2.12c List and Trim Angle Calibration Procedure

Calibrate angle indication by adjusting the offset values for list and trim in the GS820 display; the GS820 will then communicate the updated offset values to the sensor.

1. **Install the sensor at a precisely known list and trim angle.**
2. Go to menu ***4) INSTALLATION*** and select ***4B) SENSOR CALIBRATION***.
3. Enter the user password and press ***Enter***.
4. Select ***4B1) AUTOMATIC CALIBRATION WIZARD***.
5. Use ***Up*** and ***Down*** to select the trim (or list) sensor.
6. Press ***Enter*** to go to the first step of the calibration wizard; note the uncorrected angle indicated.
7. Use ***Up*** and ***Down*** to adjust the angle value indicated until it is equal to the known angle.

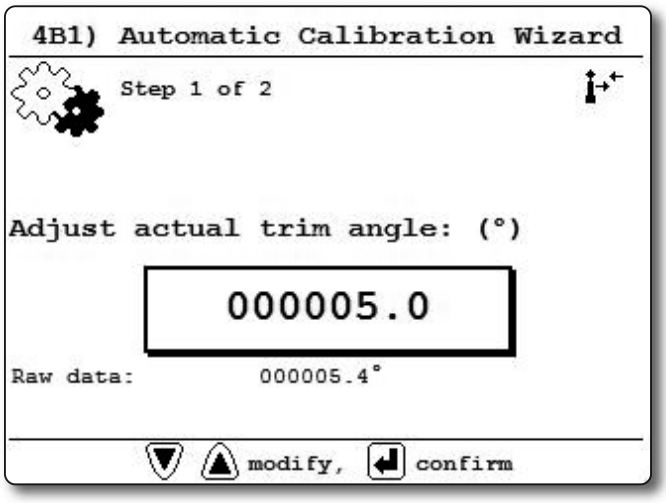


Figure: Trim Angle calibration, adjust the angle

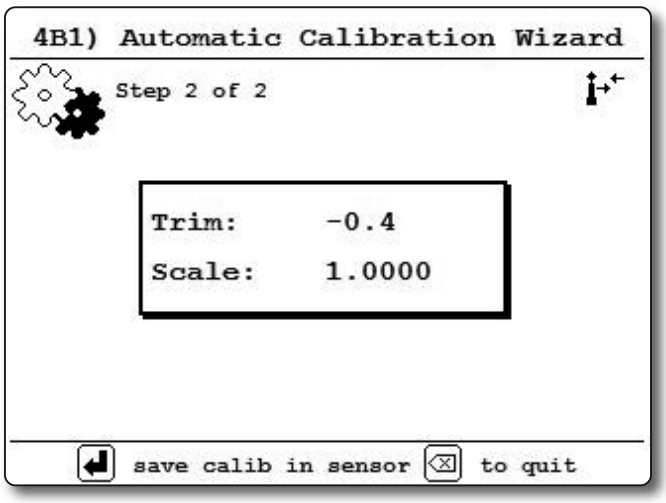


Figure: Trim Angle calibration, trim and scale values

7. Note the trim and scale values.
8. Press ***Enter*** to save and communicate changes to the sensor.
9. Repeat steps 4 through 8 for the list angle.
10. Press ***Exit*** to return to the operation display.
12. Verify accurate list and trim angle indication.

2.13 Rope payout

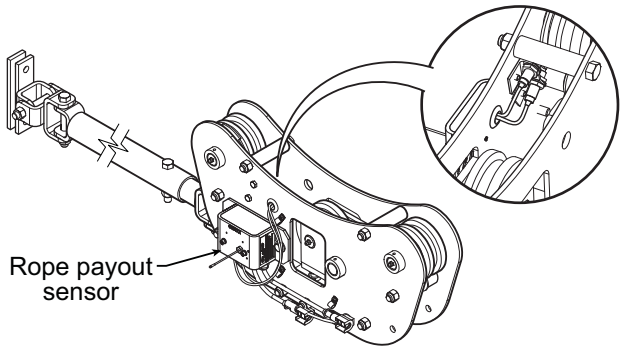


Figure: Rope payout on a line riding tensiometer

Typically the rope payout sensor is factory installed on the line riding tensiometer load sensor (figure above). Alternatively the rope payout sensor may be installed on an appropriate sheave (figure below). Power supply must be provided to the rope payout sensor. A GS820 display can then be programmed to communicate with the sensor and to indicate rope payout (length) and rope speed.

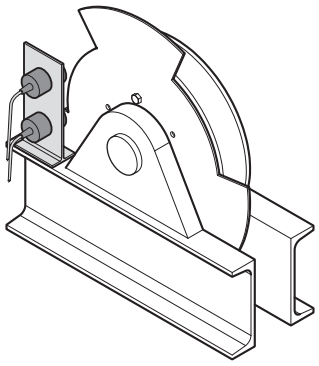


Figure: Alternative installation of a rope payout

Zero the rope payout using the Tare menu before calibration.

2.13a Rope Payout Calibration Procedure № 1: Mechanical Set-Up

1. Hoist up to reel in the wire rope fully.
2. Install the rope payout system.
3. Zero the rope payout length in the Tare menu
4. Hoist down to pay out a known length of wire rope (for example: 20 feet).
5. Verify the rope payout indicated matches the actual length of wire rope paid out. If not then follow *Rope Payout Calibration Procedure № 2*.

2.13b Rope Payout Calibration Procedure № 2: Correct with the GS820

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

1. Go to menu ***4) INSTALLATION*** and select ***4B) SENSOR CALIBRATION***.
2. Enter the user password and press ***Enter***.
3. Select ***4B1) AUTOMATIC CALIBRATION WIZARD***.
4. Use ***Up*** and ***Down*** to select the rope payout sensor, and then press ***Enter*** to confirm communication with the sensor is established.
5. Note the units that will be used during the calibration wizard, and then press ***Enter***.
6. Hoist up (pay in) the wire rope, use ***Up*** and ***Down*** to adjust the actual wire rope payout length and then press ***Enter***.

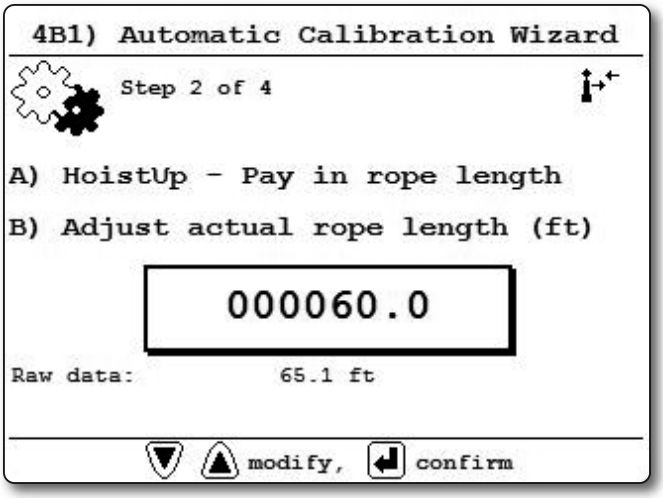


Figure: Rope payout calibration, adjust the actual rope length

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

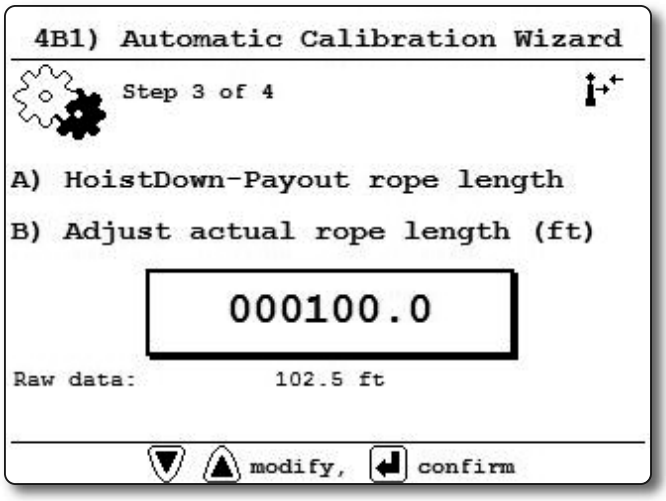


Figure: Rope payout calibration, adjust the actual rope length

8. Note the new trim and scale values.

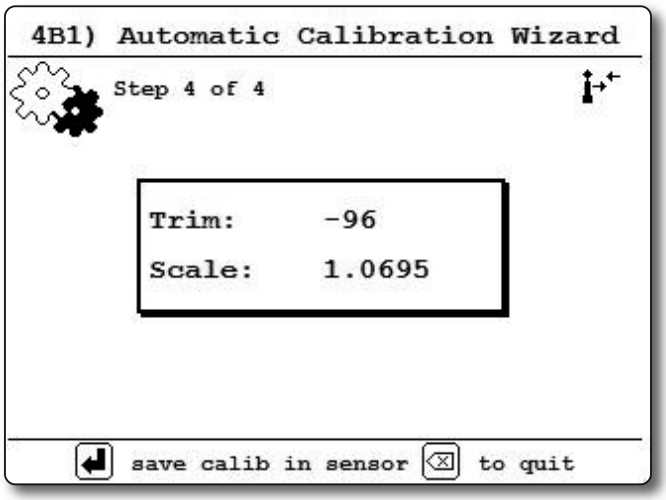


Figure: Rope payout calibration, trim and scale values

9. Press ***Enter*** to save and send the new calibration to the rope payout sensor.
10. Press ***Exit*** to return to the operation display.

2.13c Rope Payout Limits

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

2.13d Electrical connections

Voltage: 9 to 30 Volts DC, about 0.3 Amp

Red wire: positive voltage

Blue wire: negative or ground

Two types of connections are recommended;

1) Always powered up
2) Powered-up at the same source as the GS820 display unit

2.14 Data Logger

The GS820 includes a data logger that records all significant events including actual sensor values and a date and time stamp. The data logger memory can hold over 32 000 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 USB mass storage device (USB key) and then transferred to a personal computer for analysis.

2.14a Recording Modes

Adjust the data logger recording mode as required:

1. Go to menu ***4)*** and select ***4F) DATA LOGGER***.
2. Enter the user password and press ***Enter***.
3. Use ***Up*** and ***Down*** to select the data logger recording mode and press ***Enter***.

   Automatic modes only: select the record added below the recording mode (interval, variation or threshold), press ***Enter*** and adjust the value using ***Up*** and ***Down***, then press ***Enter***.
4. Press ***Enter*** to save any changes.
5. Press ***Exit*** to return to the operation display or press ***Down*** to adjust the data logger date and time (see *Date and Time* sub-section).

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

Recording Modes description:

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 ***4F) 1)*** (see step 3 above) select ***1A) MINUTES***, press ***Enter*** and then use ***Up*** and ***Down*** to adjust the record interval in minutes.

IMPORTANT! **Wind speed: the data logger recording mode must be set to automatic recording to log the data required by the wind speed report feature of the Data Logger Viewer software.**

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 ***4F) 1)*** (see step 3 above) select ***1A) VARIATION (%)***, press ***Enter*** 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 ***4F) 1)*** (see step 3 above) select ***1A) THRESHOLD №1***, press ***Enter*** and then use ***Up*** and ***Down*** to adjust the peak threshold for the first load cell. Press ***Down*** to repeat for the second load cell etc. Up to four load cells can be programmed for automatic peak data logging.

User input. The status of all sensors is recorded on demand. A normally open push button must be installed on a digital input to the GS820 through a pre-determined wire of the power supply and lockout cable.

All data. All communications between a display and its sensors are recorded.

2.14b Date and Time

Adjust the data logger date and time as required:

1. Go to menu ***4)*** and select ***4F) DATA LOGGER***.
2. Enter the user password and press ***Enter***.
3. Select ***2) DATE*** and press ***Enter***.
4. The digits of the year should be flashing: use ***Up*** and ***Down*** to adjust the year and press ***Next***.
5. Use ***Up*** and ***Down*** to adjust the month and press ***Next***.
6. Use ***Up*** and ***Down*** to adjust the day and press ***Enter*** to confirm.
7. Select ***3) TIME*** and press ***Enter*** to adjust the time.
8. The hour should be flashing: use ***Up*** and ***Down*** to adjust the hour from 00 (midnight) to 23 (11 pm).
9. Press ***Next*** to adjust the minute.
10. Use ***Up*** and ***Down*** to adjust the minute and press ***Next***.
11. Use ***Up*** and ***Down*** to adjust the second and press ***Enter*** to save any changes.
12. Press ***Exit*** to return to the operation display.

2.15 Sensor List

All sensors in the GS820 system are programmed in the sensor list. The GS820 uses information from all sensors in the sensor list. Conversely the GS820 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.

IMPORTANT! **Information displayed from load, angle and boom length sensors that are not correctly installed will not be accurate.**

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

Note: To ensure communication, sensors must be at least six feet from the GS820 display.

2.15a How to Add a Sensor to the GS820

1. Determine the radio identification number (ID) of the sensor to be added. This number between 10000 and 99999 is engraved on the sensor.
2. Go to menu ***4A)***.
3. Enter the user password and press ***Enter***.
4. Advance to the next empty sensor position in the sensor list "***No sensor***". Up to 32 sensors may be added to the sensor list. Press ***Enter***.
5. Use ***Up*** and ***Down*** to select the sensor type and press ***Enter***.
6. Use ***Up*** and ***Down*** to program the sensor ID and press ***Enter***.
7. Press ***Enter*** to save any changes made to the sensor list.
8. Press ***Exit*** to return to the operation display.

2.15b How to Remove a Sensor from the GS820

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.
2. Go to menu ***4A)***.
3. Enter the user password and press ***Enter***.
4. Select the sensor to be removed and press ***Enter*** to modify.
5. Use Up and Down to select "No sensor". This will remove the sensor from the sensor list but retain the sensor ID.
6. Press ***Enter*** to save any changes made to the sensor list.
7. Press ***Exit*** to return to the operation display.

Note: 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****".*

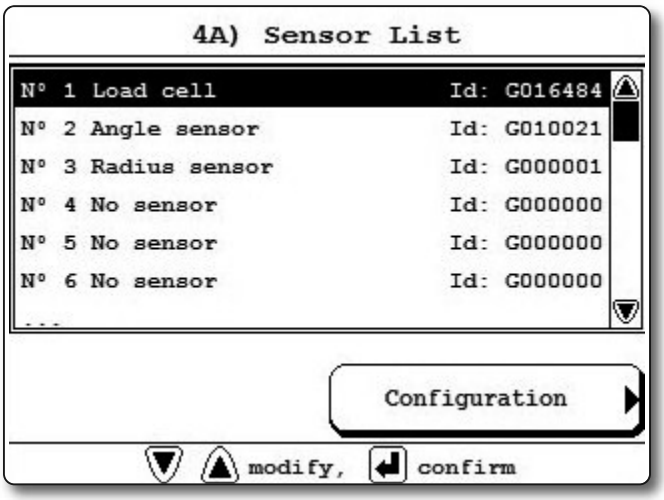


Figure: Menu 4A) - the sensor list

2.16 Network Options

2.16a Listen Only Mode

When the GS820 is started it normally wakes up the sensors in the sensor list and takes control of them. The last display powered on that is programmed for a sensor becomes that sensor's network controller. This means that if a second display is programmed for a sensor, it will take control of it; the sensor will no longer acknowledge communication from the first display. Occasionally it may be useful to monitor an installed system from a remote display without disrupting the existing network. The GS820 can be programmed to operate in "listening mode". In this mode the GS820 will display information from programmed sensors without becoming the network controller.

IMPORTANT! **Sensors can only have one network controller at a time. To receive communication from a sensor without taking control of that sensor a display must first be programmed in "listening mode".**

Program the listen only mode

1. Go to menu ***4)*** and select ***4I) NETWORK OPTIONS***.
2. Enter the user password and press ***Enter***.
3. Select ***4I1) NETWORK CONTROL)***.
4. Press ***Enter*** to modify "***DISPLAY MODE***" and use ***Up*** and ***Down*** to switch between "***NETWORK CONTROLLER***" and "***LISTEN ONLY***" modes.
5. Press ***Enter*** to save any change.
6. Press ***Exit*** to return to the operation display.

   When a display is adjusted to "listen only mode" the following message flashes three times during the start-up routine: "***THE DISPLAY IS IN LISTEN ONLY MODE***".

*Note: To regain network control of programmed sensors adjust the GS820 to "**NETWORK CONTROLLER**", shut the display off, and then start it again.*

2.16b Repeater

Communication between a GS820 and a programmed sensor can be routed through a different programmed sensor (repeater). This can be done either to extend the range of the network or to assist communication around a large radio obstacle. The battery life of the sensor repeated (source) will be reduced by about a year*. The battery life of the sensor repeater will be reduced to 35 days**. This function should not be used where it is not required.

Program a sensor repeater

1. In menu ***4I)***, select ***4I3) SET UP SENSOR REPEATOR***.
2. Select ***1) SELECT REPEATER***, press ***Enter*** to modify and use ***Up*** and ***Down*** to program the radio ID number of the sensor that will be the repeater and press ***Enter*** to confirm.

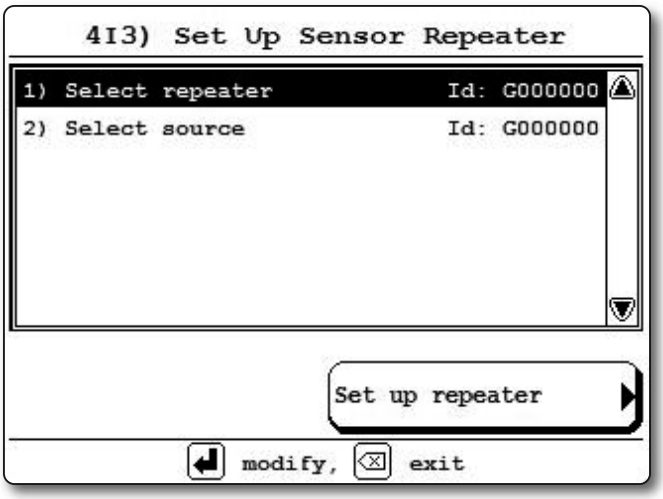


Figure: Program a sensor repeater

3. Select ***2) SELECT SOURCE***, press ***Enter*** and program the radio ID number of the sensor that will be the source and press ***Enter***.
4. Press "***SET UP REPEATER***" to save the new network path. The following messages will be displayed briefly:

   "***PARAMETERS SAVED CORRECTLY***"
   "***COMMUNICATING WITH REMOTE SENSOR…***"
   "***CONFIGURATION SAVED SUCCESSFULLY***"
5. Press ***Exit*** to return to the operation display.

Clear a sensor repeater

1. In menu ***4I)***, select ***4I2) REPEATOR LIST***. Menu ***4I2*** details the last repeater programmed. When no repeater has been programmed, "***NO REPEATER SET UP***" message is displayed.
2. Select a repeater in the list and press "***REMOVE REPEATER***" to shut down the repeater programmed. The following messages will be displayed briefly:

   "***REMOVING NETWORK PATH…***"
   "***INITIALIZING NETWORK…***"
3. To shut down additional repeaters repeat step 1 and 2.
4. Press ***Exit*** to return to the operation display.

CAUTION! **Test all system functions after setting up or removing a repeater. Shut off and then restart the GS820.**

2.16c Wireless Sensor Update

It is possible to send a firmware update to a sensor using the GS820 (menu ***4I4) INSTALL SENSOR UPDATE***). For more information on installing a sensor update please contact ***LSI***.

*** Repeated (source) battery life estimated for standard product, using new factory specified batteries correctly installed, operating 32 hours per week. Individual results may vary with intensity of use, environmental conditions and other factors.**

**** Repeater battery life estimated for standard product, using new factory specified batteries correctly installed. Individual results will not vary with of intensity of use; individual results may vary with environmental conditions and other factors.**

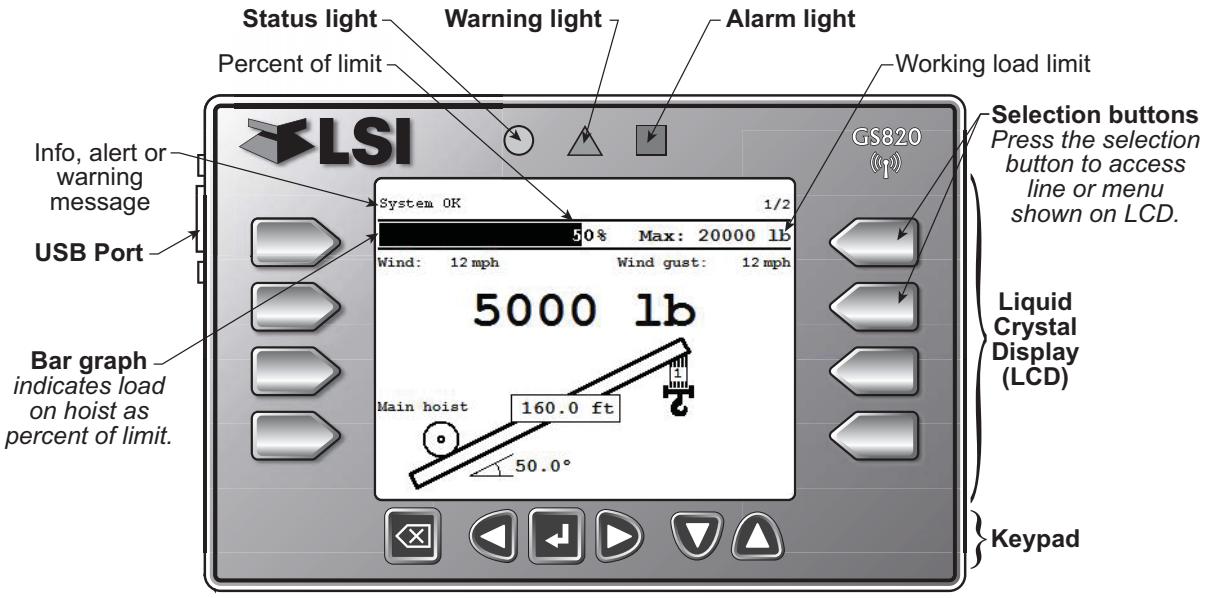
3. OPERATION

3.1 Display GS820

The GS820 displays detailed information on the liquid crystal display (LCD); warnings, alarms, and radio status is also communicated by the display buzzer.

3.2 USB Port

The USB port is used to download data from the data logger or to upload capacity charts using a USB mass storage device (USB key).



3.3 Keypad

The main keypad consists of six buttons used to control, consult, program, and troubleshoot the GS820 display and system. The keypad also includes the selection buttons that allows the user to quickly access the menus and informations displayed on the LCD.

Bypass / Exit
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. / Exit menu.

Back
Move to the previous page/digit.

Menu / Enter
Access the system menus, refer to Menu System section. / Enter menu, confirm changes to system settings.

Next
Move to next page/digit.

Down
Modify numeric values and move down through a list of choices.

Up
Modify numeric values and move up through a list of choices.

*** This applies only if the GS820 has been correctly installed to control crane lockout function.**

3.4 Display lights

Status light (green)

The status light stays on when the GS820 has a reliable radio communication link to all programmed sensors.

Warning light (yellow)

The warning light flashes when;

1. the communication with a sensor is not established ("***NoRx***" apears on LCD);
2. a warning threshold has been reached (typically 90% of the maximum limit);
3. an alarm is bypassed;
4. the sensor battery life drops below 10%. Normally several weeks of battery life remains from the moment the low battery message first appears.

A warning message is also generated on the LCD.

Alarm light (red)

The alarm light flashes when a sensor limit is reached (100% and more). An alarm message is also generated on the LCD.

3.5 Menu System

WARNING! System limits are not monitored when the display is in menu mode. DO NOT operate the crane in menu mode. DO NOT navigate system menus when operating the crane.

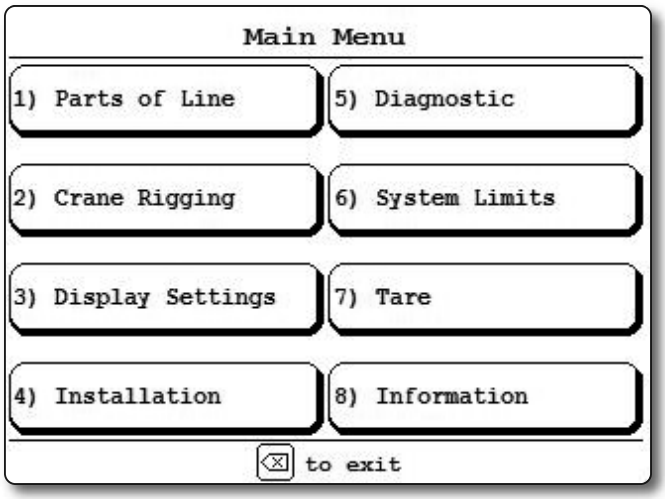


Figure: Basic menus (level one)

There are eight basic menus (level one) used to program, consult and control the GS820 system; ***1) Parts of Lines; 2) Crane Rigging; 3) Display Settings; 4) Installation; 5) System Diagnostic; 6) System limits; 7) Tare; 8) Information***.

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

3.5a Menu Numbers

The basic menus (level one) are numbered one through eight. Level two menus are lettered alphabetically. Level three menus are numbered. Menus can also include numbered lists.

3.5b Menu Navigation

From the operation display press ***Menu/Enter*** to see the eight basic menus (level one). Use the selection button to select a 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.

3.5c 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***. 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.*

3.5d Menu Layout

The menus accessible to the operator without password protection under the default factory settings are listed below.

- ***1) Parts of Line***
- ***2) Crane Rigging***
- ***3) Display Settings***
- ***4) Installation***
- ***5) System Diagnostic***
  - ***5A) System Sensors Diagnostic***
  - ***5B) Radio Network Diagnostic***
    - *5B1) Radio network*
    - *5B2) Last sensors received*
    - *5B3) Search for sensors*
    - *5B4) Bit Error Rate Test*
  - ***5C) Lockout Diagnostic***
  - ***5D) Display Diagnostic***
  - ***5E) Digital Input Diagnostic***
- ***6) System Limits***
- ***7) Tare***
- ***8) Information***

3.5e Parts of Line

The load sensor often shares the weight with multiple parts of line. For accurate load indication the GS820 must be programmed for the number of parts of line.

1. Go to menu ***1) PARTS OF LINE***.
2. Use ***Up*** and ***Down*** 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. Press ***Enter*** to modify.
3. Use ***Up*** and ***Down*** to adjust the number of parts of line.
4. Press ***Enter*** to save any changes and then press ***Exit*** to return to the operation display.

3.6 Rated Capacity Indicators

The GS820 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.

3.6a Display Programming

In order to indicate WLL the GS820 must be programmed with a valid rated capacity chart specific to the crane. The capacity chart programmed can be verified in the Information menu: press ***Menu*** and select "***8) INFORMATION***" (press ***Exit*** to return to the operation display).

IMPORTANT! **If the chart number information screen says "*CHART NOT AVAILABLE*", no chart is loaded in the GS820 and *"CHART NOT USED"*, the GS820 has not been programmed to function as a rated capacity indicator.** If rated capacity indication is required contact the person responsible for the GS820 system installation and maintenance. If in doubt, contact *LSI*.

3.6b Crane Rigging

Under no circumstances is the GS820 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 set the GS820 for rated capacity indication. The GS820 will not take into account critical variables such as weather, ground and crane conditions that will reduce the safe working capacity of the crane.

3.6c Chart Wizard

Rated capacity indication is based on interpretation of a selected capacity chart using boom angle and load radius. The chart must be selected by "rigging" the working hoist in the GS820; this is done by following the chart wizard in menu ***2) CRANE RIGGING***.

IMPORTANT! **It is possible to leave the chart wizard at any time by pressing *BYPASS/EXIT*;** the GS820 will display the message "*RIGGING ABORTED*". Current capacity chart selection may have changed, possibly changing the rated capacity indicated by the GS820. **Always complete the chart wizard all the way to the "Rigging ok" message before operating the crane.**

1. Go to menu ***2) CRANE RIGGING*** and press ***Enter*** to start the chart wizard.
2. The first page of the chart wizard is "select hoist". Use ***Up*** and ***Down*** to select the hoist and press ***Enter***. If there is only one load sensor in the system select "***MAIN***". With two or more load sensors in the system the main hoist is associated with the first load sensor in the sensor list; the auxiliary hoist is associated with the second sensor in the sensor list etc.

Figure: Select hoist menu

3. 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 ***Enter*** 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.

4. After the last step has been completed, the GS820 displays "***RIGGING OK***" and then returns to menu ***2)***. Press ***Exit*** to return to the operation display or press ***Enter*** to rig another hoist. If a sensor required by the selected capacity chart is not a part of the system or has not established communication with the GS820, then the GS820 will display "***SENSOR INVALID***".

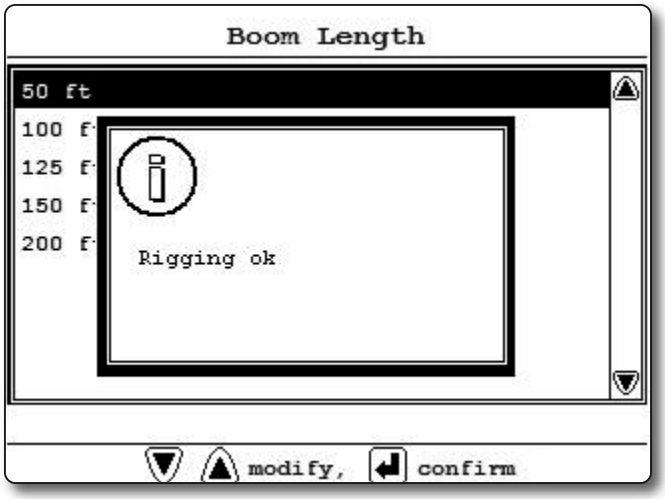


Figure: the GS820 displays "rigging ok"

3.7 Display Settings

Program the display for operator preferences in menu ***3) DISPLAY SETTINGS***.

1. Go to Menu ***3) DISPLAY SETTINGS***.
2. Use ***Up*** and ***Down*** to select the setting to modify and press ***Enter***.
3. Use ***Up*** and ***Down*** to modify the setting.
4. Press ***Enter*** to confirm.
5. Press ***Exit*** to return to the operation display.

3.7a 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.

Table: Weight Units

Unit	Equivalent	Weight	Length Unit
Notes			
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	Foot (ft.)
Metric tonne (t) *International System (SI)*	2205 lb	1000 kg	Metre (m)

3.7b Backlight Mode

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

3.7c Wind speed units

The wind speed units can be set to "km/h", "mph", "m/s" or "knot".

3.8 System Diagnostic

Diagnose system issues with the sub menus of menu ***5) DIAGNOSTIC***.

3.8a System Sensors Diagnostic

1. Go to menu ***5A) SYSTEM SENSORS DIAGNOSTIC.***
2. Select the sensor and press ***Enter*** to see the sensor data in menu ***5A1) SENSOR INFORMATION***.
3. Press ***Exit*** to return to menu ***5A)*** and select an other sensor or press ***Exit*** again to return to the operation display.

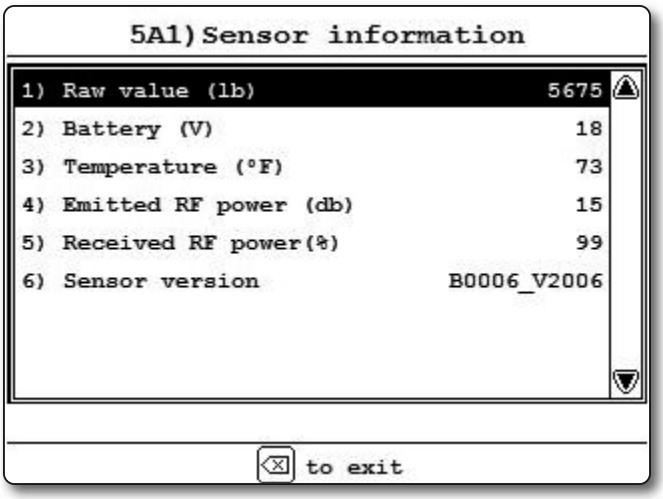


Figure: Sensor information menu

3.8b Radio Network Diagnostic

1. Go to menu ***5B2) LAST SENSORS RECEIVED***. Sensors are shown with their radio ID number and the sensor type.

> ***CAUTION!*** **The list of "last sensors received" includes all functioning GS series sensors within range. Programming a GS820 display for sensors from a different system will disable that system and render indication by both systems inaccurate.**

   a. Use ***Up*** and ***Down*** to scroll through the list.
   b. Press ***Exit*** to return to menu ***5B).***

3. Go to menu ***5B3) SEARCH FOR SENSORS***.
   a. Press ***Enter*** to launch a sensor search.
4. Go to menu ***5B4) BIT ERROR RATE TEST***. This test should only be conducted by ***LSI*** technical service personnel.
5. Press ***Exit*** to return to the operation display.

3.8c Lockout Diagnostic

Menu ***5C) LOCKOUT DIAGNOSTC*** shows the lockout condition of the output (*alarm* or *safe*) and the self-test (*pass* or *fail*); it is recommended to manually test the lockout condition;

1. Go to menu ***5C) LOCKOUT***. Select ***N° 1 WHITE WIRE***. To temporarily activate or desactivate the lockout relay press ***Enter***.

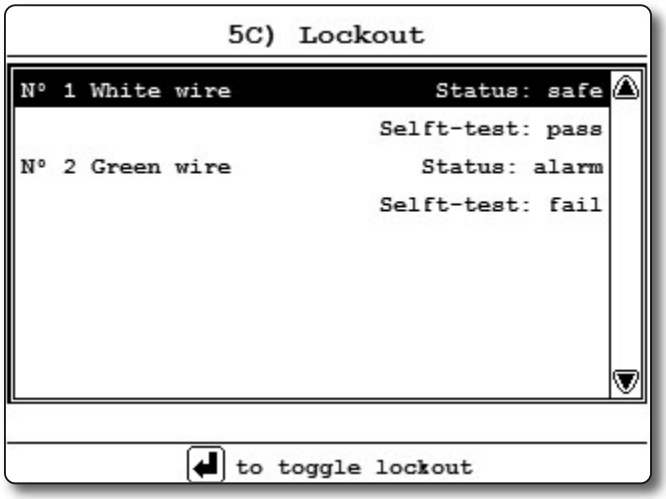


Figure: Menu 5C) Lockout, condition example

2. Press ***Down*** to go to ***N° 2 GREEN WIRE***. Repeat lockout diagnostic test.
3. Press ***Down*** to go to ***N° 3 ORANGE WIRE***. Repeat lockout diagnostic test.
4. Press ***Exit*** to return to the operation display.

3.8d Display Diagnostic

1. Go to menu ***5D) DISPLAY DIAGNOSTIC***. The page shows different informations;
   1) TIME: current time according to the GS820 internal clock.
   2) DATE: current date according to the GS820 internal clock.
   3) TIME CLOCK BATTERY: self-test *pass* or *fail*.
   4) EXTERNAL POWER: external power supply voltage.
   5) Display Internal temperature.
   6) Base station ID. The base station ID should be the same as the GS820 display serial number printed on the left side of the box.
   7) Power supply
   8) Radio certification: "FCC", "IC" indicates Federal Communications Commission (U.S.A.) and Industry Canada certification, "CE" indicates European Community certification.
   9) Radio frequency: the frequency used by the system network.
8. Press ***Exit*** to return to the operation display.

3.8e Digital Input Diagnostic

1. Go to menu ***5E) DIGITAL INPUT DIAGNOSTIC.*** The page shows the wires digital input status (white, green, orange and blue wires).
2. Press ***Exit*** to return to the operation display.

3.9 System Limits

Set hoist limits

The limit menu displays the limits for each sensor in the sensor list.

1. Go to menu ***6) SYSTEM LIMITS***.
2. Use ***Up*** and ***Down*** to select a sensor and press ***Enter*** to modify.
3. Use ***Up*** and ***Down*** to adjust the limit and press ***Enter***.
4. Press ***Exit*** to return to the operation display.

When using the GS820 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 GS820 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.

Note: 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.

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

3.10 Tare

Zero the hook

1. Go to menu ***7) TARE***.
2. Select the load sensor.
3. Press ***Enter*** to set or clear tare weight.
4. Press ***Exit*** to return to the operation display.

3.11 Information

Go to Menu ***8) INFORMATION***. Standard info menu pages include:

1. Software package
2. Firmware
3. Language pack
4. Graphic library
5. Capacity chart
6. Sensor update pkg
7. BIOS (Bootloader) number and version
8. USB driver

Critical system alerts or information messages are also displayed on the top part of the LCD. See examples below:

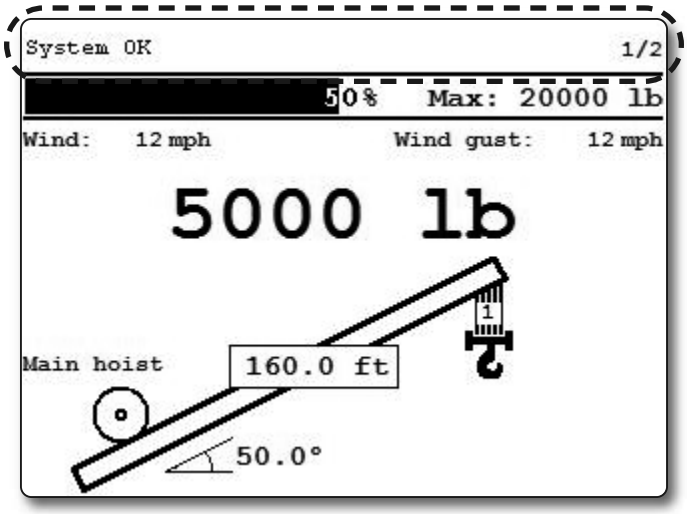


Figure: the GS820 displays "system ok"

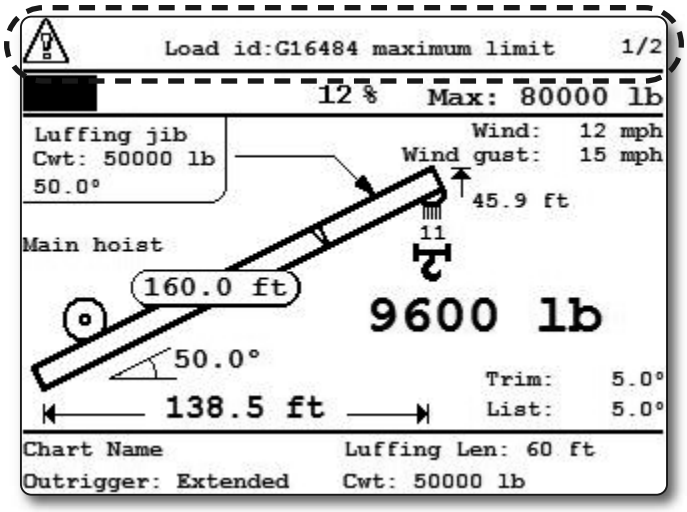


Figure: the GS820 displays an information alert

Table: Information Alerts

Alert:

"Load ID: G15000 Maximum limit"

Description:

The sensor indicates a value greater than the operator adjusted limit.

WARNING! Do not operate the crane beyond the limits specified by the manufacturer.

- Verify operator adjusted limits in the limit menu.

Alert:

"Angle ID: G15000 Minimum limit"

Description:

The sensor indicates a value less than the operator adjusted limit.

WARNING! Do not operate the crane beyond the limits specified by the manufacturer.

- Verify operator adjusted limits in the limit menu.

Alert:

"Load ID: G15000 Low battery"

Description:

Less than 10% of battery life remains in the sensor.

- Schedule battery replacement for the next available opportunity. Typically several weeks of operation remain from the moment the sensor low battery warning is first triggered.

Alert:

"Load ID: G15000 Not received"

Description:

The display isn't receiving communication from the sensor.

- Verify that the sensor ID number programmed matches the ID number of the sensor installed on the crane. Go to menu ***5A1***.

Alert:

"Verify white wire (unexpected voltage)"

Description:

Voltage is detected on the lockout wire when in alarm*. With the standard relay configuration voltage should not be present on a lockout wire in alarm condition.

- Verify the wire connection. Refer to the Power Supply and Lockout Connection sub section of this manual.

Table: Information Alerts (Continued)

Alert:

"Verify white wire (shorted to ground)"

Description:

Voltage is not detected on the lockout wire when safe**. With the standard relay configuration voltage should be present on a lockout wire in safe condition.

- Verify the wire is not shorted to ground.
- Verify the wire is not connected directly to the valve coils; a relay should be installed between the wire and the valve coils. Refer to the Power Supply and Lockout Connection sub section of this manual.

Alert:

"Main out of chart"

Description:

One or more primary conditions of the chart selected for the hoist is not met (example: telescopic boom length).

- Verify the conditions of the selected rated capacity chart.

Alert:

"Main angle above chart maximum"

Description:

The boom or jib angle is above the maximum angle permitted by the selected chart. (For charts determined by radius only, this message will occur when the radius is less than the minimum radius permitted by the chart).

- Verify the boom and jib angles permitted by the rated capacity chart selected.

Alert:

"Main angle below chart minimum"

Description:

The boom or jib angle is under the minimum angle permitted by the selected chart. (For charts determined by radius only, this message will occur when the radius is greater than the maximum radius permitted by the chart).

- Verify the boom and jib angles permitted by the rated capacity chart selected.

*** If the lockout relay is inverted this alert will occur when voltage is detected on the wire when safe.**

**** If the lockout relay is inverted this alert will occur when voltage is not detected on the wire in alarm.**

4. USB TOOL

Download data or upload capacity charts using a USB mass storage device (USB key) without removing the display from the crane.

CAUTION! Before transferring (or downloading) data logger or firmware updates, make sure the crane is stopped and is in a safe state. The crane cannot be monitored during the download process.

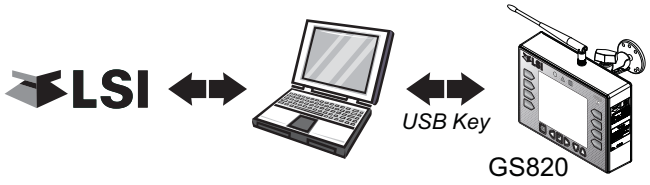


Figure: Transfer charts or data logger files

4.1 Data logger transfer from Display

4.1a Transfer from display to USB

IMPORTANT! To copy the data logger to the USB key, a password is required; contact *LSI* to get the download password. The Display ID will be asked by *LSI*.

1. **Make sure there is at least 8 MB of available space on the USB key**. Connect the USB key in the USB port, on the left side of the display.

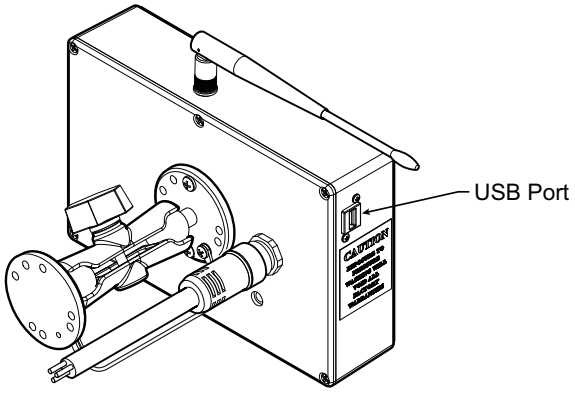


Figure: USB port location

2. After a short delay (about 2 seconds), the "***USB MENU***" shows up on the LCD.
3. Select "***COPY DATALOG. TO USB***" and press ***Enter***. In most case, you will be prompted to enter a password; enter the download password given by *LSI* and press ***Enter***. Press ***Enter*** once again to confirm the data logger download.
4. Transfer progress is indicated on screen.
5. When the transfer is done, "***TRANSFER SUCCESSFUL***" will appear. Press ***Enter***, then unplug the USB key.
6. The crane is now ready for operation.

4.1b Transfer from USB device to PC

1. Connect the USB key to a computer.
2. The data logger file is located in the root directory of the USB device:

   "*LSI_MM_dd_yyyy_hh_mm_ss.dtl*" where the double letters represent the time and date of the USB transfer. The size of the file should be 8192 kb.

4.1c Troubleshooting

Problem:

The file does not appear on the USB key.

Solution 1: Did the transfer complete successfully? Try again.

Solution 2: Look in the root directory of the USB key? The root directory is the folder that appears when you open the USB key.

Problem:

The file appears on the key but its size is 0 kb.

Solution: Did the transfer complete successfully? Try again.

Problem:

The following message appears on screen during the transfer: "***UNABLE TO CREATE FILE. REPLACE USB***"

Solution 1: The USB device may not work correctly. Replace the USB device.

Solution 2: The USB device may be in read only mode. Allow read/write permissions.

Problem:

An error message appears on screen during the transfer: "***ERROR ##***", where **##** is the error number.

Solution: restart the GS820 and try again to transfer the file. If the trouble persists, contact *LSI*.

Problem:

Nothing happens when the USB key is inserted into the USB port of the display.

Solution: Insert the USB key in the USB port, power down and then power up the display.

4.2 Upload Capacity Charts

IMPORTANT! **Contact *LSI* to get the upload password;** this password changes according to the random number indicated on the LCD**. Please provide the random number to *LSI*.**

1. Connect the USB key to a computer and copy the updated chart on the USB key.
2. Connect the USB key in the USB port.
3. After a short delay (about 2 seconds), the "***USB MENU***" will show up on the LCD. Select "***GET FILE FROM USB***" and press ***Enter***.
4. Choose the file to upload and press ***Enter***. Example typical file name: "*SPKG3_XXXX.820*"
5. A password may be required; enter the upload password given by ***LSI*** and press ***Enter***.
6. Transfer progress is indicated on screen.
7. When the transfer is done, "***TRANSFER SUCCESSFUL***" will appear. Press ***Enter*** and then unplug the USB key. The GS820 will restart by itself.

4.3 Data Logger Viewer

The data logger viewer is a software application used to display the data logger log file on a personal computer (PC).

The data logger viewer converts the log 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.

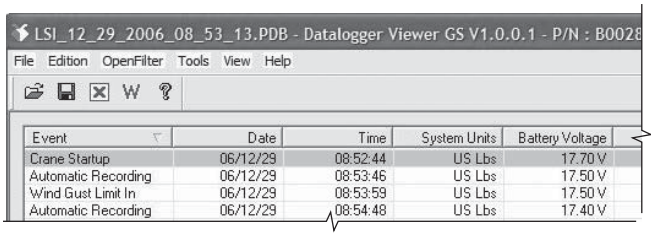


Figure: Excerpt of a full report in Data Logger Viewer

4.3a Installation on a PC

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

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

4.3b Quick Start

1. Start the data logger viewer application.
2. Open the log file (see section 4.1b). Only `.dtl` files generated by the GS820 data logger can be displayed.

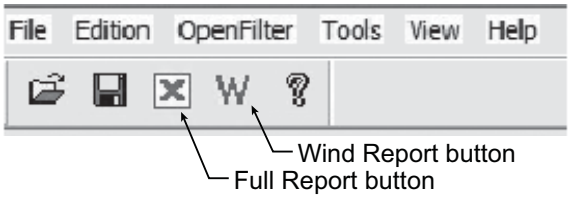


Figure: Data Logger Viewer tool bar

4.3c Full Report

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

Table: Full report column headings

Column	Description
Event	Record trigger*
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 GS820.
Sensor Status	Sensor was active or inactive at the time of the event.
Sensor Battery	Sensor battery level.
Value	Sensor value.

* *Examples: Crane start-up, sensor alarm. The beginning and end of sensor alarms are indicated as "in" and "out": examples: "overload in", "overload out".*

4.3d Wind Report

IMPORTANT! **The wind report is only available when the data has been recorded with the data logger in the automatic recording mode.**

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

Table: Wind report column headings

Column	Description
Date	Date of event recorded
Time	Time of event recorded
Sensor ID	Wind speed sensor ID number
Wind (mph)	Average wind speed during 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.

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

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

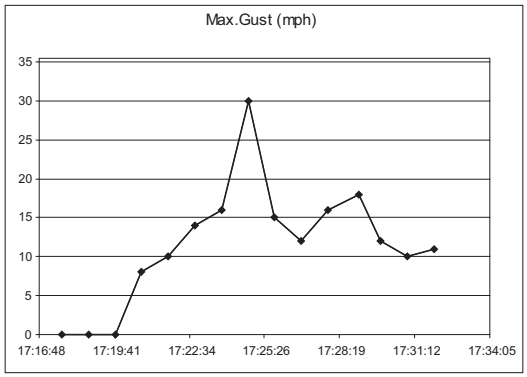


Figure: Max. Gust Chart

5. MAINTENANCE

5.1 Sensors

5.1a Replacing Sensor Battery

IMPORTANT! Protect the interior of the sensor from dirt and humidity at all times.

IMPORTANT! Both lithium or alkaline batteries can be used, however lithium battery will last about 2.5 times longer.

1. Unscrew the two allen screws about a quarter of an inch.

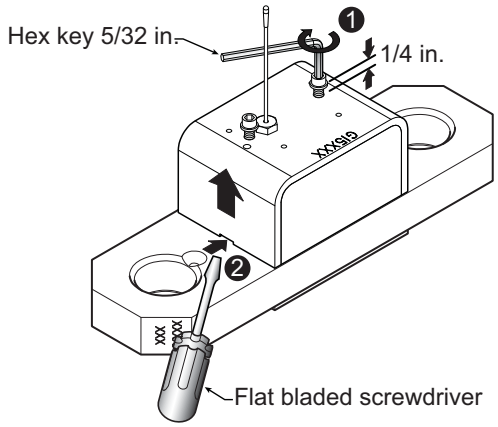


Figure: Remove the sensor box from the mounting plate

2. Insert a flat bladed screwdriver in the battery cover notch to pry the box away from the mounting plate. The silicone seal may cause some resistance.

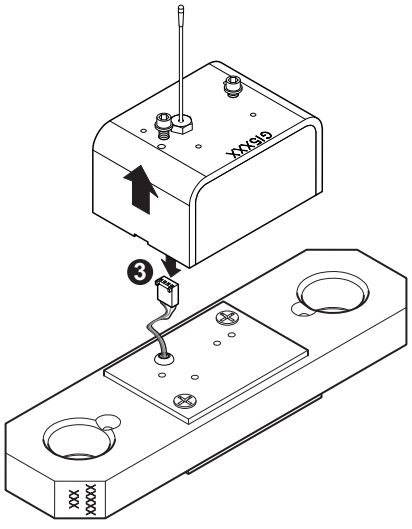


Figure: Disconnect the data wires

3. The data wires of a load cell may be disconnected to facilitate battery replacement.
4. Remove the battery by hand.
5. Remove the remaining silicone from both the box and the mounting plate.
6. Install the new battery: insert the positive end and then push in the direction of the positive pole.

Note: 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.*

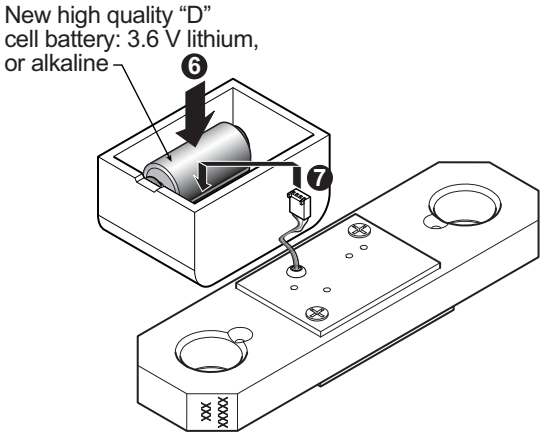


Figure: Install the new battery and reconnect the data wires

7. Reconnect the data wires if disconnected.
8. Apply a non-corrosive RTV silicone all around the edge of the mounting plate to create a new seal without bubbles or breaks.

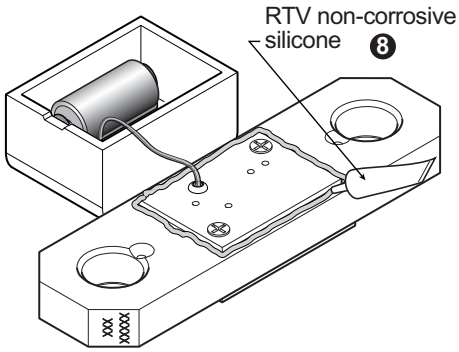


Figure: Apply non-corrosive RTV silicone

9. Reposition the box over the mounting plate and screw in the hex screws. **Do not overtighten**.

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

5.2 Anti-Two-Block switch

IMPORTANT! **Replace all the 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.**

IMPORTANT! **Both lithium or alkaline batteries can be used, however lithium battery will last about 2.5 times longer.**

5.2a Replacing the GS050 Batteries

IMPORTANT! **Class I Div I sensors certified by CSA or ATEX should use alkaline batteries only.**

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.**

This procedure does not apply to the GS005 mechanical anti-two-block transmitter; please refer to the ***Replacing Sensor Battery*** section.

1. Remove the anti-two-block from the crane and clean off dust and grime.
2. Place the anti-two-block on the edge of flat surface. Use an adjustable wrench to unscrew the large white nylon hex bolt of the wire rope about one half-inch.
3. Carefully remove the plunger assembly without separating it from the cover, and place it on a clean and dry surface.

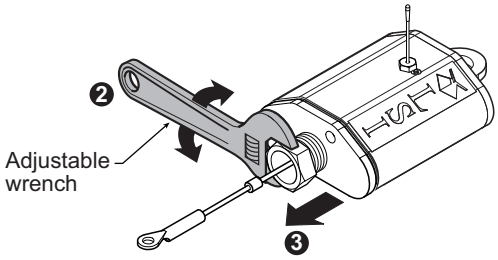


Figure: Remove the plunger assembly of the GS050

4. Slide out the four old batteries.
5. Insert the four new batteries following the positive - negative schematic printed on the back of the sensor.
6. Replace the plunger assembly. Correctly align the bottom cover before screwing in the white nylon hex bolt of the wire rope. Tighten well.
7. Pull and release the wire rope, the light emitting diode (LED) on the bottom of the sensor should flash red.

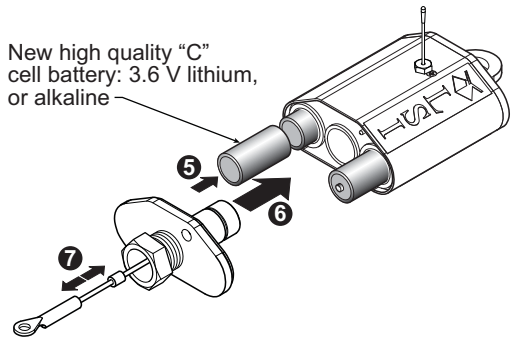


Figure: Install the new batteries and the plunger

8. Reinstall the anti-two-block switch.
9. Test the anti-two-block system for alarm and lockout before operating the machine.

5.2b Replacing the GS075 Battery

1. Remove the GS075 anti-two-block from the crane and clean off dust and grime.
2. Unscrew the two screws of the battery cover and remove the battery cover.
3. Remove the battery by hand.
4. Insert the new battery following the positive - negative schematic.
5. Reposition the battery cover and screw in both screws.

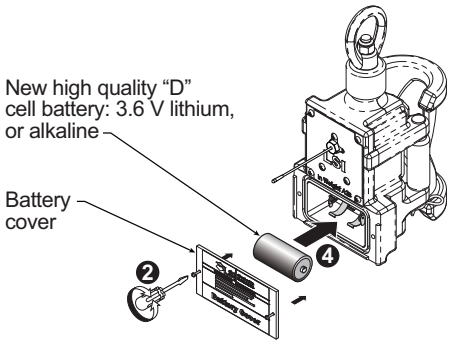


Figure: Replacing GS075 battery

6. Reinstall the anti-two-block switch.
7. Test the anti-two-block system for alarm and lockout before use.

5.3 Replacing a Sensor Antenna

Heavily damaged antennas (ripped out, sheared off, wire exposed and fraying etc.) should be replaced to ensure effective communication between the sensor and the cabin mounted display unit.

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

IMPORTANT! **The interior of the sensor must be protected from dust, grime and water at all times.**

1. Place the crane, boom, jib or ball hook such that the sensor is safely accessible.
2. Clean dust, grime and water from the sensor.
3. Identify the short black whip antenna and the white hex bolt securing it.
4. Inspect the antenna for signs of obvious physical damage.
5. Carefully unscrew the white nylon hex bolt completely and slide it up the antenna.

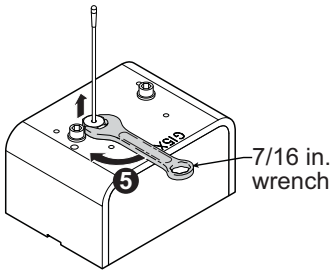


Figure: Unscrew the white nylon hex

6. 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.

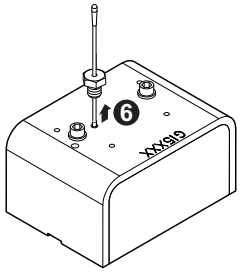


Figure: Pull out the antenna

7. Slide the white nylon hex bolt to the middle of the length of the new antenna.
8. 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.

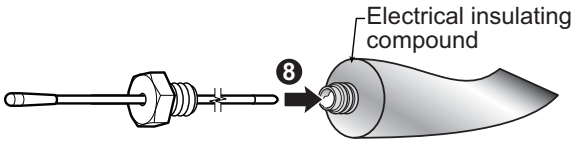


Figure: Coat the exposed metal foot of the antenna

9. 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.

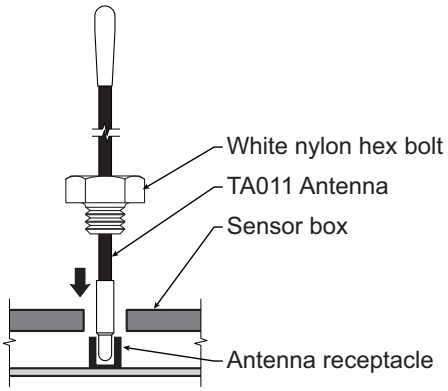


Figure: Install the new antenna

10. Carefully re-thread, screw-in and tighten the white nylon hex bolt to secure the antenna in place. **Do not overtighten**.
11. 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's manual).
12. Verify that the sensor functions properly.

5.4 Load Cells

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.

5.4a Reading Accuracy

LSI flat bar load links 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; the load cells are individually temperature compensated to guarantee accuracy. *LSI* flat bar load links are calibrated to indicate between 100% and 104% of their Safe Working Load (SWL).

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

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.

5.4b 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:

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

(Reference: SAE-J-159 7.3)

The test loads must be significantly 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 lb load cell on four parts of line has a SWL of 120 000 lb; the minimum test load in this case would be 24 000 lb, a good test load would be 60 000 lb or more.

5.4c Care

Battery. Lithium batteries older 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.

Corrosion. Verify that no corrosion is visible on the battery holder inside the load cell transmitter. If some trace of corrosion is visible, rub it off gently and put a small amount of dielectric grease* on each battery holder post to protect the contacts.

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.

Seal. 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.

Hex bolts. The 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 or operation. If the bolt head is bent or sheared verify that the transmitter box fits tightly to the load cell link before contacting *LSI* for replacement bolts.

*** Dow Corning dielectric grease № 4**

6. TROUBLESHOOTING

Display Not On

1. Verify the connection between the yellow cable wires and the crane power supply
2. Verify the crane battery, the fuse and the accessory switch.
3. Carefully disconnect the yellow cable from the display unit and reconnect it.

Display In Alarm

1. Identify the sensor in alarm. Place the sensor in safe condition (press ***Bypass*** if necessary).
2. Verify that the limits, the parts of line and the tare are correctly adjusted.
3. Verify all sensor batteries: see *Battery Diagnostic* troubleshooting section.
4. Verify the red light on the sensor box flashes (release the wire rope of an anti-two-block, change the load on a load sensor, change the angle of an angle sensor, change the boom length of a length sensor).
5. Verify radio communication: see *Radio communication* troubleshooting section.

Sensor Malfunction

1. Verify the sensor batteries: see *Battery Diagnostic* troubleshooting section.
2. Verify the red light on the sensor box flashes (release the wire rope of an anti-two-block, change the load on a load sensor, change the angle of an angle sensor, change the boom length of a length sensor).
3. Verify radio communication: see *Radio communication* troubleshooting section.

Battery Diagnostic

Go to menu ***5A) System Sensors Diagnostic***. Select a sensor and press ***Enter*** to verify the sensor status.

- "***B: 50%***": 50% of battery life remains (typically several months).
- "***In Timeout***": communication not yet established. Verify the radio ID corresponds to the installed sensor.
- Battery status is usually known within 2 minutes. When 10% or less battery life remains, for any sensor, a message will be generated (the Info alert light will flash). Follow the *battery diagnostic* procedure to identify the sensor. Batteries do not need to be replaced before the ***Low Battery*** message is generated. Usually several days, or weeks, of operation remain from the moment the ***Low Battery*** message comes. A new high quality alkaline or lithium 'D' cell battery may be used.

Radio communication

1. Verify that the antennas have a direct clear line of sight to each other.
2. Verify that the antennas do not point directly towards, or directly away from, each other.
3. Verify that the antennas are not in contact with metal other than the sensor itself.
4. Verify the antenna for damage.
5. Go to menu ***5A) System Sensors Diagnostic***. Select a sensor and press ***Enter*** to verify the sensor status.

- "***R: 85%***" means radio reception is at 85%.

Lockout Malfunction

1. Verify the connections of the lockout wire(s) (white, green, orange, blue).
2. Verify lockout coil connections.
3. Verify correct relay installation for lockout systems drawing more than one ampere on the white wire.
4. Carefully disconnect the yellow cable from the display unit and reconnect it.

7. CERTIFICATION NOTES

7.1 FCC and IC – 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.

IMPORTANT! **Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

FCC ID: QVBGS820 IC: 7076A-ICGS820

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:	1/4 wave monopole
MFG	Linx Technologies
P/N	ANT-916-CW-QW

LSI P/N:	TA008
Description:	1/2 wave dipole
MFG:	Nearson
P/N:	S467AH-915S

FCC ID: QVBGS000 IC: 7076A-ICGS000

FCC ID: QVBGS050 IC: 7076A-ICGS050

FCC ID: QVBGS075 IC: 7076A-ICGS075

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 3.0 dB. Antennas not included in this list or having a gain greater than 3.0 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:	TA011
Description:	1/4 wave monopole
MFG	Load Systems International

8. GS820 MENU OUTLINE

- **1) PARTS OF LINE**
- **2) CRANE RIGGING**
- **3) DISPLAY SETTINGS**
  - 1) Weight units
  - 2) Display language
  - 3) Backlight mode
  - 4) Wind speed units
- **4) INSTALLATION**
  - **4A) SENSOR LIST**
    - 4A1) SENSOR TYPE AND RADIO IDENTIFICATION NUMBER
      1. Configuration select (automatic, manual)
      2. Configuration number
      3. Start up page
  - **4B) SENSOR CALIBRATION**
    - 4B1) AUTOMATIC VALUE CALIBRATION WIZARD
    - 4B2) MANUAL PARAMETER ADJUSTMENT
    - 4B3) RESET SENSOR PARAMETERS
  - **4C) RADIUS SETTINGS**
    - 1) Boom length
    - 2) Slew offset
    - 3) Height offset
    - 4) Boom deflection
    - 5) Boom top length
    - 6) Boom top offset
    - 7) No load deflection
    - 8) Jib offset
    - 9) Lattice extension offset
    - 10) Jib mounting point perpendicular
    - 11) Jib mounting point parallel
    - 12) Main hoist
      - 12A) Jib length
      - 12B) Luffing jib length
      - 12C) Lattice extension length
      - 12D) Manual length
      - 12E) Sheave head length perpendicular
      - 12F) Sheave head length parallel
      - 12G) Sheave radius
      - 12H) Deduct
    - 13) Auxiliary hoist
      - 13A) Jib length
      - 13B) Luffing jib length
      - 13C) Lattice extension length
      - 13D) Manual length
      - 13E) Sheave head length perpendicular
      - 13F) Sheave head length parallel
      - 13G) Sheave radius
      - 13H) Deduct
    - 14) Auxiliary hoist 2
      - 14A) Jib length
      - 14B) Luffing jib length
      - 14C) Lattice extension length
      - 14D) Manual length
      - 14E) Sheave head length perpendicular
      - 14F) Sheave head length parallel
      - 14G) Sheave radius
      - 14H) Deduct
    - 15) Auxiliary hoist 3
      - 15A) Jib length
      - 15B) Luffing jib length
      - 15C) Lattice extension length
      - 15D) Manual length
      - 15E) Sheave head length perpendicular
      - 15F) Sheave head length parallel
      - 15G) Sheave radius
      - 15H) Deduct
    - 16) Auxiliary hoist 4
      - 16A) Jib length
      - 16B) Luffing jib length
      - 16C) Lattice extension length
      - 16D) Manual length
      - 16E) Sheave head length perpendicular
      - 16F) Sheave head length parallel
      - 16G) Sheave radius
      - 16H) Deduct
    - 17) Auxiliary hoist 5
      - 17A) Jib length
      - 17B) Luffing jib length
      - 17C) Lattice extension length
      - 17D) Manual length
      - 17E) Sheave head length perpendicular
      - 17F) Sheave head length parallel
      - 17G) Sheave radius
      - 17H) Deduct
  - **4D) CHART SETTINGS**
    - 1) Rated capacity indicator
    - 2) Crane capacity chart interpolation
    - 3) Out of charts default working load limit
    - 4) Enable start section
    - 5) Enable stop section
    - 6) Retracted boom length tolerance
    - 7) Intermediate boom length tolerance

8) Extended boom length tolerance
9) Radius tolerance
10) Boom angle tolerance

4E) MEMORY BANKS

1) Save config. A (Copy configuration to memory bank A)
2) Save config. B (Copy configuration to memory bank B)
3) Save config. C (Copy configuration to memory bank C)
4) Get config. A (Copy memory bank A to current configuration)
5) Get config. B (Copy memory bank B to current configuration)
6) Get config. C (Copy memory bank C to current configuration)
7) Restore default (Restore factory configuration)
8) Clear configuration

4F) DATA LOGGER

1) Data logger mode
2) Adjust date
3) Adjust time

4G) LOCKOUT SETTINGS

1) Warning level
2) Alarm level
3) Lockout level
4) White wire lockout trigger
5) Green wire lockout trigger
6) Orange wire lockout trigger
7) Blue wire lockout trigger
8) Lockout relay inverted

4H) PASSWORD SETTINGS

1) Administrator password
2) User password
3) Tare menu password protection
4) Limit menu password protection
5) Info menu password protection
6) System start-up password protection
7) Parts of Line menu password protection
8) Chart Rigging password protection
9) Display Settings password protection
10) Sensor List password protection
11) Sensor Calibration password protection
12) Radius Settings password protection
13) Chart Settings password protection
14) Memory Banks password protection
15) Data logger password protection
16) Lockout Settings password protection
17) Network Options password protection
18) System Diagnostic password protection
19) Alarm Bypassed protection

4I) NETWORK OPTIONS

4I1) NETWORK CONTROL
4I2) REPEATER LIST
4I3) SET UP SENSOR REPEATER
4I4) INSTALL SENSOR UPDATE

5) SYSTEM DIAGNOSTIC

5A) SYSTEM SENSORS DIAGNOSTIC

5B) RADIO NETWORK DIAGNOSTIC

5B1) RADIO NETWORK
5B2) LAST SENSORS RECEIVED
5B3) SEARCH FOR SENSORS
5B4) BIT ERROR RATE TEST

5C) LOCKOUT DIAGNOSTIC

5D) DISPLAY DIAGNOSTIC

1) Time
2) date
3) Time clock battery test
4) External power supply voltage
5) Internal temperature
6) GS820 base station identification number
7) GS820 (portable) battery level
8) Radio certification
9) Radio frequency

5E) DIGITAL INPUT DIAGNOSTIC

6) SYSTEM LIMITS

7) TARE

8) INFORMATION

1. Software package
2. Firmware
3. Language pack
4. graphic library
5. capacity chart
6. sensor update pkg
7. bios
8. usb driver

9. LSI PRODUCT LIMITED WARRANTY - 2009/02/16

9.1 Limited Warranty

LOAD SYSTEMS INTERNATIONAL INC. (hereafter "***LSI***") warrants its products (the "Products"), for a period of twenty four (24) consecutive months after delivery of such Products to the user (as evidenced on a ***LSI*** document) (the "Warranty Period"), when installed and used in accordance with specifications described in ***LSI*** Installer and User's Manual, as amended from time to time , ***LSI*** technical materials and any related writings published by ***LSI*** with respect with such Products and any industry standards, will be free from defects in materials and workmanship. During the Warranty Period, ***LSI*** or its designated service representative shall repair, or at its option, replace any Product that is confirmed to be defective by ***LSI***, in its sole discretion, in accordance with the Limited Warranty Services Procedures described below.

9.2 Warranty Services Procedures

In order to benefit of this-mentioned Limited Warranty coverages and benefits, the purchaser must notify ***LSI***'s customer service or ***LSI***'s authorized distributor or representative originally responsible for the sale of the Products within 10 days of the occurrence of a suspected defect in materials or workmanship, prior to the expiry of the Limited Warranty Period in order to obtain a Return Authorization Number. A proof of purchase of the Product, such as an invoice or a receipt certifying the validity of the Warranty, must be presented in order to obtain Limited Warranty coverage. In any event, even if a Return Authorization Number is provided to purchaser, ***LSI*** reserves the right to inspect the damaged Product or part before the final decision of repairing or replacing the defective Product or part.

The Product or part shall be returned to ***LSI*** or its designated service representative, accompanied by the Return Authorization Number with prepaid shipping charges. The purchaser must insure the shipment or accept the risk of loss or damage during the shipment. Purchaser shall also pay any tariff or duty applicable to the return of defective part or Product. ***LSI*** will, at its option, repair or replace the Product or part returned to ***LSI*** or to its designated service representative. ***LSI*** owns all parts or Products replaced, repaired or removed from a repaired Product. If ***LSI*** repairs a Product, the Product Warranty coverage Period is not extended and the Limited Warranty shall expire as if uninterrupted upon the occurrence of the 24th month from shipping from ***LSI***. If ***LSI*** replaces a Product, the replaced Product is warranted for the remainder of the original term or sixty consecutive (60) days, whichever is longer.

LSI reserves the right to require from you the user or owner of the Products, prior to determining if the Limited Warranty coverage is applicable, that ***LSI*** receive the data logging equipment used with the Products and that ***LSI*** be authorized to retrieve all information from such data logging equipment in order to, among others, ensure that the written instructions and applicable standards, including safety margins, were respected and not exceeded during Product use. Failure by you the owner or user of the Product to supply such information shall be deemed a material default of the terms and conditions of this Limited Warranty and shall be irrevocably construed as evidence that the Product was misused or abused. Consequently ***LSI*** shall irrevocably be relieved of any obligations to compensate you the user or owner of the Product for any and all damages resulting from Product failures when data logging equipment, and access to its content, cannot be freely and readily provided, unhampered, to ***LSI***.

LSI **will pay ground freight transportation costs of replacement or repaired parts or Products to the destination in Canada and the continental United States of America (the "Territory").** ***LSI*** **will not pay any transportation costs of replacement or repaired parts to destination outside of the Territory. Shipping and handling costs to locations outside the Territory shall be the responsibility and borne by Purchaser or Owner of the Product prior to any shipment by** ***LSI*****. (Contact** ***LSI*** **to get a Return Authorization Number and the address to ship parts).**

9.3 Exclusion of Other Warranties

THE ABOVE WARRANTY IS THE SOLE WARRANTY APPLICABLE AND THERE ARE NO EXPRESS, LEGAL OR IMPLIED WARRANTIES OR CONDITIONS IN RELATION TO ANY PRODUCTS INCLUDING ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE AND THOSE OTHERWISE ARISING BY STATUTE OR OTHERWISE IN LAW OR FROM A COURSE OF

DEALING OR USAGE OF TRADE, WHICH ARE EXPRESSLY DISCLAIMED. NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY ***LSI*** OR ITS EMPLOYEES OR REPRESENTATIVES SHALL CREATE A WARRANTY OR CONDITION OR IN ANY WAY INCREASE THE SCOPE OF ***LSI***'S OBLIGATION. ***LSI*** DOES NOT WARRANT THAT THE BUSINESS RESULTS OBTAINED FROM THE USE OF THE PRODUCTS WILL BE APPROPRIATE OR ADEQUATE FOR THE PURCHASER.

9.4 Exclusion

This Limited Warranty does not cover and shall not apply to:

- Any Product that is misused or abused, including being altered, modified or repaired not in accordance to ***LSI*** written instructions or authorizations and any use not in compliance with ***LSI***'s instructions and/or industry standards and practices;
- Any incidental costs or expense, such as shipping charges to ***LSI*** or an designated service representative as well as the technician out-of-pocket expenses including traveling, lodging and meal expenses, if any;
- The damages caused during the transport or the moving of the Products;
- Damages caused by accidents, abuse, misuse, a force majeure (described as events outside a ***LSI***'s or any Product user's control, including war, riot, strikes, embargoes) or external cause;
- Any cost, damage or expenses for field labor or any other expenses related to or arising from the replacement of defective parts.
- Products used for pile-driving, wire rope activated clamshell or dragline applications. If purchaser uses the Products for pile-driving, wire rope activated clamshell or dragline application, the limited warranty will be deemed to have been violated for abuse.
- Any costs associated with providing ***LSI*** with data logging equipment.

9.5 Limitation of Liability

To the maximum extent permitted by applicable law, in no event will ***LSI*** be liable to the purchaser or any third party for any indirect, special, consequential, incidental or exemplary damages whatsoever, including but not limited to loss or revenue or profit, lost or damaged data, business interruption or any other pecuniary loss whether based in contract, tort or other causes of action, even if ***LSI*** has been advised of the possibility of such damages. In any event, the total liability of ***LSI*** arising from any cause of action or claim whatsoever, whether (1) in contract, (2) in tort (including negligence, whether sole, joint, contributory, concurrent or otherwise, but not including intentional, reckless or wanton tort), (3) under strict liability, (4) under any environmental or antipollution law or regulation, (5) connected with any toxic or hazardous substance or constituent, (6) arising out of any representation or instruction, or under any warranty, (7) or otherwise, arising out of, connected with, or resulting from the design, manufacture, sale, resale, delivery, repair, replacement or use of Products or the furnishing of any service shall in no event exceed the price allocable to and paid to ***LSI*** for the individual unit of Products or service or part thereof which gives rise to the cause of action or claim.

SOME STATES OR JURISDICTIONS DO NOT ALLOW THE LIMITATION OR EXCLUSION OF LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

9.6 Recommended Practices

LSI recommends careful consideration of the following factors when specifying and installing the Products. Before installing a Product, the Installation, Operation, and Maintenance instructions provided with the unit must be read and understood and complied with.

9.7 Choice of law

This Limited Warranty shall be governed by and construed in accordance with the laws of : 1. For Products sold in Canada: the Province of Quebec or, For Products sold in the USA: the State of Florida, without giving effect to principles of conflicts of law. You agree that the exclusive venue for any disputes arising under this Agreement shall be the state and federal courts located in Orlando, Florida.

9.7a Entire Agreement

This document contains the entire agreement of the parties regarding the subject matter of the Product and supersedes all previous communications, representations, understandings and agreements, either oral or written, between you and ***LSI***.

LSI

Load Systems International

LSI Contact Information

Technical Support:

LSI Technical Support is available 24 hours a day, 7 days a week from our *Houston* and *Dubai* locations.

Please direct all technical support questions to either of these locations or contact us via email:

techsupport@loadsystems.com

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