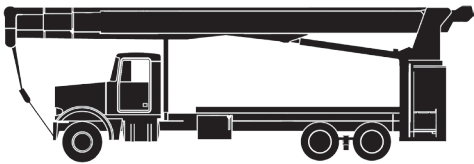




MicroGuard[®] 586

Rated Capacity Indicator System
for Truck-Mounted Cranes



Maintenance and Calibration
Manual



Consider Yourself Warned[™]

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System Maintenance

It is recommended that the following checks be performed on the system prior to each shift or crane operation to help prevent errors or malfunctions:

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 loaded in the capacity chart and installed in the crane's computer prior to factory shipment.

NOTE Please verify that the configuration code number in the display console window identifies the crane's configuration for the current operation. If in doubt, select the code number again following the steps outlined in the crane options and setup codes section of this manual.

Extension Reel, Reel-off Cable to Boom tip, Extension Reel Cable to Computer

The extension reel houses the reel-off cable to the boom tip, a cable from the extension reel to the computer, and the boom angle sensor. The extension reel provides the following signals that are sent directly to the computer via the extension reel computer cable:

- The boom extension signal is generated within the extension reel, and controlled by the reel-off cable, as the boom is extended or retracted. The extension reel measures the boom extension and provides a signal, which enables the computer to calculate the operating radius of the crane, the weight of the actual load, and the percent of rated capacity.
- The two-block signal is transmitted from the boom head, through the reel-off cable, to the extension reel and the extension reel cable to the computer. This signal becomes active when the anti-two-block switch opens, indicating a two-block condition. When this signal reaches the computer, it causes an immediate warning, characterized by a flashing light and an audible alarm on the operator's display console. The motion cutouts are also activated.
- The boom angle signal is generated within the extension reel, and designed to measure the angle of the boom relative to the horizon.
- The reel-off cable, (extension cable) extends from the extension reel to the boom tip. The reel-off cable provides an electrical path for passage of the two-block warning signal from the boom tip to the computer cable in the extension reel.
- Check the following:
 - Carefully examine the reel-off cable for damage.
 - Fully telescope the boom in and out. As the boom is extended or retracted, verify 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 retracted.

WARNING

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

Hydraulic Connections

There are two hydraulic pressure sensors, mounted inside the computer, which measure the pressure within each side of the boom hoist cylinder. These pressure sensors are connected to the boom hoist cylinder valve block by two flexible hoses. Both hoses are subject to the full hydraulic pressure contained within the upper and lower sides of the boom hoist cylinder.

- It is important to verify 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.

Anti-two-block weight

- Verify that the anti-two-block weight and its parts are undamaged, in proper position, and correctly connected.
- Check the chain on the anti-two-block weight for damage and stress, verifying that there are no open links in the chain.
- Verify that the chain is securely attached with screw pin and shackle to the narrow vertical connector projecting from the base of the anti-two-block switch.
- Verify that the anti-two-block weight has been installed around one part of the load line.

Anti-two-block switch

- Confirm that the anti-two-block switch is secure on its mounting post with safety pin inserted through the end of the mounting post, and locked into position.
- Check that the switch cable is secured to the strain relief thimble and that the thimble is on the mounting post behind the switch.
- Confirm that all electrical cables and connectors are free from damage and correctly connected.
- Lower the hook block by winching down.

NOTE

This action should disable the audible and visual alarms on the operator's display console and activate the boom motions.

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. No other pre-existing alarm conditions may be active when performing this test.

WARNING

BEFORE PERFORMING THIS TEST, TURN THE CRANE POWER OFF AND THEN ON AGAIN TO VERIFY THAT AN EXISTING TWO-BLOCK WARNING AND/OR MOTION CUT HAS NOT BEEN OVERRIDDEN. DURING THIS TEST, DO NOT PRESS THE ALARM OVERRIDE KEY TO DISABLE THE AUDIBLE ALARM. DURING THIS TEST, DO NOT WINCH THE HOOK BLOCK INTO THE BOOM TIP, IN CASE THE SYSTEM DOES NOT CUT THE CRANE MOTIONS.

1. Slowly raise the hook block until it lifts the anti-two-block weight and deactivates the anti-two-block switch.

NOTE This action should cut out the winch up motion as well as the boom down, and boom extend motions. Audible and visual alarms on the operator's display console should become active.

2. Lower the hook by winching down.

Computer Cable

The extension reel cable to the computer acts as a channel for passage of signals to the system computer.

- Verify that the cable exiting from the extension reel and running down the boom and around its pivot to the computer 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.

Load Test

The best way to identify a possible problem within the system is to do a load test. The accuracy of the load test is dependent upon concise operation of all of the sensors in the system and the correct code number setting for the configuration of the crane. If there is not a stowed deduct configuration provided by the system, perform this test with stowed attachments removed.

It is recommended that a load test be performed monthly.

WARNING

VERIFY THAT THE CONFIGURATION CODE NUMBER IN THE DISPLAY CONSOLE WINDOW IDENTIFIES THE CRANE CONFIGURATION FOR THE CURRENT OPERATION. IF IN DOUBT, SELECT THE CODE NUMBER AGAIN FOLLOWING THE STEPS OUTLINED IN THE CRANE OPTIONS AND SETUP CODES.

Load Test Steps

1. Select a known weight of at least 20% of maximum rated capacity.
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 display console. The load weight on the console should be between 0 to 10% higher than the load that was lifted. EXAMPLE: When lifting 5000 lbs., the display console window should read between 5000 and 5500 lbs.

WARNING

A LOAD READING ON THE DISPLAY CONSOLE THAT FALLS OUTSIDE OF A 10% RANGE MAY INDICATE A SENSOR PROBLEM. IT IS IMPERATIVE TO CALL YOUR SERVICE REPRESENTATIVE.

Troubleshooting

System Fault Messages

When the system detects a fault, the red warning lamp will illuminate and the message, "WARNING: SYSTEM FAULT" will flash on the display. When a more serious fault is detected, the message, "WARNING: SYSTEM OUT OF SERVICE" will flash.

To determine the fault, press the UP ARROW or DOWN ARROW key once or twice. The information window will display the related fault message. This message will appear for up to 20 seconds before the display returns to its normal display mode. If the UP ARROW or DOWN ARROW key is pressed before the 20 seconds have elapsed, the display will automatically return to its normal display mode.

Fault messages that can appear on the display and the required corrective action follow:

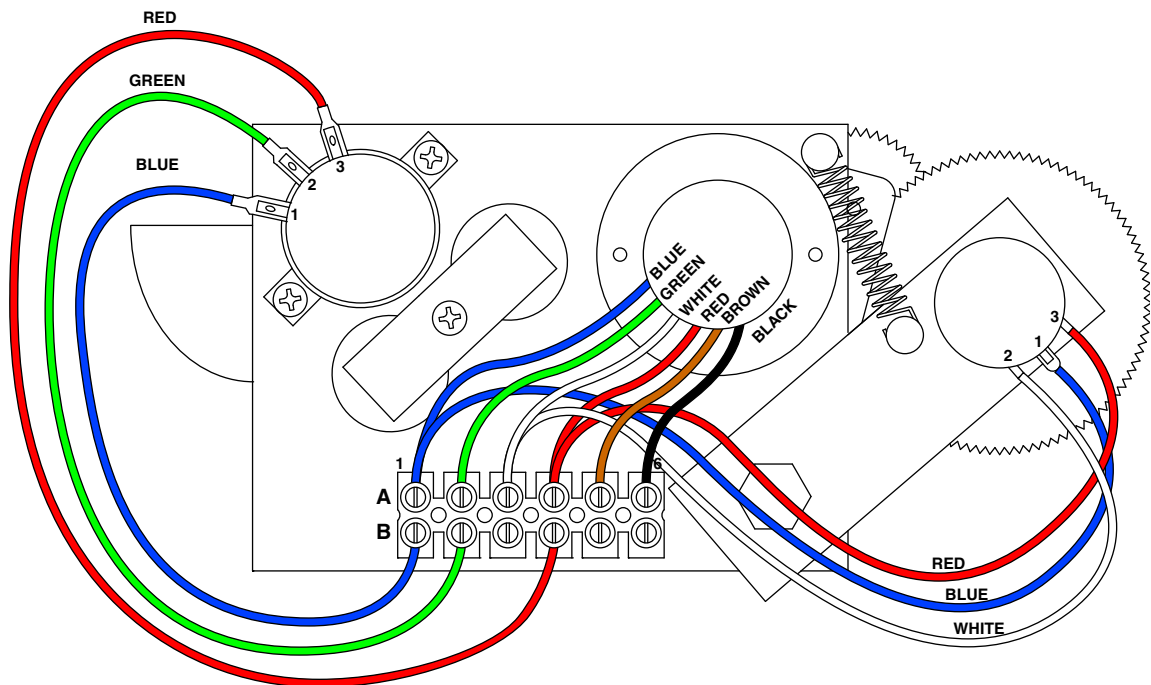
Fault Message	Corrective Action
Reselect Crane Setup	<p>This message indicates that there is an error in the crane setup selection, or there is an internal computer fault. Reselect the correct crane setup code; the error should correct itself. If not, replace the computer.</p> <p>Refer to "Computer Replacement," page 10.</p>
Check Extension	<p>This message indicates a problem with the boom extension sensor.</p> <ol style="list-style-type: none"><li data-bbox="868 961 1513 1031">1. Inspect/check cabling and connections from computer to extension reel on the side of the boom.<li data-bbox="868 1045 1513 1115">2. Inspect/check the extension reel-off cable for damage.<li data-bbox="868 1129 1513 1241">3. Remove the extension reel cover to verify operation of the extension reel. Refer to "Extension Reel Voltage Checks," page 7.
Check Angle	<p>This message indicates a problem with the boom angle sensor.</p> <ol style="list-style-type: none"><li data-bbox="868 1339 1513 1409">1. Inspect/check cabling and connections from computer to extension reel on the side of the boom.<li data-bbox="868 1423 1513 1493">2. Refer to "Adjusting the Sensors" located within this manual.<li data-bbox="868 1507 1513 1619">3. Remove the extension reel cover to verify operation of the extension reel. Refer to "Extension Reel Voltage Checks," page 7.

Fault Message	Corrective Action
Check ATB Wiring	<p>This message indicates an Anti Two-Block wiring problem usually due to an electrical short to the boom or a damaged cable.</p> <ol style="list-style-type: none"> 1. Inspect/check cabling and connections from computer to extension reel on the side of the boom. 2. Inspect/check reel-off cable from extension reel to boom tip and Anti Two-Block switch connections. 3. Verify electrical signals for the two-block drive and signal within the extension reel. Refer to "Extension Reel Voltage Checks," page 7.
Check FKO	<p>This message indicates a Function Kick-Out wiring problem that is usually caused by a fuse or crane circuit breaker failure. Remove the computer unit lid and check the 10A fuse.</p>
Replace System Chip	<p>This message indicates a problem with the system chip fitted inside the computer.</p> <ol style="list-style-type: none"> 1. Remove the computer lid and replace the system chip. <p>Note: Use only proper chip insertion and removal tools to perform this operation. Never use a screwdriver.</p>
Replace the Computer	<p>This message indicates an internal fault in the computer. In some cases, it may not be necessary to replace the computer unit.</p> <ol style="list-style-type: none"> 1. Remove the computer unit lid and check the Internal LED status indicators located on the computer circuit board. 2. Refer to "Computer Internal Status Indicators," page 8.

Extension Reel Voltage Checks

If problems occur with the two-block alarm operation, angle, or extension sensor, the following chart details voltage checks that may be made within the extension reel. Follow the action column before measuring voltages at the specified points in the voltmeter connection columns. 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	TB1/4 - RED	TB1/1 - BLUE
ANGLE SENSOR OUTPUT	0 degrees	0.4V	0.6V	TB1/2 - GREEN	TB1/1 - BLUE
EXTENSION SENSOR OUTPUT	0 ft. (0m) FULL RETRACTED	0.15V	0.35V	TB1/3 - WHITE	TB1/1 - BLUE
TWO-BLOCK DRIVE	ATB WEIGHT DOWN	5.5V	7.5V	TB1/6 - BLACK	TB1/1 - BLUE
	ATB WEIGHT UP	9.5V	10.5V	TB1/6 - BLACK	TB1/1 - BLUE
TWO-BLOCK SIGNAL	ATB WEIGHT DOWN	5.5V	7.5V	TB1/5 - BROWN	TB1/1 - BLUE
	ATB WEIGHT UP	0V	2V	TB1/5 - BROWN	TB1/1 - BLUE

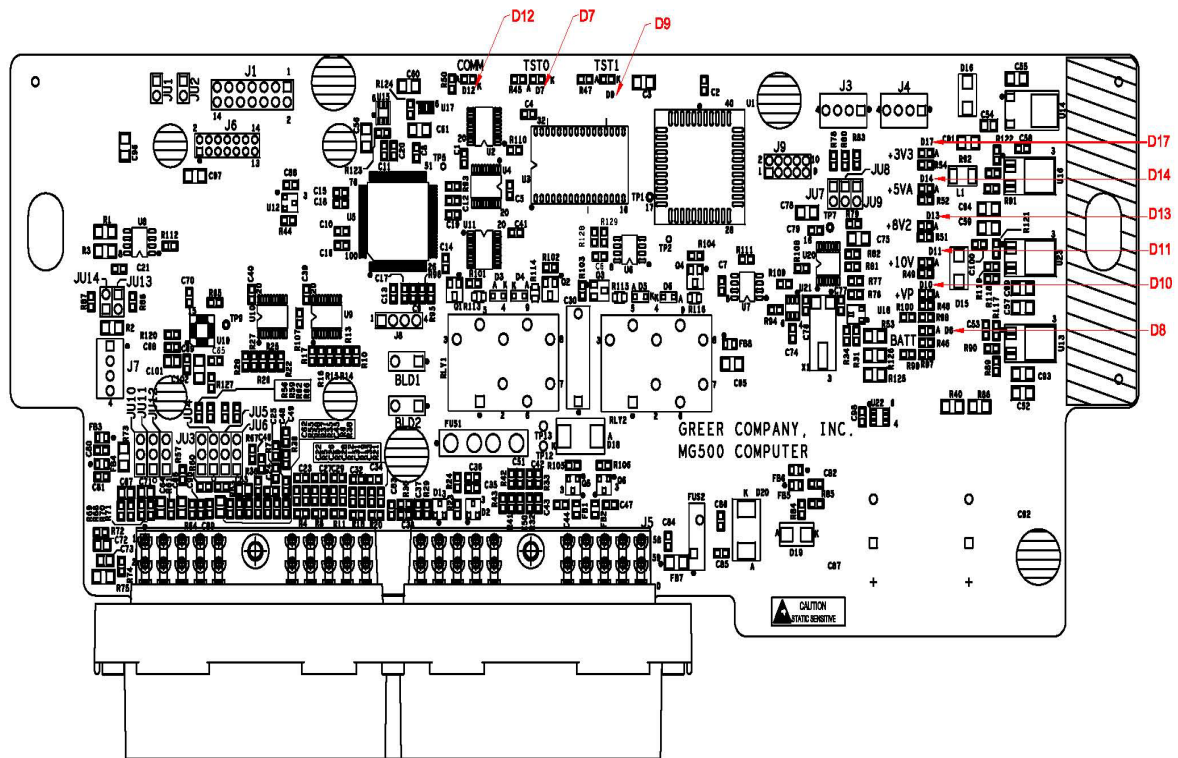


NOTE

Angle sensor output is set to 10% (1/10th) of sensor drive voltage with boom at zero degrees. Extension sensor is set to 5% (1/20th) of sensor drive voltage with boom fully retracted.

Computer Internal Status Indicators

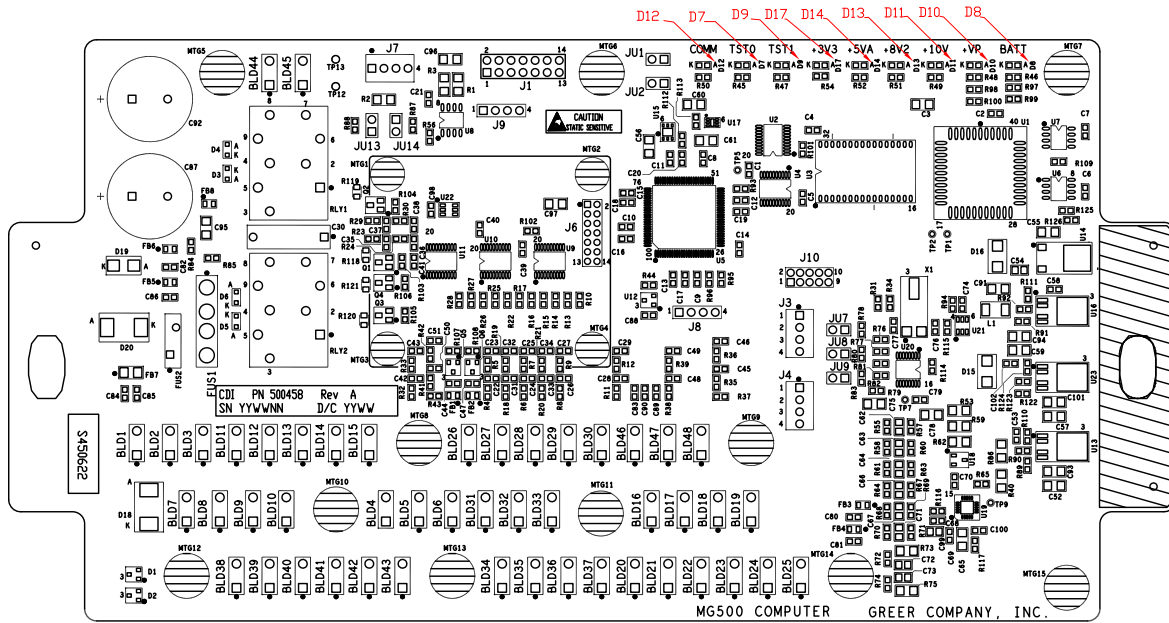
The computer unit contains 9 LED indicators that provide an aid to checking presence of power supply voltages and communications between the computer and display console. There are 6 power indicators (D8, D10, D11, D13, D14, and D17) and three communications indicators (D7, D9, and D12), all Indicators are bright green light emitting diodes. With the exception of the communications indicators, all indicators should be illuminated at the same brightness level with the system power on. A missing or dimly lit indicator indicates a power supply problem.



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

Computer Internal Status Indicators (Continued),

NOTE Due to the differences in computer unit configurations, the locations of these indicators may vary, as shown below.



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

Computer Replacement

To remove the computer unit:

1. Place the boom in its rest.
2. Turn off electrical power.
3. Disconnect all electrical connectors from/to the computer.
4. Disconnect hydraulic hose connections from/to the computer.
5. Remove computer from mounting.

WARNING

THE HYDRAULIC HOSES CONNECT DIRECTLY TO THE BOOM HOIST CYLINDER. DO NOT OPERATE THE CRANE UNLESS THE COMPUTER HAS BEEN PROPERLY REPLACED OR THE HYDRAULIC CONNECTIONS ARE PROPERLY CAPPED.

To install a new computer unit:

1. Mount the computer unit.
2. Ensure that a new system chip has been supplied with the computer.

NOTE Do not use the system chip from the original computer unit.

3. Ensure that all electrical power is turned off.
4. Connect all electrical connectors to the computer unit.
5. Connect hydraulic hoses to the computer pressure ports. (Green is base-side and red is rod-side of the boom hoist cylinder.)

NOTE If more than one fault is present, the most serious fault will appear first and must be resolved first. When the first fault is corrected, other existing faults will be displayed and must be resolved one at a time until no further fault codes are listed.

Fault messages should be reported to the Service Representative along with any noticeable damage incurred during System installation or routine checks.

Calibration

Why Calibrate the System?

The system is pre-calibrated at the factory to set the extension and angle sensors at zero.

However, the settings for length and angle are left blank as these must be entered on the crane to ensure accuracy.

In order for the computer to accurately measure the length and angle of the boom, we must enter exact start and stop points to measure to and from. To accomplish this, the system is equipped with a calibration routine that operates through the system display console. The calibration procedure provides a means of ensuring that the sensors, cables, and hydraulic connection are correctly installed, positioned, and adjusted following system installation or parts replacement.

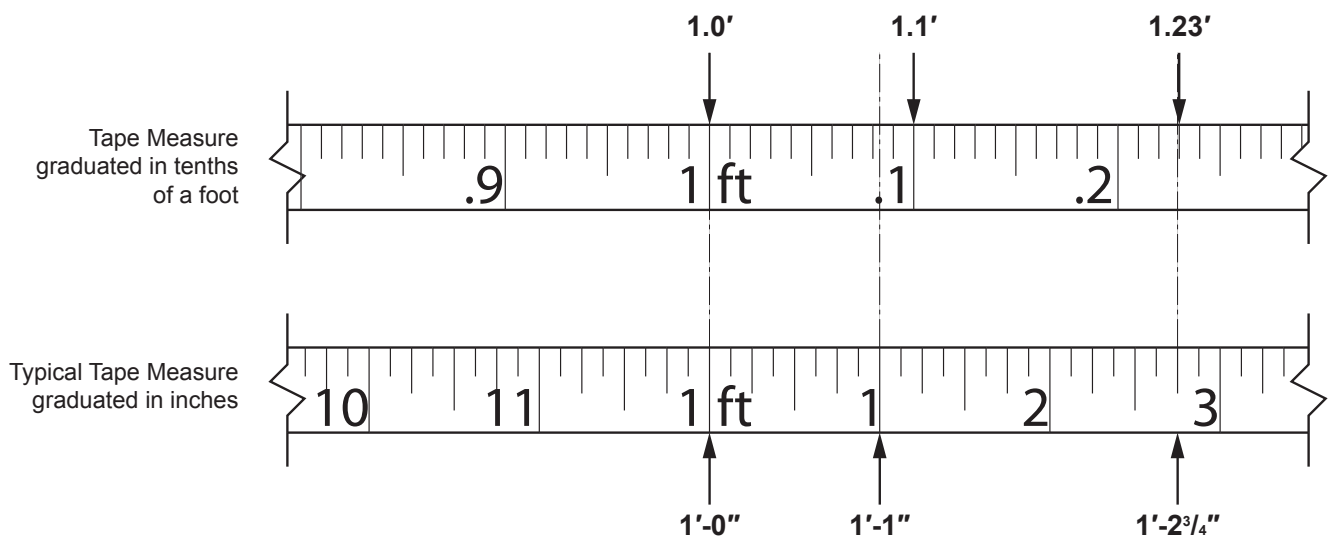
It is important that each step of this procedure is properly followed in order for the system to accurately provide load, rated capacity, warnings, and kick-out functions.

WARNING

AT ALL TIMES, OBSERVE SAFE PRACTICES. MAKE SURE THAT CRANE CAPACITY LIMITATIONS ARE UNDERSTOOD, AND THAT THE CRANE CAPACITY PLACARD IS FOLLOWED. DO NOT EXCEED MANUFACTURER'S SPECIFIED LIFTING LIMITATIONS.

Required Tools

- 1/4" nut driver or T15 Torx driver
- Digital level calibrated and accurate to 0.1° at level
- 100" measuring tape - fiber type graduated in tenths of feet



- Digital Volt/Ohm Meter capable of measurements to three decimal places.

NOTE When the installation is complete and all wiring is in place a voltage check should be performed to ensure the system is in proper working order. Refer to "Extension Reel Voltage Checks" located within this manual.

Adjusting the Sensors

1. Position the crane on firm and level ground with the outriggers properly extended and set.
2. Fully retract the boom.
3. Position the level on the boom and adjust the boom until the level reads zero degrees (0°).
4. Remove the cover from the extension reel to expose the extension and angle sensors.

Extension Cable Guides

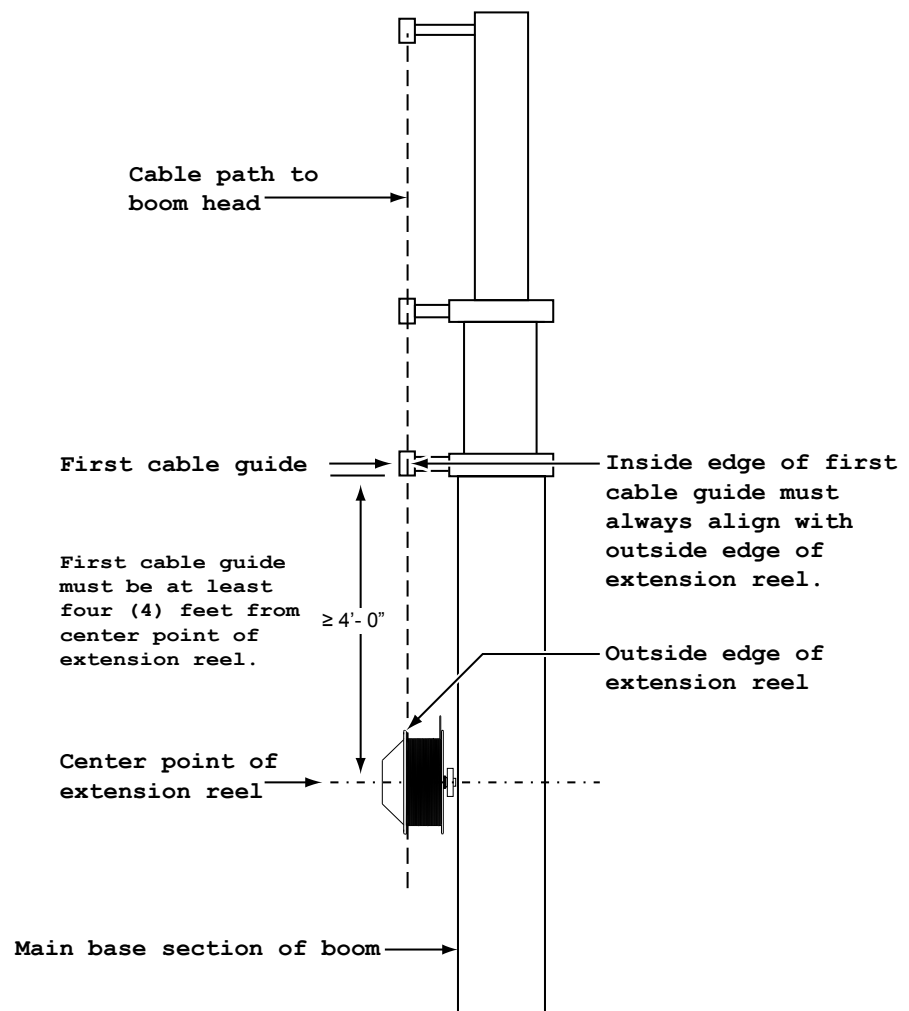
Cable guides must be used to achieve proper placement of the first roller guide.

Cable guides maintain the position of the cable, ensuring a controlled path to the boom head.

The distance between the first cable guide and the center point of the extension reel must be a minimum of four feet.

The inside edge of the first cable guide must always align with the outside edge of the extension reel.

Passage of the cable from the extension reel through the cable guides to the tie-off post on the boom head may form a straight line parallel to the boom, as shown. It may also curve toward the boom depending on the placement of the cable guides in the latter segments of the crane.



Adjusting the Reel-Off Cable

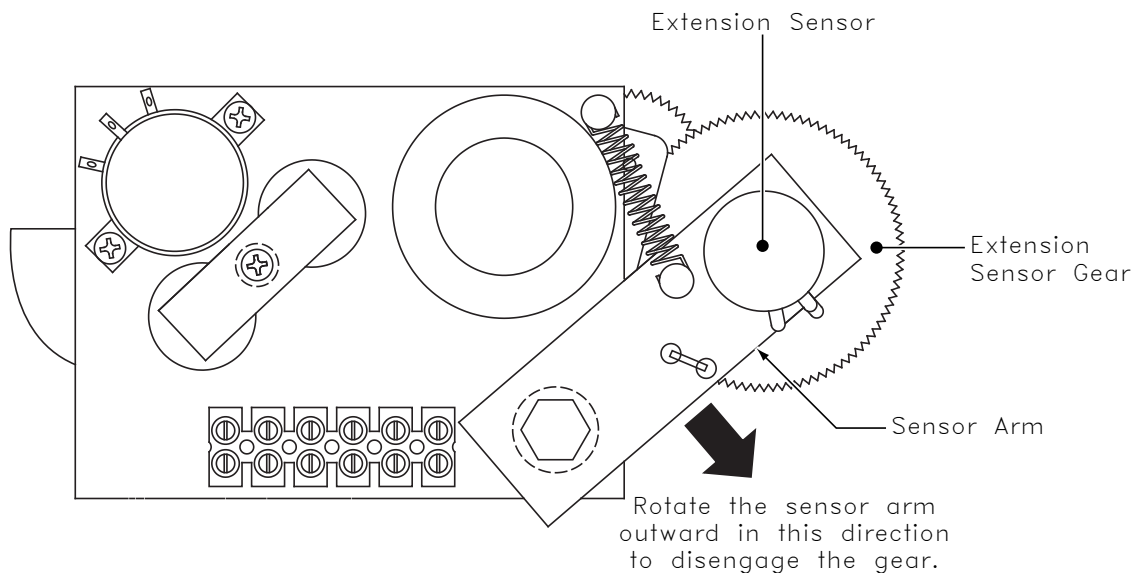
NOTE The reel-off cable must be properly pre-tensioned. This procedure keeps the cable taut at all times, with controlled, steady exit from the extension reel.

1. Fully retract the boom.
2. Slowly rotate the extension reel clockwise until a “click” is heard, indicating that the clutch inside the reel is engaged.
3. Turn the Extension Reel counter-clockwise for 5 complete rotations.

NOTE A temporary marker placed on the extension reel can facilitate the rotation count. Pre-Tension is complete.

Adjusting the Extension Sensor

1. With the level on the boom reading , rotate the extension sensor arm outward to disengage the gear.



2. Rotate the extension sensor clockwise until the end of the pot is reached. Then, continue to rotate (applying more force) to cause the clutch to slip (this is usually identified by a click).
3. Rotate the sensor exactly $\frac{1}{2}$ turn counter-clockwise to establish a proper voltage signal. Refer to “Extension Reel Voltage Checks,” page 7.
4. With the boom still level, measure the voltage of the angle sensor. Refer to “Extension Reel Voltage Checks,” page 7.

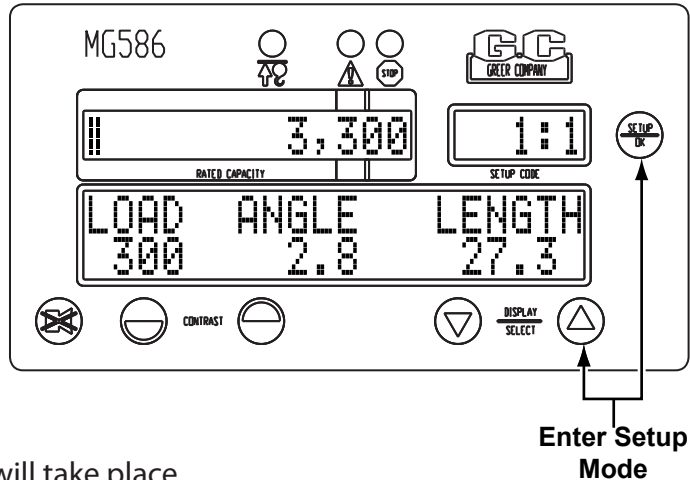
NOTE This check should be performed on older model cranes in the event the sensor has been removed and reinstalled, or repositioned incorrectly.

Entering Setup Mode

The display will guide you through each setup operation. During the setup procedure, the display console should be placed in a position that allows for easy viewing and operation while adjustments are being made within the boom extension reel.

The setup mode is activated by the following procedure:

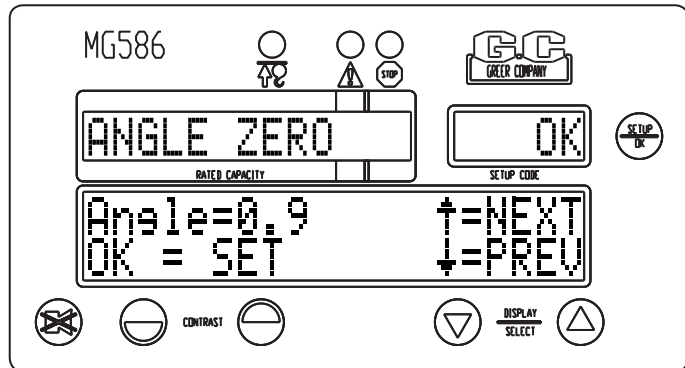
1. Press and hold the SETUP and UP ARROW keys on the display for 5 seconds



2. A brief self-test will take place.
3. Release the keys.

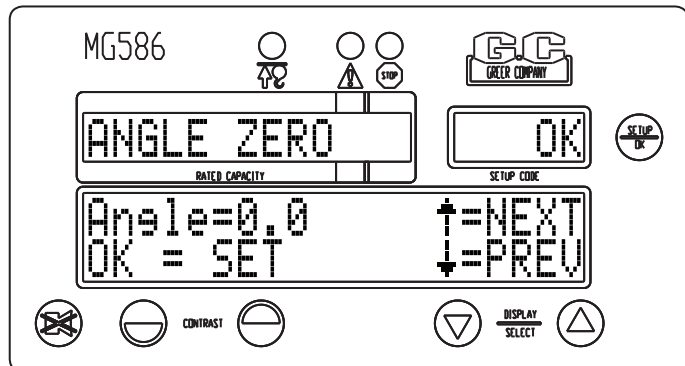
Boom Angle System Zero

When the system enters setup mode, the display will appear as in the illustration (angle reading may be different). Verify the level on the boom is still at exactly 0°.

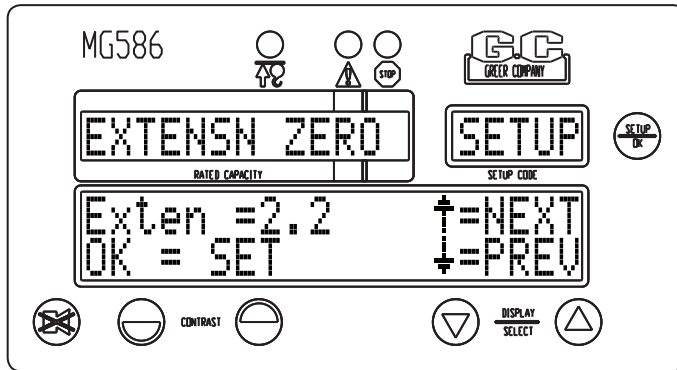


Press the SETUP/OK key to zero the system.

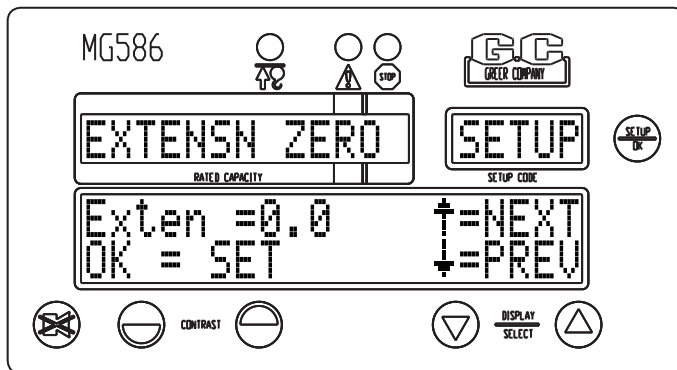
Press the UP ARROW key to continue.



Boom Extension System Zero

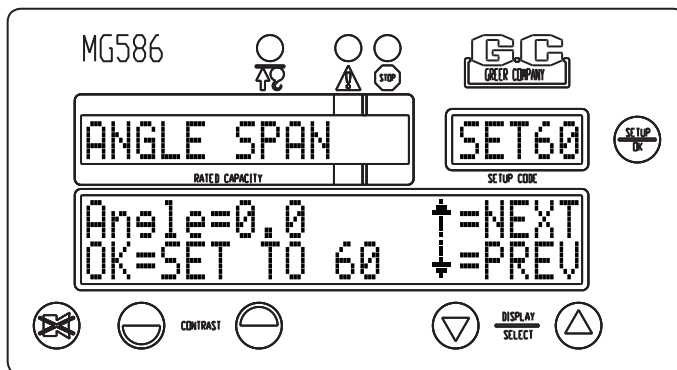


The display will appear as in the illustration (extension reading may be different). The extension sensor must be set to zero according to the procedure described previously.

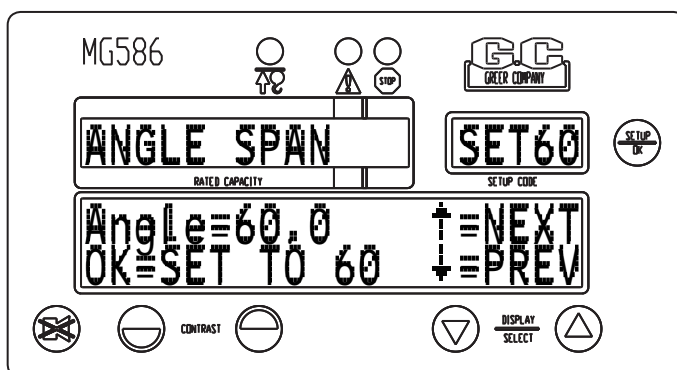


Press the SETUP/OK key to zero the span.
Press the UP ARROW key to continue.

Angle Span System Set



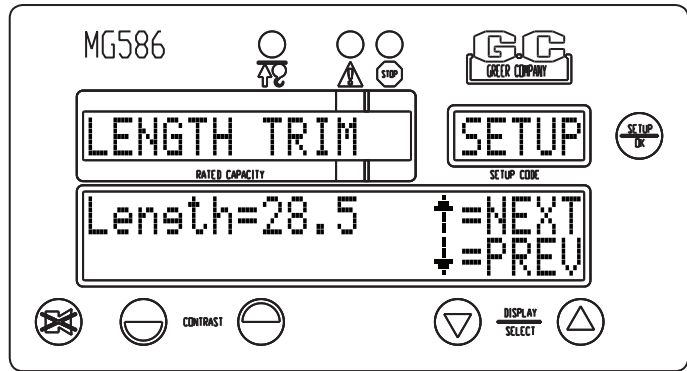
Raise the boom to exactly 60° as read from the level.



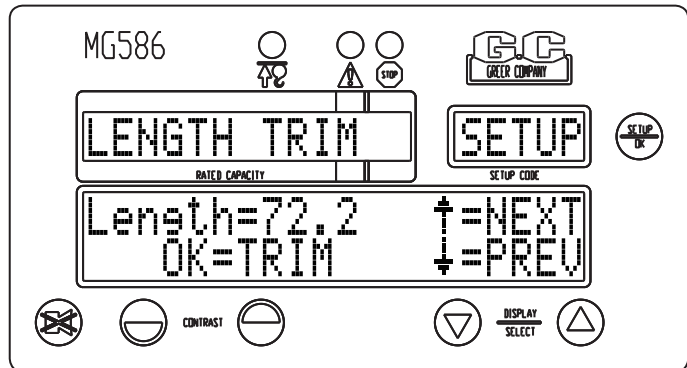
Press the SETUP/OK key to set the system to 60°.
Press the UP ARROW key to continue.

Boom Length Trim

With the boom still elevated at 60°, fully extend the boom to the end of the stroke of the extension cylinder (as indicated by a clunking sound).

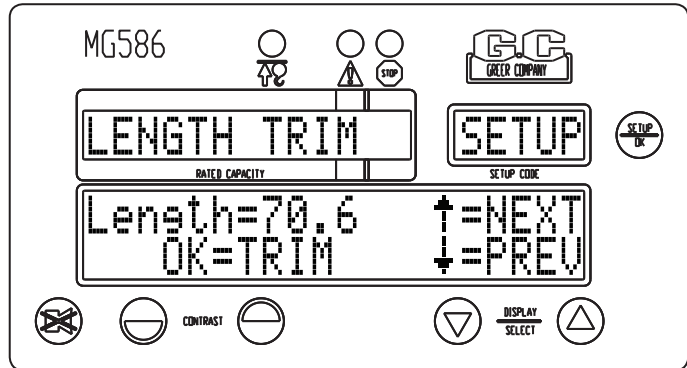


As the boom reaches full extension, the text "OK=TRIM" will appear in the information window under the text "Length =xx.x".

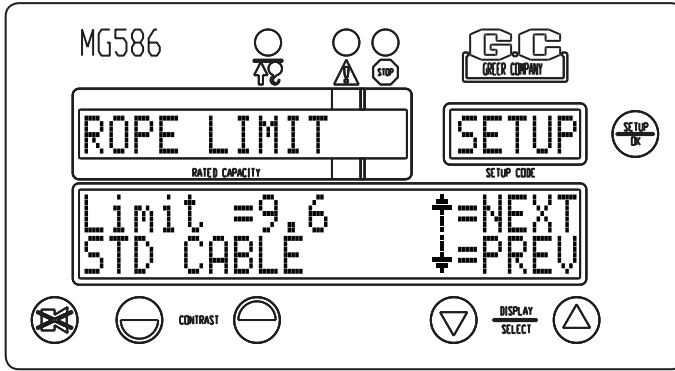


Press the SETUP/OK button to trim the length. The length measurement will be set to the exact length of the span and the extension number will be spanned in the computer calibration.

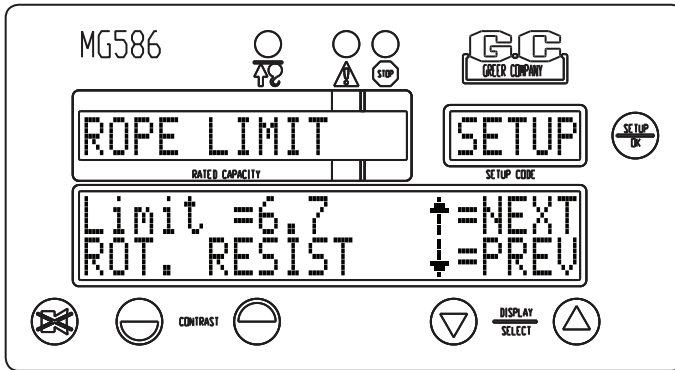
Press the UP ARROW key to continue.



Viewing Rope and Cable Limits



The system will display the proper cable limits for the type of cable selected. The cable types are preset from the crane configuration chart.



Press the SETUP/OK button to toggle between the types of cable.

Press the UP ARROW key to continue.

Consider Yourself Warned.™

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Greer Company is part of TWG



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