



CANADA

# EDAS USER MANUAL April 2016



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Please note that any one of Campbell Scientific's Measurement Consultants will be happy to assist you with any of your inquiries.

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# Water Survey Canada Environmental Data Acquisition System (EDAS)

# 1. Water Survey Canada EDAS Station Summary

The Environmental Data Acquisition System (EDAS) has been designed to meet the operational monitoring needs of Water Survey Canada's Level I and Level II EDASs. This measurement system is comprised of a Campbell Scientific CR850-XT measurement and control datalogger, and is equipped with various telemetry options including:

- Direct connection
- Stevens Water GOES Modem
- Microhard BulletPlus Cellular Modem

The system is capable of measuring an event using a pulse channel, analog sensors using its voltage channels, SDI-12 sensors using its digital channels, and can turn sensors on or off using switched power terminals.

Each EDAS comes pre-configured by Campbell Scientific Canada (CSC) for specifc applications. Through EasyLync (CSC's Windows based user interface), end users can configure the EDAS for their specifc needs.

This manual provides detailed information about the equipment used for the EDAS stations including general descriptions, information, maintenance schedules, basics on direct and wireless connections, station setup, troubleshooting tips, and installation procedures.

# 2. Equipment Overview

The equipment used for the EDAS station is a hybrid of machinery from Campbell Scientific and distributors to provide users with top of the line service, quality, and value.



Figure 2-1 EDAS equipment overview

Table 2-1 *EDAS Equipment Overview* reviews the major components that are included in the Level I and Level II EDASs along with a brief explanation of their function.

Table 2-1 EDAS Equipment Overview			
Model	Manufacturer	Description	
CR850-XT Datalogger	Campbell Scientific Inc.	Equipped with 4GB of memory, it is the control center of the EDAS station. From the datalogger you can view real-time and historical data, and download data. Additionally, sensors can be changed or setup based on your requirements. Analog and pulse based sensors are wired directly into the datalogger (see Section 4.1 <i>CR850-XT (EDAS) Datalogger</i> ).The CR850-XT is programmed using Campbell Scientific's Windows based UI, EasyLync (see Section 6 <i>EasyLync</i> ).	
Bullet-LTE Cellular Modem	Microhard	The Bullet-LTE cellular modem will be provided for all EDAS applications with the option of Bullet-LTE for wireless communications. The optional BulletPlus cellular modem allows for a	

		wireless, local Wi-Fi connection with the station. Using the LTE/4G network with built-in fallback to 3G/HSPA+, GSM, GPRS, and EDGE bands. Allows for wireless transmission of data from the EDAS (see Section 4.3 <i>BulletPlus Cellular</i> <i>Modem</i> ).
Stevens SatComm GOES Transmitter	Manuafactured by Stevens, assembled by Campbell Scientific Canada	A fully GOES Ver 2.0 compliant 300/1200 baud transmitter designed for remote applications. It functions as a satellite modem, collecting data from the CR850-XT datalogger and transmitting it to the NESDIS platform for retrieval. The Stevens SatComm comes with a V2TH satellite antenna and 28dBi GPS antenna with 6 meters of cable (see Section 4.2 <i>Stevens SatComm GOES Transmitter</i> ).
Terminal Block	Campbell Scientific Canada	The terminal block next to the CR850-XT datalogger is used for wiring both 12VDC system power and SDI-12 sensors. Red is always 12VDC (12V) and Black is always Ground (G) (see Section 4.4 <i>Terminal Block</i> ).
SW12V	Campbell Scientific Inc.	A 12Vdc switch to provide power to single or multiple sensors or other devices. It is controlled by the EDAS datalogger using EasyLync (see Section 6.6.2 <i>Settings: SW1</i> tab).
SC105	Campbell Scientific Inc.	CS I/O to RS-232 adapter used as a direct connection a Campbell Scientific datalogger to an RS-232 DCE device. The SC105 is connected to the Stevens SatComm transmitter.
LR4	Campbell Scientific Canada	The LR4 is a latching relay that is used to control power to the communications peripherals, GOES transmitter and BulletPlus cellular modem with Wi-Fi, and the SW12V ports. Power control to these devices are adjusted through EasyLync (see Section 5.6 <i>Settings</i> ).

## 2.1 EDAS Details

The EDAS is comprised of several major components. Overviews of each major component are included in this section in relation to the EDAS application.

The EDAS has a template wiring diagram available for download from the Campbell Scientific Canada website <u>https://www.campbellsci.ca/easylync-access</u>.

At any time when utilising this system, make certain you are referencing the correct wiring information to ensure accurate data and test power and sensor functionality prior to leaving the site.

#### 2.1.1 Enclosure

The fiberglass enclosure houses the CR850-XT Datalogger, Bullet-LTE Cellular Modem, Stevens SatComm GOES Modem, and terminals. It is environmentally sealed rated to NEMA 4 equivalnet and can be affixed directly to a wall or mounting structure. It also has integrated cable entries for the power supply, sensor cables, sealed bulkhead connectors with caps for all antennas with caps, and a lockable door for added security. Additionally, the enclosure contains a desiccant pack to absorb humidity and a humidity indicator card to display internal humidity levels.

The enclosure mounts directly to a wall using the 4 holes on each corner. If mounting to a pole, the Enclosure Mounting Equipment (ENC MOUNT) is available from Campbell Scientific.

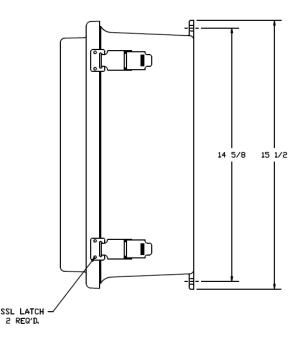
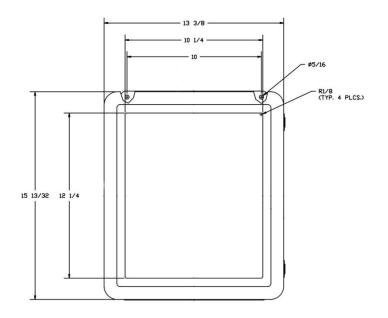
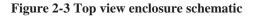


Figure 2-2 Side view enclosure schematic





Note

All schematic dimensions are in inches. For full schematic information, please see Appendix A *Full Enclosure Schematic*.

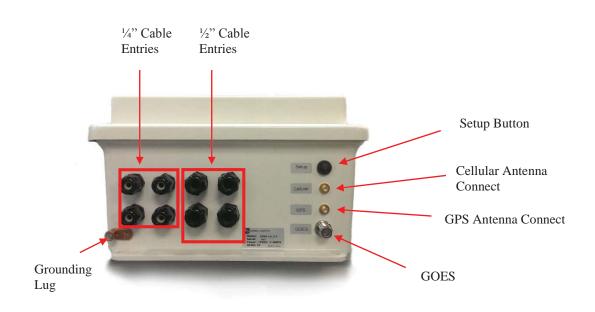


Figure 2-4 Bottom view of enclosure

The EDAS includes a *Setup* button. It is used to turn on the EDAS and enable Wi-Fi communications. Once the button is pushed, the EDAS will turn on within 10 seconds. It may take up to several minutes for the network to be visible on the PC.

Table 2-2 Botton View of Enclosure		
Element	Description	
Setup	Button. Used to power on EDAS and Wi-Fi for wireless connection through Stevens SatComm modem.	
Cellular	Antenna. Used for SatComm cellular communications.	
GPS	Antenna. Used for GPS communications.	
GOES	Antenna. Used for GOES communcations.	
<sup>1</sup> /4" Cable Entries	<sup>1</sup> /4" dimameter cable entry. Plugs are used to cover the entries when not in use. Enteries are typically used for a sensor cable.	
<sup>1</sup> / <sub>2</sub> " Cable Entries	<sup>1</sup> / <sub>2</sub> " dimameter cable entry. Plugs are used to cover the entries when not in use. Entries are typically used for sensor cables.	

### 2.1.2 CR850-XT (EDAS) Datalogger

The CR850-XT is a research-grade datalogger that includes a keypad display as part of its integrated package. Each CR850-XT reads input from sensors, then transmits the data via a communication peripheral. Multiple CR850-XTs can be configured as a network or units can be deployed individually. This rugged datalogger can provide stand-alone operation in harsh, remote environments.



Figure 2-5 CR850-XT Datalogger

This section reviews relevant data for EDAS, for further information see the CR800 & CR850 Manual available in EasyLync using *Help* (see Section 6 *EasyLync Software*).

The CR850-XT Datalogger can measure almost any sensor with an electrical response. The CR850-XT measures electrical signals and converts the measurement to engineering units. It additionally performs calculations, and reduces data to

statistical values. Not every measurement needs to be stored. The CR850-XT will store data in memory awaiting transfer to the PC via external storage devices or telecommunications. Figure 2-6 *CR850-XT wiring panel general layout* describes an overview of the functionality of the datalogger. The datalogger is programmed using EasyLync software, see Section 6 *EasyLync Software*.

#### 2.1.2.1 Wiring Diagram

This section reviews relevant wiring information for EDAS applications, for further information see the CR800 Manual available in EasyLync using *Help* (see Section 6 *EasyLync Software*).

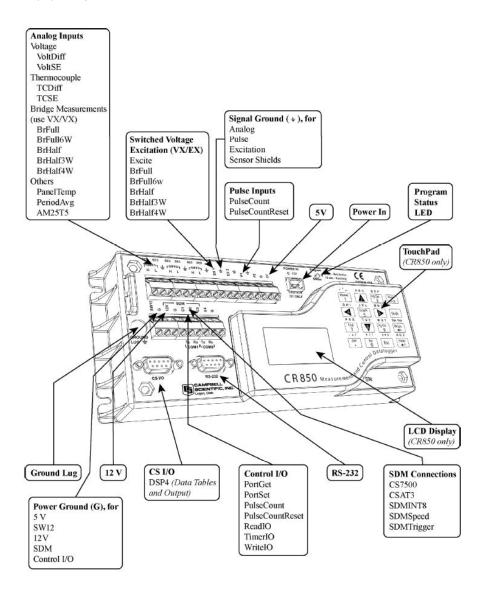


Figure 2-6 CR850-XT wiring panel general layout

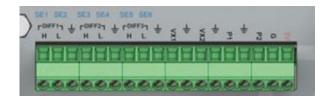


Figure 2-7 Available CR850-XT sensor ports

Analog Sensors are wired directly into the CR850-XT Datalogger via the top terminal strip. Terminals available for connection are Analog voltage labelled SE1-6 for Single-Ended and DIFF H and L 1-3 for Differential measurements, Excitation (labelled as VX1/VX2), Event (labelled as P1), and regulated continuous 5 volt (labelled as 5V). When configuring sensors in the UI in the Measurements section the following measurement types are available: Analog Volt SE (singleended), Analog Volt Diff (differential), Analog Half Bridge (single-ended), Analog Full Bridge (differential), and Pulse Count Rate (event pulse and frequency).

#### 2.1.2.2 Using the Keypad Display

The CR850-XT has an integrated keypad display. Some keys have special functions as outlined in Table 2-3 *Special Keypad-Display Key Functions*.

Table 2-3 Special Keypad-Display Key Functions			
Key	Special Function		
[2] and [8]	Navigate up and down through the menu list one line at a time.		
[Enter]	Selects the line or toggles the option of the line the cursor is on.		
[Esc]	Back up one level in the menu.		
[Home]	Takes users to top of list.		
[End]	Takes users to bottom of list.		
[Pg Up]	Takes users up several lines in a list.		
[Pg Dn]	Takes users down several lines in a list.		
[BkSpc]	Delete character to the left.		
[Shift]	Change alpha character selected.		
[Num Lock]	Change to numeric entry.		
[Del]	Delete.		

The keypad buttons allow for various on site activities including viewing a list of enabled sensors, live readings, setting calibration values and system diagnostics. It can also be used to change the setting of the display backlight, timeout, and contrast. See Table 2-4 *Datalogger Keypad Main Display* for a layout of the menus and a description of the various functions.

Menu	Sub Menu	Sub Sub Menu	Allowable Values and/or Description				
Station Name			Configured in EasyLync.				
	Custom Sensor		Configured	in EasyLync.			
	Label: Sensor 1 Details	Title	Sensor numbers (1-16) and labels will match the configured sensor labels in EasyLync (see Section 6.3.1 <i>Sensors: Details Tab</i> ).				
		Reading	Displays a Single Value Reading.				
		Next Meas T	Next Measurement Time. Indicates the time until the next measurement. Time is listed in a HH:MM:SS format.				
Sensors		Measure Now	False	Default. No Measure Taken During interaction.			
			True	Takes a measurement within 10 seconds and displays in <i>Reading</i> field.			
		Cal_Slope	Numerical	Calibration Slope. Changes slope for field calibration. Users car configure on site.			
		Cal_Offset	Numerical	Calibration Offset. Changes offset for field calibration. Users can configure on site.			
	Next TX	Displays the time until the next self-timed GOES transmission.					
	VSWR	Displays the Voltage Standing Wave Ratio.					
GOES	Batt_Loaded	Displays the battery voltage under transmission load.					
	PlatformID	Displays the platform ID set by the users for a random or self-times transmission. (see Section 6.5.3 <i>Communications: GOES</i> ).					
	Last Buffer	Shows the contents of the datalogger buffer before the last self-timed transmission.					
Batt Volt	Battery Voltage	Displays the	voltage from	the battery.			
Panel Temp	Panel Temperature	Displays the	Displays the datalogger wiring panel temperature.				
	Turn off display	Turns off the keypad display.					
	Turn on backlight	Turns on the keypad backlight. This is useful for night time use.					
Display	Contrast adjust	Use arrow ke	eys to adjust k	eypad display contrast.			
Settings	Display Timeout: Enables the display timeout	Yes	Numerical	Use to turn the display off after an inputted value in minutes. Lowest value is 1, highest value is 60.			
	display timeout	No					

#### 2.1.3 Switched 12V Power

The CR850-XT datalogger has two switched ports that provide 12VDC. The first is found directly on the CR850-XT wiring panel (see Figure 2-6 *CR850-XT wiring panel general layout*), which provides up to 900 mA of current at 25°C. The second is found external to the datalogger via the SW12V (see Table 2-1 *EDAS Equipment Overview*) and can provide up to 1.8 Amps at 25°C.

#### 2.1.4 Stevens SatComm GOES Transmitter

The SatComm GOES Satellite Modem, pre-configured in the enclosure, is connected via RS-232 ports C3 and C4 and via the SC105 9-pin peripheral connected to the CR850-XT (EDAS) datalogger. It is wired into the EDAS power terminal block at the factory.

This section reviews relevant data for EDAS, for further information see the Stevens SatComm Manual.

After initial power up of the EDAS, the Stevens SatComm warm-up begins. All the LED lights will illuminate on the top of the unit for 15 seconds while the Stevens SatComm goes through its built-in self-test (BIST) routine, after which they all go out except for the power (PWR) and GPS LEDs.

The unit will wait for the GPS receiver to give a time and date fix. After an initial GPS lock, if a valid GPS time and date fix is not obtained before the transmission time, the transmission will continue. If a GPS update has not been obtained for 24 hours, self-timed transmissions will be inhibited.

The Stevens SatComm has multiple operating modes. When the Stevens SatComm unit is in *Online* Mode, it is in a low power state called: *Low Power Standby Mode*. In this state, all the LEDs are out and the unit is consuming the minimal amount of power.

By pressing the *Switch to Online Mode* button in the *Settings* of EasyLync (see Section 6.7 *Settings*) the unit is put *Online*. When the unit is *Online*, the LEDs come on during a *Self-Timed* or *Random* transmission sequence. The LEDs also come on when the transmitter is in *Off Line (Configuration)* mode.

Table 2-5 Stevens SatComm GOES Transmitter Connections						
Wire Color	Function	Connection				
Black	Power Ground	System Ground				
Red	Input Power	System Power Source (9-30VDC) via LR4 Relay 1.				
Blue	RS-232 Output	CR850-XT – CS I/O (via SC105 and SC12)				
		Stevens SatComm – External Logger DB9.				
White	RS-232 Input	CR850-XT – C3 (RS-232 TX)				
		Stevens SatComm – External Logger DB9				
Green	RS-232 Ground	CR850-XT – G				
		Stevens SatComm – External Logger DB9				
	Data	CR850-XT – CS I/O (via SC105 and SC12)				
		Stevens SatComm – Display Port DB9.				
	PC Connection	USB				
Black	GPS Antenna	GPS Ant.				
Black	GOES Antenna	RF Output				



Figure 2-8 Stevens SatComm Transmitter front panel



Figure 2-9 Stevens SatComm Transmitter back panel

### 2.1.5 BulletPlus Cellular Modem

Note

The BulletPlus Cellular Modem is pre-configured in the enclosure to connect to the datalogger via the 9-pin RS-232 port on the CR850-XT datalogger. The modem is powered by default on the datalogger switched 12V port with optional full-time 12V power (a change in wiring is required).

Some systems may have the BulletPlus as Wi-Fi is an option on each EDAS.

This section reviews relevant data for EDAS, for further information see the BulletPlus Operating Manual.

With the datalogger's default power wiring, the BulletPlus remains in an *Off* state unless configured to turn on using EasyLync's *Communications*, see Section 6.5.2 *Communications: Cellular*. This can also be achieved by pressing the *Setup* Button on the EDAS. Once the *Setup* button is pressed, the modem will turn on within 10 seconds and the modem will initiate its boot sequence. This can take up to several minutes. After this time, the EDAS Wi-Fi network is visible as *Level I\_II EDAS SNX*, where *X* is the box serial number, and a wireless connection can be made, but by default the modem will only remain powered for 15 min, unless the external button is pressed again or the EDAS is configured to remain on for a longer period of time. Connecting to EDAS via Wi-Fi is convered in Section 5.2.1 *Wirelessly Connect to EDAS*.



Figure 2-10 Bullet-LTE front panel



Figure 2-11 Bullet-LTE back panel

Fable 2-6 Pre-configured Bullet-LTE Connections inside the EDAS Enclosure						
Wire Color	Function	Connection				
Black	Power Ground	System Ground (CR850)				
Red	Input Power	Power Source (9-30VDC) (LR4)				
Blue	None	Not used				
White	None	Not used				
	Connect CR850-XT Datalogger to Bullet-LTE	Com 2 on the datalogger				
Red		Rx				
Brown		Тх				
Yellow		Ground				

## 2.1.6 Terminal Block

The EDAS includes a Din-Rail mounted Terminal Block for the wiring of system power and SDI-12 sensors. All other sensor wiring is done on the CR850-XT wiring panel (see Section 2.1.2.1 *Wiring Diagram*).

Table 2-7 EDAS Terminal Block Wiring						
<b>Color of Block Piece</b>	Function	Connection				
Black	Input Power Positive (+) Includes 5 Amp fuse	Terminal Block Input 01				
Red	SDI-12 Power	Terminal Block Input 03				
Red	SDI-12 Power	Terminal Block Input 04				
Red	SDI-12 Power	Terminal Block Input 05				
Black	SDI-12 Power Ground	Terminal Block Input 06				
Black	SDI-12 Power Ground	Terminal Block Input 07				
Black	SDI-12 Power Ground	Terminal Block Input 08				
White	SDI-12 Signal	Terminal Block Input 09				
White	SDI-12 Signal	Terminal Block Input 10				
White	SDI-12 Signal	Terminal Block Input 11				



**Figure 2-12 Terminal block** 

Proper grounding is important for any system. Attach a grounding cable connecting from the earth ground to the EDAS grounding lug. See Figure 2-4 *Bottom view of enclosure*.

**Note** When wiring power, attach the black ground wire prior to the red positive wire.

## 2.2 Mounting Equipment and Accessories

Table 2-8 Mounting Equipment and Accessories				
Equipment (Part Number)	Description			
GPS 28 dBi Omni- directional Antenna Mount (L30626)	Includes: Ujoint, bolts, and a nut. Used to mount the GPES antenna to a pole (see Section 3.2.2 GPS 28 dBi Omni-Directional Antenna).			
Cellular Modem Omni- Directional Antenna Mount (C2083)	Intergrated mount. Part of EDAS (see Section 3.2.1 <i>Cellular 3dB Omni-Directional Antenna</i> ).			
GOES Yagi 5.5 dB Directional V2TH Antenna Mount (V2TH antenna)	Part of EDAS (see Section 3.2.3 GOES Yagi 5.5 dB Directional V2TH Antenna and Mount).			
Enclosure Mounting Equipment (ENC MOUNT)	Used to mount the enclosure to a wall (see Section 2.1.1 <i>Enclosure</i> ). Can be ordered on the Campbell Scientific website <u>http://campbellsci.ca/</u> .			

The EDAS enclosure mounts directly to a wall using the 4 holes on each corner. If mounting to a pole, the Enclosure Mounting Equipment is available from Campbell Scientific.

Provided with the EDAS are mounting brackets for antennae. Included are the 70020 for the GOES Yagi 5.5 dB Directional V2TH Antenna, for the GPS 28 dBi Omni-directional Antenna, and an integrated mount for the Cellular Modem Omni-Directional Antenna.

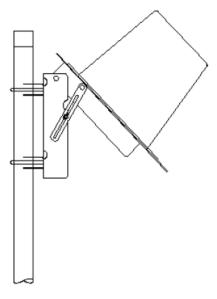


Figure 2-13 GOES Yagi 5.5dB Directional V2TH Antenna side view with pole mount



Figure 2-14 Cellular Modem Omni-Directional Antenna (C2083)



Figure 2-15 GPS 28 dBi Omni-directional Antenna Mount (L30626)

## 3. Installation

## 3.1 Installation Overview

1. Take inventory of equipment (see Table 2-8 *Mounting Equipment and Accessories*).

2. Perform site assessments and pre-planning, as required.

3. Disconnect power supply (i.e. battery).

4. Install mounts and mounting brackets as per Section 2.2 *Mounting Equipment and Accessories* using the provided U-bolts and hardware.

5. Install sensors, antennas, and enclosure as per Section 3.2 *Antenna Installation* and the given instructions for the individual sensor maunals.

6. Connect antenna cables into appropriately labelled bulkhead connectors and wire sensors into datalogger or terminal block via the cable entries (2-12 *Terminal block*).

7. Connect to a power supply (ie. battery) to power up the EDAS.

8. Connect to EasyLync (see Section 5 *Setting up a Connection from EDAS to EasyLync*).

9. Use EasyLync software to connect to and configure the EDAS for your particular application.

10. Calibrate, as required, using either EasyLync or the datalogger's built-in keypad display. For EasyLync calibration, see Section 6.6.3 *Data & Calibration: Live* 

*Readings and Calibration Tab.* To calibrate via the datalogger keypad, see Section 2.1.2.2 *Using the Keypad Display.* 

11. After configuration is complete, ensure sensors are outputting readings using EasyLync's *Live Reading* (see Section 6.6 *Data & Calibration*) and follow any validation steps from specific sensor manuals.

12. Test power and sensor functionality prior to leaving site.

## 3.2 Antenna Installation

**Note** Do not connect power to any EDAS modem until the antenna installation and termination are complete as damage to the equipment may occur.

#### 3.2.1 Cellular 3dB Omni-Direction Antenna

Each antenna comes with 20 feet (6 meters) of cable. The C2083 3dB Omni-Directional Cellular antenna is designed to be mounted on a pole. Fasten the antenna to the mounting pole using the supplied band clamps and integrated mount. Use a flat-head screw driver to tighten the band clamp until the antenna is secure.

For best reception results, ensure the antenna is facing the general direction of your nearest service provider's cellular tower. The link below provides a map of all cellular towers in Canada to assist with this.

http://www.ertyu.org/steven\_nikkel/cancellsites.html?lat=49.000000&lng=-97.000000&zoom=4&type=m



Figure 3-1 3dB Omni-Directional Antenna (C2083)

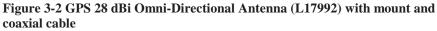
### 3.2.2 GPS 28 dBi Omni-Directional Antenna

Each antenna comes with 20 feet (6 meters) of cable. The installation of the L17992 GPS antenna and cable should begin by feeding the antenna cable through the <sup>3</sup>/<sub>4</sub> inch supplied nut and L30626 antenna mount (see Figure 3-2 *GPS 28 dBi Omni-Directional Antenna (L17992) with mount and coaxial cable*).

Secure the cable to the antenna. Thread the antenna onto the nut, being sure not to cross the threads.

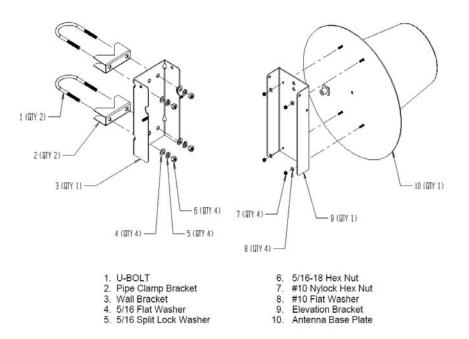
#### **Note** U-bolt can be vertical or horizontal for pole or crossarm mounting.





### 3.2.3 GOES Yagi 5.5dB Directional V2TH Antenna and Mount

Each antenna comes with 20 feet (6 meters) of cable is used for the Stevens SatComm GOES Transmitter. The location of the satellite is provided after setting up the GOES transmission parameters in the *Communications* of EasyLync (see Section 6.5.3 *Communications: GOES*).



# Figure 3-3 GOES V2TH 5.5dB Directional Antenna (V2TH antenna) mounting information

For pole mount, assemble wall bracket to pole using supplied U-Bolts and hardware according to Figure 3-3 GOES V2TH 5.5dB Directional Antenna (V2TH antenna) mounting information.

Holes are provided for wall or pole mount. For pole mount:

- 1. Tighten U-bolt nuts once azimuth is adjusted.
- 2. Adjust elevation bracket to 90° and mount antenna base plate.
- 3. Re-adjust elevation bracket to desired elevation.
- 4. Once elevation is adjusted, tighten two nuts and two hex bolts on proparms. See Figure 3-3 *GOES V2TH 5.5dB Directional Antenna (V2TH antenna) mounting information*.
- 5. Tighten bolts on hinge point for additional strength.

For the wall mount, replace U-blots with user-supplied bolts or appropriate hardware. Follow steps 1-5 as outlined above.

The V2TH Satellite Antenna can be suspended or mounted inside nonmetallic protective structures or mounted outside on a building, pole, or tower. Nonmetallic materials such as painted plywood, window glass, plastic, tar paper, or fiberglass shingles are recommended.

**Note** When mounted inside a building, do not mount to a metallic structure, as it may affect the radiated signal.

For exterior mounting, the V2TH/V4TH Elevation Mount is available. The mounting bracket is designed to clamp to a vertical pole 1" to 2" in diameter. It also has holes to allow for clamping to larger pipes or posts using steel hose clamps or mounting directly to a wall with screws or bolts. Alternate top-of-pole mount assembly (70100) is available for  $2-\frac{1}{2}$ " pipe.

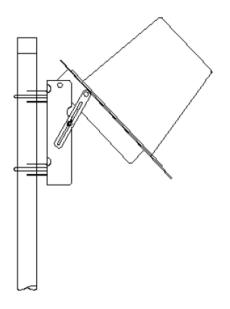


Figure 3-4 Satellite antenna side view with elevation mount

## 4. Download EasyLync to a PC

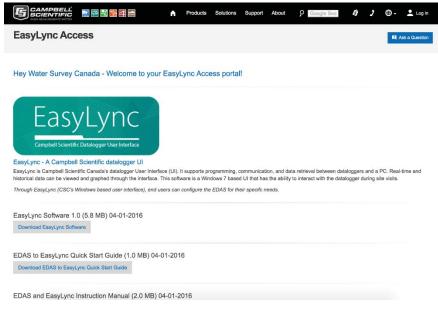
To install EasyLync to PC, select the <u>https://www.campbellsci.ca/easylync-access</u> link and input the *Username* and *Password* below.

		٨	Products	Solutions	Support	About	<b>9</b> Google Sea	glip.com	🕀 🚽 💄 Log In
EasyLync Ac	cess								Ask a Question
Username	watersurveycan								
Password									
								s	Submit

Figure 4-1 EasyLync Access

- 1. For EDAS, the Username is watersurveycan and the Password is W@ter2016.
- 2. Select the blue *Submit* button to access a unique EasyLync Access portal.

From the access portal, users can download EasyLync, the Quick Start Guide, and the EDAS Operating Manual.



#### Figure 4-2 EasyLync Access Portal

3. Select the grey *Download EasyLync Software* button to begin installing EasyLync to PC.

## EasyLync Software 1.0 (5.8 MB) 04-01-2016

Download EasyLync Software

#### Figure 4-3 Download EasyLync Software button

4. Once downloaded, extract the \*.zip file to the PC.

5. Selecting the application will prompt users to install EasyLync software through the setup wizard. From here, select *Install*.

Welcome to EasyLync				
This wizard installs EasyLync to your PC.				
EasyLync is Campbell Scientific Canada's datalogger User Interface (UI).It supports programming, communication, and data retrieval between dataloggers and a PC.Real - time and historical data can be viewed and graphed through the EasyLync interface.				
To install EasyLync on this PC, click Install.				
To exit without installing EasyLync, click Cancel.				
Install Cancel				

Figure 4-4 EasyLync Setup Wizard Install

6. Once the install is completed, users will be prompted to select the *Finish* button to acknowledge the installion is complete. A shotcut to EasyLync will be installed to your desktop.

EasyLync has successfully been installed	
You have successfully installed EasyLync to your PC.	
EasyLync has been installed to the following folder: > C:\CampbelSci\EasyLync\	
A shortcut to EasyLync has also been placed on your desktop.	977775
Please review the Quick Start Guide to assist with connecting EasyLync to the EDAS via Wi-Fi or a direct RS-232 Com Port Connection.	
	Finished



Please review Section 5 *Setting up a Connection from EDAS to EasyLync* to connect the EasyLync software to EDAS.

# 5. Setting up a Connection from EDAS to EasyLync

Note

EasyLync software is available at <u>https://www.campbellsci.ca/easylync-access</u>. Ensure that the software is installed prior to site visits.

By establishing a wireless or direct connection, the EDAS can be fully configured using EasyLync software.

The EDAS station program monitors the parameters that are defined by users during the setup process using the EasyLync software. The parameters are collected in an interval that is defined by users. The data is recorded and stored on the datalogger, then transferred to a website via cellular telemetry.

## 5.1 Direct (RS-232) Connection (Com Port) to EDAS

A direct or serial RS-232 connection is the preferred connection type as it provides the most reliable connection.

To connect a PC to a datalogger using an RS-232 connection, use a user-supplied USB to 9-pin serial converter cable (see Figure 5-1*USB to 9-pin male serial converter for example (L17394)*). If a 9-pin port is installed on the PC, use a 9-pin male to 9-pin female serial cable (see Figure 5-2 *9-pin male to 9-pin female serial cable for example (L10873)*).

The USB connector attaches to the USB port of a PC. The RS-232 connector attaches to the RS-232 port of the datalogger (Figure 5-1 *USB to 9-pin male serial converter (L17394)*).



Figure 5-1 USB to 9-pin male serial converter (L17394)



Figure 5-2 9-pin male to 9-pin female serial cable (L10873)

**Note** Make sure the driver for the USB to 9-pin serial converter is installed correctly before a site visit to ensure a direct connection is possible.

Drivers can typically be found on the manufacturer's website. If an USB to 9-pin male serial converter cable (see Figure 5-1 *USB to 9-pin male serial converter* (*L17394*)) has been purchased from Campbell Scientific, the driver can be found at: <u>http://www.campbellsci.ca/117394</u>

## 5.2 Wireless Connection Setup and Considerations

A *Setup* button is provided on the EDAS enclosure (see Figure 2-3 *Bottom View of Enclosure*). Pushing the *Setup* button activates the Wi-Fi on the cellular modem. Once the *Setup* button is pressed, the modem will turn on within 10 seconds. Once the BulletPlus Cellular Modem is powered, it initiates its boot sequence, which can take up to two minutes. The Wi-Fi is defaulted to be active for 15 minutes in order to save power. This is configurable in the *Manitaince* tab of the cellular modem (see Section 6.5.2.2 *Communcations: Cellular: Maintenance*).

After this time, the EDAS Wi-Fi network should be visible and a wireless connection can be made. This allows users to make a wireless connection using a Windows 7 based PC. The Wi-Fi network may take up to two minutes to boot and will time out after 30 minutes by default. This timeout can be extended using EasyLync *Settings* (see Section 6.7 *Settings*). This is a power saving feature and eliminates the possibility of a modem being left on after a site visit is complete.

#### 5.2.1 Wirelessly Connect to EDAS

When an EDAS is supplied with the optional BulletPlus Cellular Modem, a Wi-Fi connection from EDAS to EasyLync can be established. This connection type is used when a direct RS-232 connection cannot be established (see Section 5.1 *Direct (RS-232) Connection (Com Port) to EDAS)*.

1. Connect wirelessly to the EDAS by searching and selecting the wireless device in Windows using the Network Tool in the bottom right of the screen. By default, the name of the wireless network is *Level I\_II EDAS SNX*, where *X* is the box serial number.

**Note** The wireless network will match the *Station Name* after the initial EDAS setup through EasyLync (see Section 6.7.1 *Settings: Station Settings* Tab).



Figure 5-3 Windows network icon

2. Once *Level I\_II EDAS SN555* appears in the wireless network list, select the *Connect* button.

Campbellsci.ca Internet access	^
Dial-up and VPN	
VPN Connection	
Wireless Network Connection	Ξ
CSCC-GUEST	
Level I_II EDAS SN555	
Connect	
	Ŧ
Open Network and Sharing Center	

Figure 5-4 Windows network menu

3. Type in the network security key W@ter2016 when prompted.

Provide the second seco	work	X
Type the netw	ork security key	
Security key:	W@ter2016	
	Hide characters	
	OK	ncel

Figure 5-5 Windows network security key pop-up

4. Open the installed EasyLync Software to access EDAS. (see Section 6 *EasyLync Software* for information on how to download EasyLync).

5. From the EasyLync Dashboard, specify IP as the Connection Type.

6. Enter the IP address *192.168.12.99* and select the *Connect* button on the *Dashboard*.

## 5.3 Connect to EDAS using a Phone Line

The optional COM220 phone modem comes pre-configured with the EDAS station. Use an RJ45 Ethernet cable to connect from the phone modem, using the *Phone* port, to a PC.



Figure 5-6 COM220 Phone Modem

For more information on the phone modem, see the COM220 56k Phone Modem manual available on the Campbell Scientific website: <u>http://www.campbellsci.ca/com220</u>

If using a third-party phone modem, refer to its manual for setup instructions.

# 6. EasyLync Software

EasyLync is Campbell Scientific Canada's datalogger User Interface (UI). It supports programming, communication, and data retrieval between dataloggers and a PC. Real-time and historical data can be viewed and graphed through the interface. This software is a Windows 7 based UI that has the ability to interact with the datalogger during site visits.

EasyLync software is available at <u>https://www.campbellsci.ca/easylync-access</u> (see Section 4 *Download EasyLync to PC*). Ensure the software is properly installed on a PC in order to make an EDAS connection.

The toolbar of EasyLync is designed as a recommended workflow. For initial setup, users can work through the toolbar from left to right for ease of use.



Figure 6-1 EasyLync Toolbar

# 6.1.1 EasyLync Menu Bar

Along the top of EasyLync, there is a menu bar, located above the toolbar, which contains three options, *File, Settings*, and *Help*.

*File* allows users to interact with the settings file of EasyLync. The settings file is used to create the configuration files for the EDAS.

File	Settings Help	
	Open	Ctrl+O
٤	New Setting File	Ctrl+N
۲	Import Setting File from EDAS	
ш —	Save	Ctrl+S
e	Save As	
₽	Exit	Ctrl+Q

Figure 6-2 File dropdown menu

Table 6-1 File Dropdown Menu				
Option	Description			
Open	Opens an EDAS setting file from the PC (see Section 6.9 <i>Save &amp; Send</i> ). Uses a *.elsx extension.			
New Setting File	Creates a new blank setting file. Uses a *.elsx extension.			
Imprt Setting File from EDAS	While connected to EDAS (see Section 6.2.1 <i>Dashboard: Connecting to EasyLync)</i> . Uses a *.elsx extension.			
Save	Overwrites existing file with the current settings.			
Save As	Opens a browser windor to a file with a new name.			
Exit	Exits the EasyLync software. Will not save a settlings file or send information to the EDAS datalogger (see Section 6.9 <i>Save &amp; Send</i> ).			

File	Settings		Help
	ø	Pref	erences

Figure 6-3 Settings dropdown menu

*Settings* allows users to access EasyLync preferences for default file paths, IP addresses, and initialization strings.

Help	
	EDAS Quick Start Guide
	EDAS Operating Manual
i	About

#### Figure 6-4 Help dropdown menu

The *Help* dropdown menu contains links to information about EasyLync using the *About* option. *About* contains a full listing of the available SHEF Codes with descriptions about their uses. Additionally, it contains a link to the EDAS Operating Manual and EDAS Quick Start Guide.

## 6.1.2 Using SHEF Codes with EasyLync

The Standard Hydrometeorological Exchange Format (SHEF) is designed for realtime data use. SHEF fully qualifies the data, so that the receiving databases have all the necessary information to describe the data. A SHEF Code is a data identifier. A SHEF Block is a data string.

Throughout EasyLync, SHEF Codes and SHEF Blocks are referenced and can be used in conjunction with all GOES transmissions (see Section 5.4.2 *Communications: GOES*), alarms (see Section 5.2.2 *Measurements: Alarms Tab*), or they can be used as *Sensor Labels* (see Section 5.2.1 *Measurements: Details Tab*).

## 6.1.3 EasyLync Warning Icon

When a change to the connected EDAS occurs, a yellow warning icon appears on the page button (see Figure 6-5 *Yellow warning icon*). This warning icon indicates that the changes to the page have not been sent to the EDAS and therefore the changes have not taken effect. Once the changes are sent to EDAS (see Section 6.9 *Save & Send*), the warning icon disappears and the changes will have taken effect.



Figure 6-5 Yellow warning icon

## 6.2 Dashboard

The *Dashboard* is the initial page seen when connected to EasyLync. From here users can connect to the datalogger and view basic system status.

#### 6.2.1 Dashboard: Connecting to EasyLync

There are three methods of connecting to EasyLync to the EDAS:

- Serial is used when a RS-232 Direct connection via Com Port.
- *IP* is used when a wireless connection is established.

• *Phone Line* is used when connecting via a phone modem.

There is a fourth option in the *Specify a Connection Type* dropdown called *Offline - Terminal mode* which allows users to connect to EasyLync without an EDAS connection.

Once a successful connection is made to the EDAS (see Section 6.2.1 *Dashboard: Connecting to EasyLync*), the *Dashboard* displays system summary information such as battery voltage and panel temperature.

File Settings H	elp						
8	Ø	:=	×	lù		•	
Dashboard	Sensors	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
Status							
Disconnected							
Connection Type							
Specify a Connecti	ion Type			Offline - Terminal m	node		•
Connect	)						

#### Figure 6-6 Unconnected Dashboard

*Specifiy a Connection Type* on the *Dashboard* (see Figure 6-6 *Unconnected Dashboard*) and input any parameters required to make the connection. The parameters are listed in Tables 6-2 to 6-5 inclusive.

Variable	Allowable Values	Description	
	Serial	Connects to the EDAS via the RS- 232 or USB Port (see Section 5.1Direct (RS-232) Connection (Com Port) to EDAS)).	
Specify a Connection Type	IP	Connects to the EDAS via Wi-Fi of TCP/IP (see Section 5.2 Wireless Connection Setup and Considerations).	
	Phone Line	Connects to the EDAS via a phone modem (see Section 5.3 <i>Connect to</i> <i>EDAS using a Phone Line).</i>	
	Offline - Terminal mode	Allows users to navigate through EasyLync without connecting to the EDAS. Some EasyLync functions will be unavailable.	

When the *Offline - Terminal mode* is specfied as a connection type, EasyLync is avalible for use while not connected to EDAS. This connection type is primarily used to fix firmware bugs within EasyLync; all live measurement functions and commucations are unavailable.

When *IP* is specfied as a connection type, EasyLync connects to the EDAS via Wi-Fi or cellular.ethernet type connections (TCP/IP) (see Section 5.2 *Wireless Connection Setup and Considerations*). Enter the IP address *192.168.12.99* and select the *Connect* button on the *Dashboard*. *Delay* (*seconds*) adds seconds of delay to increase connection reliability.

IP Connection Configuration		
IP Address		
Delay (seconds)	0	

#### Figure 6-7 Dashboard: IP Connection Configuration

When *Phone Line* is specfied as a connection type, EasyLync connects to the EDAS via a phone modem (see Section 5.3 *Connect to EDAS using a Phone Line*).

Phone Line Configuration		
Dialing Number		
COM Port		•
Modem Registration String		
Delay (seconds)	0	

#### **Figure 6-8 Phone Line Configuration**

Table 6-3 Phone Line Configuration					
Variable	Allowable Values	Description			
Dialing Number	Numerical	Allows users to input their 10 digit phone number associated with the phone line.			
COM Port	Dropdown	Allows users to select a Com Port for internal or external modems.			
Modem Registration String	Numerical	Allows users to enter modem initialization strings.			
Delay (seconds)	Numerical	Adds seconds of delay to increase connection reliability			
Connect	Button	Initializes connection to datalogger based on user-defined settings.			

When *Serial* is specified as a connection type, EasyLync connects to the EDAS via RS-232 or USB Port (see Section 5.1*Direct (RS-232) Connection (Com Port) to EDAS)*.

Serial / Direct Connection Configuration		
COM Port		•
Delay (seconds)	0	
Connect		

#### Figure 6-9 Serial/Direct Connection Configuration

Variable	Allowable	Description		
	Values			
Com Port	COM X	X refers to the Com Port Number. This values varies depending on the PC and USB Port being used.		
		Select the appropriate Com Port.		
Delay (seconds)	Numerical	If using a USB serial device, adding several seconds of delay increases connectivity and reliability.		
Connect	Button	Initializes connection to datalogger based on user-defined settings.		
Connect	Button	Initializes connection to datalogger based on user-defined settings.		

# 6.2.2 Dashboard: Connected to EasyLync

Once a successful connection to the EDAS has been made (see Section 6.2.1 *Dashboard: Connecting to EasyLync*), the *Dashboard* displays system summary information such as:

- Battery Voltage
- Panel Temperature
- Station Clock
- Internal Temperature

This information will not be displayed if connection type is *Offline - Terminal mode* (see Section 6.2.1 *Dashobard:Connecting to EasyLync*).

ile Settings He			1			1	
<b>^</b>	Ø	i		lù		•	Ľ
Dashboard	Sensors	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
itation				*			
Name				Offline			
Offline Connection							
Station Clock	tation Clock 05.04.2016 19:08:00						
Disconnect	Refresh All	]					
Data Table		-21					
Key				Value			
ctive Sensors Alarm	5						
Alarm							

#### Figure 6-10 Connected Dashboard

The *Dashboard* displays live data from measurements. This display remains blank until measurements are initialized.

Table 6-5 Station Name				
Variable	Description			
Connected	Displays the station name as defined in <i>Settings</i> (see Section 5.6.1 <i>Settings: Station Settings</i> Tab). Default is blank.			
Com Port	Displays the Com Port used as defined when connected to EasyLync as <i>Serial</i> (see Table 6-2 <i>Connection Type</i> ).			
Station Clock	Displays current clock time.			
Disconnect Button	Disconnects users from EasyLync.			
Refresh all Button	Refreshes all values under Station Name.			

# 6.3 Sensors

*Sensors* is used for sensor setup, live readings, and sensor alarm setup.

Note

Users can export individual sensor settings to a PC by right-clicking on the *Sensor Label*. From this right-click menu, users also have the ability to import sensor settings from a PC to import into an alternate sensor.

## 6.3.1 Sensors: Details Tab

The *Details* tab in *Sensors* is used to configure sensors. The UI has the ability to store a minimum of 10 distinct sensor parameters. Its primary functions are:

- Setting the sensor type
- Naming the sensor (alphanumeric up to 30 characters)
- Activating/de-activating sensors (both measurement and archive)
- Defining measurement parameters

- Selecting pre-built equations
- Entering custom equations including 5<sup>th</sup> order polynomials
- Ability to add and test equations
- Setting a moving average
- Selecting Measurement Schedule
- Setting sample interval
- Setting slope and offset
- Setting decimal places and position
- Setting up to 7 significant digits
- Exporting of sensor setups for later use

D	ashbo	ard Sensors		torage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send	
d		Label	Details		c Settings		01.047			
1	V	EDAS_Battery	Alarms	Activ	/0		V			
2	1	EDAS_Temp		Туре	Type Decimal Places Decimal Position Units Sensor Label		Analog Volt SE 3 0 V EDAS, Battery			
3		Sensor_3		Deci						
\$	10	Sensor_4		Deci						
5		Sensor_5		Unit						
5	0	Sensor_6		Sens						
7	10	Sensor_7		A Ana	Analog-VoltSE Settings					
3		Sensor_8		Char			2			
Э		Sensor_9		Measurement Schedule						
10	10	Sensor_10			Sample Interval		00:01			
11		Sensor_11		Offs			00:00			
12	8	Sensor_12			er Management					
13		Sensor_13			Switched 12V Port		SW1			
14	0	Sensor_14			mup Time		00:00			
5	10	Sensor_15		A Proc Slop	essing Settings		1			
16		Sensor_16		Offs			0			
				Equation			8			
					Equation for this Meas	urement	12			
					ation					

#### Figure 6-11 Sensors: Details

Basic Settings configures the general sensor settings.

Active	V	
Туре	Analog Volt SE	•
Decimal Places	3	
Decimal Position	0	
Units	V	
Sensor Label	EDAS_Battery	

Figure 6-12 Sensors: Details: Basic Settings

Cable 6-6 Basic Settings				
Variable	Allowable Values	Description		
Active	Checkbox	Activates the sensor.		
		This is activated when the <i>Multiple SDI-12 Parameter</i> is selected. Defines the number of measurements returned by the SDI-12 sensor.		
	Battery	Measures power supply voltage.		
	Analog Half- Bridge	Applies an excitation voltage, delays a specified amount og time, and then makes a single-ended voltage measurement. With a multiplier of 1 and an offset of 0, the result us the ration of measured voltage divided by the excitation voltage. Initagtes the <i>Analog Half Bridge</i> <i>Settings</i> (see Table 6-7 <i>Analog Half Bridge and Analof Full Bridge</i> <i>Settings</i> ).		
	Analog Full- Bridge	Applies an excitation voltage to a full bridge and makes a differential voltage measurement of the bridge output. The resulting value is the measured voltage in millivolts divided by the excitation voltage in volts. Initiayes the <i>Anaolge Full Bridge Settings</i> . (see Table 6-8 <i>Analog Half Bridge and Analog Full Bridge Settings</i> ).		
	Analog Volt Diff	Initates the Analog Volt Diff Setting (see Figure 6-13 Sensors: Details: Analog-VoltSE Settings).		
	Analog Volt SE	Initates the Analog Volt SE Settings. (see Figure 6-14 Sensors: Details: Analog-VoltSE Settings).		
Туре	Datalogger Panel Temperature	Records the datalogger internal temperature panel.		
	Pulse Counter Rate	Records a pulse as either a switch closure of frequemcy. For more information, please see the CR800 Manual Section 5.1.3.1		
	Single SDI-12 Parameter	Performs an SDI-12 sensor measurement. This option displays a single measurement.		
	SDI-12 Multiple Output - Parent	Primary SDI-12 measumment sends measurement command and retrieves the first data value output from sensor. All measurement parameters are set here (e.g. all measurement command, interval, etc). Must have parent in order to have child.		
	SDI-12 Multiple Output - Child	Secondary SDI-12 measurement. Retrieves a secondary value from sensor (e.g. if sensor outputs 3 values, the child can be used to take the second or third value while the parent sensor takes the first). All parametes must mimic parent.		
	Differential Analog	Performs differential voltage measurement. For more information, please see the CR800 Manual Section 5.1.3.1.		
	Single Ended	Performs single-ended voltage measurement. For more information, please see the CR800 Manual Section 5.1.3.1.		
Sensor Label	Alphanumeric	Label given to the sensor.		
Decimal Places	Numerical	Defines the number of decimal places displayed from the measured value. Example: if users inputs a value of 3, the measurement will		

		display to the third decimal place $-0.123$ . Default is 0.
Decimal Positions	Numerical	Moves a decimal point by a factor of +/- 10. Example: if users input a value of 3, the measurement value will change from 30 000 to 30.000. Default value is 0.
Units	Alphanumeric	Defines the units associated with the measurement based on the sensor manuals. Example: $W/m^2$ is Watts per meter squared.

*Measurement Schedule* dictates when and how often a sensor will take a measurement. This appears when *Battery* or *Datalogger Panel Temperature* is selected from the *Type* dropdown.

4	Measurement Schedule			
	Sample Interval	00:01		
	Offset	00:00		

Figure 6-13 Sensors: Details: Measurements Schedule

Table 6-7 Measurement Schedule				
Variable	Allowable Values	Description		
Sample Interval	HH:MM	How often to read a value from the sensor.		
Sample Time Offset	HH:MM	Amount of time into the interval before the datalogger reads the value from the sensor.		

*Power Management* allows users to select a *Switched 12V Port* from the dropdown (these dropdown options are *SW1* and *SW2*). *SW1* and *SW2* settings are set in *Settings* (see Section 6.7.2 *Settings: SW1 and SW2*).

*Equation* allows for additional measurement setup to convert measurements to engineering units. It is also used for post-processing data on a measurement. Equation help documentation can be found under the *Help* dropdown in the menu bar.

4	Equation	
	Use Equation for this Measurement	
	Equation	<u>√</u> x

Figure 6-14 Sensors: Details: Equation

Fable 6-8 Equation				
Variable	Allowable Values	Description		
Use Equation for this Measurement	Checkbox	Allows users to enable an equation to be used.		
Equation	Alphanumeric	Allows users to create a custom equation.		
Equation Builder	Button	Selects a pre-built equation using the equation dialog.		

EDAS has two Switched 12 Volt (V) Ports available. For EDAS with cellular modems use the primary Switched 12 V port for power management of the modem. The secondary Switched 12 V port is available for sensor(s) power management. The secondary Switched 12 V has 2 connection ports; however, both ports share the same control. These power settings are set in *Settings: SW1* and *Settings: SW2* (see Section 6.7.2 *Settings: SW1 and SW2*).

Power Management		
Switched 12V Port	NONE	•
Warmup Time	00:00	

#### Figure 6-15 Measurements: Details: Power Management

Table 6-9 Power Management				
Variable	Allowable Values	Description		
	NONE	Switched 12V is not being used.		
Switched 12 V Port	SW1	Primary Switched 12V is being used.		
	SW2	Secondary Switched 12V is being used.		
Warmup Time	MM:SS	Defines the amount of time after Switched 12 is powered before initializing measurement to allow the sensor to power up and reading to stabilize when required.		

# Appears when *Analog Half-Bridge* or *Analog Full-Bridge* is selected from the *Type* dropdown (see Table 6-6 Basic Settings).

Analog Full Bridge Settings		
Diff Channel		•
EX Channel	0	
ExmV		
Settling Time	0	

Figure 6-16 Sensors: Details: Analog Bull-Bridge Settings

Table 6-10 Analog Half Bridge and Analog Full Bridge Settings		
Variable	Allowable Values	Description
Diff Channel	Dropdown	Displays values from 1-3. These are the available Differnetial Channels on the datalogger for sensor connection. On the physical EDAS datalogger, the analog inputs are labeled as DIFF1-DIFF3 (see Figure 2-7 Avaliable CR850-XT sensor ports).
Excitation Channel	Numerical	EX1-EX2 display by default. These are the available excitation channels on the datalogger for sensor connection.
Excitation in mV (will excite positive and negative)	Numerical	Excitation output from the sensor. Used for sensors which require excitation.
Setting Time mSec (leave at 0 or set to 3mSec to 50mSec)	Numerical	The amount of time to allow for signal setting after setting up a measurement (switching to the channel, setting the excitation) and before making the measurement.

Appears when *Analog Volt Diff* or *Analog Volt SE* is selected from the *Type* dropdown (see Table 6-6 *Basic Settings*).

4	Analog-VoltSE Settings	
	Channel	•

#### Figure 6-17 Sensors: Details: Analog-VoltSE Settings

The *Channel* dropdown displays values from 1-6 when *Analog VoltSE* is selected from the *Type* dropdown(see Table 6-6 Basic Settings). These are the channels on the datalogger for sensor connection.

The *Channel* dropdown displays values from 1-3 when *Analog VoltDiff* is selected from the *Type* dropdown(see Table 6-6 Basic Settings). These are the channels on the datalogger for sensor connection.

Use the *Processing Settings* to convert raw measurements to useable engineering units.

4	Processing Settings		
	Slope	1	
	Offset	0	

Figure 6-18 Sensors: Details: Processing Settings

Table 6-11 Processing Settings		
Variable	Allowable Values	Description
Slope	Numerical	Default slope is 1.
Offset	Numerical	Default offsite is 0.

Appears when *Pulse Count Rate* is selected from the *Type* dropdown.

Pulse Count/Rate Settings		
Configuration Type		•
Output Type	Counts	•

Figure 6-19 Sensors: Details: Pulse Count/Rate Settings

Table 6-12 Pulse Count/Rate Settings		
Variable	Allowable Values	Description
Configuration Type	High Frequency	Measurement option used for frequency rates (i.e. shaft encoders).
	Switch Closure	Measurment option used for pulse counts (i.e. tipping buckets).
Output Type	Counts	Incremental count per pulse. Is often used for tipping bucket measurements.
	Fequency	Incremental count/scans in Hertz. Is often used for wind sensor measurements.

Appears when *SDI-12* is selected from the *Type* dropdown (see Table 6-6 *Basic Settings*).

4	SDI-12 Single Output Settings	
	Address	
	Command	9

Figure 6-20 SDI-12 Settings

Table 6-13 SDI-12 Settings		
Variable	Allowable Values	Description
Address	Text	Address of SDI-12 sensor. This is defaulted to 0 by the sensor manufacturer.
Command	Text	Command sent to the sensor to initialize measurement or query (e.g. "?!" generally does an address query).

4	SDI-12 Multiple Output Parent Settings		
	Address		
	Command		0
	Number of Data Values	2	<u>*</u>

## Figure 6-21 SDI-12 Multiple Output Parent Settings

Appears when *SDI-12 Multiple Output – Parent* is selected from the *Type* dropdown (see Table 6-6 *Basic Settings*).

Table 6-14 SDI-12 Multiple Output Parent Settings			
Variable	Allowable Values	Description	
Address	Text	Address of SDI-12 sensor. This is generally defaulted to 0 by the sensor manufacturer.	
Command	Text	Command sent to the sensor to initialize measurement or query (e.g. "?!" generally does an address query).	
Number of Data Values	Numerical	The amount of data values outputted by the parent SDI-12 sensor.	

4	SDI-12 Multiple Output Child Settings		
	SDI-12 Multiple Output - Parent		
	Output Value of Parent	2	A

Figure 6-22 SDI-12 Multiple Output Child Settings

Table 6-15 SDI-12 Multiple Output Child Settings		
Variable	Allowable Values	Description
SDI-12 Multiple Output – Parent	Dropdown	Dropdown populates from the configured parent sensor. It allows users to select a parent to associate the child sensor with.
Output Value of Parent	Numerical	Return data value from sensor selected from the <i>SDI-12 Multiple</i> <i>Out – Parent</i> dropdown (e.g. use child to retrieve values from 2 or 3 from a sensor that has 3 outputs).

# 6.3.2 Sensors: Alarms Tab

Sensor alarms are the primary indicator of irregularities. Alarms include:

- High Threshold alarm
- Low Threshold alarm
- *Rate of Change* alarm

*Alarms* trigger an action in the event an alarm condition occurs. Users can trigger separate sensor measurements once an alarm is active.

Dashboard Measurements	iterage Communication Data & Calibration Settings Diagnostics	Save & Send
d Active Label 1 0/ Semicol 1 2 0/ Semicol 2 3 5 5emicol 3 4 5 5emicol 3 4 5 5emicol 5 6 5 5emicol 6 7 5 5emicol 7 8 9 5 5emicol 9 10 5 5emicol 10 11 0/ Semicol 10 11 0/ Semicol 10 13 5 5emicol 12 13 5 5emicol 12 13 5 5emicol 14 15 5 5emi	Fligh Threshold Alarm     Alarm Enabled     Alarm Fredis     Alarm Petels     Alarm Threshold Value     Alarm Threshold Value     Alarm Threshold Alarm     Alarm Threshold Alarm     Alarm Threshold Alarm     Alarm Fredis     Alarm Threshold Value     Alarm Fredis     Alarm Threshold Value     Alarm Resolution     Alarm Threshold     Alarm Threshold     Alarm Threshold     Alarm Threshold     Alarm Fredis     Alarm Fredis     Alarm Fredis     Alarm Threshold     Alarm Threshold     Alarm Threshold     Alarm     Alarm Alarne     Alarm Threshold     Alarm     Alarm Threshold     Alarm     Alarm     Alarm Threshold     Alarm     Alarm Alarne     Alarm Alarne     Alarm Alarne     Alarne     Alarm Alarne     Alarne	ALM. 0000 0 ALM. 0000 0 0 0 0 0 0 0 0 0 0 0

Connected to station: Offline Connection Time: 0 00.29.36

EasyLync changes detected but not applied

Figure 6-21 Sensors: Alarms Tab

The *High Threshold Alarm* alerts users of a sensor measurement that is currently above a defined threshold value.

4	High Threshold Alarm	
	Alarm Enabled	
	Alarm Prefix	ALM_
	Alarm Name	
	High Threshold Value	0.000
	Alarm Hysteresis	0

#### Figure 6-22 Sensors: Alarms: High Threshold Alarm

Table 6-16 High Threshold Alarm				
Variable	Allowable Values	Description		
Alarm Enabled	Checkbox	Enables the alarm.		
Alarm Name	Text	This name is referenced on the GOES transmission page.		
High Threshold Value	Numerical	Provides a value > test.		
Action Hysteresis	Numerical	Allows users to enter the threshold level to deactivate an alarm. This is useful when dealing with fluxuating measurement values.		

The *Low Threshold Alarm* alerts users of a sensor measurement that is currently below a defined threshold value.

Low Threshold Alarm		
Alarm Enabled	0	
Alarm Name		
Low Threshold Value	0.000	
Action	ReadSensor SDI-12 Sensor 12	0

Figure 6-23 Sensors: Alarms: Low Threshold Alarms

Variable	Allowable Values	Description
Alarm Enabled	Checkbox	Enables the alarm.
Alarm Name	Text	This name is referenced on the GOES transmission page.
Low Threshold Value	Numerical	Provides a value < test.
Action Hysteresis	Numerical	Allows users to enter the threshold level to deactivate an alarm. This is useful when dealing with fluxuating measurement values.

The *Rate of Change Alarm* alerts users of extreme change as defined by the threshold value.

A Rate of Change Alarm		
Alarm Enabled	V	
Alarm Name		
Rate of Change Value	0.000	
Action	Email	0

## Figure 6-24 Sensors: Alarms: Rate of Change Alarm

Table 6-18 Rate of Change Alarm				
Variable	Allowable Values	Description		
Alarm Enabled	Checkbox	Enables the alarm.		
Alarm Prefix	ALM	Used to distinguish the alarm value from other parameters in the public table.		
Threshold and Rate of Change Values	Numerical	Value used in the rate of change test (e.g. if this value is 1, a change from 3 to 4 will trigger the alarm).		
Action Hysteresis	Numerical	Allows users to enter the threshold level to deactivate an alarm. This is useful when dealing with fluxuating measurement values.		

<ul> <li>Alarm Action Configuration</li> </ul>	
Alarm Rate Interval	
Initiate Random GOES Data	
Primary SHEF Code	
Trigger Alternate Measurement	
Triggered Measurement	<b></b>
Alternate SHEF Code	

## Figure 6-25 Sensors: Alarms Tab: Alarm Action Configuration

See Section 6.1.2 Using SHEF Codes with EasyLync for SHEF Code information.

Table 6-19 Alarm Action Configuration				
Variable	Allowable Values	Description		
Alarm Rate Interval	Numerical value in minutes	The amount of time between designated alarm actions.		
Initate Random GOES Data	Checkbox	Send relevant alarm data at regular intervals.		
Primary SHEF Code	Alphanumeric	Allows users to define a SHEF Code for values.		

Trigger Alternate Measurement	Checkbox	Activates Alarm will trigger measurement of parameter set in <i>Triggered Measurement</i> .
Triggered Measurement	Dropdown	Allows users to select a configured measurement to read when alarm is activated and then sent to the random GOES transmission.
Alternate SHEF Code	Text	Allows users to define a SHEF Code for values.

# 6.4 Storage

*Storage* is used to add, configure, and remove data tables on the datalogger. A data table displays sensor measurement values in order to compare data. The left hand side of *Storage* is organized in a page tree format listed in order of user creation.

The data tables are individually named (alphanumeric) using up to 20 characters. Any configured sensors can be added to a data table. Users can also select the type of data to storage (sample, max, min, average). Users can store up to 64 distinct values in a data table. Battery voltage and panel temperature are pre-configured measurements that are stored by default.

The CR850-XT (EDAS) Datalogger's final storage is a ring memory with new data overwriting the oldest data. When the internal lithium battery is replaced (see Section 7 *Maintainence*), the final data tables are not retained.

#### Note

If maximum or minimum is selected as an output, a timestamp of occurance will be stored along with the value.

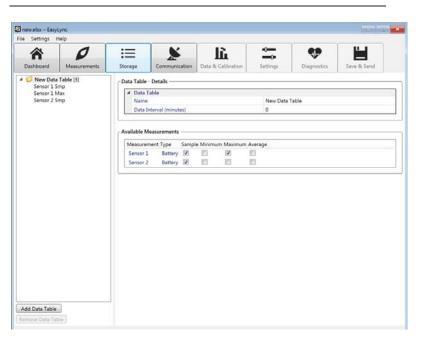


Figure 6-26 Storage

When opening *Storage*, select the *New Data Table* button from the bottom left to begin building a new data table to store sensor measurements.

*Data Table - Details* allows users to name the data table for easy reference and for a data interval input.

- Dat	a Table - Details		
	Data Table		
	Name	New Data Table	
	Data Interval (minutes)	0	

#### Figure 6-27 Storage: Data Table – Details

The *Name* is used for reference to the data table and names data files. The *Name* also appears in *Data Tables* in the *Table Monitor* tab.

Data Interval (minutes) defines how often data is written to Storage.

*Available Storage Options* shows users the allowable storage types to add to the data table from the configured sensors in *Measurements* (see Section 6.3.1 *Sensors: Details Tab*).

- A	Available Measurements					
	Measurement	Туре	Sample	Minimum	Maximum	Average
	Sensor 1	Battery	1		<b>V</b>	
	Sensor 2	Battery	1			

#### Figure 6-28 Storage: Details: Available Measurements

# 6.5 Communications

Communications is used configure the EDAS for local or remote data transfer.

Table 6-20 Available Measurements						
Variable	Allowable Values	Description				
Measurement	Read Only	Displays measurement set in <i>Measurements</i> (see Section 6.3.1 <i>Sensors:Details</i> tab).				
Туре	Read Only	Displays sensor type set in <i>Measurements</i> (see Section 6.3.1 <i>Sensors:Details</i> tab).				
Sample	Checkbox	Stores the data measurement value taken from a sensor at a single point and time.				
Minimum	Checkbox	Stores the lowest measured value during the storage interval (see CR800 Manual Appendix A.2.3.1). This value is stored with the timestamp of occurance.				
Maximum	Checkbox	Stores the highest measured value during the storage interval (see CR800 Manual Appendix A.2.3.1). This value is stored with the timestamp of occurance.				

Average	Checkbox	Stores the average of the samples taken of the measured value during the storage interval (see CR800 Manual Appendix A.2.3.1).
---------	----------	--

There are three communications options found on the Basic Configuration page:

- Wi-Fi
- Cellular
- GOES

Basic Configuration       ✓ WiFi Comjugatulin         Image: Configuration Configuration       Image: Configuration Configuration         Self-Timed Transmission Alignment       WiFi Session Duration (minutes):         The Session Duration controls how long the WiFi network will be available once the button is press attive.         Cellular Modem Configuration Configuration         Please verify you are connected to the EDAS WiFiNetwork before continuing. The default SSID has EDAS WiFiL         Click to Launce	Save & Send
Configuration Basic Configuration Basic Configuration Self-Timed Transmission Alignment	Save & Send
Basic Configuration GOES GOES GOES GOES GIVENT Consideration Generation Gene	
GOES Transmitter Configuration — Make sure the Satcomm device is connected to your PC and press the Connect and Launch button Connect and Launch	sed while the device is s been configured to ch Modem Configurati

#### Figure 6-29 Communications: Basic Configuration Tab

The *Basic Configuration* page is used to launch the setup of either the cellular modem (see Section 6.5.2 *Communication: Cellular*) using the *Click to Launch Modem Configuration* button or GOES transmitter (see Section 6.5.3 *Communications: GOES*) using the *Connect and Launch Satcomm Configuration* button.

**Note** The Click to Launch Modem Configuration and Connect and Launch Satcomm Configuration buttons will not work in Offline – Terminal mode.

## 6.5.1 Communcations: Wi-Fi

This communication method is availble when the optional BulletPlus cellular modem is configured for EDAS.

On the *Basic Configuration* page (see Figure 6-29 *Communcations: Basic Configuration tab*), users can enable/disable Wi-Fi communications using the checkbox to the left of *Enable Wi-Fi Communication*. The session duration controls how long the Wi-Fi network will be available when the *Setup* button on the enclosure is pushed (see Section 2.1.1 *Enclosure*). The length of each session can be changed within a range of 5-60 minutes. See Figure 6-21 *Communications: Configuration* tab. The BulletPlus cellular modem is pre-configured to turn on Wi-Fi for 15 minutes upon initial power up in order to have a lower power draw.

## 6.5.2 Communications: Cellular

Please be advised that this is a third-party program. This manual reviews the program and its relevance to EDAS. Additional information on the modem can be found in the BulletPlus Operating Manual.

Selecting the *Click to Launch Modem Configuration* button launches the default PC browser to configure the cellular modem.

Click to Launch Modem Configuration

#### Figure 6-30 Click to Launch Modem Configuration button

#### Note

*Click to Launch Modem Configuration* button will not work in *Offline - Terminal mode*.

To access the Microhard User Interface, use the *Username*: admin and *Password*: waterdata

tem Network	Carrier	Wireless	Firewall V	PN Route	er Serial	1/0 G	PS Apps	Diag	01010 01010 Mmin
imary Settings	Services	Keepalive	Maintena	nce Reboo	it.				
stem Informatio									
System Information									
Host Name		UserDevice			Description		my	Bulletplus-	GPS
Product Name		Bulletplus-0	PS		System Dat	e	20	16-03-31 10	):44:54
Hardware Version	1	Rev A (64M	B)		System Upt	ime	3 1	nin	
Software Version		v1.3.0			Build Date		20	16-01-18	
Software Build		1012			Build Time		17	40:35	
Temperature (°C)	)	29.6			Supply Volt	age (V)	13	.53	
arrier Information									
Module Status		Enabled			IMEI		35	5406061392	287 0
Current APN		Itestaticip.a	pn		IMSI		30	2720596964	442
Connection Statu	s	Connected			SIM Card		RE	ADY	
Network		ROGERS			SIM Numbe	r (ICCID)	89	3027204059	69644222
Home/Roaming		Home			Phone Num	ber	+1	7808602068	3
Current Technolo	gy	LTE			Cell ID		24	337921	
Frequency Band	(MHz)	BAND_LTE_	17		LAC		62	500	
IP Address		72.142.190.	14		RSSI (dBm)		-68	dBm	
DNS		64.71.255.2	54		RSRP/Q (dB	im/dB)	-86	5/-4	
		64.71.255.2			SINR (dB)		16		
Module Version		FIH7160_V1	.1_WW_01.14	46.01_AT	Module Buil	d Time	20	15-03-16 07	1:34:06
AN Status									
		00:0F:92:02	AA:CF						
MAC Address									

Figure 6-31 Summary Tab

Once the Microhard User Interface has loaded, click on the *Carrier* tab and go to *Settings*. Enter the APN, User Name, and Password (if applicable) as supplied by the phone carrier (i.e. Telus, Rogers, or Bell). Click *Submit* to save settings.

Once the settings are saved, reset the cellular modem. The changes will take effect and the modem will register on the Wi-Fi network and be ready for use. Check that the cellular modem is connected using the Microhard User Interface *Summary* tab.

For most EDAS applications, users only need to make changes under the *Settings* and *Maintenance* tabs; however, more advanced applications may need to be enabled for additional functionality of the modem. See BulletPlus Manual for full details on all the cellular modem functionalities.

It is recommended to discuss the available account types and their requirements with your intended phone carrier before configuring the cellular modem.

**Note** Modems are pre-configured for EDAS. It is not recommended to reset to default. If reset to defaut call Campbell Scientific Canada for support.

#### 6.5.2.1 Communications: Cellular: Settings

The *Settings* tab allows users to input the Access Point Name (APN) address, which is supplied by the phone carrier when an account is setup.

microha	ard systems inc.
System Network Carrier Wi	
tatus Settings SMS SMSConf	fig DataUsage
Carrier Configuration	
General	
Carrier status 🔍	Enable •
Connectivity Management 0	Auto •
IP-Passthrough	Disable •
MTU Size(500~1500/Blank) 0	
SIM Selection	Dual SIM Cards •
Dual Cards Management	
Primary Slot 0	SIM Card-1 •
SIM Card-1 (Bottom slot) Settings	
SIM Number(ICCID) 0	8912230000292746013
Data Roaming	Disable *
Carrier Operator	Auto •
Technologies Mode	AUTO  Advanced
APN	connect.telus.com
Advanced+	
SIM Pin	
Authentication	PAP V
User Name	
Password	
Network+	
SIM Card-2 (Top slot) Settings	
SIM Number(ICCID)	N/A
Data Roaming	Disable •
Carrier Operator	Auto
Technologies Mode	AUTO   Advanced
APN	auto
Advanced+	
Network+	

Figure 6-32 Cellular Settings Tab

#### 6.5.2.2 Communications: Cellular: Maintenance

The *Maintenance* tab is used to update the Operating System (OS) or firmware of the modem. This may be required when new versions of firmware are released from the Cellular Modem (BulletPlus) manufacturer Microhard.

stem Network Ca	rrier w	ireless	Firewall	VPN	Router	Serial	1/0	GPS	Apps	Diag	Admin
mmary Settings Se	rvices K	Ceepaliv	e Mainten	ance	Reboot						
ystem Maintenance											
Version Information											
Product Name	Ha	rdware 1	vpe	В	uild Versio	on		Build	Date	E	Suild Tim
Bulletplus-GPS	Ret			v	.3.0 build	1012		2016-	01-18	1	7:40:35
Upgrade Reset to Default Configur	ations	Upgra	de Firmware								
Reset to Default Confi	gurations	Reset	to Default	<b>€</b> Ke	ep Carrier	Settings					
Backup Configurations											
Configuration File Nan	ne	Micro	hardBulletplus-0	SPS.c							
		Backu	p Configuration	s							
Backup											

#### Figure 6-33 Cellular Maintenance Tab

When first reaching this page, the product name, hardware type, build version, build date, and build time will be displayed. This indates the current version of firmware in the modem and can be compared to the newest OS release date and file name to see if an update is required.

Newest version of firmware are available on the product page for the BulletPlus or Bullet-LTE found on the Campbell Scientific website: https://www.campbellsci.ca/downloads?c=9999&d=356

The *Maintenance* tab can also be used to restore the unit to its default configuration. This is not recommended as the cellular modem is pre-configured for EDAS.

Table 6-21 Firmware Updates						
Variable	Allowable Values	Description				
Erase Current Configurations	Keep All Configurations	Prevents erasing of the modem settings during a firmware upgrade. When updating firmware, use this option. If not, all configuration settings including those for Wi-Fi will be lost.				
	Keep Carrier	Erases all configurations including Wi-Fi with the exception of <i>Carrier Settings</i>				
	Erase Configurations	Erases all configurations for all settings.				
Firmware Image	Choose File Button	Allows users to browse their PC for the firmware update file found on the CSC website at <u>www.campbellsci.ca/downloads</u> .				
Upgrade	Upgrade Firmware Button	Initiates firmware upgrade.				

**Note** *Reset to Default Configuration* should not be used. Resetting results in the loss of all configured settings including Wi-Fi. If reset to defaut call Campbell Scientific Canada for support.

*Backup Configuration* allows users to save the cellular modem configured settings to their PC.

Table 6-22 Backup Configurations						
Variable	Allowable Values	Description				
Configuration File Name	Alphanumeric	Allows users to specify a file name for their backup configuration.				
Backup	Backup Configuration Button	Creates a backup file to be stored on the PC.				

## 6.5.3 Communications: GOES

Please be advised this is a third-party program. This manual reviews the program and its relevance to EDAS. Additional information on the GOES modem can be found in the Stevens SatComm Manual.

Clicking on the *Connect and Launch Satcomm Configuration* button launches the default PC browser to configure the GOES modem.

Connect and Launch Satcomm Configuration

#### Figure 6-34 Connect and Launch SatComm Configuration button

**Note** *Connect and Launch SatComm Configuration* button will not work in *Offline - Terminal mode* mode.

Plug the USB B-Type into the Stevens SatComm USB port and the other end of the USB into the PC's USB-A Type port. Windows will automatically install the drivers and assign a virtual Com Port.

A pop-up window will appear with the COM number listed for the individual USB port.

Date and Time are inputted in UTC format (GMT or Zulu time), not local time.

**Note** It is not recommded to leave the USB plugged into the Stevens SatComm as it may cause connectivity problems with the EDAS datalogger.

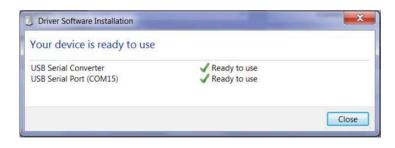


Figure 6-35 Stevens SatComm Driver Software Installation window

Once the driver is installed, click on the *SatComm* button to start the GOES setup process (see Figure 6-15 *Stevens SatComm Disconnected Tab*).

🕤 SatCommSet 2.0 ( Build	d: 13.10.17.12 )	-	
Comm Port	COM15		Refresh Com Port List
Baud Rate	38400	•	Connect
Password			Switch to Online Mode
Sa	atComm	Ir	nternal Logger

Figure 6-36 Stevens SatComm Disconnected

Variable	Allowable Values	Description
CommPort**	СОМХ	X refers to the Comm (COM) Port Number. This value varies depending on the PC and USB Port being used. Select the appropriate CommPort.
Baud Rate	Fixed	Select menu number which corresponds to the datalogger's baud rate (default 38400).
Password	Alphanumeric	Password is set through EasyLync software. Do not use
Connect	Button	Creates a connection to the SatComm Transmitter.
Switch to Online Mode	Button	Changes the operational mode of the tratransmit
SatComm	Button	Launches the setup screens.
Internal Logger	Button	Not applicable for this application.

\*\* If the USB cable has been inserted into the PC after loading SatComm software, it may be necessary to refresh the list by clicking the Refresh Com Port List link.

#### 6.5.3.1 Communications: GOES: SatComm Setup

The *SatComm Setup* tab is used to setup the GOES transmitter to communicate with the EDAS. Input required parameters including Platform ID, satellite system, antenna type, and resulting cable losses. See Figure 6-16 *Stevens SatComm Setup Tab*.

File	Help	Unload Settings to	SatComm Ownload Settings from SatComm
ans:		-	
SatCor	nm Setup Self-Timed Se	etup Random Setup Comm Port Setup DC	P Setup Summary
	GOES Platform ID	9021661E	GOES Platform ID must be exactly 8 characters using 0-9 and/or A-F only
	Satellite System	GOES CS2	
	Antenna Type	Stevens +11dBic RHCP Crossed Yagi Antenn 💌	
	Cable Loss	Standard Stevens 30ft. Antenna RF Cable 🔹	1.5 dB Max
	New Password Confirm New Password	Enable Password Protection	Password must be exactly 8 characters
	VSWR Value		Get VSWR

Figure 6-37 Stevens SatComm Setup Tab

If a self-timed transmission is desired, users can enable and input settings into the Stevens SatComm software. Use the checkbox to activate the *Data Redundancy* function, which is used if it is desired to transmit data from the current to previous transmission.

Table 6-24 Stevens SatComm Setup							
Variable	Allowable Values	Description					
GOES Platform ID	Alphanumerical	Platform identification as provided by NESDIS.					
Satellite System	Dropdown	Select the appropriate satellite system as provided by NESDIS.					
Antenna Type	Dropdown	Choose one of the three defined antenna options (see Section 3.2 <i>Antenna</i> <i>Installation</i> ) as per individual EDAS station setup.					

Cable Loss	Dropdown	Maximum dB loss is autofilled. No user entry is required.
	Other Antenna RF Cable	Must be enter maximum dB loss of cable over the installed length.
Enable Password Protection	Checkbox	Allows users to enable or disable password protection for SatComm only.
* New Password	Alphanumerical	Password must be exactly 8 characters in length.
Confirm New Password	Alphanumerical	Confirm password entered. Must be exactly as entered in <i>New Password</i> .
VSWR Value	Voltage Standing Wave Ration	Displays VSWR value when intergrated.
Get VSWR	Button	Interrogates transmitter for its VSWR value. A value of 002:00 or less is typical. A value of 005.00 will inhibit transmissions.
Т		•

## 6.5.3.2 Communications: GOES: Self-Times Setup

The *Self-Timed Setup* tab allows users to configure GOES transmissions to occur at a specified time.

SatCommSet	A CONTRACT OF AN	1	
File Help	•	Upload Settings to Sa	tComm 🚸 Download Settings from SatComm
SatComm Setup Self-T	imed Setup Random Setup Con	mm Port Setup DCP S	Setup Summary
Z Enable Self-	Timed Transmission		
Baud Rate	1200bps	Header Nun	nber 50 🔹
Channel		▼ Header Opti	ion 🔽 Fault Codes ( 9 Bytes )
			Battery Voltage ( 8 Bytes )
Interval	01 • : 00 • : 00	-	Last GPS Update Time ( 9 Bytes )
Timeslot ( sec )	10	-	Lat Long ( 33 Bytes )
			Message Count ( 9 Bytes )
Transmit Offset	00 • : 11 • : 00	•	Last Logger Update Time ( 9 Bytes )
	( a second		VGTM String ( 5 Bytes )
Message Format	ASCII	-	Temperature Internal ( 9 Bytes )
Data Redundancy			
		DCP Dat	ta Bytes Available For Data Logger: 1447
		DCP Da	ta Bytes Used For Header Options: 31
			Total DCP Field Bytes: 1416

Figure 6-38 Stevens SatComm Self-Timed Setup Tab

Variable	Allowable Values	Description
Enable Self-Timed Transmission	Checkbox	Selecting allows users to enable sel timed transmissions.
Baud Rate	Dropdown	User-selectable baud rate. Baud rat selection is determined by the assigned GOES channel (i.e. Channel 99 is a 1200 baud channel
Channel	Dropdown	User-selectable transmission chann as defined by GOES assignment.
Interval	Dropdown: HH:MM:SS	User-selectable transmission interv as defined by GOES assignment.
Timeslot (sec)	Dropdown	User-selectable transmission windo length as defined by GOES assignment.
Transmit Offset	Dropdown: HH:MM:SS	User-selectable transmission interv offset as defined by GOES assignment.
Message Format	ASCII	User-selectable message format.
-	Pseudo-Binary	
Data Redundency	Checkbox	Set transmitter for transmissions of redundant data.
		Selecting this option reduces the amount of available data bytes for individual GOES transmissions.
Header Number	Dropdown 0-63	Not required.
Header Option	Checkboxes	Optional header data. Some listed items may be redundar as they can be defined in <i>Transmission Output</i> . Selecting any or all items in this lis reduces the number of data bytes available in the data buffer.
DCP Data Bytes Avaliable for Data Logger	Read Only	Displays maximum allowable data bytes per EDAS transmission, as determined by the baud rate and message window length ( <i>Timeslot</i> ( <i>sec</i> )).
CP Data Bytes Used for Header Option	Read Only	Displays number of bytes used if header options have been selected.
Γotal SCP Field Bytes*	Read Only	Displays number of data bytes available for data transmissions.

\*If Data Redundancy is selected this value will be reduced by half.

#### 6.5.3.3 Communications: GOES: Random Setup

If a random transmission is desired based on an event, users can enable and input settings into the Stevens SatComm software through the *Random Setup* tab.

File Help		0 Upload S	ettings to SatCom	m 🔶 Download Settings from SatComn
SatComm Setup Self-Tin	ned Setup Random Setu	P Comm Port	Setup DCP Setup	Summary
Enable Randor	m Transmission			
Baud Rate	300bps	•	Header Number	0 🔹
Channel		*	Header Option	Fault Codes ( 9 Bytes )
Interval	00 • : 00 •	: 00 👻		Battery Voltage ( 8 Bytes ) Last GPS Update Time ( 9 Bytes )
Repeat Attempt(s)	0	-		Lat Long ( 33 Bytes )
Start Sequence		м	ax of 20 chars	Message Count ( 9 Bytes ) Last Logger Update Time ( 9 Bytes )
End Sequence		м	ax of 20 chars	VGTM String ( 5 Bytes ) Temperature Internal ( 9 Bytes )
Msg Length ( sec )		-		
Timeout ( sec )	0	*	CARLON AND DO	es Available For Data Logger : 0
Message Format	ASCII	-		Total DCP Field Bytes : 0

Figure 6-39 Random Setup Tab

Variable	Allowable Values	Description
Enable Random Transmission	Checkbox	Allows users to enable random transmissions.
Baud Rate	Dropdown	Baud rate selection is determined by the assigned GOES channel (i.e. Channel 99 is a 1200 baud channel).
Channel	Dropdown	Transmission channel as defined by GOES assignment.
Interval	Dropdown: HH:MM:SS	Transmission interval as defined by GOES assignment.
Repeat Attempt(s)	Dropdown: 0-255	Number of transmissions to repeat.
Start Sequence	++R	Defaults to ++ R must not be changed.
End Sequence	++E	Defaults to ++E must not be changed.
Message Length (sec)	Dropdown	User-defined message window length for transmissions.
Timeout (sec)	Dropdown	User-defined amount of time transmission is attempted before

		forfeighting.
Message Format	ASCII	User-selectable message format.
	Pseudo-Binary	
Header Number	Dropdown: 0-63	Not required.
Header Option	Checkboxes	Optional header data.
		Some listed items may be redundant as they can be defined in <i>Transmission Output</i> .
		Selecting any or all items in this list reduces the amount of data bytes available in the data buffer.
DCP Data Bytes Avaliable for Data Logger	Read Only	Displays maximum allowable bytes per transmission, as determined by the baud rate and message window length ( <i>Message Length (sec)</i> ).
DCP Data Bytes Used for Header Option	Read Only	Displays number of data bytes used if header options have been selected.
Total SCP Field Bytes	Read Only	Displays number of data bytes available for data transmissions.

## 6.5.3.4 Communications: GOES Comm Port Setup

In order to successfully communicate with the EDAS datalogger, the *Comm Port Setup* Tab requires the *Enable External Logger Interface* checkbox to be selected. Figure 6-19 *Comm Port Setup* Tab shows the recommended setting configuration.

File Help			✤ Upload Settings to SatComm ✤ Download Settings from SatCom			from SatComr
	Self-Timed Setup	Random Setup		Port Setup DCP Setup Su		
🗹 Enable U	SB Virtual Com	m Port		Enable External	Logger interface	
Baud Rate	38400		•	Baud Rate	38400	•
Parity	None		Ŧ	Data Bits	8	•
Stop Bit	1		Ŧ	Parity	None	•
Enable E	xternal Touch S	creen		Stop Bits	1	•
Baud Rate	38400		Ŧ	Logger Flow Control	Continuous Listen	•
Parity	None		Ŧ	CTS Wakeup ( sec )	0	•
Stop Bit	1		Ŧ	Clock Sync	Disable	•
			Wa	rning		
			ice comm	port settings (baud rate, ernal logger connected to		
now controly	and require the us	er to reconingui	o the cat	ind logger connected to	this port to match the h	

Figure 6-40 Comm Port Setup Tab

Table 6-27. USB Virtual Comm Por	rt	
Variable	Allowable Values	Description
Enable USB Virtual Comm Port	Checkbox	Allows users to enable the USB Virtual Comm Port. Note: Not used for operation of EDAS system
Baud Rate	Dropdowm	Baud rate selection is determined by the assigned GOES channel (i.e. Channel 99 is a 1200 baud channel). Not required.
Parity	None	Not required.
Stop Bit	1	Not required.

Optional External Touchscreen available from Stevens Water. EDAS uses it with the keypad on CR850-XT datalogger (see Section 2.1.2.2 *Using the Keypad Display*).

Table 6-28. External Touch Screen		
Variable	Allowable Values	Description
Enable External Touch Screen	Checkbox	Allows users to enable the External Touch Screen. No changes required. Pre-configured for operation of EDAS system.
Baud Rate	38400	No changes required. Pre- configured for operation of EDAS system.
Parity	None	No changes required. Pre- configured for operation of EDAS system.
Stop Bit	1	No changes required. Pre- configured for operation of EDAS system.

**Note** Any changes to this section will result in errors in the operation of the EDAS.

Connection to CR850-XT datalogger is used for data transfer from the datalogger to the GOES for transmission.

Table 6-29 External Datalog	ger Interface	
Variable	Allowable Values	Description
Enable External Datalogger Interface	Checkbox	Allows users to enable the External Datalogger Interface. No changes required, pre-configured for EDAS operation.
Baud Rate	38.4	Baud rate selection is determined by the assigned GOES channel (i.e. Channel 99 is a 1200 baud channel).
Data Bits	8	Number of data bits.
Parity	None	Not required.
Stop Bits	1	Number of stop bits.
Datalogger Flow Control	Continuous Listen	Not required.
CTS Wakeup (sec)	0	Not required.
Clock Sync	Disbale	Syncs the EDAS datalogger clock to the Stevens SatComm transmitter for GOES transimissions.

Note

Any changes to this section will result in errors with the operation of the EDAS system.

## 6.5.3.5 Communications: GOES: DCP Setup

The *Echo datalogger data over DCP Command Port* should remain disabled in the *DCP Setup* Tab. This function has not been implemented in the latest SatComm firmware version.

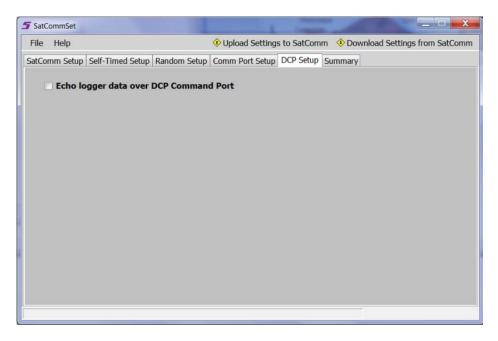


Figure 6-41 DCP Setup Tab

#### 6.5.3.6 Communications: GOES: Summary

Once the setup input parameters have been completed as outlined in the sections above, users can view status information including hardware, GPS status, channel, and Com Port information.

The setup has now been completed and users can save the configuration via the *Save to File* button (see Figure 6-21 *Summary Tab*) and exit the setup.

Users can then put the Stevens SatComm into online/operational mode by clicking the *Switch to Online Mode* button in the Stevens *SatComm Disconnected* Tab (see Figure 6-15 *Stevens SatComm Disconnected Tab*).

**Note** In order for Transmissions to be sent, the SatComm must be put into *Switch to Online Mode.* 

ile Help		🚸 Uploa	ad Settings to SatComm	Download Settings from SatCon
atComm Setup Self-Ti	med Setup	Random Setup Comm I	Port Setup DCP Setup Sun	nmary
Battery Voltage (v)	13.095		IOP Firmware Version	0.00.92 Release Date 07AUG13
Internal Temp	+25C		TEP Firmware Version	0.00.92 Release Date 07AUG13
Get Hardware Sta	tus	Cat CDC Chatra	1	- Y
		Get GPS Status	Get Channel Info	Get Comm Port Info
		Get GPS Status	Get Channel Info	Get Comm Port Info

Figure 6-42 Summary Tab

Table 6-30. Summary		
Variable	Allowable Values	Description
Battery Voltage	Read only	Outputs current battery voltage of system.
Internal Temp	Read only	Outputs current internal temperature of the GOES transmitter.
IOP Firmware Version	Read only	Shows currently installed IOP – firmware version and release date.
TEP Firmware Version	Read only	Shows currently installed TEP – firmware version and release date.
Get Hardware Status	Button	Checks for internal SatComm hardware status.
Get GPS Status	Button	Checks current GPS information (i.e. latitude and longitude).
Get Channel Info	Button	Returns values of current GOES channel information.
Get Comm Port Info	Button	Returns values of current Comm Port information.
Clear	Button	Clears values obtained from the <i>Get</i> buttons from the white textbox.
Save to File	Button	Saves GOES transmitter configuration to a PC as a *.scf file.

Users can return to EasyLync and continue data table setup by selecting sensor parameters to store including SHEF codes, data table to store on, and also include the type (sample, max, min, average) for configured sensors.

Users will also set the transmission window parameters in the *Transmission Details* (see Table 6-33 *Self-Timed Transmission: Transmission Details*).

**Note** It is not recomminded to leave the USB plugged into the Stevens SatComm as it may cause connectivity problems with the datalogger.

#### 6.5.3.7 Communications: GOES: Self-Timed Transmission

The *Time to Next GOES Transmission* is shown in seconds at the top right of the *Self-Timed Transmission* page.

**Note** The *Time to Next GOES Transmission* value is based on when *Self-Timed Transmission* is opened in EasyLync. To refresh this value, refresh the EasyLync software.

Settings	Help		1	i		í	1
*	0	iΞ		lù		•	
shboard	Measurements	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
<ul> <li>✓ Configuration Basic Configuration</li> <li>✓ GOES Self-Timed Transmission Random Transmission Alignment</li> </ul>		Transmission Window:	Self-Timed Transmis Details Table to Include —	Offset:	Time to ne	xxt GOES Transmissi Duration:	on (seconds): 0
		Data Table:	New Data Table				
		Include Fiel	d in Table			Order	Number of Value
		E Ser	nsor 1 Smp			0	
			nsor 1 Max			0	
		E Sei	nsor 2 Smp			0	0
		Select All	Clear				
		SHEF Code	use with selected m	easurements:	0	Add Shef Block	
		Added SHEF Blog	ks				
		SHEF Code	Data Table	Fields			

#### Figure 6-43 Self-Timed Transmission

Enables the self-timed GOES to extract vital information from the transmitter and set the SHEF Blocks for data transmission.

Table 6-31. Self-Timed Transmission: Configure GOES Self-Timed Transmission				
Variable	Allowable Values	Description		
Enable	Checkbox	Allows the EDAS datalogger to output to the buffer in the GOES transmitter for Self-Timed Transmissions.		
Time to Next GOES Transmission (seconds)	Read Only	Shows the Time to Next GOES Transmission.		

Read only view; exracts information from the GOES setup.

Table 6-30. Self-Timed Transmissions: Transmission Details			
Variable	Description		
Window	Shows the transmission Window Set in the GOES transmitter.		
Offset	Shows the Offset set in the GOES transmitter.		
Duration	Length of transmission in seconds.		

*Fields in Data Table to include* allows users to select individual data and extract data from all currently configured data tables. This dicates the order the data appears in the transmission string and allows users to select the number of records to include.

Number of Value		Order	in Table	a alcorda (Ei al di i
0				nciude Field I
	-	0	or 1 Smp	Senso
0	•	0	or 1 Max	Senso
0	*	0	or 2 Smp	Senso
				_

#### Figure 6-44 Fields in Data Table to Include

Table 6-32. Fields in Data Table to Include			
Variable	Allowable Values	Description	
Data Table	Dropdown	Select a user-configured Data Table (see Section 6.4 <i>Storage</i> ) to access the measumrent values for configuring SHEF Blocks.	
Include	Checkbox	Enables the Data Table to include in the SHEF Block and send via GOES.	
Field in Table	Read Only	Shows the selected data table name.	
Order	Numerical	Allows users to select the order the data appears in the GOES transmission.	
Number of Values	Numerical	Allows users to select the number of most recent records to include in the transmission.	

SHEF Code	
SHEF code to use with selected measurements:	Add Shef Block

Figure 6-45 SHEF Code

Assign ID to data value.

Table 6-33. SHEF Code							
Variable	Allowable Values	Description					
SHEF code to use with select measurements:	Alphanumeric	Allows users to define a SHEF code for values to be transmitted through GOES.					
Green Help Icon		Opens a document listing standard SHEF Codes and their definitions.					
Add Shef Code	Button	Pushes configured SHEF Block to the Added SHEF Blocks.					

SHEF Code	Data Table	Fields
	Remove	Clear

#### Figure 6-46 Self-Timed Transmission Added SHEF Blocks

Table 6-34. Self-Timed	able 6-34. Self-Timed Transmission Added SHEF Blocks							
Variable	Allowable Values	Description						
SHEF Code	Read Only	Shows the SHEF Code set for the added SHEF Block.						
Data Table	Read Only	Shows that the Data Table values are being pulled from for the added SHEF Block.						
Fields	Read Only	Shows the values that are included for the SHEF Block.						
Offline Test	Button	Shows an example of the GOES transmission.						
Remove	Button	Removes selected SHEF Block from added SHEF Blocks.						
Clear	Button	Clears values from viewing pane.						

#### 6.5.3.8 Communications: GOES: Random Transmission

*Random Transmission* functions similarly to the *Self-Timed Transmission*. Users can activate alarms to initiate a random transmission.

See Section 6.3.2 Sensors: Alarms Tab for how to setup alarms for specific sensors.

~	elp			12	-		
î	P	:=		lù		~	<u> </u>
Dashboard	Sensors	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
<ul> <li>Configurati Basic Config</li> <li>GOES</li> <li>Self-Timed 1</li> <li>Random Tra Alignment</li> </ul>	uration Fransmission	Heartbeat Tra	Random Transmissio ansmission Configura eartbeat Transmission g Random GOES Tra	tion Number of Da	ily Transmissions	1	
		Alarm Measure	ement Source		Sample Transn	nission	

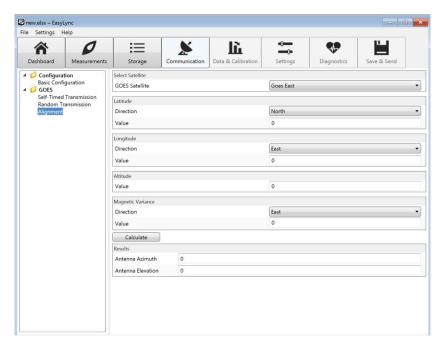
**Figure 6-47 Random Transmissions** 

*Alarm Source* is a read only value that shows the *Alarm Source* as defined by users in the *Sensors* Tab (see Section 6.3.2 *Sensors: Alarms Tab*).

The *Enable Heartbeat Transmission* checkbox allows EDAS datalogger to output the buffer in the GOES transmitter for heartbeat transmissions. *Number of Daily Transmissions* sets the number of heartbeat transmissions per day.

#### Communications: GOES: Alignment

EasyLync offers a GOES alignment utility, which gives users information on how to orient the GOES 5.5dB Directional antenna for a successful data transfer. This information is based on the location inputted into the software.



**Figure 6-48 Alignment** 

To select a *GOES Satelite*, use the dropdown to select either GOES West or GOES East satellite absed on the location of the EDAS.

The *Direction* dropdown under *Latitude* allows users to choose *North* or *South* for the site location. The *South* option not required for sites in Canada. The *Value* allows users to enter the *North* value for the site location.

The *Direction* dropdown under *Longitude* allows users to choose *East* or *West* for the site location. The *Value* allows users to enter the *East* value for the site location.

The Value under Altitude allows users to enter altitude of the site location.

Magnetic Varience refers to the difference between true north and magnetic north. The varience that is set is relative to your location in relation to your lat and long. Use <u>http://www.geomag.nrcan.gc.ca/calc/mdcal-en.php</u> to calculate the magnetic varience of the EDAS location.

Magnetic Variance		
Direction	East	•
Value	0	
Calculate		

Figure 6-49 Alignment: Magnetic Variance

Table 6-35. Alignment: Magnetic Varience							
Variable	Allowable Values	Description					
Direction	West	Allows users to choose West or East for Magnetic					
	East	Varience.					
Value	Numerical	Allows users to enter the Magnetic Varience for the site location.					
Calculate	Button	Allows users to calculate the Antenna Azimuth and Elevation based on the inputted values.					

Results	
Antenna Azimuth	0
Antenna Elevation	0

#### Figure 6-50 Alignment: Results

The *Antenna Azimuth* and *Elevation* shows the read-only the calculated Antenna Aximuth and Elevation values.

## 6.6 Data & Calibration

The *Data & Calibration* tabs are designed as a workflow: monitor, calibrate, collect, and visualize incoming data. The workflow tabs are:

- Storage Monitor
- Live Reading and Calibration
- Data Collection
- Graph

Note

Data and Calibration will not work in Offline – Terminal mode.

#### 6.6.1 Data & Calibration: Table Monitor Tab

From the *Table Monitor* tab, data collected from the datalogger is viewed. Data is pulled directly from the datalogger at a minimum of every 10 seconds (default).

A Dashboard	Sensors	:= Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send		
Table Mon									
Data Collec	tion	le Monitor: Real T	ime Monitoring						
Live Reading and	Calibration Da	ita Table:	Public						
Graph		eld	0.000			Value	Unit		
		Record Number				value	Unit		
		Time Stamp							
		Sensor_AutoCAL_T	accent(1)			-99.999			
		Sensor_AutoCAL_T				-99,999			
		Sensor_AutoCAL_T				-99,999			
		Sensor_AutoCAL_T				-99.999			
		Sensor_AutoCAL_Target(5)					-99,999		
		Sensor_AutoCAL_Target(5) Sensor_AutoCAL_Target(6)					-99,999		
		Sensor AutoCAL Target(7)							
		Sensor_AutoCAL_Target(8)					-99,999		
		Sensor AutoCAL Target(9)							
		Sensor_AutoCAL_Target(10)					-99,999		
		Sensor_AutoCAL_Target(11)				-99,999			
		Sensor_AutoCAL_Target(12)				-99,999			
		Sensor_AutoCAL_T				-99.999			
		Sensor_AutoCAL_T				-99,999			
		Sensor AutoCAL T				-99,999			
		Sensor_AutoCAL_T	arget(16)			-99,999			
	1	EDAS_Battery	Contraction of the second			0			
		Sensor_CAL_Mult1				1			
	4	Sensor_CAL_Offset	1			0			
		Sensor_Measure_N	ow1			0			
		Sensor_Next_Meas	urment_Time1			0			
		ALM_Alarm				0			
		EDAS_Temp				0			
		Sensor_CAL_Mult2				1			
		Sensor_CAL_Offset	2			0			
	3	Sensor_Measure_N	ow2			0			
	3	Sensor_Next_Meas	urment_Time2			0			
		WIFION				0			
		WIFICIFF				0			

Figure 6-51 Data & Calibration: Table Monitor

*Real Time Monitoring* allows users to view the latest measured or stored values from the EDAS datalogger.

Table 6-36 Table Monitor: Real Time Monitoring						
Variable Description						
Data Table	Dropdown used to select the data table to be displayed. Dropdown option are populated by data tables configured in <i>Settings</i> (see Section 6.7 <i>Settings</i> ).					
Refresh Interval (seconds)	Minimum value is 10 seconds. Values are set in 10 second intervals.					
Start Button	Begins data collection from the EDAS datalogger and updates values based on the refresh interval (seconds) defined.					
Stop Button	Defaults to being disabled. Once data refresh has started, users can use this button to stop the refresh of data.					

The *Table Monitor* also displays *Data as of*..., which displays the date and time of when the last data collection was taken.

#### 6.6.2 Data & Calibration: Data Collection Tab

From the *Data Collection* tab, users can select criteria to download a data file to a PC. Data is stored in a \*.dat file format. The information in the file is based on the user's configurable data tables (see Section 6.4 *Storage*). Criteria include:

- Records to be included
- Creating new data file
- Appending to existing data file
- Unique data file name
- Start and End Date and Time
- Downloading data
- Tables

e Settings	Help				· · · · · · · · · · · · · · · · · · ·		~	
â	0		:=	*	lù		•	
Dashboard	Measurem	ients	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
Table Mo	10000000000000000000000000000000000000	Collect M	ode:	Duty form 6	elected Date and Time			
Data Colle		Conect W	oue.	Data from S	elected Date and Time			
Live Reading an Grap		File Mode	÷	Append to I	End of File			
		Data from	Selected Date and	Time				
			e and Time	Time	04	/04/2016 12:00:00	AM	
End Date and Time			and Time	04/04/2016 12:00:00 AM				
		Workin	ements/Tables to ng Folder: tt Table	FileName				
			Fifteen Minute					
			Hourly					
			Daily					

Figure 6-52 Data & Calibration: Data Collection Tab

Variable	Allowable Values	Description		
		Allows users to choose how much data to collect from the EDAS.		
	Newest Number of Records	Retrieve the number of records specified in the Starting Record Number going back from the last record collected. Additional options appear when selected ( see Table XXX <i>Starting Record</i> <i>Information</i> ).		
Collect Mode	Specific Records	Retrieve a specified number of records beginning with the Starting Record Number as specified in th Starting Record Field. Additional options appear when selected (see Table XXX <i>Starting Record</i> <i>Information</i> ).		
	All Data	Retrieves all available data from selected tables in the EDAS datalogger.		
	Data from Selected Date and Time	Uses the user-selected start and end times and date to obtain the data from the EDAS to be stored between the selected times. If the EDAS does not have data for the specified time range, a blank file will be created. Additional options will appear whe selected (see Table XXXX <i>Data from Selected Data and Time</i> ).		
		<i>File Mode</i> is used to choose whether the collection data should be appended to an existing file, overwise an existing file, or create a new file. If <i>Create New File</i> is selected and the named file already exists, a new file will be created with the file name and a sequence number will be added to it.		
File Mode	Append to End of File	Adds the new data to the end of the existing data fi		
FIIE WIOUE	Overwrite Existing File	Replaces the current file with a newly created data file.		
	Create a New File	Renames the existing file with a .*bak extension ar stores new data with the specified file name. Subsequent *.bak files will be named *.bak1, *.bak etc. The most recent *.bak file will have the highes number.		

The *Data Collection* Tab allows users to collect stored data using various collection options set in *Sensors* (see Section 6.3.1 *Sensors: Details Tab*).

*Starting Record Information*, as it appears when *Newest Number of Records* is selected from *Collect Mode* (see Table 6-36 *Data Collecton*). *Number of Records* is a numerical value which dictates the number of records to be collected.

Starting Record Information	
Number of Records	0.000 🐨

#### Figure 6-53 Starting Record Information

*Date/Time Criteria* appears when *Data from a Selected Date and Time* is selected from *Collect Mode* (see Table 6-36 *Data Collecton*). This defines which records to be collected based on records' timestamp.

Data from Selected Date and Time		
Start Date and Time	03/31/2016 12:00:00 AM	*
End Date and Time	03/31/2016 12:00:00 AM	*

#### Figure 6-54 Data from a Selected Date and Time

*Starting Record Information* appears when *Specific Records* is selected from *Collect Mode* (see Table 6-36 *Data Collection*). This defines which records to be collected based on a record number.

Starting Record Information	
Starting Record Number	0.000 👻
Number of Records	0.000 👘

#### **Figure 6-55 Starting Record Information**

Table 6-38 Starting Record	Table 6-38 Starting Record Information			
Variable	Allowable Values	Description		
Starting Record Number	Numerical	Used to specify a range of records to collect. Data collection begins at this record number.		
Number of Records	Numerical	Used to specify a range of records or the number of records to go back from the last record stored in the datalogger. When a Starting Record Number is specified, the number of records begins at that number and gains at the number. The UI will collect this number of records from the EDAS.		

Users are able to cancel the download while data files are downloading to a PC. Data is retained in the EDAS datlogger after being copied to a PC.

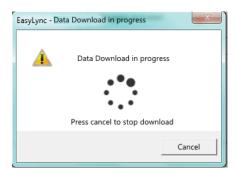


Figure 6-56 Data Collection in progress window

## 6.6.3 Data & Calibration: Live Reading and Calibration Tab

From the *Live Reading and Calibration* tab, users can view live data and adjust offsets for calibration. Features include:

- Viewing live data
- *Measure Now* button
- *Export as CSV* button
- Set Calibration button
- Timestamp of next data acquisition

**Note** Users are able to set a desired calibration value as opposed to setting a new offset. This removes the need for users to do offset calculations.

	0		i		lù			
Dashboard	Measuremen	nts	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Ser
Table M	onitor		12000					~
Data Coll	ection	- Live Rea	ding		2			
ve Reading an	d Calibration	Measu	rement: B	attery Voltage	+			
Grap	bh							
		Date a	ind time value	e Offset for Calibratic	'n			
		Меа	sure Now					Export as CSV
								Export as CSV
		Calibrati	on					Export as CSV
		- Calibrati	on					Export as CSV
		- Calibrati Calibrat Last Liv	on tion Settings re Reading		-			Export as CSV
		Calibrati Calibrat Last Liv Offset	on		0.000	99.000		Export as CSV

Figure 6-57 Data & Calibration: Live Reading and Calibration

The *Live Reading and Calibration* Tab displays current readings of the measurement in order to calibrate the offset of the sensor. Selecting the *Measure Now* button displays the 10 most recent measurements, triggered by users.

Reading			
leasurement:	Battery Voltage	•	
ate and Time \	Value Offset for Calibration		
Measure Now			Export as CS

Figure 6-58 Live Reading

Table 6-39 Living Reading	able 6-39 Living Reading		
Variable	Allowable Values	Description	
Measurement	Dropdown	Allows users to select a specific measurement in order to gain a live reading of the sensor. Dropdown options are determined by the active sensors as set in <i>Measurements</i> (see Section 6.3.1 <i>Sensors: Details</i> Tab).	
Measure Now	Button	Initiates a live reading from the EDAS datalogger of the selected sensor.	
Export as CSV	Button	Allows users to export the live readings as displayed on the viewing pane. Maximum of 10 live readings.	

*Calibration Settings* allows users to define sensor offsets in order to gain accurate measurement data.

Calibration Settings		
Last Live Reading		
Offset for Calibration	0.000	
Desired Calibrated Measurement	-99,999.000	

**Figure 6-59 Calibration Settings** 

able 6-40 Calibration Settings		
Variable	Allowable Values	Description
Last Live Reading	Read Only	Displays the last live reading that was triggered by EasyLync.
Offset for Calibration	Numerical	Allows users to set a new calibration offset for the selected sensor from the <i>Measurement</i> dropdown.
Desired Calibration Measurement	Numerical	Allows users to input the desired output reading for the selected sensor. This setting has priority over the offset for calibration. If both values are entered, only this value will be configured.
Set Calibration	Button	Initiates the calibration of the selected sensor.

#### 6.6.4 Data & Calibration: Graph Tab

The *Graph* tab enables users to create a visual representation of downloaded data from a PC to track trends (see Section 6.6.2 *Data & Calibration: Data Collection Tab*). Features include:

- Download Image button
- Display individual or multiple sensor data
- Setting start and end times

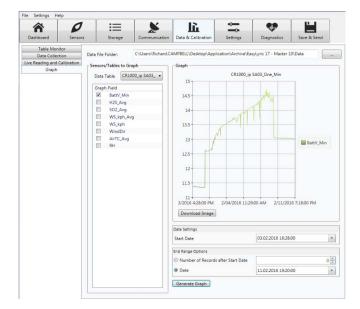


Figure 6-60 Data & Calibration: Graph

Table 6-41 Measurements/1	Sable 6-41 Measurements/Tables to Graph		
Variable	Allowable Values	Description	
Data Table	Dropdown	Dropdown values are pre-configured data tables (see Section 6.4 <i>Storage</i> ). Once selected, the data table will be added to the <i>Graph</i> and <i>Field</i> viewing pane under <i>Field</i> .	
Graph	Checkbox	Selects a sensor for graphing.	
Field	Read Only	Data tables selected from the <i>Data Table</i> dropdown.	

*Data Settings* defines a starting date and time to graph the selected data table. Users can input a date and time in a DD/MM/YYYY HH:MM:SS format.

Date Settings		
Start Date	03/31/2016 12:00:00 AM	

#### Figure 6-61 Date Settings

End Range Options defines a number of records or an end date for the graph.

End Range Options		
Number of Records after Start Date		0
Date	03/31/2016 12:00:00 AM	*



Table 6-42 End Range Optio	Table 6-42 End Range Options			
Variable	Allowable Values	Description		
Number of Records after	Radio Button	Enables the <i>Number of Records After Start Date</i> feature.		
Start Date	Numerical	Defines the number of records graphed after and including the start date.		
	Radio Button	Enables the <i>Date</i> feature.		
Date	MM/DD/YYYY HH:MM:SS	Defines the end date and time graphed, after and including, the start date.		
Generate Graph	Button	Creates a graph to visually represent data values from the selected data table. Can also be used to refresh the graph.		

## 6.7 Settings

*Settings* is used to input general EDAS information such as station name and clock offset adjustment. Users can also edit the system cutoff voltages separately for both the EDAS station and the GOES transmitter through the *SW1* and *SW2* tabs.

Additionally, users can set security parameters for the EDAS datalogger using a security code.

#### 6.7.1 Settings: Station Settings Tab

The *EDAS Security Code* section allows users to set a security code for the EDAS datalogger by using the *Enable Security Code* button. This 4-digit code must be used anytime users sends information to the datalogger when security is enabled.

The *Station Name* is what the EDAS system is called. This name is populated into the *Dashboard* (see Section 6.2.2 *Dashboard:Connected to EasyLync*).

Dashboard	Measurements	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
ation Settings SW1 SW2	EDAS Security Cod	le	ith a security code		gr		
	Station Informati     Station Name	on				utoffs and Settin tage Cutoff Low	
	Station Clock						0.000
	PC Clock: 4/4/2016 9:46:53 AM Sync				GOES Voltage Cutoff Low 0.000		
	Offset to UTC Time:	0 🗘 hours	0 🖨 minutes	Set		Itage Cutoff High	0.000
	Station Clock:	01/01/0001 12:	00:00 AM	Set	Custom	iror value	0

#### Figure 6-63 Settings: Station Settings

Users have the ability to offset the station time from the PC, by either hours or minutes in order to keep the station on standard time or set a UTC offset. Users can enter the desired date or time and click the *Set* button (see Figure 6-26 *Settings: Station Settings Tab*) to set the time manually.

Station Clock		
PC Clock:	4/4/2016 9:51:28 AM	Sync
Offset to UTC Time:	0 lours 0 long minutes	Set
Station Clock:	01/01/0001 12:00:00 AM	Set

#### Figure 6-64 Station Settings: Station Clock

Table 6-43 Station Clock		
Variable	Allowable Values	Description
PC Clock	Read only	Displays the local date and time of the EDAS datalogger in a MM/DD/YYYY HH:MM:SS format.
Sync	Button	Synchronizes to PC time based on <i>PC Clock</i> value.
Offset to UTC Time	Numerical	Sets an offset value from PC time.
Set	Button	Sets to offset based on <i>Offset to UTC times</i> values.
Station Clock	MM/DD/YYYY HH:MM:SS	Allows users to set the date and time of the station manually.
Set	Button	Sets the manually inputted Station Clock value.

*System Cutoffs and Settings* determine voltage cutoff values in order to prevent damage to EDAS and GOES.

System Cutoffs and Settin	ıgs
EDAS Voltage Cutoff Low	0.000
EDAS Voltage Cutoff	0.000
GOES Voltage Cutoff Low	0.000
GOES Voltage Cutoff High	0.000
Custom Error Value	0

Figure 6-65: Station Settings: System Cutoffs and Settings

Table 6-44 System Cutoffs a	nd Settings	
Variable	Allowable Values	Description
EDASVoltCutoffLow	Numerical	Turns off EDAS when a voltage measurement is below this value.
EDASVoltCutoffResume	Numerical	Resumes function of EDAS when a measurement is above this voltage value.
GOESVoltCutoffLow	Numerical	Turns off GOES when a voltage measurement is below this value.
GOESVoltCutoffResume	Button	Resumes function of GOES when a measurement is above this voltage value.
Custom Error Value	Numerical	Indicates an inaccurate value displayed for a measurement reading.

## 6.7.2 Settings: SW1 and SW2 Tabs

The EDAS includes two independently controlled switched power terminals: *SW1* and *SW2*. Users can program the EDAS to switch on or off power to a sensor or device based on a time interval. The *Power Interval* settings set here are selectable from *Sensors* (see Section 6.3.1 *Sensors: Details Tab*).

	0	i	×	lù	-0		
Dashboard	Measurements	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
tation Settings	A Power Interval		<u></u>			^	
SW1	Enabled						
SW2	Offset			0			
	Interval			0			
	Duration			0			
	Unit			Minut	es		

Figure 6-66 Settings: SW1 Tab

Table 6-45 SW1 Tab	)	
Variable	Allowable Values	Description
Enable	Checkbox	Enables the switched power port control options. If not selected, the SW12 is defaulted to <i>Off</i> .
Offset	Numerical	An offset into the interval at which the SW12 will turn on.
Interval	Numerical	The interval is how often the the SW12 turns on/ It is evaluated (or duty cycle) in minutes based on the dataloggers real-time clock.
Duration	Numerical	Length of time after the offset becomes true that the power port will remain active before the next interval begins.
Units	Dropdowm	Selects units of time, either <i>Minutes</i> or <i>Hours</i> for <i>Offset</i> , <i>Duration</i> and <i>Interval</i> .

Both the *SW1* and *SW2* tabs operate in the exact same way, but control two different SW12 Ports on the EDAS datalogger.

## 6.8 Diagnostics

*Diagnostics* is primarily used for troubleshooting. It also displays a talk-through to SDI-12 sensors.

#### 6.8.1 Diagnostics: Status Table Tab

The *Status Table* Tab displays values useful for troubleshooting including:

- Datalogger serial number
- OS version of EasyLync
- Length of time datalogger program has been running
- Lithium battery voltage
- Number of times system voltage has dropped below 9.6V

A Dashboard	Sensors	Storage	Communication	Lin Data & Calibration	Settings	Diagnostics	Save & Send
Status Table	Column	storage		Value	-	Junghostics	Save di Sena
Terminal Emulator	Record Number						
	Time Stamp						
	OSVersion			CR80	0.Std.27.05		
	SerialNumber			3772	4		
	StationName			Clark	eTest		
	StartTime			2016	-04-06 10:28:17.36		
	WatchdogErrors			0			
	LithiumBattery			3.473	322		
	Low12VCount			0			
	Low5VCount			0			

Figure 6-67 Diagnostics: Status Table

Table 6-46 Status Table	
Read Only Value	Description
Record	Increments for successive status table data records.
Timestamp	Scan time that the record was generated.
OS Version	EasyLync OS firmware version currently running.
SerialNumber	Serial Number of EDAS.
Station Name	Station Name set in <i>Settings</i> (see Section 6.7 <i>Settings</i> ).
Start Time	
Time Watchdog Errors	Number of Watchdog errors that have occurred while running the program.
Lithium Battery	Current voltage of the lithium battery.
Low12VCount	Number of times the system voltage dropped below 9.6 between resets.
Low5VCount	Number of times the 5V supply dropped below a functional threshold.

## 6.8.2 Diagnostics: Terminal Emulator Tab

The *Terminal Emulator* is the primarily a talk-through to SDI-12 sensors for diagnostics.

Note

*Terminal Emulator* only works in *Offline – Terminal mode*.

	0	iΞ		lù		•	
Dashboard	Measurements	Storage	Communication	Data & Calibration	Settings	Diagnostics	Save & Send
Status Table	Terminal Window						
erminal Emulate	COM Port				• C	onnect	
	Command				E	xecute Command	
	Terminal Results						

Figure 6-68 Diagnostics: Terminal Emulator

Table 6-47 Terminal	Table 6-47 Terminal Emulator					
Variable	Allowable Values	Description				
Com Port	Dropdown	Allows users to select Com Port available from the PC. Operates the same way as the <i>Serial</i> (see Table 6-4 <i>Serial/Direct Connection</i> <i>Configuration</i> ).				
Connect	Button	Establishes a connection.				
Command	Alphanumeric	SDI-12 command (i.e. ?! for address query).				
Terminal Results	Read Only	Output value.				

## 6.9 Save & Send

*Save & Send* enables users to save a settings file to the *Working Folder* (see Section 6.7 *Settings*) and simultaneously send this configuration data to an EDAS datalogger.

*Save & Send* includes an error log to indicate any reasons for failed transmissions (see Figure 6-33 *Save & Send: Displayed Error*). Progress indicators show the status of sending any configuration files to the EDAS datalogger. Should an error occur during upload, previous configuration and data will be retained.

Note

Any changes to the datalogger configuration or sensors alert EasyLync resulting in the toolbar options causing the yellow warning icon to appear. This indicates the data inputted into EasyLync must be saved and sent.

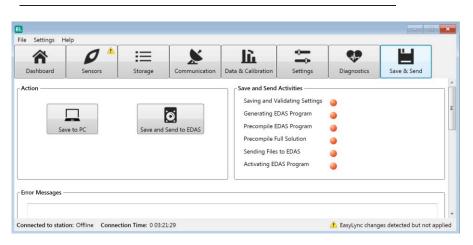


Figure 6-69 Save & Send

TABLE 6-56. Act	ion	
Variable	Allowable Values	Description
Save to PC	Button	Saves a settings file on the PC. This can be obtained through EasyLync using the <i>File</i> dropdown and selecting <i>Open</i> . The file is saved as a *.elsx extension.
Save and Send to EDAS	Button	Saves a setting file on the PC and sends an update the EDAS datalogger based on EasyLync configuration.

The EDAS provides a warning if any chages to the datalogger will result in a loss of data (see Figure 6-73 *Save & Send: Confirm Send Pop-up*).

EasyLync - Confirm Send			
1	Warning! Data for this station will be lost! All data files on the station will be deleted. Are you sure you wish to proceed?		
	Yes No		

Figure 6-70 Save & Send: Confirm Send Pop-up

In the *Save and Send Activities* area, there are green and red progress indicators, which indicates the status of the EDAS datalogger program creation or update. Red indicates there was an error. Information on any errors that have occured are displayed in the *Error Messages* area. Green indicates the update has been sent successfully.

TABLE 6-57. Save and Send Activities					
Variable	Values	Description			
Save Settings	Red or Green Status	Indicates the file has been saved to the PC.			
Building Dataogger Program	Red or Green Status	Indicates the settings file has been successfully created.			
Sending Files	Red or Green Status	Indicates file transfer to the EDAS has been completed.			
Program Activated	Red or Green Status	Indicates the settings file is now running on the EDAS.			

## 7. Maintenance

General equipment maintenance and site housekeeping is required for all EDAS stations to ensure continuous reliable data collection. Each station and sensor should be cleaned of extraneous debris as defined by the end user's maintenance program.

Table 7-1 Equipment Maintenance Schedule				
Equipment	Recommended Maintenance Interval (years)	Maintenance Services Required		
CR850-XT Datalogger	2 - 3	Calibration.		
Lithium Battery (L13519)	5	Always replace lithium battery and internal desiccant (L6554) at the same time (see Figure 7-1 <i>Lithium battery replacement</i> ).		
4-Unit Desicant Pack (L4905)	0.5	Check status on humidity indicator card and replace enclosure desiccant as required.		

**Note** Maintenance work must be performed by trained specialists in dry weather, as the equipment can be damaged due to the presence of moisture inside the unit.

## 7.1 Internal Lithium Battery

The internal lithium battery on the CR850-XT has a lifespan of 5-8 years when connected to a power supply, and should be replaced if its value drops below 3.00V, as displayed from EasyLync (see Section 6.8.1 *Diagnostics: Status Table Tab*). The disassembly procedure for replacing the internal lithium battery for the CR850-XT is outlined in Figure 7-1 *Lithium Battery Replacement*.

When the lithium battery is removed, the EasyLync settings are maintained. Items not retained include:

- Run-now and run-on power-up settings
- Routing and communications logs (relearned without user intervention)
- Time. Clock will need resetting when the battery is replaced
- Final storage data tables (see Section 6.4 *Storage*)

A replacement lithium battery (L13519) can be purchased from Campbell Scientific Canada or another supplier. The desiccant pack inside the datalogger should be replaced at the same time as the battery.

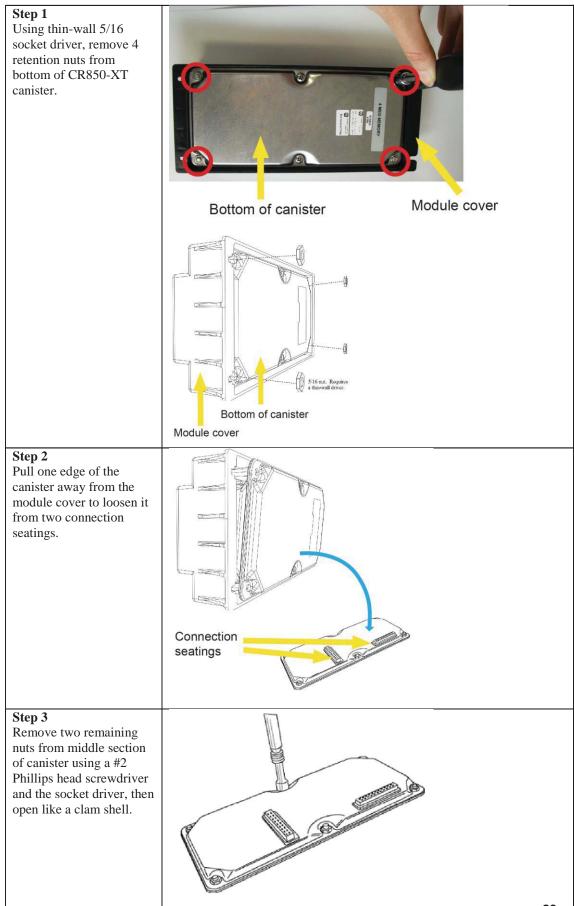
#### 7.1.1 Field Battery Replacement and Maintenance

The CR850-XT (EDAS) datalogger can be easily disassembled to replace the lithium cell and desiccant pack. Anti-static protection is required when opening the datalogger canister.

Tools required to replace battery and desiccant pack:

- Replacement lithium battery (L13519)
- 2 replacement internal desiccant packs (L6554)
- 5/16 tin-walled socket driver
- #2 Phillips head screwdriver
- Small flathead screwdriver
- Tape
- Needle nose pliers (optional to hold nuts while unscrewing)

Follow Steps 1 through 6 as seen in Figure 7-1 *Lithium battery replacement* to replace the lithium battery.



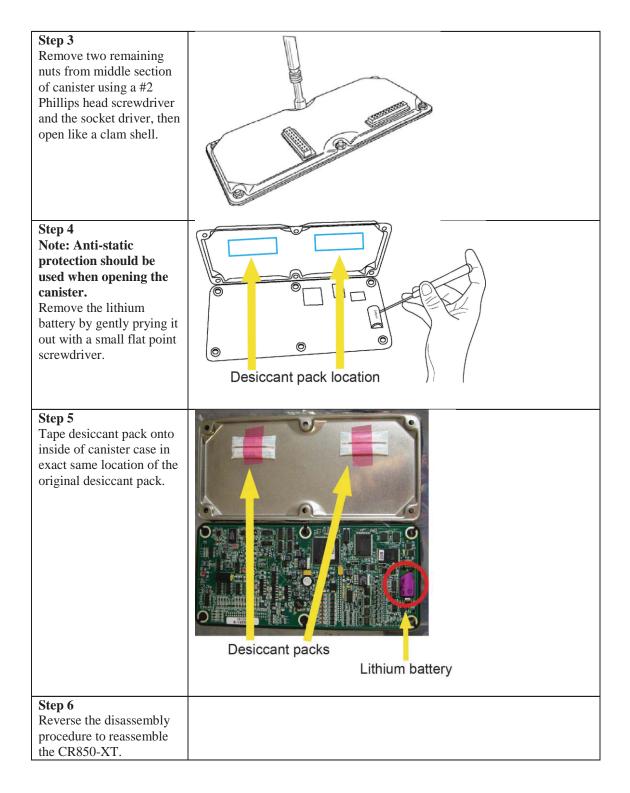
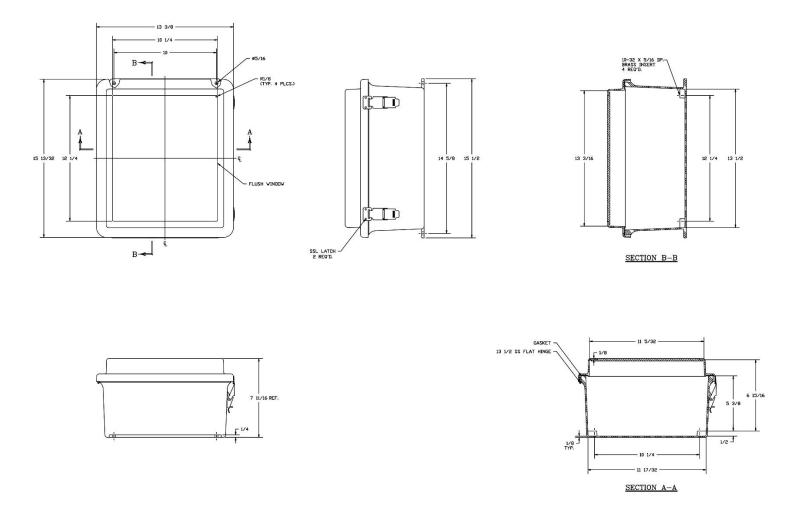


Figure 7-1 Lithium battery replacement

# Appendix A. Full Enclosure Schematic

## A.1 Full Enclosure



**Figure A-1 Full Enclosure Schematic** 



