

**The following "Lessons Learned" have been submitted by NWSH Engineering Branch and NWSREP's (DAPM/OPL/HMT/MIT). These situations are not uncommon and the solutions presented may help you in the field. If you have similar experiences (Lessons Learned) that you would like to share, please send an email to: LESSONS LEARNED**

E-mail [David Desrosiers](mailto:David.Desrosiers@nwsr.com), Engineering Focal Point, or call at 301 713-1845 x115 for questions or clarification on any of these issues.

### **WHERE'S MY DATA?**

### **WHY DO I SEE -1000000?**

### **WHY WON'T THE KEY WORK?**

When the Zeno first powers up, it has no knowledge of anything that happened before power came on... and it won't until after it has taken its **FIRST SCHEDULED READING**. Additionally, ancillary functions like telemetry, the keys, some displays, etc, ... functions not in the data measurement pathway, may show no response until the **SECOND SCHEDULED READING** takes place. This seems odd - **WHY?** First, a data logger is not like your PC. The data logger is first and foremost a **SCHEDULE** driven machine. It is not awake and fully functional between the times of a scheduled reading. If you power up at 12:01, and the logger is programmed to take readings at 15 min intervals starting on the hour (like the

FPU), nothing will happen until 14 minutes later, 12:15, when the logger wakes up and runs through its programmed operations for the first time. Until 12:15, if you try to look at stored data, the Zeno will tell you there isn't any, even if the memory is full. If you try to look at the scrolling sensor output, S1,1 command, you will only get the "no data taken yet flag" of -1000000. If you try to use the key to download data, you will get no action, because the program has not run through for the first time yet and the Zeno does not know that to do with the key inserted interrupt, yet. After the first **SCHEDULED** reading time, the program has run once and data should be available to the S1,1 command. but data may not be available from memory (and therefore to the key) yet. Some processes take multiple samples to develop a reading. If you try to access data that requires use of multiple samples, (remember

the key download asks for **ALL** the data) then the logger will ignore you until all the multiple samples are taken and it has developed a finished reading. In a nutshell, you must wait until the first reading, and sometimes the second, has been taken to expect full access to data. Remember this applies to powering on the device, and it also applies to the times when menu actions turn off data sampling, such as entering the Zeno Program Menu to enter cal coefficients. When you exit the Zeno Program Menu, you may have seen the message "Data Collection Starting In XX seconds", This tells you that data collection has been off (because you were modifying the program) and you must wait until the next **SCHEDULED** reading time to start to get new data. So the key may not appear to work for a while after a restart. You only have to look at the Zeno clock to see how long you have to wait.

## **WATCHDOG ERROR?**

## **SENSOR NOT DEFINED?**

## **CAN'T SAVE CALIBRATION PARAMETERS?**

I believe your FPU has "lost" its configuration file. The clues to it are in your statements below...i.e.:  
\*Sensor Record #1 type is not specified\* \*Sensor Name: \*(nothing) The configuration file is the code that defines what is connected to the Zeno and what the Zeno is supposed to do with the data it collects. Without a configuration file, the Zeno has no knowledge of anything connected to Sensor #1 input, as seen in the error statement "\*Sensor Record #1 type is not specified". \*Other things like

the datakey also will not work, because they are not defined and the Zeno does not know what to do when it gets that interrupt from a key being turned in the key receptacle. \* \*To recover, you simply need to reload the configuration file. Go to section 10 of the FPU assembly procedural to read about the configuration file (so you know how it works) and to see how to reload it. If you need a copy, go to: [NWSH Documentation page](#) and click on FPU Assembly Instructions, near the bottom. The configuration files are also available on that webpage. You have a choice of two, as the procedure explains. BE VERY CERTAIN that after you have reloaded the file and verified that it works, that you use the E command to

save the new configuration to flash eeprom in the Zeno... or it may disappear again at a less opportune time in the future. Once saved to flash memory, there are only a few ways that the configuration will get "lost" and most of them involve damage to the unit: - lightning - forgot to save it and power cycled - memory failure - somebody monkeying with the unit and saved garbage over it. When you save it to flash memory, it will always be there and will get reloaded every time the unit powers ON. After you reload the configuration, you will need to re enter your site data and re calibrate the unit... again using the E command afterward to save those new parameters to flash memory. .

## **BATTERY NOT CHARGING**

## **BUT REGULATOR, WIRING, CONNECTORS, SOLAR PANEL ALL OKAY?**

If any part of the solar panel is shaded, the panel may shutdown and not deliver any real power to the application. The solar panels we use are made up from multiple solar cells, connected in series to give

the voltage needed and then in parallel to give the power needed. When a solar cell is shaded it becomes a high resistance to any current impressed upon it. Thus if any individual cell of a series string is shaded, that cell will block the current generated by the other cells in that string, effectively shutting off the output. Mount the solar panels where they are in full sun, not in the fringe area under trees or behind guy wires or tower supports. Also problems have been

reported where construction or farming resulted in a lot of dust on the panel (charging always got better after a good rain?!), please train the operator to inspect and clean the panel on an "as needed basis". The FPU is supplied with a 25' connecting cable. The cable can be extended as far as you need, provided you use good outdoor rated wire of the same size or larger, and make waterproof connections above ground. If you need to trench the cable, use direct burial rated cable.

## **INSTALLATION IS CONFUSING**

### **CAN'T FIND INSTRUCTIONS TO DO.....?**

### **HOW DO I CHECK.....?**

### **WHERE ARE THE CONFIGURATION FILES?**

If you are still using Engineering Instruction, or the Beta Site Installation Procedures, or haven't downloaded a new copy of the manual since July '05, you should go to the [Surface Observations Home Page](#)

click on COOP Implementation

click on FPU Assembly Instructions, June 2005

to get an updated copy that includes recent feedback-driven modifications.

The configuration files are also on this webpage:

FPU Initial Configuration File Code, June 2005 and FPU Configuration File with Battery Voltage Tracking Code, June 2005.

## **MY CONFIGURATION FILE DOES NOT WORK**

### **I TRIED TO DOWNLOAD THE FILE TO THE GMA BUT IT KEEPS ASKING FOR THE FILE OR IT NEVER FINISHES...OR IT ABORTED REPORTING NO FILE FOUND**

The configuration file is a text file and should look exactly like the listing is Section 10, page 37, of the FPU Assembly Instructions, June 2005. Use Notepad to examine the file, NOT A WORDPROCESSOR!!!

There should not be any black boxes or graphical characters located anywhere within the file. The last characters of the file should

be the EOF at the end of the listing... there should not even be a carriage return or linefeed after the EOF. Depending upon the browser used to get the file from the [Surface Observations Home Page](#) (above), some browsers will embed html codes or control codes in the file when the File Menu/SavePage method is used to save the displayed listing to the computer as a file. This renders the configuration file useless. Look at the saved file with Notepad. Notepad is a part of MSWindows, located at the menuchain, **Start/Programs/ /Accessories/NotePad**

If you see a listing that looks different than the printed copy in the manual, delete it. Go back to the browser,

highlight the whole listing, and use copy/paste to get a copy into a blank page in NotePad, and save it from NotePad. Then use this clean copy to download to the GMA. The configuration file is very restrictive about what is in it and where the information is located. A single extraneous character can cause it to not function properly. Extra characters in the beginning will cause the GMA to not recognize the file as a configuration file and abort the download. Any extra characters on the EOF line will cause the the GMA to not recognize the end of the file and it will sit there expecting more, apparently stuck.

### **FPU DISPLAY READS A LARGE POSITIVE OR NEGATIVE NUMBER FOR RAIN AFTER IT WAS READING FINE**

If your FPU was working fine, but now is reading +60 to +99 or -60 to -99, suspect a problem with either the load cell or it's cable. If a lightning surge burns out one of the 4 strain gauges in the load cell, the GMA will measure a large positive or negative signal, resulting in a

$\pm$  number in the 80 to 100 range for a typically calibrated rain gauge. Prior to calibration, for the setup conditions of A=0, B=1000, and C=0, the numbers will be in the  $\pm$  60 to 70 range. Check the [load cell](#) (click for picture) with a volt/ohm meter set to Ohms, on a scale to show 10K ohms (10,000 ohms). Disconnect the cable, and probe the [Diagonal pin pairs](#), you should see about 10K ohms on both pairs. Probe from [corner to corner](#)

on each of the flat sides of the connector, [4 pairs](#)... you should see about 7.5K ohms. The numbers may not be exactly 10K or 7.5K but it is very important that both diagonal pairs read very close to the same, same for the 4 side pairs. Check the cable to verify that there are 4 good wires and that none of them are shorted together.

## **WILL LEAVING THE OLD CORK DASHPOT GASKET IN**

### **HELP ISOLATE THE LOAD CELL FROM LIGHTNING? OR AFFECT OPERATIONS?**

No, it will not isolate the load cell or protect it from surge damage. There is no electrical connection between the 4 electrical connections and the block of the loadcell anyway. Yes it will affect operation, please remove all trace of the gasket. The load cell block must be hardmounted to the F&P frame. The sponge-iness of the cork will act as a spring causing non-linear operation of the sensor, upsetting the response expected by the data logger.

### **RAIN VALUES VARY EACH CYCLE**

### **NOT GETTING A GOOD CONNECTION AT THE LOADCELL**

I have received some load cell cables that were thought to be defective, only to find that the sockets in the square white connector were spread open as if a Volt-Ohm-Meter probe had been inserted. Forcing a probe into these stamped metal contacts bends them out of position and renders them unreliable. If you must check the load cell cable for continuity, probe the BACK of the white connector, along-side the wire - it does not matter

if you inadvertently bend the back of the contact. [\(PICTURE\)](#) If you have a problem cable, look at the face of the white connector and examine the socket contacts within. They should be a perfect circle, with space all around them from the plastic bore of the connector, and the two expansion slits should be practically closed. If the slits are wide and the two hemispherical halves of the contact are spread to touching the bore, a needle or sharp pin can be used to GENTLY pry between the bore and socket half to bend it back into position. If needed at all, reposition BOTH halves to the center,

don't bend one all the way over to the other. When you check the load cell cable for continuity, obviously check for a direct connection between two pins, but also check that there are no other connections to each individual wire, and to the shield. The shield is connected to the backshell of the circular Mil connector, no connection at the white plastic connector. A lightning damaged cable may have one or more wires shorted together or to the shield. If you find shorted wires, the cable must be replaced.

**COULD  
DISCONNECTING THE  
BATTERY PLUG HAVE  
CAUSED THE  
PROGRAM TO LOSE  
CONTACT WITH THE  
DATA KEY  
MECHANISM?**

A power glitch is a power glitch, no matter how it is caused. Remember there are three parts to the GMA: the logger, the display and the key mechanism. The logger is quite tolerant to fluctuations in power and

will run on anything from 21V down to 7V though it starts to have problems writing to flash memory around 11V. The other two are not so tolerant. Even a momentary disruption to the display or the key receptacle, can upset them, requiring them to be reset - which you got it, only happens with a power ON reset from the logger. The battery is a reservoir of power and by it's nature will flatten out most outside imposed glitches. The solar panel is another matter, It's output power is

LOAD dependent and it's output can vary faster than you can measure with your VOM. Moving a cable or connection or walking in front (blocking the sun) of the solar panel can cause the SP output to drop like a rock (in a microsecond) - long enough to upset the display or key receptacle. It's the battery that smooths that out. So yes, pulling the battery, may cause a "system" interruption, even if it does not affect the logger (program).

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