GS920 AND GS SERIES SENSORS

INSTALLER AND USER GUIDE

WARNING - The GS920 system is designed as an operator aid. It is ***not*** a substitute for safe operating practice. Carefully read and understand this manual before proceeding.

Document ID: GS920_ENG_Rev2023May

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Legal Notices

Release Notice

This is the May 2023 release of the *GS920 & GS Series Sensors Installer and User Guide*. It applies to version of the software. P/N GS920_ENG_Rev2023May.

Product Limited Warranty Information

For applicable product Limited Warranty information, please refer to the Limited Warranty Card included with this Trimble product or consult your local Trimble authorized dealer.

Safety Information

Before proceeding, please read and understand the following information.

For your safety and that of the people that come into contact with Trimble products, understand the significance of the instructions included in this guide, respect all laws and regulations and comply with applicable standards.

Pay particular attention to items bearing the following types of alerts:

WARNING - This denotes an instruction that if not complied with may lead to serious injury or death.

CAUTION - This denotes an instruction that if not complied with may lead to product failure or property damage.

NOTE - This denotes an instruction that if not complied with may lead to product performance issues.

WARNING - Installation must be made in compliance with Trimble instructions and using Trimble supplied components only. Failure to install all parts or replacing parts or components with parts or components not supplied by Trimble, may lead to system failure, serious injury or death.

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1 Introduction

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1.1 Overview

The GS920 system includes the cabin mounted GS920, compatible crane mounted sensors and an android/ ios tablet with Lifting works application.

The GS920 creates a two-way radio network with the sensors to bring required lift data to the operator. Hoist load, boom and jib angles, boom length, wind speed and pending two-block can be detected and then indicated to the operator in real time. Working load radius can be calculated and compared to a rated capacity chart (if programmed). Furthermore, the GS920 can be programmed to generate warnings, alarms, and lockout commands, all triggered by adjustable thresholds and limits. All these events can be recorded by the data logger with a time and date stamp. The exact operational function of the GS920 system depends on the sensor configuration used and the rated capacity charts programmed (where applicable).

The GS920 includes a USB port to facilitate software and chart updates and data logger downloads using a USB mass storage device (USB key). It is IP67 rated equipment.GS920 has the RTC section in order to record the time stamping, the CR1225 battery is used as a backup power and this battery is replaceable, it will usually pop out of place due to the inbuilt spring. If it doesn't come out, gently pry it out with the flat bladed screwdriver. Replace the old battery with the new one.

> WARNING - The GS920 system is designed as an operator aid. It is ***not*** a substitute for safe operating practice.

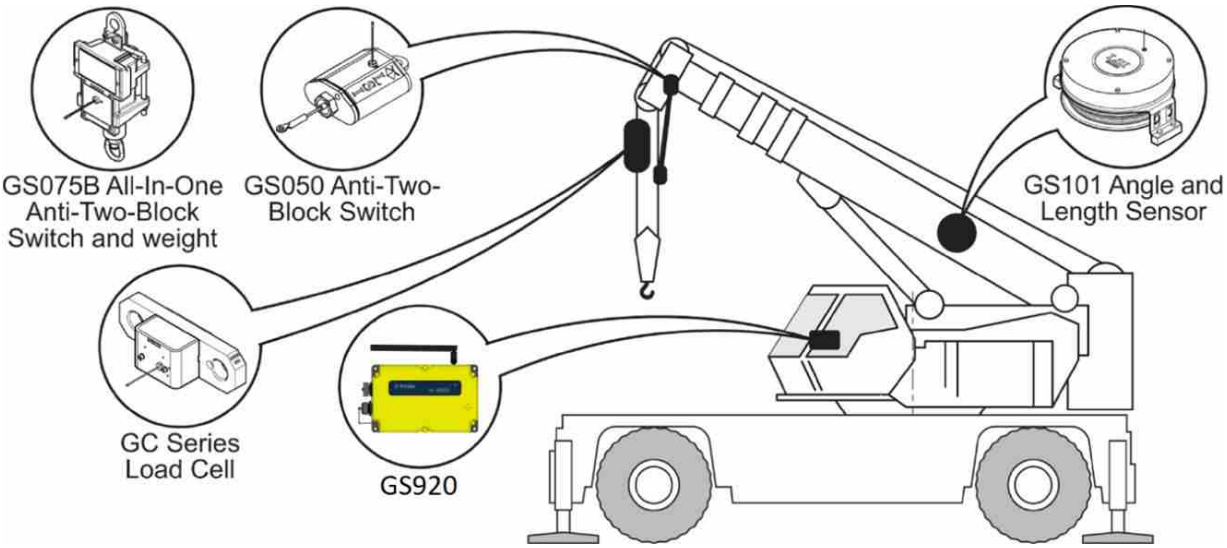

Figure: Key components in a typical system installation. Your product may vary. Not to scale.

1.2 Startup

The GS920 must be correctly programmed for the system sensors installed. The lights on the tablet will remain lit without flashing. If a sensor is missing or has a problem, a message will be displayed on the Tablet. This process may take up to one minute. The delay is created by the battery management function. Click Bypass/Exit to temporarily bypass crane function lockout caused by a missing sensor. If rigging requires a crane configuration outside of the limits defined by the rated capacity chart selected, out of chart alarms can be avoided by placing the LiftingWorks application in “rig mode”. If the rig mode is enabled in the LiftingWorks application, Click Bypass/Exit for 10 seconds to activate it. If the rig mode is not available, contact your Trimble representative or Trimble technical support representative.

1.3 Technical support

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer. Alternatively, go to the Support area of the Trimble Heavy Industry website: https://heavyindustry.trimble.com/en/support?industry=civil&category=lifting.

Product updates, documentation, and information relating to support issues are available for download.

2 Installation

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For detailed menu navigation instructions for all calibration procedures, see Operation, page 81.

> WARNING - Installation must be made in compliance with Trimble instructions and using Trimble supplied components only. Failure to install all parts or replacing parts or components with parts or components not supplied by Trimble, may lead to system failure, serious injury or death.

2.1 GS920

CAUTION - Do not crack or puncture the membrane fascia. The GS920 main control unit is splash, rain proof and dustproof. Waterproofing depends in part on the integrity of the membrane.

CAUTION - Do not power wash the main control unit. The GS920 control unit is not designed to withstand high-pressure washing devices that can erode the membrane fascia seal or create fissures in the membrane fascia. Power washing the main board voids warranty coverage.

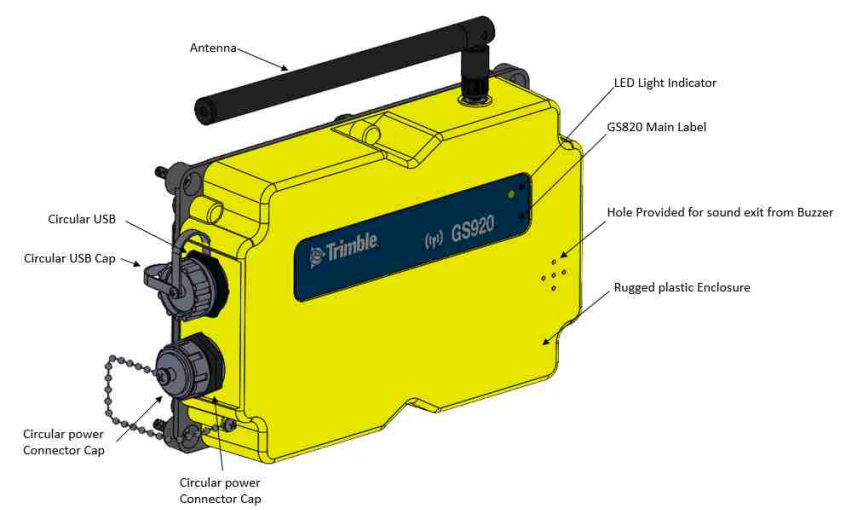

Figure: GS920.

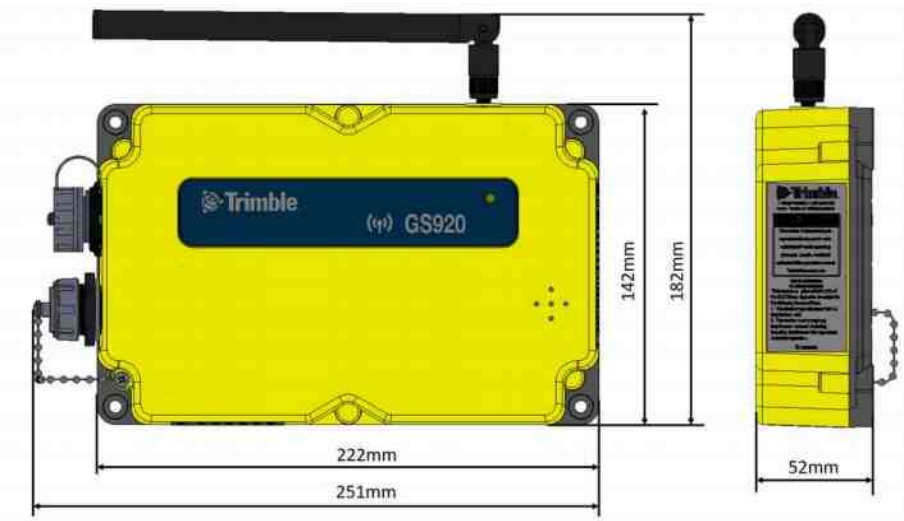

Figure: Dimensions (mm). Not to scale.

2.1.1 Mounting Bracket

Determine the mounting location; GS920 can be mounted anywhere inside the cabinet. The tablet may be installed either. It can be mounted on the dash, on a sidewall, or on the ceiling of the cab. ***To ensure reliable radio communication between sensors and the GS920, the antenna should not be in contact with metal and should have a direct and clear line of sight to the sensor antenna.*** The mounting bracket requires a flat surface of at least 2.5 inches in diameter on both sides and where the back of the surface is accessible to tighten the nuts.

Drill 1/4-inch bolt holes through the mounting surface with a 1/4-inch bit following either the two, three, or the four holes configuration.

Install the main unit with bolts. Add washers and lock nut behind the mounting surface and tighten sufficiently (bolts, nuts and washers not included).

> NOTE - If the nuts are on the outside of the cab, caulk with silicone between the washers and the cab to prevent water entry.

Adjust tablet orientation to facilitate viewing by the operator.

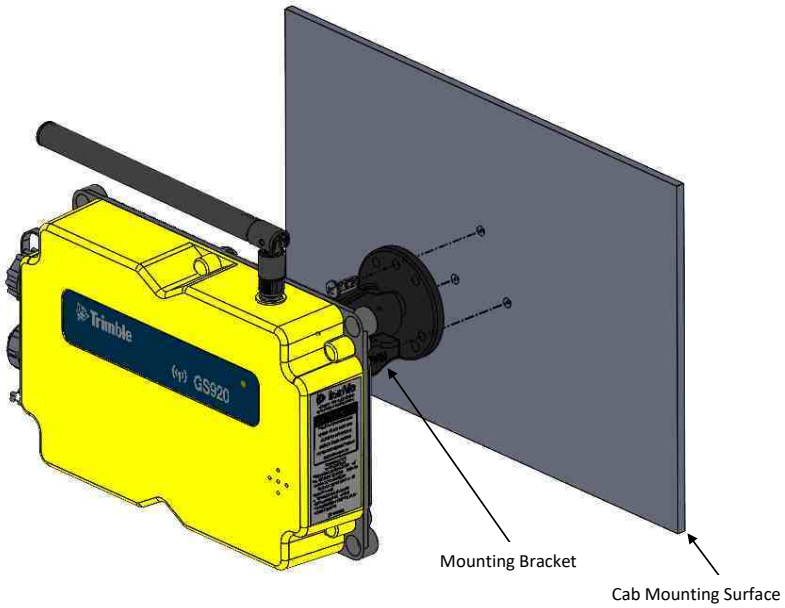

Figure: Install the unit in mounting surface

2.1.2 Antenna Position

For optimal performance, the antenna should be positioned on its side such that it is parallel to the sensor antennas (but not pointing directly to or directly away from them).

Adjust the antenna position with the articulating base.

The antenna should have 5 inches of clear space all around it.

The antenna should have an unobstructed line of sight to all sensor antennas at all boom angles.

The DC power should not exceed 30 V DC and the AC should be negligible (<1 V AC).

2.1.3 Power Supply and Lockout Connection

CAUTION - Overvoltage will void warranty. Use this power supply verification procedure. Check the power from the crane in the DC and AC modes under the following conditions:

1. Engine start-up
2. Engine idling
3. Engine revving up, during complete process, not just when it is revved up
4. Engine revving down, same process as above
5. Engine shutdown

Connect the black wire (ground) to the negative terminal of the battery or the panel connection; alternatively, bolt the black wire to the body of the machine with a 1/4-inch or 5/16-inch bolt. The ground connection must be strong enough to sustain 3 amperes.

Connect the red wire to a fused accessory source, rated at least 3 amperes, that supplies typically +12V or +24V also the maximum is +30V and minimum is +10V when the machine is in use. The GS920 will automatically detect the voltage level and adjust itself.

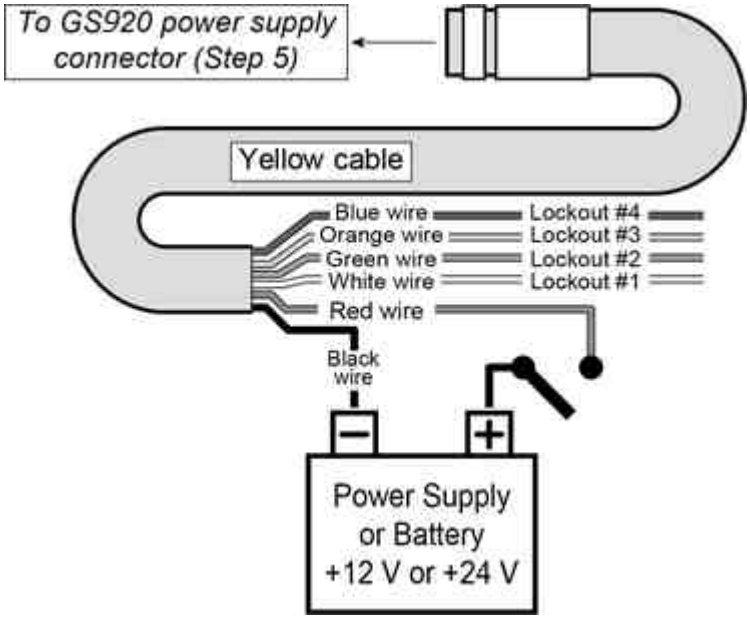

Figure: Connection without lockout

Lockout number 1 (if required): connect the white wire to a Bosch relay coil terminal. Connect the other coil terminal of the relay to the ground. When operating properly the white wire will energize at the battery positive level.

> TIP - if no voltage is present on the white wire remove the load connected to the lockout.

Current over 1 ampere on the white wire triggers an auto re-settable fuse. Current flow will resume several seconds after the short circuit is eliminated.

Lockouts number 2, 3 and 4 (if required): these wires function in the same way as the white wire described in step 3 above. Each lockout wire can be triggered by a different set of alarm conditions; see Lockout Settings, page 18.

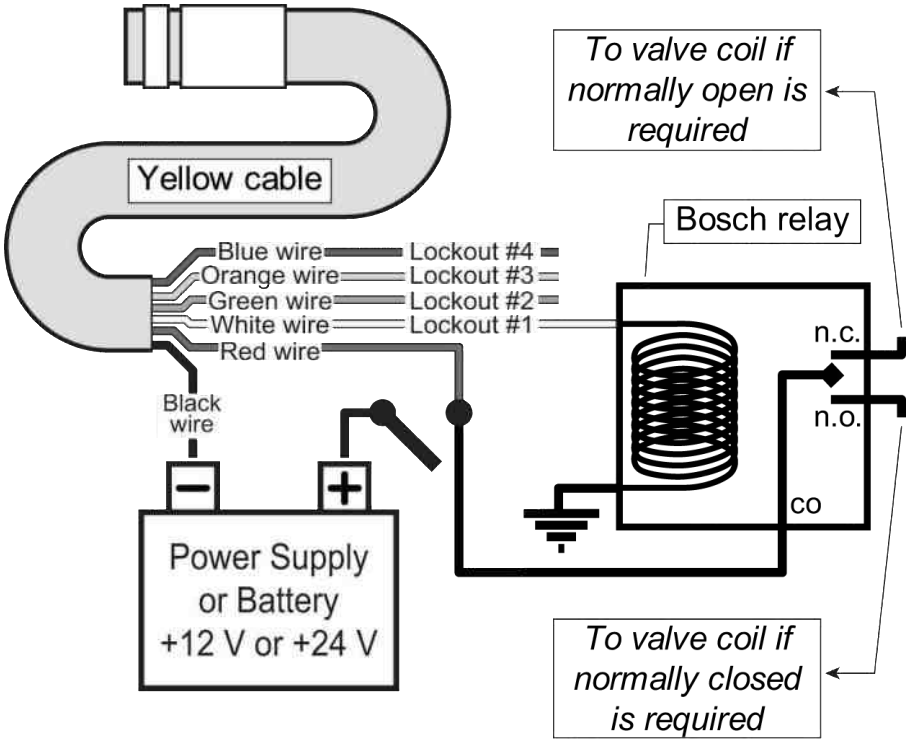

Figure: Connection with white wire lockout and recommended Bosch relay

Connect the yellow cable to the GS920. The connector is waterproof and well rated for external environments. Simply connect the cable to the unit and gently tighten the nut. ***Do not put a kink in the yellow cable where it enters the connector***; any bend in the cable at the base of the connector must not be so severe as to break the internal connections where the cable meets the connector. ***The power cable requires about 4 1/2 in. behind the unit to protect the connector***.

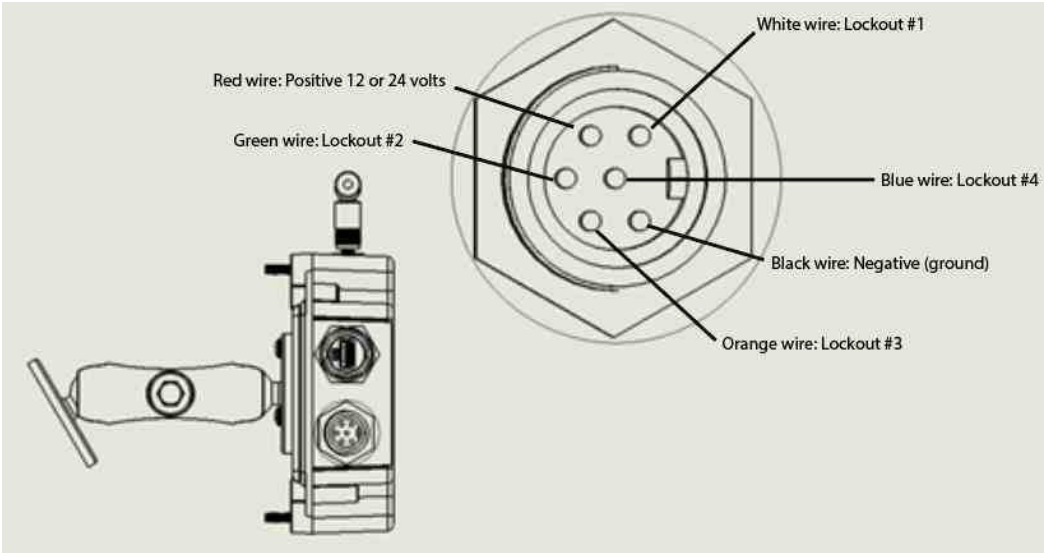

Figure: GS920 power supply connector

2.1.4 Lockout Settings

Warning, alarm, and lockout control is programmed in this menu. The GS920 can be programmed to generate alarms and lockouts for almost all programmed limits and two-block. Furthermore, warnings are generated when approaching programmed load limits and rated capacity (when applicable).

2.1.4.1 Warning level

When gross load (regardless of tare value) approaches the maximum limit for a load sensor, an intermittent warning message is on the Liftingworks application. The maximum limit for a load sensor is the lower of; a) the operator set limit (Limit Menu), and b) the working load limit (WLL) if rated capacity charts are used. The proportion of a limit that must be reached to trigger the overload warning is the warning level. The default factory setting for the warning level is 90%.

Go to menu Lockout Settings.

Enter the user password and press Enter.

Click on warning level.

Adjust the warning level.

Click on Alarm level for adjusting alarm level.

2.1.4.2 *Alarm level*

All programmed and rated capacity limits and two-block will generate an audible alarm when the alarm level is reached. Alarms will generate an intermittent alarm message on the LiftingWorks application. The proportion of a limit that must be reached to trigger an alarm is the alarm level.
The default factory setting for the alarm level is 100%.

In menu, Click Alarm level.

Adjust alarm level.

Click on lockout level or return to the main page of the LiftingWorks application.

2.1.4.3 Lockout level

All programmed and rated capacity limits and two-block can generate a lockout signal when the lockout level is reached. By default, the lockout wires carry crane power supply voltage as long as the GS920 main control units in safe condition (to inverse lockout polarity see menu Lockout relay inverted). When a lockout level is reached voltage is cut on all lockout wires linked to the lockout condition (see menu).

The proportion of a limit that must be reached to trigger lockout is the lockout level. The default factory setting for the lockout level is 105%.

In menu Click on Lockout level.

Adjust the warning level.

Click WHITE WIRE LOCKOUT TRIGGER or return to the main page of the LiftingWorks application.

2.1.4.4 *Lockout triggers*

Different events can be programmed to cut voltage on the lockout wires of the yellow cable. Each lockout wire can be linked to a different combination of lockout conditions.

In menu Click White wire lockout trigger.

Select which alarm conditions will trigger lockout on the white wire (see tables below).

Add the lockout codes for the selected alarms together to find the lockout trigger number.

Adjust the white wire lockout trigger number.

Select the next wire trigger line and repeat steps 1 through 5 or return to the main page of the LiftingWorks application.

Default Triggers

Lockout wire	Default trigger
White	4301
Green	34
Orange	32767
Blue	0

Condition	Code
Maximum wind speed	1
Minimum angle	2
Maximum angle	4
Overload	8
Work area warning approach	16
Maximum radius	32
Maximum length	64
Two-block	128
Maximum wind gust	256
Maximum rope payout	512
Slew Left Limit	1024
Slew Right Limit	2048
Maximum tip height	4096

Maximum imbalance factor	8192
Minimum slack rope	16384
Minimum list angle	32768
Maximum list angle	65536
Minimum trim angle	131072
Maximum trim rope	262144
Minimum mast radius	524288
Maximum mast radius	1048576
Minimum load limit	2097152
Slew Warning Left	4194304
Slew Warning Right	8388608
Chart Value	1677721
Chart Value Reversed	33554432
Example No. 1	
Maximum radius	32
Minimum angle	+ 2
Default green wire trigger	= 34
Example No. 2	
Maximum wind speed	1
Maximum angle	4
Overload	8
Maximum length	64
Two-block	128
Maximum tip height	+ 4096
Default white wire trigger	= 4301

2.1.4.5 *Lockout relay inversion*

By default, the lockout wires carry crane power supply voltage as long as the GS920 main control unit is in safe condition. When lockout is triggered, voltage is cut on the lockout wires linked to the lockout condition.

> WARNING - Inverting lockout relays will allow crane operation in the event the GS920 fails. Operating a crane without a functioning anti-two-block system and load and angle indication is dangerous and may be against the law.

Exceptionally the lockout relay can be inverted so that lockout wires carry no voltage in

safe condition and carry crane power supply voltage when in a triggered lockout condition. In this case if the GS920 main control unit fails, crane functions will not lockout.

In menu Click Lockout relay inverted.

Click on "YES" or "NO".

Return to the main page of the LiftingWorks Application.

2.1.5 Password Settings

Two levels of access are available:

Administrator user

The administrator password is required to change the user password. In the event both the administrator and the user passwords are lost please call Trimble technical support.

Menus accessible from the LiftingWorks application can be individually protected by the user password.

Go to menu Installation and Click Password Settings.

Enter the administrator password and press Enter.

Click Administrator password.

Adjust the administrator password.

In menu Click User password.

Adjust the administrator password.

In menu Click Tare protected.

Click on "YES" or "NO".

Repeat steps 7 and 8 to adjust password protection for each menu as required. If there are any unsaved changes the Lifting Works application will request confirmation.

2.1.6 Updated Sensor List:

GS026-01-V2

GS020-V2

GS032-V2

GC035-V2

GS075-B-V2

GS010-01-V2

GDM-1125-V2

GS010-01-PV-V2

GC018-V2

GS112-V2

2.2 Load Cell

WARNING - Capacity and safety factor for load cells and adapter plate assemblies are calculated for load along the intended axis of load (vertical with the assembly hanging free); side loading may cause load cell and adapter plate assembly to fail, causing load to drop. Lifts must be rigged such that the load cell and adapter plate assembly hang free and not be subjected to side loading.

CAUTION - The load cell must be centered on the pins to avoid uneven loading on the plate kit assembly.

NOTES - The load cell antenna should not be in contact with metal.

For optimal performance and signal reception, the GS920 load cell antenna should have a clear line of sight to the GS920 main control unit.

The load cell antenna should point to the left or to the right of the boom; it should not point directly to, or away from, the GS920 main control unit.

Install load cell bushings as supplied by Trimble. Assembly of the load cell and adapter plates must be configured to the pin size required by the specific dead end or hook to which it is to be attached. In all cases, the bushings supplied by Trimble must be used where possible to adapt the holes in the load cell to the pins. Bushings must be secured with the two allen screws provided, one on each side of the load cell.

As required, place a washer between adapter plate and pin head or nut on each end of the pin that links the adapter plates to the load cell. Additional washers should be added equally to each end of the pin as required to inhibit excessive lateral movement of load cell (maximum 1/8” total movement) and adapter plates along the pin.

If the dead end or hook to be connected to the adapter plates requires a larger opening, washers may be placed between the load cell and the adapter plates equally on both sides of the load cell.

In all cases the washers must be placed symmetrically such that the load cell is centered on the pins to avoid uneven loading.

Secure the pins with the nuts and cotter pins provided.

A qualified (lift supervisor or crane inspector) person must verify every lift assembly before first use and periodically thereafter (one to twelve months), including before any new, difficult, or otherwise different lift.

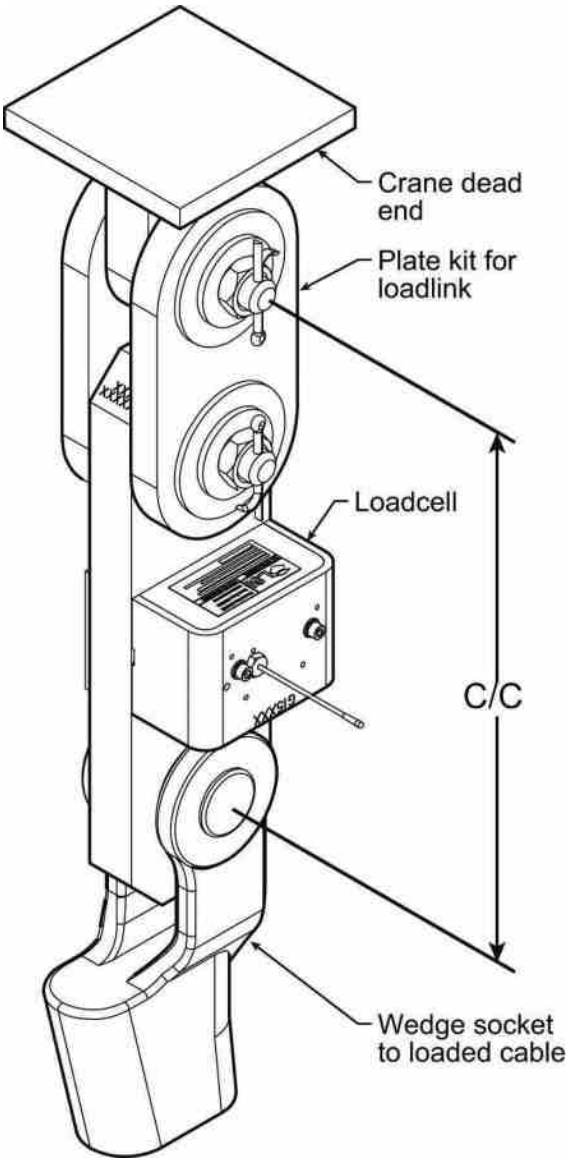

Figure: Typical load cell and adapter plate assembly installed

2.3 Angle Sensors

> NOTE - Keep the angle sensor away from the boom and any connecting metal structures when welding the metal lugs to the boom. Proximity to welding may cause permanent damage to the angle sensor and prevent accurate angle indication.

2.3.1 Mounting Procedure

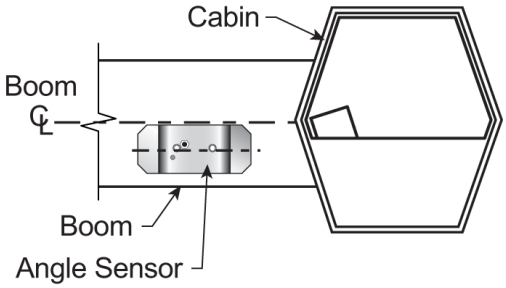

Figure: Angle sensor level with the boom (typical installation) - Side View

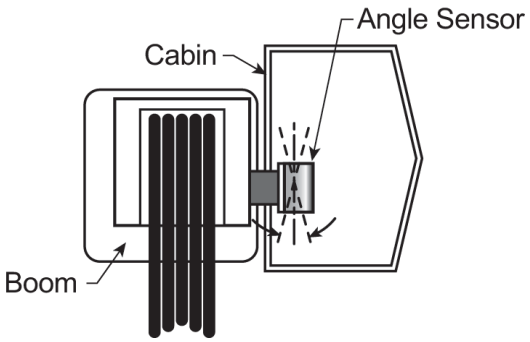

Figure: Angle sensor top/bottom axis within 15° of vertical (typical installation) - Front View

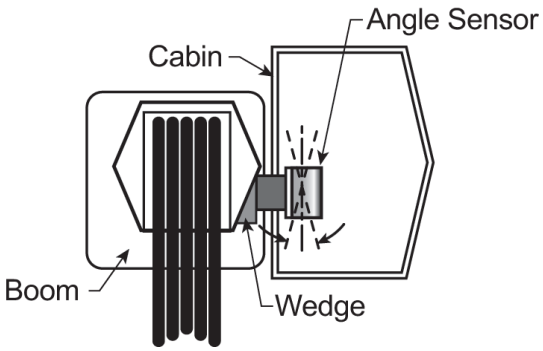

Figure: Wedge used to mount the angle sensor with its top/bottom axis within 15° of vertical (typical installation) - Front View

The GS010 series angle sensors can be turned on by starting up the GS920 to which they are programmed. The angle sensor can then assist in leveling itself with the red and green LED.

Determine the angle sensor position.

The GS010-01 boom angle sensor can be mounted on either side of the boom.

The GS010-02 360° angle sensor must be mounted on the port side of the jib.

The angle sensor must be level with the boom or jib centerline.

The top/bottom axis of the angle sensor must be within 15 degrees of vertical.

The angle sensor should have a clear line of sight to the cabin mounted GS920 main control unit.

The angle sensor antenna should not contact a metal object.

> WARNING - The angle reading may be affected by vibration and may fluctuate; the angle sensor should not be installed in close proximity to a high RPM electric motor or other source of high frequency vibration.

Install the welding pads; keep the angle sensor at least three feet from the weld site and any connecting metal objects while welding.

Mount the angle sensor to the weld pads with the screws and washers provided.

Verify angle indication on the LiftingWorks application.

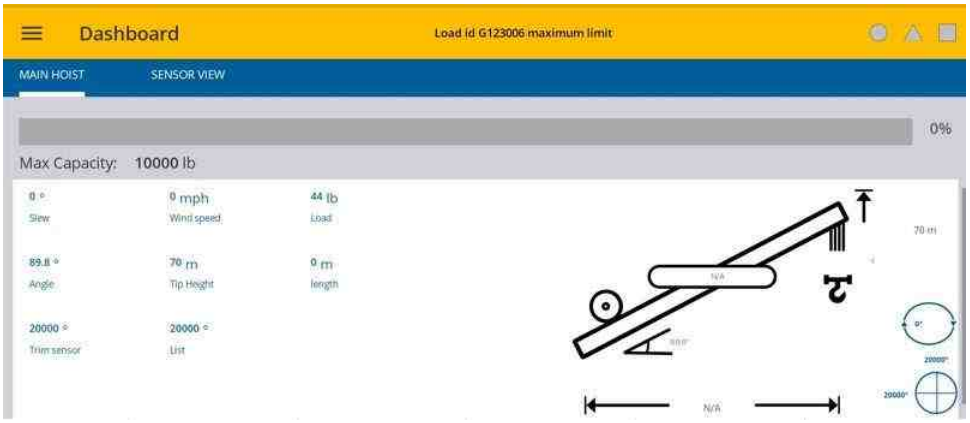

Figure: Typical operation page with boom angle indication

If the angle displayed by a GS010-01 boom angle sensor is a high negative value, then tilt the angle sensor up over 45 degrees, and then tilt back down to horizontal. The GS010-01 boom angle sensor will automatically detect on which side of the boom it is installed and correct angle indication accordingly.

2.3.2 Angle Calibration Procedure No. 1: Mechanical Setup

Level the boom such that it is perfectly horizontal; use a high-quality bubble or digital angle sensor. If the LiftingWorks application indicates 0.0 degrees, then angle calibration is complete, if not then continue to step 2.

> WARNING - Failure to ensure the boom leveled will result in false reading of the crane's radius hence the risk of structural failure of the crane or crane tipping over.

For GS011 angle/length sensors only: Carefully remove the cover of the GS101 cable reel.

Loosen the mounting screw in the slotted hole of the angle sensor mounting plate.

Pivot the angle sensor slightly until angle indication is correct. Repeat the angle validation (step 1) as required.

> NOTE - When the angle sensor is moved very slowly, it may take several seconds to see an update at LiftingWorks application. Instead move the sensor up a couple of degrees, and then bring it back down to where it should be. The small light on the angle sensor flashes when it transmits a new value to the liftingWorks application. To set the angle sensor to transmit continuously for 5 minutes, go to menu 4B1) Automatic Calibration and select the angle sensor.

2.3.3 Angle Calibration Procedure No. 2: Correct with GS920

Calibrate angle indication by adjusting the trim (offset) value in the LiftingWorks application; the GS920 will then communicate the updated trim value to the sensor.

Position the boom at a precisely known angle.

Click on Sensor Calibration.

Enter the user password.

Click on Manual Parameter Adjustment.

Select the angle sensor to be calibrated.

Click Trim.

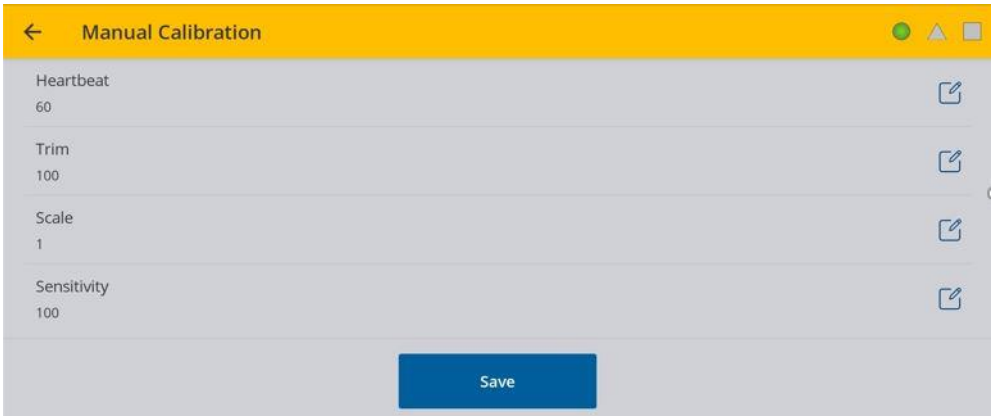

Figure: Angle Calibration Procedure No. 2

Modify the trim value.

> EXAMPLE - If the angle indicated is 0.3° over the actual angle, adjust the trim value to -0.3. If the angle indicated is 0.9° below the actual angle, adjust the trim value to 0.9.

Verify accurate angle indication at both very high and very low angles.

2.4 Anti-Two-Block Switch

> WARNING - Keep the anti-two-block switch away from the boom and any connecting metal structures when welding mounting brackets to the boom. Proximity to welding may cause permanent damage to the anti-two-block switch and render the anti-two-block system unsafe.

> NOTE - To ensure reliable radio communication between the anti-two-block switch and the GS920, the following conditions must be respected:
>
> 1. The antenna of the anti-two-block switch should not be in contact with metal.
> 2. The anti-two-block switch antenna should point to the left or to the right of the boom; it should not point directly to, or away from, the GS920 main control unit.
> 3. The anti-two-block switch antenna should have a clear line of sight to the main control unit; in most cases this means mounting the sensor on the same side of the boom as the operator's cab.

Verify the anti-two-block switch is programmed to the GS920. Switches shipped with main control unit are pre-programmed in the factory. ***Test: if the switch has been programmed to the Controller, then the LiftingWorks application will go into two-block alarm when the switch is released.*** Press Bypass to silence the alarm until the next two-block event or simulation. If the switch has not been programmed to the main control unit, this should be done before proceeding with installation. See How to Add a Sensor to the GS920, page 75.

2.4.1 Switch Bracket Installation LB011

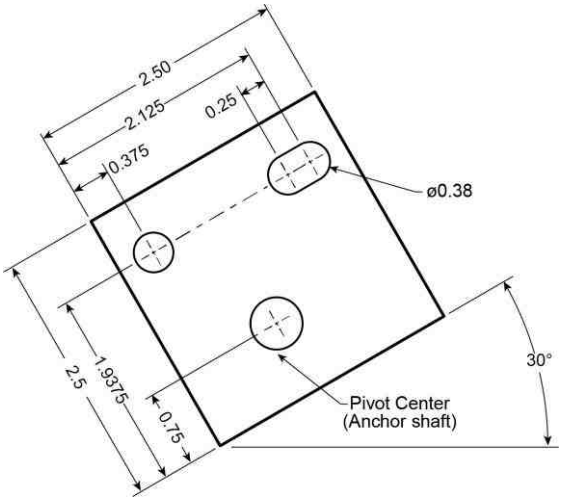

Figure: Bracket footprint and orientation. All dimensions are in inches. Not to scale.

Position the sensor mounting bracket. To ensure that the sensor can pivot securely on the mounting bracket throughout the full range of boom angle, the mounting bracket must be positioned at a 30° from horizontal with the boom parallel to the ground and such that the locking pin of the mounting bracket points up. Bolt or weld securely.

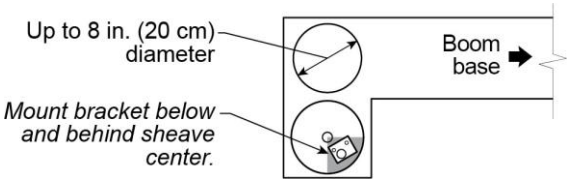

Figure: Anti-two-block switch placement on a telescopic boom

If the head sheave diameter is between 8 and 16 inches (20-41 centimeters) then two mounting brackets will be required to permit both live- and dead-end mounting.

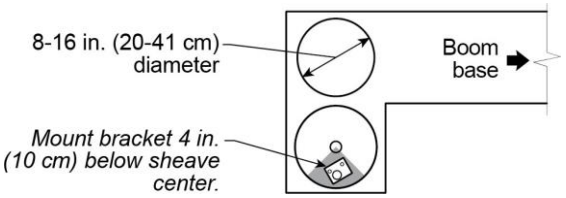

Figure: Bracket footprint and orientation. All dimensions are in inches. Not to scale.

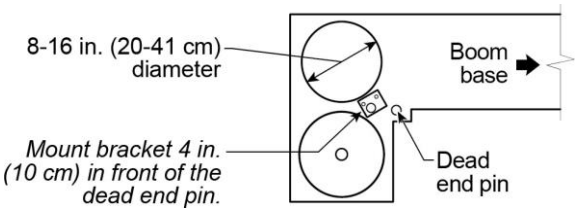

Figure: Figure: Anti-two-block switch placement on a telescopic boom

For live-end mounting on multiple sheave blocks with sheaves greater than 16 inches (41 centimeters) in diameter consult your service representative.

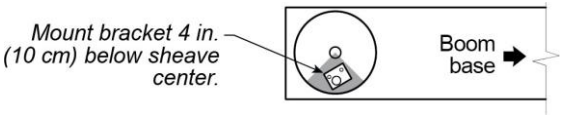

Figure: Jib, rooster, or other extension; anti-two-block switch placement for single part of line operation only

For fast line weight installation place the anti-two-block switch mounting bracket directly below the sheave center as low and as close to the edge of the sheave as possible. Place the fast line weight mounting bracket on the opposite side of the sheave with the chain hole pointing down and lined up opposite the pivot of the anti-two-block switch mounting bracket.

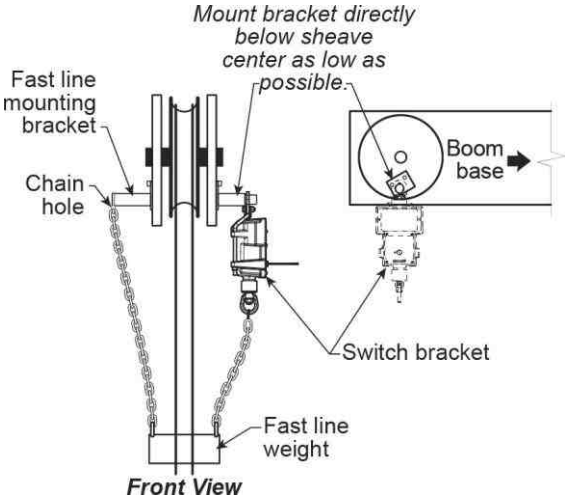

Figure: Fast line weight installation

2.4.2 GS075B Installation

Install the GS075B on the LB011 (switch bracket) already installed on the crane boom (see Switch Bracket Installation LB011, page 29), with the antenna pointing away from the boom.

Install a weight and chain assembly to the eye nut. The weight and chain assembly can either be supplied by Trimble (as an option) or the original assembly supplied with the crane. If the original assembly is to be used, its total weight must not be more than 13 lb.

2.4.3 Chain Length Adjustment

Chain length adjustment No. 1 – minimum boom angle:

At minimum boom angle, with no additional weight on the hook block and one part of line only, lift the boom just enough to have the hook block suspend and clear the sensor chain and weight.

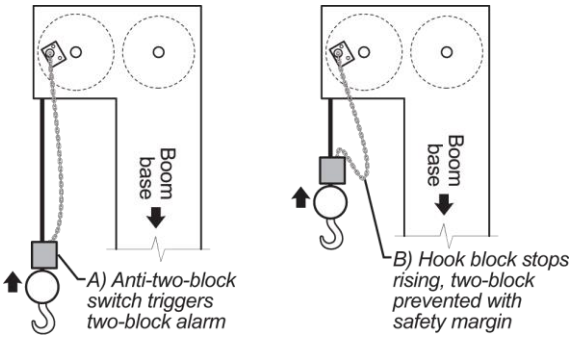

Figure: Chain length test at minimum angle

Hoist slowly until the buzzer sounds. Note the hoisting distance remaining; this distance must be great enough to allow the operator and the lockout system, if installed, to prevent a two-block event. If necessary, add chain between the sensor and weight to increase warning distance. If still insufficient, contact your service representative.

Chain length adjustment No. 2 – maximum boom angle:

Raise the boom to the maximum angle.

Hoist slowly as described in Step 1b. Verify that the warning distance is equal to or greater than that determined at the minimum boom angle.

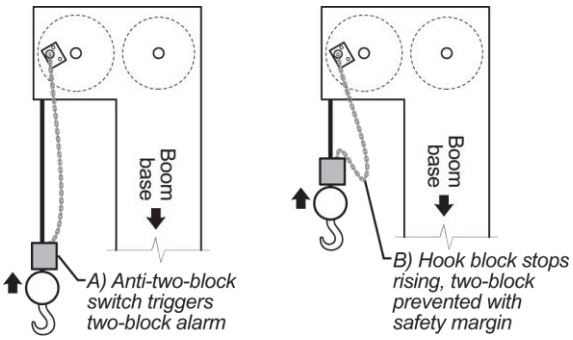

Figure: Chain length test at maximum angle

Chain length adjustment No. 3 – speed test:

Lower the boom until the weight height becomes visually clear to the operator. Repeatedly create two-block, progressively hoisting faster, to ensure that the warning and lockout work within acceptable amount of time and distance. Increase the length of the chain if needed.

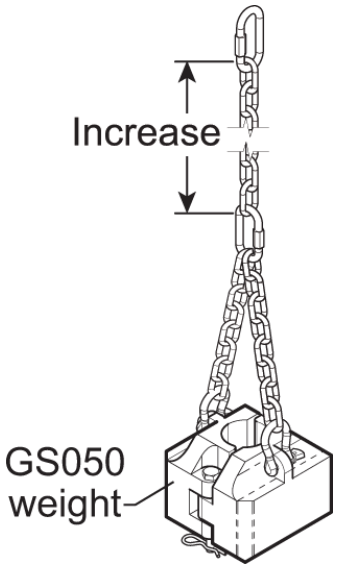

Figure: Chain length adjustment

NOTE - To increase chain length, only use lightweight chain.

2.5 Length Sensor Cable Reel

> WARNING - Arc welding may damage Trimble sensors, causing immediate failure or greatly reducing functional life. Arc welding on or near Trimble equipment will void warranty. Keep Trimble equipment well clear of any arc welding.

The GS101 includes the LS101 cable reel and the GS011 angle/length sensor. The GS011 is concealed under the cover of the LS101, though the antenna is visible. Following cable reel installation and boom length indication calibration, boom angle indication will have to be verified and possibly calibrated. Refer to Angle Calibration Procedure No. 1: Mechanical Setup, page 26 and Angle Calibration Procedure No. 2: Correct with GS920, page 27.

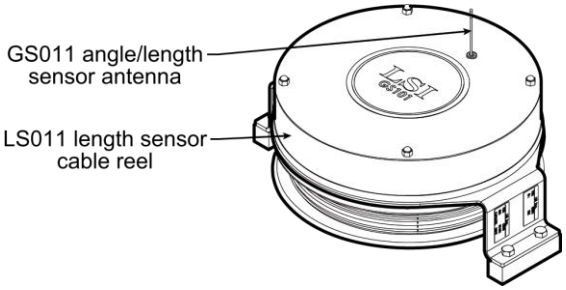

Figure: GS101 angle and length sensor

2.5.1 Maximum Boom Extension

Confirm the maximum extension of the LS101 cable reel is compatible with the maximum boom length.

Step 1. Note the cable reel maximum extension:
100 feet (30.5 meters) unless specified otherwise. T =_____

Step 2. Note the retracted boom length. A =_____

Step 3. Note the maximum extended boom length, not including jib. B =_____

Step 4. Calculate maximum boom extension. C = B – A =_____

Step 5. Compare cable reel maximum extension (T) to maximum boom extension (C). D = T – C =_____

Maximum cable reel extension must be greater than maximum boom extension.

2.5.2 Mounting the Cable Reel

Determine placement. Find a clear mounting position on the left side of the first (main) section of the boom. The mounting position should be close to the base of the boom; at least ten feet (three meters) from the tip of the first section and where the cable reel won't obstruct free boom movement at all boom angles and slew positions. Furthermore, the reel must be placed such that the cable has a clear straight line to the end of the last section at all boom lengths.

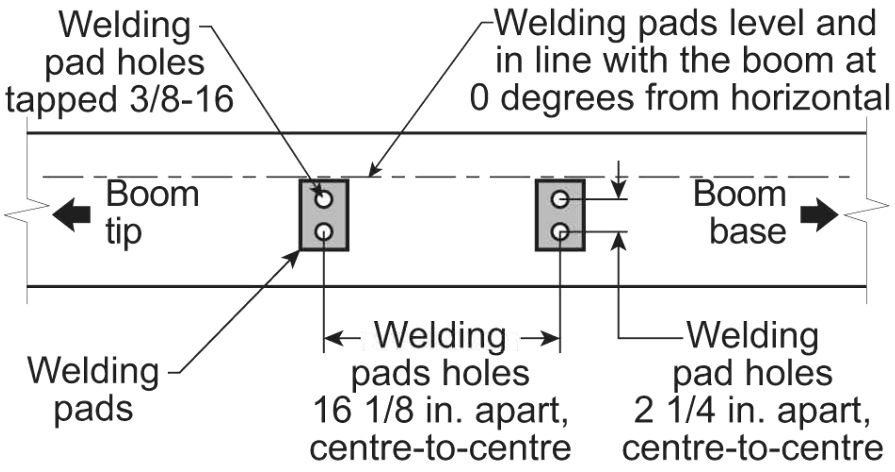

Figure: Cable reel mounting position

> NOTE - When factory installed, the GS011 angle/length sensor transmitter is integrated to the LS101 cable reel with the angle sensor zeroed. If the cable reel is installed perfectly level on the boom at 0 degrees, the angle sensor of the GS011 will also be zeroed. Minor adjustments to the angle sensor (within ±2°) are possible after cable reel installation.

Mount the welding tabs. They must be placed parallel to each other, with 16 1/8" inches between the holes' centres. Install the tabs such that they create a level mounting position in line with the boom at 0 degrees.

Attach the reel to the welding tabs with the bolts provided.

Install the first cable guide (PA111) about 10 feet (3 meters) from the cable reel. Correct alignment of the first guide is critical to ensure orderly winding of the cable on the reel. Install the other guides at the end of each of the intermediate sections and the anchor (PA113) at the end of the last section. All guides must be aligned so as to permit unobstructed movement of the cable.

Pull out at least 5 feet (1-1/2 meters) of cable, but not more than half the excess extension of measurement D. Feed through the cable guides and attach to the cable anchor on the tip of the last boom section. If additional cable length is required to reach the cable anchor point remove winds from the reel without putting additional tension on the cable reel spring. There should be minimal tension on the cable reel spring when the boom is fully retracted.

Verify the boom length indicated on LiftingWorks application. Boom length indicated should equal the actual total boom length. The actual boom length is the distance from the boom base pin to the head sheave centre as measured along the boom centreline. Depending on the exact placement of the cable reel and the cable anchor the displayed length may differ from the actual length.

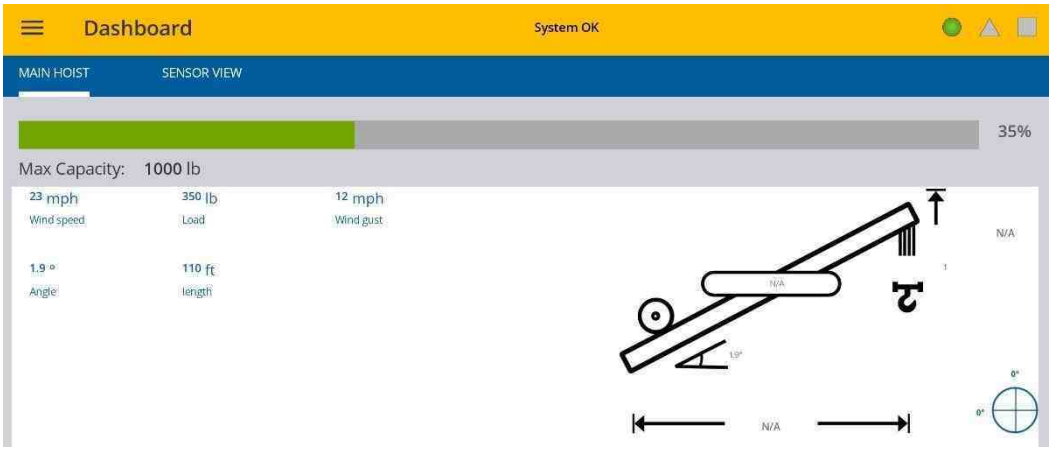

Figure: Typical operation page with boom length indication

2.5.3 Boom Length Calibration Procedure No. 1: Mechanical Setup

> CAUTION - ***Visually monitor remaining length on the cable reel as the boom is extended for the first-time following installation.*** This generally requires a second person (in addition to the operator).

Fully retract the boom.

Adjust the loose wire rope at the boom tip so that the displayed boom length matches the actual boom length.

Fully extend the boom.

Verify the boom length indicated at full boom extension matches the actual fully extended boom length. If not then follow Boom Length Calibration Procedure No. 2: Correct with the GS920, page 37.

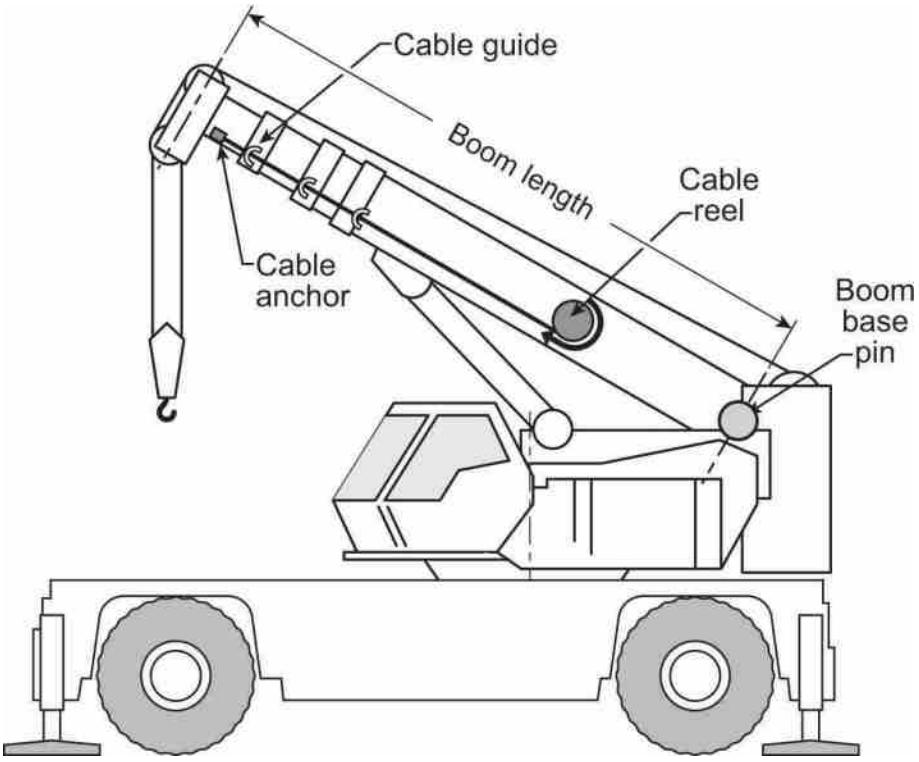

Figure: The actual boom length. Typical illustration.

2.5.4 Boom Length Calibration Procedure No. 2: Correct with the GS920

If the displayed boom length does not match the actual length of the boom retracted or extended and if it is not possible to easily correct by following Boom Length Calibration Procedure No. 1: Mechanical Setup, page 36, then follow this procedure. This procedure is completed in the operator's cab, it requires fully retracting, and then fully extending the boom, as prompted by the on-screen instructions.

Go to menu Installation and Click Sensor Calibration.

Enter the user password and go to menu Automatic Calibration Wizard.

Select the length sensor to confirm communication with the sensor is possible.

Start the wizard.

Figure: The boom length calibration wizard, Confirm minimum Boom length.

Fully retract the boom and use Up and Down to adjust the length value displayed to equal the actual fully retracted boom length, and then press Enter to confirm.

Fully extend the boom and use Up and Down to adjust the length value displayed to equal the actual fully extended boom length, and then press Enter to confirm.

Figure: The boom length calibration wizard, confirm maximum boom length.

Note the new trim and scale values.

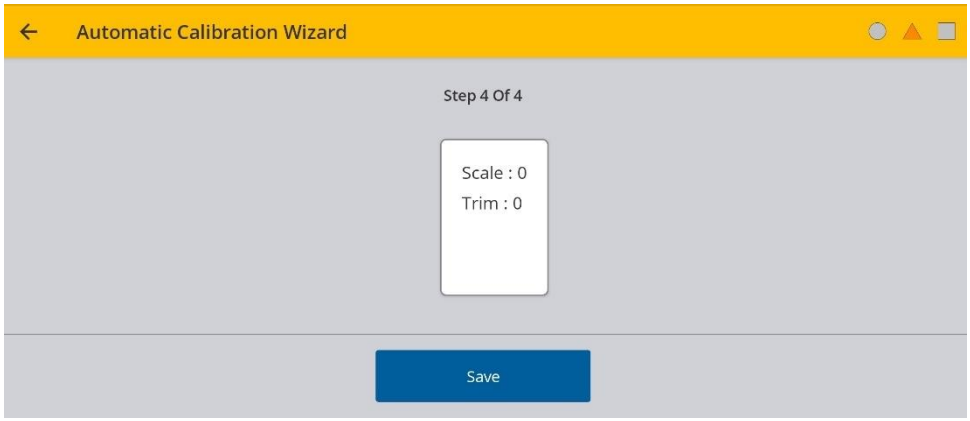

Figure: The boom length calibration wizard, Trim and Scale values.

Press Save to send the new calibration to the length sensor.

Press Back to return to the main page of the LiftingWorks application.

2.6 Radius

2.6.1 Radius Verification and Adjustment

Verify the boom and luffing jib1 angles, and the boom length2, are indicated correctly.

Verify the correct rated capacity chart is selected3.

Test No. 1: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum angle; repeat at minimum and maximum boom length2. If radius indication is not accurate then go to step 4.

Measure the basic radius parameters on the crane.

Program the basic radius parameters in the radius settings menu.

Test No. 2: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum boom angle; repeat at minimum and maximum boom length2. If radius indication is not accurate then go to the next step.

> NOTE - If the difference between the displayed radius and actual radius remains constant at all boom lengths and angles, then correct by adjusting the slew offset. For example, if the radius displayed is always 2.3 feet longer than the actual radius, then subtract 2.3 from the slew offset.

If the crane is rigged with the main boom only, then go directly to step 11.

If the crane is rigged with a rooster, jib, or other extension then the advanced radius parameters must be measured on the crane and then programmed in the radius settings menu of the LiftingWorks application.

Test No. 3: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum boom angle; repeat at minimum and maximum boom length2. If radius indication is not accurate then, go to the next step.

Test for boom deflection (telescopic crane only): is the radius indicated equal to the actual radius with the boom at 0 degrees and at 90 degrees but smaller than the actual radius with the boom at 45 degrees?

---

[1]When the hoist is rigged off a luffing jib only.

[2]Telescopic boom cranes only.

[3]Systems with rated capacity charts programmed in the GS920 only.

If yes, then adjust the boom deflection value to compensate:

Raise the boom to 45 degrees with a known load.

Compare the indicated radius with the actual radius. Change the boom deflection value and again compare the radius displayed with the actual radius.

Repeat until the radius displayed equals the actual radius.

> NOTE - With the boom at 45° and the maximum load on the hoist, the boom deflection value should equal the difference between the actual and the displayed radius. With the boom at 45° and half the maximum load on the hoist, the boom deflection value should equal twice the difference between the actual and the displayed radius.

Test No. 4: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum boom angle; repeat at minimum and maximum boom length[2]. If radius indication is not accurate, then refer to Radius Settings, page 40.

2.6.2 Radius Settings

Go to menu Installation and select Click Radius and Height Settings.

Enter the user password.

Click on radius settings to modify and adjust the settings.

Figure: Radius Settings menu

2.6.2.1 Menu 4C) Radius Settings

Boom length[1]
Slew offset[1]
Boom foot height offset
Tip height tolerance
Boom top length
Boom top offset
Jib offset
Lattice extension offset
Jib mounting point perpendicular
Jib mounting point parallel
Reel includes manual
Manual boom section length
Fully retracted boom length
Fully extended boom length
Main hoist
Jib length
Luffing jib length
Lattice extension length
Sheave head length perpendicular[1]
Sheave head length parallel
Sheave radius[1]
Deduct
Auxiliary hoist
...16A) to 16G): same as 15A) to 15G)
Auxiliary hoist 2
...17A) to 17H): same as 15A) to 15G)
Auxiliary hoist 3
...18A) to 18H): same as 15A) to 15G)
Auxiliary hoist 4
...19A) to 19H): same as 15A) to 15G)
Auxiliary hoist 5
...20A) to 20H): same as 15A) to 15G)

[1]Boom length

2.6.3 Basic Radius Parameters for a Lattice Crane

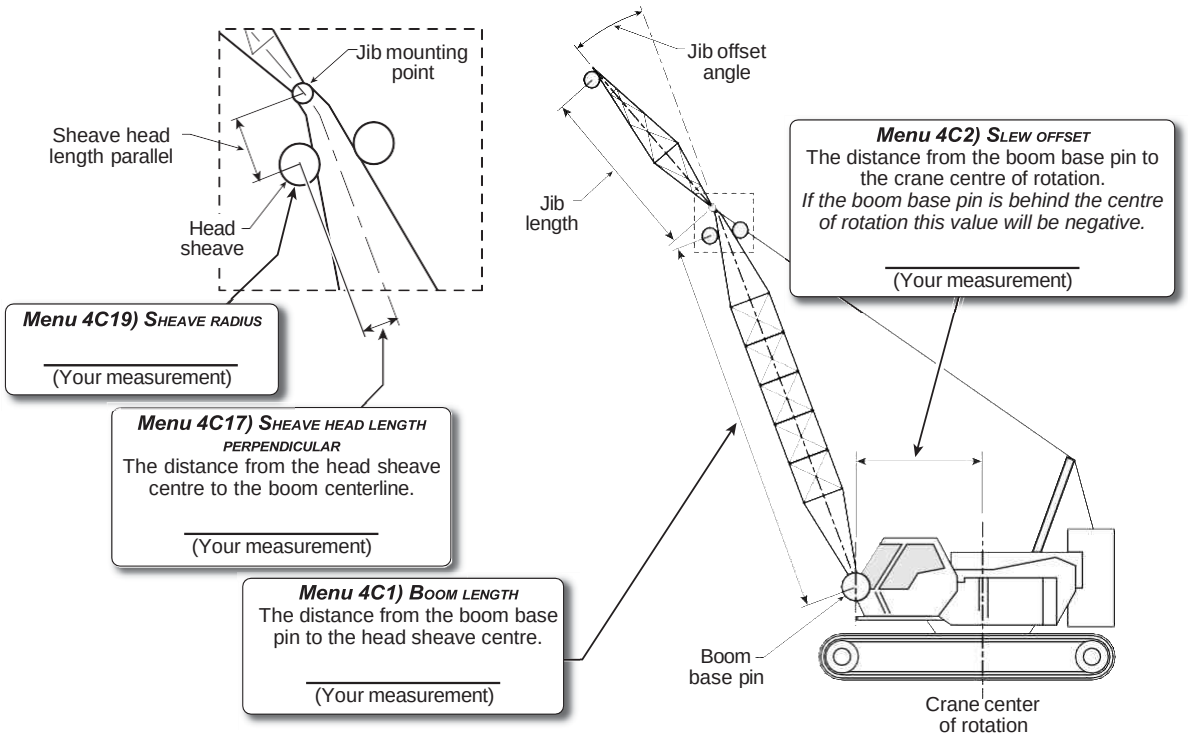

Figure: Basic radius parameters for a lattice crane.Typical installation. Not to scale.

2.6.4 Basic Radius Parameters for a Telescopic Boom Crane

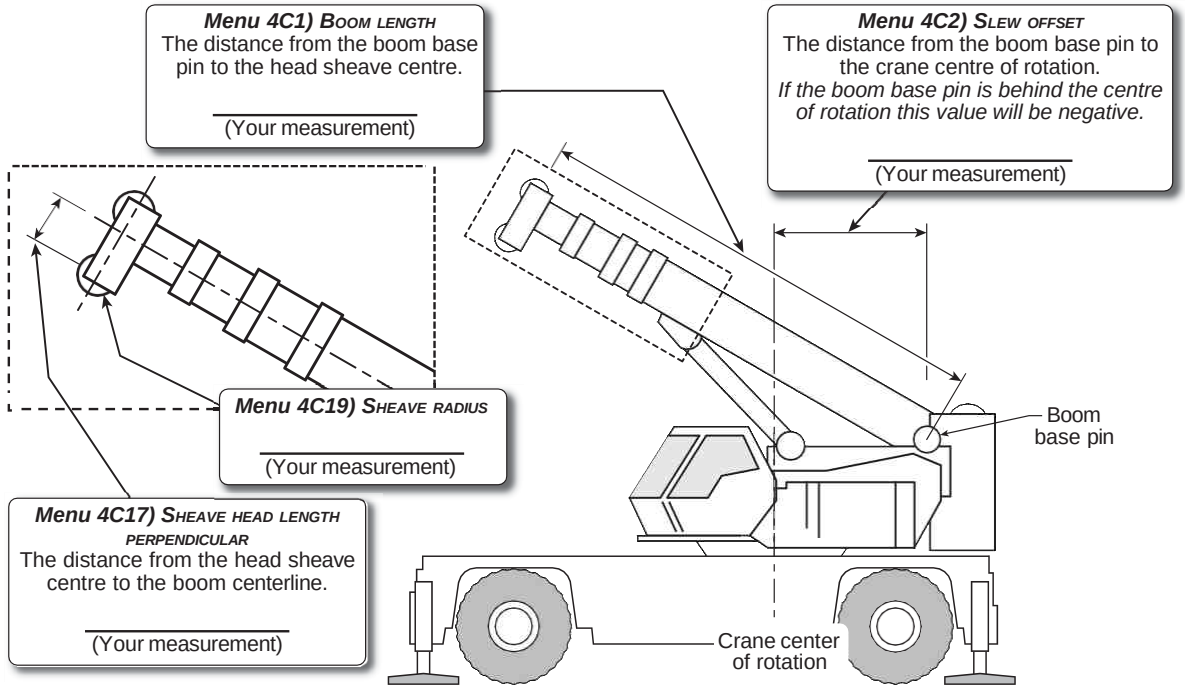

Figure: Basic radius parameters for a telescopic boom crane. Typical installation. Not to scale.

2.6.5 Advanced Radius and Height Parameters

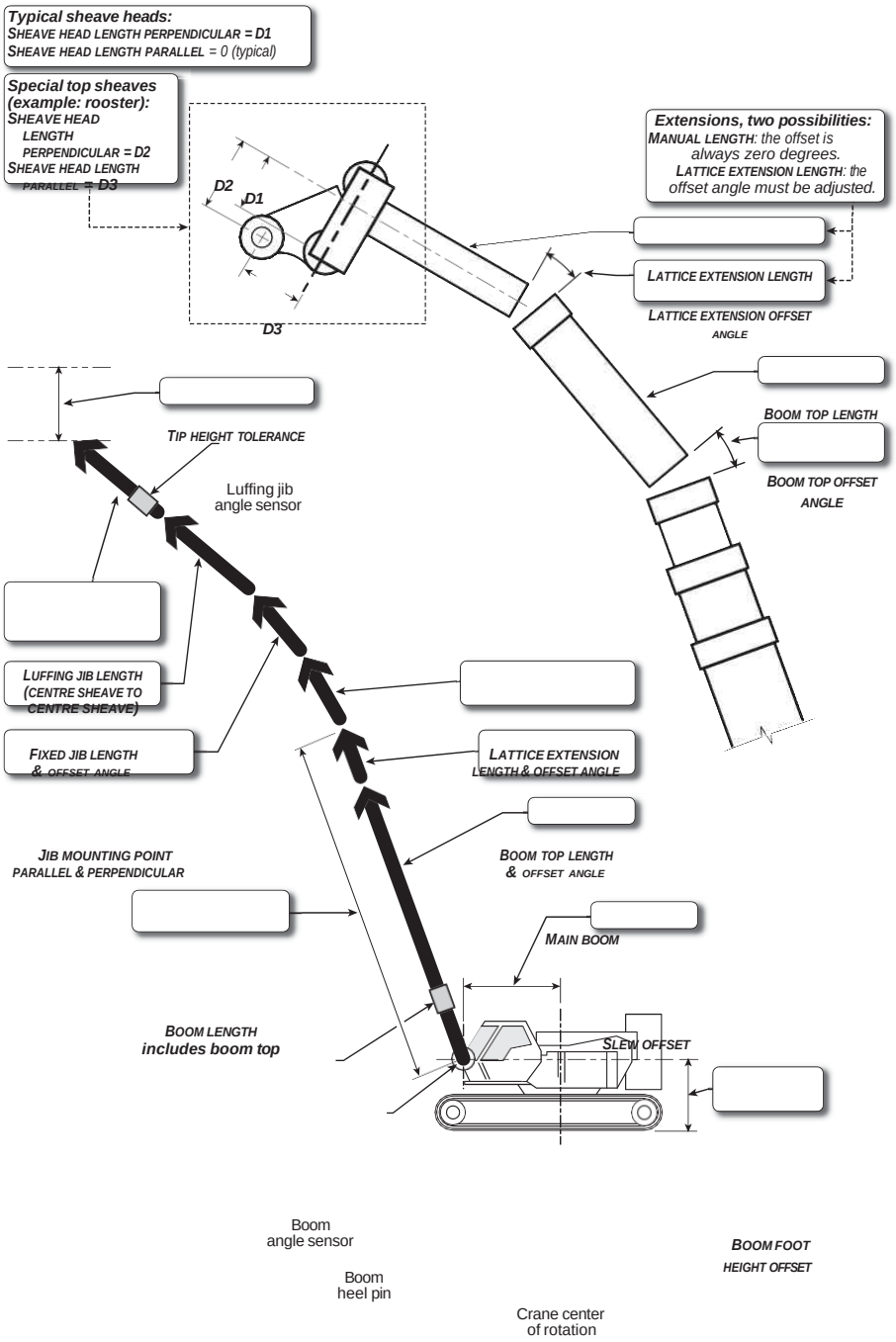

Figure: Advanced radius and height parameters. Typical installation. Not to scale.

2.6.6 Radius Parameters for a Lattice Crane with Mast

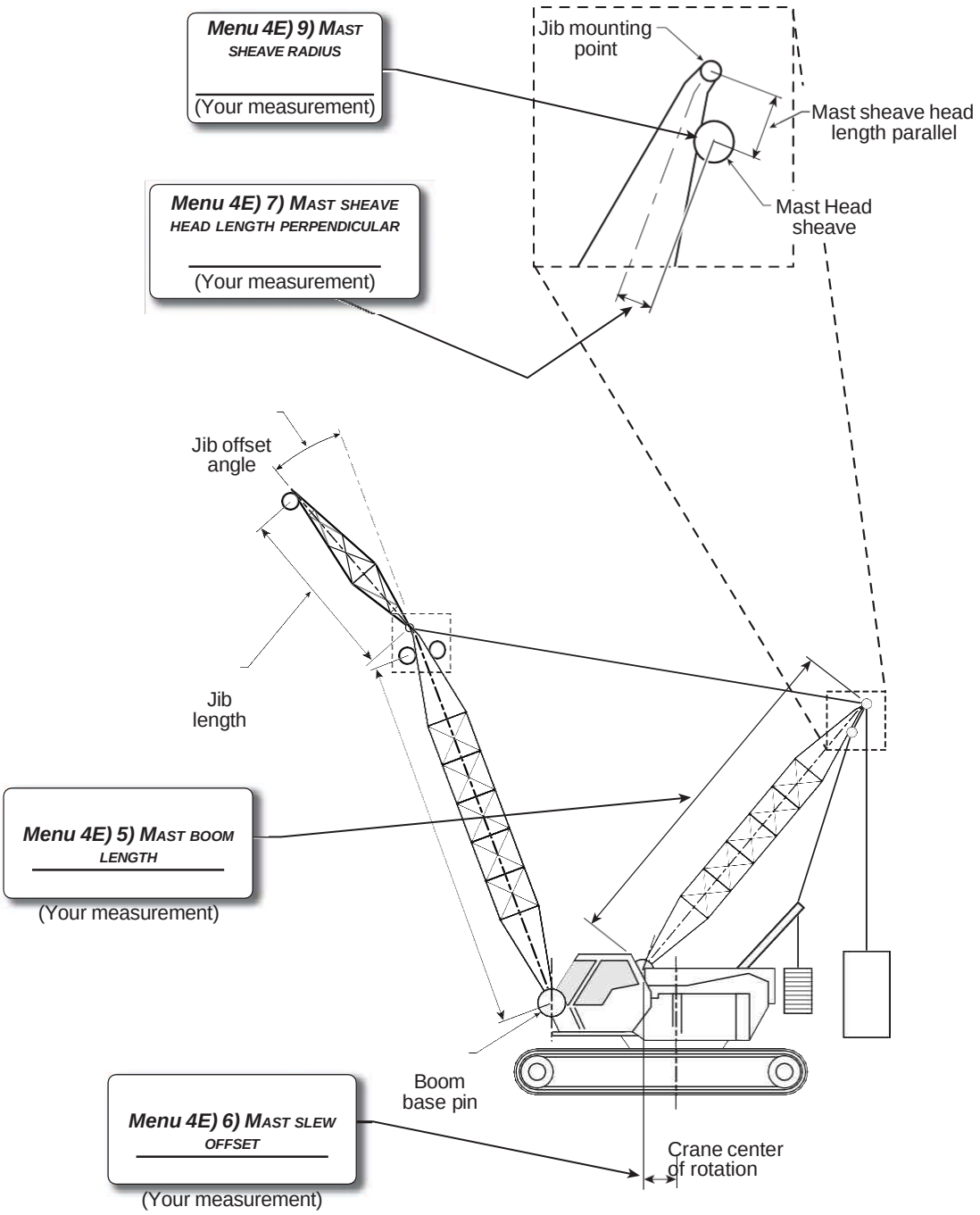

Figure: Advanced radius parameters - Lattice crane with Mast. Typical installation. Not to scale.

2.7 Wireless Wind Speed Sensor GS020

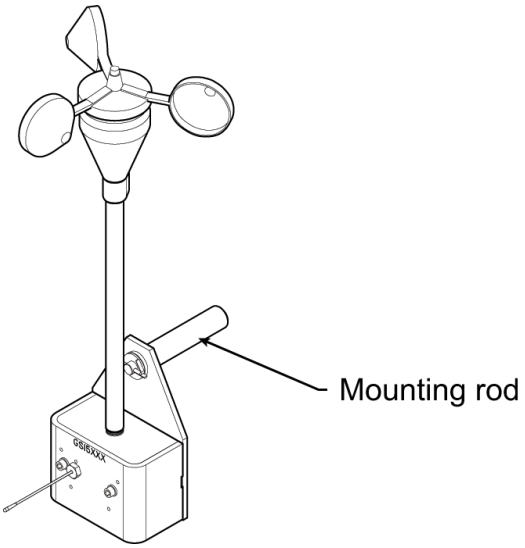

Figure: GS020 wireless wind speed sensor

Remove the mounting rod from the wind speed sensor.

> NOTE - Do not weld in proximity to Trimble sensor/transmitters.

Determine the mounting rod position.

Install the mounting rod on the same side of the boom as the cabin mounted main control unit, perpendicular to the boom, and at the highest point possible.

The wind speed sensor must pivot freely on the mounting rod at all boom angles.

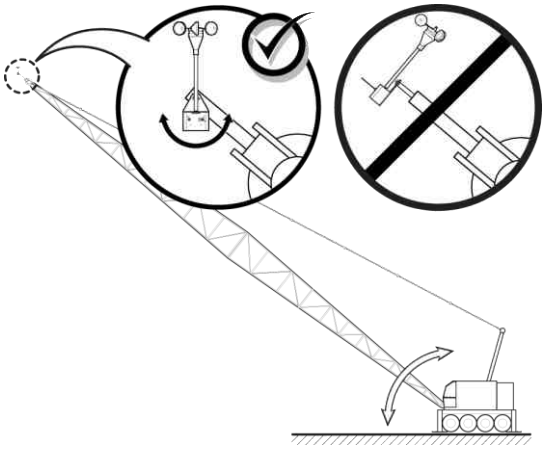

Figure: Swivel orientation

The wind cups must be fully exposed to the wind and spin freely at all boom angles.

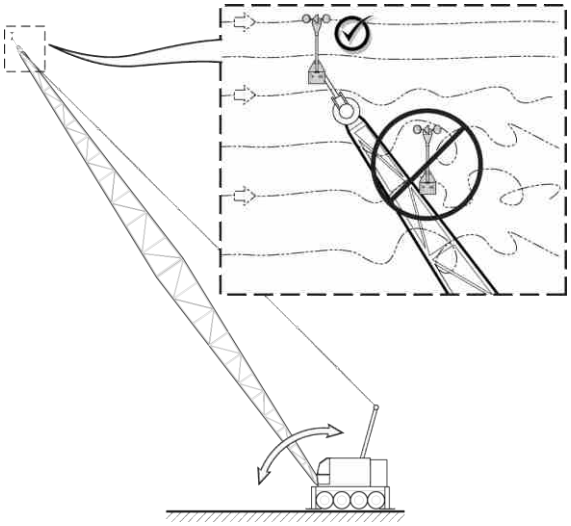

Figure: Wind clearance

There should be a clear and unobstructed line of sight between the wind speed sensor antenna and the cabin mounted unit.

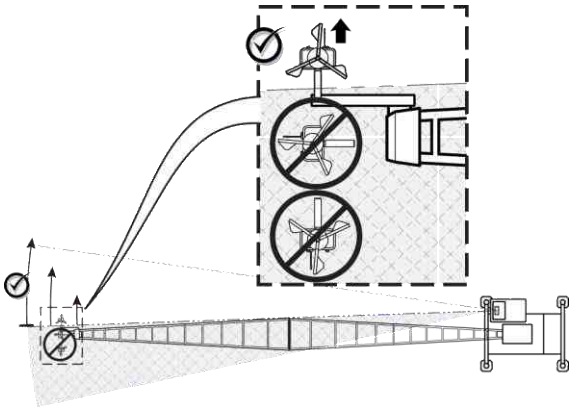

Figure: Radio line of sight - Crane top view

> NOTE - Angle iron can be used to extend the mounting position to be clear of the boom top.

Weld or screw the mounting rod to the boom at the selected position.

Re-position the wind speed sensor on the mounting rod, add the washer and secure with the cotter pin.

2.8 Wireless Load Pins

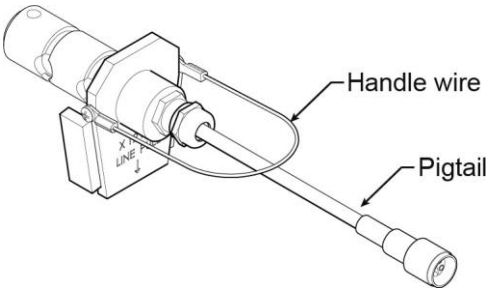

Figure: Do not pull on a load pin by the pigtail, pull on the handle wire.

2.8.1 LP011, LP015, and LP026

Mount the load pin to the boom tip or block by replacing the pin of the wedge socket. The load pin is directional and must be oriented correctly to indicate load accurately. Install the pin so that the bracket embraces the wedge socket and prevents pin rotation.

> NOTE - When installed at the boom tip, the lot number can be read right side up and the “line pull” arrow points down towards the block. When installed at the hook ball or block, the lot number can be read upside down and the “line pull” arrow points up towards the boom tip.

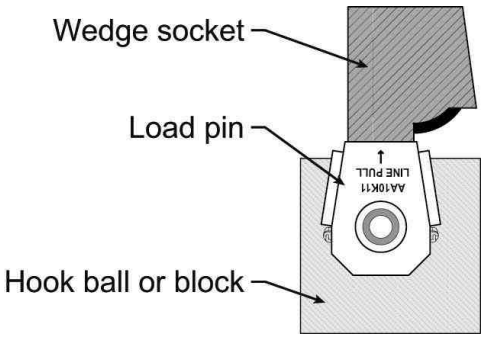

Figure: Load pin LP011, LP015 or LP026 - Installation on a single part block

Secure the load pin in place with a cotter pin or other suitable keeper device.

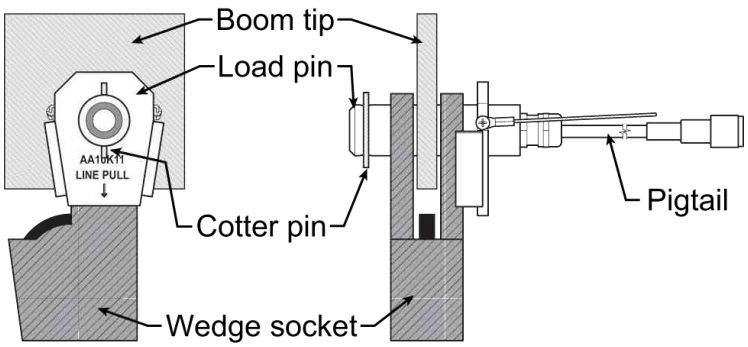

Figure: LP011, LP015 or LP026 - Installation at boom tip

2.8.2 Load Pin Transmitter GS001

Determine the transmitter mounting position.

The load pin and transmitter pigtails must connect easily without stretching or kinking at all boom angles and working conditions. The jumper cable may be used between the load pin and transmitter to increase transmitter placement options.

There must be direct unobstructed line of sight from the transmitter to the main control unit; this may not be required on cranes with a maximum boom length less than 100 feet (33 meters).

The transmitter antenna must not be in contact with any metal object.

Weld the mounting blocks where required.

> NOTE - Do not weld in proximity to Trimble sensor/transmitters.

Mount the load pin transmitter on the mounting blocks.

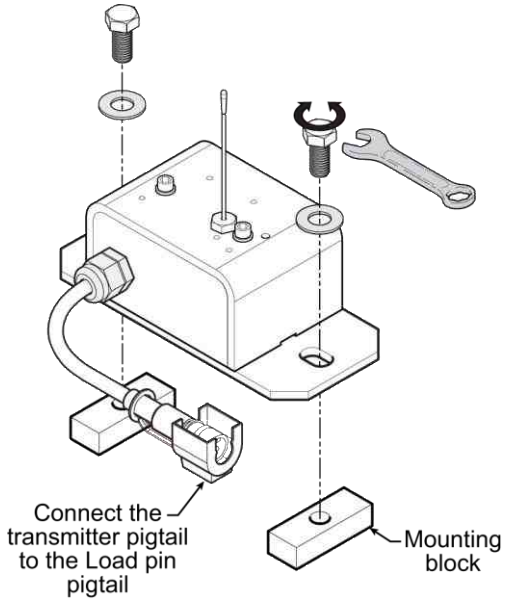

Figure: Install the load pin transmitter GS001

2.9 Line Riding Tensiometer

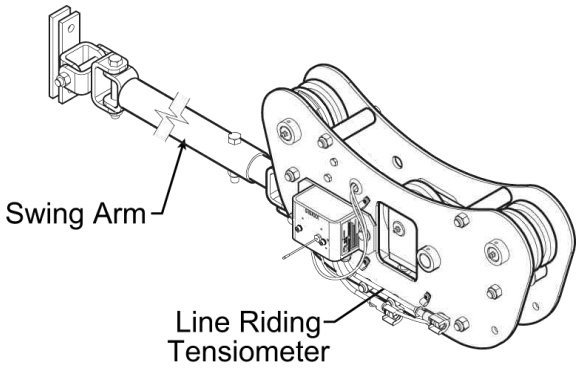

Figure: Line riding tensiometer

2.9.1 Line Riding Tensiometer Installation

CAUTION - The Line Riding tensiometer must be held by the swing arm and the tension of the wire rope; do not fix the line riding tensiometer to the boom.

The Ratio of the distance between the line riding tensiometer and the hoist drum must be 18:1 as minimum to allow a normal winding on the drum.

The angle between the swing arm and the measured rope should not exceed 30 degrees.

Two Landing Pads (Wooden cushion) must be added to allow line riding tensiometer sitting when the boom is down.

Nothing should limit free displacement of the swing arm and line riding tensiometer assembly at any boom angle or configuration.

2.9.1.1 Swing arm mounted

Most applications, mounted as far up the boom base as practical with the swing arm base attached near the tip of the butt section. This mounting allows the line riding tensiometer to follow the movement of the wire rope path.

Make sure that the swing arm is long enough to allow free movement at any boom angle.

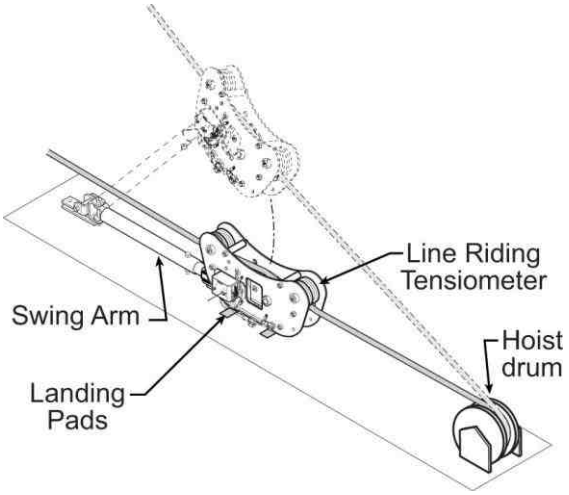

Figure: Typical installation (not to scale)

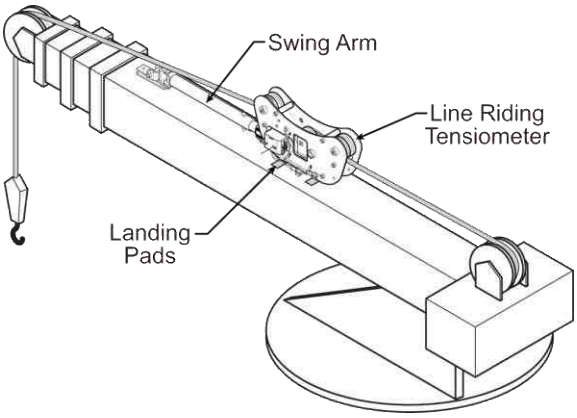

Figure: Example of a typical installation on a telescopic boom crane (not to scale)

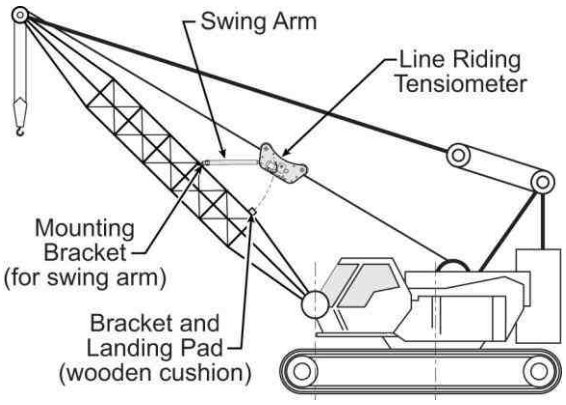

Figure: Example of a typical installation on a lattice boom crane, allows for lower clearance (not to scale)

2.9.2 Line Riding Tensiometer Installation on a Swing Arm

Verify that the line riding tensiometer size fits with the wire rope diameter.

Line Rider model	Max load (lb)	Max load (kg)	Payout Accuracy (in)	Payout Accuracy (mm)	Cable diameter (in)	Weight lb (kg)	Load-only RF transmitter	Load and Rope Payout RF transmitter	Swing Arm option	Feet Kit option
GD0375	4743	2156	0.57	14.46	3/8	29 lb 13 kg	GS007-01	GS007-02	GD012	GD030
GD0500	8343	3792	0.53	13.47	1/2					
GD0563	10571	4805	0.51	12.97	9/16					
GD0625	12971	5896	0.49	12.47	5/8					
GD0750	18514	8416	0.75	18.95	3/4	62 lb 28 mm			GD013	GD030
GD0875	25029	11377	0.71	17.95	7/8					
GD0945	32514	14779	0.68	17.21	24 mm					
GD1000	32514	14779	0.67	16.96	1					
GD1125	40857	18571	0.63	15.96	1 1/8					
GD1250	50229	22831	0.52	13.30	1 1/4	100 lb 45.5 kg			GD014	GD031
GD1260	60571	27532	0.52	13.30	32 mm					
GD1375	60571	27532	0.50	12.63	1 3/8					
GD1417	71429	32468	0.48	12.30	36 mm					
GD1500	71429	32468	0.47	11.97	1 1/2					
GD1625	83429	37922	0.45	11.30	1 5/8					
GD1750	96571	43896	0.68	17.29	1 3/4	250 lb 113.5 kg			GDO22	GD031
GD1890	124000	56364	0.63	16.13	48 mm					
GD2000	124000	56364	0.62	15.79	2					
GD2250	155429	70649	0.56	14.30	2 1/4					
GD2500	214857	97662	1.05	26.60	2 1/2	1010 lb 459 kg			GD023	GD032
GD3000	307429	139740	0.92	23.27	3					
GD4000	528571	240260	0.72	18.29	4					

Identify the hoist rope and choose a proper place, normally as far up the butt section as practical, to install the swing arm.

Install the swing arm by welding, bolting, or strapping it to the boom. It should be located to be as centered as possible with the boom end sheave and positioned such that neither the swing arm nor the line riding tensiometer interfere with the hoist rope or other objects.

Remove top sheaves and top bolts & spacers from the line riding tensiometer[1]. Place the line riding tensiometer on the unloaded hoist rope, oriented such that the transmitter antenna is on the cab side and the swing arm holes are directed to the boom top. Re-install bolts and sheaves.

Attach the swing arm end to the line riding tensiometer.

Verify that the angle the swing arm forms with the boom is not too large and that nothing limits free displacement of the swing arm and line riding tensiometer assembly at any boom angle or configuration. Extend the swing arm as needed.

If the line riding tensiometer has been supplied with rope payout, ensure that both proximity switches (led) operate as the appropriate sheave turns.

Verify that the sensor antenna is not curved.

Verify that all bolts are tight.

Operate the hoist to verify correct line riding tensiometer function.

Proceed to load pin/Line riding tensiometer calibration of the LiftingWorks /receiver (see Load Pins, Line Riding Tensiometers and Compression Cells: Calibration, page 56).

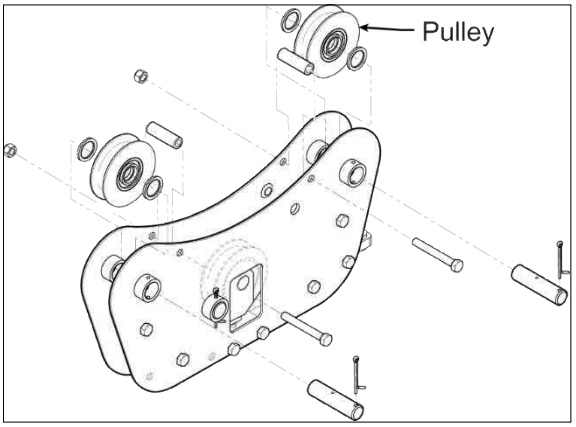

Figure: Removing top sheaves, bolts and spacers on Line Riding tensiometer type 1 (LD008 shown).

[1] The hoist rope can also be installed by passing the wire rope around the pulleys when the hook does not interfere.

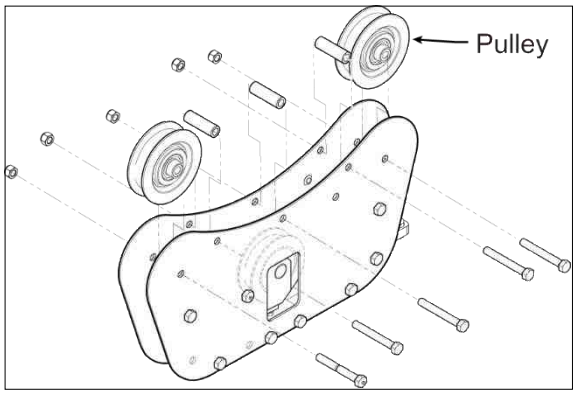

Figure: Removing top sheaves, bolts and spacers on Line Riding tensiometer type 2 (LD024 shown).

2.10 Load Pins, Line Riding Tensiometers and Compression Cells: Calibration

Load pins, line riding tensiometers and compression cells must be calibrated at installation and every time thereafter the installation, the load sensor or the load transmitter is changed.

This procedure requires two known weights. The first (light) weight should be about 10% of load sensor capacity and not less than 5%. The second (heavy) weight should be over 50% of capacity, and absolutely not less than 25%.

Go to menu Installation and select click Sensor Calibration.

Enter the user password and click Automatic Calibration Wizard.

Select the load sensor, and then click to confirm communication with the sensor is possible and to start the wizard.

Adjust the actual parts of line on the load sensor.

Figure: The automatic load calibration wizard, adjust the actual parts of line

Note the units that will be used during the calibration wizard.

Lift the first (lighter) known load and adjust the load value displayed to equal the actual known load lifted.

Lower the first load, lift the second (heavier) known load and adjust the load value displayed to equal the actual known load lifted.

Figure: The automatic load calibration wizard, adjust the load

Note the new trim and scale values.

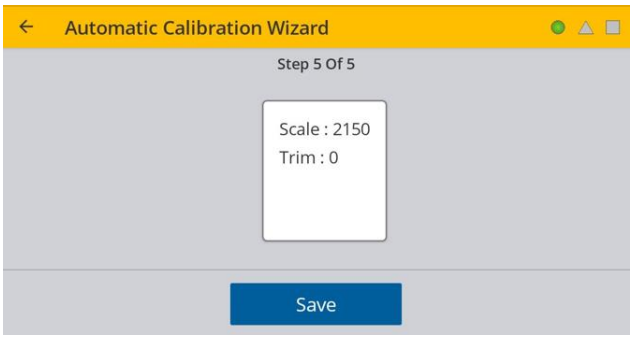

Figure: The automatic load calibration wizard, trim and scale values

2.11 Four Point Lift

The following functions are available for applications such as container cranes and gantry cranes that require load indication from four load sensors simultaneously.

Sum load indication

Imbalance

Slack Rope

These functions can be used to generate an alarm condition on the lockout wires of the GS920.

2.11.1 Sum Load Indication

When sum load indication is programmed the sum of the loads on the pre-determined load sensors is indicated by the LiftingWorks application. To activate sum load indication program a “Sum load sensor” in the sensor list. The “ID number” is used to identify the load sensors to be summed.

Sum maximum limit. The maximum limit for the sum load can be adjusted in the limit menu; the default maximum limit for sum load indication is 10000 (lb or kg depending on load units).

2.11.1.1 Program sum load indication

Go to menu Installation and select click Sensor list.

Enter the user password.

Advance to the next available sensor position, usually following the four load sensors and click to modify.

Determine the sum load cell “ID number”. For example: ID 1234 to indicate the sum of load sensors No. 1, No. 2, No. 3, and No. 4, or ID 34 to indicate the sum of load sensors No. 3 and No. 4.

Select the sensor type “Sum load cell” and click to confirm.

Adjust the ID number.

Advance to the next available sensor position to program the imbalance sensor.

Adjust the sum maximum limit in menu System Limits.

2.11.2 Imbalance

Systems programmed for four load sensors and four load sum indication can be programmed with an imbalance sensor to warn against uneven load distribution or against unwanted rope payout if one corner of the load touches down before the others.

Imbalance factor limit. The imbalance factor is the percent difference between the load on one load sensor and the average load on the other three. The imbalance factor is calculated for each of the four load sensors and then compared to an adjustable limit. The default imbalance factor limit is 15%.

Imbalance minimum limit. Imbalance is not calculated when the four-load sum is below the imbalance minimum limit. Adjust this limit to avoid generating an imbalance alarm under minimum load conditions (for example: with an empty container or with rigging only).

The default imbalance minimum limit is 1000 (pounds or kilograms depending on load available units).

Imbalance factor calculation for load sensor № 1

$$\text{Load № 1 (A) Imbalance Factor} = 100 \times \frac{(\text{Average B,C,D}) - \text{A}}{(\text{Average B,C,D})}$$

A = Load № 1 *B = Load № 2*
C = Load № 3 *D = Load № 4*

If the imbalance factor limit is 15%, then the system is safe.

$$\text{Load № 1 (A) Imbalance Factor} = 100 \times \frac{8100 - 7500}{8100} = 7.5\ \%$$

A = 7500 *B = 8100*
C = 8000 *D = 8200*

If the imbalance factor limit is 15%, then an imbalance alarm is generated.

$$\text{Load № 1 (A) Imbalance Factor} = 100 \times \frac{8100 - 6800}{8100} = \mathbf{16\ \%}$$

A = 6800 *B = 8100*
C = 8000 *D = 8200*

2.11.2.1 Program the imbalance sensor

Go to menu Installation and select Sensor list.

Enter the user password.

Advance to the next available sensor position, usually following the four load sensors.

Click the sensor type “Imbalance sensor”. Only one imbalance sensor is required to calculate imbalances for all four load sensors.

The ID can be left at 0, click Save.

Confirm the imbalance factor limit and the imbalance minimum limit in menu 6) System Limits.

2.11.3 Slack Rope

Systems programmed for four load sensors and four load sum indication can be programmed with a slack rope sensor to warn against unwanted rope payout when the load touches down.

Slack rope minimum limit. The slack rope sensor compares the sum load to an adjustable slack rope minimum limit. When the sum load goes below the slack rope limit a slack rope alarm is generated. The slack rope limit is usually adjusted to less than the weight of all rigging below the load sensors. The default slack rope minimum limit for is 1000 (pounds or kilograms depending on load available units).

2.11.4 Program the slack rope sensor

Go to menu Installation and click Sensor list.

Enter the user password.

Advance to the next available sensor position, usually following the four load sensors, the sum load sensor, and the imbalance sensor.

Select the sensor type “Slack rope sensor”. Only one slack rope sensor is required to calculate slack rope for all four load sensors.

The ID can be left at 0.

Go back to the main page of LiftingWorks application.

Adjust the slack rope minimum limit in menu System Limits.

2.12 List and Trim Angle Sensor

The GS010-03 is a two-axis angle sensor designed to detect both list and trim angle. Minimum and maximum limits for list and trim angle are adjustable in the LiftingWorks application. The unit will generate an alarm if the limits are exceeded and can be programmed to generate lockout. Furthermore, list and trim angle can be used to control rated capacity chart selection where required (example: barge cranes).

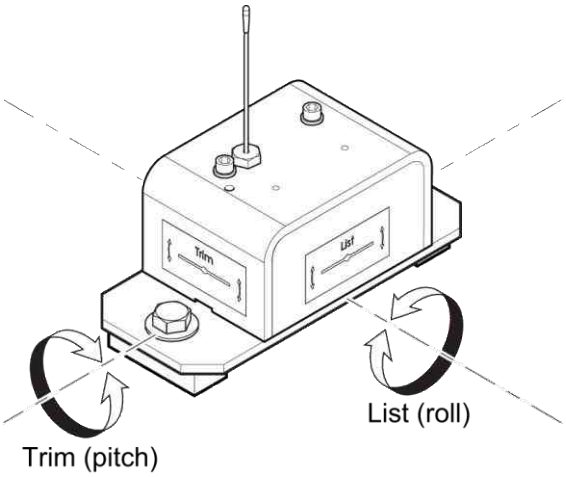

Figure: List and Trim axes

2.12.1 Programming the GS920 for List and Trim Indication

For list indication, add the GS010-03 ID number to the sensor list and select the sensor type List sensor.

For trim indication, add the GS010-03 ID number to the sensor list and select the sensor type Trim sensor.

The maximum and minimum angles for list and trim indication can be adjusted in the limit menu. The default limits are 10.0° maximum and -10.0° minimum.

2.12.2 Mounting Instructions

> NOTE - Remove the angle sensor from any connecting metal structures or surfaces when welding the metal lugs to the mounting surface. Proximity to welding may cause permanent damage to the angle sensor and prevent accurate angle indication.

Determine the angle sensor position.

The mounting surface should be flat and known to be level (0°) in both the list and trim axes.

The angle sensor should have a clear line of sight to the cabin mounted control unit.

The angle sensor should be installed horizontally, with the antenna pointing up.

The list and trim axes are indicated on the angle sensor, follow these indications to orient the sensor correctly for accurate list and trim indication.

The angle sensor antenna should not contact a metal object.

Install the welding pads; keep the angle sensor well removed from the weld site and any connecting metal objects while welding.

Mount the angle sensor to the weld pads with the screws and washers provided.

Verify list and trim angle indication in the main page of LiftingWorks application.

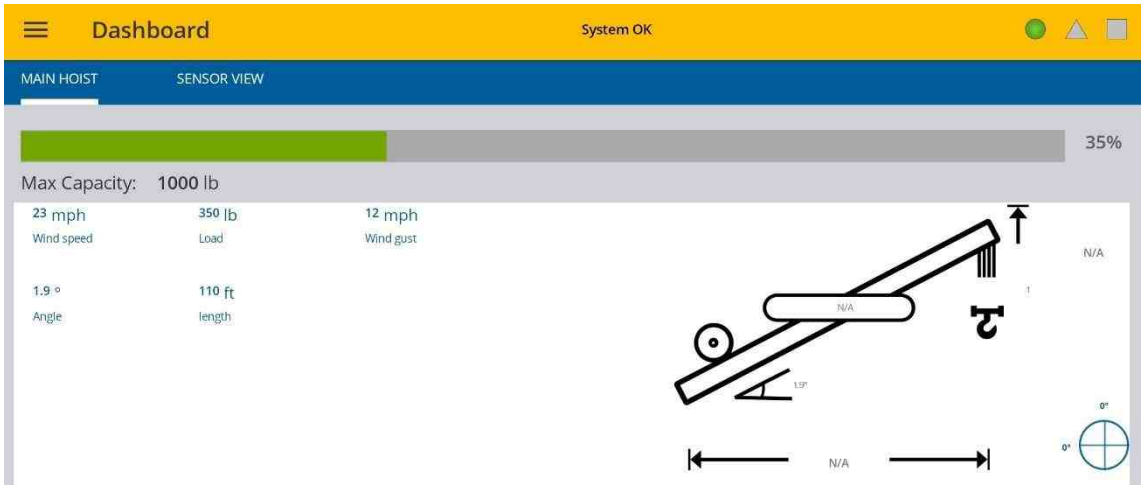

Figure: Trim and list angle indication

2.12.3 List and Trim Angle Calibration Procedure

Calibrate angle indication by adjusting the offset values for list and trim in the LiftingWorks application; the GS920 will then communicate the updated offset values to the sensor.

Install the sensor at a precisely known list and trim angle.

Go to menu Installation and Click Sensor Calibration.

Enter the user password.

Click Automatic Calibration Wizard.

Select the trim (or list) sensor.

Go to the first step of the calibration wizard; note the uncorrected angle indicated.

Adjust the angle value indicated until it is equal to the known angle.

Figure: Trim Angle calibration, adjust the angle

Note the trim and scale values.

Figure: Trim Angle calibration, trim and scale values

Save the communicate changes to the sensor.

Repeat steps 4 through 9 for the list angle.

Return to the main page of LiftingWorks application.

Verify accurate list and trim angle indication.

2.13 Rope Payout

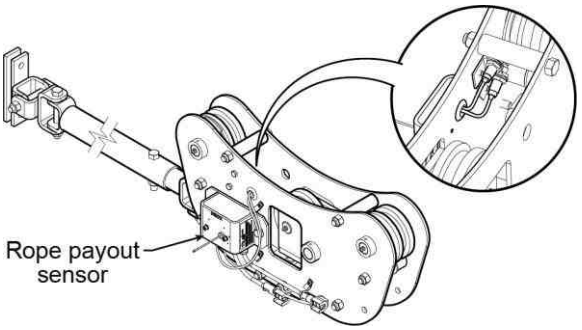

Figure: Rope payout on a line riding tensiometer

Typically, the rope payout sensor is factory installed on the line riding tensiometer load sensor (figure above). Alternatively, the rope payout sensor may be installed on an appropriate sheave (figure below). A GS920 can then be programmed to communicate with the sensor and to indicate rope payout (length) and rope speed.

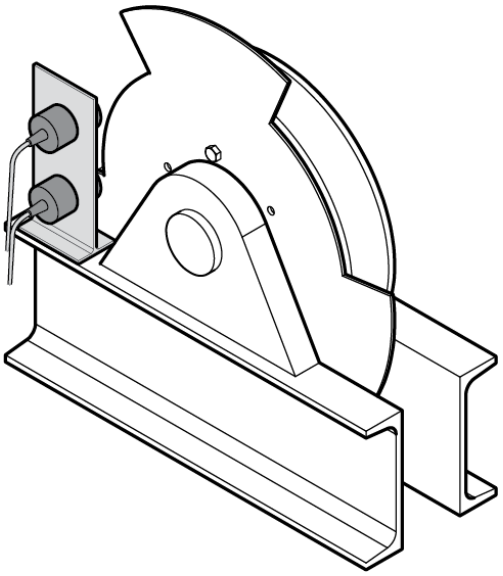

Figure: Alternative installation of a rope payout

Zero the rope payout using the Tare menu before calibration.

2.13.1 Rope Payout Calibration Procedure No. 1: Mechanical Setup

Hoist up to reel in the wire rope fully.

Install the rope payout system.

Zero the rope payout length in the Tare menu.

Hoist down to pay out a known length of wire rope (for example: 20 feet).

Verify the rope payout indicated matches the actual length of wire rope paid out. If not then follow Rope Payout Calibration Procedure No. 2: Correct with GS920, page 65.

2.13.2 Rope Payout Calibration Procedure No. 2: Correct with GS920

If rope payout indicated does not match actual rope payout, and if it is not possible to easily correct by following Rope Payout Calibration Procedure No. 1: Mechanical Setup, page 65, then follow this procedure. This procedure requires hoisting up to fully reel in the wire rope, and then hoisting down to pay out a known length of wire rope. For accurate calibration the “known length” paid out must be accurately measured.

Go to menu Installation and select click Sensor Calibration.

Enter the user password.

Click Automatic Calibration Wizard.

Select the rope payout sensor, and then click to confirm communication with the sensor is established.

Note the units that will be used during the calibration wizard, and then click Enter.

Hoist up (pay in) the wire rope, use Up and Down to adjust the actual wire rope payout length and then press Enter.

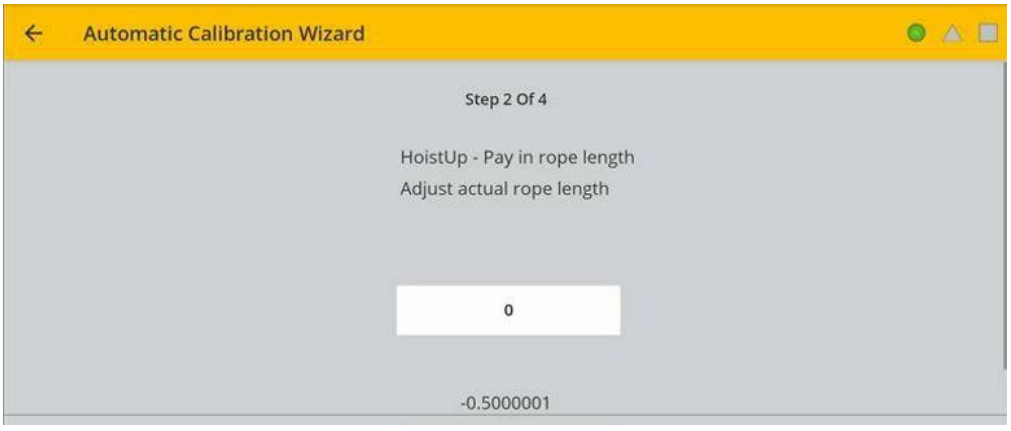

Figure: Rope payout calibration, adjust the actual rope length

Hoist down (payout) the wire rope, use Up and Down to adjust the actual wire rope payout length and then press Enter.

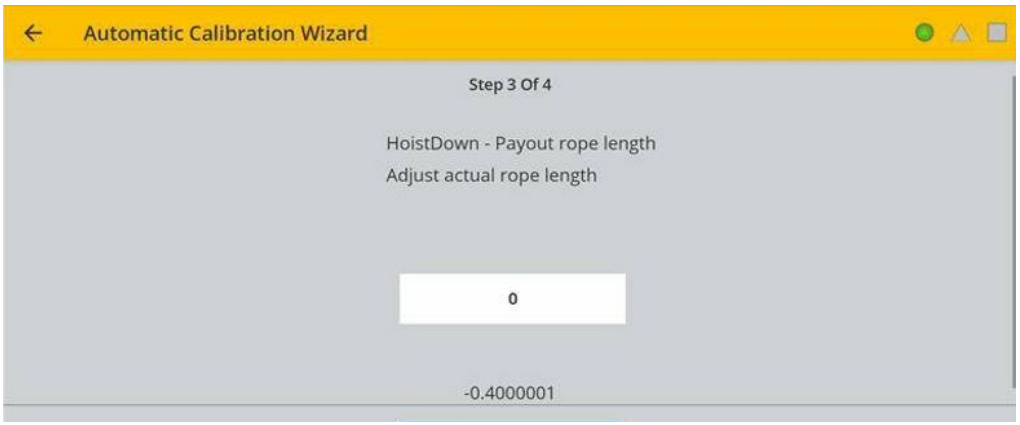

Figure: Rope payout calibration, adjust the actual rope length.

Note the new trim and scale values.

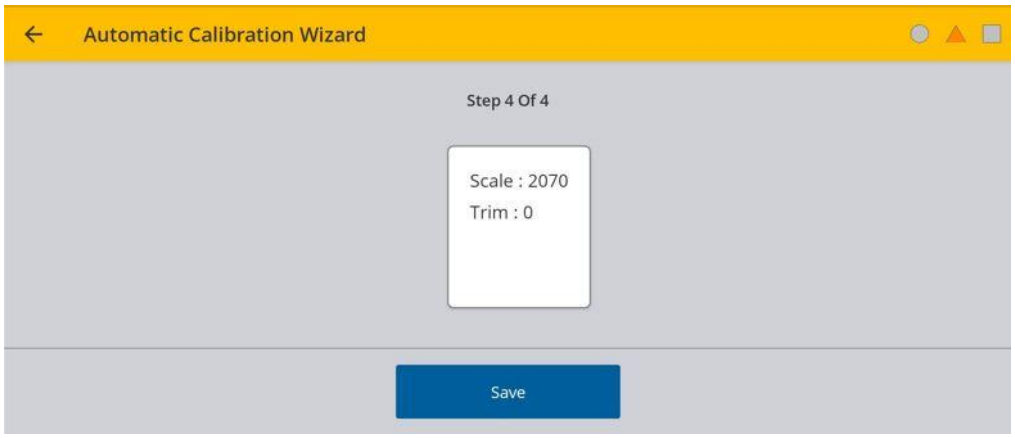

Figure: Rope payout calibration, trim and scale values.

Press Enter to save and send the new calibration to the rope payout sensor.

Press Exit to return to the main page of the LiftingWorks application.

2.13.3 Rope Payout Limits

The minimum and maximum rope payout (length) limits and the maximum rope speed limit can be adjusted in the liftingWorks applications in the limit menu. The maximum rope payout limit can be programmed to trigger lockout when exceeded, see menu 4L) Lockout Settings. The minimum rope payout limit and the maximum rope speed limit will trigger an alarm when exceeded. The default limit for maximum rope payout is 300 feet; the default minimum limit is -300 feet. The default limit for maximum rope speed is 15.0 feet per second.

2.14 Slew Sensor Installation

> WARNING - Missing or damaged teeth on the crane slew gear will prevent proper operation of the slew sensor and render the system unsafe.

2.14.1 Encoder Gear Verification

Verify that the slew (swing) sensor was supplied with the correct gear for your application:

Roll the encoder gear on the crane slew gear; it should roll without skipping.

The distance between the leading edges (X) of the slew gear teeth should correspond to the gear model shipped with your order.

> EXAMPLE - P/N PA133-01 corresponds to a slew gear with teeth leading edges 2 in. apart.

> NOTE - The slew sensor can be installed on either internal or external tooth slew gears.

2.14.2 Slew Encoder Location

Install the slew encoder near the crane slew gear where it will roll freely on the slew gear when the crane slews.

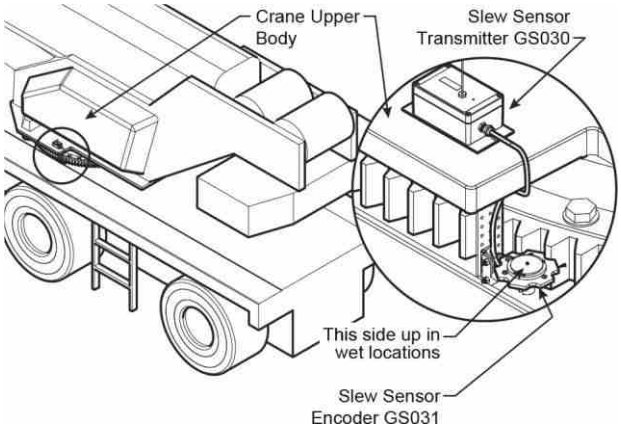

Figure: Slew encoder location. Typical installation

Make sure that the slew encoder does not come into contact with any other parts of the crane through the full motion of the crane upper body.

2.14.3 Slew Encoder Orientation

The slew encoder bracket is designed so that the encoder can be installed on either bottom, top or side surfaces. If the surface on which the sensor is to be installed is not at a square angle to the slew gear, the mounting plate can be bent and/or cut.

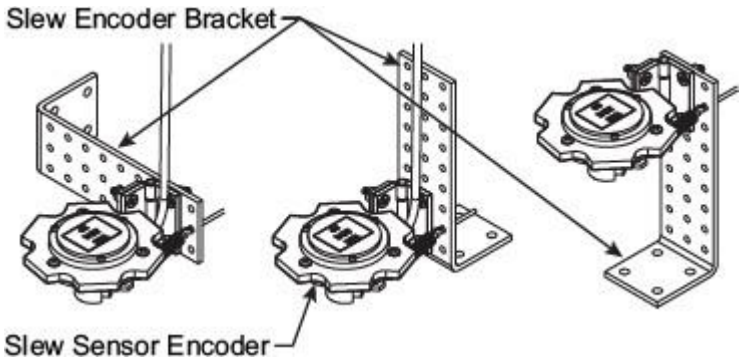

Figure: Slew encoder bracket orientation

2.14.4 Slew Encoder Installation

Find a rigid, level space near the slew gear to install the slew encoder mounting bracket.

Weld the mounting bracket in place or install with 1/4 in. screws. The screws can be installed directly on the crane plate, or a custom weld pad can be built and welded on the crane.

> WARNING - Keep the slew encoder away from any connecting metal structures when welding mounting bracket to the boom. Proximity to welding may cause permanent damage to the slew encoder and render the system unsafe.