

The Stanford University ELF/VLF Receiver

Atmospheric
Weather
Electromagnetic
System for
Observation
Modeling and
Education

Setup and basic testing guide

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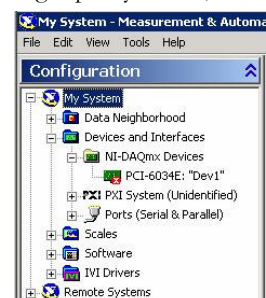
The following document is intended to describe how to connect the VLF receiver parts once they have arrived, checking for successful progress at each step. It is assumed that the necessary preparations described in the preparatory guide have already been implemented, ie, a dedicated computer has been selected, the VLF and GPS antennae have been erected, and cable have been run between the VLF antenna and computer, and between the GPS antenna and computer. In addition, the computer should be connected to the internet. If these have not yet been completed, please refer to that guide.

In order to connect the AWESOME receiver, you will need the following parts:

- (1) Preamplifier box (silver aluminum)
- (2) Preamplifier cards (wrapped in bubble wrap and shipped inside preamp box)
- (3) Line receiver box (painted red)
- (4) Filter cards (wrapped in bubble wrap and shipped inside line receiver box)
- (5) Two loops of wire for antenna, with three pin connector at end of each.
- (6) Signal cable (14 pin connector on each end)
- (7) National Instruments 6034E PCI card
- (8) Shielded 68-pin to 50 pin cable for 6034E card
- (9) GPS Antenna
- (10) GPS cable (N-type connectors on both ends)
- (11) Nullmodem 9-pin serial cable
- (12) Power cord for line receiver

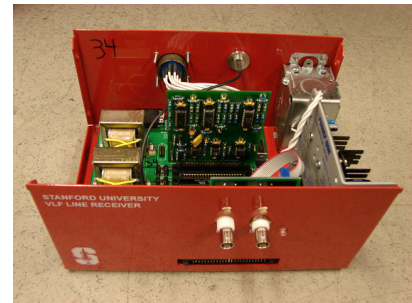
Please follow these steps in order to connect the receiver

- (1) Turn off the computer, open the inside of it and install the NI 6034E card into the computer's PCI slot. When Windows boots up, it will ask about installing a new device, just cancel to escape this menu, it will be taken care of later.
- (2) Install the "VPN" software provided by Stanford, by unzipping the file given, and following the instructions located in the text file within it. (If you don't yet have the VPN file, please ask for it). Set up the computer's username and password, and email this to Stanford. If you connect to the internet using a proxy server, then you will have to tell Stanford the IP address and port of the proxy server. Other than that, it should work smoothly as described in the VPN instructions. **If this step is successful, steps 3-6 and 14-15 can be skipped, and will be completed remotely by someone at Stanford. This will greatly speed up the setup process and is highly recommended as a priority.**
- (3) Install the "Traditional NI-DAQ 7" software, located on a CD inside the cardboard box for the 6034E card.
- (4) Open the "Measurement and Automation" icon on the desktop, if there is no icon on the desktop, check the Start menu under Programs, and National Instruments. If



you still can't find it, you may not have successfully installed the NI-DAQ software in step 1.

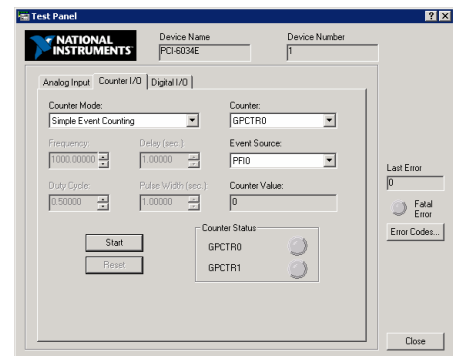
- (5) On the left tab under configurations, click on "devices and interfaces", and among the options that come up underneath it, click "Traditional NI-DAQ Legacy devices", and verify that there is listed within it a device called "PCI-6034E Dev 1". If so, the NI-DAQ card is installed successfully. See picture to left, though the red x on that icon should not be there.
- (6) Move the entire recording software package provided into a folder C:\VLF_DAO.
- (7) Open the line receiver box (see picture), remove all bubble wrap and the cards that are inside it)
- (8) Install the filter cards into the vertical slot. There are three slots, the one closest to the front is for the N/S channel, and the one in the middle is for the E/W channel. The side of the filter cards with the text and components should face the front of the box (see pictures)
- (9) Attach the nullmodem serial cable from the back of the line receiver (lower right corner) to the computer's serial port. Note that if you are using a computer that does not have a serial port, you will have to either buy a serial port that can be installed in the PCI slot, or buy and install a USB/serial adaptor, which can be found at many computer stores, in which case you will be able to utilize a USB outlet as a serial port.
- (10) Attach the thick blue cable from the FRONT slot of the line receiver, to the connector on the PCI NI-DAQ card (as pictured to the left).



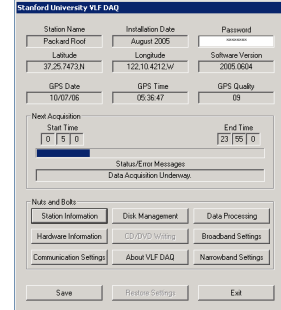
- (11) Attach the GPS cable to the antenna by running the cable through the flange, screwing in the connector, and then connecting the four screws that attach the flange to the antenna itself, as shown in the picture. Mount the GPS antenna with the cable attached to it.
- (12) Plug in the GPS antenna cable to the back of the line receiver on the other end. Screw it in as far as it'll go, though it won't go in completely.
- (13) Plug in the power cable to the line receiver, and then power on the receiver with the switch on the back. Make sure the blue light on the front of the line receiver comes on and stays on brightly, and the red lights above each of the connectors remain off. If this is not the case, turn off the line receiver and notify Stanford of what happened.
- (14) Repeat the instructions in step 4, and after that, click on "PCI 6034E (Device 1)". Then, in the right section of the window, click on "test panels". In the screen that pops up, click on the "Counter I/O" tab. You will then see a screen that looks like the picture. Change "Counter mode" to "Simple Event Counting", and then "Event Source" to "PFI0". Click on the start button, and then watch the value in the "Counter Value". This should begin to tick once per second. Hit the reset button, and then change Event Source to "PFI2". Again, click on the start and the counter value should tick at a much faster rate, 100,000 per second. If both these tests succeed, then you are ready to move on, otherwise contact Stanford.



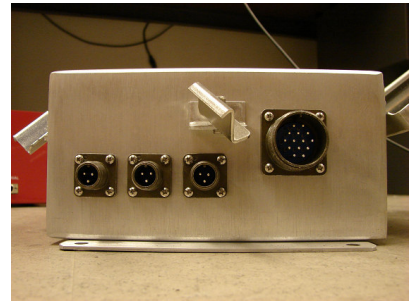
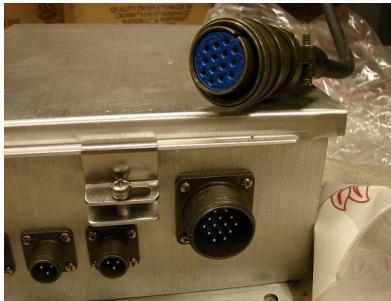
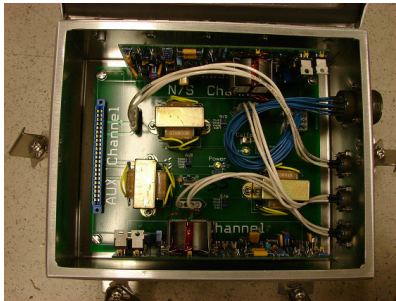
- (15) Start the recording by opening the "VLF_DAO.exe" program



under c:\VLF_DAQ. You should see a screen pop up that looks like this. The time should ticking accordingly. Note that the time and date maybe wrong, as the receiver will need to acquire links to GPS satellites first, which may take several minutes after it is first turned on. The “GPS Quality” tab indicates how many GPS satellites are visible. If the “Status/Error” message gives any problems, or if the computer goes into an automatic reboot, then contact Stanford and describe what happened



- (16) Plug in the cable that goes to the preamplifier, the large 14-pin connector, and make sure that blue light on the front of the line receiver does not go off. To make sure the connector goes in fully, force the connector inward, and then screw on the connector, and repeat several times.
- (17) Take the preamplifier out to the antenna. As in step 7, you will have to open the preamplifier, remove all the bubble wrap, and install the preamplifier cards in the slots labeled “N/S” and “E/W”. They should be installed along the top and bottom slots, with the components and text facing inward (i.e., toward each other) as shown in the pictures below.



- (18) Plug in the other end of the 14 pin connection cable into the preamplifier, as in step 15. Again, ensure that the blue light on the line receiver does not shut off. If it does, disconnect the cable and contact Stanford.
- (19) Plug in the two signal cables to the LEFT and CENTER outputs of the three smaller ones on the outside of the preamplifier boxes. The N/S oriented loop should plug into the left, with E/W going in the center.
- (20) Leave the software running for 24 hours to ensure stability. Contact Stanford if you reach this point, so they can monitor that the data is correct and the site is set up properly.