

SKYSTREAM 3.7[®]

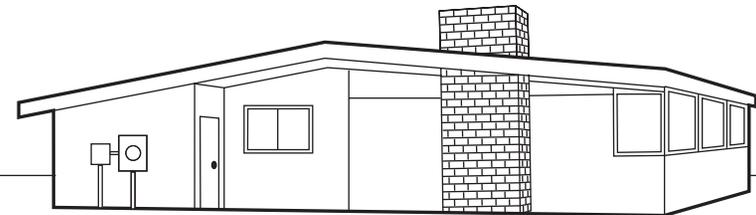
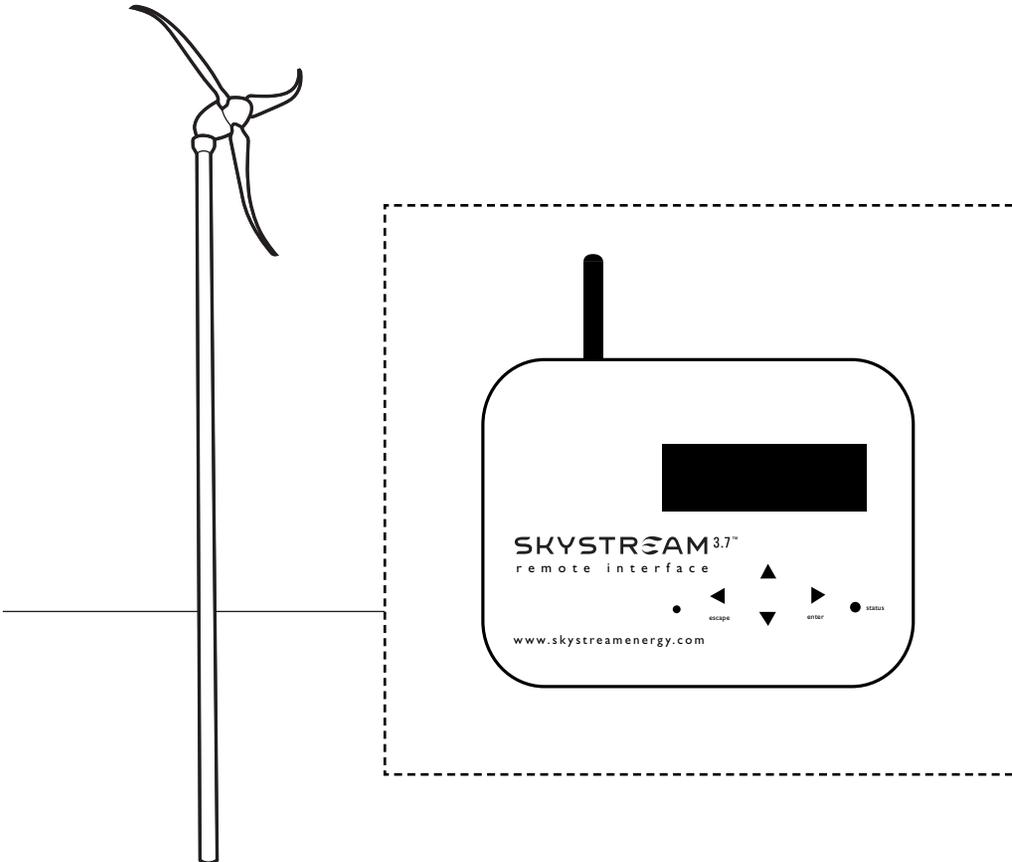
INTERFACE & SOFTWARE GUIDE

Wireless Remote Display

USB Converter

Battery Sensor Setup

DataLogger Software

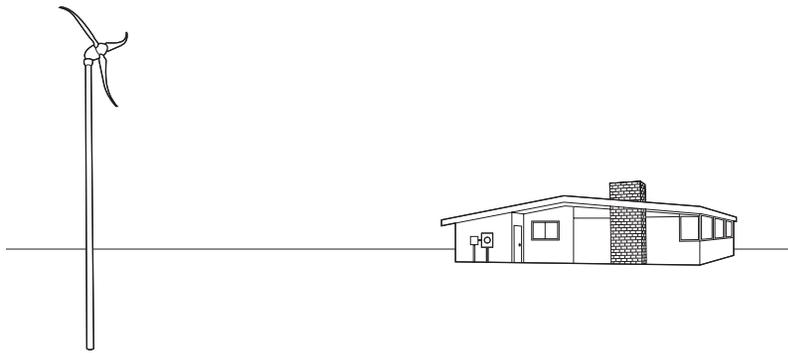


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MADE IN THE **USA**

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Skystream 3.7 Interface and Software Guide
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ONE - USING THE WIRELESS REMOTE DISPLAY

1-1 INTRODUCTION

The Wireless Remote Display provides two-way wireless communication with the Skystream 3.7®. It can receive and display information from the wind turbine and can also upload commands and new operational settings. As such it is a valuable diagnostic tool enabling monitoring and trouble shooting of Skystream without the need to remove the turbine or to run additional communication wires.

1-2 CONTROLS

Operation of the display is easy and intuitive. The LCD display presents text and numerical information, an LED indicates operational status, and four push buttons provide input control with these functions:

Scroll Up ▲

Scroll Down ▼

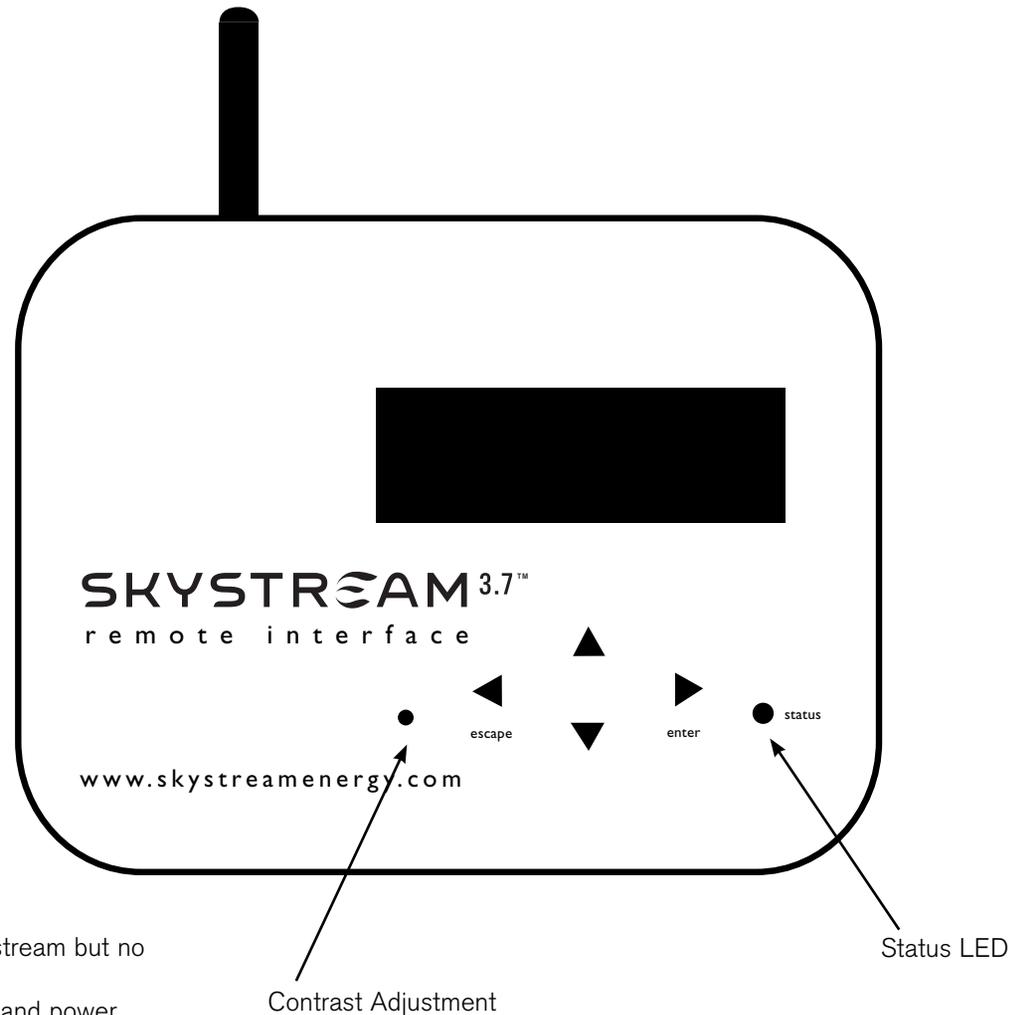
Enter ►

Escape ◀

The contrast of the LCD display may be adjusted via the potentiometer indicated in the accompanying image. Turning the screw to the left increases the contrast to the right decreases the contrast.

The Status LED provides a quick visual indication of the communication status and Skystream power production.

- Clear (white) illumination indicates communication with Skystream but no power production.
- Green illumination indicates communication with Skystream and power production.
- Orange illumination indicates no communication with Skystream



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1-3 OPERATION

Upon powering the Wireless Remote Display the LCD will present the Main Menu as shown below. Up a minute may be required before live data is displayed.

Main Menu

```
Skystream : Turb A*
Waiting    863W
300 rpm    75° F
▲/▼ Select  Tools ▶
```

- “Turb A” indicates displayed information is from Turbine A. “*” indicates successful communication between Remote Display and Skystream. A series of vertical “●” may display in place of the “*”. A single dot indicates no communication between the remote display and Skystream. Three dots indicates stable communication.
- “Waiting” is a turbine status display. The most common prompts include “Normal”, “Waiting” and “Running”. A complete list of display prompts is provided at the end of Section 1-3.
- 863 W indicates Skystream is producing 863 Watts at that moment.
- 75° F indicates Skystream is measuring an ambient temperature of 75°F. Temperature may also be displayed in °C.
- ▲/▼ Select – use the Scroll Up ▲ and Down ▼ keys to select another turbine. Additional turbine serial numbers must be entered for the keys to be effective.
- Tools ▶ - selecting the Enter ▶ key causes a “tools” menu to be displayed as shown below.

Tools Menu

```
Skystream Tools *
  ▶ Set up
    Serial Nums . .
    Control
```

From the **TOOLS MENU** use the Scroll Up ▲ and Scroll Down ▼ keys to move the arrow → to the desired selection and then press the Enter ▶ key to make the selection. The following sections describe each possible selection.

Note: the periods “..” at the end of “Serial Number” and other prompts indicate those selects may take a few moments to display after Enter ▶ button is depressed.

SETUP:

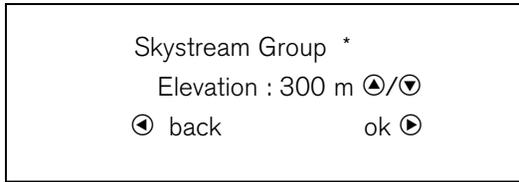
Selecting “Setup” causes the following Setup Menu to be displayed.

Setup Menu

```
Skystream Tools *
  ▶ Channel: 4
    Units: Imperial
    Elev: 2499 ft..
```

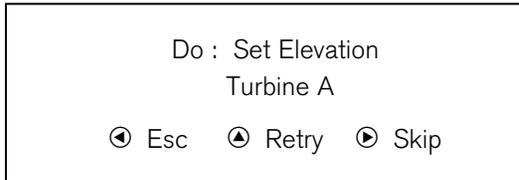
The following sections describe each available selection from the Setup Menu. Use the Scroll Up ▲ and Scroll Down ▼ keys to move the arrow “→” to the desired selection and then press the Enter ▶

- **Channel:**
With the “→” pointing to “Channel” use the Enter ▶ key to toggle through the available channels (1-5). Note when selecting the channel number you are selecting the channel for the turbine indicated by the MAIN MENU. In this case Turbine A.
- With a single turbine installation the choice of channel number is immaterial – the turbine will “find” the selected channel. If radio interference is suspected set the Remote Display to a different channel.
- **Units:**
With the “→” pointing to “Units” use the Enter ▶ key to toggle between “Imperial” (feet and °F) or “Metric” (m and °C). Use the ⏏ Escape key to confirm selection.
- **Elev:**
With the “→” pointing to “Elev” use the Enter ▶. This causes the Elevation Setup Menu to display as shown on top of page 6:



Use the ▲/▼ keys to increase the elevation. The elevation will change by 20 m or 100 ft. each time a key is depressed. When the correct elevation is displayed use the Enter ▶ key to enter the elevation or use the Escape ◀ key to return to the MAIN MENU without changing the elevation.

When new elevation setting is transmitted to Skystream an “Action Complete” message is displayed and the remote display returns to the MAIN MENU. If the elevation was not successfully transmitted to Skystream the menu shown below will be displayed:



Use the appropriate key to Escape, Retry or Skip setting the elevation and diagnose the cause of the communication error.

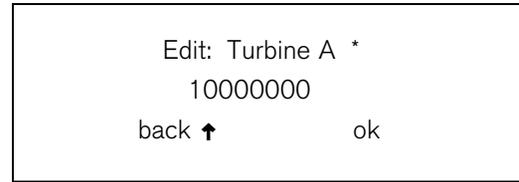
When setting the elevation, a momentary change in turbine speed may be observed. Attempt to set the elevation in the Remote Display within 500 ft of the actual installed elevation.

SERIAL NUM:

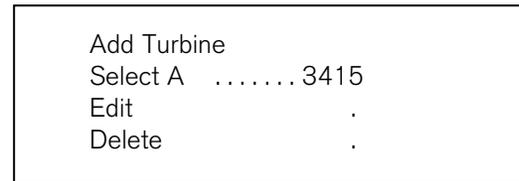
If no Turbine is entered into the display selecting “Serial Num...” causes the following prompt to display:

➔ Add Turbine *

Depressing the ▶ Enter key causes the following Serial Number change screen to be displayed:



Use the ▶ and ◀ keys to position the ↑ below a digit of the serial number and use the ▲ and ▼ keys to increment or decrement the value of the digit. When the serial number on the display matches the Skystream serial number select “ok” to enter the serial number. After selecting “ok” the following is displayed:



Select ◀ Escape to return to the MAIN MENU or use the ▲/▼ keys to Add another turbine or Edit or Delete turbines already entered into the Remote Display.

If more than one turbine is entered in the Remote Display the other turbine serial numbers may be selected by aligning the “➔” with “Select A” and using the ▶ Enter key.

CONTROL:

Control Selecting “Control” from the TOOLS MENU causes the following MENU to display:



Selecting “All stop” causes all turbines listed in the Remote Display to enter a braked mode and stop operation. Similarly, selecting “All start” causes all turbines listed in the Remote Display to resume operation.

Kilowatt Hours

It is possible to display accumulated power (Kilowatt- Hours) on the Remote Display. With communication established with a turbine, from the MAIN MENU simultaneously depress the  and  keys two times. Using a thumb on each key works well.

After depressing the keys once a series of numerical data is displayed, after the second time the keys are depressed the following screen is displayed:

Skystream: Turb A
Status: Waiting
xxx W x kWh
/ Select Tools 

In the above screen:

- After “Status” a Status Display Prompt is shown.
- “xxxW” indicates the instantaneous power being generated by Skystream.
- “x kWh” indicates the accumulated power produced by Skystream.

Status Display Prompts

The following section provides a brief summary of the Status prompts that may display on the Main Menu.

- Running – Turbine is operating and producing power
- Normal – Indicates normal operation – no fault conditions are detected.
- Waiting – Turbine is waiting for its internal timer to expire before it will restart – “Waiting” will be displayed for approximately 5 minutes after powering Skystream
- Disabled – Turbine is turned “OFF” (but still powered). For example setting “All Stop” from the control menu will cause “Disabled” to display.
- High Temp – Turbine senses a high temperature – but not so high as to cause shutdown.

- Temp Shutdown – Turbine is shutdown due to high temperature
- Restart err – Turbine encountered improper restart

Remote Display Recovery Procedure

The Remote Display incorporates a software recovery procedure that “reloads” the display operational software should a software “lockup” occur. To perform the recovery procedure perform the following steps:

- Disconnect Remote Display battery
- Unplug AC power supply
- Depress and hold down the  Escape button while reconnecting the AC power supply
- Release the  Escape button

The Remote Display will resume operation at the MAIN MENU.

1-4 WIRELESS REMOTE DISPLAY

1-4-1 Contrast Adjustment

Contrast of the Wireless Remote Display may be adjusted via the Contrast Adjustment (see CONTROLS, page 4). Turn the adjustment clockwise to decrease contrast and counter clockwise to increase contrast.

1-4-2 Battery and AC Power

The Wireless Remote Display may be powered using either the rechargeable battery pack or AC power supply. The fully charged battery pack will sustain operation of the Wireless Remote Display for approximately 6 – 24 hours of continuous operation.

Because there is no On/Off switch on the Wireless Remote Display use of the AC Power adapter is strongly recommended.

To install batteries remove the battery cover on the back of the Wireless Remote Display by “unsnapping” the cover. A small screwdriver may be used to gently pry the slotted side of the cover from the main housing. Refer to the photograph at right and connect the batteries as indicated.



1-5 USB CONVERTER

The USB converter (shown at left) enables the Wireless Remote Display to import Skystream performance data to a personal computer for system monitoring, data analysis and diagnostic trouble shooting.

The USB converter includes the USB converter module and a USB cable to connect the module to a computer USB port. The user must purchase a CAT-5 ETHERNET cable to connect USB module to the Wireless Remote Display.

TWO - Using Skystream DataLogger



TIP: User must install Skystream DataLogger software before collecting data via the USB Converter. See page 19.

2-1 TO USE DATALOGGER:

- Power Wireless Remote Display (battery or AC adapter)
- Connect USB converter module to Wireless Remote Display with Ethernet cable. Also connect module to PC with USB cable.
- Open Skystream DataLogger program.

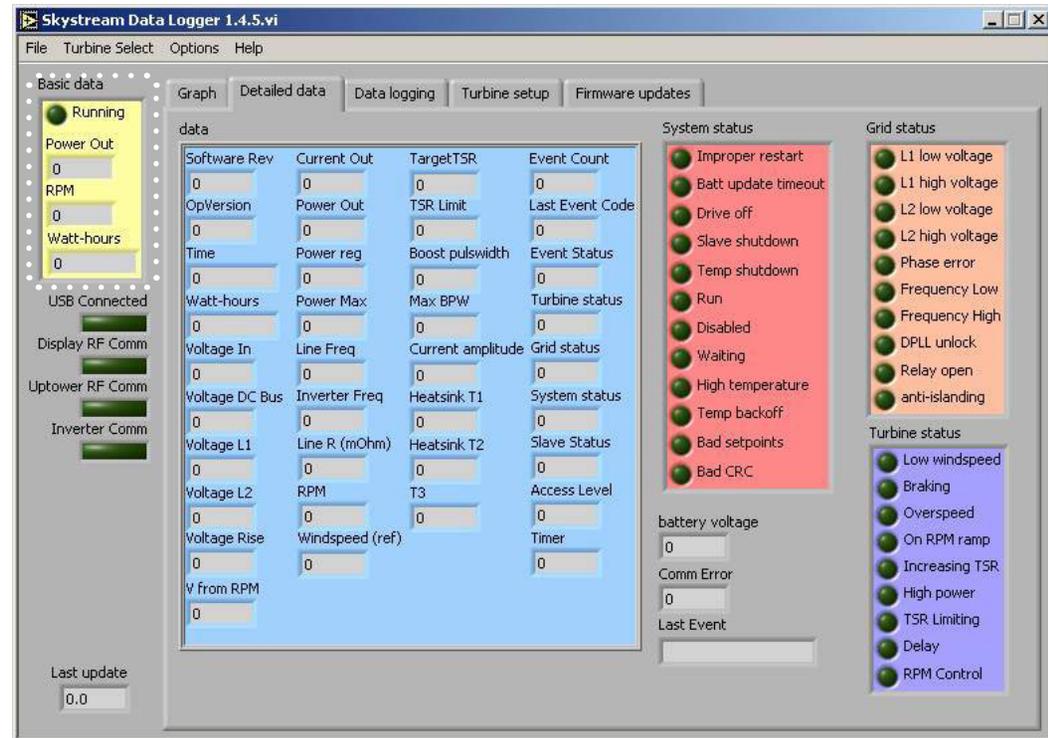
The main Datalogger display screen shown below should be displayed on PC.

Each indicator and selection available on the main display screen is described below.

2-2 BASIC DATA SCREEN

BASIC DATA – Located in the upper left corner of the display.

- Running – when illuminated indicates Skystream is operational
- Power Out – displays instantaneous Skystream power output in Watts
- RPM – displays instantaneous Skystream blade rotation speed in revolutions per minute
- Grid Voltage – displays the electric utility grid voltage as measured by Skystream
- Watt-hours – displays accumulated Watt-hours. For example if Skystream produces 800 watts for an hour display reads 800 Watt-hours.



LAST UPDATE – Text box located in lower left corner of display

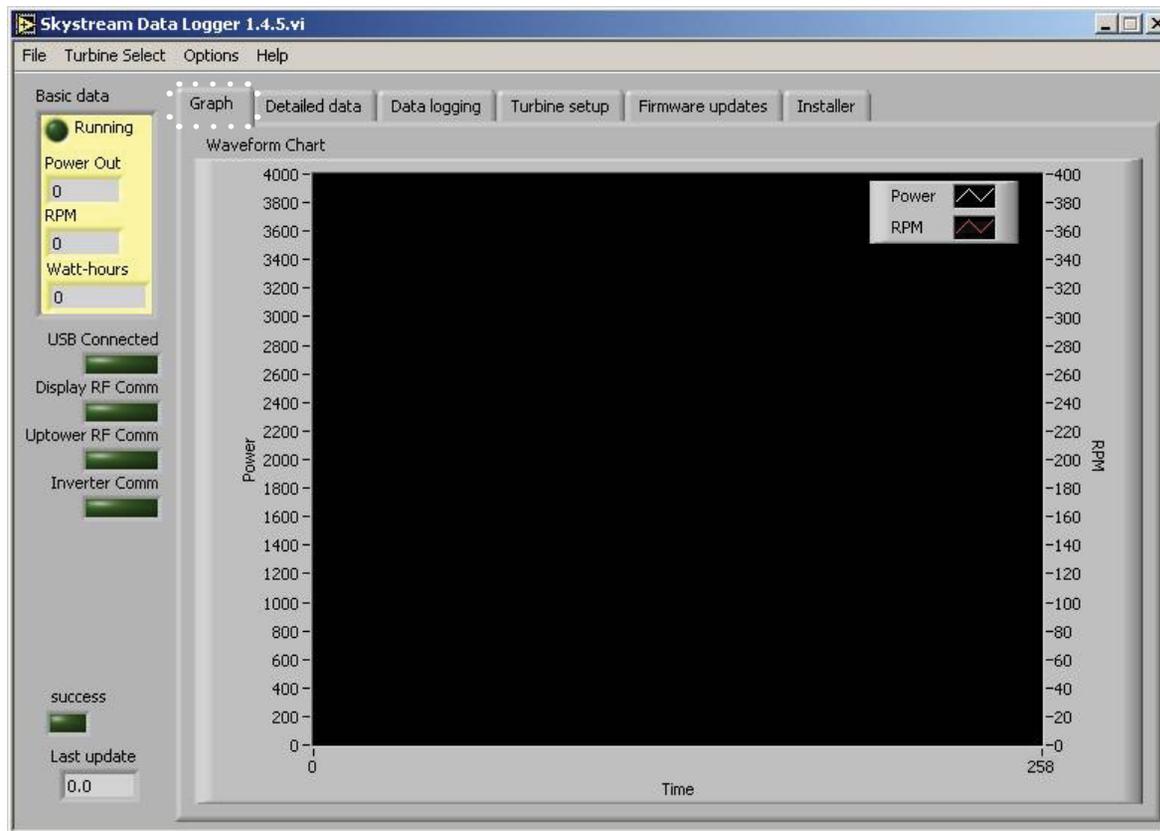
- Displays communication time in seconds between Remote Display and Skystream. Short communication time (0.2 – 0.3 seconds) indicates stable communications.

2-3 SELECTION TABS

There are six selectable tabs entitled Graph, Detailed Data, Data Logging, Turbine Setup, Firmware Updates, and Installer. Each tab is discussed separately in the following sections.

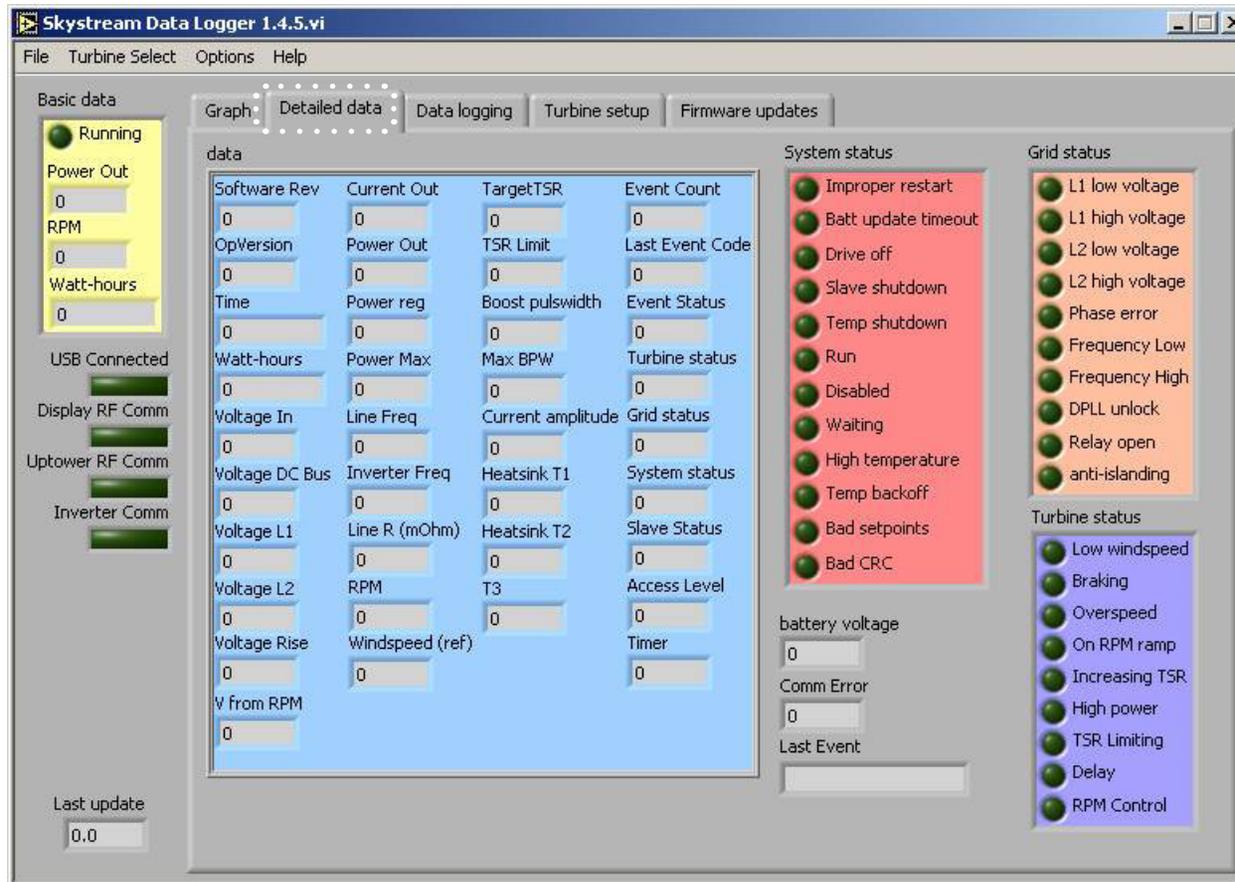
2-3-1 GRAPH

The screen below is displayed by selecting the Graph tab. It will display collected Power and RPM data as shown.



2-3-2 DETAILED DATA

The screen below is displayed by selecting the Detailed Data tab. Much of the information presented on the Detailed Data screen may be of little interest to the casual user. However, it may be helpful in diagnosing or trouble shooting therefore it is provided to assist with service and maintenance.



2-3-3 DATA LOGGING

The Data Logging screen shown on page 13 is presented as a result of selecting the Data Logging tab.

Logging Data

To start logging data:

- Set Wireless Remote Display to “Passive” mode. Mode selection is available from MAIN MENU > Device Settings > Wireless Settings > Mode.
- Select the Data Logging tab from the main display screen.
- Select or create a folder where the data files will be stored by clicking on the folder icon next to the text box titled “Folder for log files” As log files are created DataLogger will place the files in this folder. It may be most convenient to create folder on computer Desktop.
- Set the sample interval in seconds in the text box labeled “Write to file every _____second.” If “0” is entered in the text box data will be written to the file as soon as data is available from Skystream. This may be multiple times a second.
- Create the file name and format. The file name and format controls the size of the file and how often a new data file is placed in the Log File Folder created previously. See “Creating File Names, File Format” below.
- Select “Start auto logging” to start collecting data.

To end logging data:

- Depress oval shaped “Start auto logging” button on data logging screen a second time to stop data logging. Green “light” on switch will turn off.

Creating File Names, File Format

A new file is created and the old file moved to the file Folder specified on the Data Logging page. A new file is created on a time basis using special characters in the file name. The special characters and associated time intervals are listed below.

%Y = Year **%H** = hour **%m** = Month **%M** = minute **%d** = day

For example if the file string is specified as “Skystream%H” a new file is created every hour since the smallest time interval character is %H – an hour. The time interval is based on the PC clock running the DataLogger software. Also be aware that in the above case only 24 files will be created since the first file will be appended (data will be added to end of file) the next day at the same hour. For this reason it is recommended to use the complete YearMonthDay_Hour code in most cases.

File sizes are not limited. If a time interval of a year is selected and the sample rate is set to one second expect a very large file. Data is stored as comma separated data and is readily imported into spreadsheet programs such as Excel for analysis.

2-3-4 TURBINE SETUP

Use of the Turbine Setup Screen is described in detail in Section THREE - Setting up for Battery Charging.

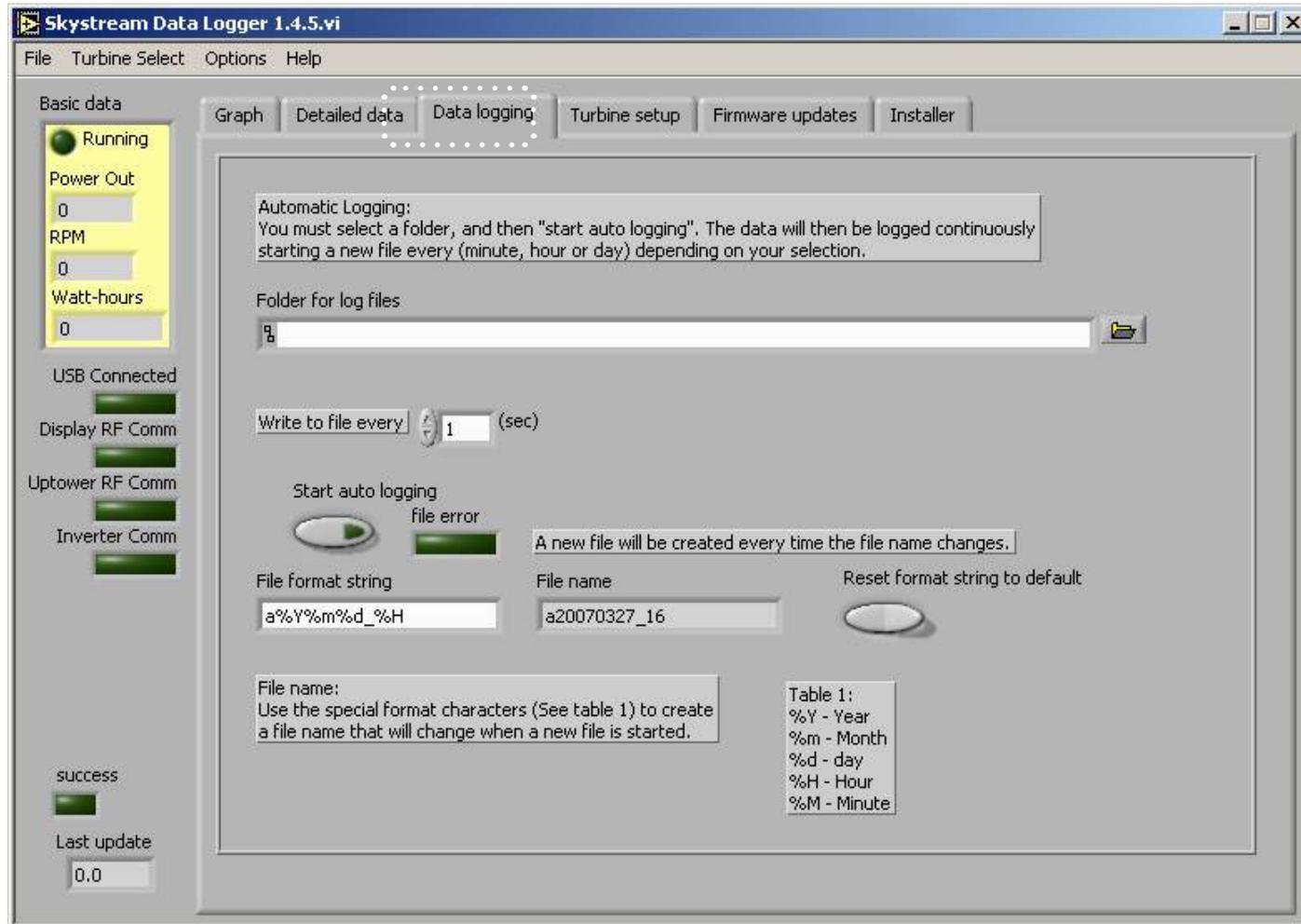
2-3-5 FIRMWARE UPDATES

The Firmware Update Screen may be utilized to update inverter, RF Communications, Battery Sensor or Remote Display software. If a software update is required specific instructions will be provided with the update.

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2-3-6 INSTALLER

Use of the Installer Screen is described in detail in Section THREE - Setting Up for Battery Charging.



Data Logging Screen

THREE - Setting Up for Battery Charging

3-1 INTRODUCTION

Skystream is easy to adapt for battery charging systems or battery-backed grid connected installations. To operate correctly, however, requires configuring each turbine in the system and the battery voltage sensor using the DataLogger Software. The Wireless Remote Display – if equipped must also be set up for battery charging. Setting up for battery charging consists of four basic steps:

- Entering turbine serial numbers into DataLogger Software
- Configuring Battery Voltage Sensor
- Configuring turbines for battery charging.
- Configuring Wireless Remote Display (if equipped)

3-2 BATTERY VOLTAGE SENSOR INSTALLATION

The Battery Voltage Sensor is shown at the right. Customer is required to supply two battery connection terminals and color coded wire.

Install sensor as follows:

- The battery voltage sensor connector will accept #20 to #14 AWG wire. Use largest gauge wire compatible with battery connection terminals. Follow good practice and color code wires – red for positive, black for negative is typical.
- Determine sensor mounting location, maximum recommended wire length is 150 ft and 30 ft for #14 and #20 AWG wire respectively.
- Strip approximately 1/4" of insulation from wires and insert in green connector supplied with Battery Voltage Sensor. Tighten screws to secure wires. Correct wire locations (battery + and -) are indicated on Battery Voltage Sensor cover. Refer to Fig. 9
- Strip insulation from other end of wires ends and install battery connection terminals following manufacturer's recommended procedure. Connect battery connection terminals to batteries.
- Insert green connector into Battery Voltage Sensor.

The sensor is now powered and ready for configuration with your system. Do not leave sensor connected to batteries without configuring sensor and Skystream for battery charging.



IMPORTANT: Battery Voltage Sensor and Skystream must be configured for battery charging or serious damage to batteries may result.

3-3 REQUIREMENTS

Setting up a battery charging system requires:

- PC or laptop with DataLogger Software installed. (version 1.4.5 or greater).
- USB converter, cat 5 ethernet cable, USB adapter cable, DO NOT CONNECT WIRELESS REMOTE DISPLAY TO PC.
- Installed Battery Voltage Sensor, sensor must be powered during configuration. See 3-2 Battery Voltage Sensor Installation.
- Skystream 3.7 installed according to recommended battery charging options shown in Section 2 of Skystream manual.

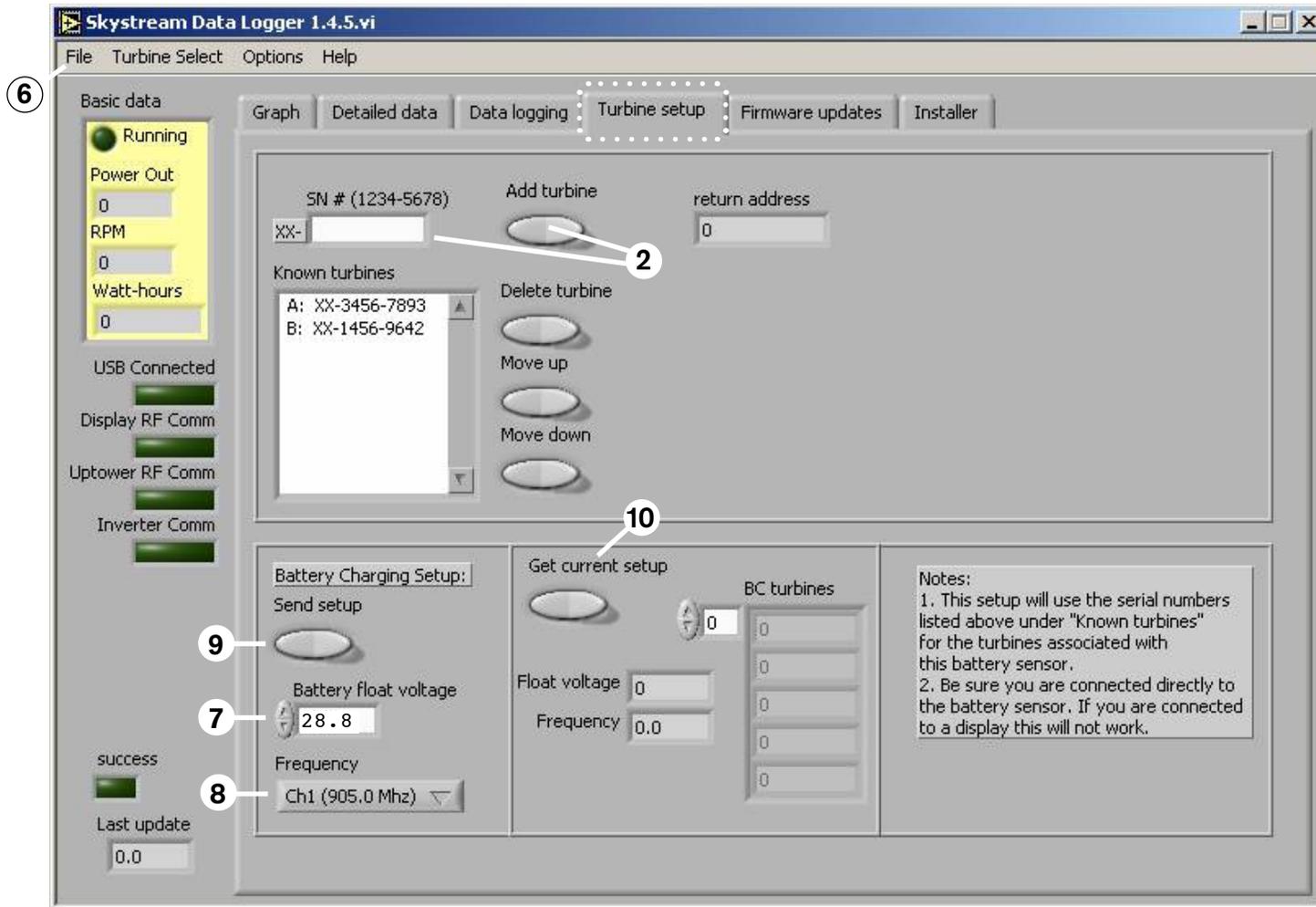
3-4 ENTERING SERIAL NUMBERS INTO DATALOGGER SOFTWARE

Perform following steps to enter turbine serial numbers into DataLogger Software. The "Turbine Setup" screen is shown on page 15. Buttons or areas of the screen referenced in the instruction are indicated with the instruction number.

1. Start DataLogger software and go to Turbine setup screen as shown on page 15.
2. Enter the turbine serial number in the "SN# (1234-5678)" text box and depress "Add turbine" button. This enters the serial number in DataLogger software. (leading digit defaults to 1)
3. If there is more than one Skystream in the system enter the serial number of each turbine. Verify serial numbers are entered correctly.



Battery Voltage Sensor



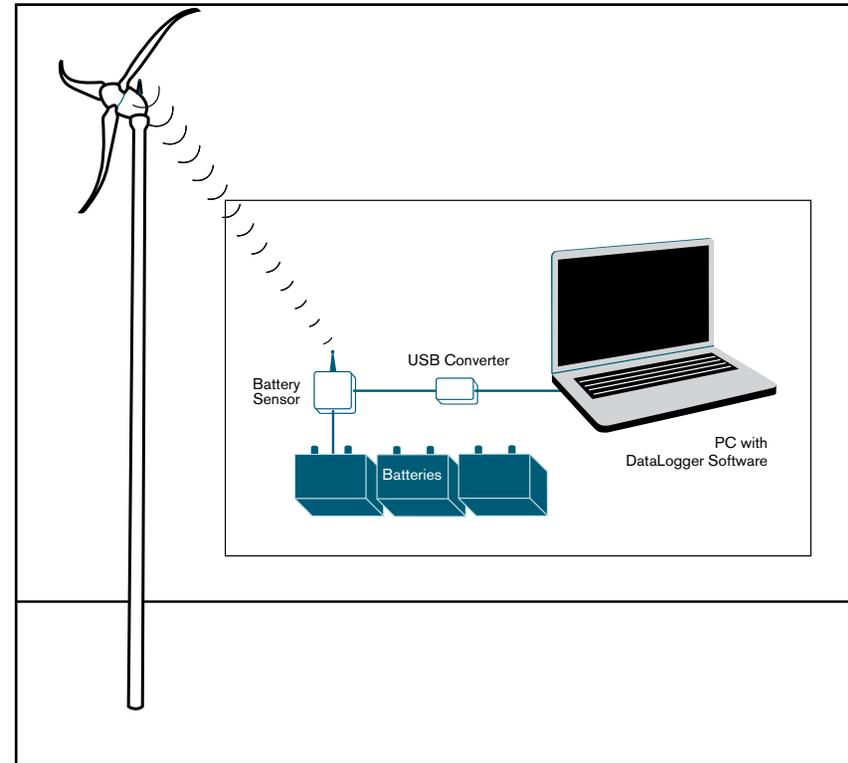
Turbine Setup Screen

3-5 CONFIGURING THE BATTERY SENSOR

4. Connect the Battery Voltage Sensor to PC or laptop (with DataLogger software). Use ethernet cable, USB cable and USB converter as shown at right.
5. Connect Battery Voltage Sensor to batteries, the sensor MUST be powered during update - refer to sensor installation instructions.
6. Select "Enable Advanced Settings" from "File" pull down menu in upper left hand corner of screen. This will cause "Installer" tab to be displayed. Do not go to Installer screen yet - remain on Turbine setup screen.
7. Enter the system "float voltage" text box in the "Battery float voltage" text box. Float voltage is defined as the system voltage when there is no current draw. Southwest Windpower recommends the following float voltage settings:

System Voltage	Float Voltage Setting
12 volts	14.1 volts
24 volts	28.2 volts
36 volts	42.3 volts
48 volts	56.4 volts

8. Select the communication channel number from the pull down menu labeled "Frequency". This will be the communication frequency of the battery charging system.
9. Depress the "Send setup" button. This sends the float voltage, the selected frequency and the turbine serial numbers listed in the "Known turbines" test box to the Battery Voltage Sensor. Make sure the numbers are correct and all turbines are listed. If communication is successful the "success" light at the bottom of the screen will turn green.
10. At any time, Battery Voltage Sensor settings may be viewed by depressing the "Get current settings" button. "success" light at the bottom of the screen must turn green and sensor information is under "Get current setup" button.



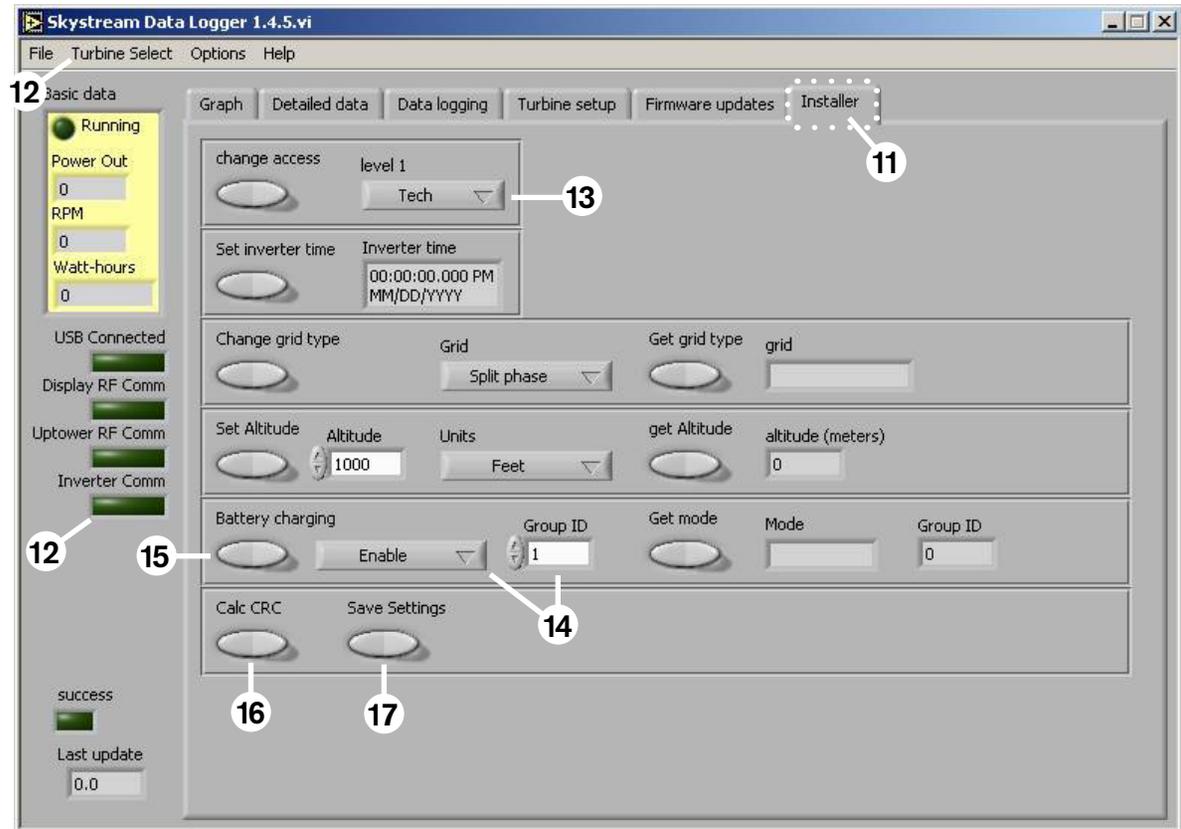
Information flow for battery charging configuration.



Warning: Incorrectly setting float voltage may cause battery over-charge and damage.

3-6 CONFIGURING TURBINE(S) FOR BATTERY CHARGING.

11. Select "Installer" screen shown at right by clicking on Installer tab.
12. Select the turbine from the "Turbine Select" pull down menu at the top of the screen (see above). Observe "Inverter Comm" light illuminate when communication occurs (see below).
13. Set access level to "Tech" from pull down menu from "change access" field as shown above. Depress "change access" button after "Tech" is selected. Success will be indicated by the "success" light turning green.
14. Set "Battery charging" to "Enable" as shown above. Enter "1" in the text box labeled "Group ID". This value MUST be set "1".
15. Depress "Battery Charging" button to upload settings to Skystream. Successful transmission will be indicated by illumination of the "success" light.
16. Depress the "Calc CRC" button at the bottom of the page. Success is indicated by illumination of the "success" light.
17. Depress the "Save Settings" button, success will be indicated by illumination of the "success" light.
18. Repeat steps 9 through 15 for remainder of turbines from the "Turbine Select" pull down menu.



Installer Screen

! **IMPORTANT:** "Battery charging" MUST be set to "ENABLE" or serious damage to batteries may result.

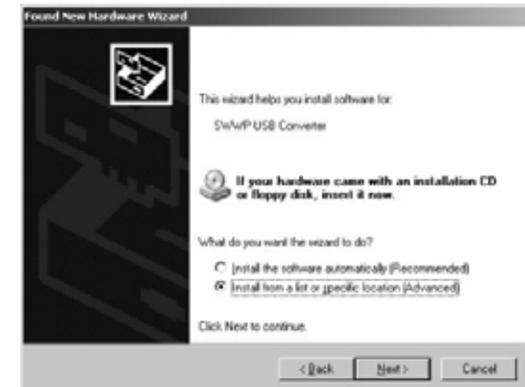
FOUR - Skystream DataLogger Installation Instructions

4-1 INSTALL THE USB DRIVERS

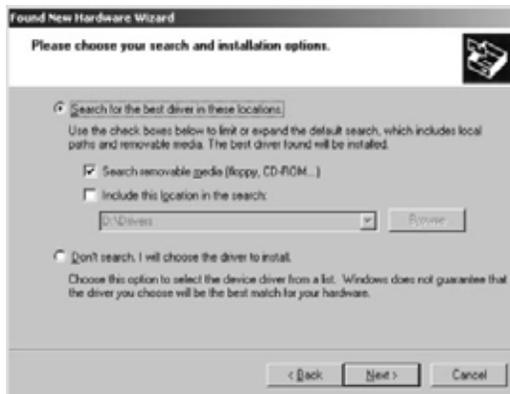
1. Attach the USB converter to the computer's USB port using the black USB cable provided.
2. Insert the CD "Skystream Datalogger and USB Converter" into the CD drive of your desktop or laptop PC. PC must have Windows 2000 or Windows XP operating system. Find and open the file "Quick Start Guide" and follow the instructions to install the Skystream DataLogger program and USB converter. The instructions. The Quick Start Guide follows:



3. Choose "No, not this time" on the first screen of the "Hardware Wizard."



4. Choose "Install from a list or specific location."



5. The drivers are located in the "Drivers" folder on the CD-ROM. If you choose "Search removable media" Windows should find the drivers.



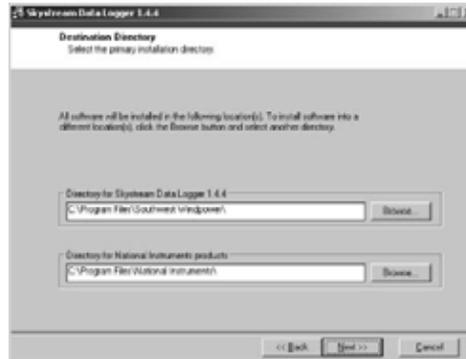
6. Click "Continue Anyway".



7. You will be prompted to install another driver. Repeat steps 3 through 6

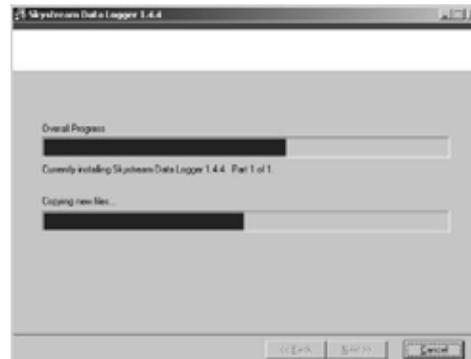
4-2 INSTALL SKYSTREAM DATALOGGER

1. Run the file “setup.exe” included on this CD-ROM.
2. Choose the folder you want to install the software to. You will see the following screens during the installation process:



3. Change directory if needed. Click “Next”.

4. “Accept” the License Agreement.



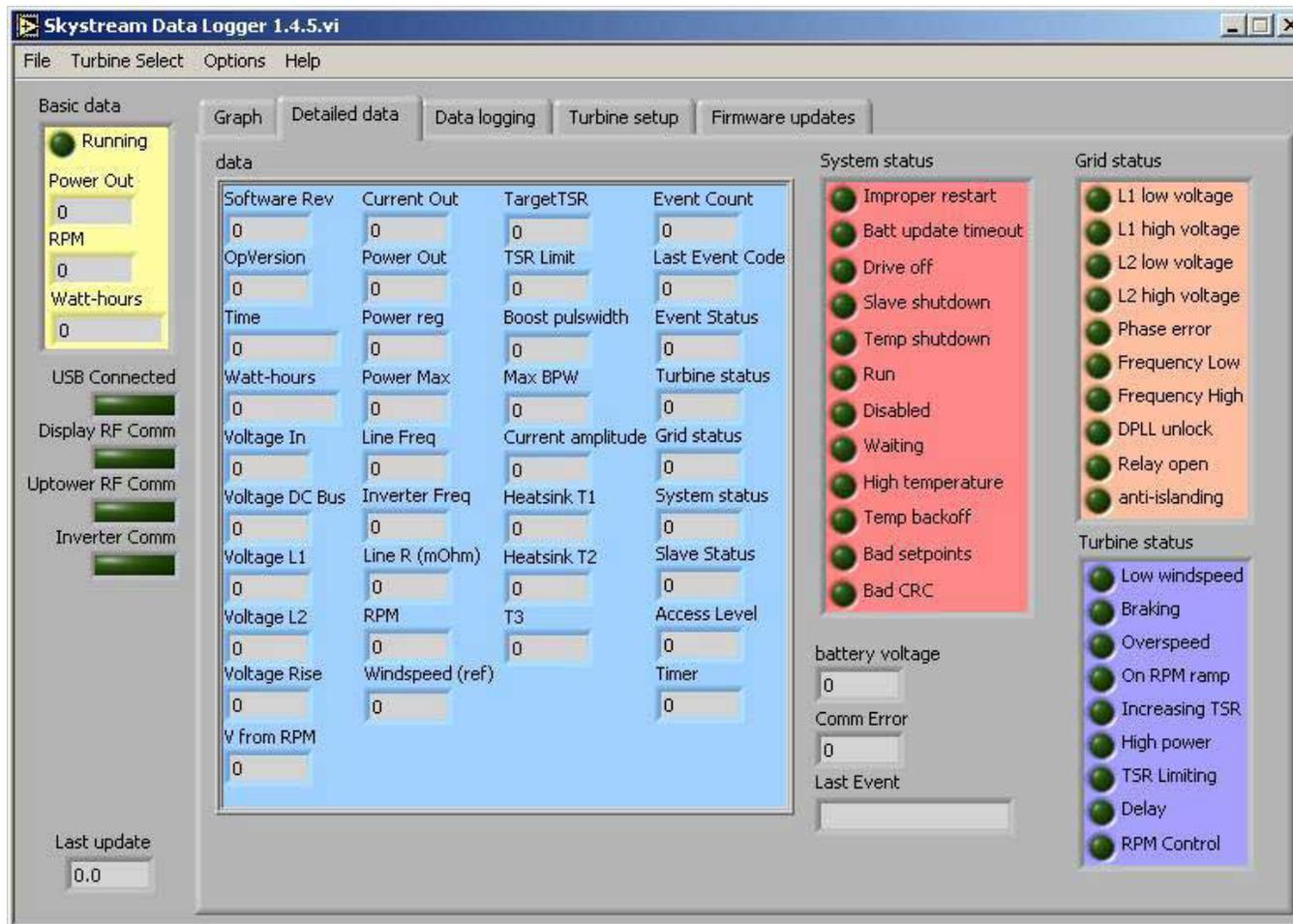
5. Verify the version.

6. No action required.

7. Click “Finish”.

4-3 RUN DATALOGGER

- 8. Now that the software is installed you can run "Skystream Data Logger" from
 - Start >
 - Program Files >
 - Southwest Windpower >
 - Skystream Data Logger



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