Crane safety instrumentation

Calibration Instructions

i4000 Multi-Purpose Indicator /Range Limiting Device for telescopic cranes, hoist rope load sensing

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The purpose of this manual is to provide the calibration technician with the procedures essential for the promotion of proper machine operation for its intended purpose. The importance of proper usage cannot be overstressed.
The calibration technician should have read, and be familiar with, the instruction manual supplied with the system.
All information in this manual should be read and understood before any attempt is made to calibrate the machine.

Since the manufacturer has no direct control over machine application and operation, conformance with good safety practice in this area is the responsibility of the user and his operating personnel.

All procedures herein are based on the use of the system under proper operating conditions, with no deviations from the original design. Alteration and/or modification of the equipment are strictly forbidden without written approval from RaycoWylie Systems.

The i4000 RaycoWylie Systems Multi-Purpose Indicator (MPI) is to be regarded only as an aid to the operator. When the parameters are set correctly, the indicator will warn the crane operator of an approaching overload condition that could cause damage to equipment, property, and/or injury to the operator or site workers in the vicinity of the crane and its load. Prior to the calibration being completed the system will not provide correct warnings and it is essential that other means are used to establish safe use of the machine.

This system must never be used, under any circumstances, as a substitute for the good judgment of a crane operator when carrying out approved crane-operating procedures. Responsibility for the safe operation of the crane lies with the crane operator. The indicator equipment will not necessarily prevent crane damage due to overloading and related causes if not set properly.

Before operating a crane equipped with a RaycoWylie system MPI, the operator must carefully read the information in the i4000 Instruction manual and the crane manufacturer operator's manual. He must also be aware of all the federal, state and local safety standard and regulations applicable to his job. Correct functioning of the system depends upon routine daily inspection.

Any suspected faults or apparent damage should be immediately reported to the responsible authority before using the crane.

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1 INTRODUCTION

This manual contains calibration information for the i4000 system. When performing calibration of the i4000 system, always observe the safety rules and regulations applicable in the country of operation to reduce the risk of personal injury or damage to the equipment. Each safety instruction throughout this manual must be taken into consideration when using the i4000 system. The information contained in this manual will enable qualified personnel to properly operate and efficiently perform calibration.

1.1 Personnel qualification and scope of this manual

Installation of the i4000 system shall be performed by a qualified technician. Furthermore, calibration of the i4000 system **must be** performed by a **RaycoWylie** trained technician. The **RaycoWylie** technician will perform a complete and structured verification of the whole system before beginning the system's calibration.

Failure to calibrate the system properly can result in overloading of the crane risking machine breakage or tipping that could result in serious injury or death. Always refer to a **RaycoWylie** trained technician to calibrate your system.

1.2 Using this manual

This manual must be used in conjunction with the Instruction Manual, refer to the instruction manual for description of the system operation, especially the section "Description of operation keys".

All numbers shown on sample screens are examples only and must be substituted with real information from the machine.

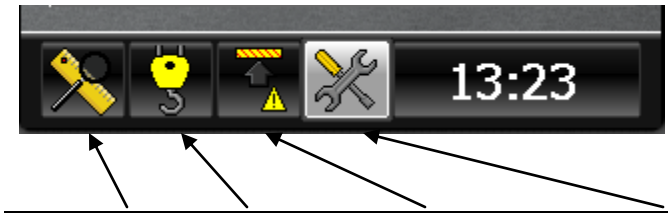
Description of operational keys:

	UP Key. Press to move up the screen when in a menu or to increase the value of a highlighted number.
	DOWN Key. Press to move down the screen when in a menu or to decrease the value of a highlighted number.
	Left Key. Press this key to scroll left through the tabs of the main menu or, in Edit mode, to return to the previous digit of a configurable value
	Right Key. Press this key to scroll right through the tabs of the main menu or, in Edit mode, to move to the previous digit of a configurable value
	CONFIRM Key. Press to enter a selection when in a menu or to accept a changed value. Note that most changed values must also be saved to permanently store them.
	ESCAPE Key. Press to exit a menu or to escape an option without saving.

2 CONFIGURATION

To ensure a successful, first calibration follow each calibration step in sequence, do not miss out any steps unless they are marked as optional.
Many calibration screens show reminder notes or hints on the bottom line, remember to read these for guidance.

The normal mode of operation of the i4000sytem is organized into four separate screens. We call it “Tabs”. Use the left or right arrow keys to navigate in these tabs.



INDICATOR TAB	LOAD TAB	RANGE LIMITING TAB	TOOLS TAB

2.1 Step #1: Accessing the calibration menu

1- Select the tool tab  using the left or right keys
2- Scroll to highlight “Calibration Mode” using **“⇧”** or **“⇩”**.
3- Press **“✓”** to enter this menu.
4- The system will request a 5 digit password. The first digit will be highlighted, use **“⇧”** or **“⇩”** to select the first digit and press **“✓”** to confirm and move on to the second digit. Repeat this for all 5 digits, after confirming the 5th digit the system will enter the calibration menu provided the password is correct. If the password is not correct the system will return to the normal working screen.
5- If a mistake is made while entering the password, press **“⇦”** to return to the previous digit.

Provided password is used the calibration menu will remain accessible until the system is powered off. The password will be required every time the menu is selected after a power on.
Your password number is: **98765**

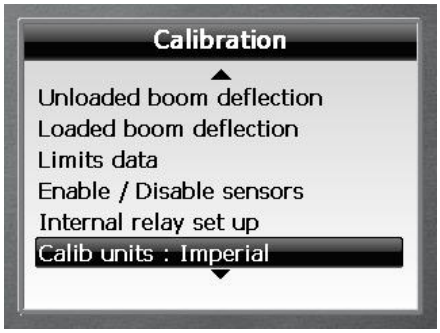
2.2 Step #2: "Enable/Disable sensor" Setting

Note: these settings reflect the configuration of your system and will generally be made during factory testing prior to delivery and should not need changing.

1- In the calibration menu, scroll up or down to the menu "Enable/Disable sensor".
2- Press **"✓"** to enter this menu.
3- Scroll to select the sensor option to edit.
4- Press **"✓"** to highlight the value to edit. Scroll up or down to change to value then Press **"✓"** to confirm.
5- Any change made is permanently registered after confirmation.
6- Press **Escape key** at any time to exit the menu when done.

All remaining items in the list are optional and set to OFF if not used.
Refer to the wiring diagram supplied with your system to determine which sensor should be enabled, this will be indicated by a table or a notation adjacent to each component.

2.3 Step #3: "Calibration units" setting



1- In the calibration menu, scroll up or down to the item "Calib units:".
2- Press **"✓"** to toggle between metric and imperial.

imperial: use x1000lbs and feet.
metric: use metric tons and metres (1 metric ton = 1000 kg).

2.4 Step #4: "Load data" Entry

Note: these settings reflect the configuration of your system when a load sensor is fitted and will generally be made during factory testing prior to delivery and should not need changing.

Some or all of this information may be pre-loaded prior to delivery but all entries should be verified and edited as required before proceeding. Length units in use will be feet or meters depending on the setting made for 'calib units' in step #3. Please advise Rayco Wylie of any changes required in this section.

1- In the calibration menu, scroll down to the item "Load data:".
2- Press **"✓"** to enter this menu.
3- Scroll to select the item to edit from the list below.
4- Press **"✓"** to highlight the value to edit. Scroll up or down to change the value then Press **"✓"** to confirm.
5- Any change made is permanently registered after confirmation.
6- Press **Escape Key** at any time to exit the menu when done.

- **Rope Limit Main:** This is the maximum tension that the cable is rated for per fall or part of line (rope SWL) for the main rope.
- **Rope Limit Aux :** This is the maximum tension that the cable is rated for per fall or part of line (rope SWL) for the auxiliary rope.
- **Max parts of line:** This is the maximum number of parts of line that can be rigged on the crane and applies to all hoists.
- **Load Approach (%):** Is the %SWL approach limit. If the %SWL is greater than this value, an intermittent audible alarm will be activated and the yellow display LED will blink. The external yellow lamp output will be ON.
  Note: %SWL = (Load / Capacity) x 100.
- **Overload (%):** Is the %SWL motion cut limit. If the %SWL is greater than this value, a continuous audible alarm will be activated and the red display LED will be ON. The external red lamp and audible alarm output will be ON. The motion cut output will be in the stop condition (cut active).
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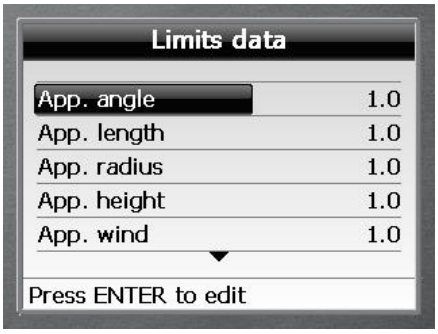
2.5 Step #5: "Limits data" Entry

This menu contains the approach warning gaps for all the limits that can be set by the operator in normal mode.

After selecting “limits setting” from the main calibration menu the screen will show:



Set the approach gap for each limit in turn, angle approach gaps are in degrees, length, radius and height gaps are set using the calibration units.

1- In the calibration menu, scroll down to the item "Limits data:".
2- Press **“✓”** to enter this menu.
3- Scroll to select the item to edit from the list below.
4- Press **“✓”** to highlight the value to edit. Scroll up or down to change the value then Press **“✓”** to confirm.
5- Any change made is permanently registered after confirmation.
6- Press **Escape Key** at any time to exit the menu when done.

- **App Angle:** This variable represents an approach warning gap before to reach the angle limit set by the operator in the normal mode. If the angle goes over this approach gap an intermittent audible alarm will be activated and the yellow display LED will blink.
- **App Length:** This variable represents an approach warning gap before to reach the boom length limit set by the operator in the normal mode. If the boom length goes over this approach gap an intermittent audible alarm will be activated and the yellow display LED will blink.
- **App radius:** This variable represents an approach warning gap before to reach the radius limit set by the operator in the normal mode. If the radius goes over this approach gap an intermittent audible alarm will be activated and the yellow display LED will blink.
- **App Height:** This variable represents an approach warning gap before to reach the height limit set by the operator in the normal mode. If the height of the boom tip goes over this approach gap an intermittent audible alarm will be activated and the yellow display LED will blink.
- **App Wind (If Wind Speed Sensor Fitted):** This variable represents an approach warning gap before to reach the wind speed limit set by the operator in the normal

mode. If the wind speed goes over this approach gap an intermittent audible alarm will be activated and the yellow display LED will blink.

- **App Rotation(if Rotation sensor fitted) :** This variable represents an approach warning gap before to reach the slew limit set by the operator in the normal mode. If the slew goes over this approach gap an intermittent audible alarm will be activated and the yellow display LED will blink.
- **Time of return**: This is the time that you have to return into safe condition before the motion cut output will be activated, when you reach a limit.

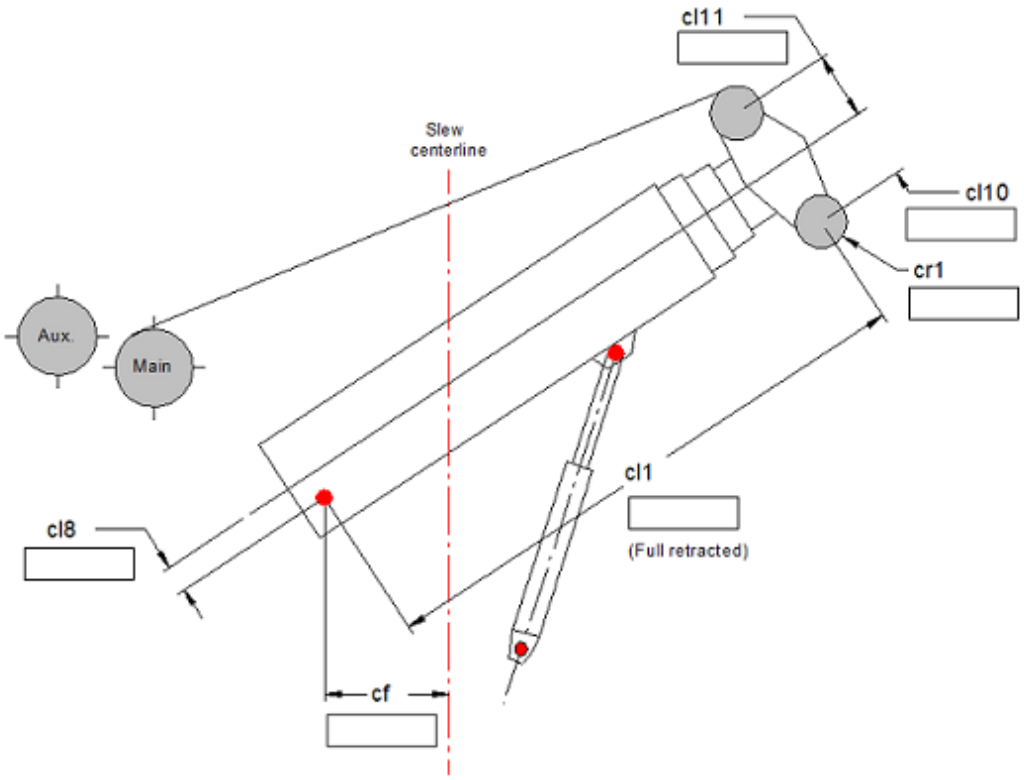
2.6 Step #6: "Dimensions" Data entry

This menu contains crane dimensions that are necessary for the calculation of the load radius and height of the boom tip.
Some or all of this information may be pre-loaded prior to delivery but all dimensions should be verified and edited as required before proceeding. Units in use will be feet or meters depending on the setting made for 'calib units' in step #3. To enter a negative value press on **"+/-"** to toggle between positive and negative value.

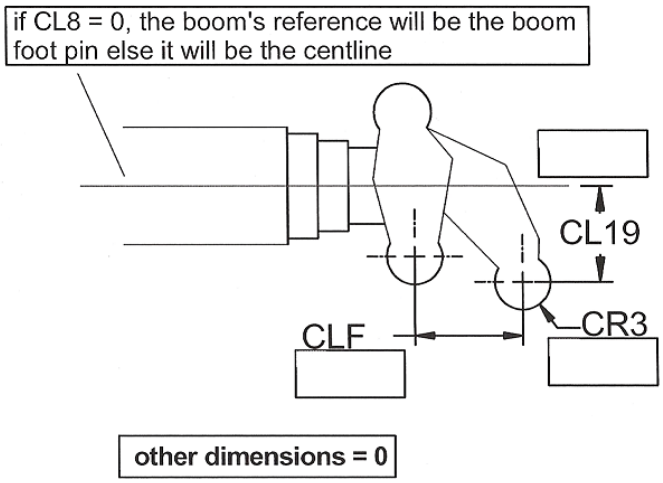
- **CL1 (full retract):** length of the main boom when fully retracted.
- **CL2 (Ext + Man)):** length of the boom with all sections fully extended including any manual or power pinned extension if fitted.
- **CL2MR (Ext + Man):** length of the boom fully extended but with any manual or power pinned extension retracted. Note: For full power booms without a manual section **CL2** and **CL2MR** are the same value.
- **CL8 (p2cb)** – vertical distance between the boom foot pin and the boom centerline with the boom horizontal. Instead of using the boom centerline as a reference, It is common to use the boom foot pin, in this case CL8 = 0 but ensure that CL10 and CL11 use the same reference.
- **CL10 -** vertical distance between the lower boom tip sheave pin (hook suspension sheave) and the boom centerline (or boom foot pin, see CL8) with the boom horizontal.
- **CL11 -** vertical distance between the upper boom tip sheave pin and the boom centerline (or boom foot pin, see CL8) with the boom horizontal.
- **CR1 (Sheave Rad.) -** lower boom tip sheave pitch radius (hook suspension sheave).
- **CF (slew offset)** – horizontal distance between the boom foot pin and the centerline of rotation of the machine. If the boom foot pin is behind the centerline of rotation then the distance is negative, otherwise it is positive.
- **CH1 (height offset)** – vertical distance between the boom foot pin and the ground.
- **Nb Jib** – Number of jib available to calibrate, if this value is greater than 0, we will have to enter dimension shown in "Fly jib geometry" for each jib.

Main boom geometry:

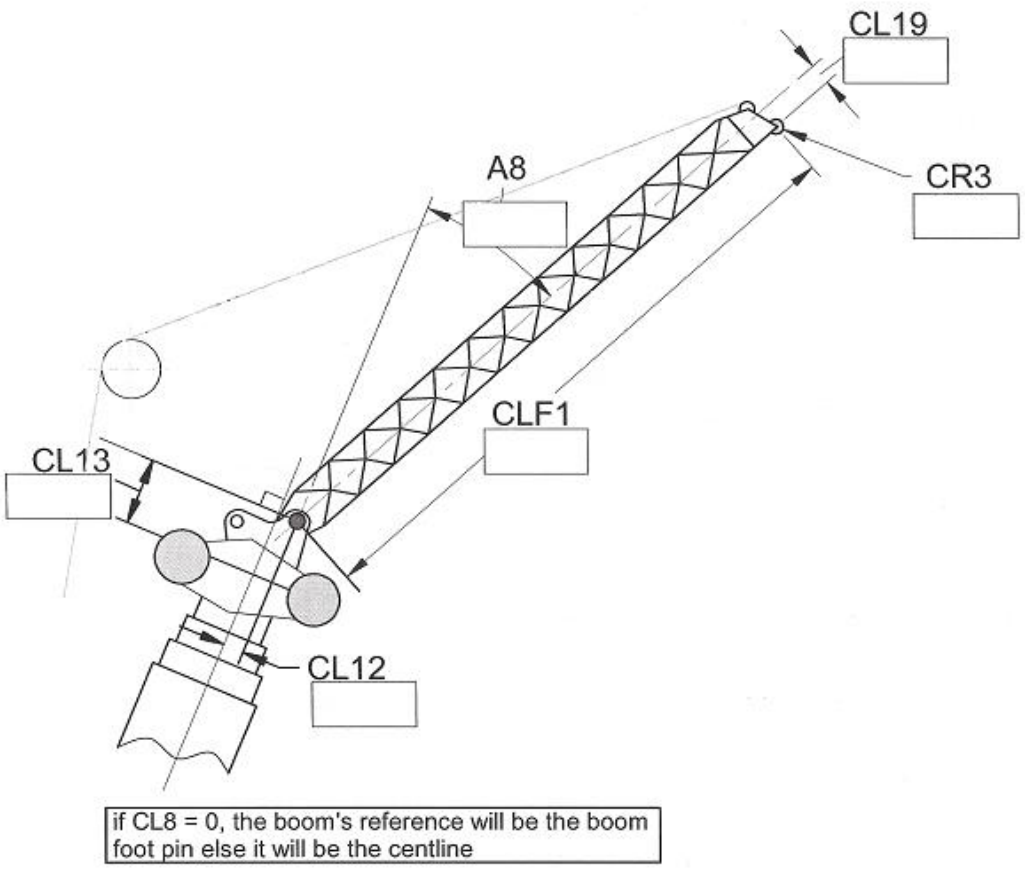
Note sign convention: All dimensions shown positive except **cf**, the centreline of slew is generally in front of the boom pivot pin in which case **cf** is negative. If any other dimension falls the opposite side of it's datum line shown in the diagrams then it's sign will change eg if the boom foot pin is above the centreline of the boom then cl8 will be negative etc.



Rooster sheave geometry :



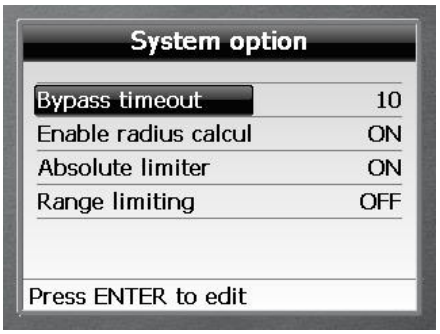
Fly jib geometry :



2.7 Step #7: "system options" setting

The system options menu allows various features to be turned on and off and may vary depending on the version of software installed in the i4000 system. **These settings will normally be pre-set before delivery and will not require changing.**

Navigate through the calibration menu using **"⇧"** or **"⇩"** to highlight "system options" and press **"✓"** to enter.



Bypass Timeout. Time allowed in seconds before to re-activate the motion cut after pressed the Bypass key in normal mode.

Enable Radius Calcul. This is to allow the calcul of the radius. All dimensions entered must be conform.

Absolute Limiter. This allow to enable the Absolute limiter.

Range Limiting. This allow to enable the range limiting option. When the range limiting is enable, the following 3 features will be displayed.

Save limit. Optional feature, if enabled then setting this to ON will display a message on start up indicating a limit is saved if a limit has previously been set.

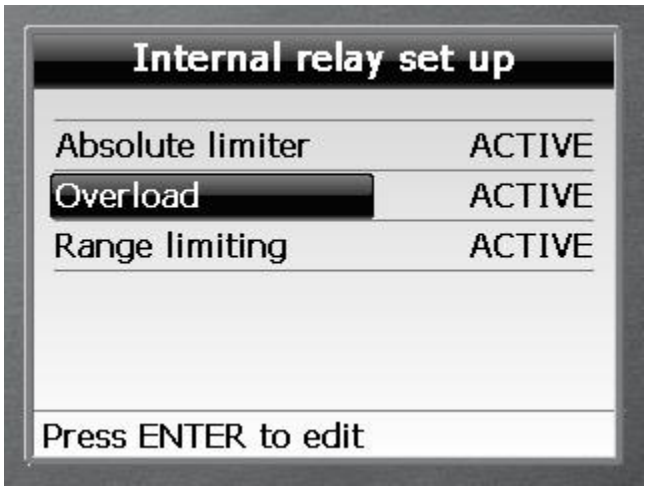
Password Range. When set to ON, Limits of the Range limiting feature is protected by a password.

Password. The Range Limiting feature will be protected by this password if set to a value other than 0.

1- To set-up a password for the Range Limiting option Press **"✓"** to enter.
2- The system will request a 5 digit password. The first digit will be highlighted, use **"⇧"** or **"⇩"** to select the first digit and press **"✓"** to confirm and move on to the second digit. Repeat this for all 5 digits, after confirming the 5th digit the system will enter the calibration menu provided the password is correct. If the password is not correct the system will return to the normal working screen.
3- If a mistake is made while entering the password, press **"⇦"** to return to the previous digit.

2.8 Step #8: "Internal Relay Set-Up"

This item allows the selection of which option the internal relay will be activated. There is three options which are available: Absolute limiter, Overload and Range Limiting as shown:



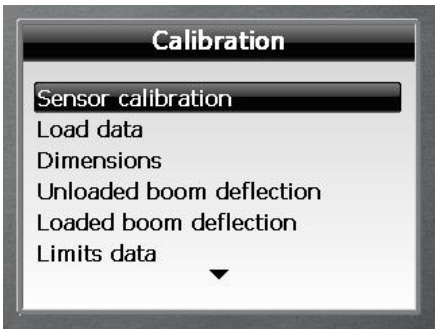
3 CALIBRATION

3.1 Step #9: "Zero sensor/Side of boom angle" angle sensor calibration

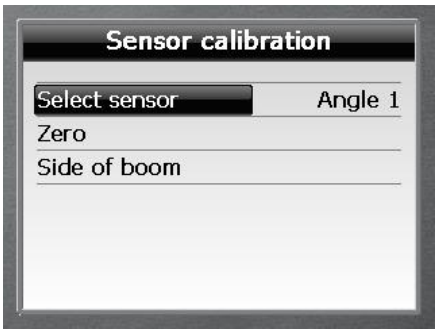
Address selection dip switch:
Every angle sensor installed has its own dedicated address. These switches are factory set prior to dispatch and will not normally require changing. Please refer to the wiring diagram to see the address dip switch setting for each angle sensor interface.

Angle Sensor Side of Boom:

1) Use **"⇧"** or **"⇩"** to choose "Sensor Calibration" and press **"✓"**.

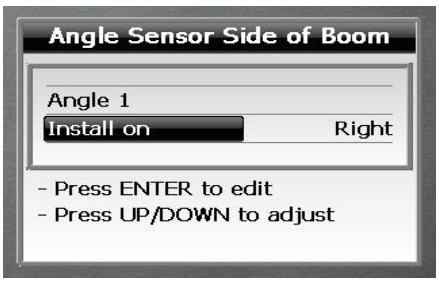


2) Use **"⇧"** or **"⇩"** to choose the "Select Sensor" and press the **"✓"**. Use **"⇧"** or **"⇩"** again to choose the Angle sensor and press the **"✓"**.



3) Use **"⇧"** or **"⇩"** to choose "Side of boom angle" and press **"✓".**
4) Press **"✓"** to highlight the value to edit and use **"⇧"** or **"⇩"** to edit the location of the angle sensor (normally integrated into the length sensor (reel), press the **"✓"** to confirm and then **Escape** to exit.

Note, "right" indicates right hand side of boom when viewed from the crane's cab.

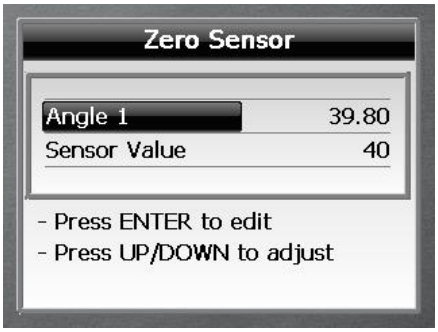


Zero angle calibration:

Ensure the correct side of boom setting has been made before setting the zero datum, if the side of boom setting is changed then the zero setting must be repeated.

1) Use **"⇧"** or **"⇩"** to choose "Zero" and press **"✓"**.

2) Boom down to zero degrees (main boom horizontal) using a precision angle measure to accurately establish the true angle of the base boom section. The angle is displayed in degrees and the sensor value is in bits. This value must be above 100 bits. If smaller, turn the sensor to increase the value.



3) Press **"✓"** to edit the angle value using **"⇧"** or **"⇩".**
4) Press **"✓"** again to confirm the zero.
5) Press **Escape** to return to the main calibration menu.

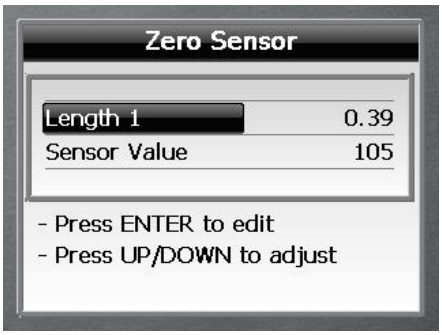
The boom angle need not be zero but it's true value must be accurately known and entered as described.

3.2 Step #10: "Zero sensor/Span sensor" length sensor calibration

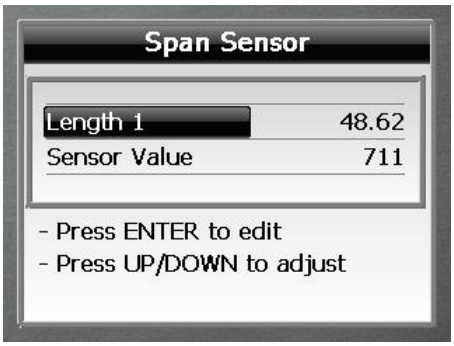
Warning: The system does not store the ZERO LENGTH into permanent memory until the SPAN LENGTH calibration has been completed. If a ZERO LENGTH calibration is done, then a SPAN LENGTH calibration must also be done.

Zero extension calibration:

1) Use **"⇧"** or **"⇩"** to choose "Select sensors" and press **"✓"**.
2) Use **"⇧"** or **"⇩"** to choose the length sensor to be calibrated, press **"✓"**.
3) Use **"⇧"** or **"⇩"** to choose "Zero" and press **"✓"**.



4) Retract the boom completely. The sensor's value must be approximately 100 bits (0,50 volts; adjust the potentiometer inside the cable reel if necessary).
5) Edit the zero value: when the boom is completely retracted, the value must be set to zero.
6) Press **"✓"** to confirm the value. Note the indicated value will return to it's earlier state temporarily, the new zero value will be stored after the next step.
7) Press **Escape** to return to the sensor calibration menu.



Span extension calibration

1) Use **"⇧"** or **"⇩"** to choose "span" and press **"✓"**.
2) Fully extend all the boom sections up to and including the section that the length sensor cable is attached to (for single reel installations this is all boom sections including a manual section if fitted). The sensor value should be a minimum of 150 bits above the zero value. Enter the difference between the extended length and the fully retracted main boom length using the units selected. For example: A fully extended boom of 30m minus a fully retracted boom of 10m = 20m. Enter 20.0 for the span extension.
3) Press **"✓"** to edit the span value.
4) Edit the span value, then press **"✓"** to confirm the value.
5) Press **Escape** to return to the sensor calibration menu.

3.3 Step #11: "Zero load/Span load" sensor calibration

When calibrating load sensors, always slowly hoist and stop the test loads smoothly in order to eliminate errors in the load reading due to frictional effects. The frictional effect on dynamometer (line rider) systems will cause the displayed load to decrease when lowering the load and to increase when hoisting the load. On dead-end load cell systems this effect is reversed. These friction effects can be minimised by ensuring boom head sheaves and hook block are in good condition and properly maintained before proceeding.

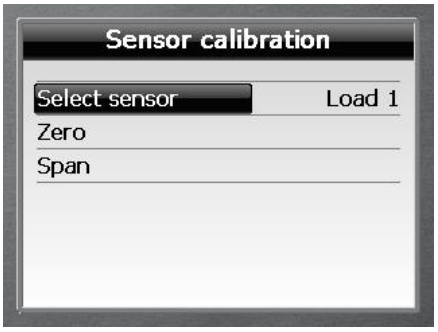
Warning: The system does not store the ZERO LOAD into permanent memory until the SPAN LOAD calibration has been completed. If a ZERO LOAD calibration is done, then a SPAN LOAD calibration must also be done.

Load sensor calibration must be done with two, accurately known test loads, a small load and a large load. The large calibration load should provide between 50-90% line pull on the hoist line while using as many parts of line as is feasible. If a large enough load cannot be found, the crane can be reeved to fewer parts to increase the line pull for a given calibration load. The smaller load should be approximately 5-10% of the larger load and in many cases the block weight alone may be sufficient. The calculated test loads should normally include the weight of the hook block and any slings, shackles etc. that are used.

Note: The system must use the part of line currently rigged on the block in the load value calculation, this value is set in the normal mode, make sure that this value is conform to the number of part of line currently rigged on the block. If it's not the case you must adjust it in the normal mode.

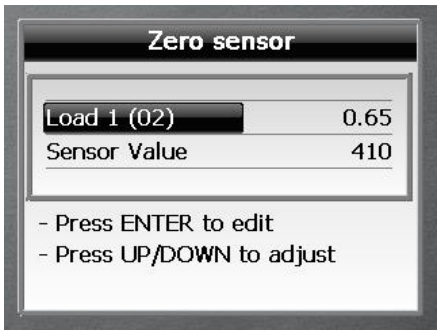
Select the load sensor to be calibrated

1) Use **"⇧"** or **"⇩"** to choose "Select sensor" and press **"✓"**.



2) Use **"⇧"** or **"⇩"** to select the relevant load sensor and press **"✓"**.

Zero load calibration:



1) Use **"⇧"** or **"⇩"** to choose "Zero" and press **"✓"**.

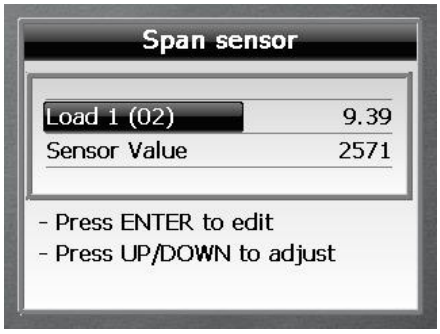
To zero the load sensor, position the boom at a safe radius for the large test load but attach and slowly lift the small test load until it is just clear of the ground.

The reading on the Sensor value is in bits and the maximum scale value is 4095. For the zero setting the display should read between 175 and 300 bits. The units for calibration are shown at the bottom of the screen.

2) Press "✓" to edit the zero value.
3) Edit the zero value to read the value of the suspended test load, then press **"✓"** to confirm the value. Note the indicated value will return to its earlier state temporarily, the new zero value will be stored after the next step.
4) Press **Escape** to return to the sensor calibration menu.

Span load calibration:

1) Use **"⇩"** to choose "Span" and press **"✓"**.



To span the load sensor, position the boom at the same safe radius for the large test load as above and slowly lift the large test load until it is just clear of the ground.

As above, the reading on the bottom line represents the current bits value of the sensor, for the span setting the reading should not be greater than the values shown in the following table depending on the size of the calibration load but should be as close to

these figures as possible. Note, values for test loads greater than 90%SWL are shown for reference only and should not be used for calibration purposes.

Test load	50%	60%	70%	80%	90%	100%	120%
Max Bits value	1765	2100	2430	2765	3100	3430	4095

If the reading is unacceptable then adjust the gain setting jumpers in the transducer interface unit to achieve the closest possible setting, refer to the label inside the interface unit for guidance. The standard gain setting number is 325, other options are 219, 253, 413, 579 and 630; a higher gain setting will result in a larger span setting value.

Warning: If the gain value is changed then redo the zero load calibration before continuing with the span load calibration.

2) Press **"✓"** to edit the span load value.
3) Edit the span value to read the value of the suspended load, then press **"✓"** to confirm.
4) Press **Escape** to return to the sensor calibration menu.

Repeat step #13 for each load sensor in turn.

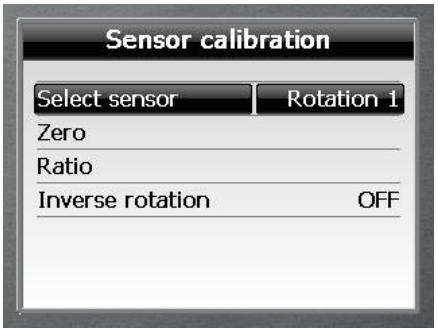
3.4 Step #12: "Rotation" sensor calibration

This sensor is available if the range limiting feature is fitted to the system, in this case a sensor is used to monitor the slew position of the crane.

Encoder type: This will be factory set and should not be changed in "Enable/ Disable sensors". It represents the type and manufacturer of the encoder that is fitted.

Select the Rotation sensor to be calibrated

1) Use **"⇧"** or **"⇩"** to choose "Select sensor" and press **"✓"**.



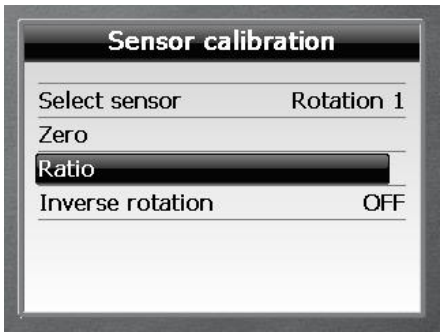
2) Use **"⇧"** or **"⇩"** to select the relevant Rotation sensor and press **"✓"**.

Zero: This is used to set the zero datum point when an absolute encoder is fitted as the slew sensor. If a relative encoder as 33M0118 is installed and selected, you don't need to do the "zero". To set the zero datum:

Rotate the machine to the zero datum point, normally centred over the front of the machine, and press **"✓"** to set the slew angle reading to zero and permanently store this point.

Ratio: This value will only be available if a multi-turn encoder is specified above and represents the number of turns that the encoder rotates for a single 360° rotation of the crane. To set this ratio:

1) Position the crane at an identifiable slew position and check that it will be safe to rotate the machine for a full circle.
2) Select **"ratio"** and press **"✓"** and select " Automatic" and press **"✓" again.** When ready to start the recording process press **"✓"** again and rotate the



machine 360° and return to the exact start point.

3) When satisfied that the machine is exactly one turn from the start, press **"✓"** to confirm the position. The system will give a value in terms of bits for single 360° rotation of the crane, only if you have selected a multi-turn encoder as 33S0047, otherwise the value stays at zero.
4) Press **Escape** to return to the main calibration menu.

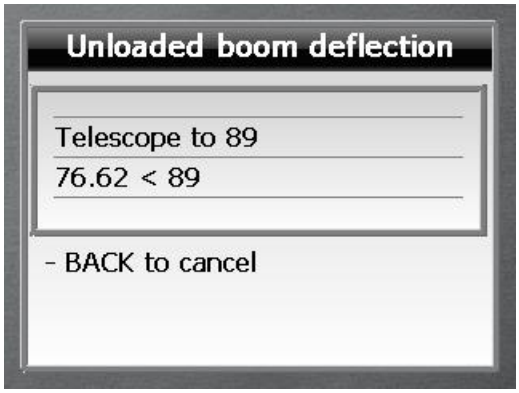
Inverse Rotation (Multi-turn Encoder): set to CW (clockwise) or CCW (counter-clockwise) as required to ensure that the slew angle reading increases when the machine is slewed to the right as viewed from the operators' position.

3.5 Step #13: "Unloaded boom deflection"

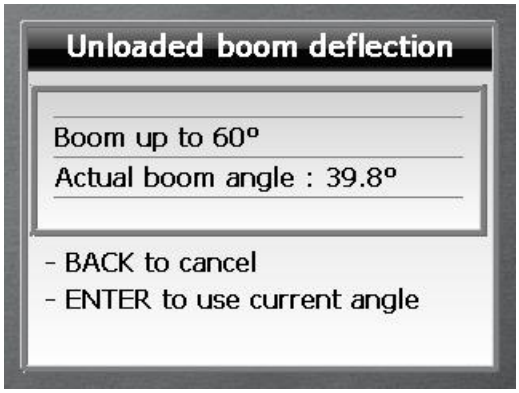
This procedure is used to add an allowance into the calculation of the hook radius to compensate for natural main boom deflection.
This procedure should only be used with machine configurations on outriggers or on crawlers.

No known test weight is required to carry out this calibration, the weight of the hook block and any slings, shackles etc. that are used will be sufficient.

1) Use **"⇧"** or **"⇩"** to highlight "Unloaded boom deflection" and press **"✓"** to enter.
The display will show the current boom length and a target boom length for calibration.



With the hook block suspended, telescope the boom out to the target length specified on the display, this is normally the maximum length available for the duty so be sure to check that the hook block does not foul the boom tip and that the boom is at a high enough angle to safely permit maximum extension.
When the boom is at the desired extension the display will change to show the current boom angle followed by a target boom angle for calibration, normally 60°. Adjust the boom angle to the target angle, when the boom is at the correct angle for calibration the display will change to show:



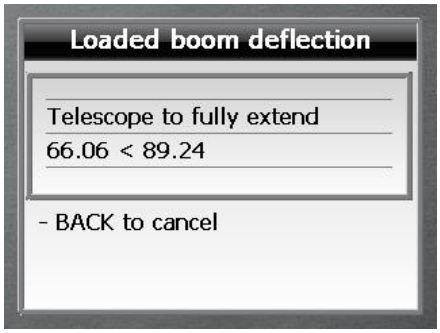
2) Accurately measure the actual radius of the hook block from the centre line of slew of the machine.
3) Use **"⇧"** or **"⇩"** to adjust the Corr.: **x.x** value until the displayed radius equals the measured radius, note that the indicated radius can only be increased, not decreased. Press **"✓"** to accept the change, the system will confirm the calibration is saved.
4) The display will show the current boom length and an another target boom length for calibration. With the hook block suspended, telescope the boom in to the target length specified on the display, this is normally the half extension available, be sure to check that the hook block does not foul the boom tip and that the boom is at a high enough angle to safely permit the half extension.
5) Accurately measure the actual radius of the hook block from the centre line of slew of the machine.
6) Use **"⇧"** or **"⇩"** to adjust the Corr.: **x.x** value until the displayed radius equals the measured radius, note that the indicated radius can only be increased, not decreased. Press **"✓"** to accept the change, the system will saved the value and return to the Main Calibration Menu

3.6 Step #14: "Loaded boom deflection"

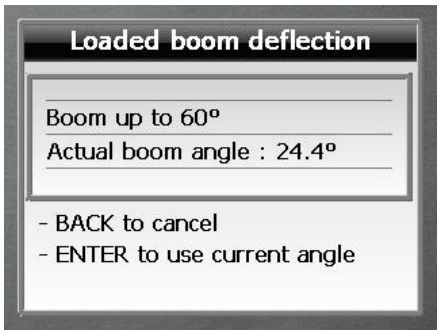
This procedure is used to add an allowance into the calculation of the hook radius to compensate for main boom and/or chassis deflection due to a suspended load.
This procedure should only be used with machine configurations on outriggers or on crawlers.
A known test weight is required to carry out this calibration, the weight should be between 50% and 90% of the SWL for the configuration being calibrated and should be based on the SWL with a fully extended boom at approximately 60° boom angle. The calculated test load should normally include the weight of the hook block and any slings, shackles etc. that are used.

1) Use **"⇧"** or **"⇩"** to highlight "Loaded boom deflection" and press **"✓"** to enter.

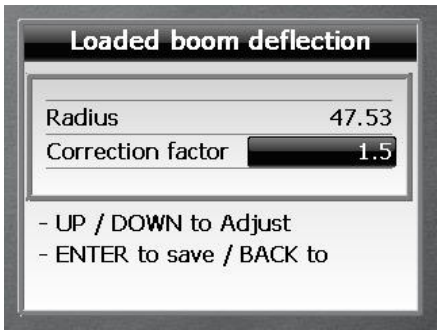
The display will show the current boom length and a target boom length for calibration.



With the hook block suspended, telescope the boom out to the target length specified on the display, this is normally the maximum length available for the duty so be sure to check that the hook block does not foul the boom tip and that the boom is at a high enough angle to safely permit maximum extension.
When the boom is at the desired extension the display will change to show the current boom angle followed by a target boom angle for calibration, normally 60°.



Adjust the boom angle to the target angle, when the boom is at the correct angle for calibration the display will change to show:



Carefully lift the test load until it is just clear of the ground. Accurately measure the actual radius of the suspended load from the centre line of slew of the machine.

2) Use **"⇧"** or **"⇩"** to adjust the Correction Factor.: **x.x** value until the displayed radius equals the measured radius, note that the indicated radius can only be increased, not decreased. Press **"✓"** to accept the change, the system will save the value and return to the Main Calibration Menu.

Carefully set the test load on the ground.

3.7 Step #15: "Transfer" Calibration backup

A copy of the calibration file can be made at any time after completing a calibration step and should be made once the final calibration is completed. **Note** a USB memory stick must be connected to connector 'UBB' of the i4000 display unit using a Deutsch to USB converter lead (RaycoWylie part no. 33V0338) before proceeding.

1) Use **"⇧"** or **"⇩"** to highlight "transfer" and press **"✓"** to enter.

2) Select "Calibration to USB" " and press **"✓"**, a copy of the calibration information will be created in a file called "cranename_000000.cal" located in the root folder of the USB memory stick. If a file of this name already exists ie a previous backup has been made then the new file will become "cranename_000000-1.cal" etc.
The final completed calibration file should be renamed:
"cranename_serialnumber_date_tech.cal" where serialnumber is the serial number of the i4000 system, the date is the date the calibration file is completed/downloaded and tech is the initials of the calibrating technician.

3.8 "Transfer" restoring calibration

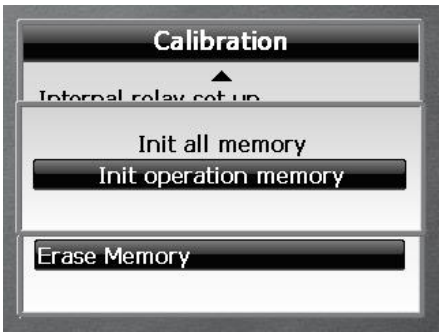
Warning: This procedure will overwrite the existing data in the i4000 system and the existing data will be lost. It is advisable to archive copies of the existing data using the procedure in step #16 as a precaution before continuing. If in doubt consult Rayco Wylie.
A copy of the calibration and/or load chart files can be restored to the i4000 system at any time. **Note** a USB memory stick must be connected to connector 'USB' of the i4000 display unit using a Deutsch to USB converter lead (RaycoWylie part no. 33V0338) before proceeding. Ensure the file required to be restored is saved in the root folder of the USB stick.
Navigate through the calibration menu using **"⇧"** or **"⇩"** to highlight "transfer" and press **"✓"** to enter.

Select "USB to Calibration" " and press **"✓"**

A list of files will be displayed, **"xxxx.cal"**. Note that only files located in the root folder of the USB stick will be displayed. Select the relevant file from the list displayed and press **"✓"**, the selected file will be copied to the i4000 system and will replace any existing data.
Once done, it is advisable to reboot the system (power off and on again).

3.9 "Erase Memory"

Warning: Initialising memory operation or all will delete all the information stored in the calibration memory, be sure you have made a backup copy of the calibration file before using this option – **if in doubt, don't!**



Init all memory
Select this option to re-initialize the system memory, a warning screen will be displayed to ask for confirmation, if confirmed all calibration data will be deleted.

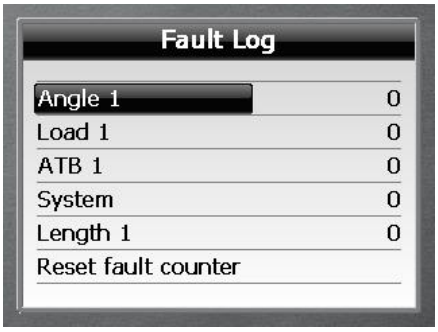
Init operational memory
Select this option to re-initialize the memory for the current configuration, only data related to the current operator settings will be deleted ie Limits, parts of line settings etc.

4 AUTOMATIC LOGS

4.1 "Fault log"

The fault log screen is a diagnostic tool used to record intermittent errors detected in various parts of the system. The numbers on the right hand side of this screen represent a count of the number of individual faults detected for each component and can be useful in tracing system faults.

Navigate through the calibration menu using **"⇧"** or **"⇩"** to highlight "View Fault Log" and press **"✓"** to enter.



Note the fault status, press **Escape** to return to the main calibration menu or select "Reset fault counter" and press **"✓"** to reset all the counters to zero.