Summer Setup

June 15, 2018

1 CONFIG.txt

Sets the configuration options for the scan of interest. This should be the main file that you modify. I commented this in the code, but below are a list of the configuration options (note that the top line [Configuration file] is required):

- ACQ TIME: The length of time to take data for before doing an FFT. The total averaging time is the product of the acquisition time and the number of acquisitions
- ADDRESS: The IP address of the Rigol. It will look something like *TCPIP0::169.254.125.188::INSTR*. This value is not static and does change. To find it, hit *ESC* on the Rigol to return it to return control back to the user. Then hit *System*, followed by *Interface*, followed by *LAN*. Make sure that it is set to *Auto* and read out the IP address. Another weird quirk that I've found is that it won't always connect, but if I type in the IP address into a web browser, open up the information page, and copy the TCPIP0 line, it normally does.
- END FREQUENCY: The maximum frequency
- GAIN: The gain of the pre-amplifiers (normally 70 dB)
- NUM AVERAGES: The number of averages done on the Rigol before reading the trace out and restarting. The Rigol has a maximum of 10,000 averages, so this number needs to be set to 9,999 or less for it to work correctly.

- PREFX: The prefix for your save files. All save files are saved as PREFIX_n where n is the nth file written.
- RATIO: The resolution bandwidth over span constant for a given window type. For a rectangular window, this is 499/400000. Knowing the required resolution and the center frequency allows you to compute the span using this ratio by solving (center frequency - 0.5*span)*resolution / span = ratio)
- RESOLUTION: The resolution is the required resolution of the bins
- RLEV: The relative level displayed on the screen. It is important to get this right or else the output is clipped for large values
- SAVEFILE: The name of the file where the current state information is stored
- TOTAL TIME: The total amount of integration time for a single window

2 status.txt

This is a write-protected file that gives the current status of the data acquisition. It is used to restart the data acquisition process when the data acquisition process is stopped (for example to change a battery). It has 3 values in it:

- The first is the current file number. This is just a counter that keeps track of the current number of files written.
- The second item is the total amount of time spent on the current window. This allows you to pick up where you left off and continue averaging
- The third item is the current center frequency

3 serialConnectionRigolLAN

This is the main code that acquires the data and writes it to disk. Currently, it is set up in the following fashion:

- Set the Rigol with the following settings:
  - Real time spectrum analyzer mode
  - Positive peak detect
  - Log scale (important)
  - Normal display setting
  - Rectangular window
  - Averaging mode
- Let the Rigol average a certain number of acquisitions (specified in the configuration file) and save this data. Note that this data gets cleared after every average. No averaging is being done locally before saving the data
- Repeat until the product of the total number of acquisitions multiplied by the acquisition time is greater than the amount of time you wanted to average for.
- Change the center frequency by span/2 and repeat the process until the center frequency reaches the end frequency specified in the configuration file.

4 Tips

- To return the Rigol to human-controlled mode, hit the *Esc* key on the front panel
- Set the IP address by hitting *System*, *Inferface*, *LAN*. Make sure that the mode is Auto and hit Apply. If unable to connect to the Rigol type the IP address into a web browser and copy the TCPIP0 line.
- Make sure that the number of averages doesn't exceed 9,999