltages with a digital voltmeter set to DC volts range.

Note: Ensure the boom is fully retracted and the angle is at 0° before checking the voltages. Always use the blue system ground wire for the negative lead on the voltage meter when checking sensor voltages and drive voltages.



SIGNAL	BOOM POSITION/ ACTION	VOLTAGE		VOLTMETER CONNECTION	
		MIN	MAX	RED (+)	BLACK (-)
SENSOR DRIVE	-	+4.7V	+5.3V	X240702 Cable, Red Wire	X240702 Cable, Blue Wire
ANGLE SENSOR OUTPUT	0 degrees	0.4V	0.6V	X240702 Cable, Green Wire	X240702 Cable, Blue Wire
EXTENSION SENSOR OUTPUT	0 ft. FULL RETRACTED	0.15V	0.35V	X240702 Cable, White Wire	X240702 Cable, Blue Wire
TWO-BLOCK DRIVE	ATB WEIGHT DOWN	5.5V	7.5V	X240702 Cable, Black Wire	X240702 Cable, Blue Wire
	ATB WEIGHT UP	9.5V	10.5V	X240702 Cable, Black Wire	X240702 Cable, Blue Wire
TWO-BLOCK SIGNAL	ATB WEIGHT DOWN	5.5V	7.5V	X240702 Cable, Brown Wire	X240702 Cable, Blue Wire
	ATB WEIGHT UP	0V	2V	X240702 Cable, Brown Wire	X240702 Cable, Blue Wire

21. Light Bar Overview (If Equipped)



The lightbar wiring is as follows:

Pin #	Lightbar Function
1	Yellow Light, Sinking Input
2	Red Light, Sinking Input
3	Power
4	Green Light, Sinking Input
5	Horn, Sinking Input

22. Revision History

REVISION	DATE ISSUED	DESCRIPTION OF CHANGE(S)	REVISED BY	ER
0	08/05/2022	Release	MJM	21-0533



by



11135 South James • Jenks, OK 74037

Phone: (918) 298-8300

Fax: (918) 298-8301

www.dovertwg.com

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