G-Wiz LCX

User Manual

Version 1.1

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NOTE: This unit has not been tested with Hybrids at this time, although it has been designed with hybrids in mind. We will post hybrid testing info when we have this data.

Limited Warranty and Disclaimer

G-Wiz Partners warrants the G-Wiz LCX Flight Computers to be free from defects in materials and workmanship and remain in working order for a period of 180 days. If the unit fails to operate as specified, the unit will be repaired or replaced at the discretion of G-Wiz Partners, providing the unit has not been damaged, modified, or serviced by anyone except for the manufacturer.

G-Wiz LCX Flight computers are sold as an experimental accessory only. Due to the nature of experimental electronic devices, especially when used in experimental carriers such as rockets, the possibility of failure can never totally be removed. The owners, employees, vendors and contractors of G-Wiz Partners shall not be liable for any special, incidental, or consequential damage or expense directly or indirectly arising from the customer or anyone's use, misuse, or inability to use this device either separately or in combination with other equipment or for personal injury or loss or destruction of other property, for experiment failure, or for any other cause. It is up to the user, the experimenter, to use good judgment and safe design practices and to properly pre-test the device for its intended performance in the intended vehicle. It is the user or experimenter's responsibility to assure the vehicle will perform in a safe manner and that all reasonable precautions are exercised to prevent injury or damage to anyone or anything. WARNING: Do not use this device unless you completely understand and agree with all the above statements and conditions. First time use of the G-Wiz LCX Flight Computer signifies the user's acceptance of these terms and conditions

How to contact G-Wiz Partners

Please see our website at: http://www.gwiz-partners.com. Our web site has the latest versions of all our user manuals, Device Firmware, FlightView Software updates, and email contact information.

Introduction

After reading this manual, if you have any questions or problems with either your flight computer or FlightView software, please visit us on the web at: http://www.gwiz-partners.com or write us at: support@gwiz-partners.com or at: G-Wiz Partners, PO Box 320103 Los Gatos, CA 95032-0101. A FAQ is maintained on the web site, and new versions of FlightView are posted there free for download.

The G-Wiz LCX flight computers are precision state-of-the-art recording altimeters that utilize dual sensors, both a barometer and accelerometer, to integrate, operate and record flight data for model and high power rockets. LCX can control flight events for up to three separate flight operations: cluster or staging, apogee deployment, and low altitude deployment. LCX's sophisticated firmware algorithms take full advantage of having a dual sensor system (the on-board accelerometer and barometric pressure sensor). The processor at the heart of these 2nd generation flight computers has an integrated 10-bit A to D converter along with a CPU core executing instructions at a rate of over a million instructions per second! They come standard with high current, open drain, power MOSFET channels initiating the pyrotechnic events.

The G-Wiz Flight Computers use proprietary firmware algorithms to determine the key events in a rockets trajectory. The key events monitored are:

- **Launch**
- **Booster burn-out**
- **Sustainer ignition (when applicable)**
- **Sustainer burn-out (when applicable)**
- **Coast**
- **Apogee (both inertial and barometric)**
- **Low altitude deployment**
- **Landing**

When used with proper batteries and pyrotechnic devices, these flight computers can air-start clusters or perform flawless staging, deploy a drogue at apogee and a main chute at programmable altitudes. You can also deploy a single chute at apogee. The peak altitude (determined by barometric pressure) is beeped out after the rocket has landed. While LCX does not record data during the flight, the peak acceleration, speed, and altitude are saved, and may be downloaded by FlightView, and save with configuration data, and any relevant notes. FlightView is also used to configure the advanced features of LCX.

Features:

- Beeper to indicate altitude and status.
- Continuous Pyro Battery monitoring prior to launch.
- Continuous continuity monitoring, prior to launch.
- Jumper to select between Cluster or Stage on Pyro channel 0
- When used for Staging, can be set to 1st, 2nd, or 3rd stage.
- All channels have an optional timer delay before event trigger. 0-15 seconds in .1sec increments
- Single battery, low current mode. Or dual battery high current mode (5A max)
- Data is sampled 64 times per second, and averaged down to 16, providing software filtering at 10 bits per sample.
- RS-232 or USB Connections
- Configurable low-altitude. Can be set in 10 foot/meter increments to 2550 feet / meters.
- Metric or English for low-altitude configuration and max altitude readout.
- Reverse protection diode to protect against accidentally connecting a battery backwards.
- Barometric altitude measurement over 70K feet MSL
- Maximum acceleration of 56Gs. Units available by special order to 112g.

Flight Computer Operation

Power On

When First powered on, the beeper will beep once or twice in a low pitch, then make a series of higher pitch single or double beeps. There will be a pause, then the sequence repeats.
The normal sequence is:

1. One or two low pitch beeps (one for Cluster, 2 for Stage)
2. Half second pause
3. A single or double high pitch beep for each Pyro port (one for good continuity, two for an open circuit)
4. 1 second pause
5. Repeat from 1

Where in step 1, a single beep indicates that pyro 1 will be used for Clustering (i.e. triggered on launch detect), and 2 beeps indicates staging. The higher pitch beeps in step 3 indicate continuity of the pyro ports. Starting with port 0, one beep is “Good” continuity, 2 beep is “Bad” continuity.

Occasionally, this sequence will start with a two-tone “warble” followed by 2 beeps. This means that the CPU battery is low, and should be changed. It can also be caused by forgetting to place a jumper wire from CPU Batt+ to Pyro Batt+ when using just one battery.

Error Indication

If an error is detected at power on, it will cause the beeper to emit a two-tone “warble” instead of the usual beep sequence above. If the problem is only low-power, then the above sequence will be followed after the warble.
If you hear a warble instead of the regular sequence:

Do not Fly!

Landing

After landing, the LCX computer will begin the readout phase by beeps from the piezo beeper. The numbers are beeped out in quick sequences with very brief pauses between each number sequence. ZERO is represented as a long beeeep, 1 is a quick chirp, 2 is 2 chirps, and so on. After the number sequences the unit will pause for ONE FULL SECOND and then repeat the number sequences. For example, 5081 feet of altitude would be represented in beeps by: chirp chirp chirp chirp chirp (5) – beeeep (0) – chirp chirp chirp chirp chirp chirp chirp chirp (8) – chirp (1) – pause – then repeat the sequence, in other words, 5 chirps – quick pause – 1 long beep (for zero) – quick pause – 8 quick chirps – quick pause – 1 chirp – then a full one second pause (noting the end of the sequence) – then repeat the number sequences. If the example is 12,112 feet it would equal: chirp – chirp chirp – chirp – chirp – chirp chirp – pause – repeat sequence.

The computer must be turned off (then on) before launching again. Data will not be lost.

Quick Start Hardware Configuration

There are two jumpers on this computer, one used to switch pyro 0 from cluster to stage use, the other to switch high or low current limit on all outputs.

Jumper Functions		
Jumper position number	**With Jumper IN**	**With Jumper OUT**
JP 3 (Pyro current selection)	**High Current (two batteries only)**	**Low Current (one battery possible)**
JP 2 (Cluster or Stage selection)	**Stage**	**Cluster**

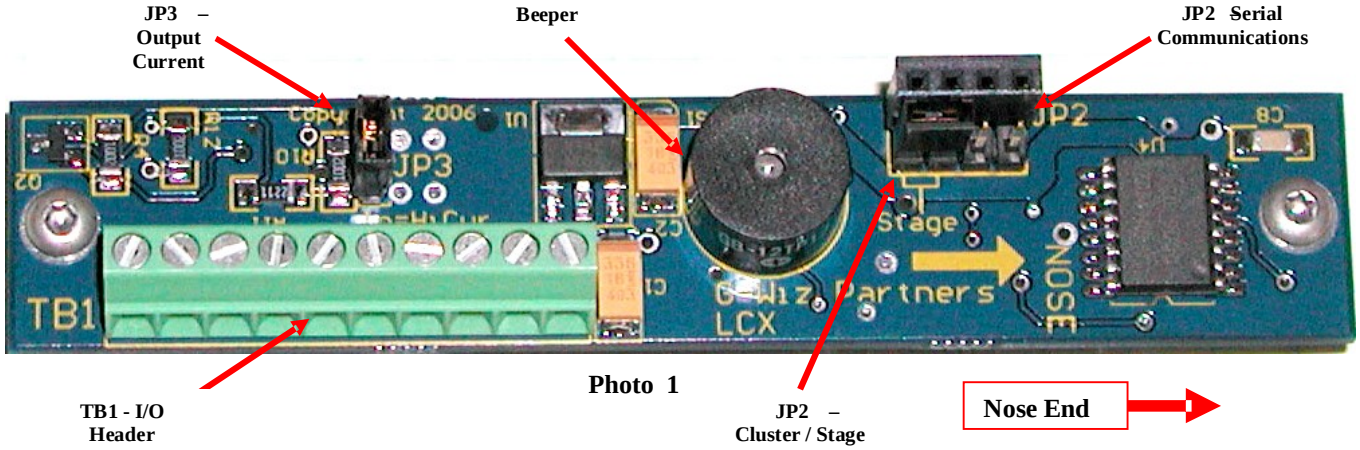


Photo 1

Use the following guide to wire batteries, charges and igniters to the terminal bar. This information is also printed on the PC board under the connector.

TB1 – Terminal Block I/O Header

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	Pin 10
Batt +	Batt -	Pyro 0	Pyro 0	Pyro 1	Pyro 1	Pyro 2	Pyro 2	Batt -	Batt +
Pyro Battery		Cluster / Stage		Apogee		Main		CPU Battery	

Easy Guide for Launch Setups:

1 Dual parachute deployment using one 9v. battery (No clustering or staging).

[A single battery powers both the computer and firing devices]

1.1. Run a jumper wire from the "CPU Battery" + terminal (TB1 Pin 10 on the terminal bar) to the "Pyro Battery" + terminal (TB1 Pin 1 on the terminal bar) (See photo 2 below)

1.2. Pull the small twin pin jumper connector **OFF** of the **JP3** twin pins (located about 1/3 the way up the board from the bottom – and located on the far side from the terminal bar.) This sets it for low pyro current, which is best when using a single battery. [Use Davyfire 28b's to fire your charges in the low current mode, as any other electric match device will most likely not work – unless using two batteries and the High current mode with the twin pin JP3 jumper ON.

1.3. This is the only jumper you have to deal with for dual deployment with a single battery – all other jumpers should be ON the twin pin connectors.

1.4. Connect the power source, a 9 volt battery (*preferably with some type of switch in the circuit*), to the nose end of the terminal bar (either TB1 Pins 9 & 10).

1.5. With power disconnected, wire the Drogue chute firing device to the Apogee **+** and – terminals (TB1 pins 5 and 6) (*Davyfire 28b firing devices are not polarity sensitive*). (If testing, test lights may not have the proper resistance to signal the beeper)

1.6. Wire the Main chute firing device to the Main + and – terminals (TB1 pins 7 and 8).

1.7. Once all the correct firing devices are hooked up you can test the circuits. Turn on your power switch to the altimeter. Once you've tested it by listening to the beep, you can either leave it on or turn it off until the rocket is mounted on the pad. When you turn on the power to the altimeter the beeper will:

- Emit **a two low tones** (signaling the battery is OK, and that the cluster/stage jumper is set to stage).
- If the battery is getting low, it will warble twice.
- Then emit **two chirps** (signaling the cluster and staging channel has nothing connected to it)
- Then emit **a single chirp** (signaling the apogee channel firing device, a Davyfire N28B has continuity). Two quick tones means there is No continuity.
- Then emit **a single chirp** (signaling the main chute channel Davyfire N28B has continuity). Two quick tones means there is No continuity.
- **Then it will pause and cycle the beep pattern again.**

1.8. Photo 2 below shows the altimeter connected to a single battery, and set to deploy a drogue at apogee and a main at 800 feet (the default).

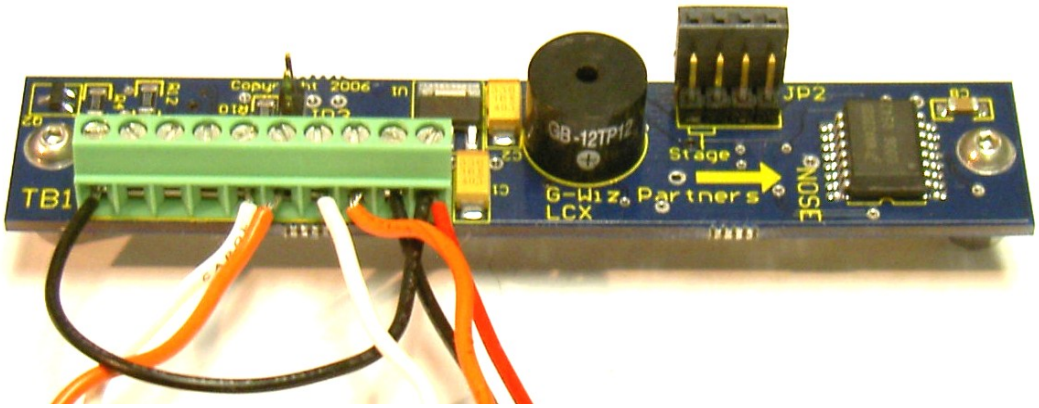


Photo 2

2. Dual parachute deployment with dual batteries (No clustering or staging).

[One battery powers the computer and one powers the pryo channels]

2.1 **To use a dual battery setup DO NOT use a jumper wire from the computer battery + (TB1 pin 10) to the pyro battery + (TB1 pin 1) terminals. Connect two batteries. A 9 volt battery for the computer should be wired to the "nose end" of the terminal bar (TB1) (positive + to Pin 10 and negative – to Pin 9) (*which should have some method to switch the power to the computer on and off*). A second battery (9 to 15 volts) should be wired to the pyro power terminals terminal bar 1 (TB1), designated as "pyro" (+ to Pin 1, and – to Pin 2).**

2.2 The small twin pin jumper at **JP3** should be **ON** the pins (located about ½ the way up the board from the bottom – and on the far side from the terminal bar.) This sets the altimeter for high pyro current, which should only be used in the dual battery configuration.

2.3 This is the only jumper you have to deal with for normal single motor launches with dual deployment parachutes, even though you're using dual batteries.

2.4 Once all the correct firing devices are hooked up you can test the circuits. Turn on your power switch to the altimeter. Once you've tested it by listening to the beep sequence, you can either leave it on or turn it off until the rocket is mounted on the pad. When you turn on the power to the altimeter the beeper will:

- § Emit **a two low tones** (signaling the battery is OK, and that the cluster/stage jumper is set to stage) If not, it will warble. If it warbles the battery is getting low. If it warbles fast the battery is too low to function properly .
- § If the battery is getting low, it will warble twice.
- § Then emit **two chirps** (signaling the cluster and staging channel has nothing connected to it)
- § Then emit **a single chirp** (signaling the apogee channel firing device, a Davyfire N28B has continuity). Two quick tones means there is No continuity.
- § Then emit **a single chirp** (signaling the main chute channel Davyfire N28B has continuity). Two quick tones means there is No continuity.
- § **Then it will pause and cycle the beep pattern again.**

2.5 In photo 3 the altimeter is connected to separate batteries to power the computer and the pryo channels. Charges are wired to deploy both apogee and low altitude parachutes (main set at the default of 800 feet).

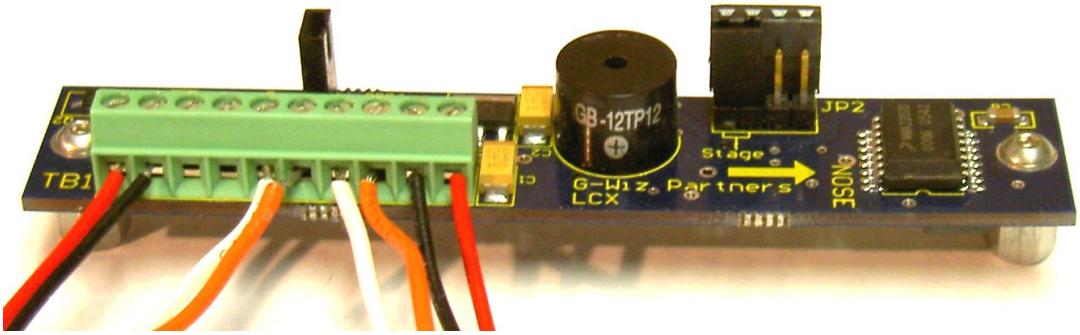


Photo 3

3. Second Stage plus dual parachute deployment with dual batteries

[One battery powers the computer and one powers the pryo channels]

3.1 To use a <u>dual battery setup DO NOT use a jumper wire from the computer battery + (TB1 pin 10) to the pyro battery + (TB1 pin 1) terminals</u>. Connect two batteries. A 9 volt battery for the computer should be wired to the "nose end" of the terminal bar (TB1) (positive + to Pin 10 and negative – to Pin 9) (which should have some method to switch the power to the computer on and off). A second battery (9 to 15 volts) should be wired to the pyro power terminals terminal bar 1 (TB1), designated as "pyro" (+ to Pin 1, and – to Pin 2).

In the Staging mode the unit fires an ignition device for the staging motor (or motors) when it detects motor burnout of the booster motor (or motors).
In the Cluster mode the unit fires the cluster motor (or motors) as soon as it detects and confirms launch, which occurs at approximately 0.5 seconds from the first movement of the rocket. Consider that there is also a delay factor from the time the igniter fires until the time the motor (or motors) actually ignite.

3.2. The small jumper connector should be **ON** the **JP3** twin pins (located about ? the way up the board from the bottom – and located on the far side from the terminal bar). This sets it for High pyro current (which is required when setting the altimeter for any type of staging or clustering).

3.3. Set the system to **stage**. **Staging** (**JP2/Stage ON**) fires a motor (or motors) when the booster burns out. Set it to stage by **plugging in** the **JP2/Stage** twin pin jumper. The **JP2** jumper is located on the lower part of the communications connector

3.4. Once all the correct firing devices are hooked up you can test the circuits. Turn on your power switch to the altimeter. Once you've tested it by listening to the beep sequence, you can either leave it on or turn it off until the rocket is mounted on the pad. When you turn on the power to the altimeter the beeper will:

- Emit **two quick tones** (signaling the battery is OK, and that the cluster/stage jumper is set to stage) If not, it will warble. If it warbles the battery is getting low. If it warbles fast the battery is too low to function.
- If the battery is getting low, it will warble twice.
- Then emit **a single chirp** (signaling the cluster and staging channel firing device, a Davyfire N28B has continuity). Two quick tones means there is No continuity.
- Then emit **a single chirp** (signaling the apogee channel firing device, a Davyfire N28B has continuity). Two quick tones means there is No continuity.
- Then emit **a single chirp** (signaling the main chute channel Davyfire N28B has continuity). Two quick tones means there is No continuity.
- **Then it will pause and cycle the beep pattern again.**

2.1 In photo 4 the altimeter is connected to separate batteries to power the computer and the pryo channels, charges are wired for apogee and low altitude deployment (in this case, the default 800 feet) and a stage sequence (**JP2 / Stage ON**) (which fires when the altimeter senses the booster motor burnout

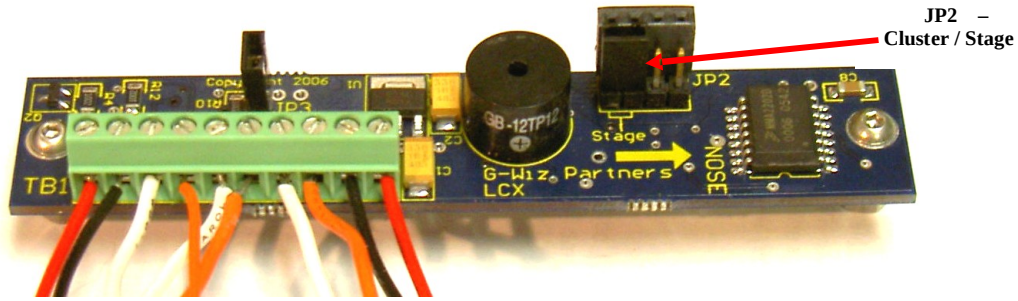


Photo 4

4. Single parachute deployment at apogee with one 9v.

Follow the instructions in section 1.1 just as you would when setting up for dual deployment with a single battery. The only difference is that there is but one firing device to connect. Omit step 6 (connecting a device to the low altitude pyro ports). With the shunt plug in place (or power disconnected), be sure you connect your firing device to the Apogee **+** and – terminals (pin 5 and 6) [Use Davyfire 28b's to fire your charges in the low current mode, as any other electric match device will most likely not work – unless using two batteries and the High current mode with the twin pin JP3 jumper ON.]

Once all the correct firing devices are hooked up you can test the circuits. Turn on your power switch to the altimeter. Once you've tested it by listening to the beep sequence, you can either leave it on or turn it off until the rocket is mounted on the pad. When you turn on the power to the altimeter the beeper will:

- Emit **two low tones** (signaling the battery is OK, and that the cluster/stage jumper is set to stage) If not, it will warble. If it warbles the battery is getting low. If it warbles fast the battery is too low to function properly (if no sound check the required jumper wire for single battery use running.
- If the battery is getting low, it will warble twice.
- Then emit **two chirps** (signaling the cluster and staging channel has nothing connected to it)
- Then emit **a single chirp** (signaling the apogee channel firing device, a Davyfire N28B has continuity). Two quick tones means there is No continuity.
- Then emit **two chirps** (signaling the Main channel has nothing connected to it).
- **Then it will pause and cycle the beep pattern again.**

Photo 5 below shows the altimeter set to be powered by a single battery and wired up and set to deploy a single parachute at apogee.

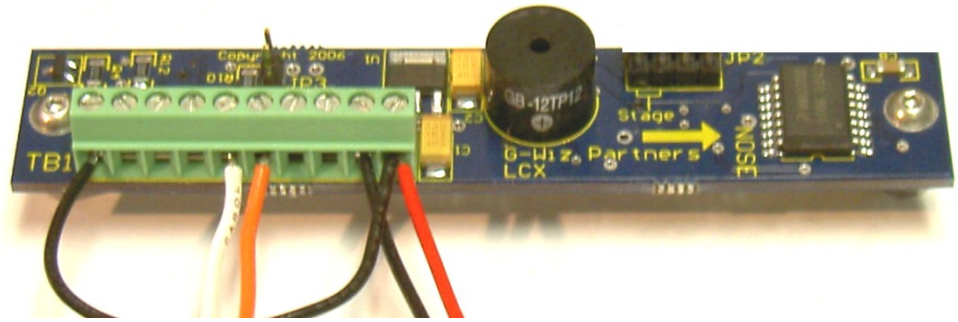


Photo 5

Quick Start Software Configuration

By default, the LCX computer comes configured to behave just like its first generation cousin. Staging is for first stage, low altitude in 800 ft. English units are used, no delays are used. If this is what you want, no more need be done.

To change something:

1. Make Sure that FlightView is installed on your computer, and that you have an available serial port and G-Wiz serial interface or an available USB port and G-Wiz USB interface..
    a. Insert CD-Rom and open "Install.html" or go to http://www.gwiz-partners.com/Downloads/install/install.html using your computer's browser.
    b. Follow the instructions to install FlightView for your computer.
2. (Optional) Connect G-Wiz USB interface.
    a. Connect interface board to Flight Computer by inserting the 8 pin connector (JP2) to the matching socket on the LCX. You will have to remove the cluster / stage jumper to do this. See photo 7 below.
    b. Connect USB Cable to interface board and computer.
    c. Connect power to the LCX.
    d. The install process places the drivers for your machine in a directory under your install directory. Under Windows, a dialog will appear asking how to install the drivers. Do not search the internet, or the computer. Instead, elect to tell it where the drivers are. If you installed at the default location, this will be: C:\Program Files\GWizViewer\usbDrivers. This process is shown in detail for Windows XP in Appendix D. Macintosh users should follow the procedure in described in Appendix C.
3. (Optional) Connect G-Wiz RS-232 serial interface.
    a. Connect interface board to Flight Computer by inserting the 8 pin connector (JP2) to the matching socket on the LCX. See photo 7 below.
    b. Connect power to LCX.
    c. Connect a Straight Through serial cable between interface and computer.

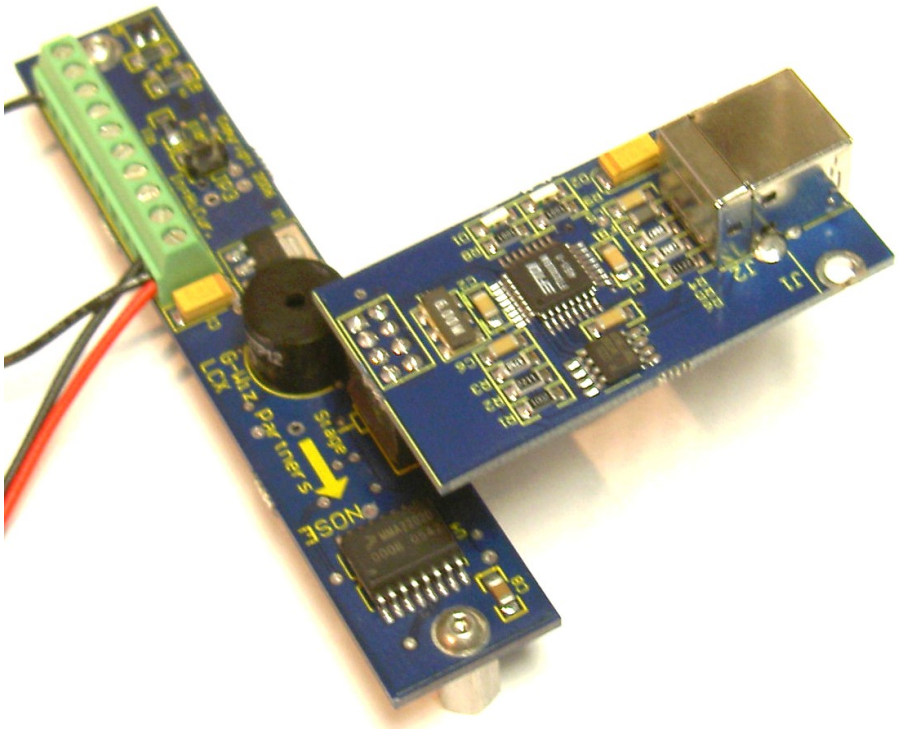
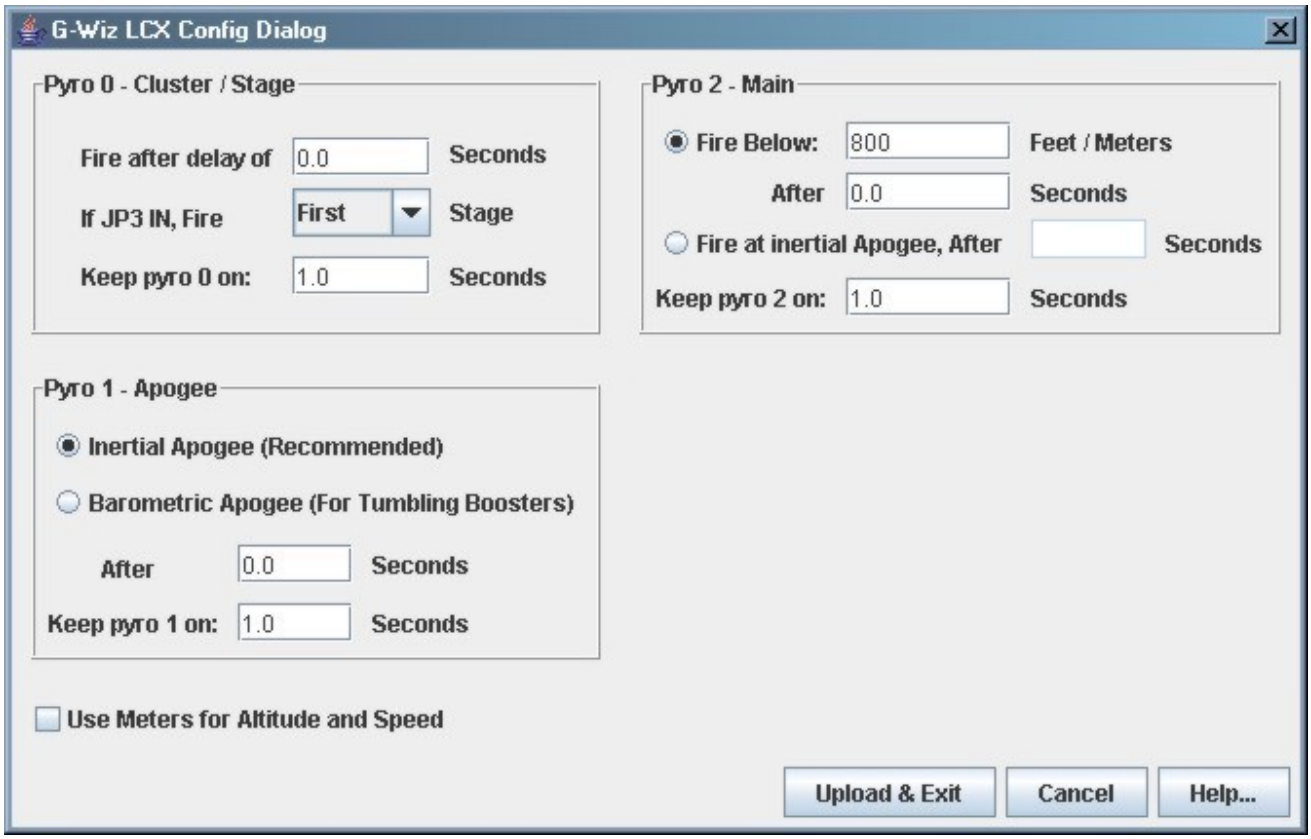


Photo 7

4. Run FlightView
    a. Select “File / Preferences” from the Menus. A dialog will appear allowing you to set various options. Use this dialog to set the communications port to use.
    b. Select “G-Wiz / Connect” from the menus. FlightView will try to open the LCX for communication. When it succeeds, it should say “connected to G-Wiz LCX” in the bottom left of the screen.
    c. Select “G-Wiz / Configure”.
    d. The following Dialog Box will appear, allowing you to change the pyro port configuration.



    e. See the “FlightView : Configuration” later in this manual for details.
    f. Press “Upload & Exit” when done. The new configuration will not be loaded until the Flight Computer has been turned off, then on again.
    g. More detail is given in the “Software” section.

Software

FlightView LCX Features

Starting with version 2.6 FlightView supports LCX configuration and data viewing, in addition to its base feature set.

Before you try to connect, select File / Preferences to bring up the dialog in Figure 1.

With a list of Serial Ports available. Select the port connected to your computer, and click OK. If you commonly connect to the same port, you should not need to do this again, unless there is some other problem connecting. Your choice is saved, and will be tried first for subsequent connections.

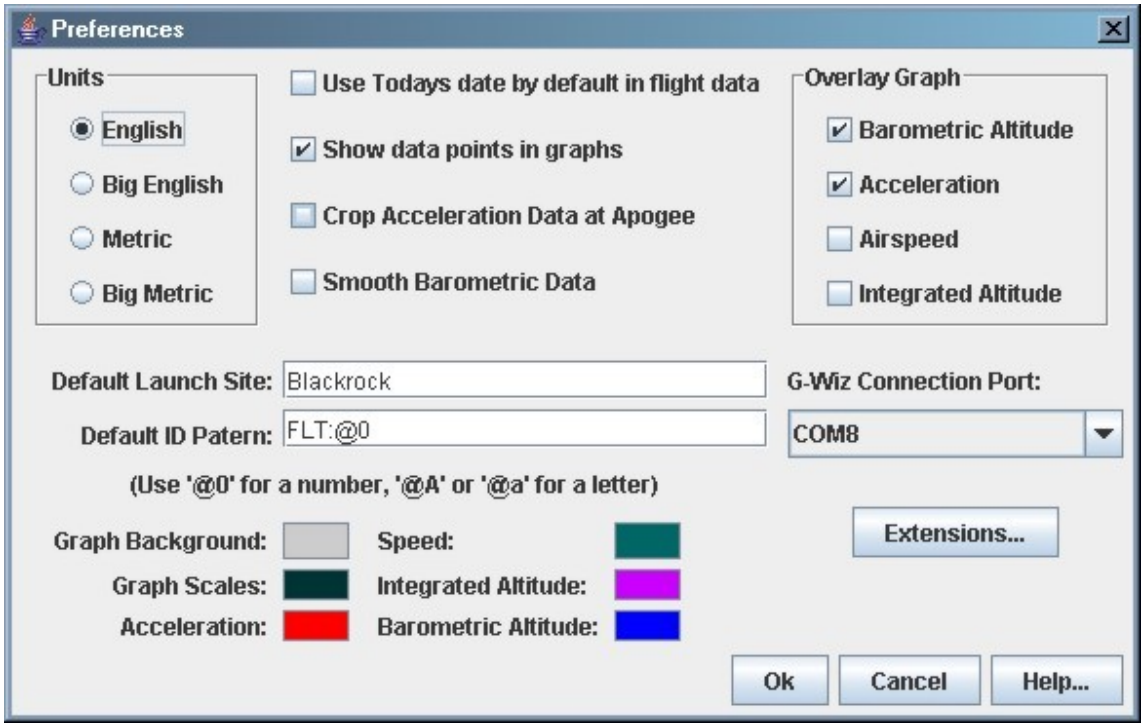


Figure 1

After you select a port, and click 'OK', select "GWiz / Connect" to connect.

When Connected, The GWiz Menu (See Figure 2) will have several additional items, and there will be a banner at the bottom of the window indicating that a connection has been made.

The additional menu items allow you to:

- Configure the computer
- Calibrate the accelerometer
- Bench Test the computer
- Get Statistical Data on the Sensors.

Configuration

The configuration item will read the configuration memory of LCX, and display it in the dialog shown in Figure 2:

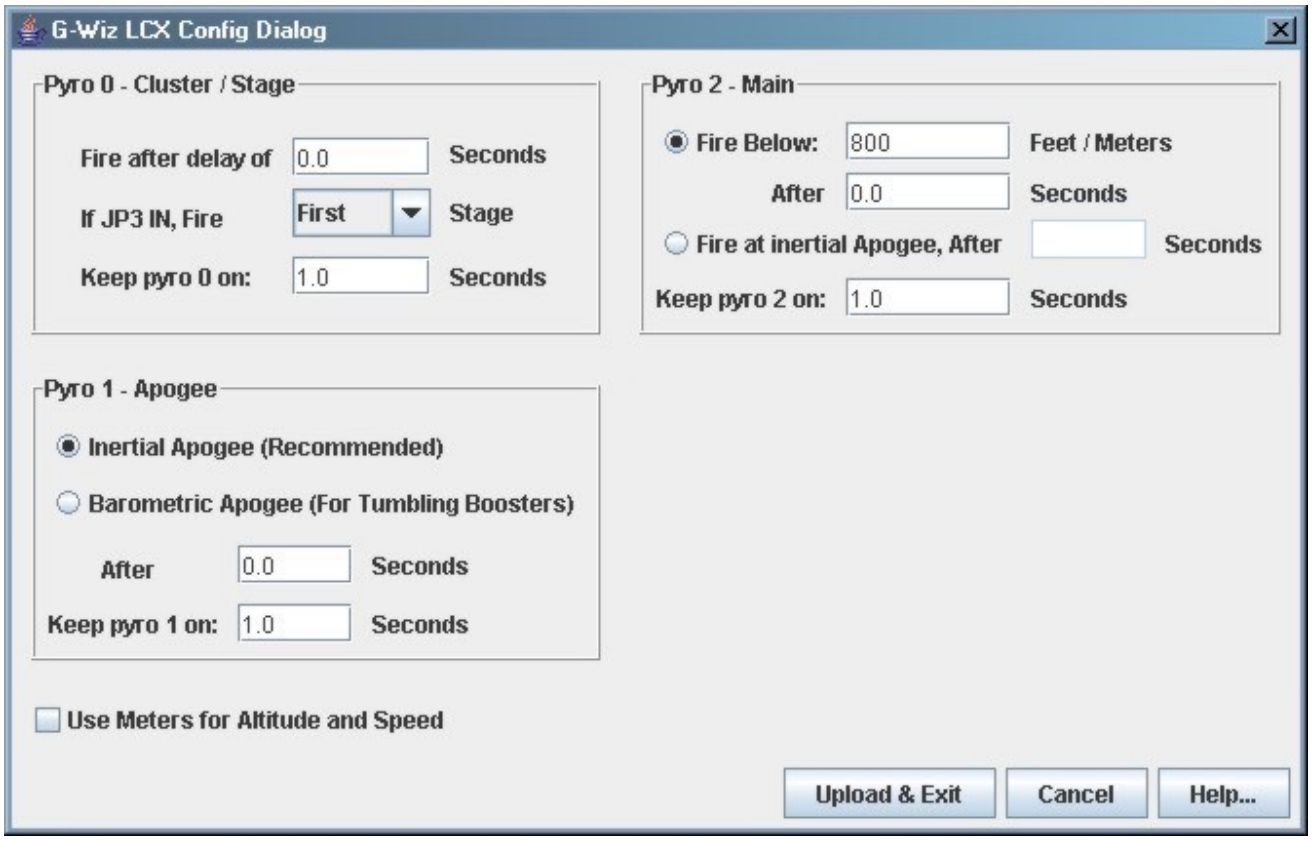


Figure 2

The Configuration Dialog allows you to change the behavior of the LCX in flight. It is divided by port, as each port has a specific function:

- Pyro 0 is used for igniting a Cluster at liftoff (JP2 / Stage OUT) or Staging (JP2 / Stage IN). You can add a delay of 0-15 seconds (fractions permitted) between the event, and the firing of the port. You can also set which stage to fire, when JP2 is IN - 1st, 2nd, or 3rd, corresponding to how many "burnout" events to look fore before firing.
- Pyro 1 is used for Apogee deployment. You can specify a delay, as above, and you can specify whether to use Inertial Apogee (RECOMMENDED) or Barometric Apogee. Using Barometric Apogee is useful in strap-on boosters and other situations where tumbling may occur. Tumbling confuses the inertial apogee algorithm.
- Pyro 2 is used for Main deployment. You have two choices - you can set an altitude to deploy at from 10 to 2550 feet or meters (based on selection of Meters check-box, below) in increments of 10, and you can add a delay as well. Or you can deploy the main a given time after (inertial) apogee. This is a special feature included for the ARLISS flights, but may also be useful to provide 2 stage deployment in conditions where the computer cannot be exposed to atmospheric pressure.

All 3 ports allow you to change the time that the port is ‘on’ for. This is mostly useful for controlling things other then deployment charges. There is also a global option, selectable by checking the appropriate box:

§ Use Meters for Altitude and Speed - When selected, uses metric measurement for readout and altitude specification.

After uploading the new configuration, the Flight Computer must be turned off, and on again before the new configuration will be used.

Read Memory

Unlike our recording altimeters, LCX is not designed for data collection. The default “Read Memory” item will only read the flight configuration, continuity status, and maximum altitude, speed, and acceleration:

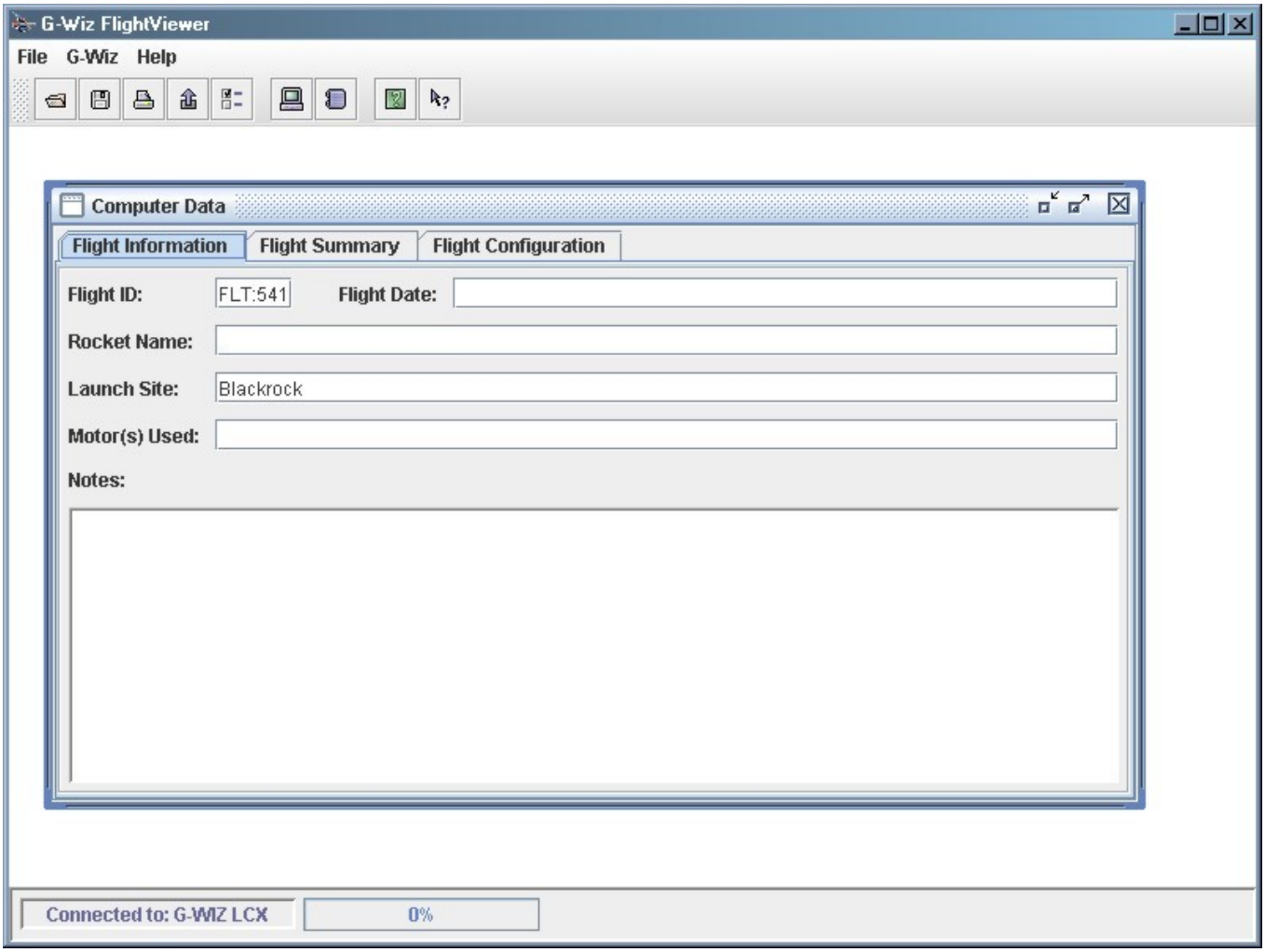


Figure 3

Bench Testing

The Bench Test item will scan the sensors and ports of LCX, then display this dialog in Figure 4:

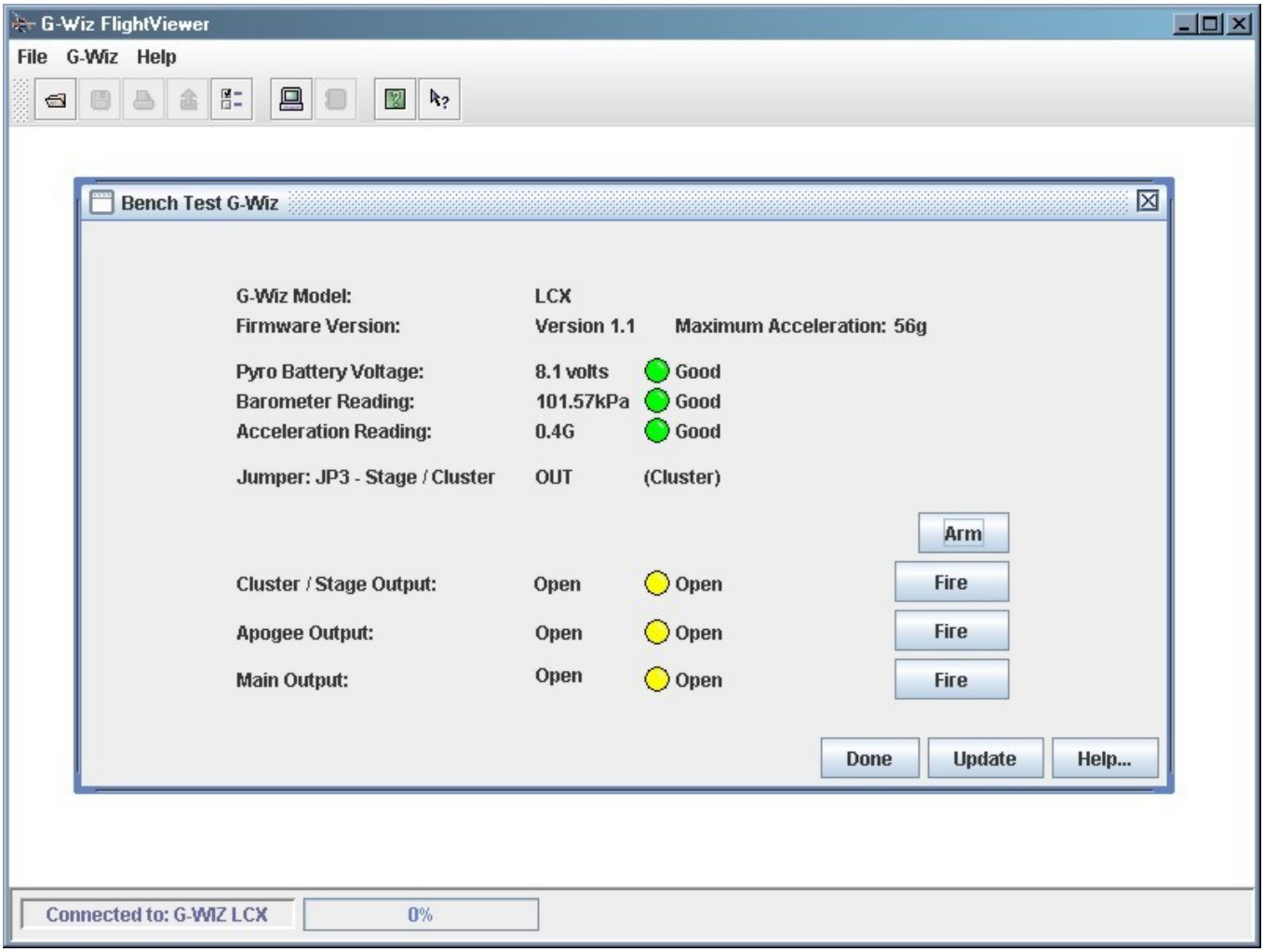


Figure 4

This window shows the current values of all sensors, and the continuity state of the pyro outputs. In addition, there is an 'indicator light' to tell you the relative quality of that value. Green is good, Red bad, and Yellow questionable. Note that open pyro ports will generate yellow indicators, as there is probably legitimately nothing in them. Continuity reads as “Good” if the igniter value is between 0 and 30 ohms. You may also selectively arm and fire the pyro channels to test battery power or igniters. Pressing the 'Update' button will cause all values to be re-read. For the sensor self-tests, the barometer should read somewhere in the area of 100kPa +- 20kPa. Acceleration -1 to +1 g depending on computer orientation.

Calibration

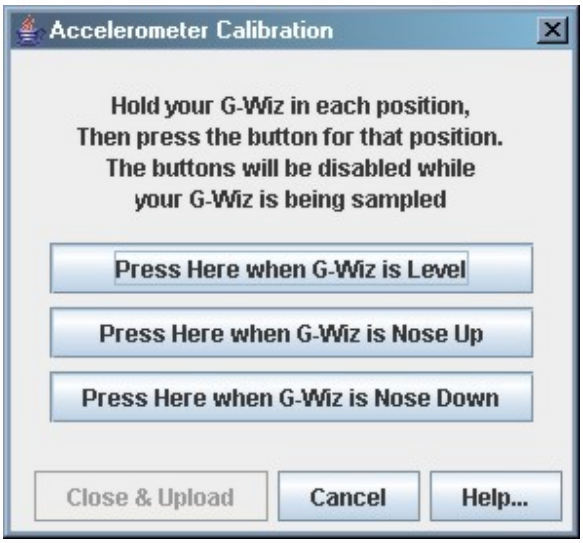


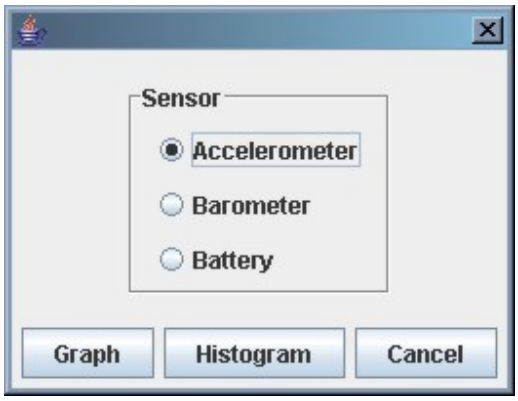
Figure 5 shows the "Calibrate Accelerometer" dialog. It is fairly self-explanatory.

All units are pre-calibrated at the factory, and should be good for a temperature range of 50-90f. Recalibration should be done for use outside that range.

Figure 5

Sensor Statistics

This is a tool that exists just to satisfy your curiosity. There are 3 analog inputs on the LCX, and this menu item displays a dialog (see Figure 6) that lets you choose one, and display data from that sensor continuously as a Graph (Figure 7) or as a Histogram (Figure 8), along with accumulated statistical data.



Data shown includes:

- Current – The value just read.
- Mean – That statistical mean of the last 100 samples.
- Std. Dev. – The Standard Deviation of the last 100 samples.
- Std. Variance – The Standard Variance of the last 100 samples.
- ENOB – The Effective Number of Bits. Essentially, a measure of how clean the data is.

Figure 6

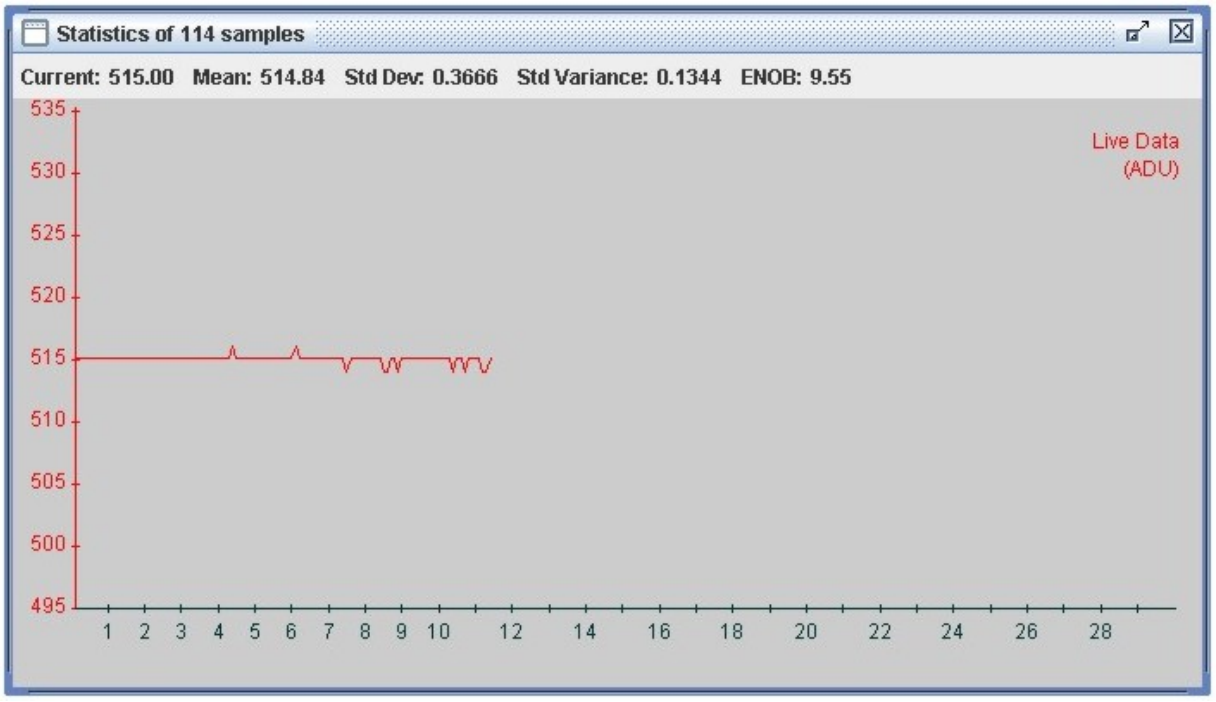


Figure 7

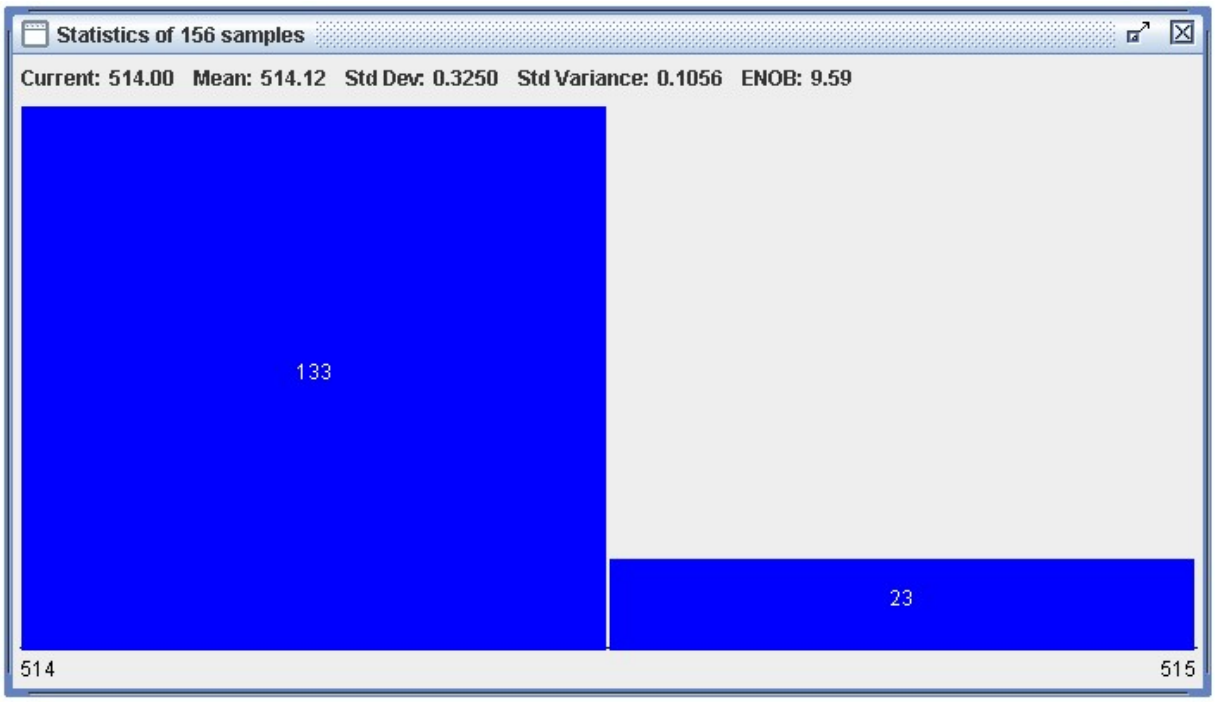
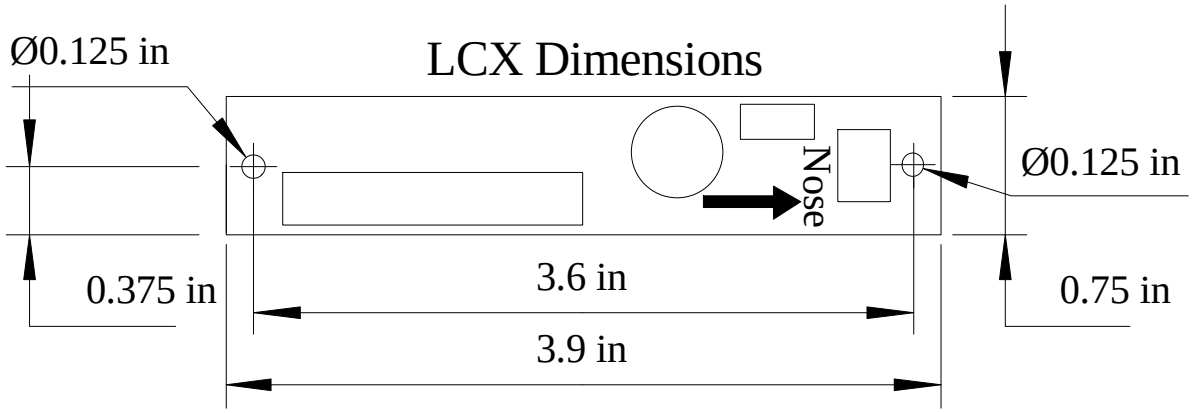


Figure 8

Appendix A Mechanical Drawing



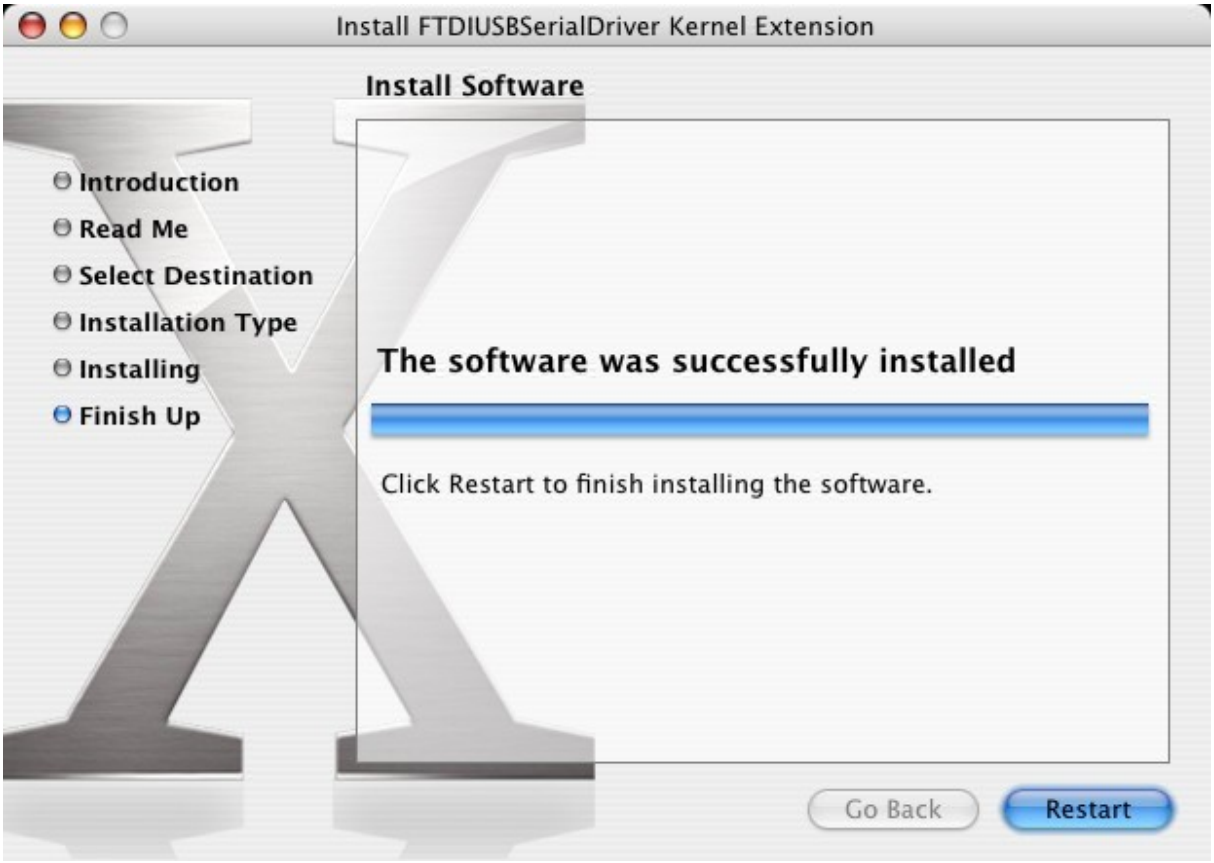
Appendix B - Specifications

Parameter	LCX (default)
Max. Acceleration	+/- 56 g
Max. Barometric Altitude	70K feet MSL
Number of Pyro channels	3
Maximum continuous current per channel	4 Amps
Current Limit (low current mode using Duracell MN1604 battery)	~1.5 amps
Number of batteries required	1 or 2
Recommended Battery	9 VDC transistor battery (Duracell MN1604)
Max. voltage applied to Flight Computer (terminal block pins 9 & 10)	15 VDC
Computer current consumption	16mA typ.
Max. Pyro channel voltage	20 VDC
Pyro channel test current (9VDC battery)	3.5mA
Pyro channel firing time	1 second
Pyro channel functions	**1**:Stage/cluster, **2**: Apogee parachute deployment **3**: Low altitude parachute deployment
Low Altitude Pyro channel activation (default)	800' feet AGL +/- 80 feet
Altitude readout	Beep-out, MSD first, of Barometric Altitude
Main Battery Life (with separate Pyro Battery)	10 hours
Weight (grams)	23 grams
Operating Temp. Range	-40 to 85°C

Appendix C Installing USB Drivers on Macintosh

Unfortunately, installing the USB drivers on the Mac is a bit complex. First, make sure you have FlightView 2.21 or later. If not, it can be downloaded from our web-site: www.gwiz-partners.com.

Open the folder where FlightView was installed, usually Applications:GWizViewer
You should see a package icon with the name "FTDIUSBSerialDriver.dmg." Double click to install.

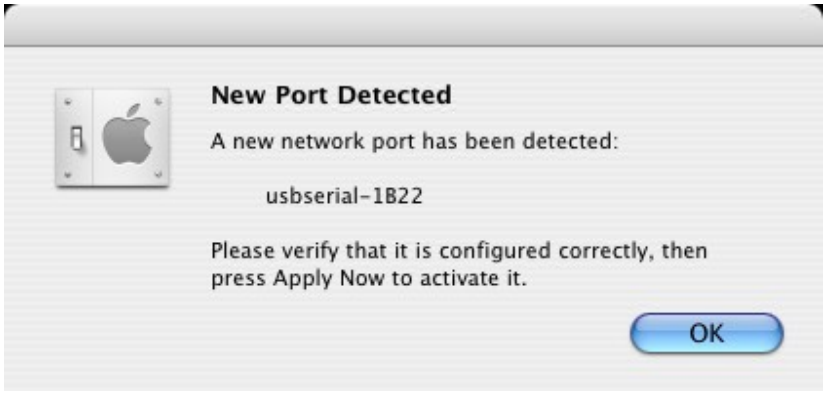


Restart.
Use a terminal program to look in the "/dev" directory for these files:

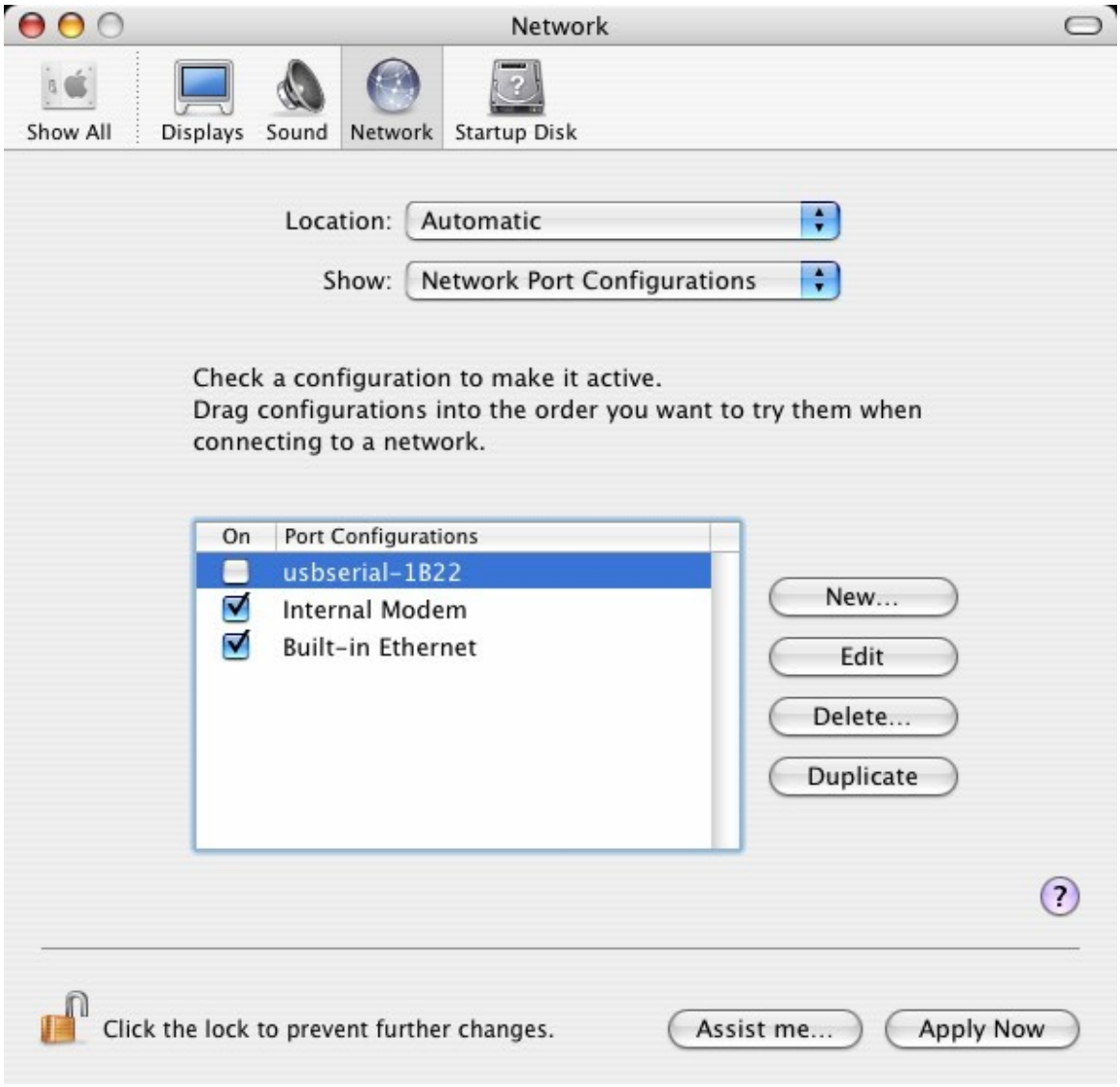
/dev/cu.usbserial-xxxxxxxx
/dev/tty.usbserial-xxxxxxxx

where "xxxxxxxx" is a seemingly random letter and number string.

Next, run "System Preferences" and select "Network" (i.e. Go -> Applications -> System Preferences -> Network). A dialog should appear with "New Port Detected."



Select OK, and the following dialog should appear:



The select "Network Port Configurations" from the "Show" list.
The new port should appear in the box. Check the box next to it, and click "Apply Now". This should be sufficient to get the new serial port working.

If you have problems, try this:
First, try checking the permissions. Open a terminal window, log in as root and type:

```
cd /system/library/extensions
ls -al
```

The file "FTDIUSBSerialDriver.kext" should be owned by root and wheel. If not, type:

```
chgrp -R wheel FTDIUSBSerialDriver.kext
```

And reboot.

And if you are still having problems:
Next is a bit harder. First, you need to know your administrator password. Go to your utilities folder, and open a terminal window.

At the prompt, type: "`cd /Library/StartupItems/FTDIReEnumerate`" and hit return.

Now type "`sudo pico FTDIReEnumerate`" and hit return.

The Mac will ask for your administrator password, and then display a file in an editor window within the Terminal.

There will be a line that looks like this:

```
/Library/StartupItems/FTDIReEnumerate/ReEnumerate –v0403 –p6001
```

You should replace it with these two lines:

```
/Library/StartupItems/FTDIReEnumerate/ReEnumerate –v0403 –pEE18
/Library/StartupItems/FTDIReEnumerate/ReEnumerate –v0403 –pDA38
```

Then save the file, exit the editor, exit Terminal, and Restart the Macintosh.

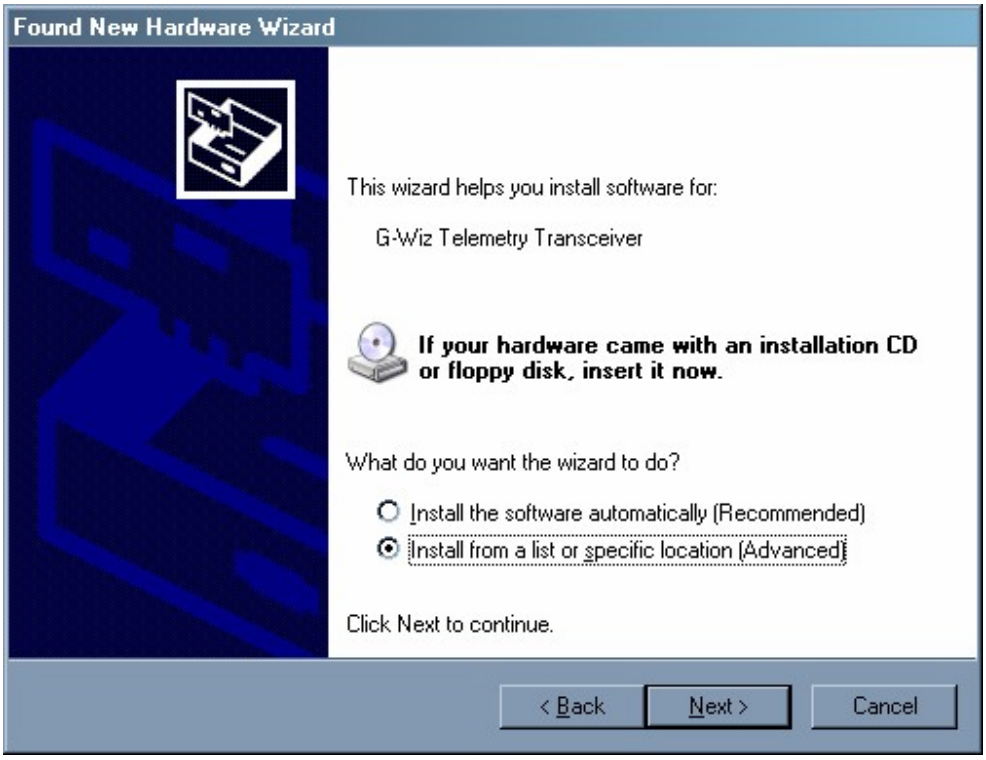
You should now be able to connect to LCX using USB.

Appendix D Installing USB Drivers on Windows XP

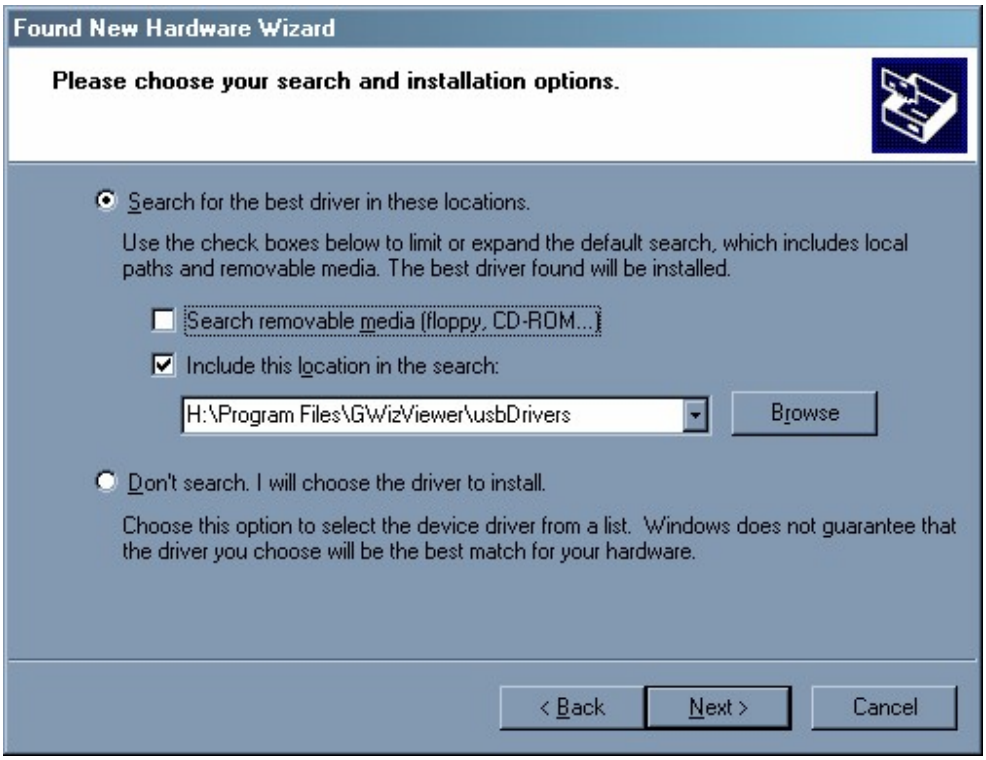
Windows XP seems to be harder for people to install our drivers on, so here is something of a guided tour.

When our USB board or Telemetry base station is first connected, Windows XP will display a dialog like this:

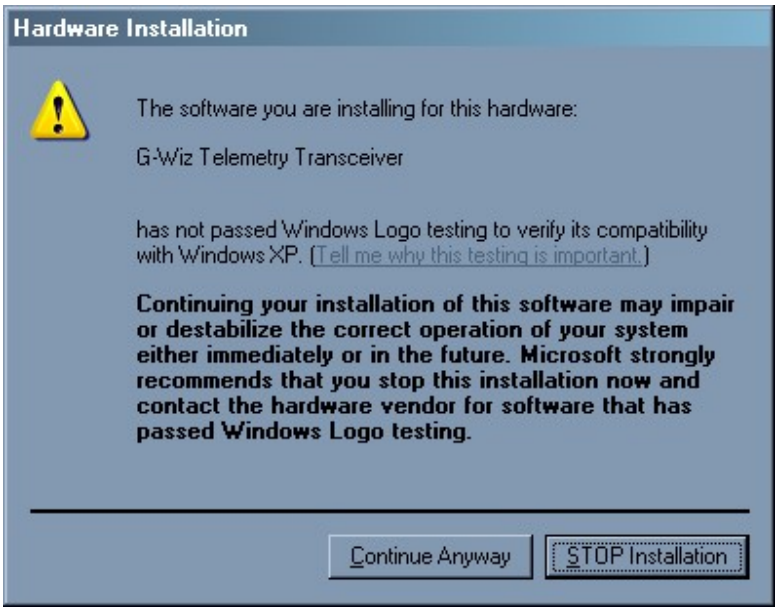
Select "No, not at this time", as shown, and press "Next >". Windows XP will now display this dialog:



Again, select "Install from a list or specific location (Advanced)" as shown, and click "Next >". Windows will now display this dialog:



Again , as shown, select Search for the best driver in these locations. And Include this location in the search . De-select any other choices. In the edit field, use Browse or type in the location of the GWizViewer install directory, and the usbDrivers directory under it. The location shown here is the default install location, if your main disk is H . Finally, Windows XP will display a dialog like this:



Just press Continue Anyway and installation should continue. This whole process will happen twice – just follow the same directions both times.

That s it!