

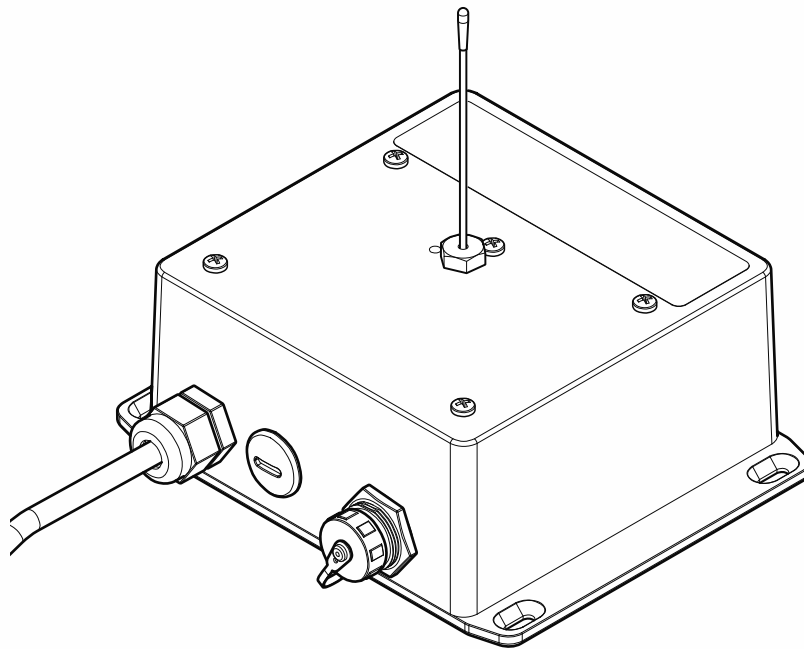


Load Systems International

WIRELESS TECHNOLOGY & CRANE INSTRUMENTATION
DIVISIONS

GS221-02/05/07 System & GS Series Sensors

INSTALLER AND USER'S MANUAL



WARNING! The GS221 system is designed as an operator aid and is in no way a substitute for safe operating practice.




WARNING! Carefully read and understand this manual before proceeding.



BEFORE PROCEEDING

Read and understand the following:

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

Pay particular attention to items bearing the alert symbol  and the following words:



WARNING!

Warning: this denotes an instruction that if not complied with may lead to serious injury or death.



CAUTION!

Caution: this denotes an instruction that if not complied with may lead to product failure or property damage.



IMPORTANT!

Important: this denotes an instruction that if not complied with may lead to product performance issues.



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

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1. INTRODUCTION

1.1 Overview

The GS221 **LSI Wireless Gateway** acts as a base station for GS series wireless sensors. Not limited to crane applications the **LSI Gateway** can be used in a wide range of industrial process monitoring situations. The **LSI Gateway** doesn't have an integrated display; it provides a bridge from GS wireless sensors to an existing CAN bus automotive or industrial automation network. The system is primarily configured via a USB cable using the PC software tool **LSI WM Configurator**.

 **WARNING!** The GS221 system is designed as an operator aid and is in no way a substitute for safe operating practice.

1.2 Start-Up

The **LSI Gateway** has been pre-configured for the system with which it shipped. It starts up with its green light flashing as it wakes up the system sensors and creates a radio communication link with each. Once a reliable communication network is established, the green light stops flashing. This process may take up to 60 seconds. Thereafter the green light flashes only when the **LSI Gateway** communicates with sensors.

2. OPERATION

2.1 Normal operation

Radio communication between sensors and the **LSI Wireless Gateway** is made in packets. Radio packets include both the source and destination ID numbers. This allows the **LSI Gateway** to send acknowledgements back to the transmitter.

On start-up the **LSI Gateway** sends a radio packet to each of the system sensors. This communication wakes the sensor and identifies the **LSI Gateway** as the network controller. The sensor then sends future communications to the **LSI Gateway**.

Sensors transmit once every 60 seconds and whenever their measurement changes by more than a default threshold. Example: A wind speed sensor transmits when wind speed varies by 2 mph or more.

The **LSI Gateway** sends a packet on the CAN bus network every time a sensor communication is received.

3. CONFIGURATION

Configuration of the GS221 **LSI Wireless Gateway** requires access to a PC with a USB port; initial configuration may be easier prior to physical installation of the **LSI Gateway**. Refer to the **Installation** section as required.

3.1 PC Installation

3.1a System Requirements

Windows 2000, XP, Vista (32/64bit) or Windows 7 (32/64bit).

3.1b LSI WM Configurator and USB Driver Installation

Before starting installation, make sure that no **LSI Gateway** is not connected to the computer.

1. Download the installation file from www.loadsystems.com/wmconfigurator.
2. Install the file and follow the steps from the installation wizard.

When transferring the files, the installation wizard will automatically execute the USB driver installation; a Windows warning will recommend to stop the installation, ignore this warning and select **Continue Anyway** (Windows XP) or **Install this driver anyway** (Windows Vista, Windows 7).

3.1c LSI Gateway Connection

Windows Vista / Windows 7:

1. Connect the **LSI Gateway** to the computer; the device will automatically be installed.

Windows XP:

1. Connect the **LSI Gateway** to the computer; **Found New Hardware Wizard** will appear.
2. If Windows asks to connect to Windows Update to search for software, select **No, not this time** and then click **Next**.
3. Select **Install the software automatically**, then click **Next** to continue.
4. A Windows warning indicating that the driver has not been tested will recommend to stop the installation, ignore this warning and select **Continue Anyway**.

5. When the installation wizard has finished installing the software, click **Finish** to close the wizard.

When the installation is completed, the **Device Manager** will appear as shown below;

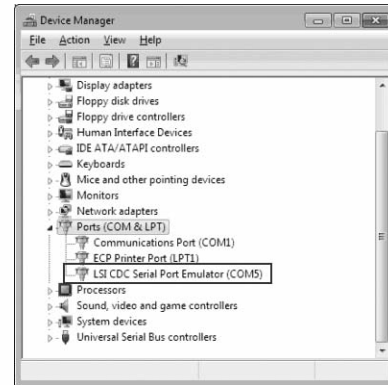


Figure: Device Manager, Windows Vista / Windows 7

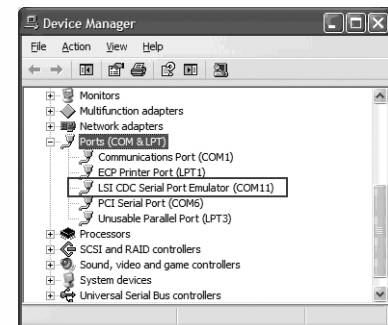


Figure: Device Manager, Windows XP



WARNING! The system must be installed in compliance with **LSI** instructions and using **LSI** supplied components only. Failure to install all parts, or replacing parts or components with parts or components not supplied by **LSI**, may lead to system failure, serious injury or death.

3.2 Application overview

Access the menus from the treeview (in the upper-left) by clicking on it. The appropriated details will be displayed in the right section of the application.

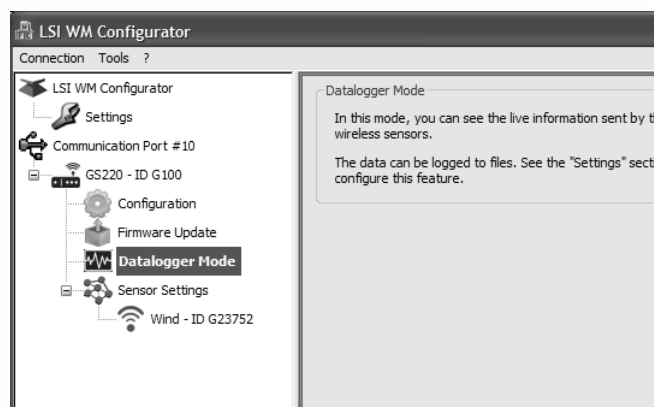


Figure: Application overview.

3.2a Settings

The data from the datalogger mode can be saved on the computer disk.

1. Define the time interval and location folder of the logs.
2. Press **Apply** to save changes or **Cancel to reload existing setting**.

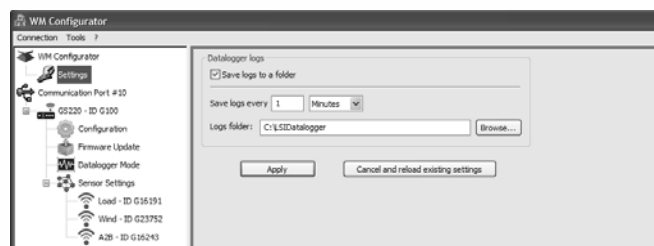


Figure: Settings

3.2b Communication Port

This section displays the communication port in use, the port type and status. The **Open** status indicates that the communication port is in use and that the **LSI Gateway** is communicating information.

3.2c Configuration

Sensor List:

All sensors in the GS221 system are defined in the **Configuration** menu and are also displayed under **Sensor Settings** in the treeview section. Refer to section 3.3 **Sensor List** to add, remove or modify sensor information.

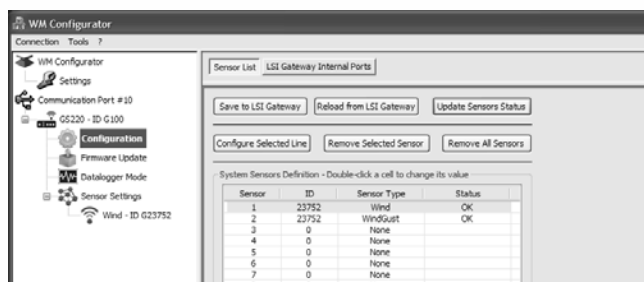


Figure: Sensor List.

LSI Gateway Internal Ports:

The **LSI Gateway** internal communication ports behavior can be configured in the **LSI Gateway Internal Ports** section.

- **Step 1:** Select the **LSI Gateway** internal port to be configured.
- **Step 2:** Set the data logging options of the selected port.

The data logging options set are compatible with the **Datalogger Mode** from the left menu.

Data Filter. Defines the information sent to the internal communication port;

All sensors: Surrounding sensors, including the system sensors.

System Sensors Only: Sensors configured in the **LSI Gateway**.

- **Step 3:** Set advanced port settings.

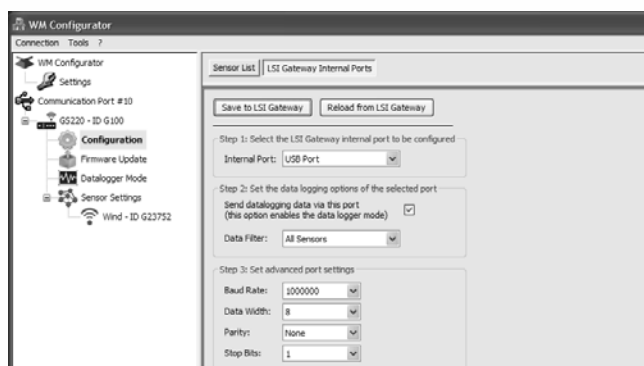


Figure: LSI Gateway Internal Ports.

3.2d Firmware Update

This section displays current **LSI Gateway** firmware information and is used to update the firmware. Refer to section 3.4 **Firmware Update**.

3.2e Datalogger Mode

In this mode, live information sent by the wireless sensors is displayed. The data can be logged to files; see the 3.2a **Settings** section to configure this feature.

3.2f Sensor Settings

When a sensor is selected under **Sensor Settings**, the following information is communicated to the **LSI Gateway**;

- **Base Station ID:** The radio id number of the **LSI Gateway** that has the sensor programmed in its sensor list.
- **Heart Beat:** When no change is detected in sensor value, the sensor status will be communicated to the GS221 in the interval indicated (in seconds).
- **Communication timeout before sleep mode:** When the base station stops communicating information to the sensors, the sensors become inactive (sleep mode). The value indicated is the time (in seconds) before the sensors switch to the sleep mode.
- **Calibration Offset:** Sensor calibration.
- **Calibration Scale:** Sensor calibration.
- **Tx Sensivity:** The minimum change in sensor value required to trigger communication.

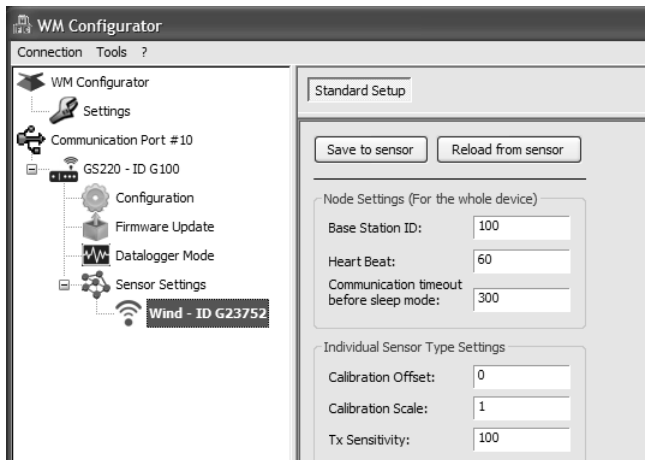


Figure: Sensor standard setup.

3.3 Sensor List

1. In the **Configuration** menu, select **Sensor List**.
2. **Adding sensors:** To add sensors to the sensor list;
Select a line and click on **Configure selected line** or double-click on the line.
Enter the sensor ID and the sensor type .
3. **Removing sensors:** To remove any sensor from the list;
Select the sensor line to remove and click on **Remove selected sensor**.

4. **Reload from LSI Gateway:** Reload data from the **LSI Gateway** and *display data without saving any changes* (the unsaved data in the **LSI Gateway** will be replaced).
5. **Save to LSI Gateway:** Save changes in the **LSI Gateway** memory. **Save to LSI Gateway** is automatically followed by **Update sensor status**.

3.4 Firmware Update (LSI Gateway only)

1. Select **Firmware Update** in the treeview section.
2. In the right section, click on **Browse** to select the update file (extension .220) and then click **Update Firmware Now**.



IMPORTANT! A firmware update will reset the LSI Gateway to the factory default configuration.

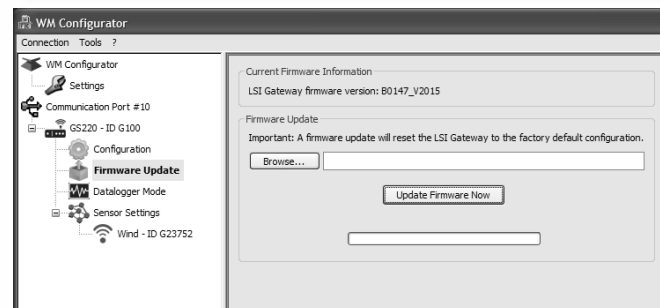


Figure: Firmware update.

3.5 Packet Format

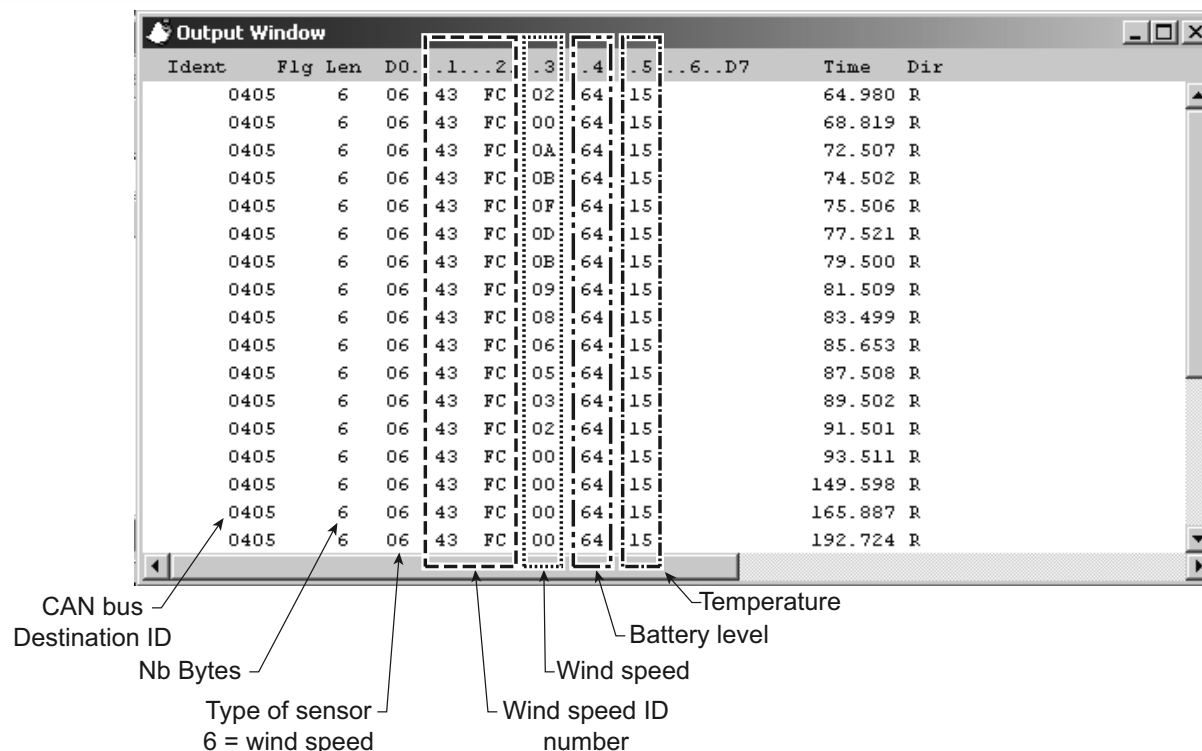


Figure: CAN Bus packet format: example of a CAN Bus log window

Wind speed shown at 0x0F, which is 15 mph.

Battery level is: 0x64, decimal 100%

Temperature: 0x15, which converts into 21C.

Wind speed sensor ID number: 0x43Fc: 17404

CAN Bus packet format

Destination ID: \$0405
 Bit rate: 250kBits/s
 Number of bytes: 6

Table: Radio sensor types available

LSI Sensor type	Number
Load cell, load pins, etc...	1
Angle sensor	2
Boom Length from cable reel	3
Anti-two-block switch	5
Wind speed	6
Rope Payout from line rider	8
Rope Speed from line rider	9
Heel angle sensor	10
List angle sensor	11
Slew sensor (swing angle)	12
Wind Gust (maximum wind in last 5 to 10 minutes)	13

Table 2: packet format

Byte	Description	Data Range
0	Sensor type (see Table: Radio sensor types)	Wind speed always equal to 6
1	Wind speed sensor ID number	MSB
2	Wind speed sensor ID number	LSB
3	Wind speed value in mph	Unsigned byte, between 0 and 200
4	Remaining battery life, in percentage	Unsigned byte, between 0 and 100
5	Sensor temperature in degrees Celcius, -40C to +85C	Signed byte, between -40C & +85C

3.6 Changing sensors

If a sensor needs to be changed, the **LSI Gateway** must learn to recognize the replacement sensor. Two mechanisms are available to change an ID in the sensor list of the **LSI Gateway**.

- 1) Automatic ID change
- 2) Manual ID change

3.6a Automatic sensor settings

LSI will supply a replacement sensor programmed to replace the original one. When the replacement sensor is detected by the **LSI Gateway** it causes the **LSI Gateway** to automatically update the sensor list, replacing the ID of the old sensor with that of the new; the process may take up to two minutes to complete.

Note: The ID number included in the CAN bus packet will change to reflect the different radio ID of the new sensor.

3.6b Manual sensor setting

See Configuration 3.1 to 3.4.

4. INSTALLATION

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

IMPORTANT! Do not power wash the **GS221 LSI Gateway**. Power washing the **LSI Gateway** voids warranty coverage.

4.1 GS221 LSI Gateway Installation

The GS221 **LSI Wireless Gateway** should be installed on the same side of the cab as the wind speed sensor with a direct clear line of sight to the sensor at all boom angles. Avoid hiding the **LSI Gateway** behind a metal structure if at all possible. Optimizing position to improve the radio link will increase sensor battery life.

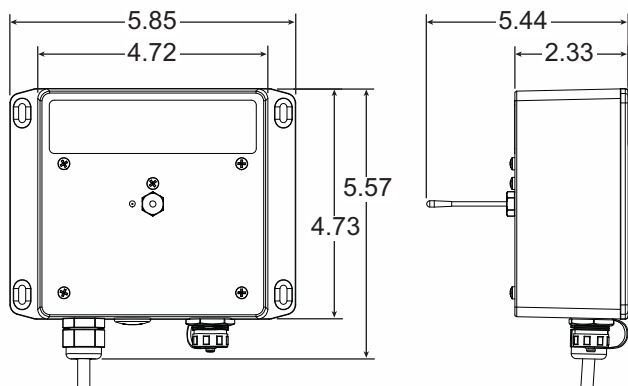


Figure: GS221 LSI Gateway dimensions. Not to scale. Dimensions are in inches.

4.1a Antenna Position

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

1. The antenna should have 5 inches of clear space all around it.
2. The antenna should have an unobstructed line of sight to all sensor antennas at all boom angles.

4.1b Power Supply Connection

1. Connect the blue wire (ground) to the negative terminal of the battery or the panel connection; alternatively bolt the blue wire to the body of the machine with a 1/4 inch or 5/16 inch bolt. The ground connection must be strong enough to sustain 1 ampere.
2. Connect the red wire to a fused accessory source, rated at least 1 ampere, that supplies +12 or +24 volts when the machine is in use. The GS221 will automatically detect the voltage level and adjust itself.

4.1c Wiring

Table: Wire description

Wire	Description	M12 Connector wire color
1	Shield	Brown
2	Power	White
3	Gnd	Blue
4	CAN_H	Black
5	CAN_L	Gray

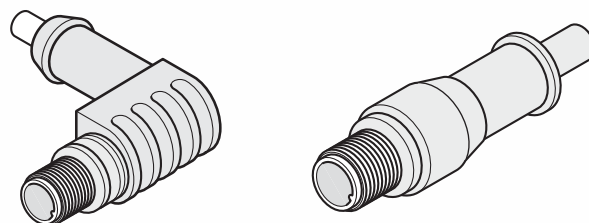
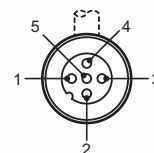


Figure: GS221-05 and GS221-07 connector pins

Table: Wire description

Wire Color	Connector Pin	Description
Red	B	Power supply, 10 to 30 volts
Black	C	Ground
Blue	G	CAN bus ground
		(not required on most CAN bus)
Green	E	CAN-H
White	F	CAN-L

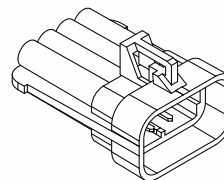


Figure: GS221-02 connector pin

4.2 Wireless Wind Speed Sensor GS020

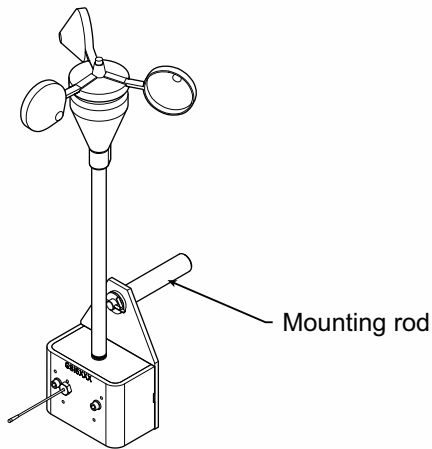


Figure: GS020 wireless wind speed sensor

1. Remove the mounting rod from the wind speed sensor.



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

2. Determine the mounting rod position.
 - a. Install the mounting rod on the same side of the boom as the cabin mounted display, perpendicular to the boom, and at the highest point possible.
 - b. The wind speed sensor must pivot freely on the mounting rod at all boom angles.
 - c. The wind cups must be fully exposed to the wind and spin freely at all boom angles.

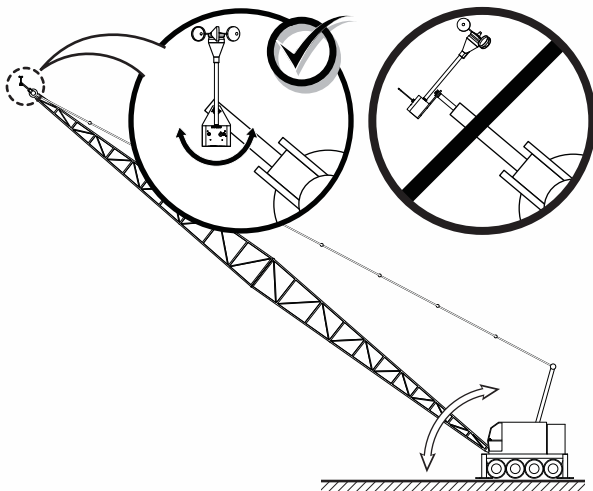


Figure: Swivel orientation

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

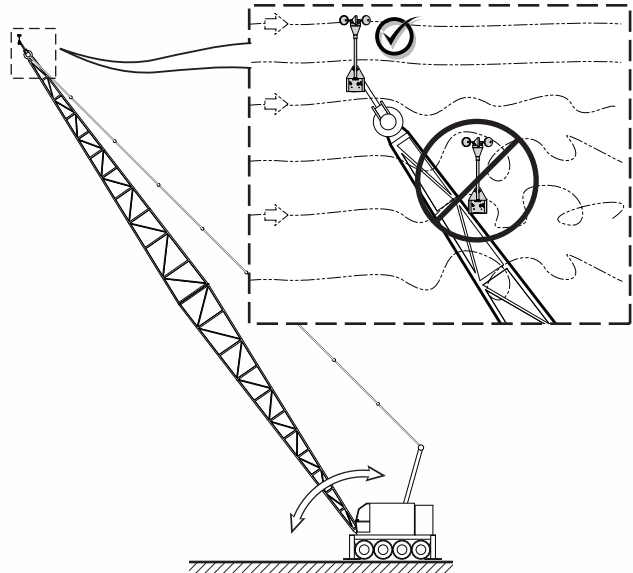


Figure: Wind clearance

- e. The transmitter antenna should not contact any metal object.

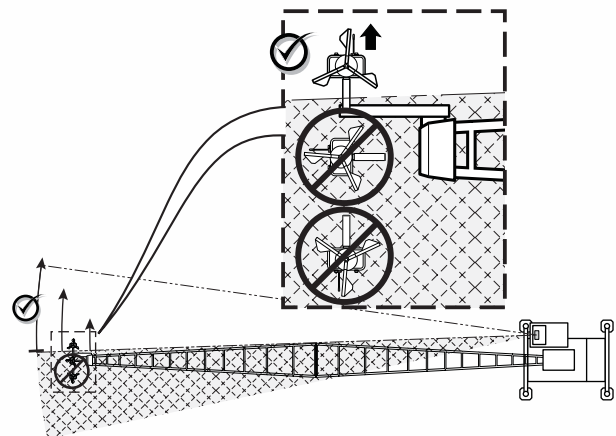


Figure: Radio line of sight - Crane top view

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

Note: Angle iron can be used to extend the mounting position to be clear of the boom top.

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

5. MAINTENANCE

5.1 Replacing the 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.
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.

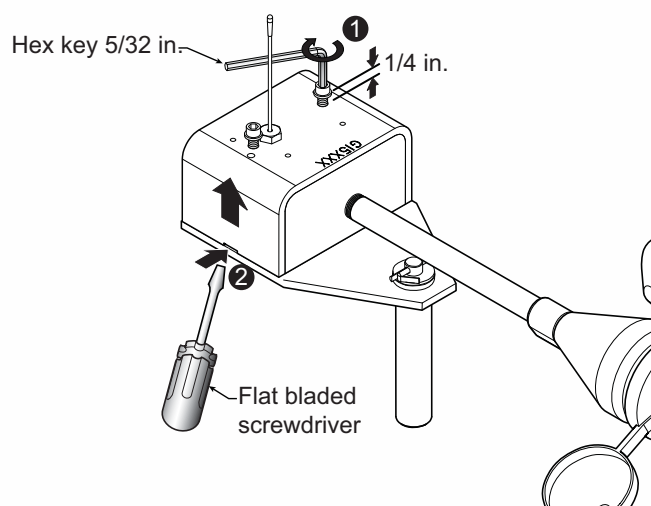


Figure: Remove the sensor box from the mounting plate

3. Remove the battery by hand.
4. Remove the remaining silicone from both the box and the mounting plate.

5. 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, 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

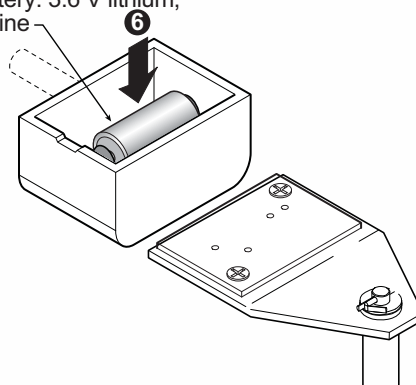


Figure: Install the new battery

6. Apply a non-corrosive RTV silicone all around the edge of the mounting plate to create a new seal without bubbles or breaks.

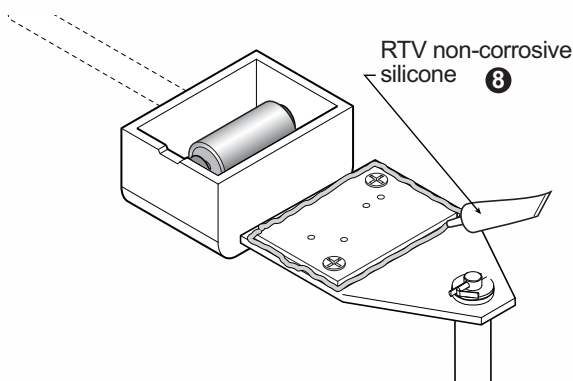


Figure: Apply non-corrosive RTV silicone

7. Reposition the box over the mounting plate and screw in the hex screws. **Do not over-tighten.**

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

5.2 Replacing the 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.



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.

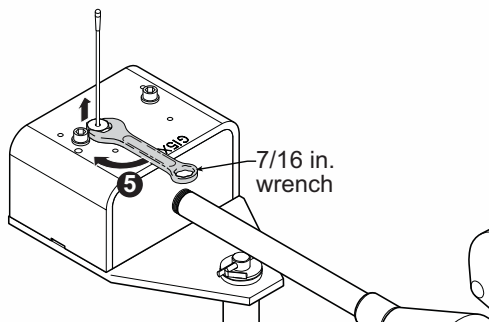


Figure: Unscrew the white nylon hex

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.

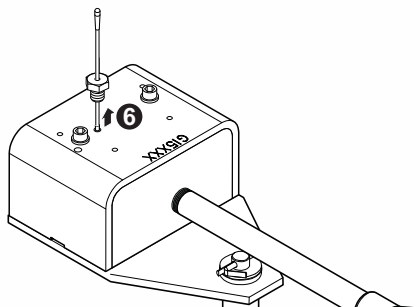


Figure: Pull out the antenna

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.

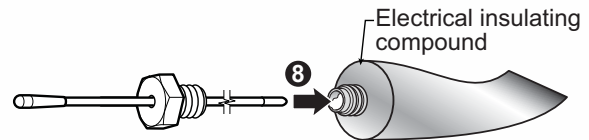


Figure: Coat the exposed metal foot of the antenna

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.

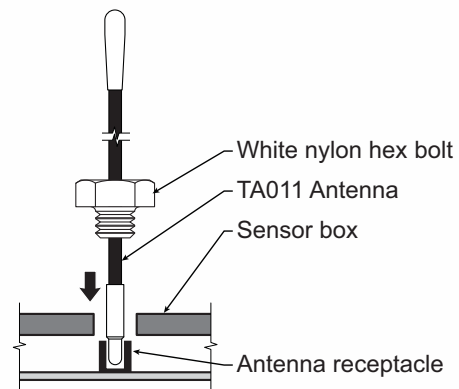


Figure: Install the new antenna

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.
12. Verify that the sensor functions properly.

6. CERTIFICATION NOTES

6.1 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: QVBGS200 IC: 7076A-ICGS200

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

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.

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Antenna List

LSI P/N:	TA011
Description:	1/4 wave monopole
MFG	Load Systems International

6.2 CE

6.2a 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

6.2b 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.

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

7.1 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.

7.2 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).

7.3 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.

7.4 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.

7.5 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.

7.6 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.

7.7 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.

7.7a 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

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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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