

Grove Manitowoc National Crane Potain

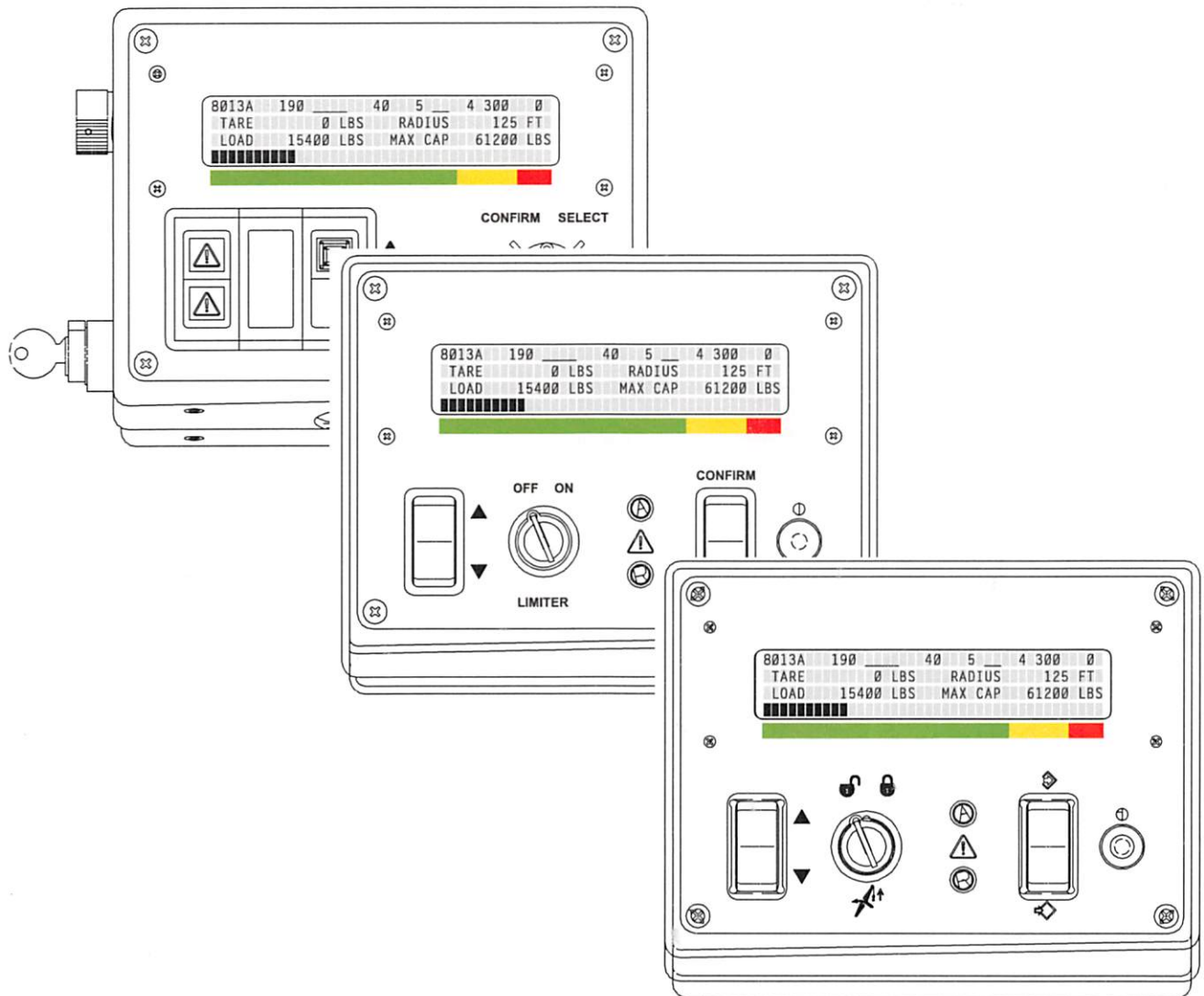
Manitowoc
Crane Care

999
LMI Operation
REFERENCE



Folio 1880v2

Manitowoc Model 111, 222, 777, 777T, 888, 999, and 2250 Rated Capacity Limiter (RCL) / Rated Capacity Indicator (RCI) Manual



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Due to continuing product innovation, specifications in this manual are subject to change without notice.

Contents

1.0	Introduction	5
1.1	Purpose	5
1.2	Definitions.....	5
1.3	Contacting Crane Care.....	5
1.3.1	North America, South America, and Canada	5
1.3.2	Europe, Middle East, and Africa.....	5
1.3.3	Asia	5
2.0	Safety.....	6
3.0	RCL/RCI system	7
4.0	Working screen	9
5.0	Configuration and Calibration (cranes without a Master Node)	11
5.1	How to determine if a crane has a Master Node	11
5.2	How to change the language used in the displays	11
5.3	CONFIGURE LMI screen	11
5.4	Calibration screens.....	16
5.4.1	When should sensors be calibrated?	16
5.4.2	What is sensor calibration?	16
5.4.3	CALIBRATE ANGLE screen	18
5.4.4	CALIBRATE SHEAVE screen	21
5.5	MULTIPLE SHEAVES screen	24
5.6	DIAGNOSTIC SCREEN	26
6.0	Configuration and Calibration (cranes with a Master Node).....	27
6.1	How to determine if a crane has a Master Node	27
6.2	How to change the language used in the displays	27
6.3	CONFIGURE LMI screen	28
6.4	Calibration screens.....	32
6.4.1	When should sensors be calibrated?	32
6.4.2	What is sensor calibration?	32
6.4.3	CALIBRATE ANGLE screen	32
6.4.4	CALIBRATE LOAD screen.....	35
6.5	DIAGNOSTIC SCREEN	38
7.0	Appendix.....	40
7.1	Crane configurations	40
7.2	Load sheave and angle sensor voltages.....	41
7.2.1	Load sheave voltages	41

7.2.2	Angle sensor voltages	41
7.3	2010 CE requirements	42
7.3.1	Only applies to model 999 and 2250 cranes equipped with Master Nodes	42
7.3.2	Reduced speed for 100-110% rated capacity loads.....	42
7.3.3	RCI/RCL external override switch	42

1.0 Introduction

1.1 Purpose

NOTE: These instructions only apply to:

- Cranes *without* a Master Node — that have software program version Imi030 (or Imi130) and newer installed. For example, Imi031 (or Imi131) would be newer.
- Cranes *with* a Master Node.

The purpose of this publication is to provide qualified operators with operating instructions for the Manitowoc RCL/RCI. The system is designed to aid the operator in identifying overload conditions, which can cause structural failure of the boom and jib or loss of stability (tipping).

1.2 Definitions

Rated Capacity **Indicator** (RCI) — is a system of devices which automatically provides an audible/visual signal when the **actual load** approaches, reaches and/or exceeds the rated capacity value when applied to the current crane configuration.

Rated Capacity **Limiter** (RCL) — is a system of devices which automatically provides an audible/visual signal when the **loading conditions** approaches, reaches and/or exceeds the rated capacity value when applied to the current crane configuration. When the actual load exceeds the rated capacity, the RCL/RCI system supplies a signal to stop some of the crane functions.

NOTE: In this publication the Rated Capacity Limiter and Indicator information is combined, with the initials **RCL/RCI** representing both systems.

The limiter is turned on/off in the Configuration screen. In some countries it is illegal to disable the RCI alarms and limiter shut down. The fault responses can not be turned off if the crane has been programmed for use in these countries.

If the RCL crane function lockout is enabled, the controller disables the following crane functions until the overload condition is corrected:

- Hoist **up**.
- Boom **down** (or **up** if boom is raised above its maximum chart angle).
- Luffing jib **down** (or **up** if jib is raised above its maximum chart angle).

1.3 Contacting Crane Care

For questions, contact the following:

1.3.1 North America, South America, and Canada

Toll Free: 1-888-499-7278 (USA & Canada)
International: (001) 717-593-2000

1.3.2 Europe, Middle East, and Africa

International: +33-472-187-900

1.3.3 Asia

Toll Free: 800-8288-278 (China Area)
Overseas: +65-6268-8278

2.0 Safety



WARNING **Overload Hazard!**

The RCL/RCI has been installed on crane to aid operator.

Presence of RCL/RCI on crane in no way substitutes for, or lessens, requirement that operator knowledge, experience, and judgment are required to ensure safe operation of crane.

If RCL/RCI is not configured correctly, it will not properly sense load and alert operator to overload conditions. Before using RCL/RCI, operator shall read and understand instructions in this publication.

3.0 RCL/RCI system

The RCL/RCI is a computer program that monitors the crane load and compares it to the operator's configured capacity chart.

RCL/RCI console part number	Crane models used on	RCL/RCI console
179941	111, 222, 888, 999	
196285	2250, 777, 777T	
A14717	2250, 777	
	999	

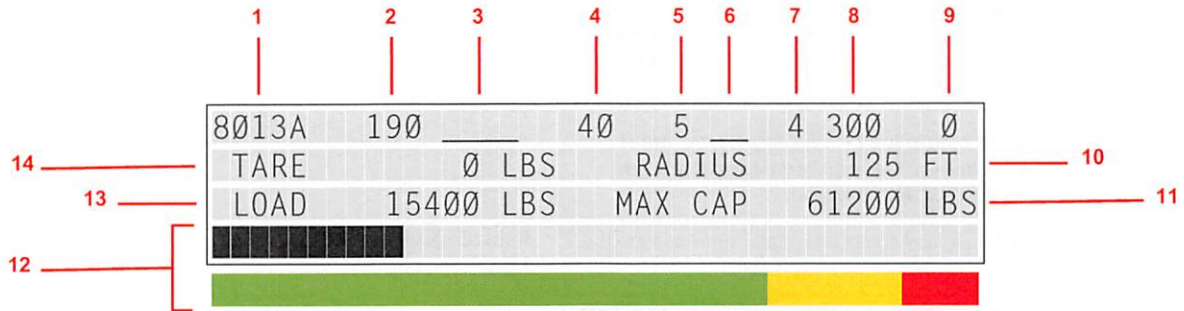
#	Description	#	Description	#	Description
1	RCL/RCI display.	8	CONFIRM / SELECT switch.	15	Boom point load sensor.
2	RCL/RCI display contrast control.	9	Limiter key shutdown switch.	16	Luffing jib top RIN controller.
3	Amber light — near maximum load indicator.	10	Programmable controller.	17	Luffing jib angle sensor.
4	Red light — maximum load.	11	Angle sensor.	18	Jib point load sensor.
5	Limiter key shutdown switch.	12	Load sensor.	19	Intermediate fall load sensor.
6	Display light switch.	13	Boom top RIN controller.	20	Fixed jib point load sensor.
7	SCROLL up/down switch.	14	Boom angle sensor.	21	Fixed jib top RIN controller.

RIN = Remote Input Node.

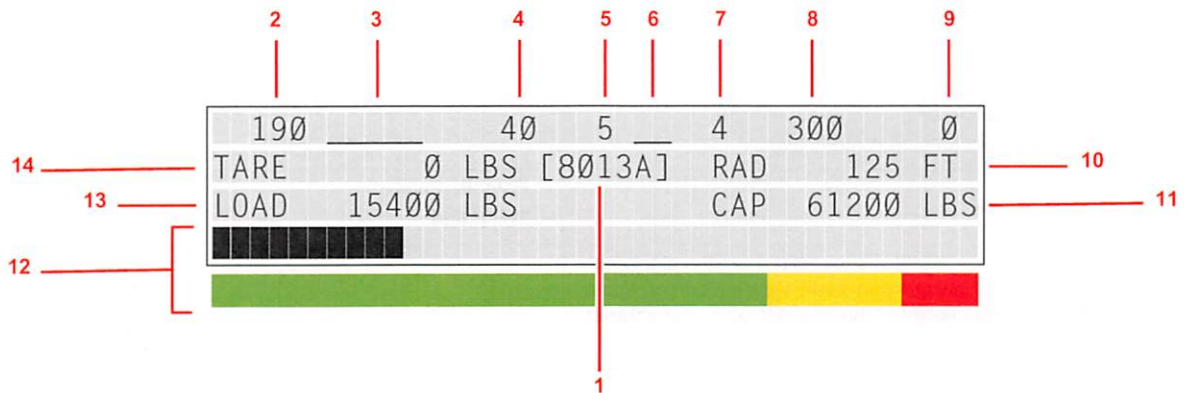
4.0 Working screen

The Working screen shows all the load, capacity, configuration, and rated capacity information required for operation of the crane.

Working screen for cranes *not* equipped with a Master Node:



Working screen for cranes equipped *with* a Master Node:



Item	Description	Units of Measurement
1	Capacity chart in use (8013A is a 2250 chart).	—
2	Boom length.	<ul style="list-style-type: none"> • Feet (English) • Meters x 10 (Metric) — "90" on the display means "9.0" Meters.
3	Luffing jib length.	<ul style="list-style-type: none"> • Feet (English) • Meters x 10 (Metric) — "123" on the display means "12.3" Meters.
4	Fixed jib length.	<ul style="list-style-type: none"> • Feet (English) • Meters x 10 (Metric) — "55" on the display means "5.5" Meters.
5	<ul style="list-style-type: none"> • Fixed jib offset (in the screen above) — if the crane is configured with a fixed jib. • Capacity chart boom angle — if the crane is configured with a luffing jib. • Boom-to-luffing jib angle — if the crane is configured with boom-to-luffing jib chart. 	• Degrees
6	Degrees of list for pedestal or barge mounts. For other configurations, the value is for engineering purposes only.	• Degrees

7	Parts of line.	—
8	Maximum line pull — maximum allowed line pull by the rope/drum.	<ul style="list-style-type: none"> • Pounds/100 — “300” on the display means “30000” Pounds. • Ton x 10 — “100” on the display means “10.0” Tons.
9	<p>Capacity chart deduct. <i>The RCL/RCI program does not automatically compensate for any deducts required by the various capacity charts (jib and wire rope, load blocks, slings, below boom and jib points). The operator is responsible for determining and calculating deducts specified on applicable capacity charts and for entering data into the RCL/RCI program. Always round calculations UP to the nearest hundred. For example, is calculated deduct is 1675 pounds, enter 1700 pounds.</i></p> <p><i>A crane can be overloaded — tipping or structural failure can occur — if the required deducts are not entered into the RCL/RCI program.</i></p>	<ul style="list-style-type: none"> • Pounds/100 — “300” on the display means “30000” Pounds. • Ton x 10 — “100” on the display means “10.0” Tons.
10	Radius — distance from the crane center of rotation to the center line of the load block or weight ball.	<ul style="list-style-type: none"> • Feet (English) • Meters (Metric)
11	<p>Rated capacity — the capacity chart’s maximum allowable load for the current drum in use. Maximum capacity is always based on the <i>least</i> of the following values:</p> <ul style="list-style-type: none"> • Manitowoc capacity chart, • Maximum line pull, • Drum torque capacity. 	<ul style="list-style-type: none"> • Pounds (English) • Ton (Metric)
12	<p>Load/Rated capacity ratio:</p> <ul style="list-style-type: none"> • Green = safe level. • Yellow = approaching the maximum level. • Red = exceeded the maximum level. 	—
13	Suspended load.	<ul style="list-style-type: none"> • Pounds (English) • Ton (Metric)
14	Tare — a load value that is subtracted from the displayed load so that the operator can easily view load differences. For example, the weight of the hook block can be entered as a tare. The displayed load would then show only the weight suspended from the hook block. <i>However, tare is just a visual aid and does not affect the rated capacity calculation of the RCL/RCI. Rated capacity is always determined from the entered tare plus the displayed load.</i>	<ul style="list-style-type: none"> • Pounds (English) • Ton (Metric)

5.0 Configuration and Calibration (cranes *without* a Master Node)

5.1 How to determine if a crane has a Master Node

The Working screen for a crane equipped with a Master Node is different from the Working screen that appears when a crane does *not* have a Master Node.

For an example of each Working screen, see “4.0 Working screen” on page 9.

5.2 How to change the language used in the displays

Select the CONFIGURE LMI screen to change the display language. The language prompt is one of the final steps in CONFIGURE LMI.

5.3 CONFIGURE LMI screen

The CONFIGURE LMI screen is used to configure a crane when it is first set up or when an attachment like a luffing jib is added or removed.

Before starting crane configuration, determine the sheaves that will be used. See “7.1 Crane configurations” on page 40.


The last programmed chart and crane configuration for each *load sensing sheave* is retained in memory. This allows an operator to switch between sheaves without having to reprogram the configuration — *assuming that no changes have been made to parts of line, boom length, and so on.*

To configure a crane, follow these steps:

NOTE: If *multiple* load sensing sheaves from one point are used, then both sheaves must be configured before being selected.

Step	Action	Display
1	When power is applied to the RCL/RCI, the Bootstrap screen appears for a few moments. <i>V1.03 is the bootstrap program version.</i>	<pre>LMI 4x40 Bootstrap V1.03 Date: 04/12/99</pre>
2	Then the following screen appears. Press CONFIRM to continue.	<pre>8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP Confirm LBS</pre>
3	After pressing CONFIRM, the Working screen appears.	<pre>8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP 61200 LBS</pre>

4	<p>Press SCROLL until an asterisk (*) appears in front of CONFIGURE LMI.</p>	<pre>*CONFIGURE LMI CALIBRATE ANGLE OPT DIAGNOSTIC SCREEN CALIBRATE SHEAVE MULTIPLE SHEAVES SCROLL or SELECT Item</pre>
5	<p>Press SELECT to select CONFIGURE LMI.</p>	<pre>[>Sheave 3 Configuration] CFG0 SCROLL to Change CONFIRM to Continue</pre>
6	<p>Press SCROLL to select the first sheave to configure, for instance, Sheave 1.</p> <p>In the following screens, a 2250 crane will be configured for a boom with a fixed jib. In this example, only the fixed jib point (Sheave 3) will be used, not the lower boom point (Sheave 1). See "7.1 Crane configurations" on page 40.</p> <p>NOTE: No matter what crane configuration is used, <i>all four sheaves</i> must be configured. In this case, Sheave 1, 2, and 4 will be set to "not used".</p>	<pre>[>Sheave 1 Configuration] CFG0 SCROLL to Change CONFIRM to Continue</pre>
7	<p>After the sheave number has been set, press CONFIRM.</p>	<pre>[Sheave 1 Configuration] CFG1 >POINT UPPER SCROLL to Change CONFIRM to Continue</pre>
8	<p>Press SCROLL to set the point, in this case LOWER.</p> <p>NOTE: Only select UPPER point when there is an upper point on the boom, fixed jib, or luffing jib. When configuring a fixed jib, the LOWER point is generally used.</p>	<pre>[Sheave 1 Configuration] CFG1 >POINT LOWER SCROLL to Change CONFIRM to Continue</pre>

21	Then press CONFIRM.	<pre> [Rea 1 Configuration] CFG8 >LANGUAGE FRANCAIS DEFIL > changer CONFIRM > continuez </pre>
22	Press SCROLL to change the screen language.	<pre> [Sheave 1 Configuration] CFG8 >LANGUAGE ENGLISH SCROLL to Change CONFIRM to Continue </pre>
23	Then press CONFIRM.	<pre> [Sheave 1 Configuration] CFG9 >ALARM ON Load Limiter ON SCROLL to Change CONFIRM to Continue </pre>
24	<p>Press SCROLL to set the alarm and limiter:</p> <p>ALARM LIMITER</p> <p>OFF OFF — indicators and limiter off.</p> <p>ON OFF — just indicators on.</p> <p>ON ON — indicators and limiter on.</p> <p>Then press CONFIRM.</p>	<pre> [Sheave 1 Configuration] CFG9 >ALARM ON Load Limiter OFF SCROLL to Change CONFIRM to Continue </pre>
25	Press CONFIRM again. The Working screen will appear.	<pre> 8Ø13A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP 61200 LBS </pre> 
26	To configure the remaining sheaves, repeat the process above.	

5.4 Calibration screens

5.4.1 When should sensors be calibrated?

NOTE: A crane must be configured (page 11) before it is calibrated.

Angle sensors and load-sensing sheaves should be calibrated:

- Before a near-capacity lift.
- When the crane is first set up.
- Whenever an angle sensor or a load-sensing sheave is replaced.
- When any displayed *angle* is found to be in error by more than 2°.
- When any displayed *load* is found to be in error by more than 4%.
- Every year.

5.4.2 What is sensor calibration?

Sensor calibration is the process of matching actual measured *values* (such as distance, angle, and weight) to the angle and load sensor *data* (voltages). If these sensors are not calibrated correctly, then the boom (or luffing jib) angle and load may not be interpreted correctly by the crane.

5.4.2.1 Load sensors

Load-sensing sheaves require *both* light and heavy load calibration procedures.

5.4.2.1.1 Angle sensors

Angle sensors require *both* low and high angle calibration procedures.

Angle sensors can be calibrated using one of two methods — OPERATING RADIUS or BOOM ANGLE:

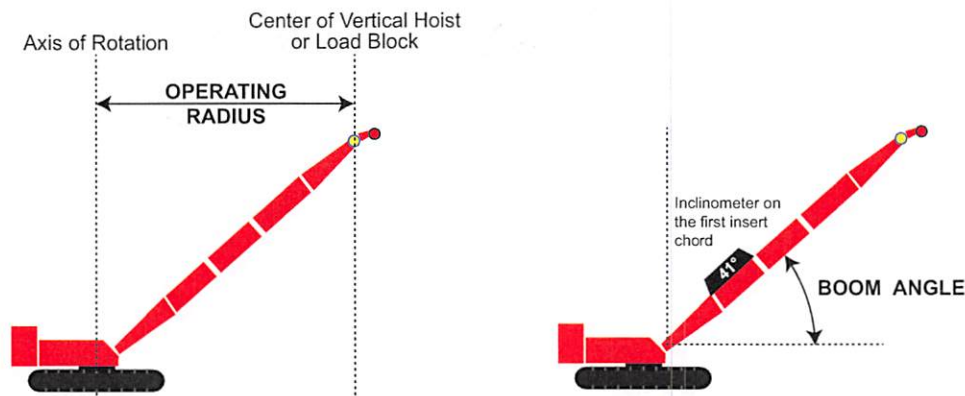


Figure 1: Angle sensor calibration methods

5.4.2.1.2 OPERATING RADIUS

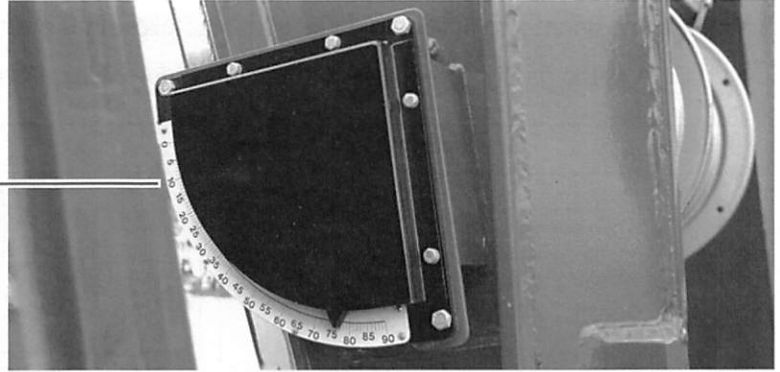
This is the preferred technique because this method more accurately takes boom deflection into account.

5.4.2.1.3 BOOM ANGLE (or Angle)

If this method is used, it is recommended that an inclinometer, not the boom butt indicator (see below), be used to measure the boom angle. The inclinometer should be placed as far up the first insert as possible in order to more accurately account for boom deflection

NOTE: If a luffing jib is attached to a boom, then the Angle method should be used to calibrate the boom.

Boom angle indicator on the boom butt.



Low angle can be between $10^{\circ}/30^{\circ}$
High angle can be between $65^{\circ}/80^{\circ}$


5.4.3 CALIBRATE ANGLE screen

To calibrate boom and luffing jib angle sensors, follow these steps:

NOTE: A crane must be configured (page 11) before it is calibrated.

Step	Action	Display
1	When power is applied to the RCL/RCI, the Bootstrap screen appears for a few moments. <i>V1.03 is the bootstrap program version.</i>	LMI 4x40 Bootstrap V1.03 Date: 04/12/99
2	Then the following screen appears. Press CONFIRM to continue.	8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP Confirm LBS
3	After pressing CONFIRM, the Working screen appears.	8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP 61200 LBS
4	Press SCROLL until an asterisk (*) appears in front of CALIBRATE ANGLE.	CONFIGURE LMI *CALIBRATE ANGLE OPT DIAGNOSTIC SCREEN CALIBRATE SHEAVE MULTIPLE SHEAVES SCROLL or SELECT Item
5	Press SELECT.	>CODE # 0 SCROLL or CONFIRM CAL0
6	Press SCROLL until the CODE # is 128.	>CODE # 128 SCROLL or CONFIRM CAL0
7	Press CONFIRM.	Calibrate *LUFF JIB CAL3 Low Angle 0.0 DEGS RAD FT High Angle SCROLL or SELECT Item CONFIRM to Return
8	Press SELECT and a greater than symbol (>) will appear in front of LUFF JIB.	Calibrate >LUFF JIB CAL3 Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL to Change or CONFIRM Item

9	Press SCROLL until BOOM appears.	<pre> Calibrate >BOOM CAL2 Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL to Change or CONFIRM Item </pre>
10	Then press CONFIRM. NOTE: The boom should always be calibrated before the luffing jib.	<pre> Calibrate *BOOM CAL2 Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL or SELECT Item CONFIRM to Return </pre>
11	Press SCROLL to move the asterisk (*) in front of Low Angle.	<pre> Calibrate BOOM CAL2 *Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL or SELECT Item CONFIRM to Return </pre>
12	Then press SELECT.	<pre> Calibrate BOOM CAL2 >Low Angle 0.0 DEGS RAD FT High Angle 0.00 V Lower to MIN ANGLE. Enter ANGLE. Confirm </pre>
13	Lower the boom to the <i>minimum</i> angle specified for the current capacity chart. Press SCROLL to adjust the Low Angle degrees until the: <ul style="list-style-type: none"> • Displayed radius (RAD) matches the <i>measured radius</i> (page 16) or • Displayed Low Angle matches the crane's current <i>measured low angle</i> (page 16). NOTE: As SCROLL is used to change the displayed low angle, the displayed radius (RAD) value will also change.	<pre> Calibrate BOOM CAL2 >Low Angle +30.0 DEGS RAD 210 FT High Angle 4.38 V Lower to MIN ANGLE. Enter ANGLE. Confirm </pre>
14	Then press CONFIRM.	<pre> Calibrate BOOM CAL2 *Low Angle +30.0 DEGS RAD 210 FT High Angle 4.38 V SCROLL or SELECT Item CONFIRM to Return </pre>
15	Press SCROLL to move an asterisk (*) in front of High Angle.	<pre> Calibrate BOOM CAL2 Low Angle +30.0 DEGS RAD 210 FT *High Angle 4.38 V SCROLL or SELECT Item CONFIRM to Return </pre>
16	Then press SELECT.	<pre> Calibrate BOOM CAL2 Low Angle +30.0 DEGS RAD 210 FT >High Angle 4.38 V Raise to MAX ANGLE. Enter ANGLE. Confirm </pre>

<p>17</p>	<p>Raise the boom to the <i>maximum</i> angle specified for the current capacity chart.</p> <p>Press SCROLL to adjust the High Angle degrees until the:</p> <ul style="list-style-type: none"> • Displayed radius (RAD) matches the <i>measured radius</i> (page 16) or • Displayed High Angle matches the crane's current <i>measured high angle</i> (page 16). <p>As SCROLL is used to change the displayed high angle, the displayed radius (RAD) value will also change.</p>	<pre> Calibrate BOOM CAL2 Low Angle +80.4 DEGS RAD 50 FT >High Angle 8.54 V Raise to MAX ANGLE. Enter ANGLE. Confirm </pre>
<p>18</p>	<p>Then press CONFIRM.</p>	<pre> Calibrate BOOM CAL2 Low Angle +80.4 DEGS RAD 50 FT *High Angle 8.54 V SCROLL or SELECT Item CONFIRM to Return </pre>
<p>19</p>	<p>Press CONFIRM again to return to the Working screen.</p>	<pre> 8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP 61200 LBS </pre> 
<p>20</p>	<p>Repeat the above process if there is a luffing jib. Otherwise, this completes angle sensor calibration.</p>	

5.4.4 CALIBRATE SHEAVE screen

To calibrate load-sensing sheaves, follow these steps:


NOTE: A crane must be configured (page 11) before it is calibrated.

NOTE: Tare must be **off** during calibration so that the load includes weight of load lines, lifting slings, load block or weight ball, and lifted load.

Step	Action	Display
1	When power is applied to the RCL/RCI, the Bootstrap screen appears for a few moments. <i>V1.03 is the bootstrap program version.</i>	<pre>LMI 4x40 Bootstrap V1.03 Date: 04/12/99</pre>
2	Then the following screen appears. Press CONFIRM to continue.	<pre>8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP Confirm LBS</pre>
3	After pressing CONFIRM, the Working screen appears.	<pre>8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP 61200 LBS</pre>
4	Press SCROLL until an asterisk (*) appears in front of CALIBRATE SHEAVE.	<pre>CONFIGURE LMI CALIBRATE ANGLE OPT DIAGNOSTIC SCREEN *CALIBRATE SHEAVE MULTIPLE SHEAVES SCROLL or SELECT Item</pre>
5	Press SELECT.	<pre>>CODE # 0 SCROLL or CONFIRM CAL0</pre>
6	Press SCROLL until the CODE # is 128.	<pre>>CODE # 128 SCROLL or CONFIRM CAL0</pre>
7	Press CONFIRM.	<pre>Calibrate *Sheave 1 CAL1 LIGHT LOAD 0 LBS 0.00 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return</pre>

8	Press SELECT and a greater than symbol (>) will appear in front of Sheave.	<pre> Calibrate >Sheave 1 CAL1 LIGHT LOAD 0 LBS 0.00 V HEAVY LOAD SCROLL to Change or CONFIRM Item </pre>
9	Press SCROLL to change the sheave number.	<pre> Calibrate >Sheave 4 CAL1 LIGHT LOAD 2000 LBS 0.87 V HEAVY LOAD SCROLL to Change or CONFIRM Item </pre>
10	Press SELECT and an asterisk (*) will appear in front of Sheave.	<pre> Calibrate *Sheave 4 CAL1 LIGHT LOAD 2000 LBS 0.87 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
11	Press SCROLL to move the asterisk (*) in front of LIGHT LOAD.	<pre> Calibrate Sheave 4 CAL1 *LIGHT LOAD 2000 LBS 0.87 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
12	Press SELECT and a greater than symbol (>) will appear in front of LIGHT LOAD.	<pre> Calibrate Sheave 4 CAL1 >LIGHT LOAD 2000 LBS 0.87 V HEAVY LOAD Lift LIGHT LOAD. Enter LOAD. Confirm </pre>
13	<p>Lift a light load (a single line pull less than 3300 pounds or 1.5 metric tons).</p> <p>Then press SCROLL until the displayed LIGHT LOAD matches the <i>measured</i> light load weight.</p>	<pre> Calibrate Sheave 4 CAL1 >LIGHT LOAD 2200 LBS 0.92 V HEAVY LOAD LESS REQD Lift LIGHT LOAD. Enter LOAD. Confirm </pre> <p>MORE REQD (or LESS REQD) will appear if the crane needs to lift more (or less) weight. Until the weight is corrected, the load value can not be adjusted.</p>
14	Press CONFIRM.	<pre> Calibrate Sheave 4 CAL1 *LIGHT LOAD 2200 LBS 0.92 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
15	Press SCROLL until an asterisk (*) appears in front of HEAVY LOAD.	<pre> Calibrate Sheave 4 CAL1 LIGHT LOAD 2200 LBS 0.92 V *HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>



16	Press SELECT and a greater than symbol (>) appears in front of HEAVY LOAD.	<pre> Calibrate Sheave 4 CAL1 LIGHT LOAD 22000 LBS 0.92 V >HEAVY LOAD Lift HEAVY LOAD. Enter Load. Confirm </pre>
17	<p>Lift a heavy load (a load greater than 2/3 of the drum's rated single line pull).</p> <p>Then press SCROLL until the displayed HEAVY LOAD matches the <i>measured</i> heavy load weight.</p>	<pre> Calibrate Sheave 4 CAL1 LIGHT LOAD 26000 LBS 5.67 V >HEAVY LOAD MORE REQD Lift HEAVY LOAD. Enter Load. Confirm </pre> <p>MORE REQD (or LESS REQD) will appear if the crane needs to lift more (or less) weight. Until the weight is corrected, the load value can not be adjusted.</p>
18	Press CONFIRM.	<pre> Calibrate Sheave 4 CAL1 LIGHT LOAD 26000 LBS 5.67 V *HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
19	Press CONFIRM again.	<pre> 8013A 190 ___ 40 5 ___ 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 26000 LBS MAX CAP 61200 LBS </pre> 
20	Repeat the above process if there are other sheaves to calibrate. Otherwise, this completes sheave calibration.	

3,300 lbs or less for light load
 20,000 lbs or more for heavy load

5.5 MULTIPLE SHEAVES screen

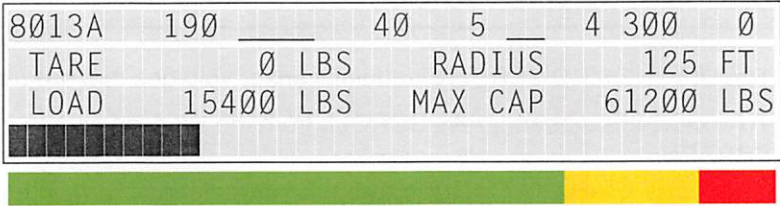
NOTE: If multiple lead sensing sheaves from one point are used, then both sheaves must be configured before being selected.

If boom point load sensing sheaves 1 and 2 or luffing point load sensing sheaves 3 and 4 are selected, rated line pull for each sheave is compared to maximum. The sum of both sheaves' load is calculated for total percent of chart capacity.

Line pull or chart capacity that is closest to 100 percent rated capacity is displayed in MAX CAP line on the Working screen. The MAX CAP line changes if another sheave load or total rated capacity is closest to maximum capacity.

The displayed LOAD corresponds with displayed MAX CAP. If the program is limited by maximum line pull, the LOAD and MAX CAP shows that line pull.

Step	Action	Display
1	When power is applied to the RCL/RCI, the Bootstrap screen appears for a few moments. <i>V1.03 is the bootstrap program version.</i>	<pre>LMI 4x40 Bootstrap V1.03 Date: 04/12/99</pre>
2	Then the following screen appears. Press CONFIRM to continue.	<pre>8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP Confirm LBS</pre> 
3	After pressing CONFIRM, the Working screen appears.	<pre>8013A 190 40 5 4 300 0 TARE 0 LBS RADIUS 125 FT LOAD 15400 LBS MAX CAP 61200 LBS</pre> 
4	Press SCROLL until an asterisk (*) appears in front of MULTIPLE SHEAVES.	<pre>CONFIGURE LMI CALIBRATE ANGLE OPT DIAGNOSTIC SCREEN CALIBRATE SHEAVE *MULTIPLE SHEAVES SCROLL or SELECT Item</pre>
5	Press SELECT.	<pre>SINGLE SHEAVE MLT SUM SHEAVES 1 AND 2 *SUM SHEAVES 3 AND 4 SCROLL to Change or CONFIRM Sheave</pre>
6	Press SCROLL to select the sheave configuration.	<pre>*SINGLE SHEAVE MLT SUM SHEAVES 1 AND 2 SUM SHEAVES 3 AND 4 SCROLL to Change or CONFIRM Sheave</pre>

<p>7</p>	<p>Then press CONFIRM. The Working screen will appear again.</p>	
<p>8</p>	<p>This completes multiple sheave configuration.</p>	

6.0 Configuration and Calibration (cranes *with* a Master Node)

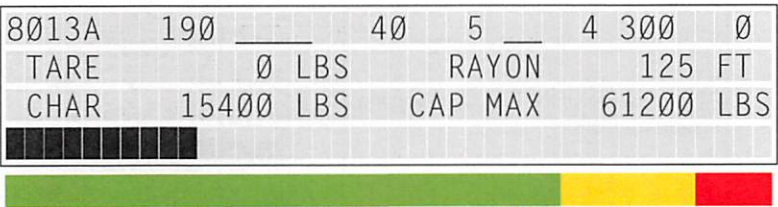
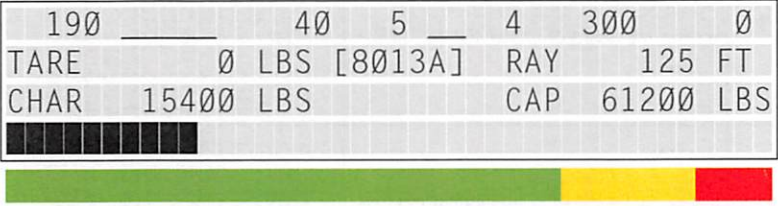
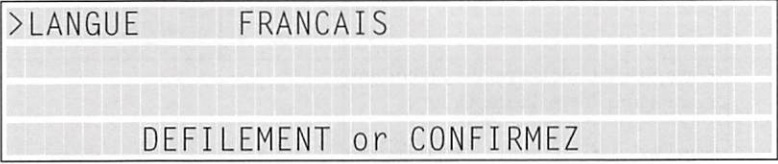
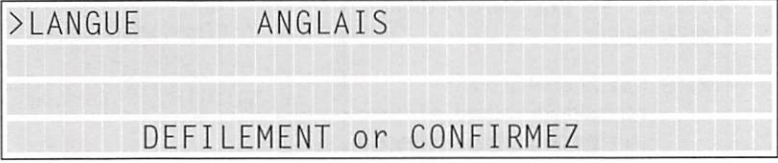
6.1 How to determine if a crane has a Master Node

The Working screen for a crane equipped with a Master Node is different from the Working screen that appears when a crane does *not* have a Master Node.

For an example of each Working screen, see “4.0 Working screen” on page 9.

6.2 How to change the language used in the displays

To change the language used in all of the displays, follow these steps:

<p>1</p>	<p>Display the Working screen.</p>	<p>Working screen (French) for cranes <i>without</i> a Master Node:</p>  <p>Working screen (French) for cranes <i>with</i> a Master Node:</p> 
<p>2</p>	<p>Press SELECT.</p>	
<p>3</p>	<p>Press SCROLL to change the screen language, in this case English.</p>	
<p>4</p>	<p>Press CONFIRM to return to the Working screen which will now have English text.</p>	

6.3 CONFIGURE LMI screen

The CONFIGURE LMI screen is used to set the basic crane configuration. The Configuration screen is used when a crane is first set up or when an attachment like a luffing jib is added or removed.

Before starting crane configuration, determine the drums that will be used. See "7.1 Crane configurations" on page 40.


The last programmed chart and crane configuration for each drum is retained in memory.

To configure a crane, follow these steps:

Step	Action	Display
1	Then the following screen appears. Press CONFIRM to continue.	<pre> 190 40 5 4 300 0 TARE 0 LBS [8013A] RAD 125 FT LOAD 15400 LBS Confirm CAP 61200 LBS </pre>
2	After pressing CONFIRM, the Working screen appears.	<pre> 190 40 5 4 300 0 TARE 0 LBS [8013A] RAD 125 FT LOAD 15400 LBS CAP 61200 LBS </pre>
3	Press SCROLL until an asterisk (*) appears in front of CONFIGURE LMI.	<pre> *CONFIGURE LMI CALIBRATE ANGLE DIAGNOSTIC SCREEN CALIBRATE LOAD SCROLL or SELECT Item </pre>
4	Press SELECT to select CONFIGURE LMI.	<pre> [>Drum 2 Configuration] SCROLL to CHANGE CONFIRM to Continue </pre>
5	Press SCROLL to select the first drum to configure, for instance, Drum 1. In the following screens, a 2250 crane will be configured for a boom with a fixed jib. In this example, only Drum 1 will be used. NOTE: No matter what crane configuration is used, <i>all drums</i> must be configured. Drums that are <i>not</i> used must have SENSOR set to NotUsed.	<pre> [Drum 1 Configuration] SCROLL to CHANGE CONFIRM to Continue </pre>
6	After the drum number has been set, press CONFIRM.	<pre> [Drum 1 Configuration] >SENSOR SHEAVE 1 SCROLL to CHANGE CONFIRM to Continue </pre>

<p>7</p>	<p>Press SCROLL to select the appropriate sensor:</p> <ul style="list-style-type: none"> • LINK — wireless load link. • SHEAVE — load-sensing sheave. • NotUsed. 	<pre>[Drum 1 Configuration] >SENSOR LINK SCROLL to CHANGE CONFIRM to Continue</pre>																								
<p>8</p>	<p>If LINK is selected and CONFIRM is pressed, a TxID number will appear.</p> <p>NOTE: A TxID number can be found on the label of a wireless load link.</p>	<pre>[Drum 1 Configuration] >TxID 0000 SCROLL to CHANGE CONFIRM to Continue</pre>																								
<p>9</p>	<p>Press SCROLL to change the digit that is currently blinking. A value from 0 - 9 and A - F can be entered.</p> <p>Press SELECT to move to the next digit. Then use SCROLL to change that digit.</p> <p>Repeat the process until all four digits match the wireless link code.</p>	<pre>[Drum 1 Configuration] >TxID A51F SCROLL to CHANGE CONFIRM to Continue</pre>																								
<p>10</p>	<p>Press CONFIRM.</p>	<pre>[Drum 1 Configuration] >POINT LOWER SCROLL to CHANGE CONFIRM to Continue</pre>																								
<p>11</p>	<p>Press SCROLL to set the point, in this case UPPER.</p>	<pre>[Drum 1 Configuration] >POINT UPPER SCROLL to CHANGE CONFIRM to Continue</pre>																								
<p>12</p>	<p>Then press CONFIRM.</p>	<pre>>8012A [Drum 1 Configuration] BOOM 170 BOOM ANG LIST JIB1 JIB1 ANG CRAWLER JIB2 JIB2 ANG CTWT</pre> <table border="1"> <tr> <td>8012A</td> <td>Current capacity chart number.</td> </tr> <tr> <td>BOOM</td> <td>Boom length.</td> </tr> <tr> <td>JIB1</td> <td>Luffing jib length.</td> </tr> <tr> <td>JIB2</td> <td>Fixed jib length.</td> </tr> <tr> <td>BOOM ANG</td> <td>Boom angle if using a luffing jib capacity chart.</td> </tr> <tr> <td>JIB1 ANG</td> <td>Boom-to-luffing jib angle if boom chart with luffing jib capacity chart.</td> </tr> <tr> <td>JIB2 ANG</td> <td>Fixed jib offset.</td> </tr> <tr> <td>LIST</td> <td>List angle if barge capacity chart is used.</td> </tr> <tr> <td>CRAWLER</td> <td>Crawler extended (OUT) or retracted (IN) on certain models only.</td> </tr> <tr> <td>RATING</td> <td>Truck crane rating over rear or 360° swing.</td> </tr> <tr> <td>STINGER</td> <td>MAX-ER trailer arm length.</td> </tr> <tr> <td>CTWT</td> <td>Total counterweight in pounds or kilograms (MAX-ER only).</td> </tr> </table>	8012A	Current capacity chart number.	BOOM	Boom length.	JIB1	Luffing jib length.	JIB2	Fixed jib length.	BOOM ANG	Boom angle if using a luffing jib capacity chart.	JIB1 ANG	Boom-to-luffing jib angle if boom chart with luffing jib capacity chart.	JIB2 ANG	Fixed jib offset.	LIST	List angle if barge capacity chart is used.	CRAWLER	Crawler extended (OUT) or retracted (IN) on certain models only.	RATING	Truck crane rating over rear or 360° swing.	STINGER	MAX-ER trailer arm length.	CTWT	Total counterweight in pounds or kilograms (MAX-ER only).
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<p>13</p>	<p>Press SCROLL until the appropriate values appear.</p> <p>In this case, the boom is 190 feet with a 40 foot fixed jib at a 5 degree offset angle.</p> <p>The RCL/RCI program will not allow any data to be changed if the corresponding load sensing sheave detects a line pull greater than 3300 pounds (1.5 metric tons).</p> <p>The capacity chart will change automatically. However, if selections are <i>not</i> confirmed, then all selections will be lost when the RCL/RCI is turned off. In this case, previously stored data will be used when the RCL/RCI is turned on again.</p>	<pre> >8Ø13A [Drum 1 Configuration] BOOM 19Ø BOOM ANG _ LIST _ JIB1 _ JIB1 ANG _ CRAWLER _ JIB2 4Ø JIB2 ANG 5 CTWT _ </pre>
<p>14</p>	<p>Then press CONFIRM.</p>	<pre> [Drum 1 Configuration] >PARTS 1 SCROLL to Change CONFIRM to Continue </pre>
<p>15</p>	<p>Press SCROLL to set the parts of line number.</p>	<pre> [Drum 1 Configuration] >PARTS 4 SCROLL to Change CONFIRM to Continue </pre>
<p>16</p>	<p>Then press CONFIRM.</p>	<pre> [Drum 1 Configuration] >LINEPULL 15ØØØ LBS SCROLL to Change CONFIRM to Continue </pre>
<p>17</p>	<p>Press SCROLL until the correct maximum line pull is set.</p> <p>To determine the <i>single line pull</i> for the drum in use, refer to the capacity chart and wire rope specifications for the boom or boom and jib in use.</p> <p><i>Single line pull</i> equals maximum load divided by parts of line.</p>	<pre> [Drum 1 Configuration] >LINEPULL 3ØØØØ LBS SCROLL to Change CONFIRM to Continue </pre>
<p>18</p>	<p>Then press CONFIRM.</p>	<pre> [Drum 1 Configuration] >DEDUCT Ø LBS Cap 12ØØØØ LBS SCROLL to Change CONFIRM to Continue </pre>
<p>19</p>	<p>Press SCROLL until the appropriate deduct value, if any, appears.</p> <p>As DEDUCT value is increased, the capacity value (Cap) is decreased by the same amount.</p>	<pre> [Drum 1 Configuration] >DEDUCT 15ØØ LBS Cap 1185ØØ LBS SCROLL to Change CONFIRM to Continue </pre>

20	Then press CONFIRM.	<pre> [Drum 1 Configuration] >TARE 0 LBS Load 15400 LBS SCROLL to Change CONFIRM to Continue </pre>
21	<p>For an unknown TARE value:</p> <ul style="list-style-type: none"> Lift all items that are to be tared out clear off the ground. Note the displayed Load. Press SCROLL until the TARE value equals the displayed load that was noted earlier. <p>To turn tare off:</p> <ul style="list-style-type: none"> Press SCROLL until TARE is 0. 	<pre> [Drum 1 Configuration] >TARE 500 LBS Load 15400 LBS SCROLL to Change CONFIRM to Continue </pre>
22	Then press CONFIRM.	<pre> [Drum 1 Configuration] >ALARM ON Load Limiter ON SCROLL to Change CONFIRM to Continue </pre>
23	<p>Press SCROLL to set the alarm and limiter:</p> <p>ALARM LIMITER</p> <p>OFF OFF — indicators <i>and</i> limiter off.</p> <p>ON OFF — just indicators on.</p> <p>ON ON — indicators <i>and</i> limiter on.</p> <p>Then press CONFIRM.</p>	<pre> [Drum 1 Configuration] >ALARM ON Load Limiter OFF SCROLL to Change CONFIRM to Continue </pre>
24	Press CONFIRM again. The Working screen will appear.	<pre> 190 40 5 4 300 0 TARE 0 LBS [8013A] RAD 125 FT LOAD 15400 LBS CAP 61200 LBS </pre> 
25	To configure the remaining drums, repeat the above process.	

6.4 Calibration screens

6.4.1 When should sensors be calibrated?

See "5.4.1 When should sensors be calibrated?" on page 16.

6.4.2 What is sensor calibration?

See "5.4.2 What is sensor calibration?" on page 16.

6.4.3 CALIBRATE ANGLE screen

NOTE: A crane must be configured (page 11) before it is calibrated.

To calibrate boom and luffing jib angle sensors, follow these steps:

Step	Action	Display
1	Then the following screen appears. Press CONFIRM to continue.	
2	After pressing CONFIRM, the Working screen appears.	
3	Press SCROLL until an asterisk (*) appears in front of CALIBRATE ANGLE.	
4	Press SELECT.	
5	Press SCROLL until the CODE # is 128.	
6	Press CONFIRM.	

7	Press SELECT and a greater than symbol (>) will appear in front of LUFF JIB.	<pre> Calibrate >LUFF JIB Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL to Change or CONFIRM Item </pre>
8	Press SCROLL until BOOM appears.	<pre> Calibrate >BOOM Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL to Change or CONFIRM Item </pre>
9	Then press CONFIRM. NOTE: The boom should always be calibrated before the luffing jib.	<pre> Calibrate *BOOM Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL or SELECT Item CONFIRM to Return </pre>
10	Press SCROLL to move the asterisk (*) in front of Low Angle.	<pre> Calibrate BOOM *Low Angle 0.0 DEGS RAD FT High Angle 0.00 V SCROLL or SELECT Item CONFIRM to Return </pre>
11	Then press SELECT.	<pre> Calibrate BOOM >Low Angle 0.0 DEGS RAD FT High Angle 0.00 V Lower to MIN ANGLE. Enter ANGLE. Confirm </pre>
12	<p>Lower the boom to the <i>minimum</i> angle specified for the current capacity chart.</p> <p>Press SCROLL to adjust the Low Angle degrees until the:</p> <ul style="list-style-type: none"> • Displayed radius (RAD) matches the <i>measured radius</i> (page 16) or • Displayed Low Angle matches the crane's current <i>measured low angle</i> (page 16). <p>NOTE: As SCROLL is used to change the displayed low angle, the displayed radius (RAD) value will also change.</p>	<pre> Calibrate BOOM >Low Angle +30.0 DEGS RAD 210 FT High Angle 4.38 V Lower to MIN ANGLE. Enter ANGLE. Confirm </pre>
13	Then press CONFIRM.	<pre> Calibrate BOOM *Low Angle +30.0 DEGS RAD 210 FT High Angle 4.38 V SCROLL or SELECT Item CONFIRM to Return </pre>
14	Press SCROLL to move an asterisk (*) in front of High Angle.	<pre> Calibrate BOOM Low Angle +30.0 DEGS RAD 210 FT *High Angle 4.38 V SCROLL or SELECT Item CONFIRM to Return </pre>

6.4.4 CALIBRATE LOAD screen

NOTE: A crane must be configured (page 11) before it is calibrated.

To calibrate load-sensing sheaves, follow these steps:

NOTE: Tare must be **off** during calibration so that the load includes weight of load lines, lifting slings, load block or weight ball, and lifted load.

Step	Action	Display
1	Then the following screen appears. Press CONFIRM to continue.	<pre> 190 _____ 40 5 _ 4 300 0 TARE 0 LBS [8013A] RAD 125 FT LOAD 15400 LBS Confirm CAP 61200 LBS </pre>
2	After pressing CONFIRM, the Working screen appears.	<pre> 190 _____ 40 5 _ 4 300 0 TARE 0 LBS [8013A] RAD 125 FT LOAD 15400 LBS CAP 61200 LBS </pre> 
3	Press SCROLL until an asterisk (*) appears in front of CALIBRATE LOAD.	<pre> CONFIGURE LMI CALIBRATE ANGLE DIAGNOSTIC SCREEN *CALIBRATE LOAD </pre> <p>SCROLL or SELECT Item</p>
4	Press SELECT.	<pre> >CODE # 0 </pre> <p>SCROLL or CONFIRM</p>
5	Press SCROLL until the CODE # is 128.	<pre> >CODE # 128 </pre> <p>SCROLL or CONFIRM</p>
6	Press CONFIRM.	<pre> Calibrate *Drum 1 SHEAVE 3 LIGHT LOAD 0 LBS 0.00 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
7	Press SELECT and a greater than symbol (>) will appear in front of Drum.	<pre> Calibrate >Drum 1 SHEAVE 3 LIGHT LOAD 0 LBS 0.00 V HEAVY LOAD SCROLL to Change or CONFIRM Item </pre>

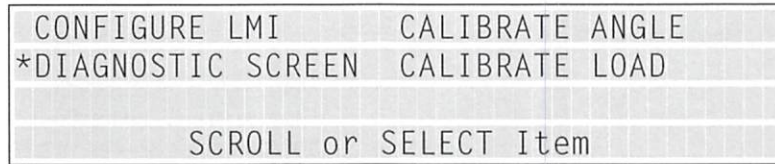
<p>8</p>	<p>Press SCROLL to change the Drum number.</p>	<pre> Calibrate >Drum 2 SHEAVE 2 LIGHT LOAD 0 LBS 0.00 V HEAVY LOAD SCROLL to Change or CONFIRM Item </pre>
<p>9</p>	<p>Press SELECT and an asterisk (*) will appear in front of Drum.</p>	<pre> Calibrate *Drum 2 SHEAVE 2 LIGHT LOAD 0 LBS 0.00 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
<p>10</p>	<p>Press SCROLL to move the asterisk (*) in front of LIGHT LOAD.</p>	<pre> Calibrate Drum 2 SHEAVE 2 *LIGHT LOAD 0 LBS 0.00 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
<p>11</p>	<p>Press SELECT and a greater than symbol (>) will appear in front of LIGHT LOAD.</p>	<pre> Calibrate Drum 2 SHEAVE 2 >LIGHT LOAD 40000 LBS 9.98 V HEAVY LOAD LESS REQD Enter load and Confirm </pre>
<p>12</p>	<p>Lift a light load (a single line pull less than 3300 pounds or 1.5 metric tons). Then press SCROLL until the displayed LIGHT LOAD matches the <i>measured</i> light load weight.</p>	<pre> Calibrate Drum 2 SHEAVE 2 >LIGHT LOAD 2200 LBS 0.92 V HEAVY LOAD LESS REQD Enter load and Confirm </pre> <p style="text-align: right;">MORE REQD (or LESS REQD) will appear if the crane needs to lift more (or less) weight. Until the weight is corrected, the load value can not be adjusted.</p>
<p>13</p>	<p>Press CONFIRM.</p>	<pre> Calibrate Drum 2 SHEAVE 2 *LIGHT LOAD 2200 LBS 0.92 V HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
<p>14</p>	<p>Press SCROLL until an asterisk (*) appears in front of HEAVY LOAD.</p>	<pre> Calibrate Drum 2 SHEAVE 2 LIGHT LOAD 2200 LBS 0.92 V *HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return </pre>
<p>15</p>	<p>Press SELECT and a greater than symbol (>) appears in front of HEAVY LOAD.</p>	<pre> Calibrate Drum 2 SHEAVE 2 LIGHT LOAD 2200 LBS 0.92 V >HEAVY LOAD Lift HEAVY LOAD. Enter Load. Confirm </pre>

<p>16</p>	<p>Lift a heavy load (a load greater than 2/3 of the drum's rated single line pull). Then press SCROLL until the displayed HEAVY LOAD matches the <i>measured</i> heavy load weight.</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Calibrate Drum 2 SHEAVE 2 LIGHT LOAD 26000 LBS 5.67 V >HEAVY LOAD MORE REQD Lift HEAVY LOAD. Enter Load. Confirm</p> </div> <p style="text-align: center; margin-top: 10px;">MORE REQD (or LESS REQD) will appear if the crane needs to lift more (or less) weight. Until the weight is corrected, the load value can not be adjusted.</p>
<p>17</p>	<p>Press CONFIRM.</p>	<div style="border: 1px solid black; padding: 5px;"> <p>Calibrate Drum 2 SHEAVE 2 LIGHT LOAD 26000 LBS 5.67 V *HEAVY LOAD SCROLL or SELECT Item CONFIRM to Return</p> </div>
<p>18</p>	<p>Press CONFIRM again.</p>	<div style="border: 1px solid black; padding: 5px;"> <p>190 40 5 4 300 0 TARE 0 LBS [8013A] RAD 125 FT LOAD 15400 LBS CAP 61200 LBS</p> <div style="background-color: black; width: 100px; height: 15px; margin-top: 5px;"></div> <div style="background-color: green; width: 70%; height: 15px; margin-top: 5px;"></div> <div style="background-color: yellow; width: 15%; height: 15px; margin-top: 5px;"></div> <div style="background-color: red; width: 15%; height: 15px; margin-top: 5px;"></div> </div>
<p>19</p>	<p>Repeat the above process if there are other drums to calibrate. Otherwise, this completes load calibration.</p>	

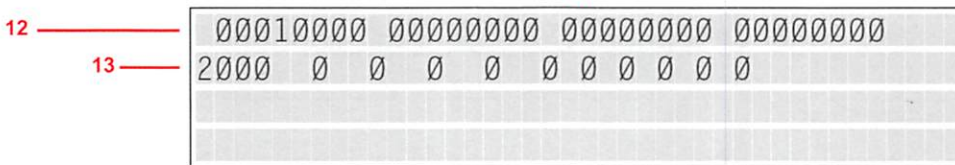
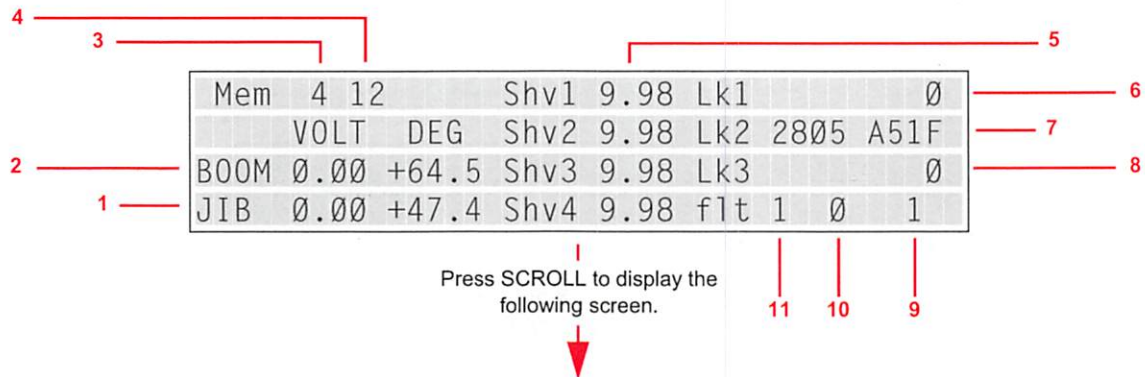
6.5 DIAGNOSTIC SCREEN

The DIAGNOSTIC SCREEN contains sensor voltages that are useful in crane troubleshooting.

To access this screen, press SCROLL from the Working screen until an asterisk (*) appears before DIAGNOSTIC SCREEN:



Then press SELECT to display a screen similar to the following:



Press SCROLL to display the *previous* screen.
or
Press CONFIRM to return to the Working screen.

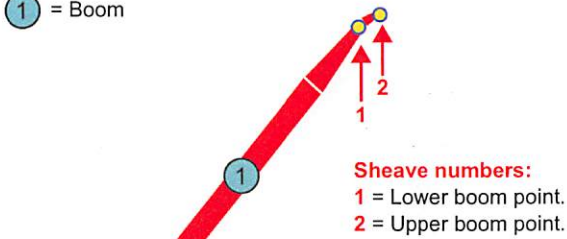
Item	Name	Description																							
1	Luffing jib values	Luffing jib angle and angle sensor voltage. See "Angle sensors" on page 16.																							
2	Boom values	Boom angle and angle sensor voltage. See "Angle sensors" on page 16.																							
3	Memory errors	Flash memory status — shows one or a combination of the following diagnostic numbers. For example, a value of 12 = 8 + 4 which means <i>Calibration data is not confirmed</i> and <i>Configuration data is not confirmed</i> : <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th>Number</th> <th>Meaning</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>Normal status.</td> <td>—</td> </tr> <tr> <td>1</td> <td>Chart data flash memory error.</td> <td>Capacity charts may need to be reloaded or the master node may be defective. Contact Crane Care (page 5).</td> </tr> <tr> <td>2</td> <td>Capacity data flash memory error.</td> <td>Capacity charts may need to be reloaded or the master node may be defective. Contact Crane Care (page 5).</td> </tr> <tr> <td>4</td> <td>Configuration data is not confirmed.</td> <td>Configure the crane (page 11). If this error appears again, contact Crane Care (page 5).</td> </tr> <tr> <td>8</td> <td>Calibration data is not confirmed.</td> <td>Calibrate the crane (page 16). If this error appears again, contact Crane Care (page 5).</td> </tr> <tr> <td>16</td> <td>Configuration data being written to flash memory.</td> <td rowspan="2">These are status messages, not errors.</td> </tr> <tr> <td>32</td> <td>Calibration data being written to flash memory.</td> </tr> </tbody> </table>	Number	Meaning	Action	0	Normal status.	—	1	Chart data flash memory error.	Capacity charts may need to be reloaded or the master node may be defective. Contact Crane Care (page 5).	2	Capacity data flash memory error.	Capacity charts may need to be reloaded or the master node may be defective. Contact Crane Care (page 5).	4	Configuration data is not confirmed.	Configure the crane (page 11). If this error appears again, contact Crane Care (page 5).	8	Calibration data is not confirmed.	Calibrate the crane (page 16). If this error appears again, contact Crane Care (page 5).	16	Configuration data being written to flash memory.	These are status messages, not errors.	32	Calibration data being written to flash memory.
Number	Meaning	Action																							
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16	Configuration data being written to flash memory.	These are status messages, not errors.																							
32	Calibration data being written to flash memory.																								

4	RCL/RCI version	Software version of the RCL/RCI program (12 in this case).
5	Sheave voltages	See "Load sheave voltages" on page 41.
6	Load link 1	For each load link, a counts value followed by a 4-digit TxID number. NOTE: The above values will only appear if wireless load links are used <i>and</i> a CANbus boom node is used.
7	Load link 2	
8	Load link 3	
9	RCI state	The following faults can be summed. For example, a value of 22 (= 2 + 4 + 16) would mean that these faults have occurred: Luffing jib state high + boom state high + multi load fault. 1 = RCI state is in overload. 2 = Luffing jib state high. 4 = Boom state high. 8 = Sensor fault. 16 = Multi load fault. 64 = Luffing jib state low 128 = Boom state low.
10	Sensor fault	The following faults can be summed just like the above RCI states: 1 = 1st load drum sensor is out of range. 2 = 2nd load drum sensor is out of range. 4 = 3rd load drum sensor is out of range. 8 = 4th load drum sensor is out of range. 64 = Boom angle sensor out of range. 128 = Jib angle sensor out of range.
11	Communication fault	The following faults can be summed just like the above RCI states: 1 = No fresh data received from crane. 2 = Corrupted data received. 4 = Communication is in download state — a data download cable is connected.
12	CON numbers	Configuration numbers used for crane options.
13	CraneSTAR information	<p>This CraneSTAR data will only appear if CraneSTAR is activated:</p> <p style="text-align: center;"> 2000 0 0 0 0 0 0 0 0 0 0 0 </p> <p style="text-align: center;"> A B C D E F G H I J K </p> <p>A — GPS year. B — GPS month. C — GPS day. D — GPS hour. E — GPS minute. F — GPS second. G — Not applicable.</p> <p>H — Satellite status: 1 = at least 1 satellite is in view. 0 = Satellite FAILURE because (1) satellite antenna is missing or (2) no satellites are in view.</p> <p>I — GPS status: 1 = GPS fix is valid. 0 = GPS FAILURE because (1) not enough satellites are in view, (2) GPS information has become outdated, or (3) GPS antenna is missing.</p> <p>J — GSM (cellular) status: 1 = GSM communication established. 0 = GSM FAILURE because (1) GSM antenna is missing or (2) no GSM connection has been established.</p> <p>K — CAN status: 1 = CraneSTAR TCU is communicating with the crane controller via CANbus. This should happen 1 minute after Ignition On. 0 = No CANbus communication. If this happens, all the other status values will indicate failure.</p>

7.0 Appendix

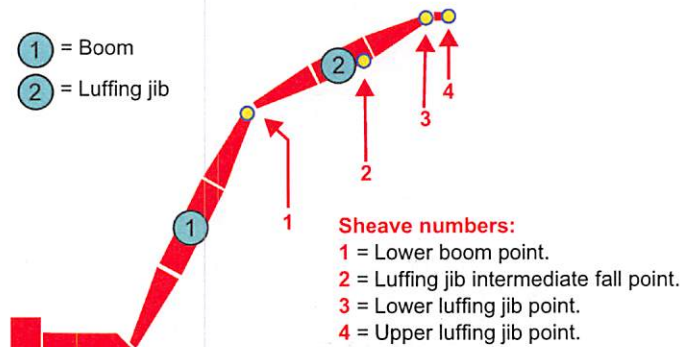
7.1 Crane configurations

① = Boom



Boom with upper point

① = Boom
 ② = Luffing jib



Boom with luffing jib

① = Boom

③ = Fixed jib

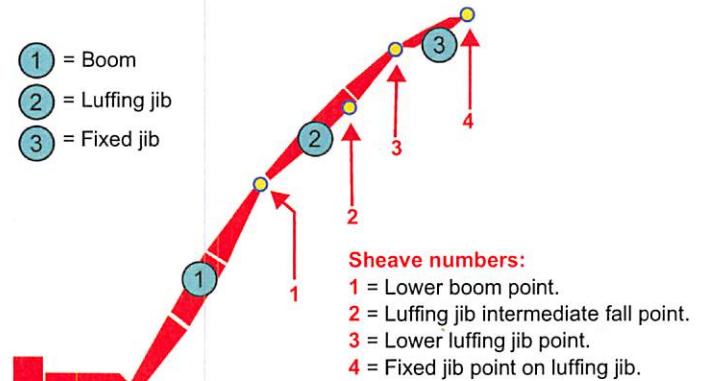


Boom with fixed jib

Sheave numbers:

- 1 = Lower boom point.
- 3 = Fixed jib point (111, 222, 222 wagon, 777, 777T, 888, and 999).
- 4 = Fixed jib point (M250 and 2250).

① = Boom
 ② = Luffing jib
 ③ = Fixed jib



Boom with luffing jib with fixed jib

7.2 Load sheave and angle sensor voltages

This values below are uncalibrated so the values are estimates.

7.2.1 Load sheave voltages

Crane models 111, 222, and 222 wagon ¹		
Pounds ²	Metric Tons	Voltage
0	0	0.50
10,000	4.5	2.25
16,000	7.2	3.30
20,000	9.0	4.00
24,000	10.8	4.70

Crane models 777, 777T, M250, and 2250		
Pounds ²	Metric Tons	Voltage
0	0	0.80
15,000	6.8	3.63
21,000	9.5	4.77
24,000	10.9	5.33
30,000	13.6	6.46

Crane models 888 and 999		
Pounds ²	Metric Tons	Voltage
0	0	0.50
10,000	4.5	2.25
16,000	7.2	2.95
20,000	9.0	3.30
24,000	10.8	4.00

¹ Model 222HD with 1 1/4-inch (3.18 cm) rope use 777 columns.

² Single part line pull at any sheave (1, 2, 3, or 4).

7.2.2 Angle sensor voltages

Crane models 111, 222, 222 wagon, 888, and 999			
Boom angle 222 #260 boom with luffing jib, 888, 999		Boom angle 111 boom 222, 222 wagon without luffing jib Luffing jib angle 222 #222 luffing jib	
Degrees	Voltage	Degrees	Voltage
0	0.93	-60	0.74
30	2.19	-45	1.16
45	2.80	0	2.40
60	3.43	45	3.66
80	4.27	60	4.08
		70	4.36
		80	4.67

Crane models 777, 777T, M250, and 2250			
Boom angle		Luffing jib angle	
Degrees	Voltage	Degrees	Voltage
0	1.86	-60	1.48
30	4.38	-45	2.31
45	5.60	0	4.80
60	6.86	45	7.32
80	8.54	70	8.72

7.3 2010 CE requirements

7.3.1 Only applies to model 999 and 2250 cranes equipped with Master Nodes

In this document, the following features apply only to a 999 or 2250 crane equipped with a Master Node and configured to be used in a country requiring the CE standard.

7.3.2 Reduced speed for 100-110% rated capacity loads

When operating between 100% and 110% rated capacity, the speed of the crane functions is limited to 15% of their maximum speed for load increasing actions (raising loads and lowering boom) and for swing and travel in both directions.



DANGER

**Improper use of RCI/RCL external override switch could result in:
DEATH OR SERIOUS INJURY**

This switch bypasses the limiter (shutdown) function of the RCI/RCL.

- The switch may only be used by authorized personnel during emergency operation as indicated below.
 - Operate in safe direction only: raise boom or lower load to prevent tipping or structural damage.
-

7.3.3 RCI/RCL external override switch

An RCL/RCI override switch is provided outside the cab in a lockable box (see Table 1 on page 43).

The override switch allows emergency operation of the crane functions in case of RCL/RCI component failures: boom angle sensor, luffing jib angle sensor, and load sensing sheaves (load pins).

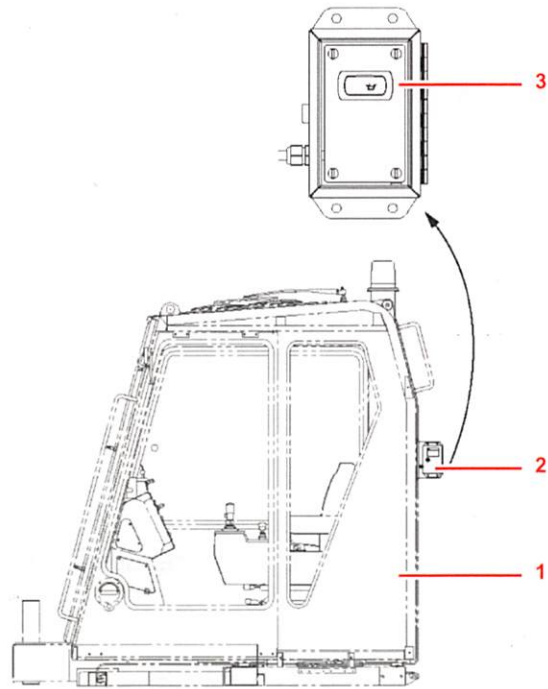
- When the external override is on, the speed of the crane functions is limited to 15% of their maximum speed for load increasing actions.
- Actuation of the external override and all relevant data is recorded in a data recorder.

Press the right end of the rocker to TURN ON the external override. The external override is automatically turned off after 30 minutes of continued operation, engine shutdown, and/or crane shutdown.

Press the right end of the rocker again to manually TURN OFF the external override.

When the external override is turned on, the operating limit fault will come on and RCL OVERRIDE will appear on the system fault screen in the cab.

Table 1: RCL/RCI override switch



Item	Description
1	Operator cab.
2	Lockable box.
3	RCL/RCI override switch.

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CRANE SOFTWARE INSTALLATION

All Models (Software rev00c or rev00f or newer)

TABLE OF CONTENTS

General	1
Personnel.....	1
Software Installation Requirements	1
Installing Program on Laptop	1
Installing Software and Charts On Laptop	3
Downloading Software and Charts To Crane PC.....	4
Non-CAN bus Software	4
Installing Software Program rev00c.....	4
Installing Software Program rev00f or Newer ...	5
CAN Bus Software	6
Installing Software Program rev00c.....	6
Installing Software Program rev00f or Newer ...	7
Rules-Discarding Files.....	8
Documentation.....	8
Form 00SVFM045	at end of this Publication

GENERAL

This publication provides qualified service technicians with instructions for installing crane software and capacity chart files on Manitowoc cranes equipped with an EPIC control system — either non-CAN bus or CAN bus.

Crane software terms:

- MCC Controls Application — Personal computer application used to download crane software and capacity chart information.
- Crane Software — EPIC controller program designated by the **.HEX** suffix in 4X40 programs and the **.H86** suffix in CAN-bus programs.
- Chart Software — Crane capacity chart information designated by the **.IHX** suffix.

NOTE: Chart software is serial number specific and should not be used on any other crane.

PERSONNEL

Crane software and capacity chart files must be installed only by a qualified, trained technician as instructed in this document.

To become qualified to install software, the technician must be trained by a qualified instructor. Properly completed Software Installation Training Form OOSVFM044 (at end of this document) must be submitted to Manitowoc Crane Care Customer Service verifying technician training.

SOFTWARE INSTALLATION REQUIREMENTS

To successfully install crane software and capacity chart files, the following items are required:

- A laptop PC with a user friendly operating system. The laptop must have a RS 232 serial port.
- Data downloading cable — Manitowoc # A06301-0.
- Current version of crane software installed on laptop PC.

INSTALLING PROGRAM ON LAPTOP

The MCC Controls Application is updated when necessary. You should verify your program version with Manitowoc Crane Care Customer Service before installing software or capacity charts.

The MCC Controls Application can be ordered on compact disc (CD) from Manitowoc Crane Care Customer Service at the time you order crane software and chart software for a particular crane.

Before the crane software program can be installed, a folder must be created on the laptop's hard drive (C drive), as follows:

1. Click on **My Computer** Icon.
2. Click on **C** drive icon.
3. Click on **File** menu.
4. Click on **New**.
5. Select **Folder**.
6. A folder is created in **C** drive called **New Folder**.
7. Click on **New Folder** icon to rename folder.
8. Enter new name **MCC Controls**, for example.

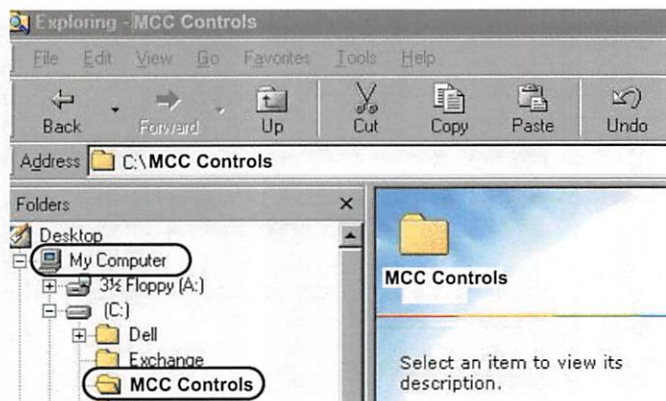


FIGURE 1

To install crane software and capacity chart files from CD:

1. Insert CD disc into laptop's CD drive.
2. Click on **My Computer** Icon (see Figure 1).
3. Click on CD disc drive icon to reveal folder similar to **rev00c** or **rev00f** or **newer** (see Figure 2).



FIGURE 2

4. Click on folder icon to install loading program.
5. Click on **package** folder icon (see Figure 3).



FIGURE 3

6. Click on **setup.exe** icon (see Figure 4).

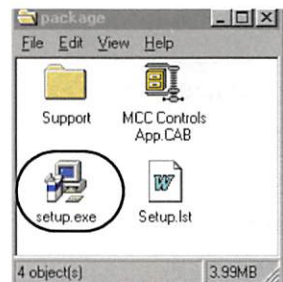


FIGURE 4

7. The program will begin to copy some files and proceed to the setup screen.
8. When the **MCC Controls Setup** program screen is displayed, click **OK** (see Figure 5).

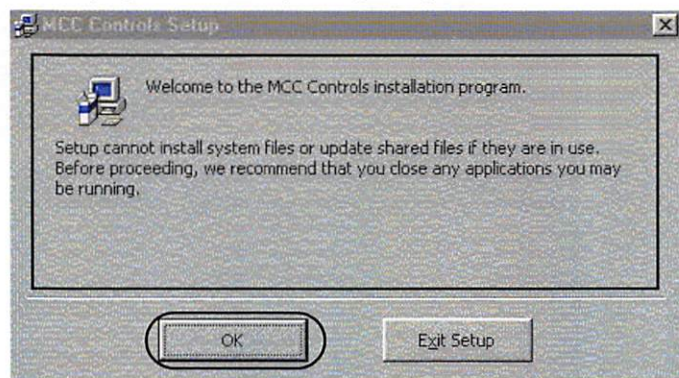


FIGURE 5

9. On the **MCC Controls Setup** screen (see Figure 6), click **Change Directory** to set location to the pre-created **MCC Controls** folder.

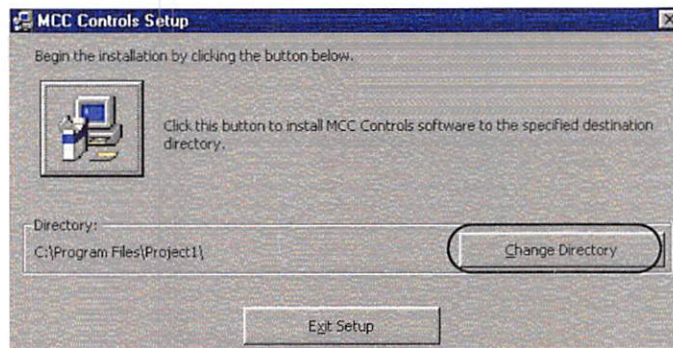


FIGURE 6

10. Locate the **MCC Controls** folder on the **C** drive and click **OK** (see Figure 7).

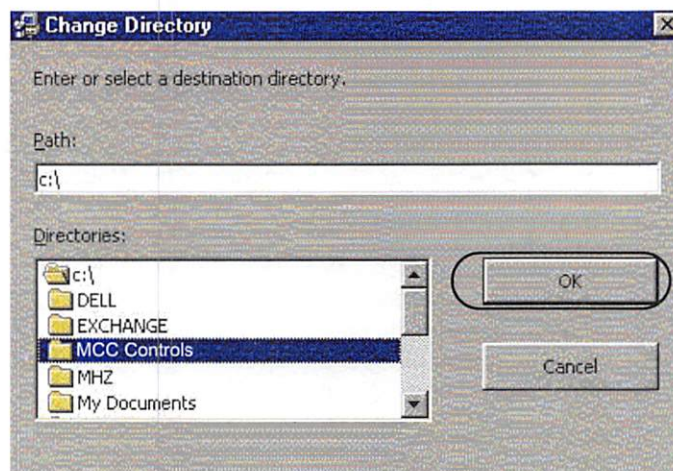


FIGURE 7

11. Click on the **Computer** icon to proceed with the installation of the download program into the **MCC Controls** folder (see Figure 8).

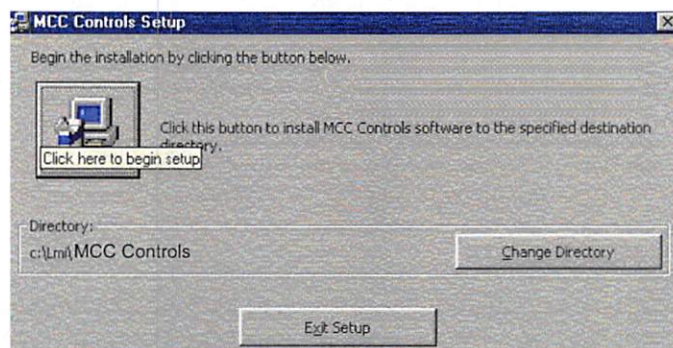


FIGURE 8

12. When asked to verify **Program group**, click **Continue**.
13. While in setup, a pop up screen may be displayed indicating a newer file exists on your laptop. Click **Yes** to keep your newer existing file.
14. The screen will indicate when setup is complete. Click on **OK**.
15. A desktop shortcut to the download program may be desired. To create a shortcut:

- a. Select **My Computer** icon on the desktop screen and click.
 - b. Select **C** drive and click.
 - c. Select **MCC Controls** folder and **Left** click.
 - d. In the folder **Right** click on **MCC Control App.exe** and select **Create Shortcut** and click. A shortcut icon will then be displayed.
 - e. Move shortcut icon to desktop or other desired area.
16. When a new MCC Controls Application version becomes available, the older version must first be removed from the laptop before the new program can be loaded. To remove an old program:
- a. Click on **Start** for menu column in bottom left corner of screen.
 - b. Click on **Settings**.
 - c. Click on **Control Panel**.
 - d. Click on **Add/Remove Programs** icon.
 - e. Select **MCC Controls App.exe** from menu (see Figure 9).



FIGURE 9

17. Click **Add/Remove** button and existing program will be removed from **C** drive of the laptop.

INSTALLING SOFTWARE AND CHARTS ON LAPTOP

The software provided will be for a specific crane unless advised differently.

1. Before installing new crane software, a folder must be created on laptop's desktop, as follows:
 - a. **Right** click on desktop (main screen) for menu bar and select **New**. A secondary menu screen is displayed.
 - b. Click on **Folder** on secondary menu. A folder called **New Folder** becomes visible on desktop screen.
 - c. Rename folder. For example, you could use the crane serial number (2251025).
2. Open crane software files. **Right** click **MEC2.HEX** (non-CAN bus) or **Master.H86** (CAN bus) file icon.
3. When menu bar becomes visible, click **Save As...**
4. When **Save Attachment** screen appears, select desktop location to locate renamed folder created in step 1c.
5. When **Save Attachment** screen for intended folder becomes visible, click on **Save** button.
MEC2.HEX or **Master.H86** file is now saved to selected folder. Do not change names of files.
6. Return to crane software files and **right** click on **Imidata.ihx** (non-CAN bus) or **candata.ihx** (CAN bus) file icon.
7. When menu bar becomes visible, click **Save As...**
8. **Save Attachment** screen for intended folder should become visible, (if not, select from desktop location).
9. Click on **Save** button. **Imidata.ihx** or **candata.ihx** file is now saved to selected folder.

DOWNLOADING SOFTWARE AND CHARTS TO CRANE PC

The procedure for downloading non-CAN bus crane software is different from the procedure for downloading CAN bus crane software. *Refer to proper procedure.*

Non-CAN bus Software

Before installing non-CAN bus software and capacity charts, perform following steps:

- PARK all crane functions.
- STOP engine. It must be off for entire procedure.
- TURN ON cab power.
- RECORD current configuration settings (handle, chart numbers, etc.) before downloading new software. When download is complete, use this information to confirm crane is configured as it was before download.

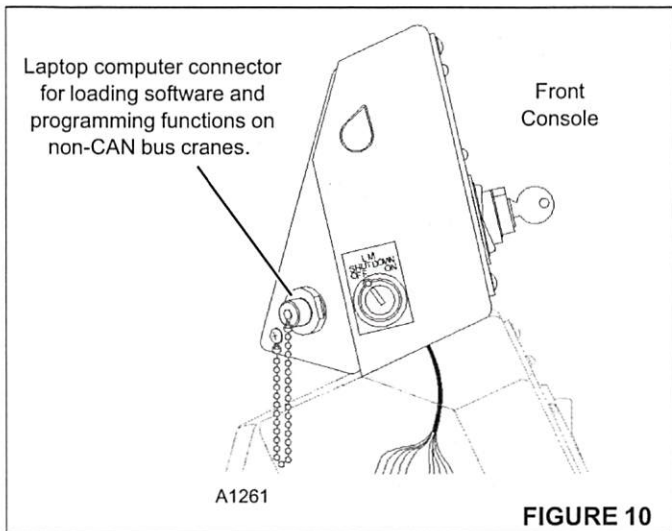


FIGURE 10

Installing Software Program rev00c

1. Click on shortcut icon **MCC Controls App**. The selected folder appears (see Figure 11).
2. Click on **MCC Controls App.exe** icon to launch program (see Figure 11).



FIGURE 11

3. **Manitowoc Controls Interface - rev00c** screen is displayed (see Figure 12).
4. Select desired laptop serial port to be used as well as "LMI" (see Figure 12).
5. Turn on cab power. **Do not start engine.**

6. Wait until program switches from Bootstrap screen to working screen.
7. Connect download harness to install port and to RS 232 serial port on laptop (see Figure 10).
8. Press **Reset and Load Hex** button in lower center (see Figure 12). A screen will drop down called **Open**.
9. Locate and open crane **MCC Controls** folder (example: 2251123 folder).
10. Locate and click on **Mec2.hex** icon to select file and then click on **Open** button (see Figure 12). The hex file will now download the program. A screen displays bootstrap information during download process and controls application shows data address.

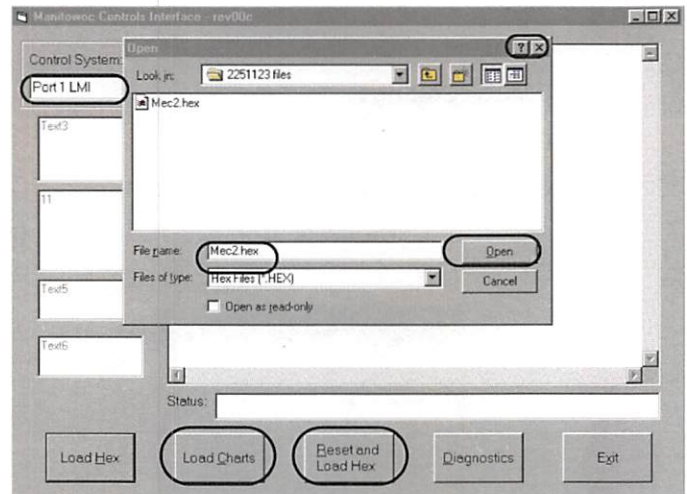


FIGURE 12

11. When laptop interface screen displays **Process Complete/Timed Out** the screen closes automatically.
12. Select and press **Load Charts** button at bottom of screen. A screen will drop down called **Open**.
13. To reduce chart loading time, scroll up or down one screen from display working screen to menu screen. Locate on **Open** screen and click on **Imidata.ihx** icon to select file (see Figure 13).

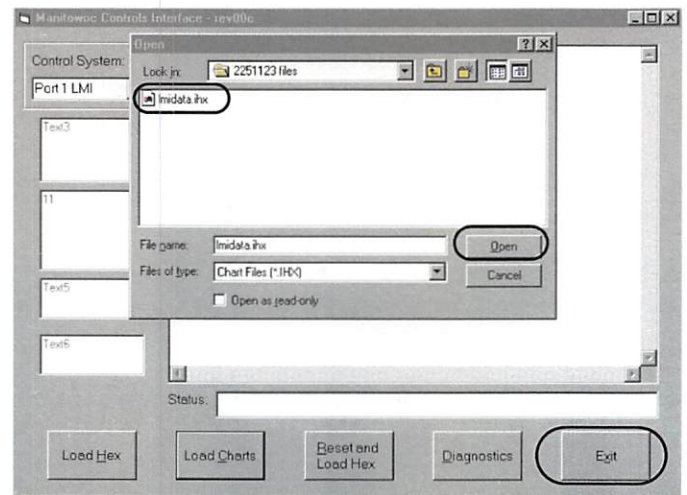


FIGURE 13

14. Click on **Open** button to open file. Capacity charts will now begin to load. While charts are loading the screen

will display status (**Erasing page** or **Load data good**) in the lower left corner of display menu screen.

15. When screen changes to indicate in **Status** bar that programming is finished (example: Load Data in Address 49480 Close File), the capacity charts are fully loaded into crane's rated capacity indicator/limiter (load moment indicator) system. Click **Exit** button on control interface screen (see Figure 13) and disconnect cable. Scroll up or down on display and working screen will return.
16. Check configuration screen to ensure the system is configured as it was before chart loading. Lift a few different loads to determine if system is weighing loads correctly.
17. **Right** click on serial number folder (example: 2251123). Select delete on bar and click to remove folder from laptop.
18. Fill in Field Software Installation form **OOSVFM045** and return form to Manitowoc Crane Care Customer Service as instructed on form.

Installing Software Program rev00f or Newer

1. Click on shortcut icon **MCC Controls App**. The selected folder appears (see Figure 14).
2. Open folder and click on **MCC Controls App.exe** icon to start program installation (see Figure 14).



FIGURE 14

3. **Manitowoc Controls Interface - rev00f or newer** screen is displayed (see Figure 15).

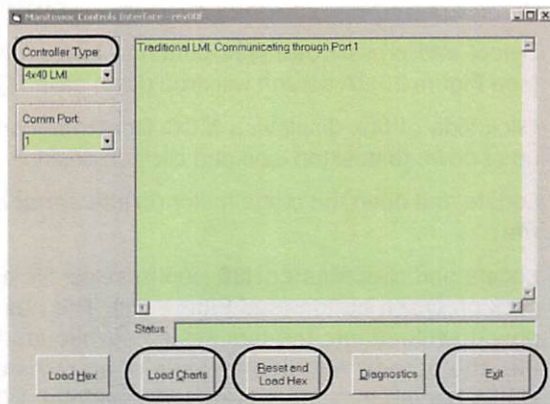


FIGURE 15

4. The 4 X 40 program is for all Non CAN-Bus Systems.
5. **TURN ON** cab power (RUN) position. **Do not start engine.**

6. Wait until program switches from Bootstrap screen to working screen.
7. Connect download harness to install port and to RS 232 serial port on laptop (see Figure 10).
8. Select and press **Reset and Load Hex** button in lower center (see Figure 15).
9. A screen will drop down called **Open** as shown in Figure 16.
10. Locate and open crane **MCC Controls** folder (example: 2251123 folder).

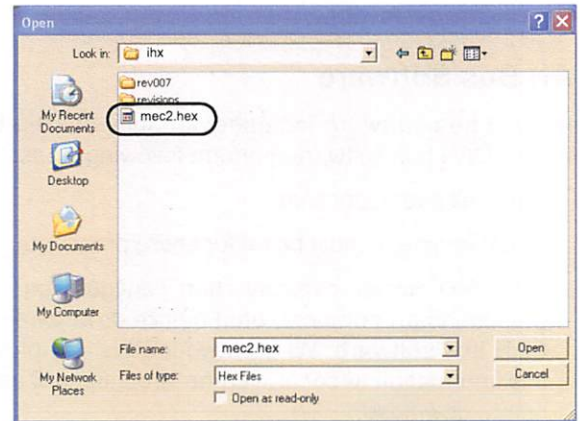


FIGURE 16

11. Locate and click **mcc2.HEX** icon to select file (see Figure 16). The hex file will now download the program. The screen will display **Process Complete/Timed Out** when files are fully loaded and file closes automatically.
12. Go back to the **Manitowoc Controls Interface - rev00f or newer** screen (see Figure 15).
13. Select and press **Load Charts** button at bottom of screen.
14. A screen will drop down called **Open** (see Figure 17).

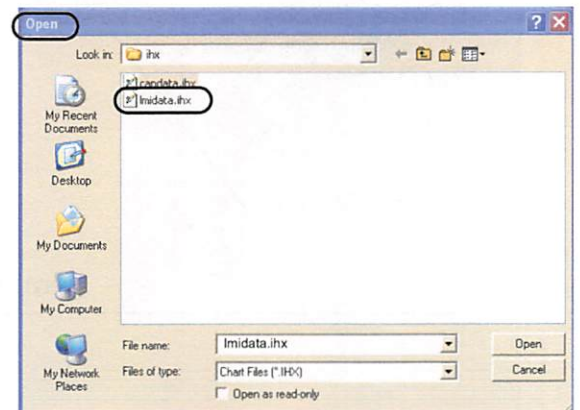


FIGURE 17

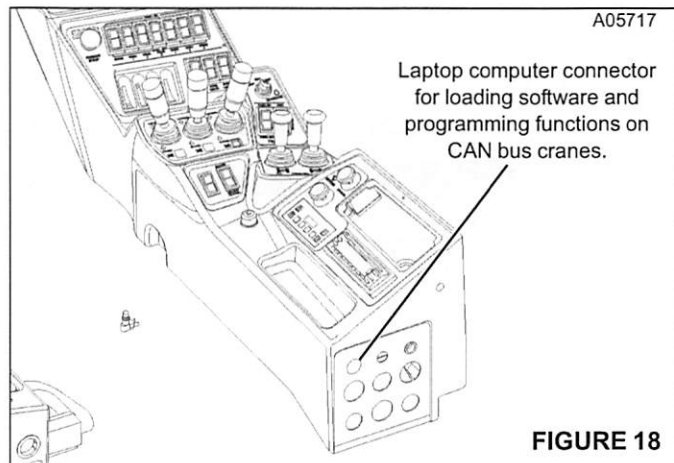
15. Locate and click **Imidata.ihx** icon to select file (see Figure 17). The hex file will now download the capacity charts. The screen will display **Process Complete/Timed Out** when files are fully loaded and file closes automatically.

16. Click **Exit** button on control interface screen (see Figure 15) and disconnect cable. Scroll up or down on display and working screen will return.
17. Check configuration screen to ensure system is configured as it was before chart loading. Lift a few different loads to determine if system is weighing loads correctly.
18. **Right** click on serial number folder. Select delete on bar and click to remove folder from laptop.
19. Fill in Field Software Installation form **OOSVFM045** and return form to Manitowoc Crane Care Customer Service as instructed on form.

CAN Bus Software

The CAN bus software includes capacity charts. Before installing CAN bus software, perform following steps:

1. PARK all crane functions.
2. STOP engine. It must be off for entire procedure.
3. RECORD current capacity chart configuration settings (handle, chart numbers, etc.) before downloading new CAN bus software. When download is complete, use this information to confirm crane is configured as it was before download.
4. Cab power must be OFF to start download.
5. Connect download harness to console CAN bus install port and to RS 232 serial port on laptop (see Figure 18).
6. Determine if you have software program **rev00c** (go to installing rev00c topic) or **rev00f or newer** (go to installing rev00f or newer topic).



Installing Software Program rev00c

1. Click on shortcut icon **MCC Controls App**. The selected folder appears (see Figure 14).



FIGURE 19

2. Click on **MCC Controls App.exe** icon to launch program (see Figure 19).
3. Manitowoc Controls Interface screen is displayed (see Figure 20). Press button under **Control System**, located in upper left corner of screen.
4. Select desired laptop serial port to be used as well as CAN shown in Figure 20.
5. TURN ON cab power (RUN) position. **Do not start engine.**

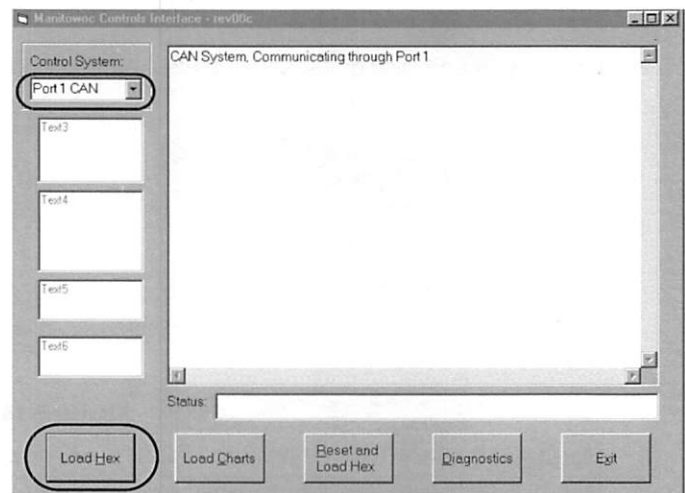


FIGURE 20

6. Select and press **Load Hex** button in lower left corner (see Figure 20). A screen will drop down called **Open**.
7. Click side of box displaying **MCC Controls** icon. Scroll up or down to desktop icon and click on desktop icon.
8. Locate and open the crane folder (**crane serial number file**).
9. Locate and click **Master.H86** icon to select file and then click on **Open** button (see Figure 21). The hex file will now download into the bus system. While loading the file, the screen will display rows of squares and the status bar will indicate address of download. When the controls interface **MCC Controls App.** displays **Process Complete/Timed Out** the files are fully loaded and the screen closes automatically.

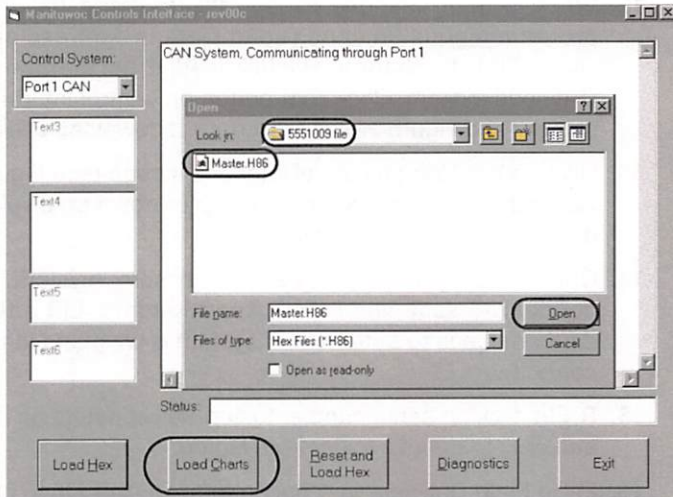


FIGURE 21

10. Select and press **Load Charts** button in lower left part of screen. A screen will drop down called **Open**.
11. Locate and open the *crane model* folder.
12. Select and click on **candata.ihx** icon to select file (see Figure 22). Click on **Open** button to open file. Rated capacity charts will now begin to load.

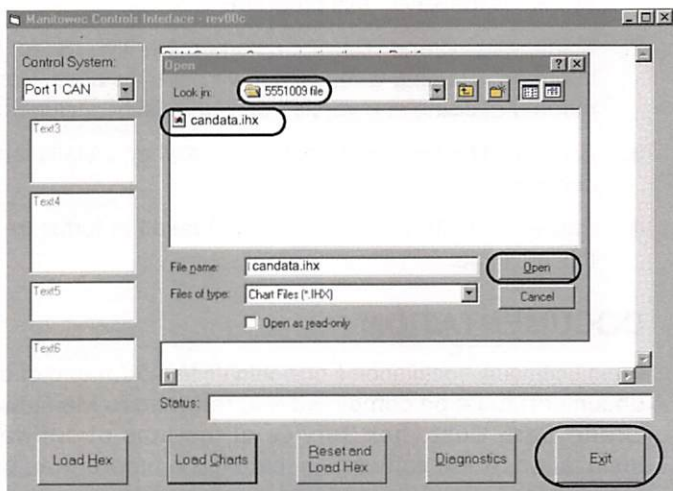


FIGURE 22

13. When screen changes to indicate a **Status** bar that programming is finished (Load Data in Address and Close File), the charts will be fully loaded into the crane's CAN bus system. Click **Exit** button on control interface screen (see Figure 22) and disconnect download cable.
14. Scroll up or down on rated capacity screen and working screen will return.
15. Check configuration screen to ensure system is configured as it was before chart loading. Lift a few different loads to determine if system is weighing load correctly.
16. Right click on serial number folder, select delete on bar, and click to remove folder from laptop.
17. Fill in Field Software Installation form **OOSVFM045** and return form to Manitowoc Crane Care Customer Service as instructed on form.

Installing Software Program rev00f or Newer

1. Click on shortcut icon **MCC Controls App**. The selected folder appears (see Figure 23).



FIGURE 23

2. Open folder and click on **MCC Controls App.exe** icon to start program installation.
3. Manitowoc Controls Interface screen is displayed — **Manitowoc Controls Interface - rev00f or newer** (see Figure 24).

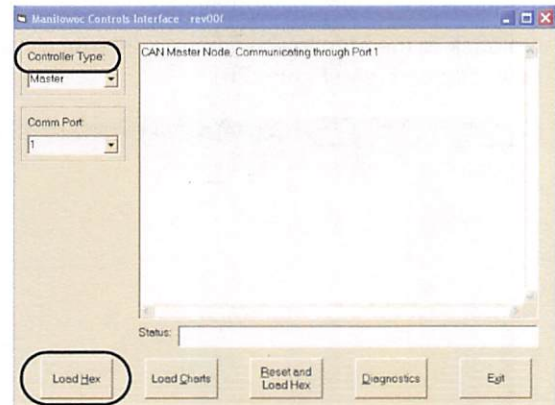


FIGURE 24

4. Press button under **Control Type**, in upper left corner of screen to select controller type to be loaded. The controller options are:
 - a. Master: Master Node
 - b. Bin: Bin Node
 - c. Boom: Boom or Jib Node
 - d. Display: Graphic Interface
 - e. Remote: Remote Controller
 - f. Universal: Universal Node (2 through 9)
 - g. Engine: Engine Node
 - h. 4 X 40: Non CAN-Bus System
5. Select the communication port (**Port 1 or 2**) that your computer is connected to.
6. TURN ON cab power (RUN) position. **Do not start engine.**
7. Select and press **Load Hex** button in lower left corner (see Figure 24). A screen will drop down called **Open** as shown in Figure 25.

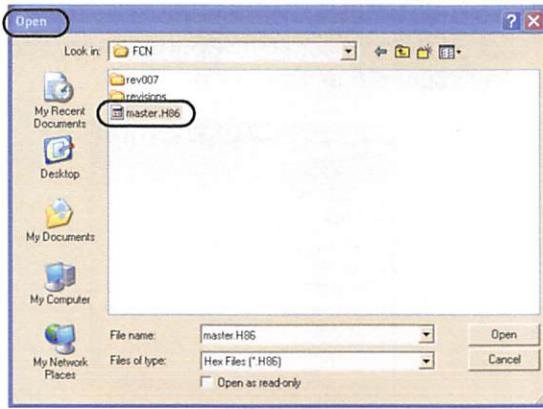


FIGURE 25

8. Locate and click **Master.H86** icon to select file (see Figure 25). The hex file will now download the selected controller. The controls interface main screen will display **Process Complete/ Timed Out** when files are fully loaded and file closes automatically.
9. Go back to the Manitowoc Controls Interface - rev00f or newer screen (see Figure 26).

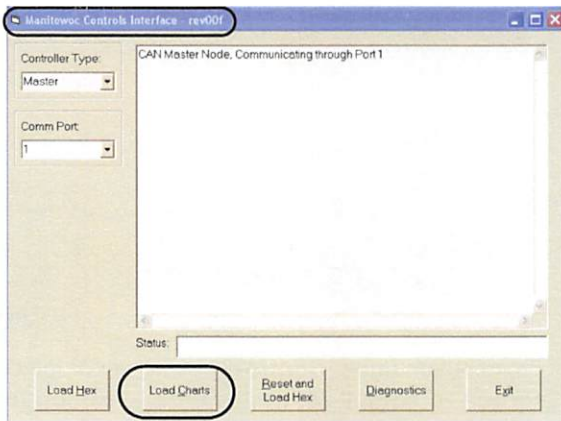


FIGURE 26

10. Select and press **Load Charts** button in lower left. A screen will drop down called **Open**.
11. Locate on **Open** screen and click on **candata.ihx** icon to select file (see Figure 27). Click on **Open** button to open file. Rated capacity charts will now begin to load.

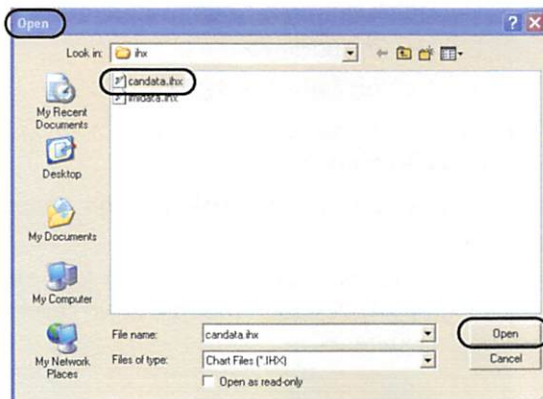


FIGURE 27

12. When screen changes to indicate a **Status** bar that programming is finished (Load Data in Address and Close File), the charts will be fully loaded into the crane's CAN bus system. Click **Exit** button on control interface screen (see Figure 22) and disconnect download cable.
13. Click **Exit** button on control interface screen (see Figure 22) and disconnect cable. Scroll up or down on display and working screen will return.
14. Check configuration screen to ensure system is configured as it was before chart loading. Lift a few different loads to determine if system is weighing loads correctly.
15. **Right** click on serial number folder. Select delete on bar and click to remove folder from laptop.
16. Fill in Field Software Installation form **OOSVFM045** and return form to Manitowoc Crane Care Customer Service as instructed on form.

RULES-DISCARDING FILES

1. Only install files to crane systems that you are instructed to or that are agreed upon. Authorization by Manitowoc Crane Care Customer Service to download a particular system is the key to this program.
2. Manitowoc Crane Care Customer Service is to be informed in writing when files have been installed. Serial number of crane and version of files must be included.
3. Files must be deleted from the laptop when installation is completed.
4. Failing to abide by these rules will result in forfeiture of this privilege.

DOCUMENTATION

Field Software Installation Form **00SVFM045** (at end of this document) must be completed and returned to Manitowoc Crane Care Customer Service at the time of software installation. If the software is installed on more than one crane, a form must be completed for each crane.



FIELD SOFTWARE INSTALLATION

Date _____

Dealer _____

Branch _____

Model Crane _____

Serial Number _____

Software Version _____

Reason for installation:

Software Installed by:

Name _____

Telephone # _____

E-mail address _____

Upon installation of new software, please return completed form to
Crane Care Customer Service at Manitowoc:

Email: latticeteam@manitowoc.com

Fax: 920-683-6278



SOFTWARE INSTALLATION TRAINING

Date _____

Dealer _____

Branch _____

Model Crane _____

Serial Number _____

Software Version _____

Trainees

1. Name _____

Telephone # _____

E-mail address if you wish to receive updates _____

2. Name _____

Telephone # _____

E-mail address if you wish to receive updates _____

3. Name _____

Telephone # _____

E-mail address if you wish to receive updates _____

Instructed by:

 **WARNING**

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

 **CALIFORNIA
PROPOSITION 65 WARNING**

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

 **WARNING**

The battery posts, terminals, and related accessories contains chemical lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Wash hands after handling.

 **CALIFORNIA
PROPOSITION 65 WARNING**

Battery posts, terminals, and related accessories contain chemical lead and lead compounds, chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Wash hands after handling.

Crane Care regional contact centers

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800 8288 278 (China)

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