Terex
RCI 510 Calibration and Troubleshooting Manual

GREER COMPANY ®

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Introduction

The Greer Company is dedicated to the design and manufacture of electronic parts created to aid in crane operation. This manual has been developed to assist Service Personnel understand, locate, and identify problems that may arise during the operation of the RCI 510 Rated Capacity Limiter System. Do not use this system in place of an operator who is knowledgeable in safety guidelines, crane capacity, information, and the crane manufacturer's specifications. Use of calibration routines without consultation with the Greer Company invalidates the warranty.

Where to go for help

When field repairs cannot be made without replacement of a part, or when troubleshooting advice is needed, the following support number should be called.

Greer Company

Service: Jenks, OK

Telephones: (918) 298-8300

Fax: (918) 298-8301

Information provided to support personnel must be accurate and complete. Have your crane Model Number and Serial Number ready. Carefully describe the problem, noting any unusual system responses that may help us to quickly and effectively solve your problem.

1.1 Overview & Preparation

The Troubleshooting Manual for the RCI 510 Rated Capacity Limiter System, manufactured by the Greer Company provides information and methods for isolating problems that may arise during the operation of the system. Some of these problems can be corrected in the field. Other problems may require replacement of parts or the return of a part to the factory for servicing. Service personnel should have prior training and experience in the procedure for operation and setup of this system.

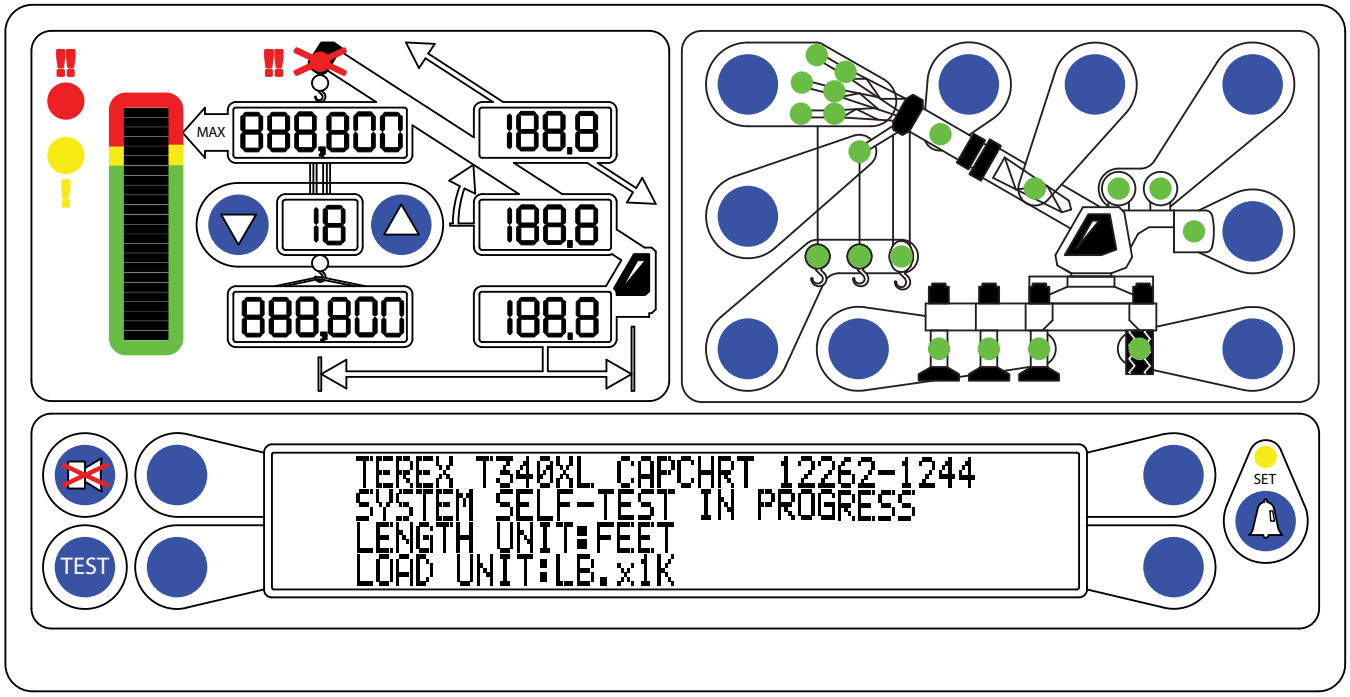
For inspection and calibration, the service technician will need a basic tool kit consisting of wrenches and screwdrivers (flat and Phillips blades), a digital multimeter (DMM) capable of measuring DC voltage with a range of 0 volts to ± 50volts and resolution of 0.1 volts with a resistance range of 0 ohms to 2 megaohms. Low-cost analog meters are not appropriate since the input impedance of these meters may give false readings.

2.1 System Self-Test

When the power is turned on or when the “TEST” button is pressed during operation, the computer and operator’s display console perform a “SELF-TEST,” verifying the computer, display console, cables, and all remote sensors are working properly.

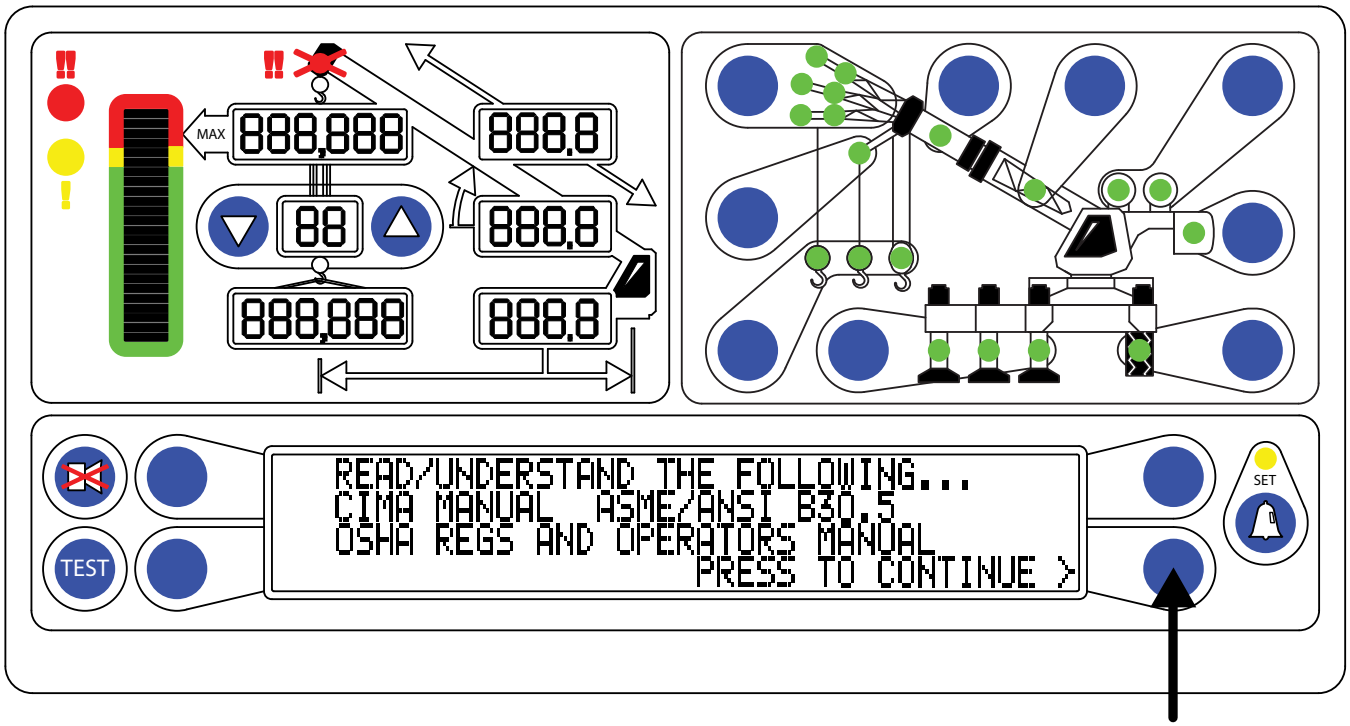
During the “SELF-TEST”, all display functions are activated, allowing the operator to check whether or not all indicators are functional.

NOTE: It is important that the indicators displayed during the SELF-TEST are recognized and fully understood by the operator to aid in correctly determining computer and display communication problems.



Immediately following electrical power up or pressing the “TEST” button, the system performs a “SELF-TEST”. During this time the numerical display segments and bar graph segments are illuminated, the audible alarm will sound and alarm indicator lights are illuminated. The information window displays the machine model and load chart number.

2.1 System Self-Test (cont.)



Following the Power-Up Self-Test, the information window will display the following message. During this time, crane motions are disabled by the system function kickout.

Press the “PRESS TO CONTINUE” button to acknowledge the information display message and allow the system to begin normal operation.

2.2 Display Console Problems

Display Console Problems are difficult to isolate because of the interaction between the display console and the computer unit. Failure of either unit, or the cabling between the two units, causes malfunction of display console indications. Diagnosis of some system problems can be carried out without the proper function of the display console and it's communication with the computer unit.

To solve problems using display console indications, carefully observe the display console at "power-on" and through the self-test. Next, use the following chart to help decide the course of action.

PROBLEM	ACTION
There are no display indications at all when power is turned on. All displays remain blank and no lights are illuminated	Refer to Section 3.3
The load, angle, radius, length, and rated capacity display windows do not show "188.8" or the bar graph display window has missing black segments during the self-test.	Replace the display console.
The red or yellow indicator lights do no illuminate during the self-test.	Replace the display console.
The display console does not do the self-test. No words or logical numbers ever appears after the power is turned on. The displays look jumbled, with missing segments.	Replace the display console.
The display console lights are illuminated. Load, angle, radius, length, and rated capacity show "188.8" or 888,8000 for load and capacity, but the information window displays: "Bad Communications with main computer"	Display console is OK. Check connectors on the back of the display console. Refer to Section 3.5

2.3 Fault Reporting and Fault Codes

System Fault Codes provide one of the most important ways to quickly locate and assess problems within the RCI 510 system. Review this section carefully.

Each time the system is turned on, it goes through a brief self-testing process that detects most faults in the system. During normal operation, a self-test can be initiated at any time by pressing the TEST button on the display console.

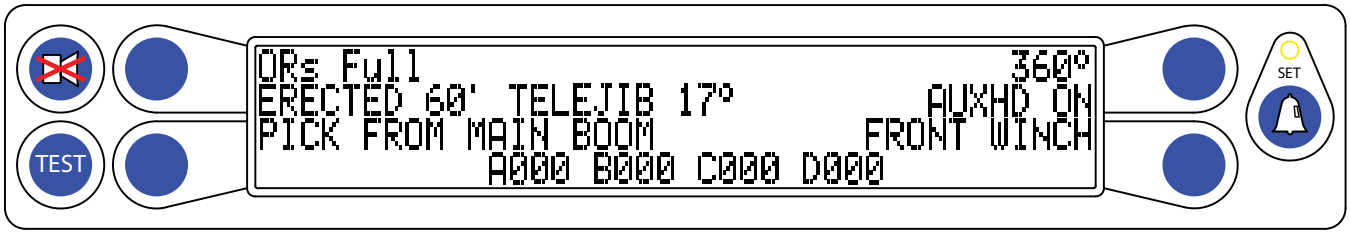
Many fault conditions are detected without a system self-test.

Faults detected in the system during the self-test are indicated on the display console in the following ways:

- The RED OVERLOAD LED will illuminate.
- The ALARM will sound.
- “WARNING SYSTEM FAULT!” will be displayed at the bottom of the text window.

Fault codes may be displayed on the display console. To view the codes, press and hold the “TEST” button and wait for the system to complete the “SELF-TEST”. The system will reboot, keep holding the “TEST” button until the screen displays the codes, as shown.

The user may also view fault codes after entering the Calibration Menu and accessing the “00 Error Codes” menu.



NOTE: During this time, the system may display prompts such as “CHECK CONFIGURATION BEFORE YOU CONTINUE”. Select the appropriate response while keeping the TEST button pressed. Do not release the TEST button. Fault codes will be shown in the lower portion of the window as long as the TEST button is pressed.

There are four groups of FAULT CODES: A, B, C & D. The function of these groups and a complete listing of each code is provided on the following pages.

NOTE: It is important to always investigate Faults in the “B” and “C” groups before continuing with “A” and “D” group faults.

2.3.1 Group “A” Fault Codes

NOTE: Group “A” fault codes represent faults detected for analog sensors. Check and repair “B” and “C” group faults before proceeding with group “A” fault finding sensors.

This chart details the available codes in the left column and the corrective actions to take.

Fault Code	Swing Sensor	Boom Angle Sensor	Extension Sensor	Tdx 1 Rod Pressure	Tdx 0 Piston Pressure	Action
000	**No Fault Found**					**None**
001					**X**	**Replace Computer.**
002				**X**		
003				**X**	**X**	
004			**X**			**Check Extension Calibration. If Recalibration does not fix the problem, replace the Sensor Baseplate Assembly.**
008		**X**				**Check Angle Calibration. If recalibration does not fix the problem, replace the Sensor Baseplate Assembly.**
016	**X**					**Replace Swing Sensor.**

2.3.2 Group “B” Fault Codes

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

This chart details the available codes in the left column and the actions to take in the right column.

Fault Code	FKO Power Feed	ATB Power Feed	Display Console	ADC 2 Internal Fault	ADC 1 Internal Fault	ACTION
008		**X**				**Refer to sections 6.5 and 6.6 for Troubleshooting Information.**
016	**X**					**Check Crane Circuit Breakers.** **Check the FKO fuse.**

2.3.3 Group “C” Fault Codes

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

This chart details the available codes in the left column and the actions to take in the right column.

Fault Code	Serial EEprom	Crane Data	RAM	Duty Data	Program	Action
000	No Fault Found					NONE
001					X	Replace the Duty File. Refer to section 3.5.2.
002				X		
003				X	X	
004			X			Replace the computer.
005			X		X	Replace the Duty File. Refer to section 3.5.2.
006			X	X		
007			X	X	X	
008	X					Erase Crane Data and reselect operator setup.
016	X					Corrupt calibration. Replace computer.

2.3.4 Group “D” Fault Codes

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

This chart details the available codes in the left column and the actions to take in the right column.

Fault Code	Wrong Swing Area	Wrong Boom Length	Chart Not Found	Action
000	No Fault Found			NONE
001			X	Re-select crane setup. Check other sensor faults first.
002		X		Boom length is out of range for selected chart. Check crane setup, boom length, and extension.
003		X	X	Re-select crane setup. Check other sensor faults first.
004	X			Swing to correct working area to select chart. Check swing sensor zero.
005	X		X	Swing to correct working area to select chart. Check swing sensor zero.
006	X	X		Re-select crane setup. Check other sensor faults first.
007	X	X	X	Re-select crane setup. Check other sensor faults first.
016				DataLogger Malfunction – Error detected in the daughterboard chip. It should be replaced or updated with a compatible version.

2.4 “NO FAULT CODE” Problems

This section addresses problems which may occur and may not be reported by the computer fault code system.

2.4.1 Anti-Two-Block Alarm (ATB)

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 switches, or an open circuit between the computer ATB feed and the ATB switch(es). Check the reeling drum cable for damage. Ensure the Anti-Two-Block switches are correctly connected. Check the slip-ring and wiring inside the reeling drum. Check the signal cable from the reeling drum to the computer. Check the connectors.

Problem:

- *The Anti-Two-Block alarm is continuously OFF (safe). De-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 between the computer and the ATB switch(es). Check the reeling drum cable for damage. Ensure the Anti-Two-Block switches are correctly connected. Check the slip-ring and wiring inside the extension reel. Check the signal cable from the reeling drum to the computer. Check the connectors.

2.4.2 Displayed Load or Radius Errors

This section aids in fault diagnosis of 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. The accuracy of the radius (unloaded) value is governed by the extension and angle sensors.

Ensure there are no system faults before continuing.

2.4.2.1 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 when the boom is fully retracted. 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 THE REELING DRUM CABLE LAYERING**.

3. Check the zero of the extension sensor with the boom fully retracted. Enter the Calibration Mode and use the “SPAN” command. Select sensor No. 2 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, refer to **ENTERING THE CALIBRATION MODE**. 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 **CALIBRATING SPAN OF EXTENSION AND ANGLE**.

2.4.2.2 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 with the crane centered over front (rough terrain) or centered over rear (truck crane).

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 + 0.5 ft. If it does not match, continue to the **CALIBRATING THE ANGLE SENSOR ZERO** procedure.
3. Raise the boom to a high angle (at least 60°) and measure the angle with the inclinometer. Ensure the displayed angle matches the inclinometer reading within 0.1°. If the displayed angle is incorrect, follow the angle span calibration procedure in **CALIBRATING SPAN OF EXTENSION AND ANGLE**.

2.4.2.3 Check Boom Angle

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

1. Fully retract the boom.
2. Using an inclinometer set the boom to 0° and ensure the displayed boom angle value is 0.0°. If the angle value is not 0.0°, refer to **CALIBRATING THE ANGLE SENSOR ZERO.**
3. Raise the boom to a high angle (at least 70°) and measure the angle with the inclinometer. Ensure the displayed angle matches the inclinometer reading within 0.1°. If the displayed angle is incorrect, refer to **CALIBRATING SPAN OF EXTENSION AND ANGLE**.

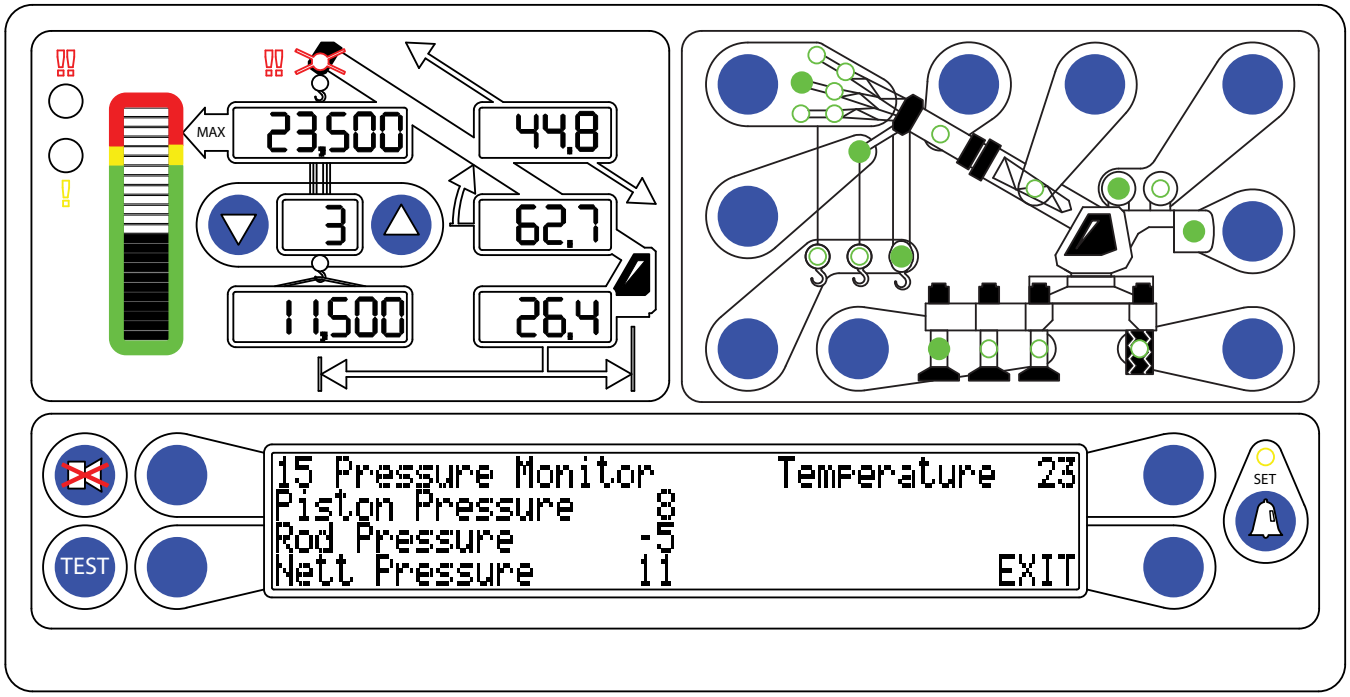
2.4.2.4 Check Pressure Sensors

There are two pressure sensors installed as part of the system. Both pressure sensors are mounted within the computer unit. One is connected to the piston side of the boom hoist cylinder via flexible hose; the other is connected to the rod side of the boom hoist cylinder via flexible hose. Both hoses are protected by velocity fuses within the boom hoist cylinder valve block on the end of the cylinder.

The pressure sensor 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 sensor 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. The maximum continuous working pressure for the sensors is 250 bar (3625 PSI).

The pressure sensing system is calibrated at the factory. Pressure sensors may not be individually replaced. Any serious problem will necessitate changing the entire computer unit.

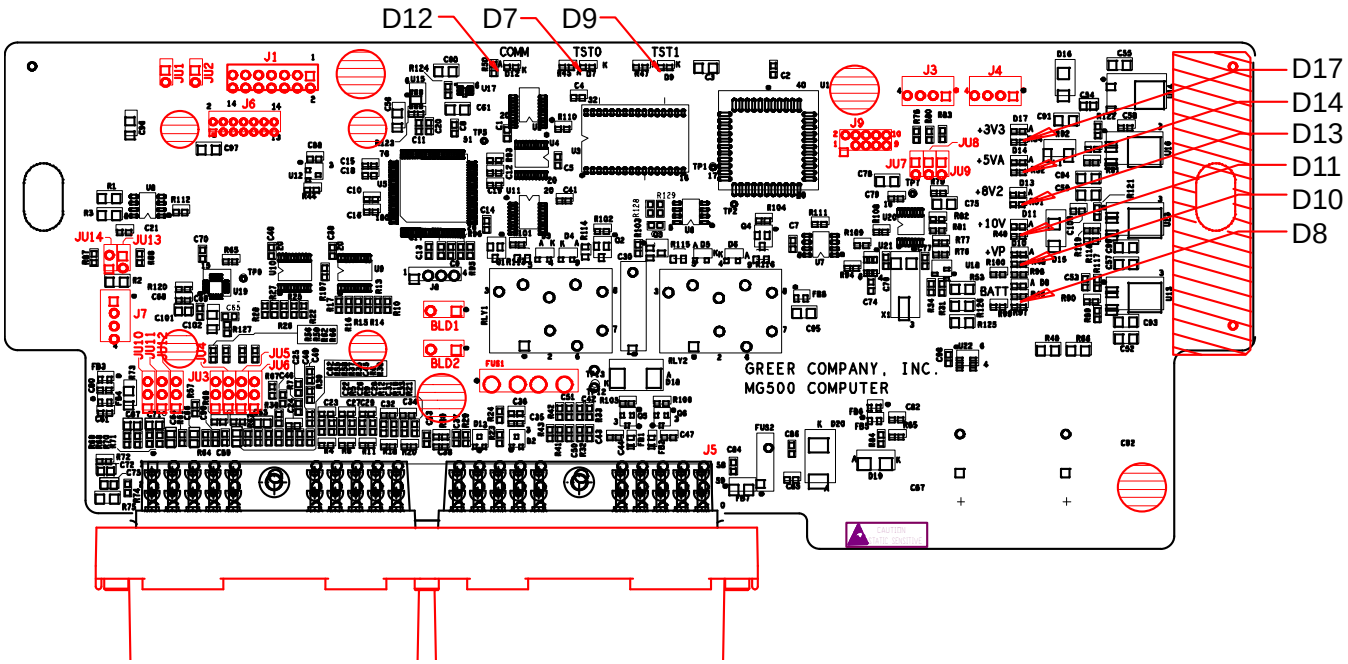
1. Lower the boom until the boom hoist cylinder is fully retracted and on its stop.
2. Loosen the hydraulic connections to the pressure sensors to ensure zero pressure is present on the sensors.
3. Enter the calibration mode and press “Menu Up” button to access “15 PRESSURE MONITOR” to view both sensor pressures and net pressure.
4. Check the pressure values of both sensors. The pressure values should be between -75 and +75 PSI. If not, replace the computer unit.
5. Check the nett pressure value. This should be between -35 and +35 psi. If not, replace the computer unit.



3.1 Computer Unit Overview

The Computer Unit provides all necessary functions to read the sensors, control computations, disconnect functions, and communicate with the display console/internal bar graph.

NOTE: Due to differences in computer unit configurations, the locations of various board components may vary.



3.2 Internal Status Indicators

The computer unit contains a row of LED indicators for checking computer operation. During normal operation, all LEDs will be illuminated with the COMM indicator blinking. If not, please contact technical support for assistance. Use the following chart and preceding image for LED location.

LED Indicator	Function
D7	Communication Indicator TST0
D8	Battery Power_POS
D9	Communication Indicator TST1
D10	+VP
D11	+10V
D12	COMM (Communication Indicator)
D13	+8V2
D14	+5V
D17	+3V3

3.3 The COMM Indicator

The COMM Indicator provides an indication of the communication with the display console and of the running state of the computer program. Carefully observe the COMM Indicator and the display console at power on and through the self-test, then use the following chart to assist in diagnosing the problem.

COMM Indicator at Power On	Action
From the moment the power is applied, the COMM indicators do not illuminate. During and after the brief self-test, the COMM Indicators remain off.	The computer is not running. Check status indicators. Try to reset the system by powering off and on. Listen to the computer for the relays to click. If they do not click, replace the system chip. If not successful, replace the computer.
From the moment system power is applied, the COMM Indicators flash at a fast rate and never stop. The display console never goes to normal display and displays “188.8” or 888,000 in the number display windows.	Communication with the display has not been made. Check connector at rear of the display console.
At the moment power is applied, the COMM Indicators flash briefly, and then switches off. After a few seconds, the COMM Indicators start to flash quickly and never stop.	This is the normal operation of the communication between the computer and display console. If there are any problems with indications on the display console, go to section 2.2.

3.4 Function Kickout Fuse

The computer unit contains a standard 10-Amp replaceable fuse, identified as FUS1 on the computer board, which protects the function kickout circuit and relay contacts.

Replace the fuse if these three conditions are present:

- System error codes indicate the FKO power feed is missing.
- The crane circuit breaker is closed.
- Power from the crane is present.

3.5 Replacing the Computer Unit

Computer Removal

1. Lower the boom until the boom hoist cylinder is completely retracted and on its stop or the boom is firmly in the boom rest.
2. Disconnect the hydraulic connections at the computer unit. Cap the end of the hydraulic hoses.
3. Disconnect both electrical connectors at the computer unit.
4. Remove the hardware securing the computer to the cab wall.

Computer Installation

1. Secure the computer unit to the cab wall with the mounting hardware.
2. Ensure the electrical connections face downward.
3. Connect the electrical connectors.
4. Remove the protective caps from the hydraulic ports.
5. Connect the base-side pressure (green band) hose to the piston pressure port.
6. Connect the rod-side pressure (red band) hose to the rod pressure port.

Power-Up and Calibration

NOTE: Switch the crane power ON and ensure all LED check lights within the computer unit are illuminated. Ensure the COMM LEDs are flashing and the display console is operating.

Checks:

1. Use an inclinometer to check the accuracy of the boom angle and use the tape to measure the radius at four or five points.
2. Ensure the hydraulic connections are secure and not leaking.
3. Secure the computer lid.
4. Move to Section 5.1 to begin calibration of the new computer.

4.1 Display Console Overview

The Operator's Display Console allows the user to see the crane values (angle, radius, load, etc.) and crane configuration selection. The display also provides calibration functions used for testing and fault diagnosis.

4.2 Checking the Display Console

It is important to note the Operator's Display Console may become damaged when operated under extreme conditions. If you suspect the display console is damaged, review the following sections.

4.2.1 Reading the LCD

Always adjust the display contrast first. For bracket-mounted models only, reposition the display console slightly. The most commonly encountered problem is caused by reflections.

NOTE: It may not be possible to correct this problem completely, especially on flush-mounted display consoles which may be exposed to bright sunlight.

4.2.2 Unresponsive Buttons

Not all button options are available at all times. It is important to verify that the non-responsive button is programmed to respond during the operation of the system. Press the button in the center. Pressing the printed symbol 'at one end' may not activate the switch underneath. Buttons that are damaged or have a surface that is worn may cause the switch underneath to operate improperly. In this case, refer to Operator's Display Console – Removal and Installation.

4.2.3 Connectors

A Singular Circular Connector, common to all display models, is positioned on the rear of the rear of the display console. For bracket-mounted styles, it is clearly visible on the rear of the housing. On flush-mounted versions, it is 'hidden' behind the panel within the dash assembly. Handle this connector carefully, it is possible for the pins and sockets within the connector halves to bend, break, or 'be pushed back' inside the housing.

4.2.4 Horn

On vertical Flush-Mounted Display Consoles, the Horn is outside the housing. If there is a problem with the horn, ensure the Horn Drive Wire is correctly connected to the black terminal on the rear of the display console housing. If the wire is intact, connected correctly, and the horn is still not operating properly, it is possible the horn may need to be replaced.

4.3 Replacing the Display Console

Removal

1. Disconnect the electrical cable from the electrical connector on the rear of the Operator's Display Console.
2. Remove the knob on each side of the console and retain.
3. Remove the defective display console from the bracket in the cab.

Installation

1. Put the Operator's Display Console on the bracket located in the cab by positioning it between the bracket legs.
2. Insert and tighten the knob on each side of the console.
3. Connect the electrical cable to the electrical connector on the rear of the console.

5.1 Calibration Mode

The Greer 510 system is an aid to crane operation. Use this system with an operator trained in safety guidelines, crane capacity information, and the crane manufacturer's specifications.

When the computer is new, it has no zero or span calibrations. It is necessary to enter zero and span settings for accurate length and angle calculations.

Tools Needed:

- Digital level accurate to 0.1°
- 150-200ft. tape measure graduated in 1/10ths
- Digital multimeter

Pre-Requisites for Calibration

- The crane must be properly set on level ground per the manufacturer's specifications.
- Maximum boom height will be necessary for calibration. Ensure the area is free of overhead obstructions.
- All options such as jibs, fly's, auxiliary heads, etc. must be setup in the computer.

5.2 Entering the Calibration Mode

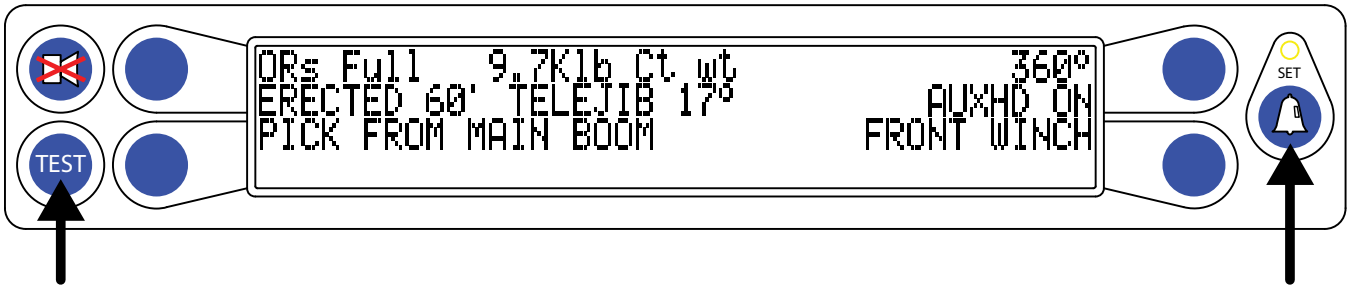
NOTE: This instruction is intended for OEM units on the assembly line or units in the field where a replacement computer has been installed. When the computer is new, it does not contain zero and span information for the crane.

In order for the computer to measure length and angle, zero points must be entered into the system.

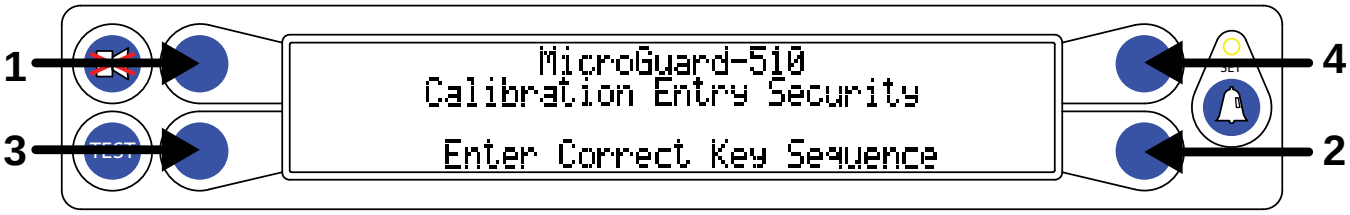
Before proceeding to the calibration screens, the display must be properly configured for the actual crane setup. It is permissible to have Stowed Jib and Auxiliary Head, Multi Part Line, etc. but they must be noted in the crane setup before calibration.

Follow these steps to ensure proper calibration. The actual crane setup must be reflected on the display. Check the **Greer 510 Operator's Manual** for proper setup of the display unit.

1. To enter Calibration Mode, the display must be in "Normal Operating" mode.
2. Press the "TEST" and the "OPERATOR ALARM BUTTON" simultaneously.

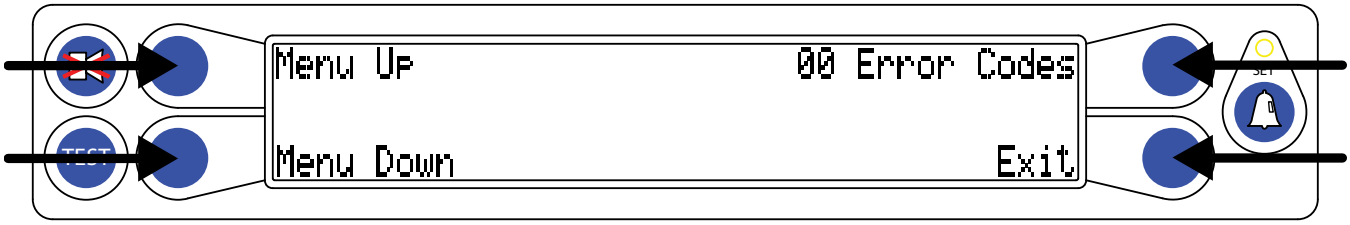


3. Enter the Security Code within 5 seconds, or the system will revert to the "Normal Operating" mode. The numbers indicate the proper order to press the buttons.



5.3 Calibration Menus

After entering the calibration menu, scroll through the menu options by pressing the “Menu Up” or “Menu Down” buttons. To select an item, press the button adjacent to the menu listing as shown in the example.



The main menu items used to calibrate the system are:

- 02 Zero Sensors
- 03 Span Sensors
- 04 Swing Potentiometer

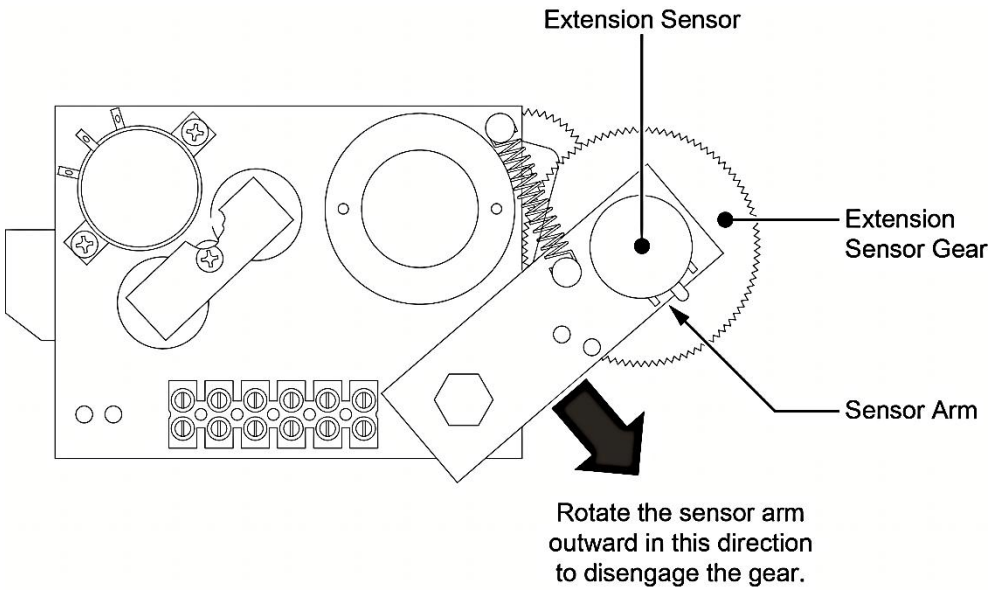
The only calibrations needed are for boom extension and boom angle. They must be properly set to zero.

The system is also equipped with a swing potentiometer. This is designed to track the turret in relation to the chassis.

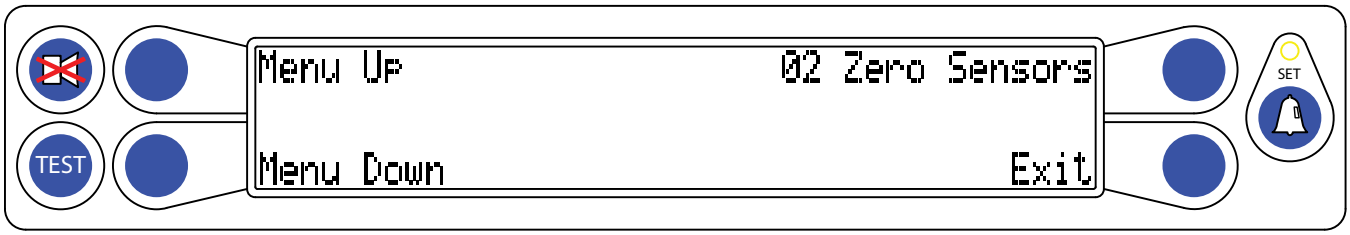
Boom extension and angle readings are dependent on the correct span values to be entered into the system. These span values are determined by using a digital level on the boom angle, and measuring the span of boom extension.

5.4 Zeroing the Extension and Angle Sensors

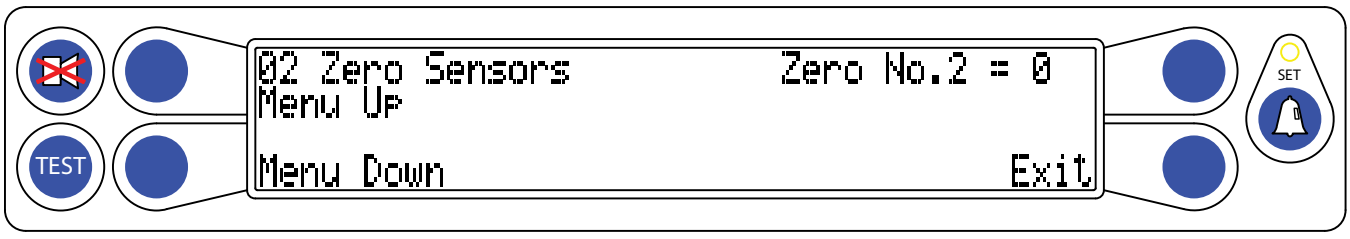
NOTE: Prior to zeroing the sensors, remove the reeling drum cover to reveal the length and angle sensors.



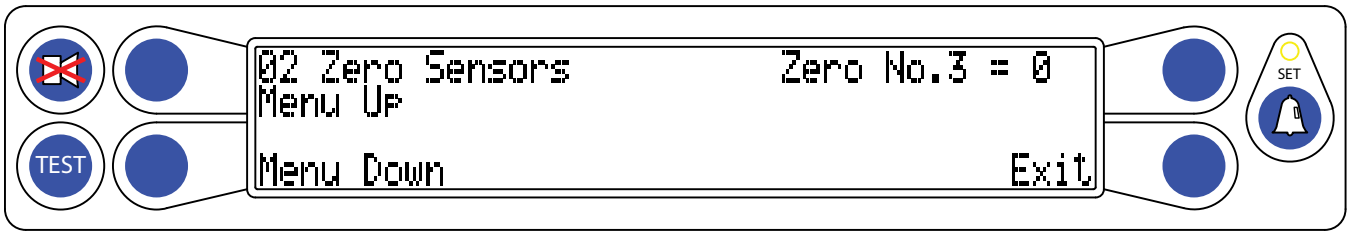
1. Fully retract the boom and place at 0.0°. Verify with a digital inclinometer.
2. Rotate the extension sensor gear clockwise until it stops against the clutch in the potentiometer.
3. Rotate the gear counter-clockwise 1/2 turn and let the spring pull it back to engage with the drum gear.
4. Press the “Menu Up” button until the “02 Zero Sensor” option is on the screen.



5. Press the “02 Zero Sensor” button.
6. Press the “Zero No. 2 = ” button to zero the extension sensor. This will change the display to read “Zero No. 2 = 0”.



7. With the boom still at 0.0°, press the “Menu Up” button.
8. The screen will advance to “Zero No. 3 = ”.
9. Press the “Zero No. 3 = ” button to zero the angle sensor. The display will now read “Zero No. 3 = 0”.

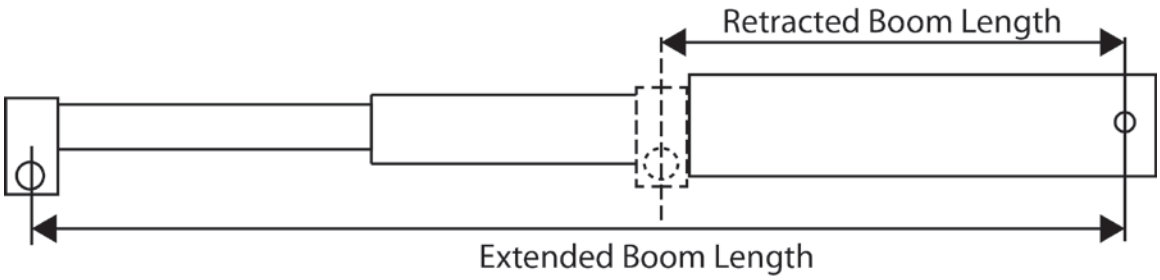


10. Zero calibration is now complete.

5.5 Calibrating Span of Extension and Angle

WARNING!

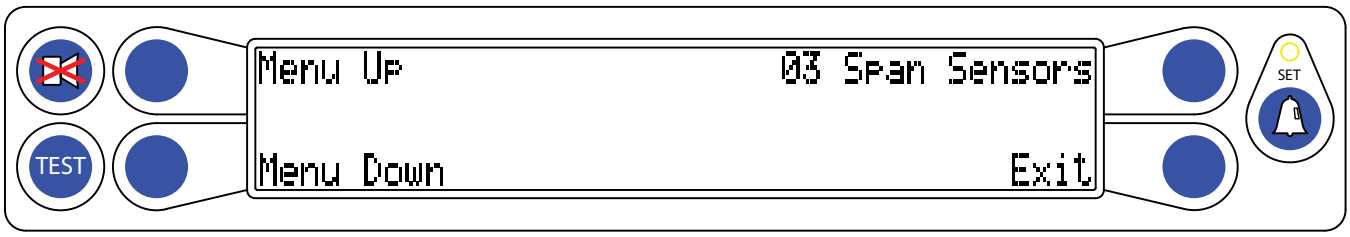
THE AREA OVERHEAD ABOVE THE CRANE MUST BE CLEAR OF OBSTRUCTIONS PRIOR TO CALIBRATING SPAN OF EXTENSION AND ANGLE!



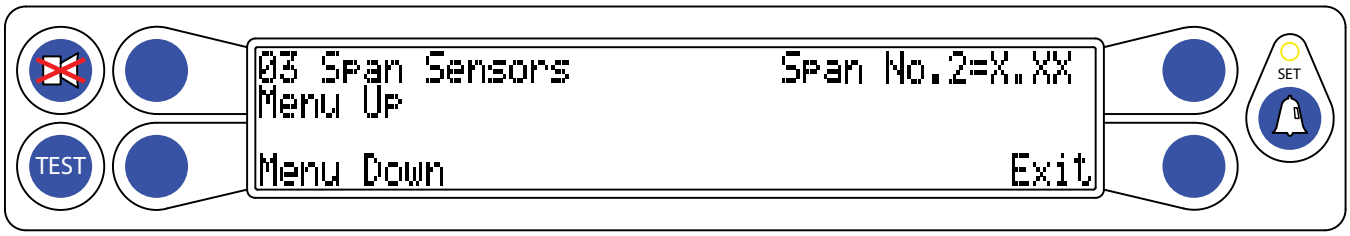
Extended Length – Retracted Length = Span

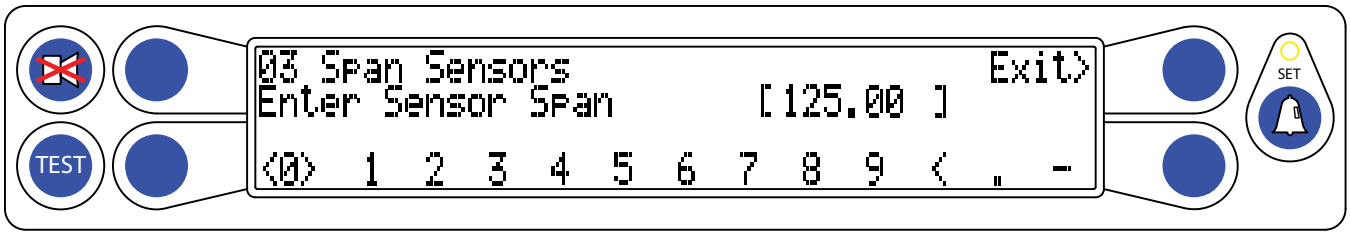
Spanning the sensors defines in the computer the angle and extension of the boom. In order to set the angle span, the information from the digital level must be used to enter the number. The boom extension span number is the Extended Length – Retracted Length = Span. The above graphic demonstrates how to properly measure the span.

1. Fully extend the boom and raise the boom to at least 60°.
2. From the Calibration Menu, press the “Menu Up” button to display the “03 Span Sensors” option.

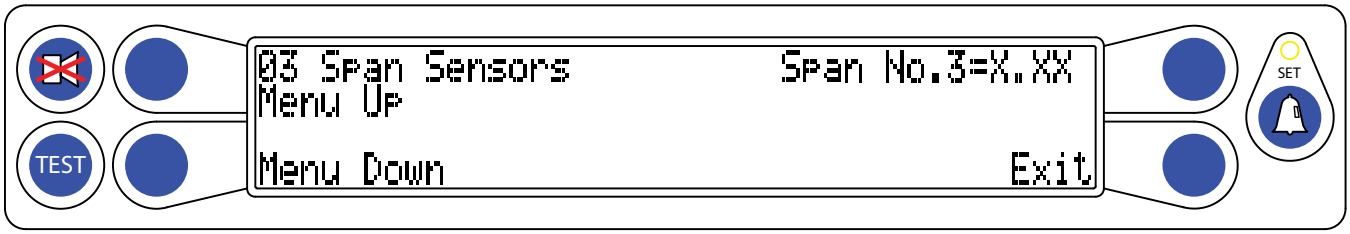


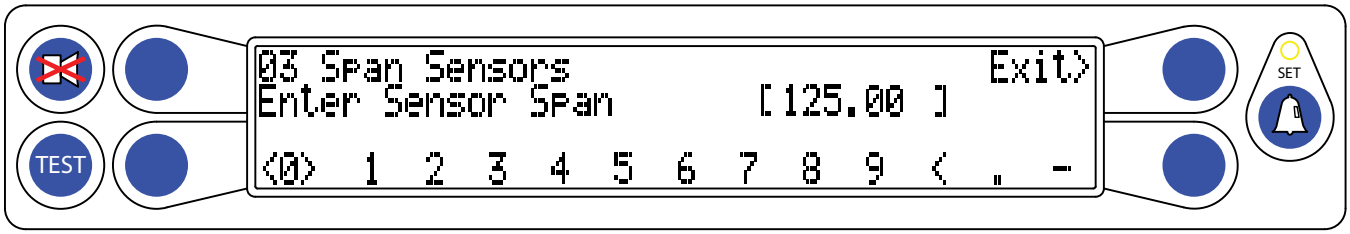
3. Press the “03 Span Sensors” button.
4. Press the “Span No 2= X.XX” button to access the number entry screen.





5. The lower left and right buttons move the cursor left or right for number selection. The upper left button enters each digit inside the brackets. The reverse cursor will allow you to erase the numbers entered, one at a time.
6. Enter the Extension Span (**Extended Length – Retracted Length = Extension Span**).
7. Press the upper right button when the number is complete. This will save the number to the system memory. The extension span is now complete.
8. Press the “Menu Up” button to display “Span No 3=X.XX”.
9. Press the “Span No 3=X.XX” button to access the number entry screen.





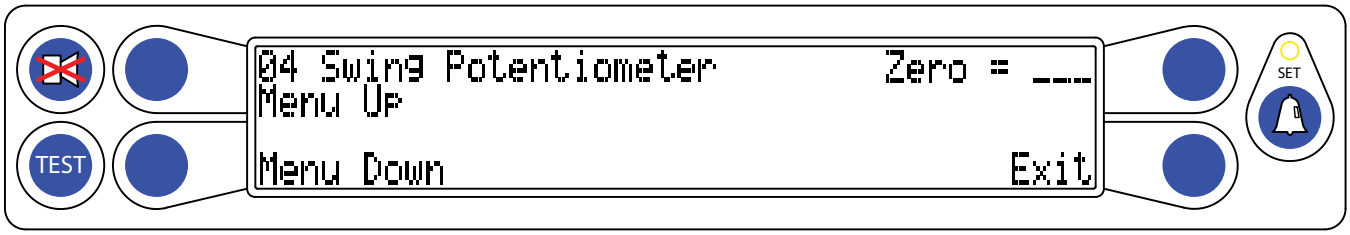
10. The lower left and right buttons move the cursor left or right for number selection. The upper left button enters each digit inside the brackets. The reverse cursor will allow you to erase the numbers entered, one at a time.
11. Enter the angle from the digital level on the boom.
12. Press the upper right button when the number is complete. This will save the number to the system memory.
13. The angle span is now complete.

NOTE: All numbers can be changed if entered incorrectly. If 9.99 is entered mistakenly instead of 99.9, the sensor can be re-calibrated and the information will be overwritten.

5.6 Calibrating the Swing Potentiometer

The system uses a 360° circle for determining the location of the swing. The swing must have a Zero point set so the system knows where to begin counting. The stowed boom position is over the front of the vehicle. When the boom is placed over front, set the house lock. This is important because the pick and carry tolerance is very close. If the house lock is not set, the user may not be able to gain the “LINE” work area needed to pick and carry.

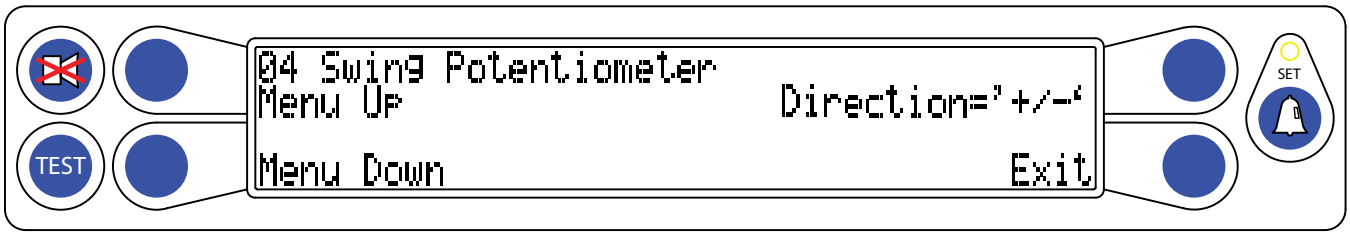
1. From the Calibration Menu, press the “Menu Up” button to display “04 Swing Potentiometer”.
2. Press the “04 Swing Potentiometer” button.
3. The --- lines mean the potentiometer is not recognized by the system and has not had the Zero point set.



4. Press the “Zero = ___” button to set the Zero point. The system will recognize the swing pot and have the needed “starting point.”
5. Lift the boom and rotate to the right (clockwise). The numbers should count up, 1°, 2° to 360°. If the numbers are not going up, change the direction of the swing.
6. The Swing zero has been set. Press the “Exit” button.

5.6.1 Calibrating Swing Direction

1. While still in the “04 Swing Potentiometer”, press the “Menu Up” button until “Direction = +/-“ is displayed.



2. Press the “Direction = +/-” button to change the direction of the swing.

The system is now calibrated. Normal production test procedures may be performed on the unit.

5.7 Outrigger Position Sensors

There is no troubleshooting available for the outrigger position sensors. If an error code is displayed for the outrigger position sensors, contact service for assistance. No calibration is needed when replacing a faulty outrigger position sensor.

5.8 After the Calibration Routine

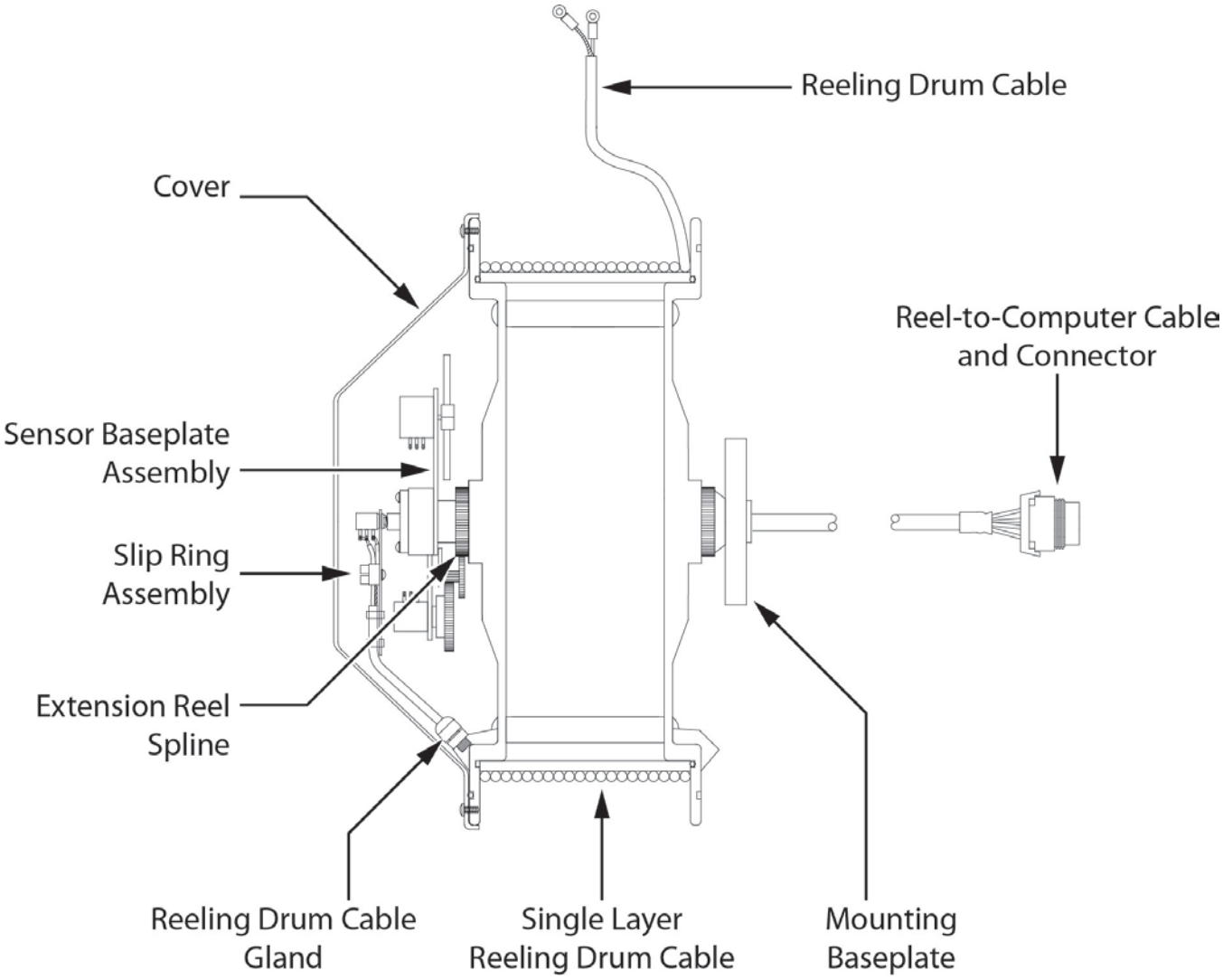
When the calibration routine is complete, thoroughly test the machine to ensure the radius is accurate to + 0.5 of a foot.

In order to perform load testing, a known weight is necessary. Perform testing from 2-3 different boom angles, as well as extensions.

The load shown must be within 0 to +10% when testing. If the load is outside these limits, the calibration should be rechecked for accuracy. The displayed load should not be lower than the actual weight.

6.1 Reeling Drum Overview

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 the setup these devices is performed correctly. Incorrect maintenance can result in system calculation errors.

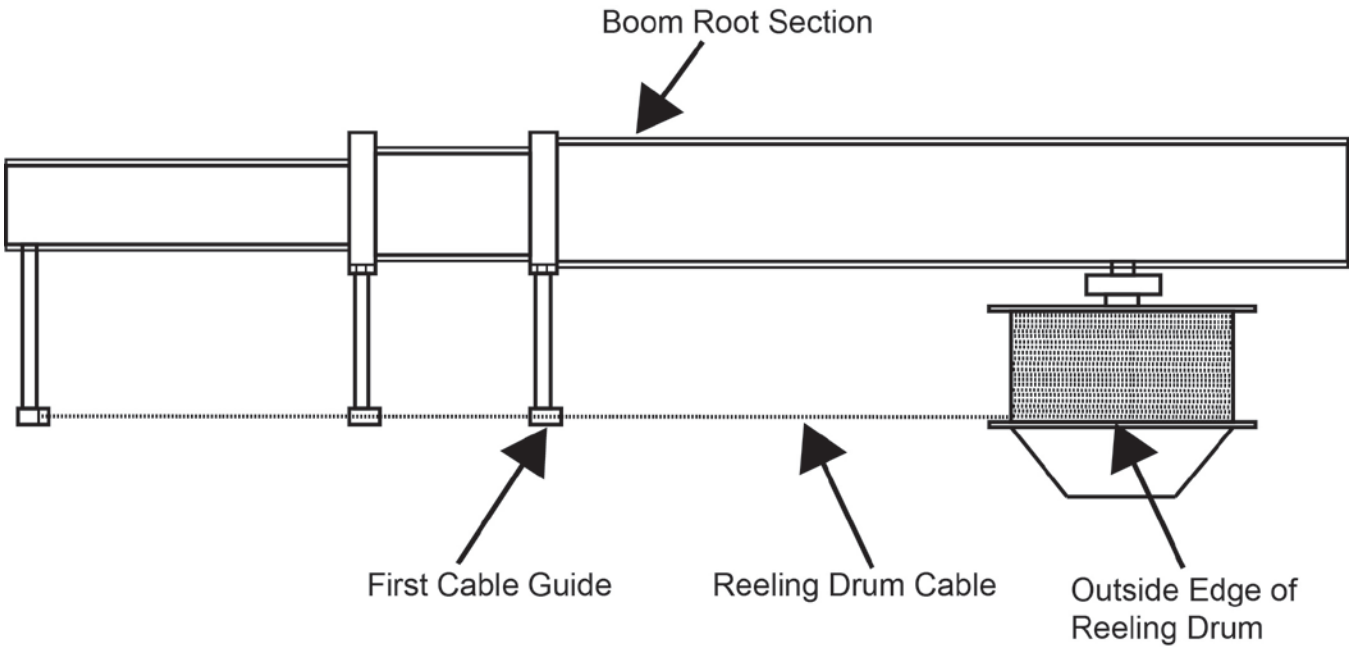


6.2 Checking the Reeling Drum Cable Layering

The reeling drum 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 reeling drum 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

6.3 Sensor Baseplate Assembly

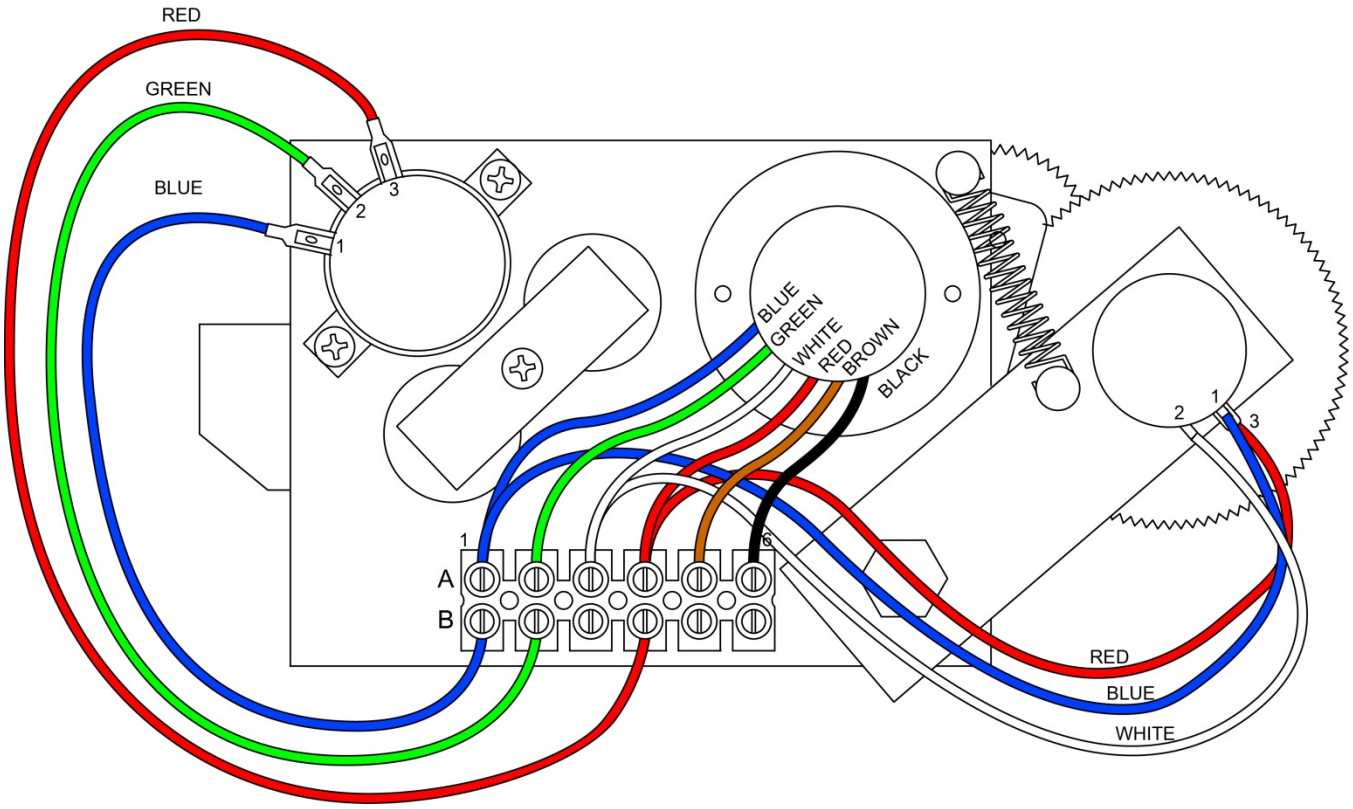
The sensor baseplate assembly supports and connects the extension and angle sensors. It also supports the two-block switch signal and signal cable to the computer.

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 set during production on the potentiometer shaft; and the extension potentiometer gear contains a protection clutch, both are 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.

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	BLUE
ANGLE SENSOR OUTPUT	0 degrees	0.4V	0.6V	GREEN	BLUE
EXTENSION SENSOR OUTPUT	0 ft. FULL RETRACTED	0.15V	0.35V	WHITE	BLUE
TWO-BLOCK DRIVE	A2B WEIGHT DOWN	5.5V	7.5V	BLACK	BLUE
	A2B WEIGHT UP	9.5V	10.5V	BLACK	BLUE
TWO-BLOCK SIGNAL	A2B WEIGHT DOWN	5.5V	7.5V	BROWN	BLUE
	A2B WEIGHT UP	0V	2V	BROWN	BLUE


RED
GREEN
BLUE
1
2
3
BLUE
GREEN
WHITE
RED
BROWN
BLACK
1
6
A
B
2
1
3
RED
BLUE
WHITE

6.4 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 reeling drum cable, slip-ring, and reel-to-computer cable. With the Anti-Two-Block weight hanging freely on the switch, the switch contact is closed and the signal return to the computer is high. When the weight 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.

6.5 Checking the Reeling Drum Cable

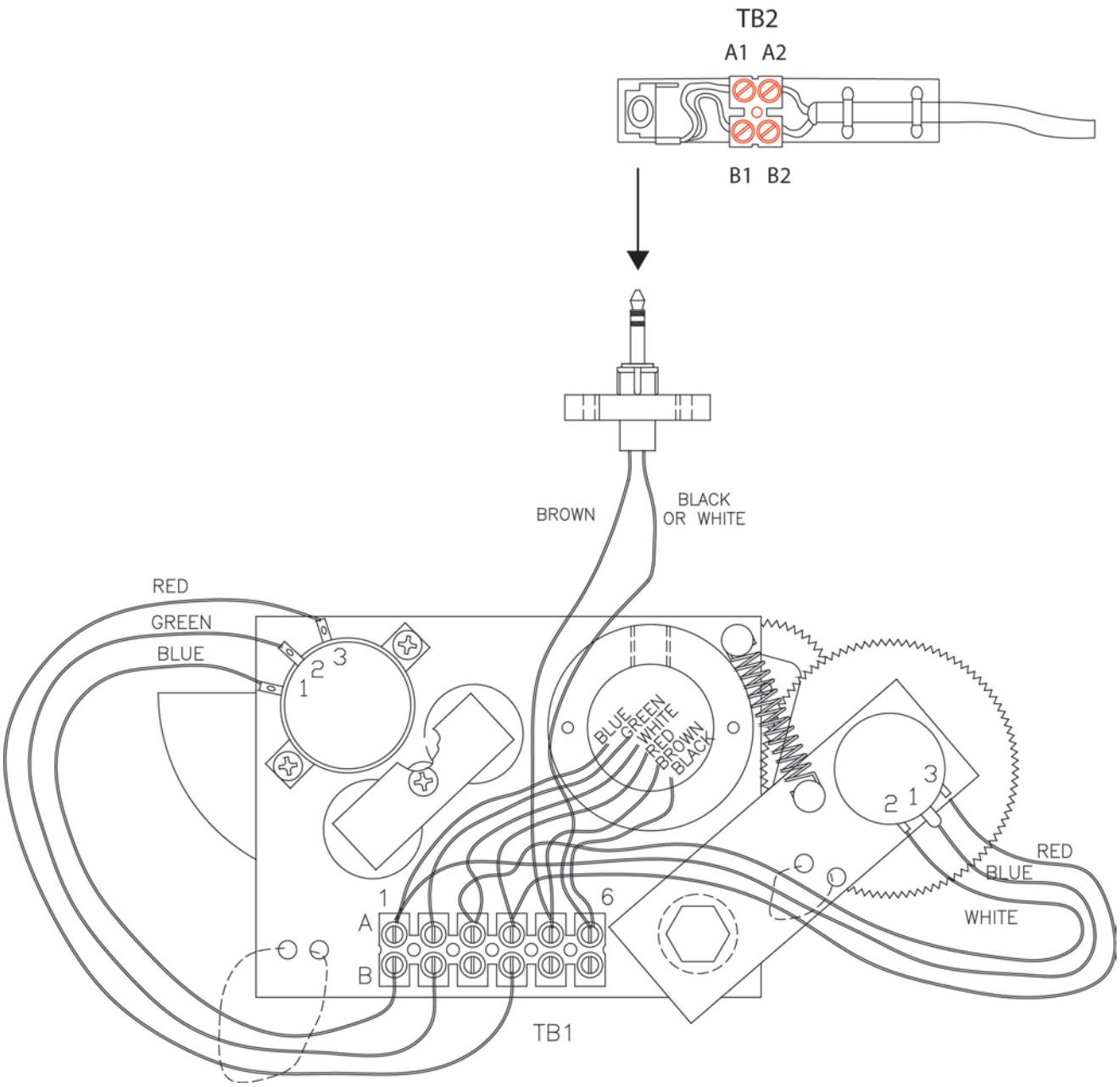
The outer braid of the cable carries the Anti-Two-Block feed to the switches. If the cable sheath is damaged, this may cause a short circuit to the boom/chassis and indicate a fault code of “B008”(Refer to **GROUP “B” FAULT CODES**). The same fault code will be indicated if the ATB switch is closed and 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.

6.6 Checking the Anti-Two-Block Circuit

Before continuing, ensure the connections are correct at the ATB switches on the boom head/jib. This procedure checks the ATB circuit when no power is applied to the circuit, use the diagram on the following page.

1. Remove the extension reel cover.
2. Disconnect the slip-ring arm from the plug by pulling it away from the center of the reel.
3. Close the ATB switch at the boom head by suspending the weight from it or pulling on the chain.
4. Measure the resistance between blue and braid wire terminal connections on the sensor arm.
5. With the ATB switch closed, the resistance should be less than 300 ohms. If not, inspect the reel-off cable, ATB switch, and the boom head connectors for an open circuit.
6. Open the ATB switch at the boom head by lifting the weight.
7. Measure the resistance between blue and green wire terminal connections on the sensor arm.
8. With the ATB switch open, the resistance should be greater than 10,000 ohms. If not, inspect the reeling drum cable, ATB switch, and the boom head connectors for a short circuit.


TB2
A1 A2
B1 B2
BROWN
BLACK
OR WHITE
RED
GREEN
BLUE
1
2
3
BLUE
GREEN
WHITE
RED
BROWN
BLACK
RED
BLUE
WHITE
1
6
A
B
TB1

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