The Stanford University ELF/VLF Receiver

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Software Set-up
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The following document is intended to be given to the local site host, for information on how to set up the software. This guide has been written after the software has been handed over in the form of a zip file.

To begin, unzip the zip file attached and place the VLF_DAQ folder directly under the C drive. Within the c:\VLF_DAQ folder is another folder called Matlab work. Inside that folder are a few files -- copy those files to the folder c:\Matlab7\work, if you have Matlab installed. To use the software, simply find VLF_daq.exe in the folder and double click on it. The sotware should work on the first try, but let me know if it doesnt. Certain functions will require having matlab 7.0 [release 14] or higher installed but the critical functions do not require it.

When you start it up, you will notice the top half contains information on the system's acquisition, including date, time, location, etc. The middle part shows when the next scheduled acquisition is and the status of the system. The bottom part contains buttons to modify all the settings and schedules.

The password field at the top is needed to gain access to the buttons on the bottom, or to exit the software. The password is lionroar.

Once you've confirmed that the program opens and you can enter the password, close the program, and instead open the VLF_daq_console.exe program. The console looks exactly like the acquisition software except for one small thing.....it doesn't record anything. The purpose of the console is to change all the settings without the program recording. Important: Any time you change any of the software settings, you must press the "save" button, on the main VLF_DAQ screen. The new settings will not take effect until the next time the program is opened.

Now I will take you through the menus one by one:

The station information menu has information about the site just for bookeeping purposes. I didn't put it all in so fill in what you want. The "station ID", by the way, is the two-character code that appears at the beginning of all the data files.

The hardware information menu references the A/D card and the GPS system, this is already set up.

Communication information menu is where you set up the information for FTP transferring. The settings are already in place for the data transfer. The other part of the communication information menu is network settings which you won't need to use.

The data processing menu has two sections at the moment. The spectrogram button is used if you want to have real time spectrograms generated and either saved to the computer, or posted to the internet (or both). You will not be able to run realtime spectrograms and narrowband simultaneously, however, unless you have a computer with a new hyperthreaded processor. Otherwise, you can do once per day spectrograms for diagnostic purposes. The other button, create/modify filter settings, you can ignore, but it enables you to set up a filter for the data to apply in real time. The one filter that is needed, for the narrowband software filter, is already installed and set up.

The next two menus are the broadband settings and narrowband settings, which is where you set up and modify the recordings. The structure is that it divides up all your recordings into a number of channels. For broadband, this means recording off of one antenna. For narrowband, this means recording one frequency off one antenna. The bottom part is where you set the acquisition schedule. Each channel has one or more "timings" associated with it. So for each chunk you'd like to record, click on the "Add" button, and fill in the start and times. For continuous recordings, the period refers to the length of the file, and the period is not applicable. For synoptic recordings, the period is the amount of time per cycle, and the duration is the length of the recording. So, for example, if you wanted to record one minute out of every 15, period would be 0:15:0 and duration would be 0:1:0. Each channel can have multiple timings, but those timings must be the same type -- you cant have a continuous and synoptic timing on the same channel. If you want both broadband and synoptic recordings, simply make a new channel number by pressing the "Add" button near the top. For both the channels and the timing within the channels, you can scroll through them with the next and prev buttons, and delete ones that are no longer needed. The A/D channel number, not to be confused with the broadband or narrowband channel number, refers to whether you want the N/S antenna (1) or the E/W antenna (2). Note the checkboxes near the top where you can decide whether to ftp the data, whether to do low-res narrowband, etc. For narrowband channels the "primary filter number" should always be "NB", and the sample frequency is the integration frequency for the HI-res data (low-res will still be 1Hz).

I set up a default recording schedule for you already, which can be changed. It is important that the recording schedule and the FTP transfer times be in agreement, ie, the ftp transfer times should not be during recording times.

If you want the data automatically transferred to another drive, like an external hard drive, the key is to use the dailycleanup.bat file, which appears in the VLF_DAQ folder. This is a simple batch file which is run once per day. You can set the time that this batch file is run by going to the disk management menu. If the batch file is empty, nothing will happen, but you can fill it with commands to move all the data. I left you an example on how to do this, check the dailycleanupmod.bat file.

When you look at dailycleanupmod.bat, you'll also notice a line at the top, which records the time the batch file was run in the dailycleanuptracker.txt file, just in case you want to keep track. The next line calls a matlab function called dailyMatlab, which should be placed in the folder c:\Matlab. This is optional, but this dailymatlab enables you to implement "buffer mode", which means you can keep a backlog of broadband data in some location, and the oldest data will be automatically deleted once per day enough to make room for the new stuff. So if you set aside enough space for 72 hours of data, then you can save everything there, and then at any given time you will have the last 3 days of broadband data available. So if some event occurs for which you want broadband, and you know about it only after the fact, you won't lose its data.

The way the dailymatlab works is to designate a location, which you can set in line 13 of the matlab code. This location can be another internal drive or another place on the C drive, but I recommend not using an external hard drive because the transfer will take an hour or so, and you'd probably prefer to record instead. Transferring to another internal hard drive will take 20-30 minutes or so. The amount of space you will set aside is set in line 5, in bytes (so 250*1024*1024*1024 is 250GB). Each hour of two-channel broadband data is ~1.5GB. The "bytes per file" refers to the length of each file being moved, typically we use half hour chunks. The dailymatlab will delete enough files to make room, and then it will go into the new day's recording, and move everything from broadband channels 0 and 1 to the designated location. This means you must reserve broadband channels 0 and 1 for the buffer-mode data (corresponding to NS and EW), and put all your other broadband files (like synoptic, or a short test recording) on channels 2 or higher.

The dailymatlab.m file has a second section -- which will find the most recent file in your synoptic folder (if one exists), make a spectrogram, and save it as a picture on your hard drive -- just one. This is useful to take a quick look at a piece of data once per day to make sure it's working. Note that if you want to use this function, but not use the buffer-mode, you can simply delete the section of the dailymatlab. Lines 1-47 do the buffer mode stuff, and lines 48-end do the single spectrogram. But be sure you leave the "exit" at the end, because this closes matlab and resumes the rest of the dailycleanup.

The rest of the dailycleanup can then move the data somewhere, if you want it, which by this point will not include the buffer-mode data. As it is currently set up, though the dailycleanup is blank which means the dailymatlab will not be run, and the data will not be automatically transferred. But now you can modify the setup as you prefer. If you set up any scripts that can convert the data from Matlab to another format, calling that script from dailycleanup.bat is the

easiest way to do it. I previously sent you the details of the Matlab files so you can convert to any form, but let me know if you have any questions about that part.

Anytime you make any changes to the software settings, you must press the save button on the main screen of the VLF_DAQ, while the password is entered. Then, you must exit the software and reopen it. All the software settings are stored in a file called daqsettings.dat, under the VLF_DAQ folder. For your convenience, the VLF_DAQ also contains a folder called "modes". You can save various daqsettings files here in these folders, to allow you to switch back and forth easily. Another folder, called batches, contains files that will swap out the daqsettings file in the relevant folder.