

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 DIAGNOSTIC** 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 deactivate the lockout relay press **Enter**.

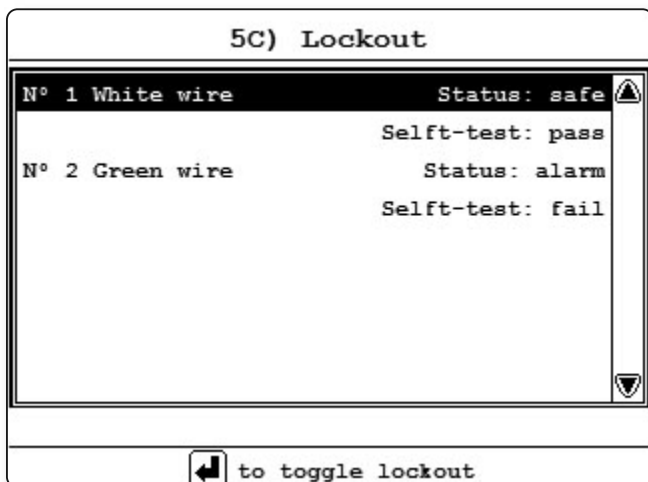


Figure: Menu 5C) Lockout, condition example

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 **Left** and **Right** 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:

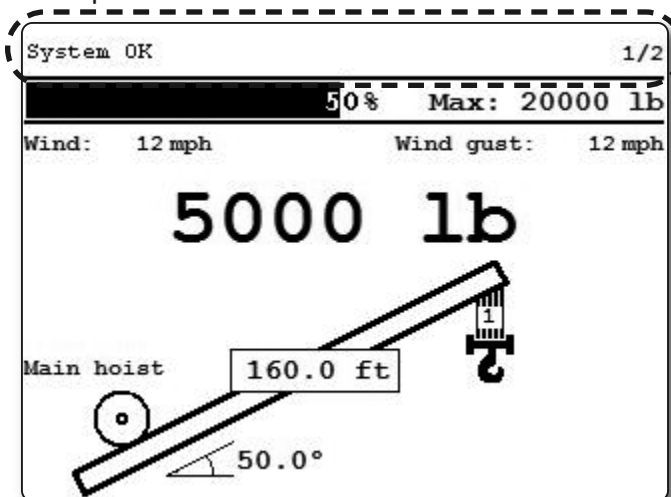


Figure: the GS820 displays "system ok"

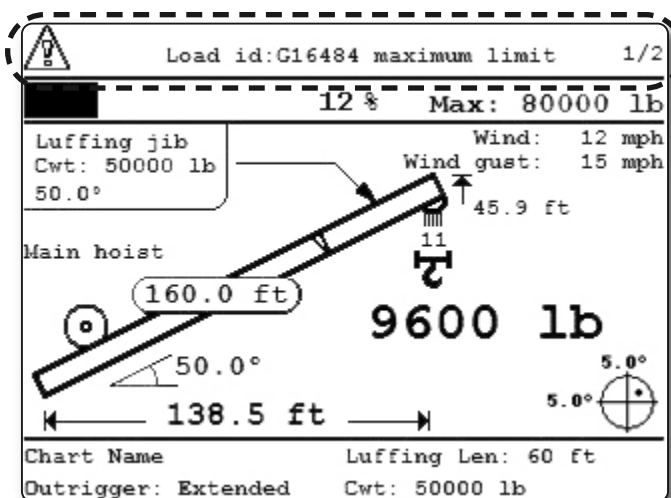




Figure: the GS820 displays an information alert

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.
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 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.
<ul style="list-style-type: none"> • 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).
<ul style="list-style-type: none"> • 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).
<ul style="list-style-type: none"> • 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).
<ul style="list-style-type: none"> • 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.

3.12 Mast Settings

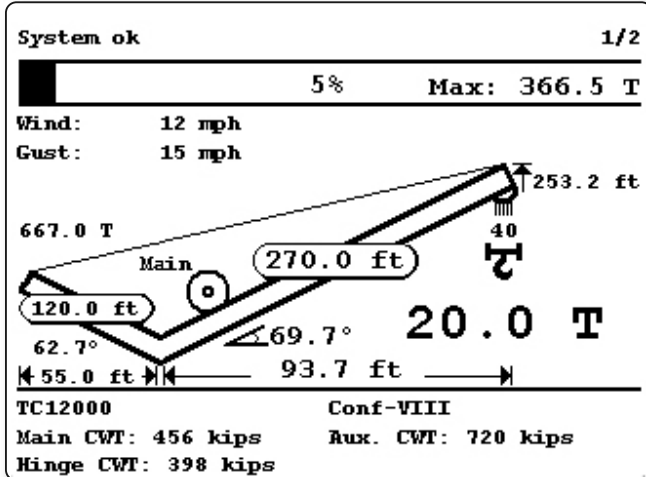


Figure: The GS820 displays the mast information

1. Activate mast display in menu **4E) 1**.
2. For mast load indication set the mast load cell ID in menu **4E) 2**; for mast angle and radius indication set the mast angle sensor id in menu **4E) 3**. Mast radius indication can be calibrated by adjusting the mast radius parameters in **4E) 6** to **4E) 9**.

Note: When a load or an angle sensor is associated to the mast, the word “(mast)” is added to the sensor type in the sensor list.

Note: When the mast is deactivated, the system ignores the sensors associated to the mast; however, the mast sensor ID numbers are retained to facilitate future re-activation.

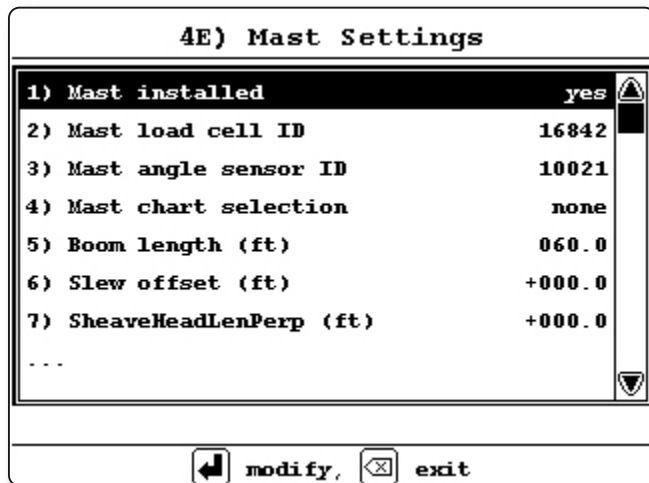


Figure: Mast settings menu

To indicate rated mast capacity, the GS820 must be programmed with rated mast capacity charts. Set the mast capacity chart selection mode in menu **4E) 4**. The options are:

None: Rated mast capacity is not indicated. The mast load limit is determined by the load cell limit (menu **6**) and the number of parts of line.

Operator mode: The operator must manually select the appropriate mast capacity chart in the **CRANE RIGGING** menu.

Automatic mode: The mast capacity chart is automatically determined by the crane load chart(s) selected.

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.

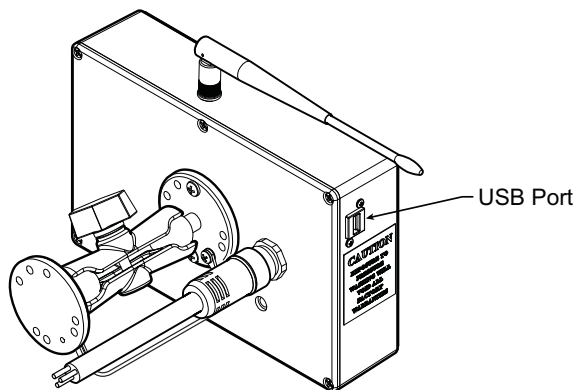


Figure: USB port location

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.

Event	Date	Time	System Units	Battery Voltage
Crane Startup	06/12/29	08:52:44	US Lbs	17.70 V
Automatic Recording	06/12/29	08:53:46	US Lbs	17.50 V
Wind Gust Limit In	06/12/29	08:53:59	US Lbs	17.50 V
Automatic Recording	06/12/29	08:54:48	US Lbs	17.40 V

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 .dt1 files generated by the GS820 data logger can be displayed.

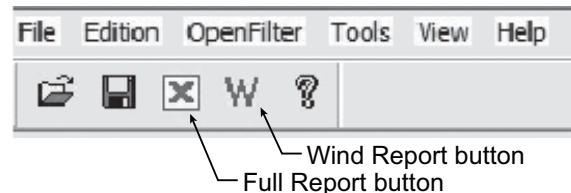


Figure: Data Logger Viewer tool bar

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

<u>Column</u>	<u>Description</u>
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)

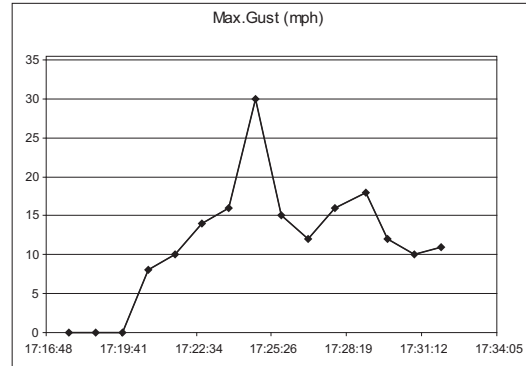


Figure: Max. Gust Chart

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.

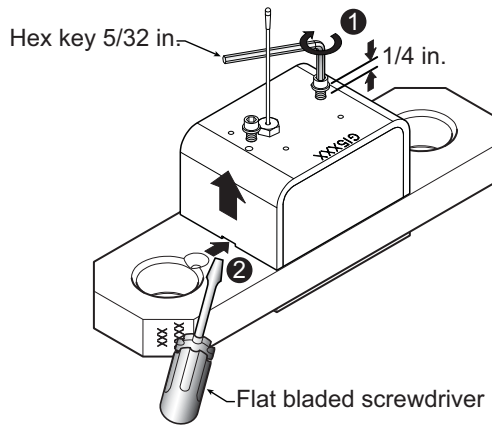


Figure: Remove the sensor box from the mounting plate

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.

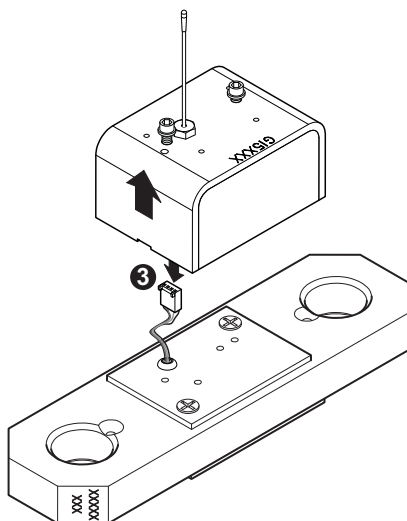


Figure: Disconnect the data wires

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.*

New high quality "D" cell battery: 3.6 V lithium, or alkaline

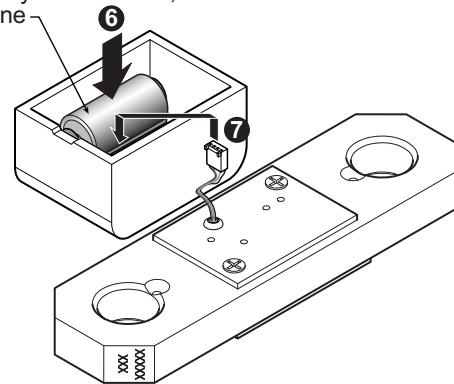


Figure: Install the new battery and reconnect the data wires

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.

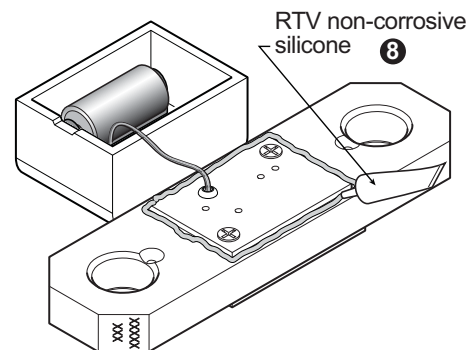


Figure: Apply non-corrosive RTV silicone

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.

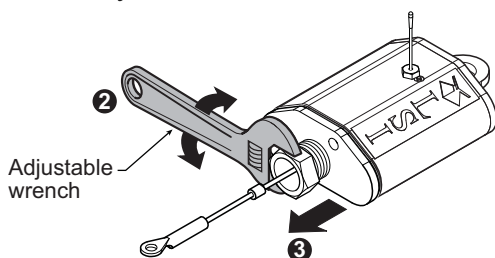


Figure: Remove the plunger assembly of the GS050

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.

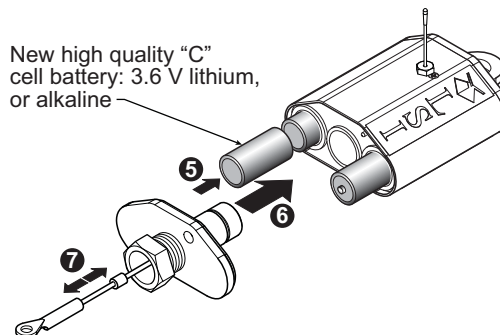


Figure: Install the new batteries and the plunger

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.

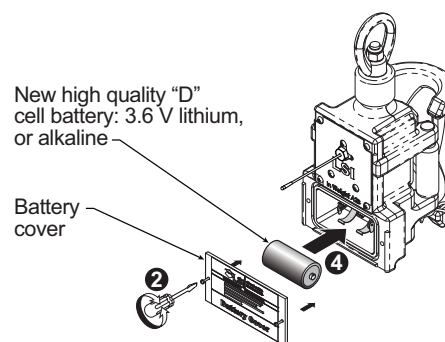


Figure: Replacing GS075 battery

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.

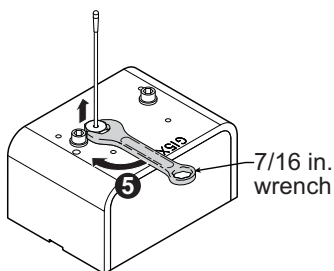


Figure: Unscrew the white nylon hex

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.

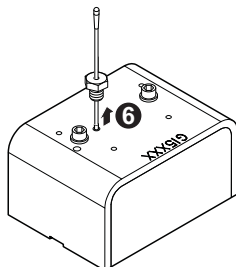


Figure: Pull out the antenna

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.

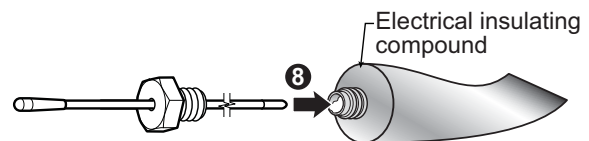


Figure: Coat the exposed metal foot of the antenna

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.

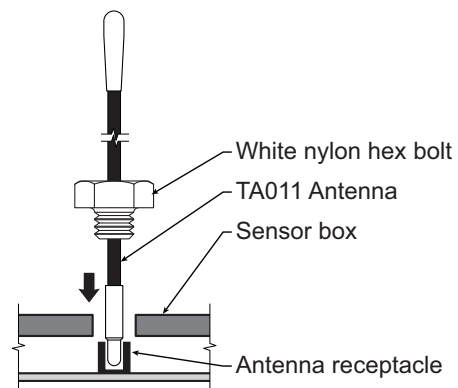


Figure: Install the new antenna

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:

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

(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.

- "**BATTERY: 50%**": 50% of battery life remains (typically several months).
- "**UNABLE TO REACH REMOTE SENSOR**": 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.
- "**RECEIVED RF POWER: 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 Model Numbers

CSA and ATEX

CSA Class I, Division 1 and 2 Rated Equipment: part numbers end with “-CSA”

Example: GC012-CSA

ATEX Zone 0 & 2: the letters “ATEX” are included in the part numbers

Example: GC012-ATEX-CE

7.2 Important Notes for Hazardous Area Certified Components

7.2a Specifications

WARNING!

- Understand manual before operation.
- Replace batteries only in a non-hazardous area.
- Substitution of components may impair intrinsic safety.
- Substitution of components may impair suitability for Class I, Division 2.
- Do not remove power cable from display when on.

Sensors: GCxxx-ATEX-CE series sensors, GS001-ATEX-CE, GS002-ATEX-CE, GS010-ATEX-CE, GS011-ATEX-CE, GS020-ATEX-CE, GS005-ATEX-CE, GS050-ATEX-CE (all intrinsically safe):

II 1 G Ex ia IIC T4

7.2b Ensuring Safe Operation in Hazardous Areas

WARNING!

- Equipment must be correctly installed according to the instructions described in this manual and need to be installed in locations providing adequate protection from impact and external damage.
- Always make sure the system works properly. Test all components before using the crane. A description of display status and warning lights is available in the Operation section of this manual.

7.2c Product Repair And Servicing

LSI products have no replaceable or user serviceable parts except the antenna and the batteries. Suggested load cell maintenance instructions are described in the Maintenance section of this manual. For any other suspected problems, damage or required servicing, please contact your closest LSI office.

Table: Battery type

Models	Battery type and specification
GC005-ATEX-CE GC012-ATEX-CE GC018-ATEX-CE GC035-ATEX-CE GC060-ATEX-CE GC100-ATEX-CE GC170-ATEX-CE GS001-ATEX-CE GS002-ATEX-CE GS005-ATEX-CE GS010-01-ATEX-CE GS010-02-ATEX-CE GS010-03-ATEX-CE GS-011-ATEX-CE GS020-ATEX-CE	“D” Type 3.6 V lithium batteries Tadiran TL-5930 model Temperature code “T4”
GS050-ATEX-CE	“C” Type, 1.5 V alkaline Duracell PC1400 model Temperature code T 150°C

7.3 Equipment Markings

ATEX Part number (end with CSA-CE)

Model No: GS050-CSA-CE
Anti-Two-Block Switch

WARNING!
Read the operator's manual.
Test before every use.

–
C
+

–
C
+

Batteries: replace with “C” size alkaline Duracell model #PC1400.
TEST: the light on the bottom must flicker red and green when the cable is cycled in and out.

International: **+1 281 664 1330**

–
C
+

–
C
+

Built in 2008
4495 Hamel Blvd,
suite 110, Québec,
QC, Canada
Serial number is on
the front

II 1 G Ex ia IIC T150
08ATEX0068 X Issuer: 0344
ExIa IIC T150
WARNING – DO NOT
REPLACE BATTERY WHEN AN
EXPLOSIVE GAS
ATMOSPHERE MAY BE
PRESENT

CERTIFICATION NOTES

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GS050;

<p>Load Systems International Inc</p>	<p>Model No: GC012-CSA-CE Load Cell 5.41 (12 000 lb) Single part line pull capacity Please read reference manual for details</p>
<p>CE</p> <p>Built in 2008 4495 Homel Blvd, suite 110, Québec, QC, Canada Serial number is on the front</p>	<p>II 1 G Ex ia IIC T4 08ATEX0068 Issuer: 0344 Exia IIC T4 WARNING - DO NOT REPLACE BATTERY WHEN AN EXPLOSIVE GAS ATMOSPHERE MAY BE PRESENT</p>

GCxxx, GS001, GS002, GS005, GS010, GS020; GS020;

Ignition hazard: "WARNING - POTENTIAL ELECTROSTATIC CHARGING HAZARD"

FCC

<p>Model No: GS050 Anti-Two-Block Switch</p>		
<p>-</p> <p>C</p> <p>+</p>	<p>WARNING! Read the operator's manual. Test before every use.</p> <p>Batteries: "C" size lithium 3.6V or alkaline. TEST: the light on the bottom must flicker red and green when the cable is cycled in and out.</p> <p>USA: (888) 819 4355 International: +1 281 664 1330</p> <p>IC:7076A-ICGS050 FCC ID: QVBSGS050</p> <p>* This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.</p>	<p>+</p> <p>C</p> <p>-</p>
<p>-</p> <p>C</p> <p>+</p>		<p>+</p> <p>C</p> <p>-</p>

GS050;

<p>Load Systems International Inc</p>	<p>Model No: GC012 Load Cell 12 000 lb Single part line pull capacity</p>
<p>IC: 7076A-ICGS000</p>	<p>FCC ID: QVBSGS000</p>
<p>* This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) This device must accept any interference received, including interference that may cause undesired operation.</p>	

GCxxx, GS001, GS002, GS005, GS010, GS020;

		<p>(ub219)</p>
<p>See manual for details. Replace with Tadiran TL5930 lithium 3.6V battery. Use non-corrosive RTV sensor safe silicone only. The use of other silicones may void the warranty. International Sales & Service (Houston, USA): 281-664-1330</p>		

Inside Battery Boxes: GCxxx, GS001, GS002, GS005, GS010, GS020 (ATEX and FCC);

<p>LSI INC. Battery Operated: D Type, Lithium, 3.6 VDC Class I, Gr. A, B, C & D Exia INTRINSICALLY SAFE Temperature Code: T4 Model: 215780</p>	
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Intrinsically safe sensors have the following stainless steel plate, p/n UB223;

7.4 Class 1 Division 1 and Division 2 certifications

Class 1, Division 1 certification (intrinsically safe) is available for most **LSI** sensors. *Class 1, Division 2 certification* (non-incendive) is available for the GS550 display.

Certificate CSA #1332949 on master contract 215780 is available on request

Applicable requirements certified by CSA include:

- CSA Standard C22.2 No.0.4-M2004: Bonding and grounding of electrical equipment (protective grounding)
- CSA Standard C22.2 No.0-M1991: General requirements Canadian electrical code part II.
- CSA Standard C22.2 No.0142-M1987: Process control equipment
- CSA Standard C22.2 No.157-M1992: Intrinsically safe and non-incendive equipment for use in hazardous locations
- CSA Standard C22.2 No.213-M1987: Non-incendive electrical equipment for use in class I, division 2 hazardous locations
- UL Standard 508, seventeenth edition: industrial control equipment
- UL Standard 913, sixth edition: intrinsically safe apparatus and associated apparatus for use in class I, II, III, division 1, hazardous (classified) locations (LS Series)
- UL Standard 913, seventh edition: intrinsically safe apparatus and associated apparatus for use in class I, II, III, division 1, hazardous (classified) locations (GS Series)
- UL Standard 1604, third edition: electrical equipment for use in class I and II, division 2, and class III hazardous (classified) locations.

7.5 ATEX certifications

- EN 60079-0: 2004 - Electrical apparatus for explosive atmospheres - General requirements
- EN 60079-11: 2007 - Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
- EN 60079-26 Explosive atmospheres - Part 26: Equipment with equipment protection level (EPL) Ga


Test Report: KEMA No. 211369200.

7.6 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: QVBGS001 IC: 7076A-ICGS001

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 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:	1/4 wave monopole
MFG	Load Systems International

7.7 EMI / EMC

EMI/EMC (Electro-Magnetic Immunity & Electro-Magnetic Compatibility):

EN 301 489-3 V1.4.1 (2002-08)

Clause 8.2: Limits for radiated emissions from ancillary equipment, measured on a standalone basis (measuring distance of 10m): Pass

Clause 8.3: Limits for conducted emissions DC power input/output ports: Pass

Test method used: CISPR 22, EN 61000-3-2: 2000 and EN 61000-3-3:1995+ A1:2001

All tests were performed using measurement apparatus defined in CISPR 16-1. Radiated emissions measurements conformed to requirements of CISPR 16-1.

Clause 8: immunity tests

Enclosure-radio frequency electromagnetic field, EN 61000-4-3: Pass

Signal – RF common mode, EN 61000-4-6: Pass

DC Power input ports, RF common mode, EN 61000-4-6: Pass

Clause 9.2, radio frequency electromagnetic field: Pass

Clause 9.5, radio frequency common mode: Pass

ESD (Electro-Static Discharges)

LSI products are tested against norm EN 61000-4.

Other Compliances

- SAE J159 and SAE J987
- ASME B30.5-2000
- Franklin laboratory: LSI products are safe to use in proximity to blasting caps
- New-York City: MEA 110-05-E, in compliance with 19.1.1(a).1 requirements of Reference Standard RS 19-2 of the Building Code
- ABS (American Bureau of Shipping)
 - API Spec 2C compliant

7.8 Environmental conditions

Ambient temperature	84° C maximum for the sensors, and 59° C maximum for the display
Operating temperature	-35° C to 85° C (-31° F to 185° F)
Humidity range	0% to 100%

7.9 CE

7.9a Declaration of conformity



Declaration of Conformity According to EN 45014

Manufacturer's Name: Load Systems International Inc.

Manufacturer's Address:

Canada:

4495 Blvd. Wilfrid-Hamel, Suite 110
Québec, QC, Canada, G1P 2J7

United States of America:

9223 Solon, Suite A
Houston, TX 77064

United Arab Emirates:

Q3-171 SAIF Zone, P.O. Box 7976
Sharjah - UAE

declare under our own responsibility that the products:

Model	Description
GC005-CE, GC005-ATEX-CE	5 000 lb Capacity Load Cell
GC012-CE, GC012-ATEX-CE	12 000 lb Capacity Load Cell
GC018-CE, GC018-ATEX-CE	18 000 lb Capacity Load Cell
GC035-CE, GC035-ATEX-CE	35 000 lb Capacity Load Cell
GC060-CE, GC060-ATEX-CE	60 000 lb Capacity Load Cell
GC100-CE, GC100-ATEX-CE	100 000 lb Capacity Load Cell
GC170-CE, GC170-ATEX-CE	170 000 lb Capacity Load Cell
GS001-CE, GS001-ATEX-CE	Load Transmitter With Pigtail 6 in.
GS002-CE, GS002-ATEX-CE	Load Transmitter With Pigtail 6 in for balanced cell
GS005-CE, GS005-ATEX-CE	Anti-Two-Block Transmitter
GS010-XX-CE, GS010-XX-ATEX-CE	Angle Sensor
GS011-XX-CE, GS011-XX-ATEX-CE	Angle Sensor With Length Input
GS012-CE	Angle Length Sensor
GS020-CE, GS020-ATEX-CE	Wind Speed Sensor
GS035-CE	Pressure Transducer
GS050-CE, GS050-ATEX-CE	Anti-Two-Block Sensor
GS075-CE	All-In-One Anti-Two-Block Switch Weight
GS2XX-CE	LSI Wireless Gateway
GS320-CE	Stand Alone Wind Speed Display
GS375-CE	Stand Alone A2B Display
GS550-CE, GS550-ATEX-CE	Standard GS display
GS550-03-CE	Hand-Held GS display
GS550-XX-CE	OEM GS display
GS820-CE	Graphical GS display


to which this declaration refers conform to the relevant standards or other standardising documents:

Safety: IEC 61010-1: 2nd ed. (2001), EN 61010-1: 2nd ed. (2001)

Wireless: EN 300 220-3 V1.1.1 (2000-09)


EMC: EN 301 489-3 V1.4.1 (2002-08)


Québec, April 1st, 2010


Eric Beaulieu
Technologies Manager

7.9b CE Safety

 **WARNING!** When captors are used, the ambient temperature should not be higher than 84°C and the display should not be used when the ambient temperature is higher than 59°C, otherwise there can be a burn possibility.

 **WARNING!** For the operator's safety, take only the ambient temperature range into consideration. The device should be used within this range specified above.

 **WARNING!** The protection will be impaired if the material and equipment are used in a manner not specified by the manufacturer.

 **IMPORTANT!** The IP of equipment corresponds to 65.

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) MAST SETTINGS

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*

4J) 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*

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**.

NOTES



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:

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