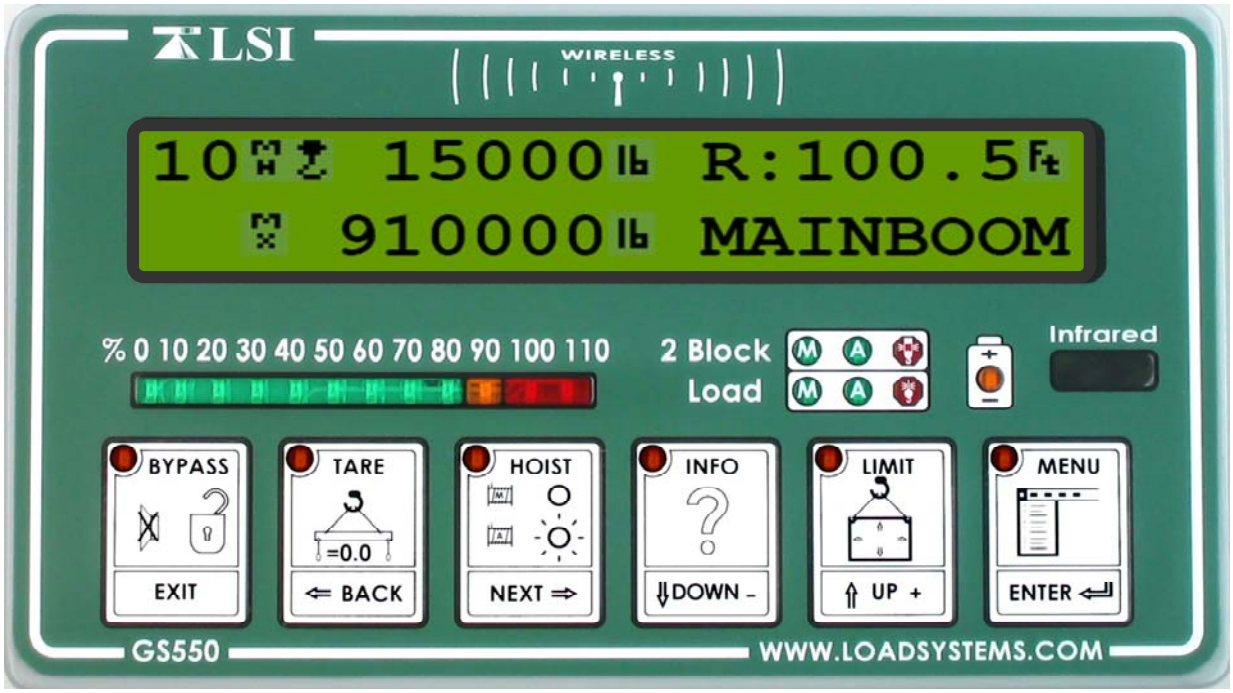
Load Systems International

GS550 System User Manual

GM550 Version 1043 Revision 2 (FCC-IC)



Bring critical lift data to the operator in real time.

Table of Contents

Overview

The GS550 system includes the cabin mounted GS550 radio display and compatible crane mounted sensors. The GS550 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 indicated to the operator in real time. Working load radius can be calculated and compared to a rated capacity chart (if programmed). Furthermore the GS550 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 GS550 system depends on the sensor configuration used and the rated capacity charts programmed (where applicable). The GS550 includes an infrared port to facilitate software and chart updates and data logger downloads using a compatible palm or cell phone. Compatible sensors include the GS050 anti-two-block, the GC series load cells and GS001 series line rider and load pin transmitters, the GS010 angle sensors, the GS011 angle sensor and length transmitter and the GS020 wind speed sensor. The GS550 system is designed as an operator aide and is in no way a substitute for safe operating practice.

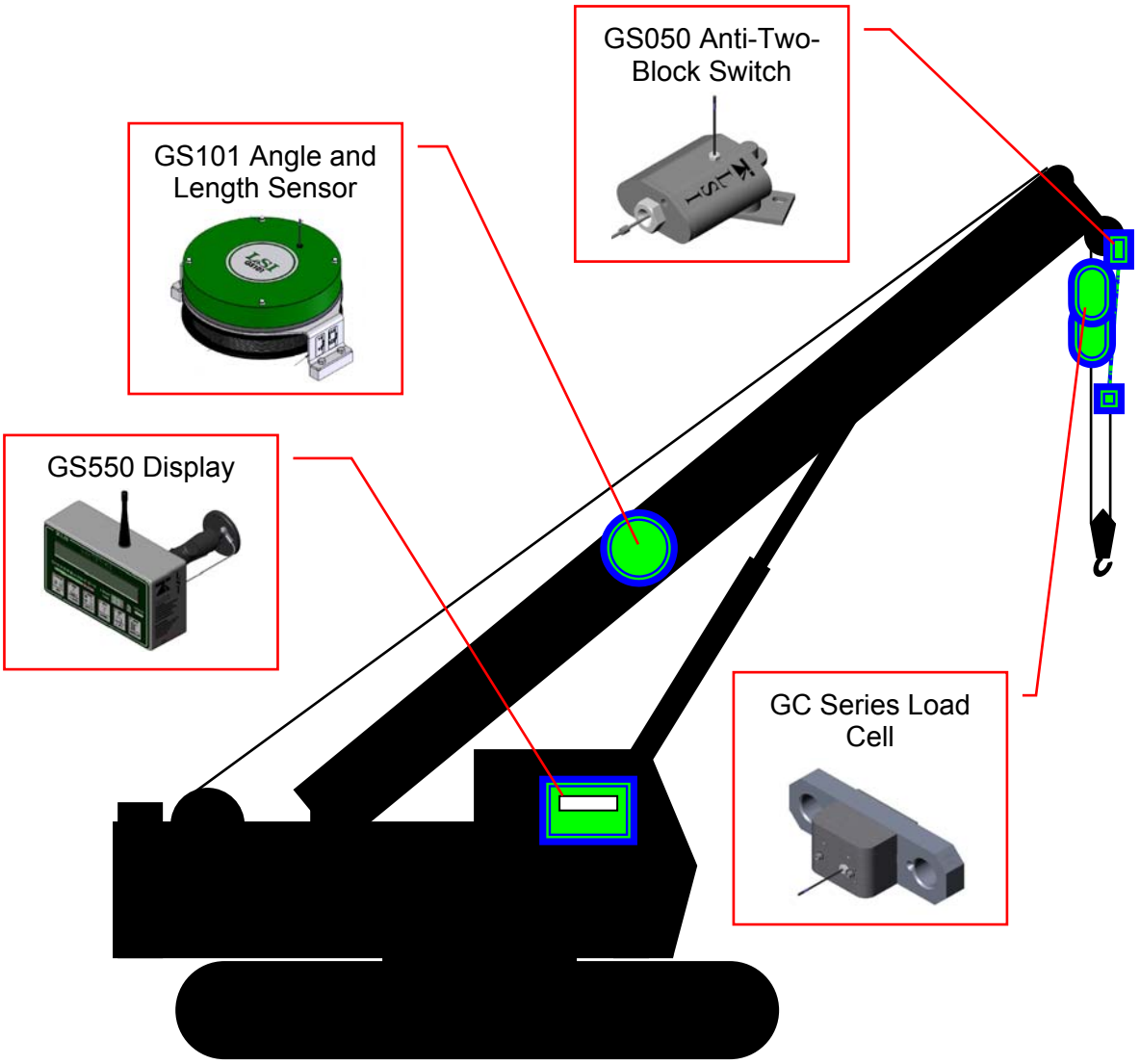


Figure: Key components in a typical system

Start-Up

The GS550 must be correctly programmed for the system sensors installed. The GS550 powers up with several green lights flashing, this indicates that the display is waking up programmed sensors and creating a radio communication link with each. Once a reliable radio communication network is established, all green lights will remain lit without flashing.

This process may take up to one minute. The delay is created by the battery management function and does not affect system security. If an anti-two-block switch detects a pending two-block event, if a load cell detects a change in load, or if an angle sensor detects a change in angle, the appropriate radio link will be established in less than 0.1 seconds. To immediately wake-up a load cell, lift the hook with a load; to immediately wake up an angle sensor, change the boom angle.

In special conditions of lockout created by a missing sensor, you may bypass that sensor until the next display power up by pressing bypass for 10 seconds. That sensor green light should stop flashing and then turn off.

Operation

Display GS550

The GS550 displays detailed information on the backlit, two lines liquid crystal display (LCD). Additional information including warnings, alarms, and radio status is communicated by the display lights and the display buzzer.

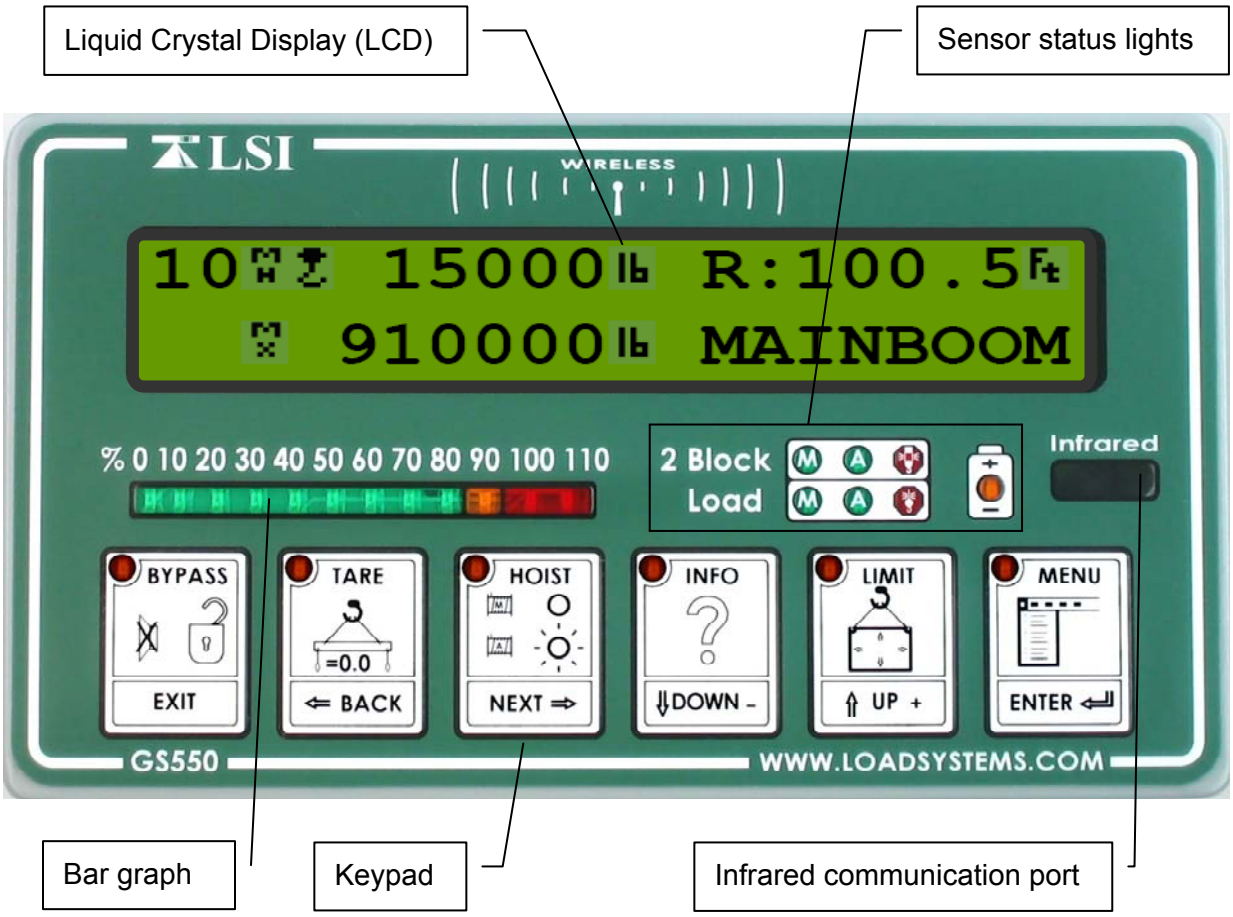


Figure: GS550 front view

Load Display

The GS550 typically displays load information as follows: the number of parts of lines, the hoist indicator, the tare/no tare indicator, the weight, the weight units. Very large load values may overwrite the weight units and tare indication symbols.

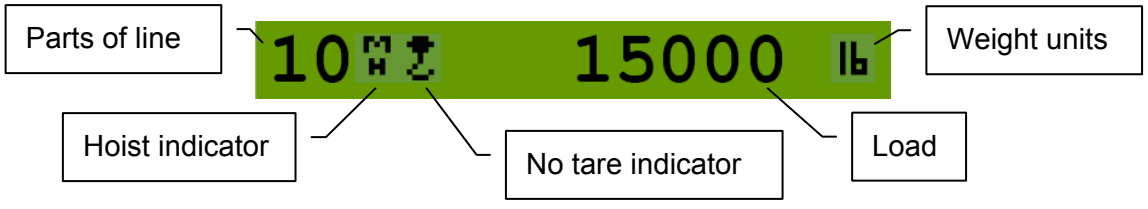


Figure: GS550 load display

Liquid Crystal Display (LCD)

Detailed lift data and system information is displayed here. The liquid crystal display (LCD) can be adjusted to facilitate viewing in varied lighting conditions. See Menu 3) Display Settings.

Sensor Status Lights

Detailed lift data and system information is displayed here. The liquid crystal display (LCD) can be adjusted to facilitate viewing in varied lighting conditions.

2 Block

The red 2 Block alarm light comes on when a programmed anti-two-block switch is in alarm.

The green “M” (main) and “A” (auxiliary) anti-two-block radio status lights stay on when the GS550 has a reliable radio communication link to all programmed anti-two-block sensors. The radio status lights flash green when communication is intermittent or absent. The M refers to the first anti-two-block sensor programmed in the sensor list. The A refers to all other anti-two-block sensors programmed in the sensor list.

Load

The red Load alarm light comes on when a load sensor is in overload.

The green “M” (main) and “A” (auxiliary) load radio status green lights stay on when the GS550 has a reliable radio communication link to all programmed sensors. The radio status lights flash green when communication is intermittent or absent. The M refers to the first sensor programmed in the sensor list except anti-two-block. The A refers to all other sensors programmed in the sensor list except anti-two-block.

Low Battery

The amber light of the battery icon comes on when battery life for a sensor programmed in the sensor list drops below 10%. Normally several weeks of battery life remains from the moment the low battery light first comes on.

Bar Graph

The bar graph displays the gross load lifted by a load sensor as a proportion of the maximum load allowed, expressed in 10% increments. Maximum load is the lowest of the operator set maximum load limit and the working load limit (WLL) as calculated from the rated capacity charts*. When there are two or more load sensors programmed in the sensor list the bar graph will indicate the load for the sensor closest to its maximum allowable.

Infrared Port

The infrared port is used to download data from the data logger or to upload firmware updates and capacity charts using a GT103 portable download tool or other compatible device.

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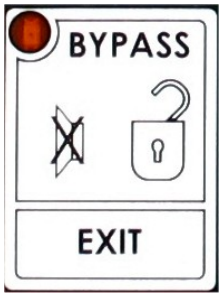
* **WLL is indicated by rated capacity indicators only.**

Keypad

The keypad consists of six buttons used to control, consult, program, and troubleshoot the GS550 display and system. Each button has two functions; a primary (operation) function and a secondary (menu) function for navigation and programming. The secondary functions are described in the section GS550 Menu System.

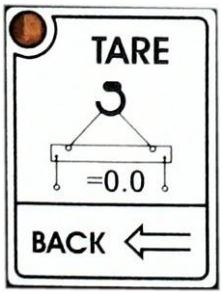
Primary functions:

Bypass: Press **Bypass** to override lockout for emergency purposes*. The alarm will remain silent until the next alarm; lockout will re-engage as soon as the button is released.



Tare: Zero the hook and rigging weight.

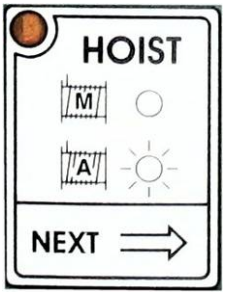
Step 1. Press **Tare** to enter the tare menu.
Step 2. Use **Next** to select the load sensor.
Step 3. If no tare value, then press **Tare** to create a tare value equal to the weight on the load sensor. Example: with hook block and rigging only. Load display is net weight (gross weight minus tare value).
Step 4. To remove tare value, press **Tare**.
Step 5. Press **Bypass** to return to the operation display.



	Tare Indicators		Load Indication	
	LCD	Tare Light	LCD	Bar Graph
No tare value		Off	Gross Weight	Gross weight
Tare value = x		On	Net Weight	Gross weight

Table: Tare indicators and load indication

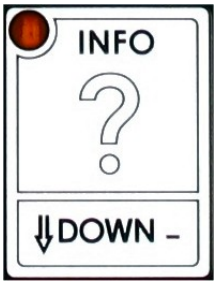
Hoist: Press **Hoist** to change the operating display page. The exact order and content of operation display pages depends on system sensor and capacity chart configuration. Systems with more than one load sensor typically display main hoist load information on the first page and auxiliary hoist load information on the second page.



* **This applies only if the GS550 has been correctly installed to control crane lockout function.**

Info: Press **Info** to see system information; use **Next** to scroll through the pages.

Page 1) BIOS (Binary Input Output System) number and version
Page 2) Firmware number and version
Page 3) Chart number and version (if available)
Page 4) SPKG (Software Package) number

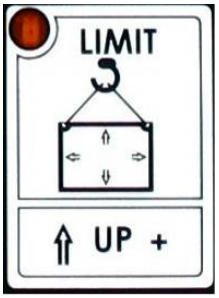


Limit: Set hoist limits.

Step 1. Press **Limit** to access the limit menu. The limit menu displays the limits for each sensor in the sensor list on successive pages.
Step 2. Use **Next** to scroll from one limit to the next.
Step 3. Use **Up** and **Down** to adjust a limit.

When using the GS550 as a load indicator without programmed crane specific rated capacity charts the load limit is typically set to the lesser of the rope limit, the hoist limit, and the maximum allowed capacity as determined from the capacity charts.

When using the GS550 as a rated capacity indicator with programmed crane specific rated capacity charts the load limit is typically set to the lesser of the rope limit and the hoist limit.

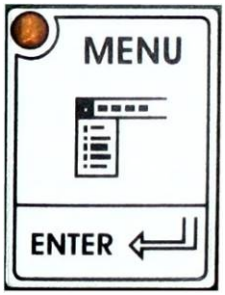


Tip: Press Up and Down simultaneously to return a limit to the factory default setting. The factory default maximum limit for load sensors is 10 000 lb per part of line.

Tip: When the weight units are tons the minimum load limit increment is 0.1 ton per part of line.

Menu: Press **Menu** to access the five basic system menus:

Menu 1) Parts of Lines
Menu 2) Crane Rigging
Menu 3) Display Settings
Menu 4) Installation
Menu 5) System Diagnostic



Menu System

There are five basic menus (level one) used to program, consult and control the GS550 system.

Menu 1) Parts of Lines
Menu 2) Crane Rigging
Menu 3) Display Settings
Menu 4) Installation
Menu 5) System Diagnostic

The basic menus include nested sub-menus (level two, three and four) designed to address specific tasks including adjusting values, choosing from lists and following “wizards” through step by step processes.

Menu Numbers

Menus are identified by a number in the upper left corner. The basic menus (level one) are numbered one through five. Level two menus are lettered alphabetically. Level three menus are numbered. Level four menus are alphabetized.

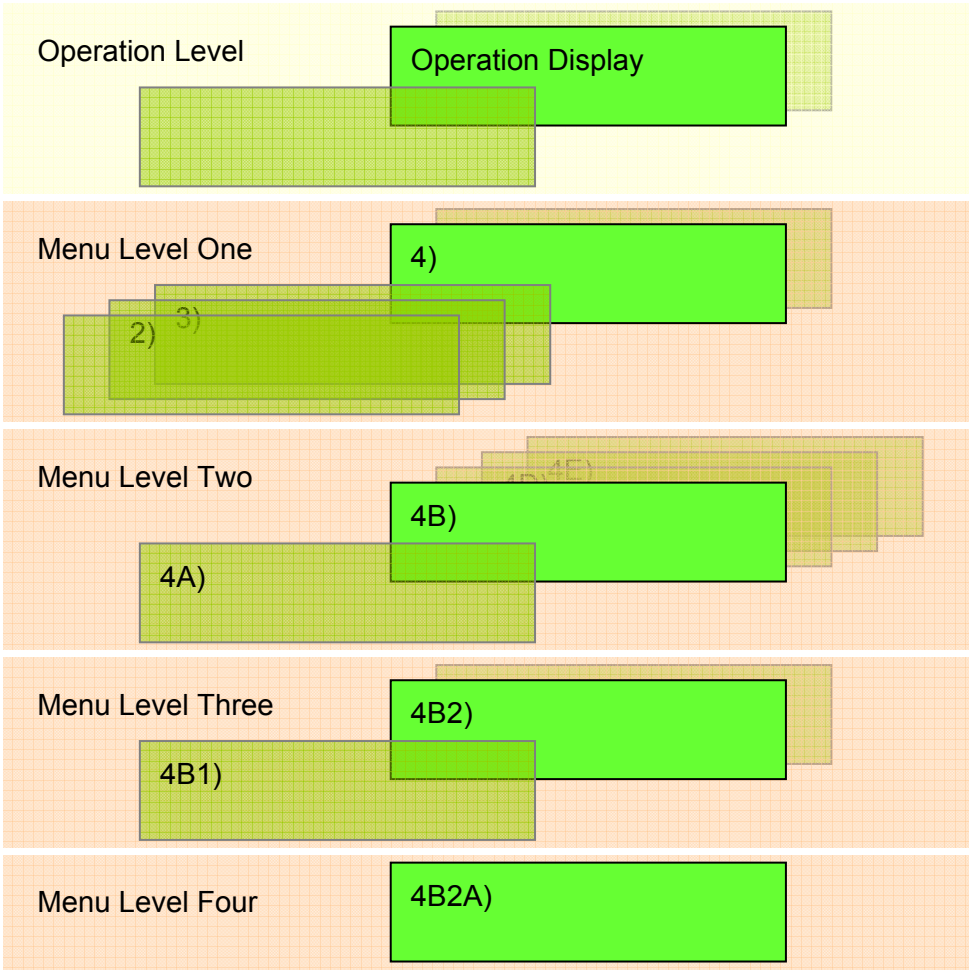


Figure: Menu Numbers

Menu Navigation

From the operation display press **Menu** to see the five basic menus (level one). Press **Enter** to drill down one level and enter a selected menu. Press **Exit** to leave a menu and return up one level. Press **Next** to move to the next page within a menu; press **Back** to move to the previous page within a menu. Use **Up** and **Down** to modify numeric values and to move through a list of choices.

Tip: most menus are circular; press Next on the last page of a menu to return to the first page.

Tip: most lists are circular; press Down on the last entry of a list to return to the first entry.

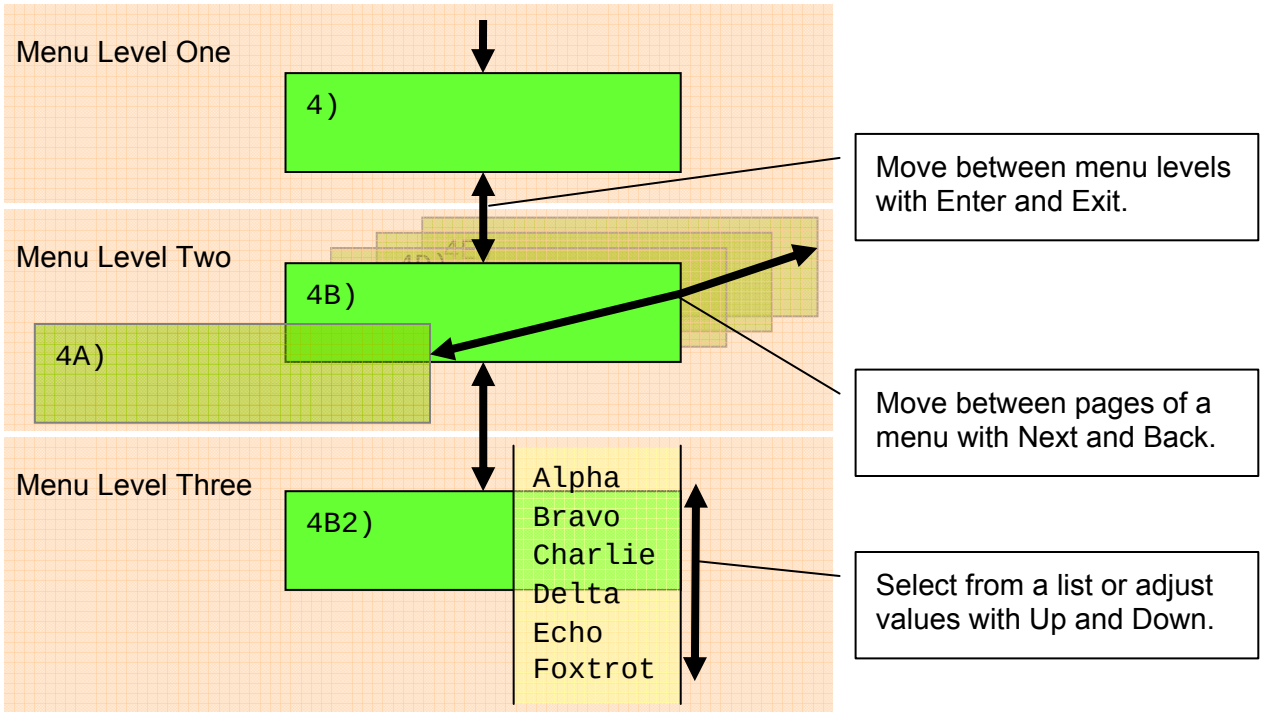


Figure: Menu Navigation

Password Protection

The submenus of menu 4) Installation are protected by a password by default. Password settings can be adjusted in menu 4H) Password Settings. The factory set administrator and user passwords are AZA. If the user password is forgotten, it can be changed as long as the administrator password is known.

Forgotten password? Call LSI technical support (Houston, TX) at 888 819 4355 or contact your local LSI representative.

Menu Layout

The figure below shows the menus accessible to the operator without password protection under the default factory settings.

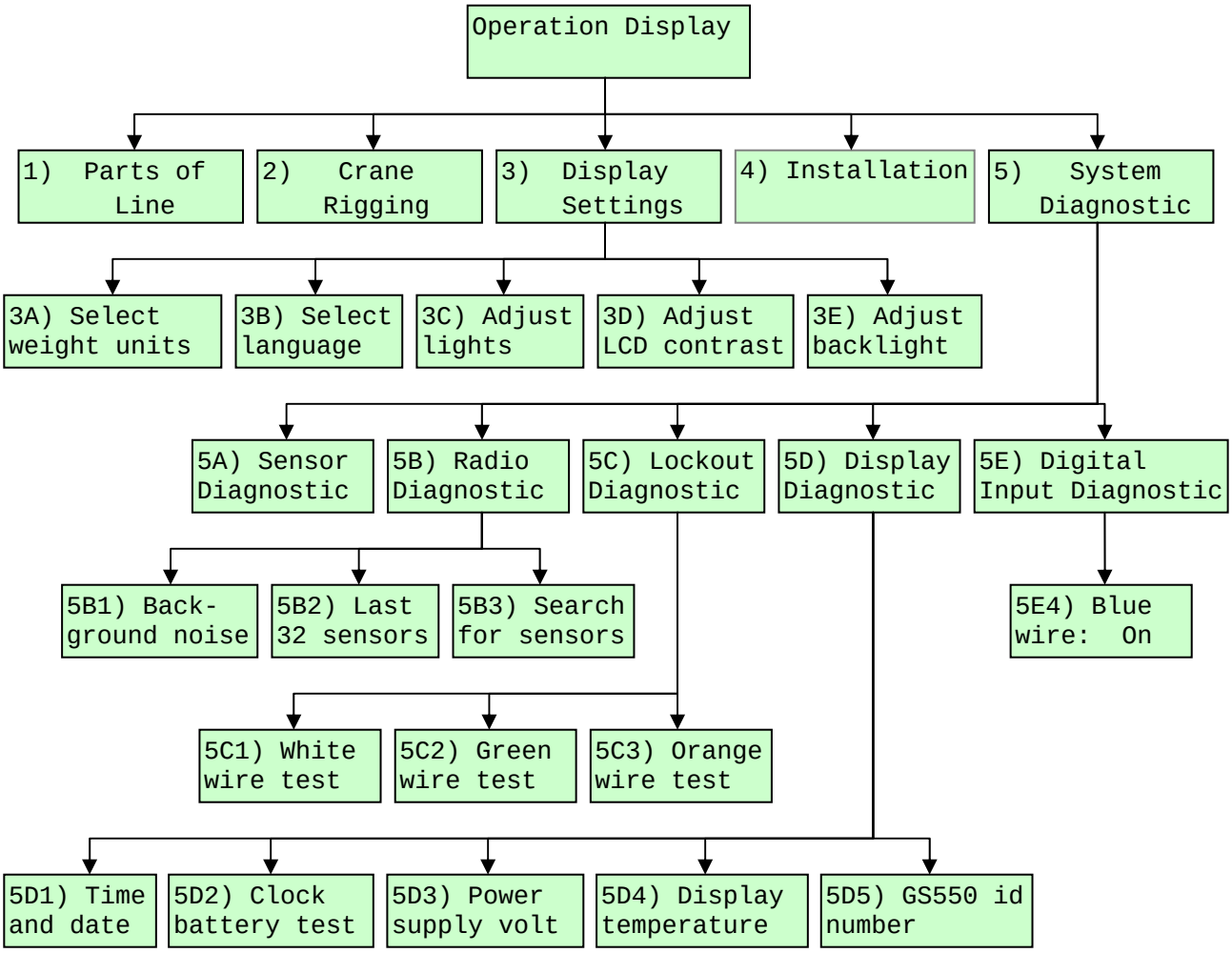


Figure: Open access menus – default factory settings

Parts of Line

The load sensor often shares the weight with multiple parts of line. For accurate load indication the GS550 must be programmed for the number of parts of line.

Step 1. Press **Menu** → **Enter** to enter menu 1) Parts of Line.

Step 2. Use **Next** and **Back** to select the load sensor; typically sensor number one is associated with sheave one (the main hoist) and sensor number two is associated with sheave two (the auxiliary hoist) etc.

Step 3. Use **Up** and **Down** to adjust the number of parts of line.

Step 4. Press **Enter** to save any changes and then press **Exit** twice to return to the operation display.

Crane Rigging – Capacity Chart Selection

The GS550 can be programmed to assist the operator by indicating the working load limit (WLL) from the crane specific rated capacity charts according to the angle and radius information received from the boom mounted sensors. Under no circumstances is the GS550 a substitute for safe operating practices. The operator must fully understand the crane rigging and the crane rated capacity chart to be able to correctly program the GS550 for rated capacity indication. The GS550 will not take into account critical variables such as weather, ground and crane conditions that will reduce the safe working capacity of the crane.

In order to indicate WLL the GS550 must be programmed with a valid rated capacity chart specific to the crane. The capacity chart programmed can be verified on the chart number page of the Information menu: press **Info** → **Next** → **Next** (press **Exit** to return to the operation display). If the chart number information screen says “Chart not loaded” the GS550 has not been programmed to function as a rated capacity indicator. If rated capacity indication is required contact the person responsible for the GS550 system installation and maintenance. *If in doubt, contact LSI.*

Rated capacity indication is based on interpretation of a selected capacity chart using boom angle and load radius. This requires:

Installation: The GS550 must be programmed for a correctly installed boom angle sensor and a radius sensor. Additionally a length sensor will be required for telescopic booms; luffing jibs may require an angle sensor. Furthermore, the GS550 must be programmed with accurate mounting point dimensions for the head sheaves, jibs, extensions and other structures that will determine working load radius for each of the hoist lines used; reference menu 4C) Radius Settings.

Operation: The chart must be selected by “rigging” the working sheave in the GS550; this is done by following the chart wizard in menu 2) Crane Rigging.

The Chart Wizard

Important! It is possible to leave the chart wizard at any time by pressing Bypass; the GS550 will display the message “Rigging ABORTED”. Current capacity chart selection may have changed, possibly changing the rated capacity indicated by the GS550. Always complete the chart wizard all the way to the “Rigging ok” message before operating the crane.

Step 1. Press **Menu** → **Next** → **Enter** to start the chart wizard.

Step 2. The first page of the chart wizard is generally “select sheave”. Use **Up** and **Down** to adjust the sheave number. If the there is only one load sensor in the system leave the sheave value at one. With two or more load sensors in the system sheave one (the main hoist) is associated with the first load sensor in the sensor list; sheave two (the auxiliary) is associated with the second sensor in the sensor list etc.

Step 3. Press **Next** to advance to the next step of the chart wizard.

Step 4. The steps that follow will depend on the size and complexity of the rated capacity chart itself. Typical steps include chart selection, outrigger / on rubber selection and boom length selection (lattice cranes only). Use **Up** and **Down** to select from the list of choices and then press **Next** to advance to the next step. For accurate rated capacity indication the rigging configuration selected in the chart wizard must reflect the actual rigging of the working sheave.

Step 5. After the last step has been completed the GS550 will display “Rigging ok” and then it will return to the operation display. If a sensor required by the selected capacity chart is not a part of the system or has not established communication with the GS550, then the GS550 will display “sensor invalid”.

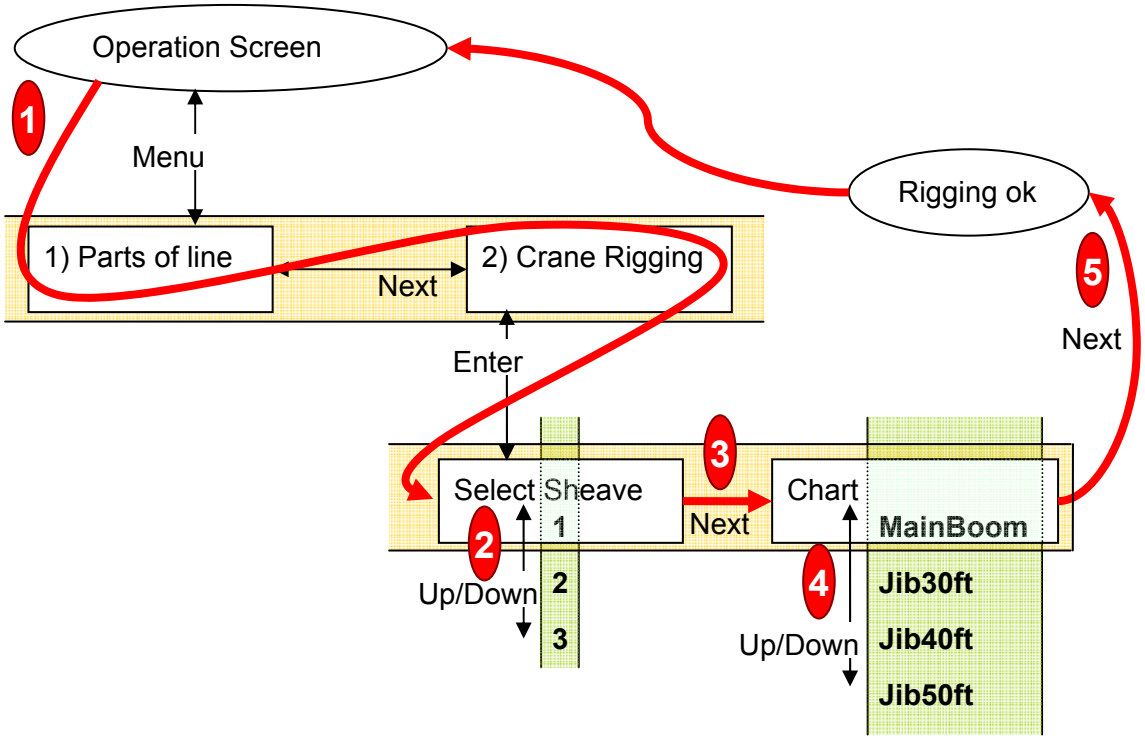


Figure: The chart wizard – follow steps 1 through 5 to select the capacity chart

Display Settings

Program the display for operator preferences in menu 3) Display Settings.

Weight Units

The weight units for load display may be selected according to operator preference. Length units are associated with weight units by default; see the table below.

Important! Rated capacity charts are programmed with the units on the charts provided. Intervals of boom length and load radius, and the steps of rated capacity, may differ on rated capacity charts in different units for the same crane.

Step 1. Press **Menu** → **Next** → **Next** → **Enter** to go to menu 3A) Weight units.
Step 2. Use **Up** and **Down** to select the weight units for load display.
Step 3. Press **Next** to advance to the language adjustment page or press **Exit** twice to return to the operation display.

Units		Notes	Equivalent Weights		Length Unit	
Pound	(lb)		1 lb	0.4536 kg	Foot	(ft.)
Kilogram	(kg)		2.205 lb	1 kg	Metre	(m)
Short ton	(T)	United States	2000 lb	907.2 kg	Foot	(ft.)
Long ton	(T)	United Kingdom	2240 lb	1016 kg	Metre	(m)
Tonne	(t)	International System (SI)	2205 lb	1000 kg	Metre	(m)

Table: Weight units

Language

Future versions of the GS550 will include different display language options.

Step 1. Press Menu → Next → Next → Enter → Next → Next to go to menu 3B) Display language.
Step 2. Press Next to advance to the contrast adjustment page or press Exit twice to return to the operation display.

Light Intensity

Adjust the intensity off the LEDs (light emitting diodes) to facilitate viewing in bright sunlight or in reduced visibility.

Step 1. Press Menu → Next → Next → Enter → Next → Next to go to menu 3C) Light intensity adjustment.
Step 2. Use Up and Down to adjust the intensity of the lights.
Step 3. Press Next to advance to the contrast adjustment page or press Exit twice to return to the operation display.

Contrast

Adjust the LCD contrast to optimize visibility.

Step 1. Press Menu → Next → Next → Enter → Next → Next → Next to go to menu 3D) LCD contrast adjustment.

Step 2. Use Up and Down to adjust the display contrast.

Step 3. Press Next to advance to the backlight adjustment page or press Exit twice to return to the operation display.

Backlight Mode

Adjust the LCD backlight control mode to conform to viewing and power supply conditions.

Step 1. Press Menu → Next → Next → Enter → Next → Next → Next → Next to go to menu 3E) Backlight mode.

Step 2. Use Up and Down to select the backlight control mode. The LCD backlight can be always on, always off or on a four second timer. In the four second timer mode the backlight will come on for four seconds when any button is pressed.

Step 3. Press Next to advance to the backlight adjustment page or press Exit twice to return to the operation display.

System Diagnostic

Diagnose system failures with the sub menus of menu 5) System Diagnostic.

System Sensors Diagnostic

Access key sensor data for each sensor in this menu:

Step 1. Press **Menu** → **Back** → **Enter** → **Enter** to go to menu 5A1).
Step 2. Use **Back** and **Next** to select the sensor.
Step 3. Press **Enter** to see sensor data.
Step 4. Use **Back** and **Next** to select another sensor or press **Exit** four times to return to the operation display.

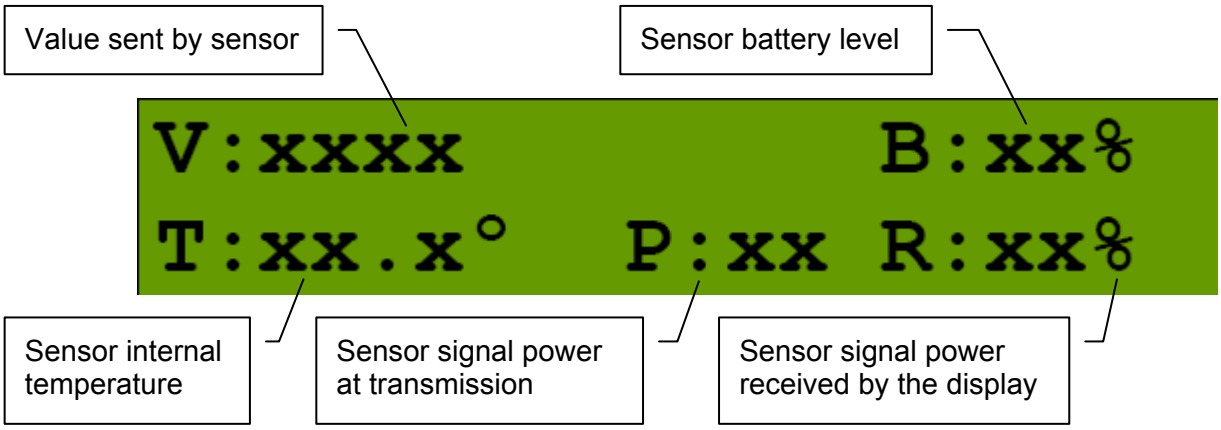


Figure: Key data accessible behind the menu 5A1) for each sensor

Radio Network Diagnostic

Access key network data in this menu:

Step 1. Press Menu → Back → Enter → Next → Enter to go to menu 5B1) Radio network background noise.
Step 2. Press Next to go to menu 5B2) List last 32 sensors received.
Step 3. Press Enter to access 5B21), the list of the last 32 sensors received. Sensors are shown with their radio id number and the sensor type.
Step 4. Use Up and Down to scroll through the list.
Step 5. Press Exit to return to menu 5B2)
Step 6. Press Next to go to menu 5B3) Search for sensors.
Step 7. Press Enter to launch a sensor search. After searching, the display automatically reverts to 5B21), the list of the last 32 sensors received (see step 2 above).
Step 8. Press Exit three times to return to the operation display.

WARNING! The "list of last 32 sensors received" includes all functioning GS series sensors within range. Sensors listed here are not necessarily installed on the same crane as the GS550 and may be a part of a functioning GS550 system on a neighbouring crane. Programming a GS550 display for sensors from a different system will disable that system and render indication by both systems inaccurate.

Lockout Diagnostic

Confirm GS550 lockout output circuits in this menu.

Step 1. Press Menu → Back → Enter → Next → Next → Enter to go to menu 5C1) White wire… The page shows the lockout condition of the output (alarm or safe) and the self-test (pass or fail).

Step 2. Press Next to go to menu 5C2) Green wire diagnostic …

Step 3. Press Next to go to menu 5C3) Orange wire diagnostic…

Step 4. Press Exit three times to return to the operation display.

Display Diagnostic

Confirm key function indicators for the GS550 display in this menu.

Step 1. Press Menu → Back → Enter → Next → Next → Next → Enter to go to menu 5D1) Time and Date. The page shows the current time and date according to the GS550 internal clock.

Step 2. Press Next to go to menu 5D2) Time clock battery. Self-test pass or fail.

Step 3. Press Next to go to menu 5D3) External power voltage.

Step 4. Press Next to go to menu 5D4) Display internal temperature.

Step 5. Press Next to go to menu 5D5) GS550 base station id. The base station id should be the same as the GS550 display serial number printed on the left side of the box

Step 6. Press Exit three times to return to the operation display.

Digital Input Diagnostic

Confirm GS550 digital input function in this menu.

Step 1. Press Menu → Back → Enter → Back → Enter to go to menu 5E4) Blue Wire. The page shows the blue wire digital input status.

Step 2. Press Exit three times to return to the operation display.

Installation

Display GS550

Important! Do not crack or puncture the membrane fascia. The GS550 display is splash and rain proof. Waterproofing depends in part on the integrity of the membrane.

Important! Do not power wash the display. The GS550 display 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 display voids warranty coverage.

Mounting Bracket

Step 1. Determine the mounting location. The display may be installed either inside or outside the cab. 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 GS550, the antenna must not be in contact with metal and must have a direct and clear line of sight to the antennas of all sensors. The mounting bracket requires a flat surface of at least 2 inches in diameter on both sides and where the back of the surface is accessible in order to tighten the nuts.

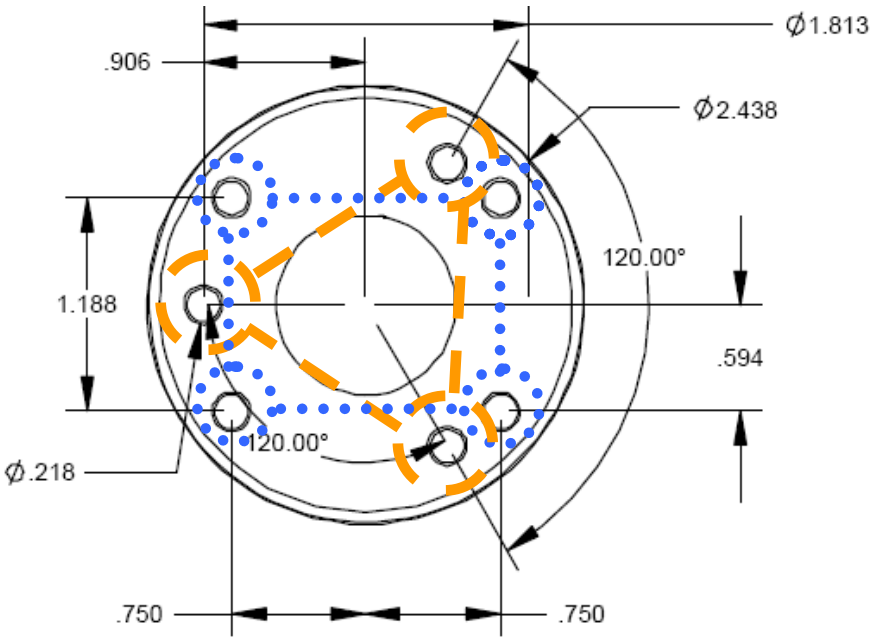


Figure: Display mounting bracket footprint

Step 2. Drill ¼ inch boltholes through the mounting surface with a ¼ inch bit following either the three, or the four, hole configuration.

Step 3. Install the display with the supplied bolts. Add the washers and the lock nut behind the mounting surface and tighten sufficiently.

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

Step 4. Loosen the wing nut of the bracket arm to adjust display orientation to facilitate viewing by the operator and then tighten it back up.

Figure: The power cable requires about 4 ½ in. behind the display to protect the connector

Power Supply and Lockout Connection

Step 1. Connect the black wire (ground) to the negative terminal of the crane battery or the panel connection; alternatively bolt the black wire to the body of the machine with a ¼ inch or 5/16 inch bolt. The ground connection must be strong enough to sustain 3 Amp.

Step 2. Connect the red wire to a fused accessory source, rated at least 3 Amps, that supplies +12 or +24 volts when the crane is on. The GS550 will automatically detect the voltage level and adjust itself.

Step 3. Lockout number 1 (if required): connect the white wire to a Bosch relay coil. Connect the other terminal of the relay to the ground. When operating properly the white wire will energize at the battery positive level. Troubleshooting; if no voltage is present on the white wire remove the load connected to the lockout. Current over 1.5 Amps on the white wire triggers an auto re-settable fuse. Current flow will resume several seconds after the short circuit is eliminated.

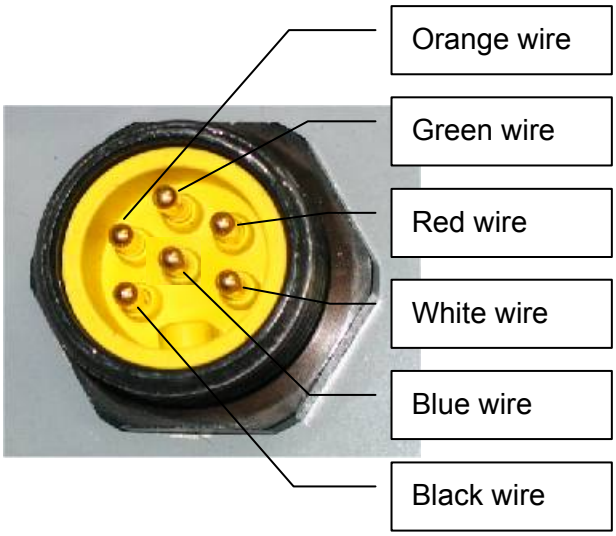


Figure: GS550 power supply connector

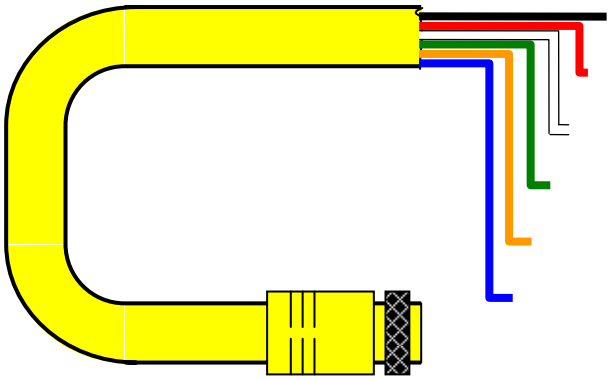


Figure: Power supply cable, part № LB006

Wire Colour	**Function**
Black	Negative (ground)
Red	Positive 12 or 24 volts (crane power supply)
White	Lockout № 1
Green	Lockout № 2
Orange	Lockout № 3
Blue	Lockout № 4 (option)

Table: GS550 power supply and lockout connection

Step 4. Lockout number 2 (if required): the green wire functions in the same way as the white wire; see above. The green wire lockout signal could be triggered by a different set of alarms than the other lockout wires. See lockout code table on the next page.

Step 5. Lockout number 3 (if required): the orange wire functions in the same way as the white & green wires; see above.

Step 6. Optional Lockout number 4: if purchased with the fourth lockout option, the blue wire will function in the same way as the white & green wires, see above.

Step 7. Connect the yellow cable to the GS550. The connector is waterproof and well rated for external environments. Simply connect the cable to the display 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.

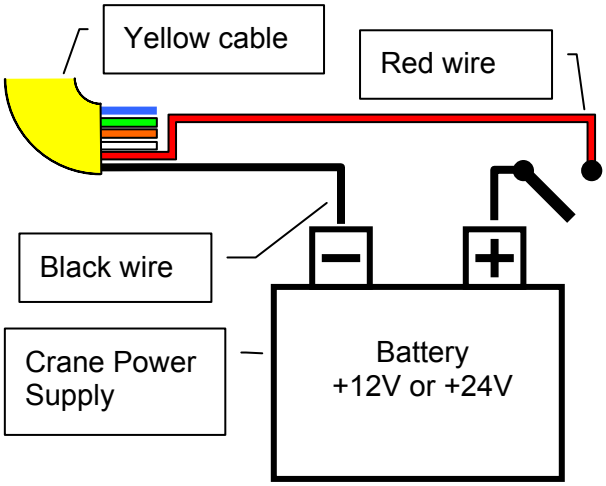


Figure: Connection without lockout

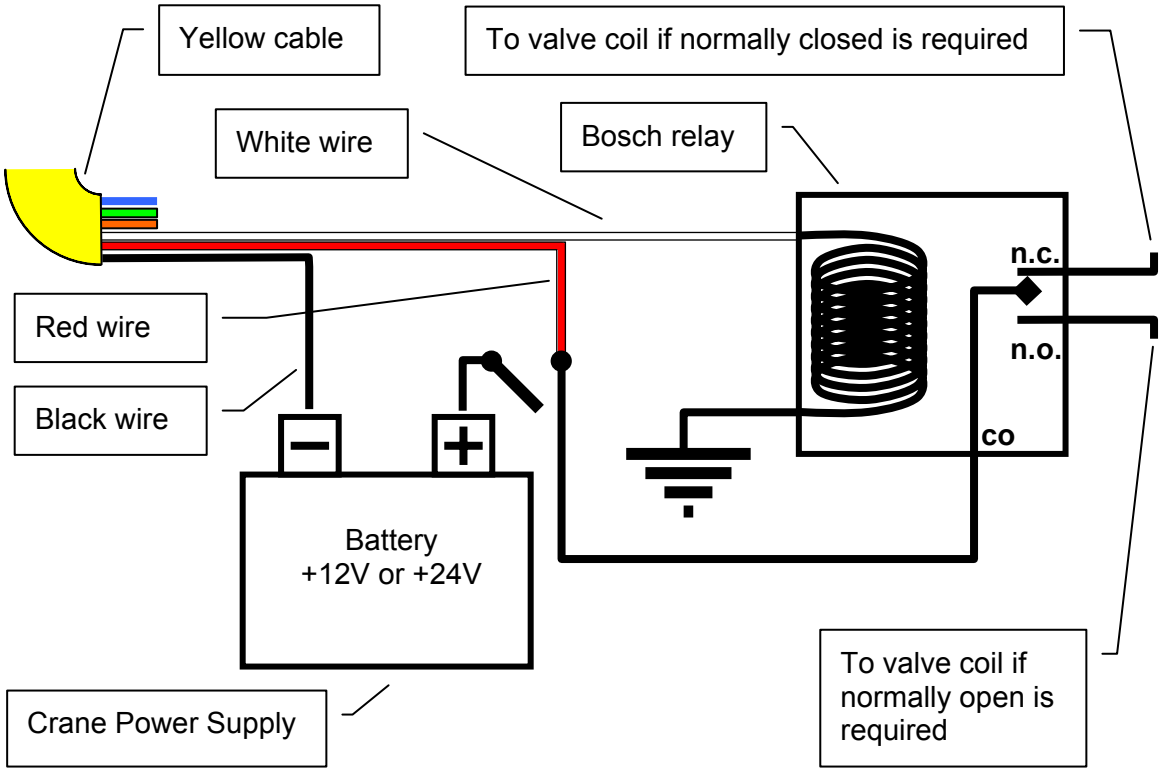


Figure: Connection with white wire lockout and recommended Bosch relay

Lockout Settings

Warning, alarm and lockout control is programmed in this menu. The GS550 can be programmed to generate alarms and lockout for almost all programmed limits, and two-block. Furthermore, warnings are generated when approaching programmed load limits and rated capacity (when applicable).

Warning Level

When gross load (regardless of tare value) approaches the maximum limit for a load sensor the red overload alarm light will flash. The maximum limit for a load sensor is lower of the operator set limit (Limit Menu) or the WLL if rated capacity indication is 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%.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next**→ **Next** → **Next** → **Next** → **Enter** to access menu 4G1) Warning level.
Step 2. Use **Up** and **Down** to adjust the warning level.
Step 3. Press **Next** to advance to the alarm level adjustment page or press **Exit** three times to return to the operation display

Alarm Level

All programmed and rated capacity limits and two-block will generate an audible alarm when the alarm level is reached. In the event of two-block or overload the appropriate alarm light will light solid. Other alarms will generate an intermittent alarm message on the LCD. 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%.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next**→ **Next** → **Next** → **Next** → **Enter** → **Next** to access menu 4G2) Alarm level.
Step 2. Use **Up** and **Down** to adjust the alarm level.
Step 3. Press **Next** to advance to the lockout level adjustment page or press **Exit** three times to return to the operation display

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 display is in safe condition (to inverse lockout polarity see menu page 4G8). When a lockout level is reached voltage is be cut on all lockout wires linked to the lockout condition (see menu pages 4G4 through 4G7). 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%.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next**→ **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** to access menu 4G3) Lockout level.
Step 2. Use **Up** and **Down** to adjust the lockout level.
Step 3. Press **Next** to advance to the white wire lockout trigger adjustment page or press **Exit** three times to return to the operation display

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.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next**→ **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** to access menu 4G4) White wire lockout trigger.

Step 2. Select which alarm conditions will trigger lockout on the white wire.

Step 3. Add the lockout codes for the selected alarms together to find the lockout trigger number.

Step 4. Use **Up** and **Down** to adjust the white wire lockout trigger number.

Step 5. Press **Next** to advance to the next wire trigger menu page and repeat steps 2 through 5, or, press **Exit** three times to return to the operation display.

Condition	Code
Maximum wind speed	1
Minimum angle	2
Maximum angle	4
Overload	8
Minimum sum load	16
Maximum radius	32
Maximum length	64
Two-block	128
Maximum wind gust	256
Maximum rope payout	512
Minimum slew	1024
Maximum slew	2048
Maximum tip height	4096
Maximum imbalance factor	8192
Minimum slack rope	16384

Table: Lockout codes

Example: Typical white wire lockout trigger; two-block, maximum boom length, overload, high angle and maximum wind speed	Two-Block	128
	Maximum length	64
	Overload	8
	Maximum angle	4
	Maximum wind speed	+ 1
	White wire lockout trigger	= 205

Example: Typical green wire lockout trigger; maximum load radius and minimum boom angle	Maximum radius	32
	Minimum angle	+ 2
	Green wire lockout trigger	= 34

The following conditions will not trigger lockout; they will generate an alarm:

- Minimum list angle
- Maximum list angle
- Minimum heel angle
- Maximum heel angle
- Maximum rope speed

Lockout Relay Inversion

WARNING! Inverting lockout relays will allow crane operation in the event the GS550 display fails. Operating a crane without a functioning anti-two-block system and load and angle indication is dangerous and may be against the law.

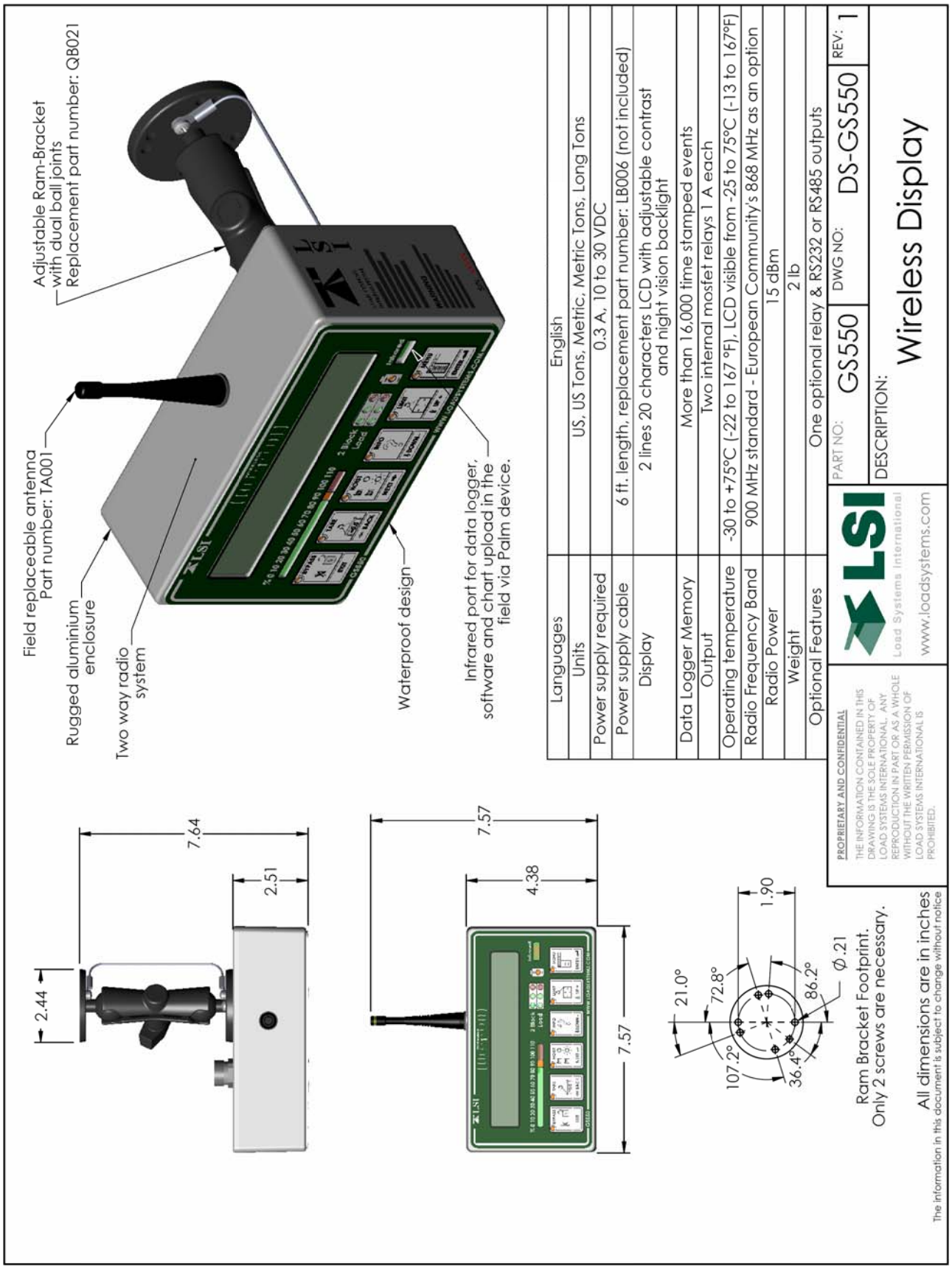
By default the lockout wires carry crane power supply voltage as long as the display is in safe condition. When a lockout level is reached voltage is be cut on all lockout wires linked to the lockout condition (see menu pages 4G4 through 4G7). Lockout is lifted only as long as the display functions and the safe conditions are met (see menu pages 4G1 through 4G7). 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 display fails, crane functions will not lockout.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next**→ **Next** → **Next** → **Next** → **Enter** → **Back** to access menu 4G8) Lockout relay inverted.
Step 2. Use **Up** and **Down** to switch between “yes” and ”no”.
Step 3. **Exit** three times to return to the operation display.

Password Settings

Three levels of access are available: administrator, operator and public. The administrator password is required to change the operator password. In the event both the administrator and the operator passwords are lost please call your LSI representative. Menus accessible from the operation display can be individually protected by the operator password.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next**→ **Next** → **Next** → **Next** → **Next** to access the menu 4H1) Set administrator password.
Step 2. 4H1) Set administrator password: Press **Next** three times to advance to the set user password page or, to change the administrator password, use **Up** and **Down** to adjust the flashing letter and then use **Next** to advance to the next letter. Press **Enter** to save any changes.
Step 3. 4H2) Set user password: Press **Next** three times to advance to the tare menu protection page or, to change the user password, use **Up** and **Down** to adjust the flashing letter and then use **Next** to advance to the next letter. Press **Enter** to save any changes.
Step 4. Menu 4H3) Tare protected: use **Up** and **Down** to switch between “yes” and “no” and press **Next** to advance to the next menu page.
Step 5. Repeat step 4 to adjust password protection for each menu as required. Press **Enter** at any time to save changes made. Press **Exit** at any time to return to menu 4) Installation. If there are any unsaved changes the display will request confirmation: press **Enter** to save before quitting or press **Exit** to quit without saving.


Adjustable Ram-Bracket
with dual ball joints
Replacement part number: QB021
Field replaceable antenna
Part number: TA001
Rugged aluminium
enclosure
Two way radio
system
Waterproof design
Infrared port for data logger,
software and chart upload in the
field via Palm device.
Languages English
Units US, US Tons, Metric, Metric Tons, Long Tons
Power supply required 0.3 A, 10 to 30 VDC
Power supply cable 6 ft. length, replacement part number: LB006 (not included)
Display 2 lines 20 characters LCD with adjustable contrast and night vision backlight
Data Logger Memory More than 16,000 time stamped events
Output Two internal mosfet relays 1 A each
Operating temperature -30 to +75°C (-22 to 167 °F), LCD visible from -25 to 75°C (-13 to 167°F)
Radio Frequency Band 900 MHz standard - European Community's 868 MHz as an option
Radio Power 15 dBm
Weight 2 lb
Optional Features One optional relay & RS232 or RS485 outputs
2.44
7.64
2.51
7.57
4.38
7.57
21.0°
72.8°
107.2°
36.4°
86.2°
1.90
Ø .21
Ram Bracket Footprint.
Only 2 screws are necessary.
All dimensions are in inches
The information in this document is subject to change without notice
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LSI
Load Systems International
www.loadsystems.com
PART NO: GS550
DWG NO: DS-GS550
REV: 1
DESCRIPTION:
Wireless Display

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.

Important! The load cell antenna must not be in contact with metal.

Important! The load cell antenna must have a clear line of sight to the GS550 display.

Important! The load cell antenna must point to the left or to the right of the boom; it must not point directly to, or away from, the GS550 display.

Step 1. Install load cell bushings. 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 must be used where possible to adapt the holes in the load cell to the pins. Bushings must be secured with the hex screws provided, one on each side of the load cell.

Step 2. Place at least one 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 and adapter plates along the pin.

Step 3. 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.

Important! On the smaller of the two pins, the space between the link and the plates should not exceed ¼ inch either side of the centred link regardless of washer placement.

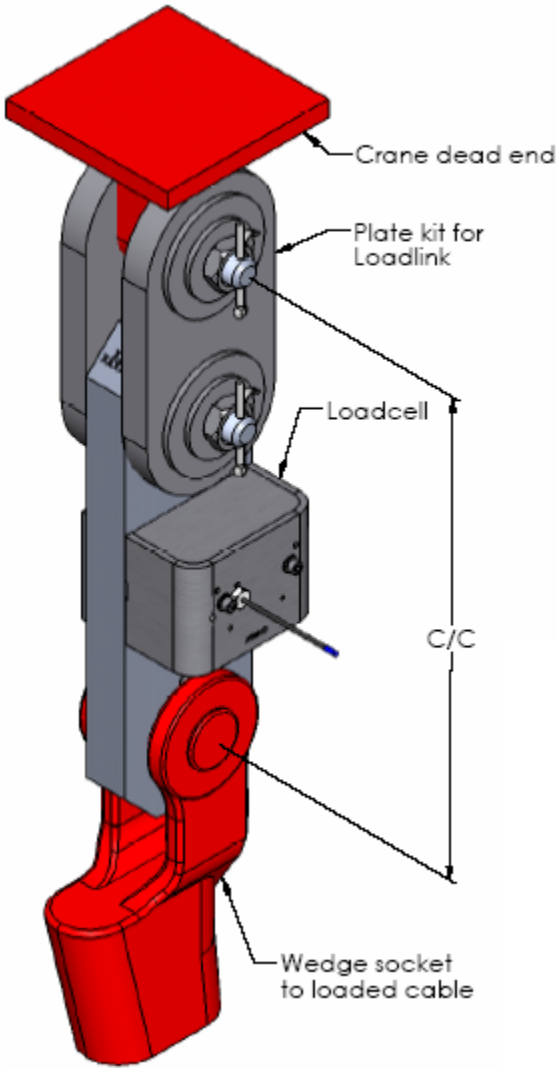


Figure: Typical load cell and adapter plate assembly installed

Step 4. In all cases the washers must be placed symmetrically such that the load cell is centred on the pins.

Step 5. Secure the pins with the nuts and cotter pins provided.

Step 6. A qualified person must verify every lift assembly before first use and periodically thereafter, including before any new, difficult or otherwise different lift.

Angle Sensors for the Boom or Jib

WARNING! 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.

Mounting Procedure

The GS010 series angle sensors can be turned on by starting up the GS550 display to which they are programmed. The angle sensor can then assist in levelling itself with the red and green LED.

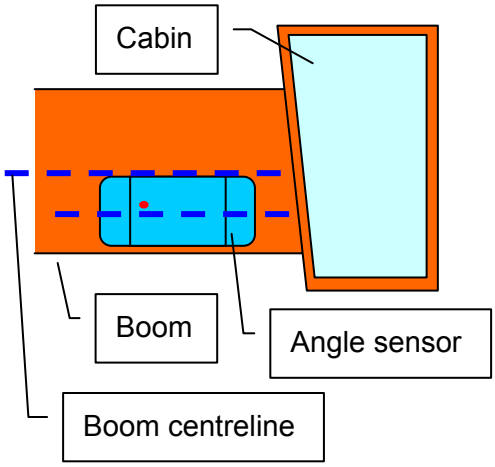


Figure: Angle sensor level with the boom – side view

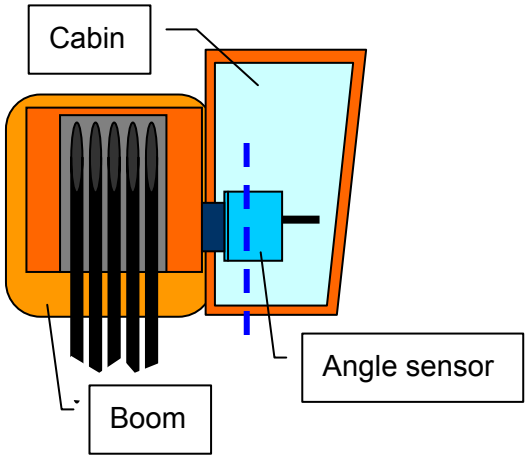


Figure: Angle sensor top/bottom axis within 15° of vertical – front view

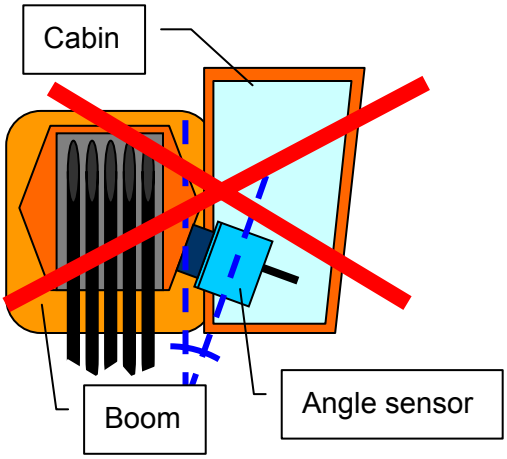


Figure: Do not mount the angle sensor with its top/bottom axis more than 15° from vertical – front view

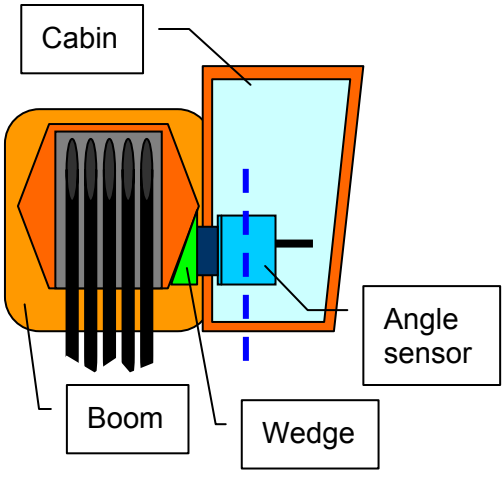


Figure: A wedge used to mount the angle sensor with its top/bottom axis within 15° of vertical – front view

Step 1. Determine the angle sensor position.
   a. The GS010-01 boom angle sensor can be mounted on either side of the boom.
   b. The GS010-02 360° angle sensor must be mounted on the left side of the jib.
   c. The angle sensor must be level with the boom centreline.
   d. The top / bottom axis of the angle sensor must be within 15 degrees of vertical
   e. The angle sensor must have a clear line of sight to the cabin mounted display.
   f. The angle sensor antenna must not contact a metal object.

Step 2. Install the welding pads; keep the angle sensor well removed from the weld site and any connecting metal objects while welding.

Step 3. Mount the angle sensor to the weld pads with the screws and washers provided.

Step 4. Verify angle indication on the GS550 LCD.

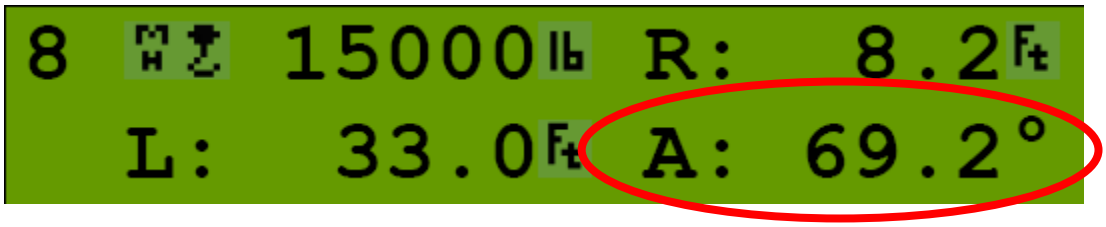


Figure: Typical operation page with boom angle indication

Step 5. 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.

Tip: To enable crane functions when alarm conditions are present, press Bypass for 10 seconds to enter the "Rig Mode". Press Bypass once to exit.

Angle Calibration Procedure № 1: Mechanical Set-Up

Step 1. Level the boom such that it is perfectly horizontal; use a high quality bubble or digital angle sensor. Verify the GS550 display indicates 0.0 degrees.

If not then:

Step 2. (GS011 angle/length sensor only) Carefully remove the cover of the LS101 cable reel.

Step 3. Loosen the mounting screw in the slotted hole of the angle sensor mounting plate.

Step 4. Pivot the angle sensor slightly until angle indication is correct.

Tip: When the angle sensor is moved very slowly, it may take several seconds to see an update at the GS550 display. 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 display.

Angle Calibration Procedure № 2: Correct with the GS550

Calibrate angle indication by adjusting the trim (offset) value in the GS550 display; the GS550 will then communicate the updated trim value to the sensor.

Step 1. Position the boom at a precisely known angle.
Step 2. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Enter** → **Next** → **Enter** → to go to manual calibration menu page 4B2A)
Step 3. Use **Back** and **Next** to select the angle sensor to be calibrated.
Step 4. Press **Enter** → **Next** to got to the trim adjustment page.
Step 5. Use **Up** and **Down** to adjust the trim value.

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

Step 6. Press **Enter** to save changes.
Step 7. Press **Exit** four times to return to the operation display.
Step 8. Verify accurate angle indication at both very high and very low angles.

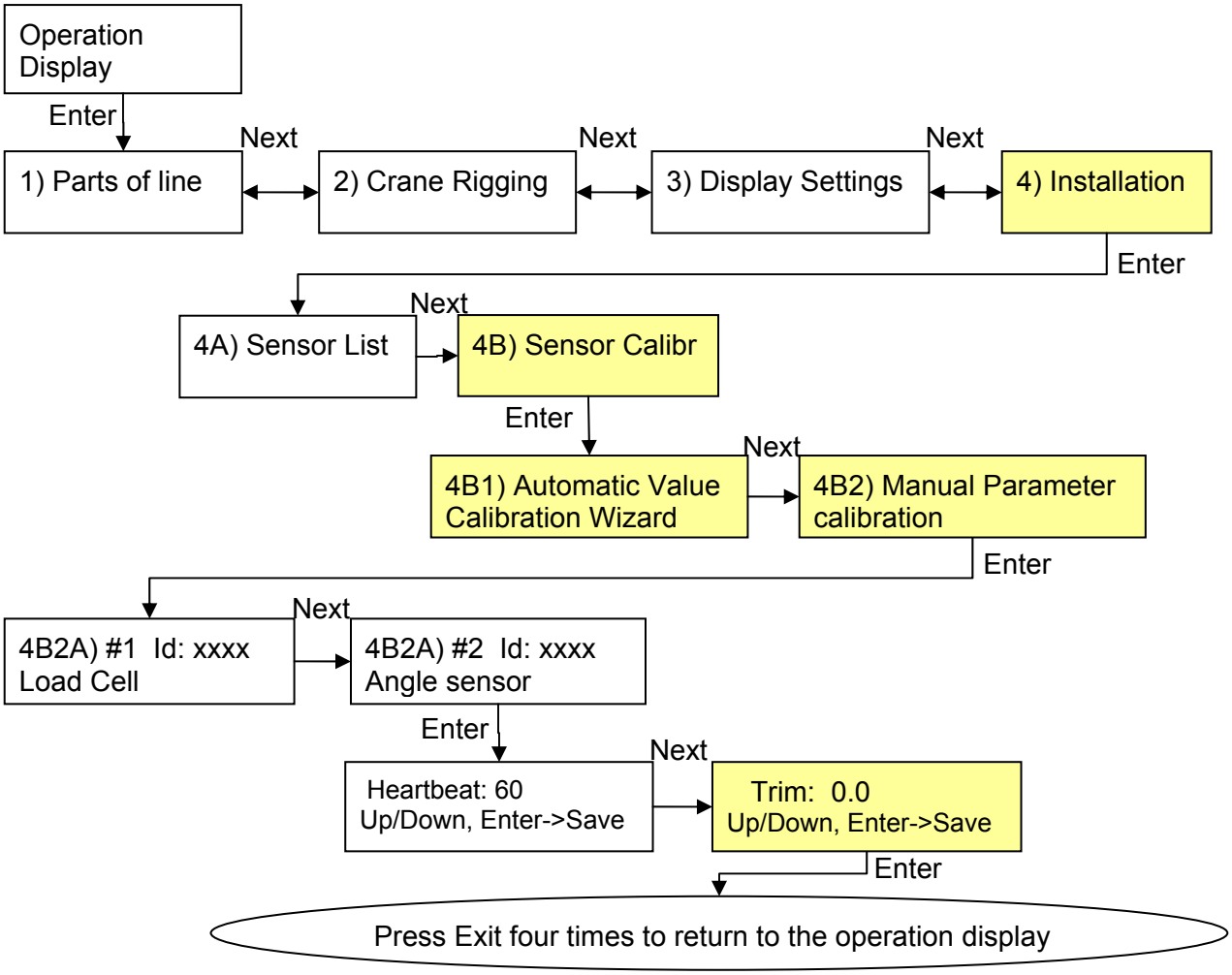


Figure: Angle Calibration Procedure № 2

Anti-Two-Block Switch GS050

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.

Important! To ensure reliable radio communication between the anti-two-block switch and the GS550 display the following conditions must be respected:

- **The antenna of the anti-two-block switch must not be in contact with metal.**
- **The anti-two-block switch antenna must point to the left or to the right of the boom; it must not point directly to, or away from, the GS550 display.**
- **The anti-two-block switch antenna must have a clear line of sight to the GS550 display; in most cases this means mounting the sensor on the same side of the boom as the operator's cab**

Step 1. Verify the GS050 anti-two-block switch is programmed to the GS550 display. Switches shipped with displays are pre-programmed in the factory. Test: if the switch has been programmed to the display then the display will go in to two-block alarm when the wire rope of 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 display, this should be done before proceeding to step 2. See *How to Add a Sensor to the GS550*.

Step 2. 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.

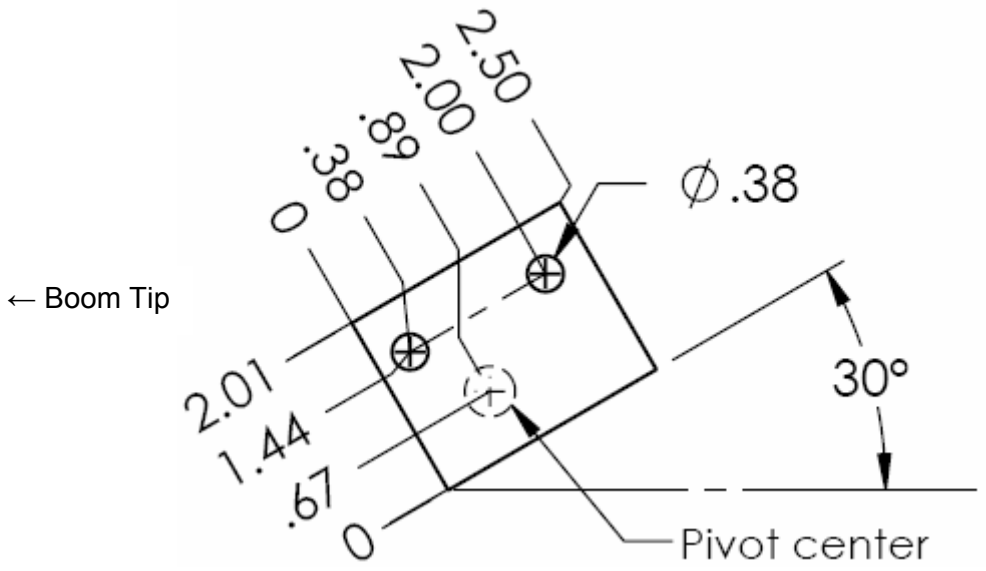


Figure: Mounting bracket footprint and recommended orientation. All dimensions are in inches.

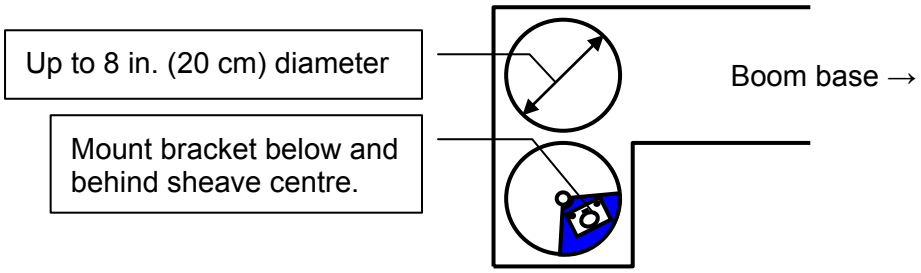


Figure: Telescopic boom, anti-two-block switch placement for both live and dead end mounting

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

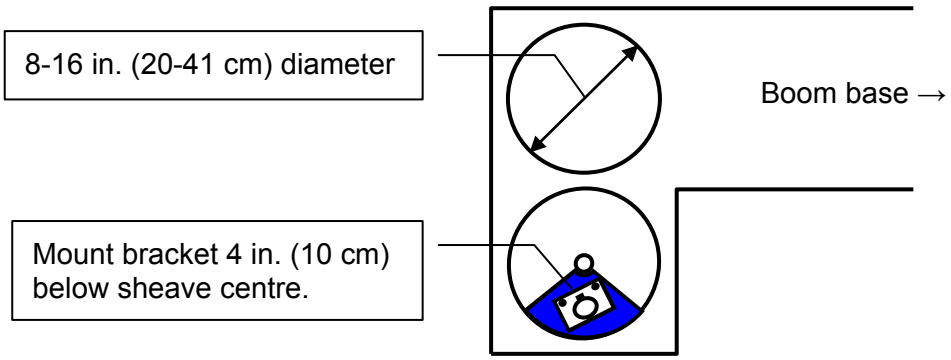


Figure: Lattice boom, anti-two-block switch placement for live end mounting

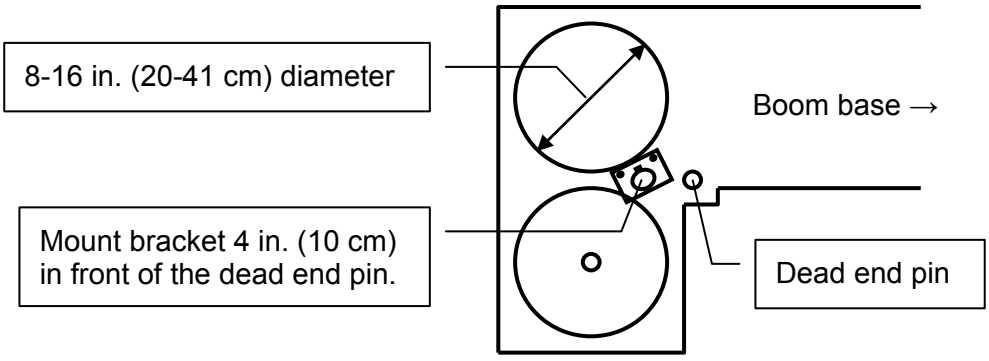


Figure: Lattice boom, anti-two-block switch placement for dead end mounting

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

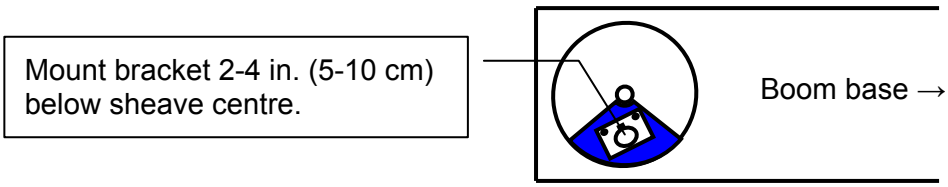


Figure: Jib, rooster or other extension, anti-two-block switch placement for single part of line operation only

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.

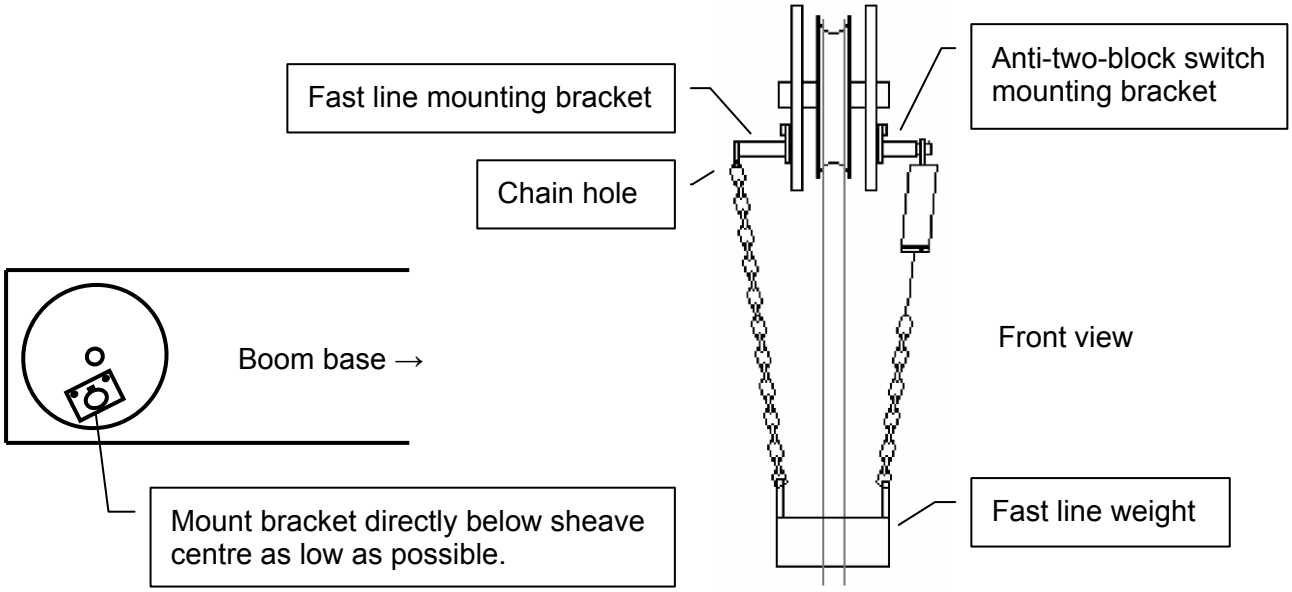


Figure: Fast line weight installation

Step 3. Chain length adjustment № 1 – minimum boom angle

i. 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.
ii. Hoist slowly until the red two-block warning lights comes on and 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 lightweight chain between the sensor and weight to increase warning distance. If still insufficient, contact your service representative.

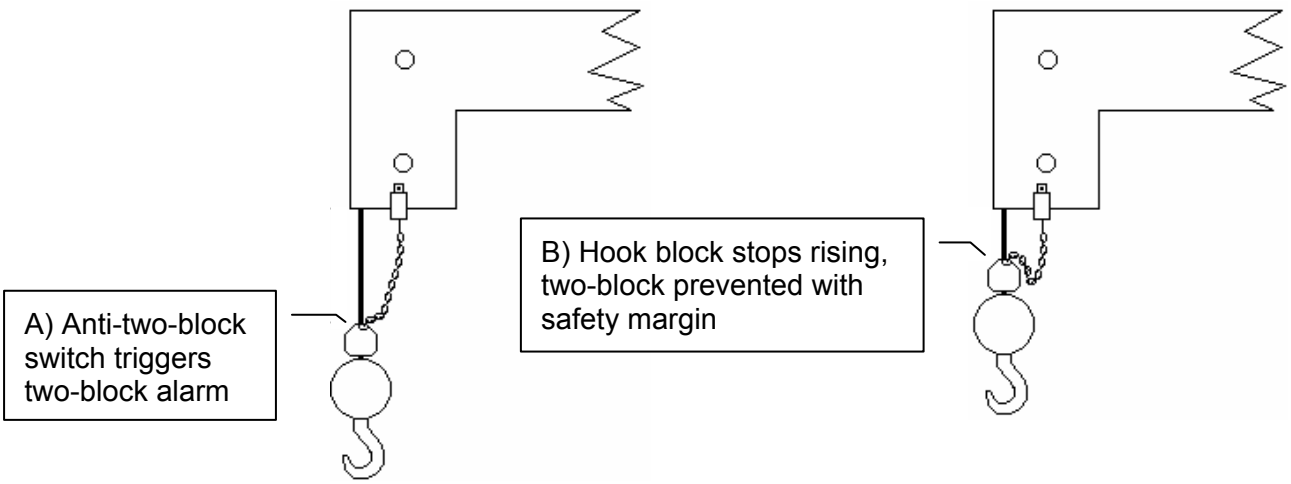


Figure: Anti-two-block weight chain length test at minimum boom angle

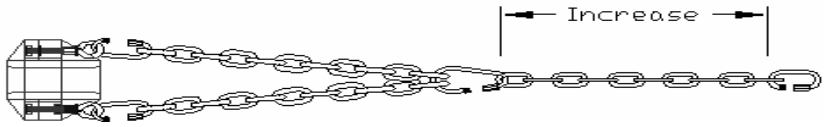


Figure: Anti-two-block weight chain length

Step 4. Chain length adjustment № 2 – maximum boom angle

i. Raise the boom to the maximum angle.
ii. Hoist slowly until the red two-block warning lights comes on and 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 lightweight chain between the sensor and weight to increase warning distance. Verify that the warning distance is equal to or greater than that determined at the minimum boom angle.

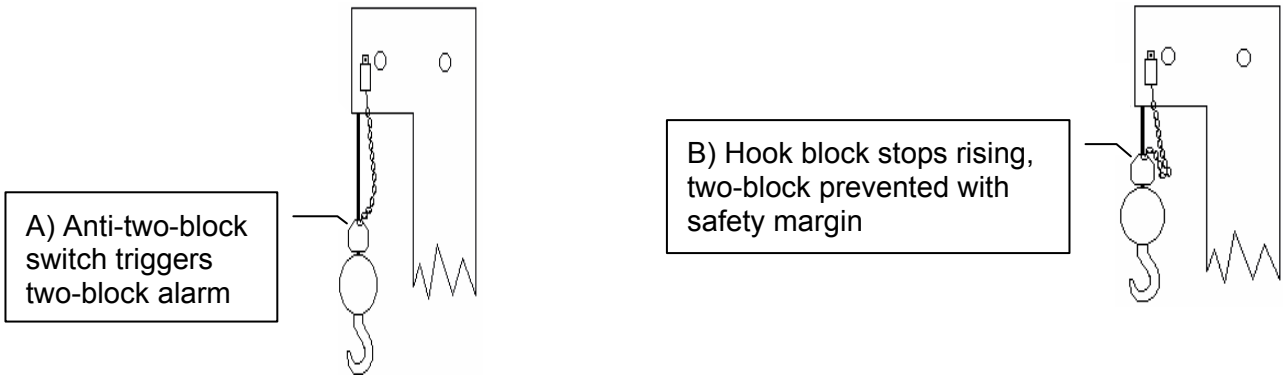


Figure: Anti-two-block weight chain length test at maximum boom angle

Tip: Have a second person stand off to the side of the crane to closely monitor the hoisting distance from the hook block to the head sheave block.

Step 5. Chain length adjustment № 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 small chain if needed.

Length Sensor Cable Reel

WARNING! Arc welding will damage LSI sensors, causing immediate failure or greatly reducing functional life. Arc welding on or near LSI equipment will void warranty. Keep LSI 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 the sections *Angle Calibration Procedure № 1* and *Angle Calibration Procedure № 2* for instructions.

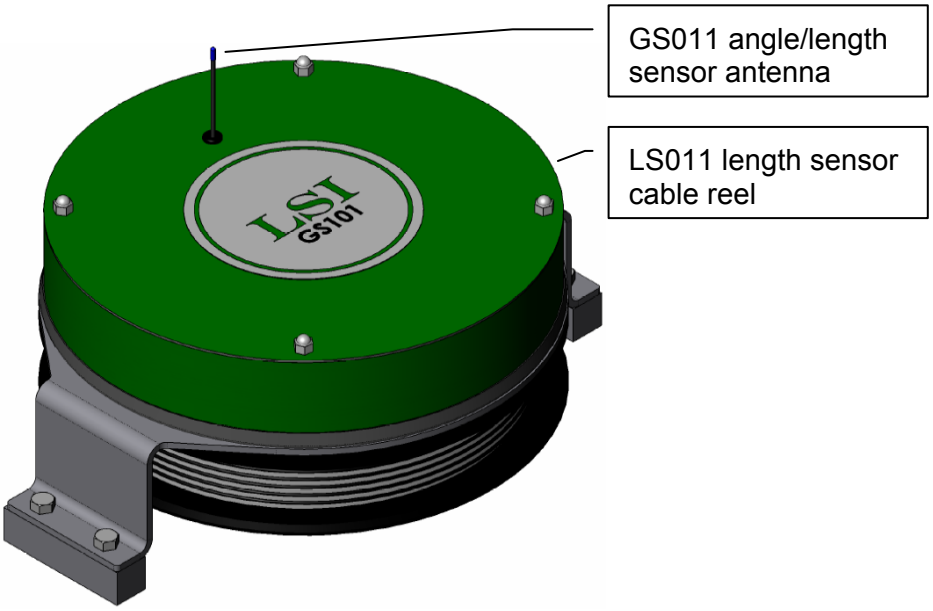


Figure: GS101 angle & length sensor

Maximum Boom Extension

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

Step 1.	Note the cable reel maximum extension: 100 feet (30.5 metres) 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.

Mounting the Cable Reel

Step 1. Determine placement. Find a clear mounting position on the left side of the first (lowest) section of the boom. The mounting position should be close to the base of the boom; at least ten feet (three metres) 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.

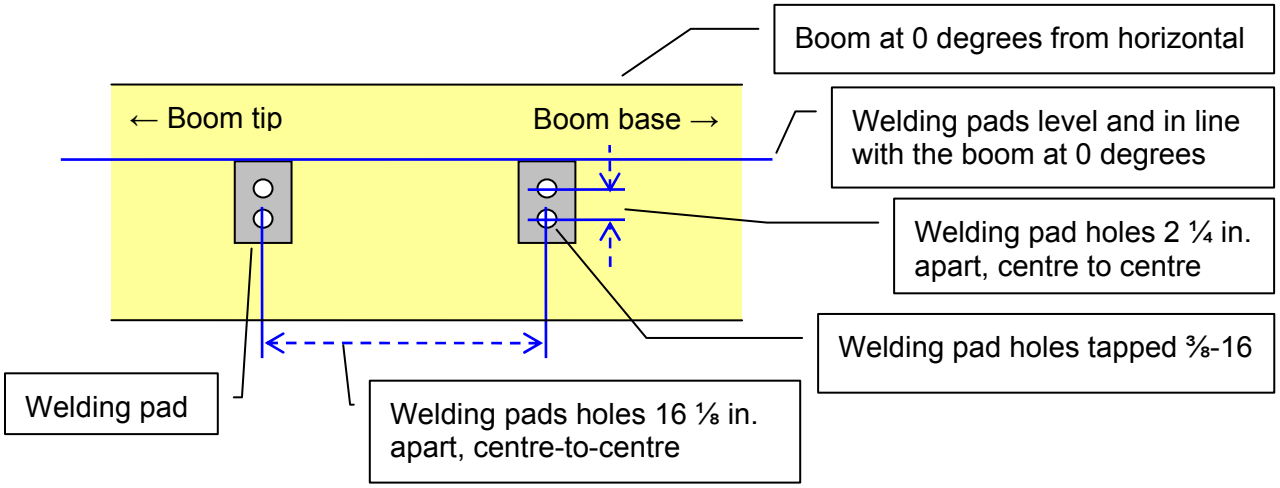


Figure: Cable reel mounting position

Step 2. Mount the welding tabs. They must be placed parallel to each other, with 16 ⅛ inches between the holes' centres. Install the tabs such that they create a level mounting position in line with the boom at 0 degrees.

Tip: 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 plus or minus two degrees) are possible after cable reel installation.

Step 3. Attach the reel to the welding tabs with the bolts provided. The reel should be orientated with the GS011 angle/length sensor antenna coming out the top side of the cable reel cover.

Step 4. Install the first cable guide (PA111) about 10 feet (3 metres) 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.

Step 5. Pull out at least 5 feet (1 ½ metres) of cable, but not more than half the excess extension D (see *maximum boom extension* step five). 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.

Step 6. Verify the boom length indicated on the GS550 LCD. Boom length is indicated following the length abbreviation "L", typically on the first or second operation page. 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.

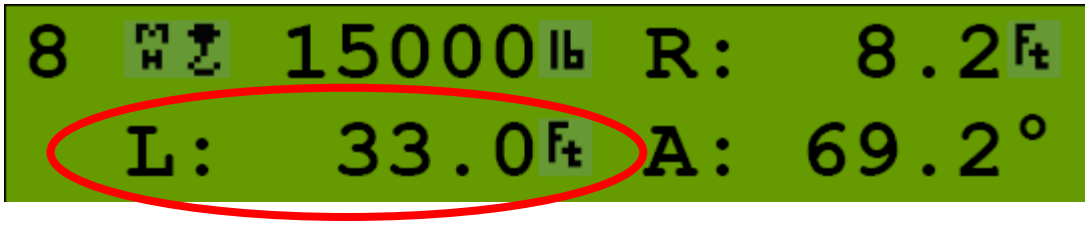


Figure: GS550 LCD – typical operation page two with boom length indication

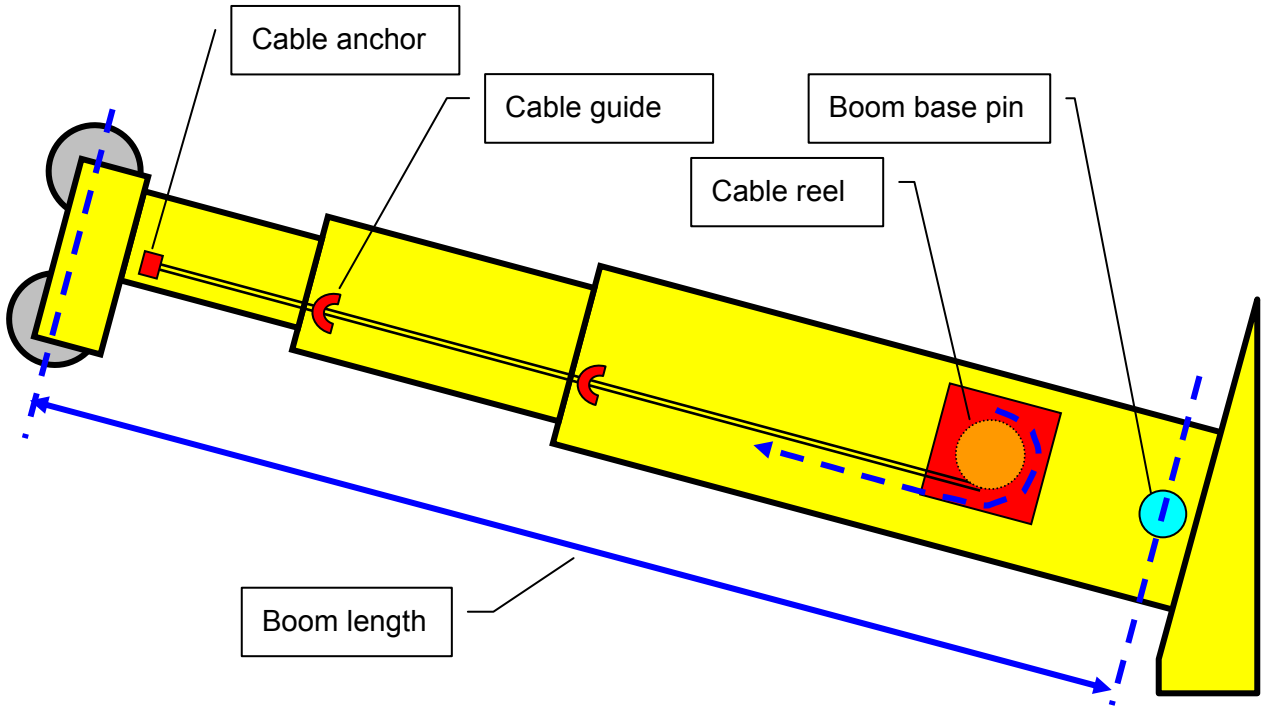


Figure: The actual boom length

Boom Length Calibration Procedure № 1: Mechanical Set-Up

Important! Monitor length sensor cable length remaining as the boom is extended for the first time with the installed cable reel. This generally requires a second person (in addition to the operator.

Step 1. Fully retract the boom
Step 2. Adjust the loose wire rope at the boom tip so that the displayed boom length matches the actual boom length.
Step 3. Fully extend the boom
Step 4. Verify the boom length indicated at full boom extension matches the actual fully extended boom length. If not then follow *Boom Length Calibration Procedure № 2*.

Boom Length Calibration Procedure № 2: Correct with the GS550

If displayed boom length does not match actual boom length for retracted or extended boom and if it is not possible to easily correct by following Boom Length Calibration Procedure № 1 (previous page), then follow this procedure. This procedure is completed in the operators cab, it requires fully retracting, and then fully extending the boom, as prompted by the on screen instructions.

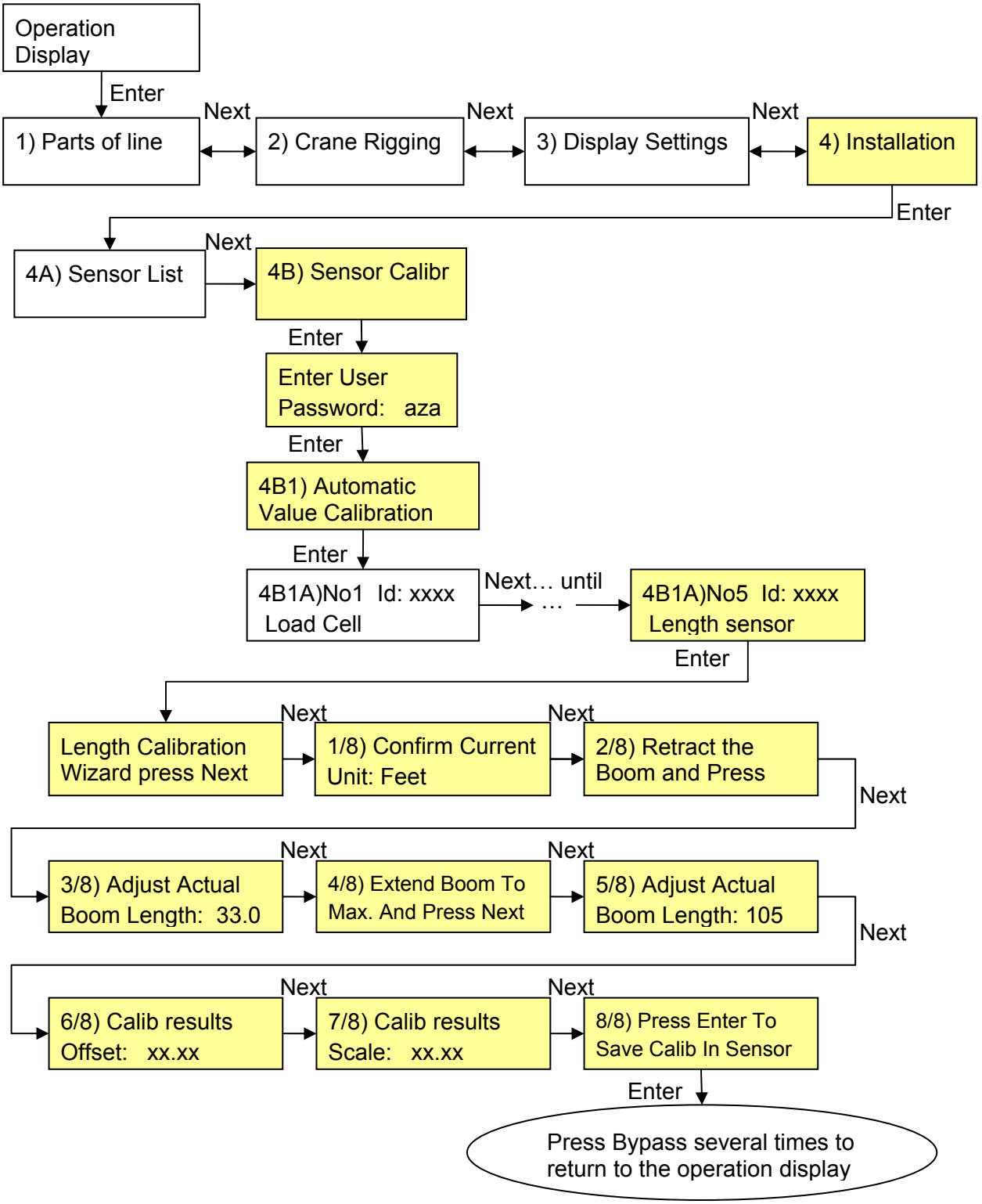


Figure: Boom Length Calibration Procedure № 2

Radius Calculation

Before proceeding with radius calibration:

Install the display unit (see Installation – Display GS550).

Install the angle sensor (see Installation – Angle Sensors for the Boom or Jib) and verify the accuracy of its reading.

Telescopic boom cranes: install the length sensor (see Installation – Length Sensor Cable Reel). Make sure the length is displayed properly for retracted and extended boom.

Lattice boom cranes, GS550 not programmed with rated capacity charts: the boom length must be entered manually in the display. This value must be adjusted every time the length of the lattice boom is changed. To access this page in the main operating pages, press on the Hoist button several times and one of the first 3 or 4 pages should offer to adjust the boom length. Note: the boom length adjustment screen will not be visible if the system is setup with a cable reel system because the cable reel will provide boom length automatically. The page will not be visible if the system has charts in it because the rigging menu will offer the available boom length (see System Operation – Crane Rigging)

Boom Length:150.0 + -
change value

Enter the jib length if the working hoist is rigged to a jib. This value must be adjusted every time the length of the jib is changed.

Jib Length: 50.0 + -
change value

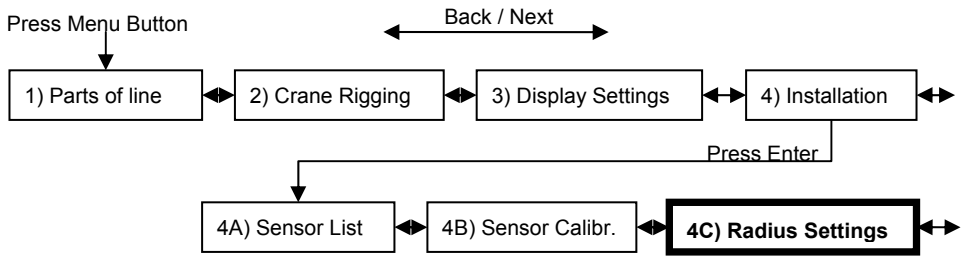
Enter the jib-offset angle if the working hoist is rigged to a jib. This value must be adjusted every time the angle of the jib is changed. Note: for accurate radius display when working with a luffing jib, an angle sensor must be installed on the luffing jib.

Jib Offset: 10.0 + -
change value

Radius Settings

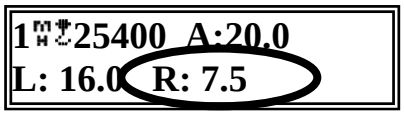
The boom length (lattice cranes only), jib length and jib offset angle must be correctly entered in the GS550 for accurate radius display. Furthermore, upon installation the GS550 must be calibrated for several crane specific angle and length parameters. Default values may have been programmed at the factory before shipping. Upon installation these parameters must be confirmed and accurate radius display verified.

In most chart systems, the radius settings have already been pre-adjusted and radius should only need verification. If capacity chart did not include both, angle & radius, then the chart entry person may not have been able to adjust radius settings variables.



Step 1) To enter the radius settings screens, enter in the menu sections 4C. (Press menu, then use the Next button to installation, page 4, then press Enter(menu), use Next to reach page #3, press Enter again to enter.)

Step 2) Determine the following measurements to within a tenth of a foot: slew offset, sheave head length and sheave radius. These measurements are described in the subsections Radius Parameters for a Lattice Crane and Radius Parameters for a Hydraulic Crane that follow. Verify that the radius parameters have been set correctly; the values may be adjusted with the + and - buttons. Press the Next button to proceed from one parameter to the next.



Step 3) Test the radius indication. Compare the radius displayed with the actual radius at different lengths of boom extension and different boom angles. If the radius displayed by the GS550 corresponds to the actual radius in all cases, the radius function is correctly calibrated. Be sure that all radius parameters have been carefully noted to facilitate re-calibration in the event of component or system upgrade, change, or re-installation. If there is a difference between displayed radius and actual radius that remains constant during changes in boom length and angle the slew offset can be adjusted to compensate (see step 2 above). E.g. if the radius displayed is always 2.3 feet longer than the actual radius subtract 2.3 from slew offset. If the radius displayed is still different from the actual radius proceed to the subsection Radius Display Troubleshooting that follows.

Radius Parameters for a Lattice Crane

The radius calculation parameters highlighted in green must be measured on the crane and set into the radius settings of the GS550 display unit

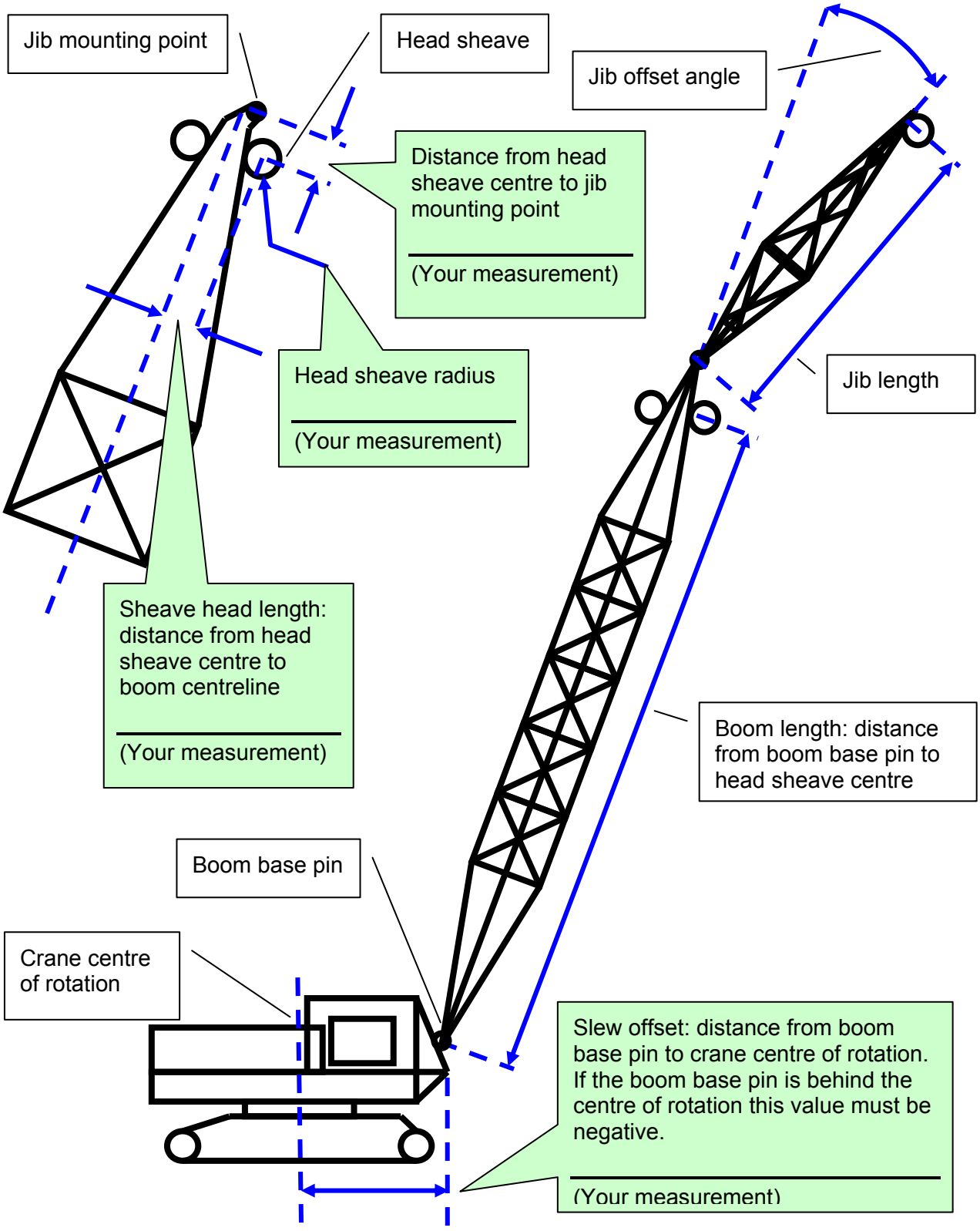
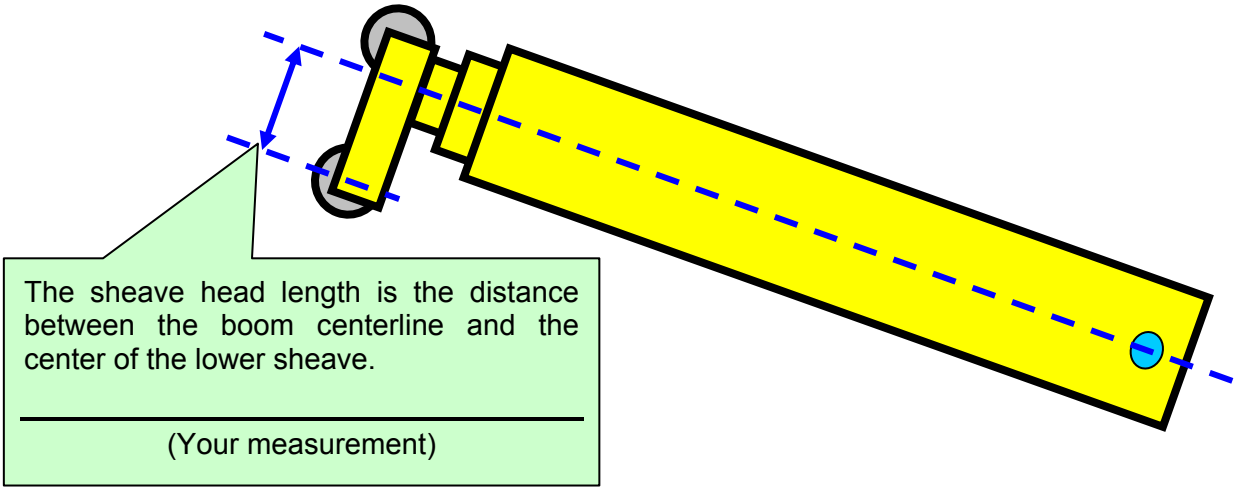


Figure: Basic radius parameters for a lattice crane

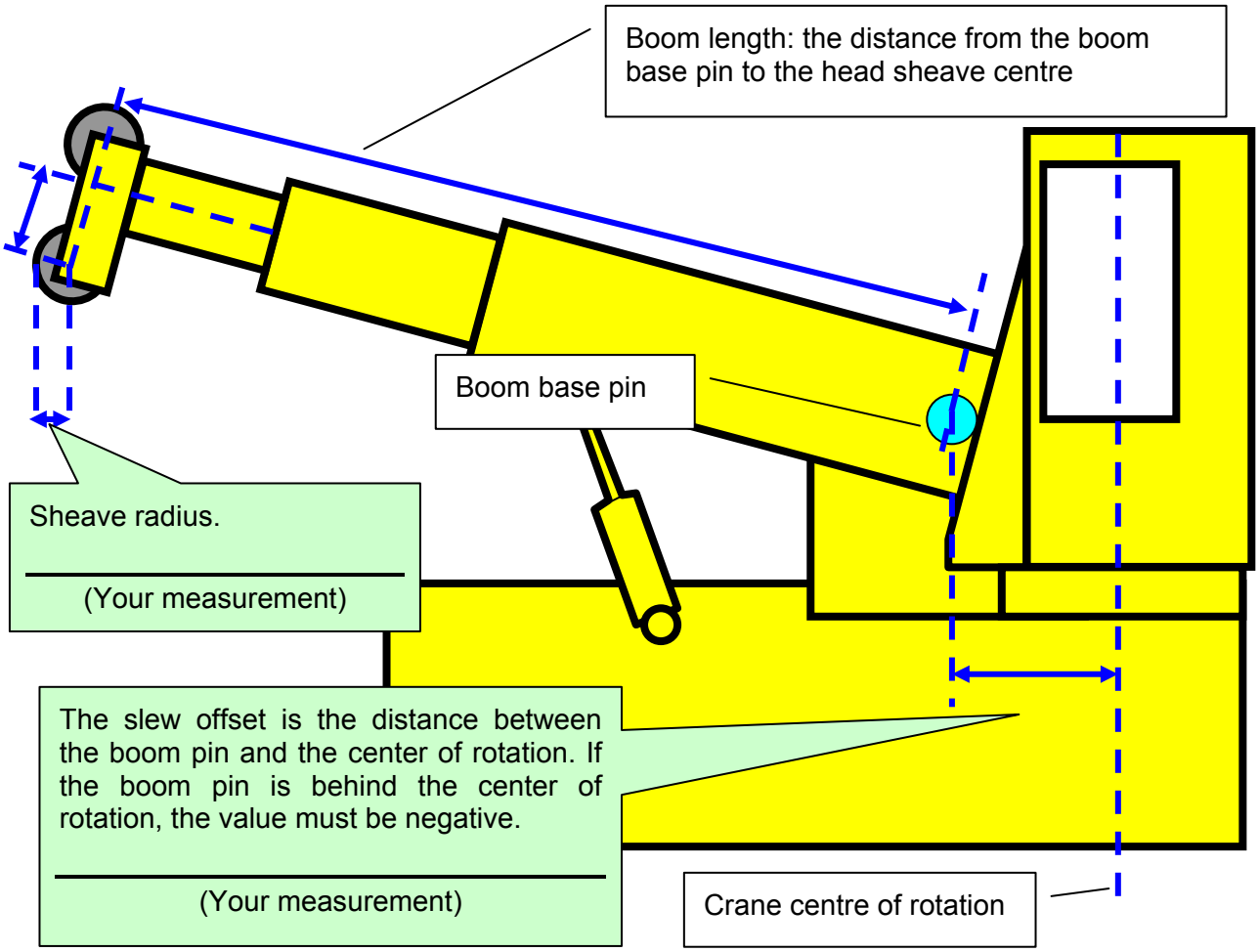
Radius Parameters for a Hydraulic Crane

The radius calculation parameters in green must be measured on the crane and set into the radius settings in the GS550 display.



The sheave head length is the distance between the boom centerline and the center of the lower sheave.

(Your measurement)



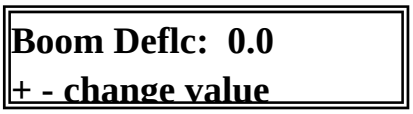
Radius Display Troubleshooting

For accurate radius calculation the actual boom length and angle, and the jib length and angle must be correctly displayed by the GS550 and all radius parameters must be correctly measured and entered in the radius settings of the GS550 display. Before proceeding with troubleshooting confirm that all steps described at the beginning of the Radius Calculation section, including the radius parameters subsection, have been followed. The most common reason for error is caused by incorrect slew offset compensation. If the difference between the radius displayed and the actual radius remains constant through all boom angles and boom lengths the slew offset should be adjusted accordingly.

Boom Deflection

Some booms bend significantly with a load on the hook, thus reducing effective radius. Boom deflection can be verified if the displayed radius is equal to the actual radius with the boom at 0° and at 90° but greater at a boom angle of 45° (boom deflection is greatest at 45°). Furthermore, the effect of boom deflection is greater when the boom is longer. To compensate for boom deflection, adjust the boom deflection value in the radius settings of the GS550. Follow the steps below to determine the appropriate boom deflection compensation value.

Step 1) Raise the boom to 45° with a known load.



Step 2) Compare the radius displayed with the actual radius. Change the boom deflection compensation value and again compare the radius displayed with the actual radius. Adjust the boom deflection value until the radius displayed equals the actual radius.

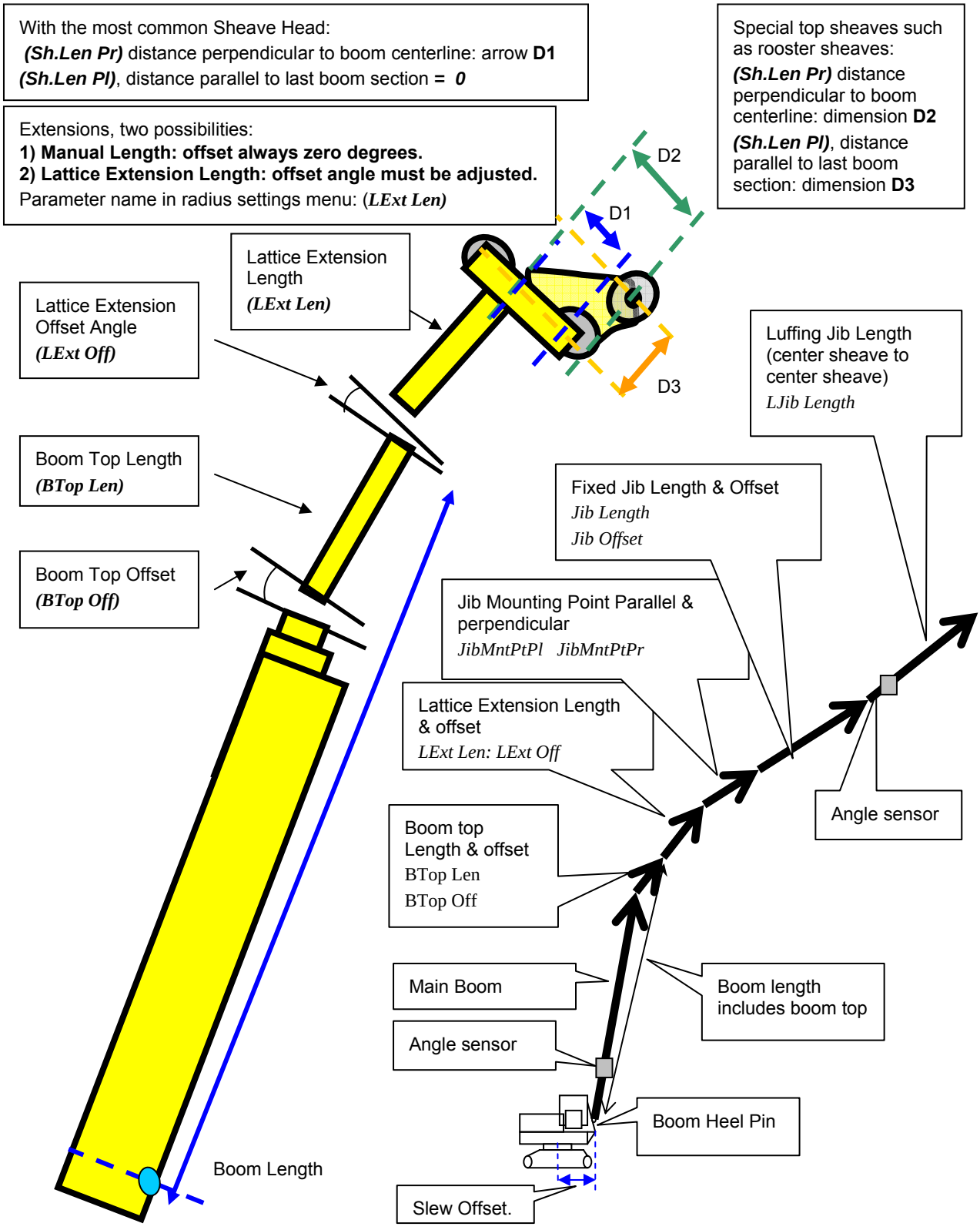
Tip: with the boom at 45° and the maximum load on the hoist, the boom deflection compensation value should equal the difference in feet between the radius displayed and the actual radius. With the boom at 45° and half the maximum load on the hoist, the boom deflection compensation value should equal twice the difference in feet between the radius displayed and the actual radius.

No Load Deflection

The "No load deflection" value (menu 4C7) permits compensation for booms that deflect significantly under their own weight, even with no load on the hoist. This value should not be adjusted unless so advised by LSI technical support.

Advanced Radius Settings (Reference)

On most cranes, the radius parameters described above should be sufficient to calibrate accurate radius indication. When the GS550 has been programmed with rated capacity charts additional radius parameters may facilitate fine tuning radius indication.

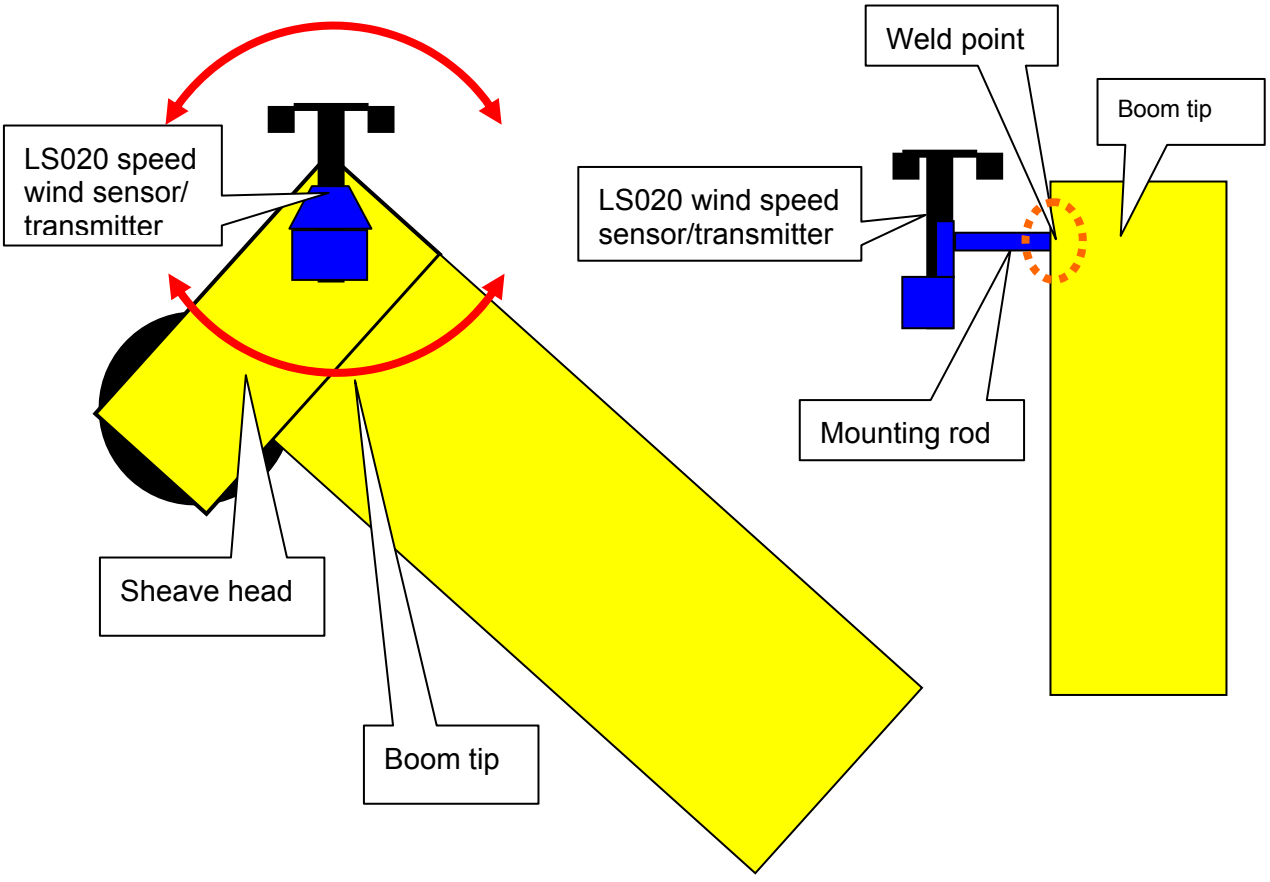


Wireless Wind Speed Sensor GS020

Includes:
Wind speed sensor/transmitter assembly
Mounting rod
Mounting screw
Mounting screw washers (2)

Installation

Unscrew the mounting rod from the wind speed sensor transmitter assembly.
Select the welding point for the mounting rod. The mounting rod must be installed on the same side of the boom as the cabin mounted display, perpendicular to the boom at the highest point possible.
The sensor/transmitter assembly must swing free of any obstruction,
No object should interfere with the wind cups,
There must be a clear and unobstructed line of sight between the sensor/transmitter antenna and the cabin mounted display unit,
The transmitter antenna must not contact any metal object.
WARNING! Do not weld in proximity to LSI sensor/transmitters.
Weld the mounting rod to the boom at the selected point.
Screw the sensor/transmitter assembly to the mounting rod with the mounting screw. Note that washers should be screwed one to each side of the brass bushing of the sensor/transmitter assembly.



Wireless Load Pins

WARNING! Do not pull on a load pin by the pigtail.

LP011, LP015, and LP026

Step 1. 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.

Tip: 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 a single part block the lot number can be read upside down and the "line pull" arrow points up towards the boom tip.

Step 2. Secure the load pin in place with a cotter pin or other suitable keeper device.

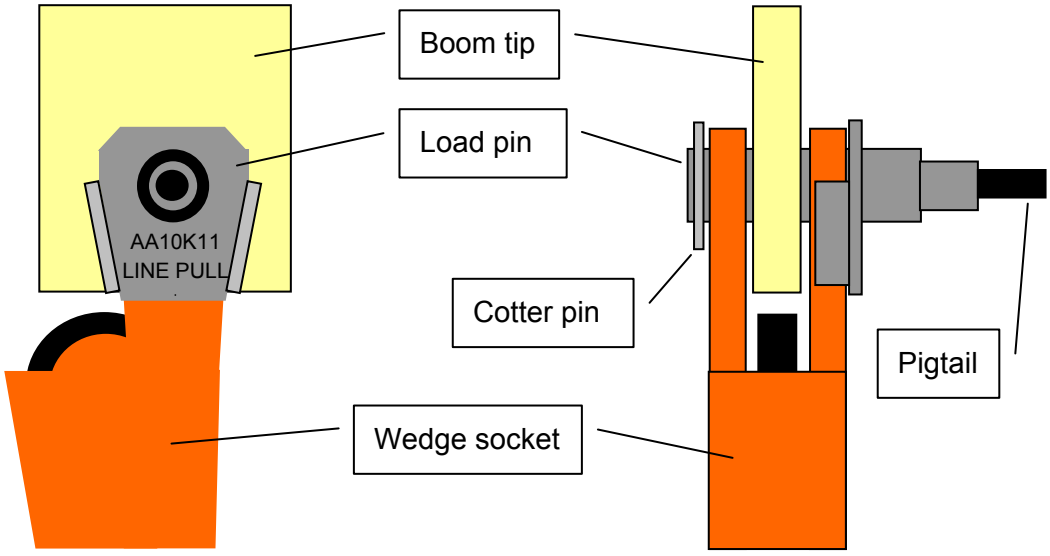


Figure: Load pin LP011, LP015, or LP026 – installation at boom tip

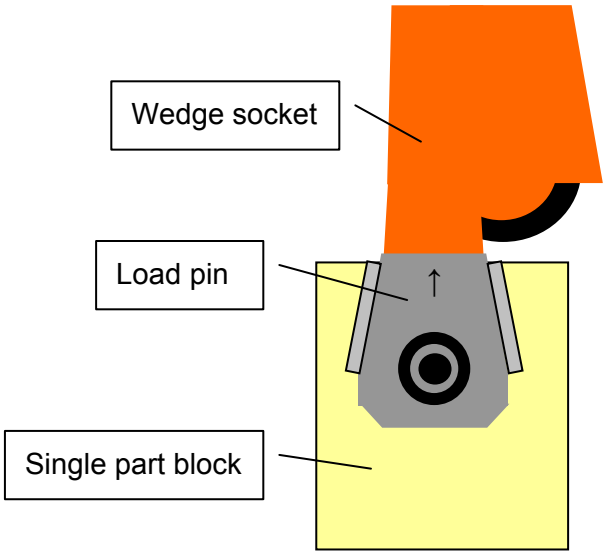


Figure: Load pin LP011, LP015, or LP026 – installation on a single part block

Load Pin Transmitter GS001

Step 1. Determine the transmitter mounting position.

a. 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.

b. There must be direct unobstructed line of sight from the transmitter to the display (this may not be required on cranes with a maximum boom length less than 100').

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

Step 2. Weld the mounting blocks where required.

WARNING! Do not weld in proximity to LSI sensor/transmitters.

Step 3. Mount the load pin transmitter on the mounting blocks.

Load Calibration: Load Pins, Line Riders and Compression Cells

Important! Load indication by load pins, line riders and compression cells must be calibrated!

This procedure applies to load pins, line riders and compression cells. This procedure must be followed at installation and every time thereafter the load sensor or load transmitter is changed. Flat bar load links (part numbers GC005, GC012, GC018, GC035, GC060, GC100, GC170 etc.) are factory calibrated, on site calibration is not required.

This procedure requires lifting 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, the larger the better, and absolutely not less than 25%.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Enter** → **Enter** to go to the automatic value calibration wizard menu.

Step 2. Use **Next** to advance to the page showing the id number of the load sensor to be calibrated and the sensor type “Load cell”.

Step 3. Press **Enter**, the display will verify communication with the load sensor.

Step 4. Press **Next** to start the load calibration wizard.

Wizard Step 1 of 9.	Use **Up** and **Down** to adjust the actual number of parts of line on the load sensor. Press **Next**.
Wizard Step 2 of 9.	Use **Up** and **Down** to adjust the weight units for load display. Press **Next**.
Wizard Step 3 of 9.	Lift the first (smaller) known load. Press **Next**.
Wizard Step 4 of 9.	Use **Up** and **Down** to adjust the load value to display the first actual known load lifted. Press **Next**.
Wizard Step 5 of 9.	Lower the first known load and then lift the second (heavier) known load. Press **Next**.
Wizard Step 6 of 9.	Use **Up** and **Down** to adjust the load value to display the second actual known load lifted. Press **Next**.
Wizard Step 7 of 9.	Note the new trim load value. Press **Next**.
Wizard Step 8 of 9.	Note the new scale load value. Press **Next**.
Wizard Step 9 of 9.	Press **Enter** to send the new calibration values to the load sensor. The display will briefly display confirmation that the new calibration has been saved by the load sensor.

4B1)Automatic value Calibration wizard
4B1A)No 1 id:G9999 Load cell
Load Calibration Wizard. Press Next
1/9) enter actual parts of line: 1
2/9) Confirm current units pound (lb)
3/9) Lift known load No 1: 2415
4/9) Adjust actual load No 1: 2000
5/9) Lift known load No 2: 7021
6/9) Adjust actual load No 2: 6000
7/9) Calib Result Trim: 42
8/8) Calib Result Scale:0.8487
9/9) Press Enter to save calib in sensor

Step 5. Press **Exit** three times to return to the operation display.

Load indication by load pins, line riders and compression cells varies depending on the load sensor, the load transmitter and the installation. Recalibrate after every change in load sensor or load transmitter and when installing on a different machine.

The calibration values are stored in the load transmitter; recalibration is not required if the display is changed.

Load indication should be tested periodically with known loads at both the high and low ranges of load sensor capacity.

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.

1. Sum load indication
2. Imbalance
3. Slack Rope

Each of these functions can be used to generate an alarm condition on the lockout wires of the GS550.

Sum Load Indication

When sum load indication is programmed the sum of the loads on the pre-determined load sensors is indicated by the operation display. 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.

The 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 display units).

Program Sum Load Indication

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to the sensor list, menu page 4A1.

Step 2. Press **Next** repeatedly to advance to the next available sensor position, usually following the four load sensors.

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

Step 4. Use **Up** and **Down** to adjust the id number.

Step 5. Press **Next**.

Step 6. The sensor type should flash; use **Up** and **Down** to select the sensor type “Sum load cell”.

Step 7. Press **Enter** to save any changes.

Step 8. Press **Next** to program the imbalance sensor or press **Exit** three times to return to the operation display.

Step 9. Adjust the sum maximum limit in the limit menu

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.

The 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%.

The 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 (lb or kg depending on load display units).

Program the Imbalance Sensor

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to the sensor list, menu page 4A1.
Step 2. Press **Next** repeatedly to advance to the next available sensor position, usually following the four load sensors and the sum load sensor.
Step 3. The id can be left at 0, press **Next**.
Step 4. The sensor type should flash; use **Up** and **Down** to select the sensor type Imbalance sensor. Only one imbalance sensor is required to calculate imbalance for all four load sensors.
Step 5. Press **Enter** to save any changes.
Step 6. Press **Exit** three times to return to the operation display.
Step 7. Confirm the imbalance factor limit and the imbalance minimum limit in the limit menu.

How it Works

$$\text{Load № 1 Imbalance Factor} = 100 \times \frac{\text{Average (Load 2, 3, and 4)} - \text{Load 1}}{\text{Average (Load 2, 3, and 4)}}$$

Example: Imbalance factor calculation for load sensor № 1

A	7500	B	8100
C	8000	D	8200

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

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

A	6800	B	8100
C	8000	D	8200

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

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

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.

The 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 (lb or kg depending on load display units).

Program the Slack Rope Sensor

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to the sensor list, menu page 4A1.

Step 2. Press **Next** repeatedly to advance to the next available sensor position, usually following the four load sensors, the sum load sensor and the imbalance sensor.

Step 3. The id can be left at 0, press **Next**.

Step 4. The sensor type should flash; use **Up** and **Down** to select the sensor type Slack rope sensor. Only one slack rope sensor is required to calculate slack rope for all four load sensors.

Step 5. Press **Enter** to save any changes.

Step 6. Press **Exit** three times to return to the operation display.

Step 7. Adjust the slack rope minimum limit in the limit menu

Data Logger

The GS550 includes a data logger that records all significant events with a date and time stamp and actual sensor values. The data logger memory can hold over 16 000 records, this is equivalent to several days or several years of operation depending on the recording mode selected and machine use. The data can be extracted using a portable download tool and then transferred to a personal computer for analysis.

Recording Modes

The events recorded by the data logger depend on the recording mode selected.

Alarm Only

Record alarms only. All the other data logger modes also record alarms.

Automatic Recording

A record is added at a specified interval. When the automatic recording data logger mode is selected on menu page 4F1 (see step 3 below) *press **Next** to go to page 4F11) and then use **Up** and **Down** to adjust the record interval in minutes.*

Wind speed special reports: to use the wind speed report feature of the Data Logger Viewer software on a personal computer the data logger recording mode should be set to automatic recording.

Automatic Variation

A record is added when load increases by more than the operator adjusted percentage. When the automatic variation data logger mode is selected on menu page 4F1 (see step 3 below) *press **Next** to go to page 4F11) and then use **Up** and **Down** to adjust the variation threshold.*

Automatic Peak

In the automatic peak mode the data logger analyzes the measured weight and records the peak value only. One threshold per load cell must be adjusted. When the weight drops by more than the peak threshold the peak weight is recorded. Only one event is recorded for each pick when the threshold is adjusted correctly. When the automatic peak data logger mode is selected on menu page 4F1 (see step 3 below) *press **Next** to go to page 4F11) and then use **Up** and **Down** to adjust the peak threshold for the first load cell. Press **Next** to repeat for the second load cell etc. Up to four load cells can be programmed for automatic peak data logging.*

User Input

Available on request only, the status of all sensors is recorded on demand. A custom hardware modification to the GS550 display is required and a normally open push button must be installed on a digital input to the GS550 through a pre-determined wire of the power supply and lockout cable.

All Data

All communications between a display and its sensors are recorded.

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Next** → Enter to go to menu 4F1) Data logger mode
Step 2. Use **Up** and **Down** to select the data logger recording mode.
Step 3. Automatic modes only: press **Next** to advance to the adjustment page for the interval (automatic recording mode), variation (automatic variation recording mode), or threshold (automatic peak recording mode).
Step 4. Press **Enter** to save any changes.
Step 5. Press **Exit** three times to return to the operation display or press **Next** to adjust the data logger date and time (see below).

Tip: all alerts are recorded by the data logger regardless of the mode selected.

Date and Time

Adjust the data logger date and time as required:

Step 1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Next** → **Enter** → **Next** to go to menu 4F2) Adjust date.
Step 2. The last two digits of the year should be flashing: use Up and Down to adjust the year.
Step 3. Press **Next** to adjust the month.
Step 4. The month should be flashing: use **Up** and **Down** to adjust the month.
Step 5. Press **Next** to adjust the day.
Step 6. The day should be flashing: use **Up** and **Down** to adjust the day.
Step 7. Press **Next** to adjust the time.
Step 8. The hour should be flashing: use **Up** and **Down** to adjust the hour from 00 (midnight) to 23 (11 pm).
Step 9. Press **Next** to adjust the minute.
Step 10. The minute should be flashing: use **Up** and **Down** to adjust the minute.
Step 11. Press **Next** to adjust the second.
Step 12. The second should be flashing: use **Up** and **Down** to adjust the second.
Step 13. Press **Enter** to save any changes.
Step 14. Press **Exit** three times to return to the operation display.

The Sensor List

All sensors in the GS550 system are programmed in the sensor list. The GS550 uses information from all sensors in the sensor list. Conversely the GS550 will not use or display information from sensors that are not programmed to the sensor list. If a sensor is removed from the crane then it must be removed from the sensor list. If a sensor is replaced the sensor list must be updated with the new id number.

WARNING! Information display from load, angle and boom length sensors that are not correctly installed will not be accurate.

WARNING! Rated capacity, radius, and tip height based on information from angle and boom length sensors that are not correctly installed will not be accurate.

Tip: To ensure communication sensors must be at least six feet from the GS550 display.

How to Add a Sensor to the GS550

Step 1. Determine the radio identification number (id) of the sensor to be added. This number between 10000 and 99999 is engraved on the sensor.
Step 2. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to menu page 4A1).
Step 3. Advance to the next empty sensor position in the sensor list. Press **Next** repeatedly until the LCD shows "No sensor" on the bottom line. Up to 32 sensors may be added to the sensor list.
Step 4. The id number should flash; this means it is adjustable. Use **Up** and **Down** to program the sensor id.

Tip: Press **Up** and **Down** simultaneously to make the sensor id number jump directly to 10000.

Step 5. Press **Next**.
Step 6. The sensor type ("No sensor") should flash; this means it is adjustable. Use **Up** and **Down** to select the sensor type.
Step 7. Press **Enter** to save any changes made to the sensor list.
Step 8. Press **Exit** three times to return to the operation display.

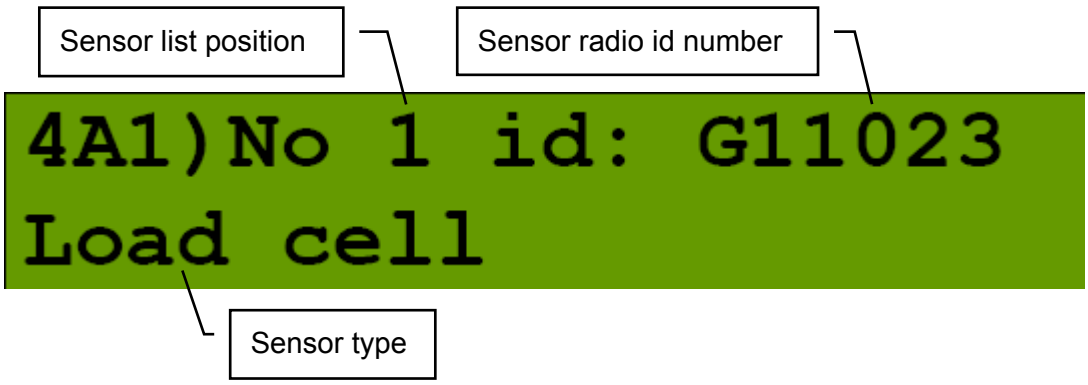


Figure: Menu page 4A1) – the sensor list

How to Remove a Sensor from the GS550

Step 1. Determine the sensor to be removed. If more than one sensor of the same type has been added to the sensor list then determine the radio identification number (id) of the sensor to be removed before proceeding. This number between 10000 and 99999 is engraved on the sensor.

Step 2. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to menu page 4A1).

Step 3. Press **Next** repeatedly to advance to the page of the sensor list showing the id of the sensor to be removed.

Step 4. The sensor id should flash, press **Next**, the sensor type should flash; this means it is adjustable. Use **Up** and **Down** to select "No sensor". This will remove the sensor from the sensor list but retain the sensor id.

Tip: Press **Next** and **Back** simultaneously to remove the sensor from the sensor list. The id number will revert to 0, and the sensor type will revert to "No Sensor".

Step 5. Press **Enter** to save any changes made to the sensor list.

Step 6. Press **Exit** three times to return to the operation display.

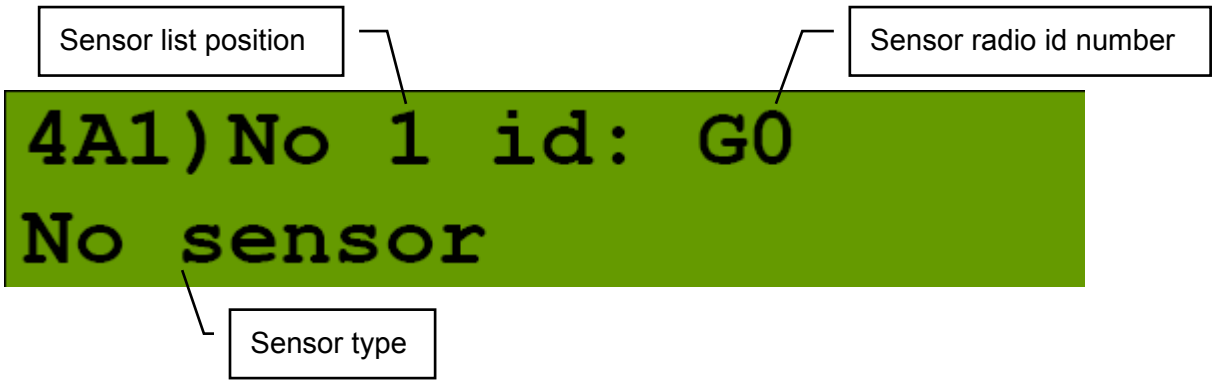


Figure: Menu page 4A1) – the sensor list

Portable Download Tool

The portable download tool consists of a compatible Palm personal digital assistant (PDA) and LSI software kit. Using the portable download tool it is possible to update firmware, install rated capacity charts or export data logger files without removing the display from the crane. Wireless communication between the Palm and the GS550 display is possible through the IrDA (infrared) ports on the Palm and on the display and wired communication is possible between the Palm and a personal computer (PC) through a USB connection.

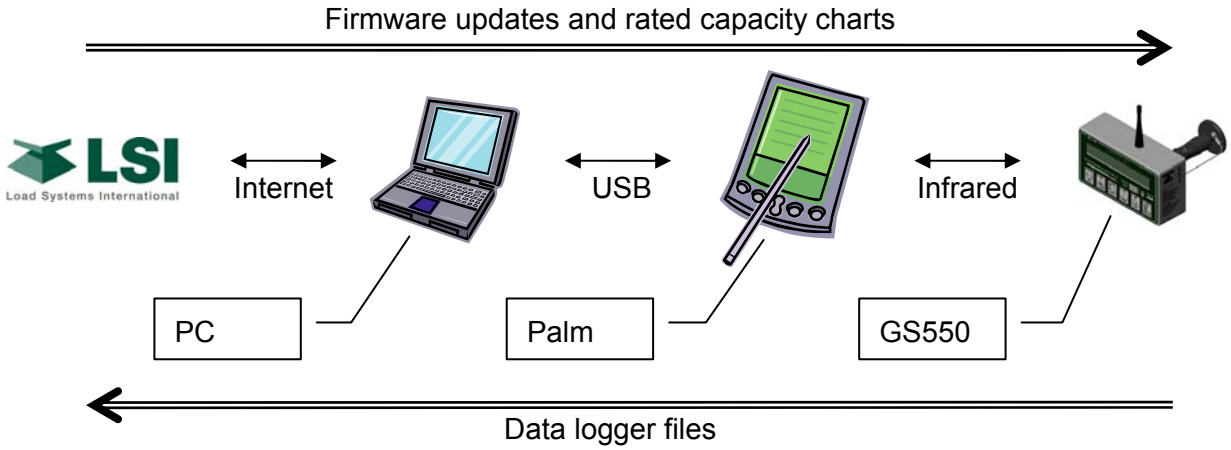


Figure: Upload and download possibilities using the portable download tool

Important! The PALM must be charged prior to, or during, set-up.

The purpose of this section is to explain:

- How to install Palm software on a PC.
- How to update a GS550 firmware
    - Transfer files from a PC to the Palm.
    - Transfer files from the Palm to a GS550.
    - Conserve GS550 configuration when updating firmware
- How to extract a data logger file from the GS550
    - Transfer files from a GS550 to the Palm.
    - Transfer files from the Palm to a PC.

Figure: Palm transferring files to a GS550

Installing Palm Software

Step 1. Insert the CD-ROM identified Desktop Software & manual in the personal computer (PC) CD-ROM drive; installation will begin automatically. This software is also available on the internet at Palm's web site: `http://www.Palmone.com/us/support/downloads/win_desktop.html`

Step 2. The software should be installed in the default directory: `C:\Program Files\Palm`.

Step 3. Follow the installation wizard step by step.

Step 4. When asked to create a new account, click Yes, but leave the name field blank. The installation wizard will automatically create a folder with the name of the Palm.

Step 5. When prompted to reboot the PC click Yes.

Step 6. In Windows Explorer go to `C:\Program Files\PalmOne` and start HotSync.exe. A small icon will appear in the Windows tray bar to indicate that HotSync is installed on your PC; this software is used to establish communication and synchronize data between the Palm and the PC.

Transferring Files

Transfer Firmware Files from a Personal Computer to the Palm

Two types of files can be sent to the Palm:

- LSI files identified by the filename extension `.pdb`, including firmware, rated capacity charts and system configuration updates for the GS550.
- LSI files identified by the filename extension `.prc`, including firmware and data logger software for the Palm.

Step 1. Connect the Palm to a USB port on the personal computer (PC) using the supplied cable.

Step 2. In Windows Explorer: double click (or right click) on required file names with the `.pdb` or `.prc` extensions; Windows will automatically start a PalmOne list of files that will be sent to the Palm the next time the Palm is synchronized.

Step 3. On the Palm: press the star icon to start HotSync. Once started HotSync will connect the Palm with the PC and update files from each.

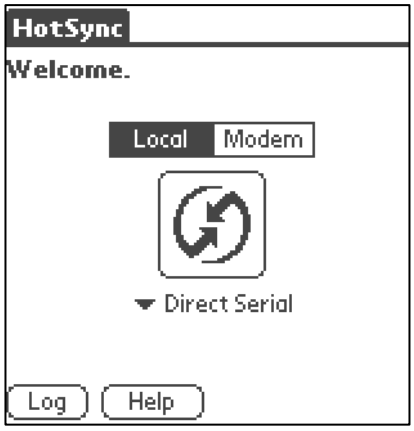


Figure: The Palm HotSync page

Transfer Firmware Files from the Palm to a GS550

Step 1. On the Palm, start the *LSI Firmware* software:
   a. Press the house icon to go to the Home menu.
   b. Select All from the drop down menu in the upper right hand corner.
   c. Select *LSI Firmware*.

Step 2. On the GS550 display, press and hold **Bypass** while starting the display. The display will enter a safer mode and allow firmware updates.

Step 3. Align the infrared ports of the Palm and the GS550, about 6 inches (10 centimetres) apart.

Step 4. On the Palm, send the file:
   a. Select a firmware or chart file to send from the *LSI Firmware* file list.
   b. Press Send. The GS550 will display "`Transferring`". When the transfer is complete the Palm generates a short musical alarm and the GS550 displays the version identification of the newly installed GS550 firmware.

Step 5. Repeat steps two through four to transfer any additional files.

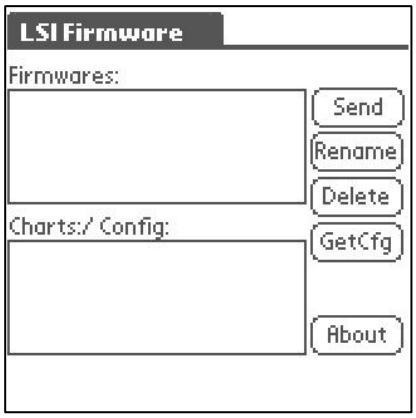


Figure: The Palm LSI firmware list

Tip: For advanced users only. To conserve the GS550 configuration during a firmware update read the section that follows...

Conserve GS550 Configuration When Updating Firmware

The *LSI Firmware* Palm Software can conserve the actual (old) system configuration, including the sensor list and radius parameters, when updating firmware in a GS550 display. When this option is selected the Palm retrieves the configuration from the GS550 and saves it before sending the new firmware. If a problem occurs during the firmware update, then the saved configuration file will be displayed in the LSI Firmware Charts/Config list on the Palm. The configuration can then be returned to the GS550 by following the instructions "Transfer Firmware Files from the Palm to a GS550"

Step 1. On the Palm , start the *LSI Firmware* software:
   a. Press the house icon to go to the Home menu.
   b. Select All from the drop down menu in the upper right hand corner.
   c. Select *LSI Firmware*.

Step 2. Correctly align the infrared ports of the Palm and the GS550.

Step 3. On the Palm, press GetCfg. The GS550 will display "`Transferring`". When the transfer is complete the Palm generates a short musical alarm and a file with the name `CONFIG#` is added to the Charts/Config list.

Transfer Data Logger Files from the GS550 to the Palm

Step 1. On the Palm, start the *LSI Datalogger* software.

a. Press the house icon to go to the “home” menu

b. Select All from the drop down menu in the upper right hand corner

c. Select *LSI Datalogger*.

Step 2. Align the infrared ports of the Palm and the GS550 about 6 inches (10 centimetres) apart.

Step 3. On the Palm, receive the file:

a. Press Receive.

b. Select Complete to transfer the entire data logger memory, or select From Last to transfer only data logged since the last download. The GS550 will display “`Transferring`”. When the transfer is complete the Palm generates a short musical alarm and displays the uploaded file name in the LSI Datalogger file list.

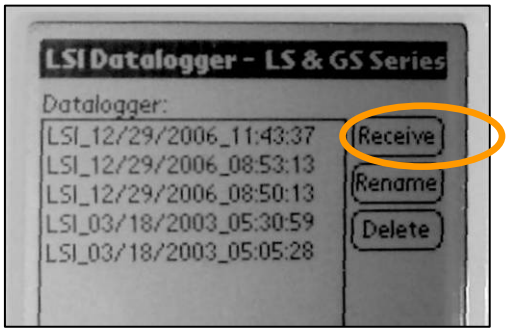


Figure: The Palm LSI Datalogger file list

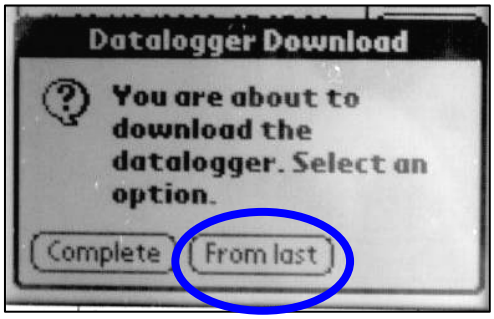


Figure: The Palm LSI Datalogger options

Transfer Data Logger Files from the Palm to a Personal Computer

Step 1. Connect the Palm to a personal computer (PC) using the Palm -USB cable.

Step 2. On the Palm, press the star icon to start HotSync. HotSync will connect the Palm with the PC and update files from each. Data logger files will be transferred to the following directory of the personal computer:

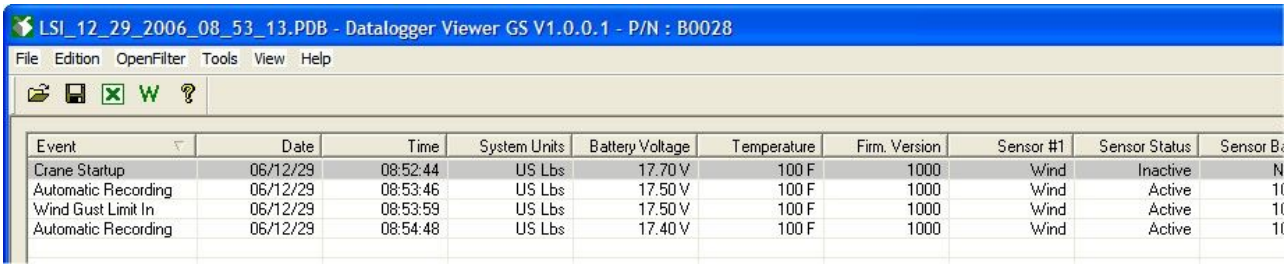
`C:\Program Files\Palm\PALM_NAME\Backup`

Note: `PALM_NAME` is the actual name of the Palm PDA device.

Data Logger Viewer

The Data logger viewer is a software application used to display on a personal computer (PC) a log file generated by the GS550 data logger. To transfer data logger files from a GS550 to a PC see the section “Transferring Files”.

The Data logger viewer opens the log file, converts it from a Palm database file to a text (binary) file, and then displays the contents. Two reports can be produced and transferred to Excel, the full report and the wind speed report.



Event	Date	Time	System Units	Battery Voltage	Temperature	Firm. Version	Sensor #1	Sensor Status	Sensor Ba
Crane Startup	06/12/29	08:52:44	US Lbs	17.70 V	100 F	1000	Wind	Inactive	N
Automatic Recording	06/12/29	08:53:46	US Lbs	17.50 V	100 F	1000	Wind	Active	1(
Wind Gust Limit In	06/12/29	08:53:59	US Lbs	17.50 V	100 F	1000	Wind	Active	1(
Automatic Recording	06/12/29	08:54:48	US Lbs	17.40 V	100 F	1000	Wind	Active	1(

Figure: Excerpt of a full report in Data Logger Viewer

Installation on a Personal Computer

Install the CD in a CD-ROM drive. The interactive installation process should start automatically within 30 seconds; if not then:

Step 1. Click Start.
Step 2. Click My Computer.
Step 3. Double-click on the CD-ROM drive.
Step 4. Double-click on `setup.exe`.
Step 5. Complete the installation as instructed on screen.

Quick Start

Step 1. Select the Data logger viewer application from the Start menu of the personal computer.

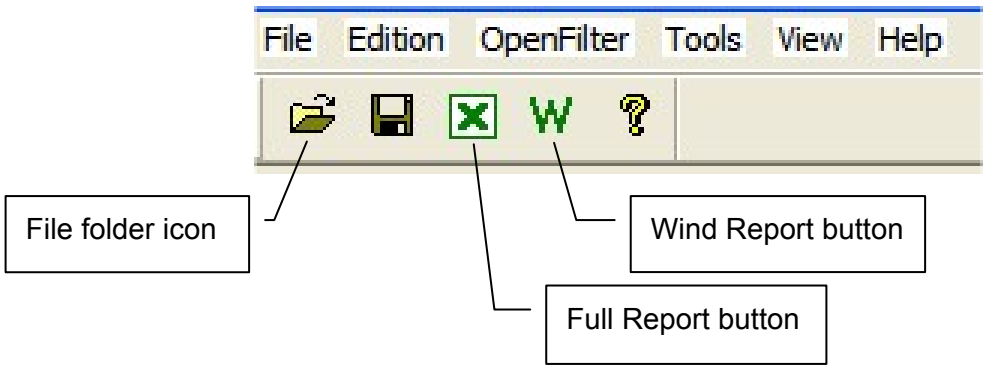


Figure: Data Logger Viewer tool bar

Step 2. Click on the file folder icon to open a log file (or click on File → Open).

Step 3. Enter the file location. The Palm software usually writes the Palm files to a folder with a name like

`C:\Program Files\Palm\PALM_NAME\Backup\`

Note: `PALM_NAME` is the actual name given to the Palm.

Step 4. Select the log file to open. Only `.pdb` files generated by the LSI software in the Portable Download Tool are supported.

`LSI_08_13_2004_15_31_48.PDB`

Example: A typical file name for a log file generated by a GS550 datalogger

Full Report

To export the full report to Excel, click on the Full Report button in the tool bar.

Column	Description
Event	Record trigger. *Examples: Crane start-up, sensor alarm.* The beginning and end of sensor alarms are indicated as “in” and “out”. *Examples: "overload in", "overload out".*
Date	Event date stamp.
Time	Event time stamp.
System Units	Length units (metric or US) and weight units at the time of the event.
Battery Voltage	Display power supply voltage at the time of the event.
Temperature	Internal temperature of the display.
Firm. Version	Display firmware version at the time of the event
Sensor # 1	Sensor type. The sensor number corresponds to the sensor list programmed in the GS550
Sensor Status	Sensor was active or inactive at the time of the event.
Sensor Battery	Sensor battery level
Value	Sensor value

Table: Full report column headings

Wind Report

To create a wind report in Excel, click on the Wind Report button in the tool bar.

	A	B	C	D	E	F
1	Date	Time	Sensor ID	Wind (mph)	Nb.Gust	Max.Gust (mph)
2	2006-12-28	17:17:41	10033	0	0	0
3	2006-12-28	17:18:42	10033	0	0	0
4	2006-12-28	17:19:43	10033	0	0	0
5	2006-12-28	17:20:44	10033	5	0	8
6	2006-12-28	17:21:45	10033	6	0	10
7	2006-12-28	17:22:46	10033	8	0	14
8	2006-12-28	17:23:47	10033	12	0	16
9	2006-12-28	17:24:49	10033	22	1	30
10	2006-12-28	17:25:50	10033	13	0	15
11	2006-12-28	17:26:51	10033	9	0	12
12	2006-12-28	17:27:52	10033	9	0	16
13	2006-12-28	17:29:03	10033	8	0	18
14	2006-12-28	17:29:54	10033	8	0	12
15	2006-12-28	17:30:55	10033	7	0	10
16	2006-12-28	17:31:56	10033	7	0	11

Figure: Excerpt of a Wind Report

Column	Description
Date	Date of event recorded
Time	Time of event recorded
Sensor ID	Wind speed sensor id number
Wind (mph)	Average wind speed in the period
Nb. Gust	Number of gusts exceeding the wind speed maximum limit during the period.
Max. Gust (mph)	Maximum wind speed (gust) during the period.

Table: Wind report column headings

The data from the Wind or Max Gust columns can be easily charted.

Step 1. Press Control and select the time column and either the Wind or the Max Gust column.
Step 2. Click Insert → Chart
Step 3. Select X-Y (Scatter)

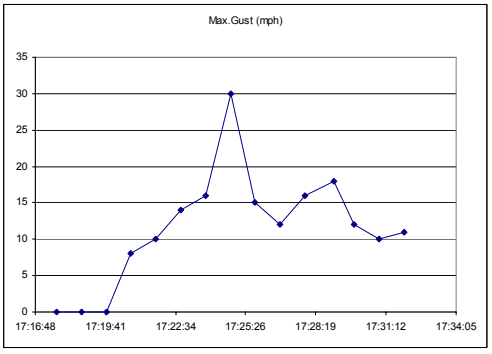


Figure: Max. Gust Chart

Maintenance

Replacing Sensor Batteries

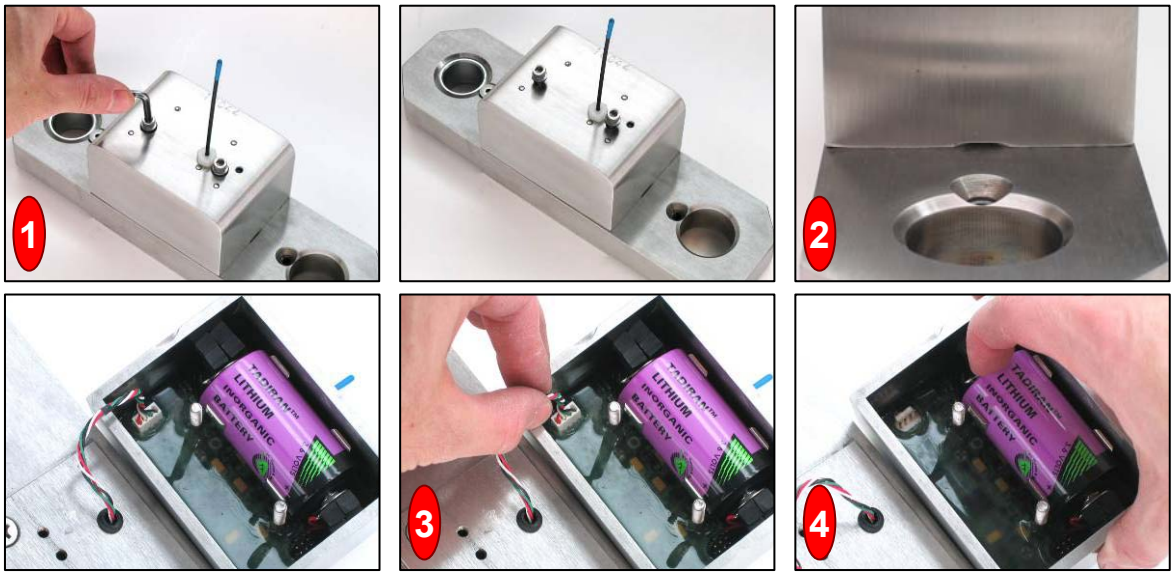
All Sensors Except the GS050 Anti-Two-Block Switch

What Is Needed

- A hex key 5/32 in. (approximately 3.97 mm)
- A flat bladed screwdriver
- One (1) new high quality “D” cell battery: 3.6 V lithium, or alkaline
- RTV non-corrosive silicone

Tip: A 3.6 volt lithium “D” cell battery will provide about two years of battery life for a load cell, while an alkaline “D” cell battery will provide less than one year of battery life.*

Step 1. Unscrew the two hex screws about a quarter of an inch.
Step 2. Insert the flat bladed screwdriver in the battery cover notch to pry the box away from the mounting plate. The silicone seal may cause some resistance.
Step 3. The link wires of a load cell may be disconnected to facilitate battery replacement.
Step 4. Remove the battery by hand
Step 5. Remove the remaining silicone from both the box and the mounting plate.
Step 6. Install the new battery: insert the positive end and then push in the direction of the positive pole.
Step 7. Reconnect the link wires if disconnected.
Step 8. Apply the non-corrosive RTV silicone all around the edge of the mounting plate to create a new seal without bubbles or breaks.
Step 9. Reposition the box over the mounting plate and screw in the hex screws. Do not over-tighten.



Figures: Removing the old battery

* **Actual battery life will vary greatly depending on the application, the frequency of use, the age and quality of the battery etc.**

The GS050 Anti-Two-Block Switch

What Is Needed

- An adjustable wrench
- Four (4) new high quality “C” cell batteries: 3.6 V lithium, or alkaline
- RTV non-corrosive silicone

Tip: Four 3.6 volt lithium “C” cell batteries will provide over four years of battery life, while four alkaline “C” cell batteries will provide about one year of battery life.*

Important! Replace all four batteries of the anti-two-block switch at the same time. Unchanged batteries will reverse polarity severely reducing battery life.

Important! Protect the interior of the anti-two-block switch from dirt and humidity at all times.

Step 1. Remove the anti-two-block from the crane and clean off dust and grime.

Important! Do not unscrew the white nylon hex bolt of the antenna.

Important! Do not unscrew the small screw to the left of the antenna.

Step 2. Place the anti-two-block on the edge of flat surface. Use the adjustable wrench to unscrew the large white nylon hex bolt of the wire rope about one half-inch.

Step 3. Carefully remove the plunger assembly without separating it from the cover, and place it on a clean and dry surface.

Step 4. Slide out the four batteries.

Step 5. Insert the four new batteries following the positive – negative schema printed on the back of the sensor.

Step 6. Replace the plunger assembly. Correctly align the bottom cover before screwing in the white nylon hex bolt of the wire rope. Tighten well.

Step 7. Pull and release the wire rope, the light emitting diode (LED) on the bottom of the sensor should flash red.

Step 8. Reinstall the anti-two-block switch.

Step 9. Test the anti-two-block system for alarm and lockout before use.

Figures: Changing batteries of a GS050 anti-two-block switch

* **Actual battery life will vary greatly depending on the application, the frequency of use, the age and quality of the batteries etc.**

Replacing Antennas

Sensors

The GS series sensor antenna (part number TA011) is identified with a blue strip. The TA011 is replaceable.

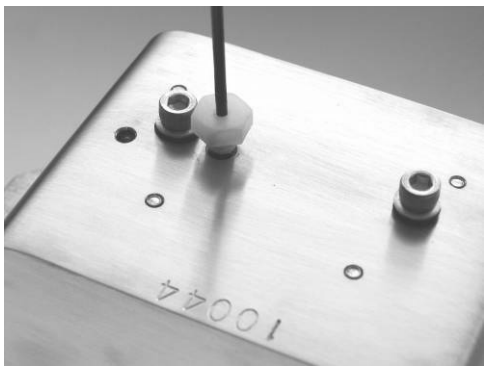
Slightly damaged antennae (bent, sheathing scratched, plastic head cap missing etc.) should not be replaced unless otherwise identified as preventing proper sensor function. Heavily damaged antennae (ripped out, sheared off, wire exposed and fraying etc.) should be replaced to ensure communication between the sensor and the cabin mounted display unit.

The following items are necessary to successfully replace the sensor antenna:
a new antenna with white nylon hex bolt
a small pair of pliers
an electrical insulating compound

Place the crane, boom, jib or ball hook such that the sensor is safely accessible.

This procedure may be followed without removing the sensor from the crane only if it is safe to do so; avoiding removal and reinstallation procedures may save time. If removed, an angle sensor must be re-calibrated during reinstallation for correct angle display (see the angle sensor installation section of the user manual).

During this procedure the interior of the sensor must be protected from dust, grime and water at all times. If it rains during the procedure an umbrella or other suitable means of protection should be used.



Clean dust, grime and water from the sensor.

Identify the short black whip antenna and the white hex bolt securing it.

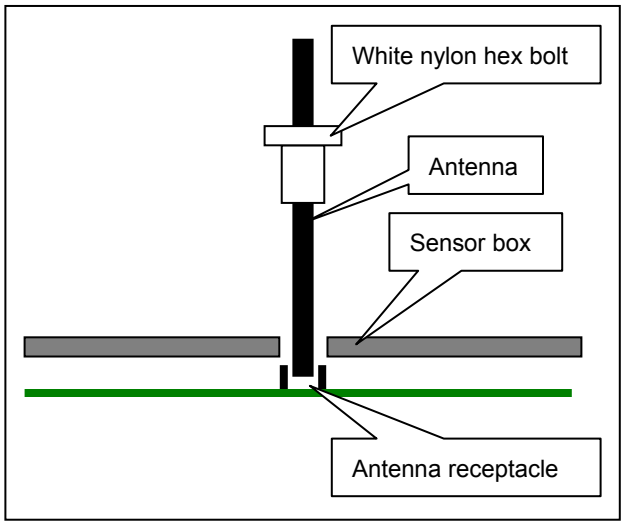
Inspect the antenna for signs of obvious physical damage.

Carefully unscrew the white nylon hex bolt completely and slide it up the antenna.

Grip the antenna by the base of the black plastic sheathing and pull it straight out of the hole in which it is seated. Place the old antenna aside.

Slide the white nylon hex bolt to the middle of the length of the new antenna.

Coat the exposed metal foot of the new antenna with an electrical insulating compound by carefully inserting it in the mouth of the compound tube.



Hold the new antenna by the black plastic sheathing and guide it through the hole in the sensor box. Carefully seat the antenna in its mating connector. When the antenna is correctly seated, pulling on it will be met with light resistance.

Carefully re-thread, screw-in and tighten the white nylon hex bolt to secure the antenna in place.

Reinstall the sensor if necessary (if removed from the boom or jib, an angle sensor will require re-calibration during the installation procedure, see the angle sensor installation section of the user manual).

Verify that the sensor functions properly.

Load cell maintenance

WARNING! Heavy shock may affect load indication accuracy. Inspect the load cell regularly for clearly visible dents or scratches. Test the load indication if collision damage is visible.

Reading Accuracy

LSI Load cells are pre-calibrated at the factory. No "zeroing" or other calibration is required on installation. Each link is heat treated to age the steel and ensure stable readings for many years; load cells are individually temperature compensated to guarantee accuracy.

Load cells are calibrated to indicate between 100% and 104% of their Safe Working Load (SWL). SAE J-159 4.2.1 recommends load indicating devices should show not less than 100% of the actual load and not more than 110% of the actual load.

Recommended Maintenance

Load Testing

LSI recommends testing the load cell every year for accuracy. The simplest way of testing a load cell is to lift at least two known weights. A test weight should be known with an accuracy of ±1%. If the load cell is installed at the boom tip dead end, all additional equipment such as blocks, slings, sensors, etc. should also be known to an accuracy of ±1%.

Determine the accuracy of the tested system with the following formula:

$$\frac{\text{Indicated Load}}{\text{Actual Load}} \times 100 = \%\ \text{of Load}$$

(Reference: SAE-J-159 7.3)

The test loads must be significant relative to the load cell capacity. The minimum test weight is about 20% of the safe working load; a good test weight is greater than 50% of the SWL. For example, a 30,000 Lbs load cell on 4 parts of line has a SWL of 120,000 Lbs; the minimum test load in this case would be 24,000 lbs, a good test load would be 60,000 lbs or more.

Taking Care of the Load Cell

- Battery: Lithium batteries over than 18 months old (alkaline batteries over 6 months old) should be changed at the first available planned inspection even if there is not yet a low battery warning. This will avoid costly delays in the field. See section 3 of this manual for details.
- Inside the load cell transmitter: verify that no corrosion is visible on the battery holder. If some trace of corrosion is visible, gentle rub it and put a small amount of dielectric grease* on each battery holder post to protect the contact.
- Mechanical stresses: verify the load cell sides for dents or heavy scratches. The side of the load cell under the transmitter box is the most sensitive region. Engraving a number in this area will affect load cell accuracy and reliability. If the transmitter box has been hit and the box does not fit perfectly to the underlying link, please call LSI to have it repaired. Engraving on the transmitter box sides will not affect reading.

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* **Dow Corning dielectric grease #4**

- Box water tightness: if the transmitter box has been removed it must be correctly resealed with RTV non-corrosive silicone.
- Antenna: small scratches on the antenna will not affect radio communications. A heavy bending of the antenna or bare sections on the wire may reduce the radio efficiency.
- Transmitter box hex bolts: hex head bolts on the transmitter box are there to protect the antenna and to hold the transmitter box on the load cell link. If one or both hex nuts are scratched, it will not affect the load cell readings on operation. If the bolt head is bent or sheared verify the transmitter box fits tightly to the load cell link before contacting LSI for replacement bolts.

Trouble shooting

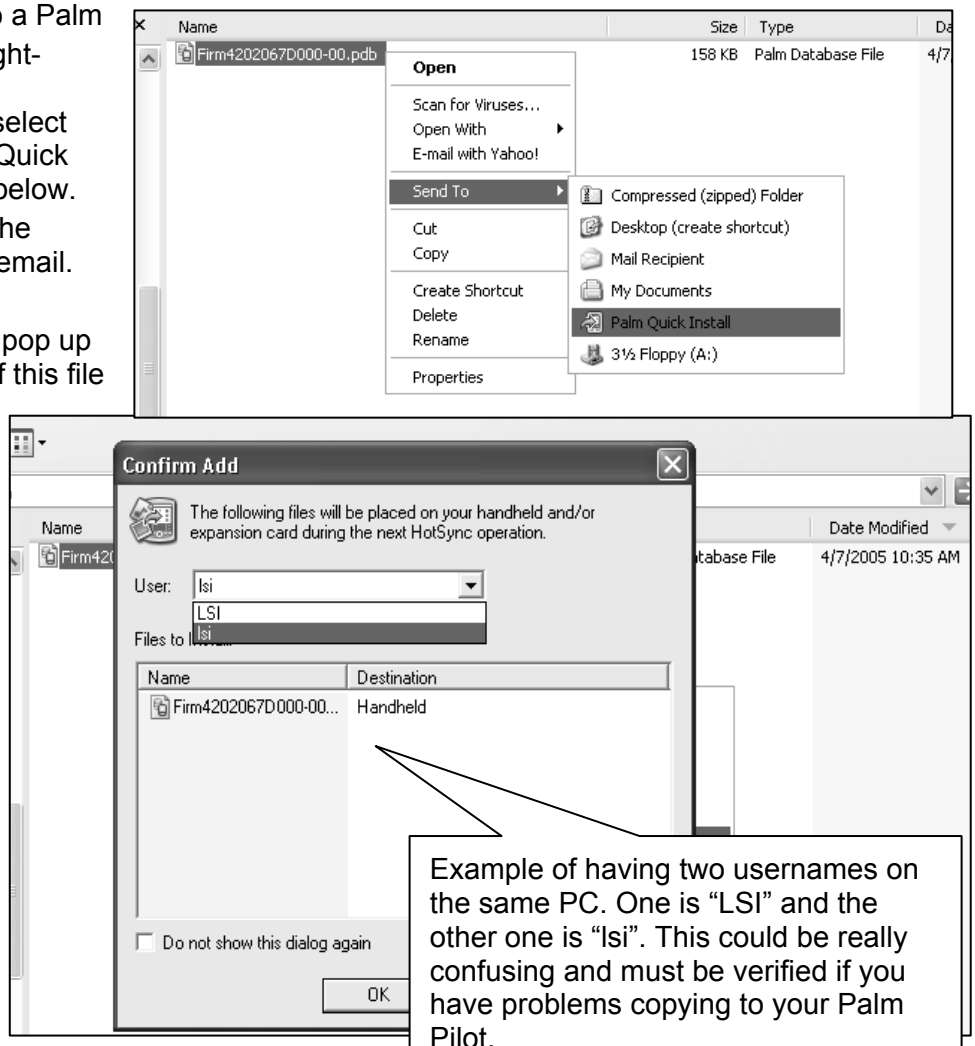
Palm Pilot Communication Issues

Difficulties copying a file to a Palm Pilot when using several Palms with the same PC.

1. Transfer a firmware to a Palm

a. Click on the mouse right-button over the file in an Explorer window. Then select "Send To"… and "Palm Quick Install". See the picture below.

b. Or… double-click on the firmware received in an email.



Example of having two usernames on the same PC. One is "LSI" and the other one is "lsi". This could be really confusing and must be verified if you have problems copying to your Palm Pilot.

2) Usually a window will pop up to confirm the addition of this file to the list of files to be transferred to a Palm. Verify the "User" in this window. Two or more "User"s may be configured to the PC.

How to verify how much memory is left on a Palm Pilot.

1) Power up the Palm. With the plastic pen, press on the Home icon on the lower left side of the screen to see the time of day on the upper left. 2) Press on the time of day, a menu should pop up, press on <Info…> in this menu. A page will show how m

Example;

1.1M means 1.1 megabytes, equates to 1100 Kb (Kilobytes). Each GS550 firmware uses more than 140Kb of memory. If there is not enough memory left, verify if some applications or datalogger files could be removed.

Note: A firmware with crane capacity charts may require more memory.

How to free up memory

1) Power up the Palm. With the plastic pen, press on the Home icon on the lower left side of the screen until an icon called "LS420 Download" is visible.
2) Press on the LS420Download icon. A list of available files will be displayed.
3) Press on the file to be deleted
4) Press on the delete button
5) The system will ask confirmation before deleting the file

What to do if the palm doesn't respond.

If the Palm doesn't appear to respond to commands, or if problems occurr during a transfer operation, the Palm can be reset by pressing the reset button on the back. All applications will then restart; data should not be lost.

INSTRUCTIONS TO THE USER

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.
Increase the separation between the equipment and receiver.
Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

FCC ID: QVBGS550 IC: 7076A-ICGS550

RF Exposure Warning:
This product complies with FCC/ IC radiation exposure limits set forth for an uncontrolled environment. To comply with RF exposure requirements, the unit must be installed and operated with 20 cm (8 in.) or more between the product and your body. This product may not be collocated or operated in conjunction with any other antenna or transmitter.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 2.0 dB. Antennas not included in this list or having a gain greater than 2.0 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Antenna List

LSI P/N: TA001
Description: ¼ wave monopole
MFG: Linx Technologies
P/N: ANT-916-CW-QW

LSI P/N: TA008
Description: ½ wave dipole
MFG: Nearson
P/N: S467AH-915S

FCC ID: QVBGS000 IC: 7076A-ICGS000

RF Exposure Warning:
This product complies with FCC/ IC radiation exposure limits set forth for an uncontrolled environment. To comply with RF exposure requirements, the unit must be installed and operated with 20 cm (8 in.) or more between the product and your body. This product may not be collocated or operated in conjunction with any other antenna or transmitter.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 0.5 dB. Antennas not included in this list or having a gain greater than 0.5 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Antenna List

LSI P/N: TA011
Description: ¼ wave monopole
MFG: Load Systems International

FCC ID: QVBGS050 IC: 7076A-ICGS050

RF Exposure Warning:
This product complies with FCC/ IC radiation exposure limits set forth for an uncontrolled environment. To comply with RF exposure requirements, the unit must be installed and operated with 20 cm (8 inches) or more between the product and your body. This product may not be collocated or operated in conjunction with any other antenna or transmitter.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 0.5 dB. Antennas not included in this list or having a gain greater than 0.5 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.)is not more than that permitted for successful communication.

Antenna List

LSI P/N: TA011
Description: ¼ wave monopole
MFG: Load Systems International

Menu Outline

1) Parts of Line

2) Crane Rigging

3) Display Settings

- 3A) Weight units
- 3B) Display language
- 3C) Light intensity
- 3D) LCD contrast
- 3E) Backlight mode

4) Installation

- 4A) Sensor List
  - 4A1) Sensor type and radio identification number
  - 4A2) System selected configuration number
  - 4A3) Configuration number selection mode
- 4B) Sensor Calibration
  - 4B1) Automatic value calibration wizard
  - 4B2) Manual parameter calibration
  - 4B3) Reset sensor parameters
- 4C) Radius Settings
  - 4C1) Boom length
  - 4C2) Slew offset
  - 4C3) Height offset
  - 4C4) Boom deflection
  - 4C5) Boom top length
  - 4C6) Boom top offset
  - 4C7) No load deflection
  - 4C8) Jib offset
  - 4C9) Lattice extension offset
  - 4C10) Jib mounting point perpendicular
  - 4C11) Jib mounting point parallel
  - 4C12) Select sheave
  - 4C13) Jib length
  - 4C14) Luffing jib length
  - 4C15) Lattice extension length
  - 4C16) Manual length
  - 4C17) Sheave head length perpendicular
  - 4C18) Sheave head length parallel
  - 4C19) Sheave radius
  - 4C20) Deduct
- 4D) Chart Settings
  - 4D1) Operation mode
  - 4D2) Crane capacity chart interpolation
  - 4D3) Out of charts default working load limit
  - 4D4) Enable start section
  - 4D5) Enable stop section
  - 4D6) Retracted boom length tolerance
  - 4D7) Intermediate boom length tolerance
  - 4D8) Extended boom length tolerance
  - 4D9) Radius tolerance
  - 4D10) Boom angle tolerance
- 4E) Memory Banks
  - 4E1) Copy configuration to memory bank A
  - 4E2) Copy configuration to memory bank B
  - 4E3) Copy configuration to memory bank C
  - 4E4) Copy memory bank A to current configuration
  - 4E5) Copy memory bank B to current configuration
  - 4E6) Copy memory bank C to current configuration
  - 4E7) Restore factory configuration
  - 4E8) Clear configuration
- 4F) Data Logger
  - 4F1) Data logger mode
  - 4F2) Adjust date
  - 4F3) Adjust time
- 4G) Lockout Settings
  - 4G1) Warning level
  - 4G2) Alarm level
  - 4G3) Lockout level
  - 4G4) White wire lockout trigger
  - 4G5) Green wire lockout trigger
  - 4G6) Orange wire lockout trigger
  - 4G7) Blue wire lockout trigger
  - 4G8) Lockout relay inverted
- 4H) Password Settings
  - 4H1) Set administrator password
  - 4H2) Set user password
  - 4H3) Tare menu password protection
  - 4H4) Limit menu password protection
  - 4H5) Info menu password protection
  - 4H6) System start-up password protection
  - 4H7) Parts of Line menu password protection
  - 4H8) Chart Rigging password protection
  - 4H9) Display Settings password protection
  - 4H10) Sensor List password protection
  - 4H11) Sensor Calibration password protection
  - 4H12) Radius Settings password protection
  - 4H13) Chart Settings password protection
  - 4H14) Memory Banks password protection

4H15) Data logger password protection

4H16) Lockout Settings password protection

4H17) Network Options password protection

4H18) System Diagnostic password protection

4H19) Alarm Bypassed protection

4I) Network Options

4I1) Display mode

4I2) Set-up sensor repeater

5) System Diagnostic

5A) System Sensors Diagnostic

5B) Radio Network Diagnostic

5B1) Radio network background noise

5B2) List last 32 sensors received

5B3) Search for sensors

5C) Lockout Diagnostic

5C1) White wire status and self-test

5C2) Green wire status and self-test

5C3) Orange wire status and self-test

5D) Display Diagnostic

5D1) Time and date

5D2) Time clock battery test

5D3) External power supply voltage

5D4) Display internal temperature

5D5) GS550 base station identification number

5E) Digital Input Diagnostic

5E4) Blue wire status

Menu Locator

LSI Contact Information

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