



i4300/4500 Calibration Procedure for Grove Industrial Cranes



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1 Introduction

The i4300/i4500 system is preloaded with the operating software (Windows-based), the load chart file and the master calibration for this unit. The purpose of this procedure is to adjust the values of the master calibration to improve accuracy of this specific unit. The i4300 calibration procedure can be looked at as two separate tasks: 1) THE SENSORS; length and angle. 2) FAST CAL; tweaking the master calibration file to ensure the correct radius, empty hook weight, and proper load value with test weight.

Before each calibration step make sure the duty selected on the main page corresponds to the actual configuration of the crane. The calibration menu options are specific to the duty selected.

In order to ensure the load calibration is correct, make sure that the presence of the correct jib is indicated in the duty selection process if the jib is mounted on the side of the boom.

2 Units

In order to change and set your desired units appearing on the main screen, press the mode button on the top left. Scroll to “units” and select the desired units. This is independent of the calibration units. To change and set the calibration units, go to the calibration menu (see section below to access the calibration menu). Scroll down to “calibration units”. It will be either metric or imperial. If metric, then use metric values if calibrating the boom length, and BAR if calibrating the transducers. If it is set to imperial, the length calibration will be in feet and the pressure calibration will be in PSI.

3 Calibration Menu

Warning: While in calibration mode, the lockout functions of the Rayco Wylie system may be disabled, exercise caution.

Note: Do not press any button while the system is saving a value, wait until the display indicates that the operation is complete.

Enter calibration mode by pressing the upper left button, scrolling down to ‘calibration’ and pressing the checkmark button. Enter the password. There are two passwords used to enter the calibration menu. **If 01234 does** not allow access to dimension, cal data, system options, **use 04321**. You are now ready to calibrate.

4 Angle Calibration

Perform this step on outriggers. On the main screen, select the duty that corresponds to your current configuration.

With the boom resting on the physical stop, lift the boom until your digital angle gauge indicates zero degrees.

Enter calibration mode (see procedure in section 2)

- Use the up or down buttons to choose the “select sensor” line and press the check mark.
- Highlight the angle sensor and press the check mark.
- Wait for the system’s confirmation.
- Scroll down to choose the “span sensor or side of boom angle” line and press check mark. Ensure that the angle sensor is shown as being installed on the left side of the boom, if not press checkmark and then scroll up or down to change the value to left, then press the checkmark.
- Choose “Zero sensor” line and press check mark.
- Press the check mark to highlight the value for “Zero Angle 1”, and enter zero for each digit by pressing the check mark to move to the next digit and using the up and down arrows to change the value for each digit.
- Return to the main screen and elevate the boom to validate angle reading by comparing to your digital device.

5 Length Calibration

Make sure your duty is selected to the current crane configuration.

Bring the boom to a fully retracted position.

Enter calibration mode (see procedure in section 2)

- Use the up or down buttons to choose the “select sensor” line and press the check mark.
- Highlight Length 1 and press the check mark.
- Wait for the system’s confirmation.
- Scroll down to choose the “zero sensor” line and press the check mark.
- The sensor’s value must be approximately 100 bits (if not, remove cable reel cover, press down on the potentiometer and turn the gear).
- Press the check mark to edit each digit of the zero value (since the boom is completely retracted, each digit must be set to zero).
- Press the check mark to confirm the value of the last digit.
- Press the escape button above the check mark to return to the calibration page.
- Scroll down to choose the “span sensor or side of boom angle” line and press check mark.

- Extend the boom completely. The sensor value must be less than 950 bits. (A short boom crane should have a value of about 700 bits and the longer boom models are generally around 900 bits).
- Refer to the crane main boom chart. Enter the difference between the fully extended main boom length and the fully retracted main boom length. For example: A fully extended boom of 81 feet minus a fully retracted boom of 34 feet = 47 feet. You enter 47.0 at span extension.
- Press the check mark to edit each digit of the span value using the up or down buttons to adjust each digit of the span value.
- Press the check mark to confirm the value.
- Press the escape button above the check mark twice to return to the main screen.

The value for the extended boom should now be displayed on the screen above the boom. Fully retract the boom and verify that the calculated length matches the value on the load chart.

6 Transducer Calibration

Warning: While in calibration mode, the lockout functions of the Rayco Wylie system may be disabled, exercise caution.

If you are calibrating an i4300 system using canbus pressure transducers, go straight to section 7.0

If you are upgrading the console from an i3500 to a i4500 while using the i3500 pressure transducers, it is recommended to perform a pressure transducer calibration. **See section 3.3 on page 28 in the Calibration Instructions 55M4500CCE00.** If your calibration units are in imperial, you will need to convert the BAR values of pressure sensors to PSI.

In order to recalibrate the transducers using PSI, get the BAR value from the transducer, (inscribed onto the body of the transducer, normally 260.0 to 290.5), and multiply by 14.5.

Example: A single transducer for load 1, BAR value is 275.7, PSI value is 3997.65 ($275.7 \times 14.5 = 3997.65$). This will be the number entered for "Span Load 1" in "Span Pressure".

Warning: If you recalibrate using the BAR value when you needed PSI, your load reading on the main screen will always be zero, and if you go to "Load Offset" in "Calibration", you will see that the actual load is about -3000lbs when there is no pressure in the lift cylinder.

7.0 Fast Cal

The system is now ready for load calibration. Follow the steps in the order listed below. Boom movements while calibrating the load should be as slow as possible. Avoid quick starts and stops that could cause the boom to bounce.

7.1 Unloaded Deflection

Perform this step on outriggers (extended and down). On the main screen make sure the duty corresponds to your current crane configuration.

In the calibration menu, select “unloaded deflection”. You will be prompted to go to 60 degrees, (+/- 1 degree). If your max boom angle is less than 65°, go to 55° instead of 60°. Extend boom fully. When the system detects that the boom is at the correct length, (fully extended) and at the correct angle, it will show you the calculated radius and the correction value. Measure the actual radius in feet and tenths of a foot and compare it to the calculated value. Adjust the correction value until the calculated radius is **approximately .20 above** the actual measured value. Press the check mark. You will be prompted to retract the boom to a given length. After doing so, the system will again display the calculated radius. You will measure the actual radius and adjust the correction value again for an indicated radius **approximately .20 above the actual**.

7.2 Loaded Deflection

Perform this step on outriggers (extended and down). On the main screen make sure the duty corresponds to your current crane configuration.

Return the boom to fully extended at 60 degrees (use 55° if your max boom angle is less than 65°) and check the load chart or the maximum capacity rating on the RaycoWylie display in the lower right corner of the screen. To do the loaded deflection test, the crane should be loaded with 75% or more of the capacity at this physical position, (fully extended and 60 degrees (55° if 60° is impossible)). This calibration can be done with less than 75% if that load is not available. Using a smaller load can degrade the system accuracy. Select loaded deflection in the calibration menu, and follow the prompts. It operates just like the unloaded deflection except there is only one radius measurement to take instead of two. Adjust the displayed radius to be **approximately .20 above the actual radius** that you measured under the load. Save this value and return to the main screen to verify that your new radius value is being displayed on the screen. **Note:** The load must be suspended above the ground when saving the correction value.

7.3 Loaded Deflection on Rubber

Perform this step if you want a more precise radius on rubber.

Configure the crane with outriggers retracted and select the corresponding duty on the main screen. Using an appropriate load for 60 degrees and a fully extended boom, select rubber deflection in the calibration menu. Adjust the correction value as was done in step 5.2

Note: This test should be done over the side

7.4 Load Offset

In this step, we need to find the lightest reading of the empty hook. Move the boom to the following positions and record your empty hook load reading beside them:

Fully extended at 10° _____

Fully extended at 60 ° (or 55°) _____

Fully retracted at 10 ° _____

Fully retracted at 60 ° (or 55°) _____

Wait ten seconds after boom up for load to settle before recording your reading.

Determine which of these has the lightest indicated load.

Return to that physical location and go into “load offset” in the calibration menu. You will see two numbers. One is the actual load in thousands of pounds, (350lbs=.35), the other is a correction value.

Boom up for about 2 seconds, wait for 10 seconds, adjust the correction value until the load reading is approximately **60lbs** above the actual weight of the hook plus the estimated rope weight, if any. Repeat as necessary until you get the desired result.

7.5 Load Adjust

This is normally done at the same boom position where we set the load offset, however, after setting the proper load reading at this physical location, you must verify that the other 3 positions have a good load reading. The load offset changes the indicated load by adding or subtracting pounds of load. The load adjust changes the percentage of the calculated load that we show on the display. A “load adjust” correction value of 1.00 is equal to 100% of the calculated load, while .95 is 95% of the calculated load.

To do this test, we will need a known load. Preferably at or higher than 50% of the capacity for the current physical condition. More is better. Calculate: known weight to be lifted (load below the hook) + hook weight + rope weight. The sum is what we want showing up as indicated load. Enter “load adjust” in the calibration menu. Now slowly boom up until the load is off the ground and at a minimum of 2 degrees, wait 10 seconds and then adjust the correction value up or down until you get the indicated load to exceed the actual by 4-6%. Repeat as necessary, always using a boom up movement with a 10-15 second time for load stabilizing before making an adjustment. If the load swings excessively, you may need to stabilize it for this test. To verify the calibration, record the load indicated and actual radius, at 10 degrees and max angle minus 10 degrees for both fully retracted and extended using a minimum of 2 different loads (the radius values will be needed for the radius offset in section 5.6).

Note: Some cranes may display a rapid decrease in the load reading that extends past the 10-15 second time frame. You may need to allow for additional time for the load to settle.

7.6 Adjusting the load while booming down

Do this test using the main boom configuration.

If you are installing a jib on a system that was calibrated at the Gove facility, do not do step 3 below, skip to step 4.

1. With a load of at least 5000lbs, and a fully retracted boom, or 1000lbs and a fully extended boom, slowly boom up by at least 2 degrees, wait 10 seconds, observe the load value, it should be 3-8 percent heavy.
2. Now slowly boom down, the load reading will drop, and then rise and stabilize within 2-3 seconds. The load reading while in motion down should be close to the boom up and stop value.
3. If it is not providing the desired load reading, then change the “rod diameter” value in dimensions in the calibration file, save the new value, and retest. It may take a few tries to get the load value to indicate in the preferred range.
4. For cranes calibrated at the Gove facility, never alter the rod diameter. If a higher load reading is needed for the duty being examined, achieve it by increasing the load offset, (adding pounds), or increasing the load adjust, (adding a percentage).

An adjustment to the rod diameter value is a universal change to the crane as it will have an effect on all boom configurations during the downward motion of the boom. Consequently, this type of adjustment would only be done on main boom and not tweaked for the optimization of load readings using the pivot head or jib, (unless that is the primary configuration of you crane). If, after changing the rod diameter, you need a heavier load on other boom configurations while in motion down, achieve it by increasing the load offset, (adding pounds), or increasing the load adjust, (adding a percentage).

7.7 Radius Offset

Measure the radius with the boom fully extended and fully retracted at 10 and 60 degrees for each boom configuration (main boom, jib zero, jib 15, jib 30....). While loaded, you should have collected this data in step 5.5. Record the measured value and the display value. Adjust security gap for radius in “system options” in the calibration menu to a value that will make the indicated radius .20 feet more than the lowest measured value. For example, if main boom was measured at 32.2 and the indicated on the system was 32.3, and this was the closest to the actual radius the system displayed, you would want to set security gap for radius to a value of .10. This would make the system read a minimum of .20 above the actual radius. Record the correction value and the radius before and after setting the correction value.

8 Jib Calibration

Mount the jib on the boom tip, change the duty to inform the system that you are using the jib, and repeat the following calibrations: unloaded-loaded deflection (5.1 and 5.2), load offset (5.4), load adjust (5.5), adjustment for radius offset (5.6). Each boom configuration has its own fast cal file. Therefore, if you have a three position jib, (this includes jibs whose pivot point is a pivoting boom head), you will be doing a fast cal 4 times. Once for the main boom, and three more times for the jib, (jib at 0 degrees, jib at 15 degrees, jib at 30 degrees).

Note: If your jib has a manual extension which changes the jib length, then each of the jib configurations will need to be calibrated twice. For example, if you have a 12 foot jib with a 6 foot extendable section making the total an 18 foot jib when extended, you will need to calibrate the 12 foot jib and then the 18 foot jib. You will find that the duty list for the jib offset angles will show two jib lengths for each angle. It may read like this, 12 foot jib at 0 degrees, 12 jib at 15 degrees, 12 foot jib at 30 degrees, 18 foot jib at 0 degrees....All of these will need to be calibrated as per the instructions in sections 7.1-7.5. Do not do step 7.6.

9 Optional Pivot Head Calibration

The pivot head has the same programmable parameters as there are for the jib. If desired, the forward pivot head locations can be selected as the current duty after configuring the crane physically. For better accuracy, the pivot head calibration can be done using the same method as for the jib, with the exception of the radius adjustment.

10 Save the Calibration File

Plug in the supplied memory stick and adaptor cable in the middle socket in the back of the display. In the calibration menu, select the `Transfer` function and upload to the USB stick. After saving the file to your storage location, change the file name to the crane serial number followed by the TF number from the sticker on the rear of the console.