4195A Capture, Display and Compare

A set of utilities to make life easier when capturing data from the HP 4195A.

This document and all software was written by:
George Hrysanthopoulos, george@maximaphysics.com

Overview

The HP 4195A is a beautiful instrument. It is really a measuring computer. However, for some reason, it has not been documented properly. Normally, data we scan (or measure) is commonly shared for the benefit of all. Not so much for the 4195A. Some very nice code has been written for the instrument but it is isolated. My goal is to create software tools to read from the 4195A (and other instruments) and display the results in HTML pages so it can easily be shared, viewed and used for comparison between runs.

As one would expect, all my code is GPL.

I won't waste your time. I will show you how to take multiple measurements from the 4195A and view all the results side-by side in an "easy to use" web interface.

Here we go.

Prerequisites

Hardware: HP 4195A, Prologix GPIB/Ethernet adapter.

Software: Linux. I use Fedora 33.
Python 2.7.18 and plotly. You might need more python modules. Install what is requested. Usually this shows up as “missing module” when you run the python program.

Prologix GPIB code is used to interface with instruments on the GPIB bus. Download the latest from the Prologix site. This software can talk directly to the controller and it is great for debugging. Get it from here:
http://prologix.biz/gpib-ethernet-controller.html

Download the GPIB interface code for python.

This is the core interface code. You can get it here. Everything depends on this code:
https://github.com/nelsond/prologix-gpib-ethernet

Configuration:

Both the IP and GPIB address are set in a file called: **prologix_gpib.conf**

The software references this file to set itself up.

Configure the Prologix adapter properly:

I have it set to: 192.168.1.18 – Make sure you can ping it!

Configure the 4195A GPIB address:

I have it as: 3

Download all my software (from github) and make sure all the python modules are installed. My working directory is in:

/opt/GPIB/GPIB-Code

Install apache

Setup the HTTP document root. I created a directory like this:
/var/www/html/GPIB

Inside are 2 files:

lrwxrwxrwx 1 root root 29 Mar 4 22:01 index.cgi -> /opt/GPIB/GPIB-Code/index.cgi

drwxr-xr-x 3 root root 4096 Apr 20 22:03 scans

Note: The soft link points to the software you downloaded from github!

There is a file in the software tree called:
httpd_conf_sample_entries

Use what's in there to update your apache conf file:
/etc/httpd/conf/httpd.conf

If you setup apache properly, you should be able to go to:

`http://your_machine/ GPIB/index.cgi`

and see this:

That's it! Nothing fancy. The name of your apache server and the time/date underneath. We will get very fancy in one minute !

Let's create some scans!

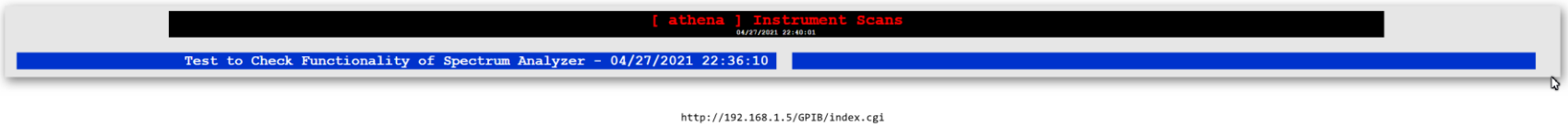
Let's setup the 4195A to be a spectrum analyzer for the FM radio band: 90-110MHz.

Lets run:

```
[root@athena-n]:/opt/GPIB/GPIB-Code # ./plot_copyxa \
1 \
sample_spectrum_test1 \
"First Run of Spectrum Test" \
"Test to Check Functionality of Spectrum Analyzer"

Output path = /tmp/GPIB_BUILD
IP: 192.168.1.18 - GPIB: 3
Resolution Bandwidth: 100E+3Hz
Reference Top: -50
Span: 20E+6Hz
Start: 90E+6Hz
Stop: 110E+6Hz
Step: 50E+3Hz
Sweep Time: 1.36000001431
[gpib.read] End of Data
0 > SPECTRUM Configuration
1 > N,FREQUENCY_Hz,MAG_dBm,MAG
```

Now, let’s look at the HTML page:



As you can see, the text for the first run, is the same as the fourth parameter.
Now that we’ve established a project name, let’s run again with the same project.

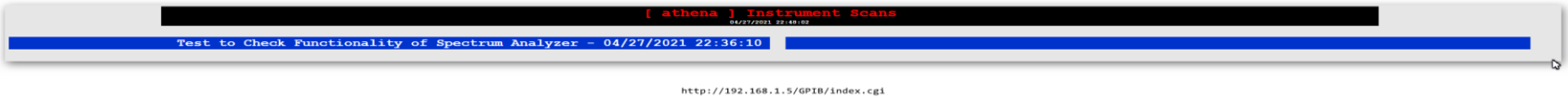
```
root@athena-n]:/opt/GPIB/GPIB-Code # ./plot_copyxa \

2 \
sample_spectrum_test1 \
"Second Run of Spectrum Test"

Output path = /tmp/GPIB_BUILD
IP: 192.168.1.18 - GPIB: 3
Resolution Bandwidth: 100E+3Hz
Reference Top: -50
Span: 20E+6Hz
Start: 90E+6Hz
Stop: 110E+6Hz
Step: 50E+3Hz
Sweep Time: 1.36000001431
[gpib.read] End of Data
0 > SPECTRUM Configuration
1 > N,FREQUENCY_Hz,MAG_dBm,MAG
```

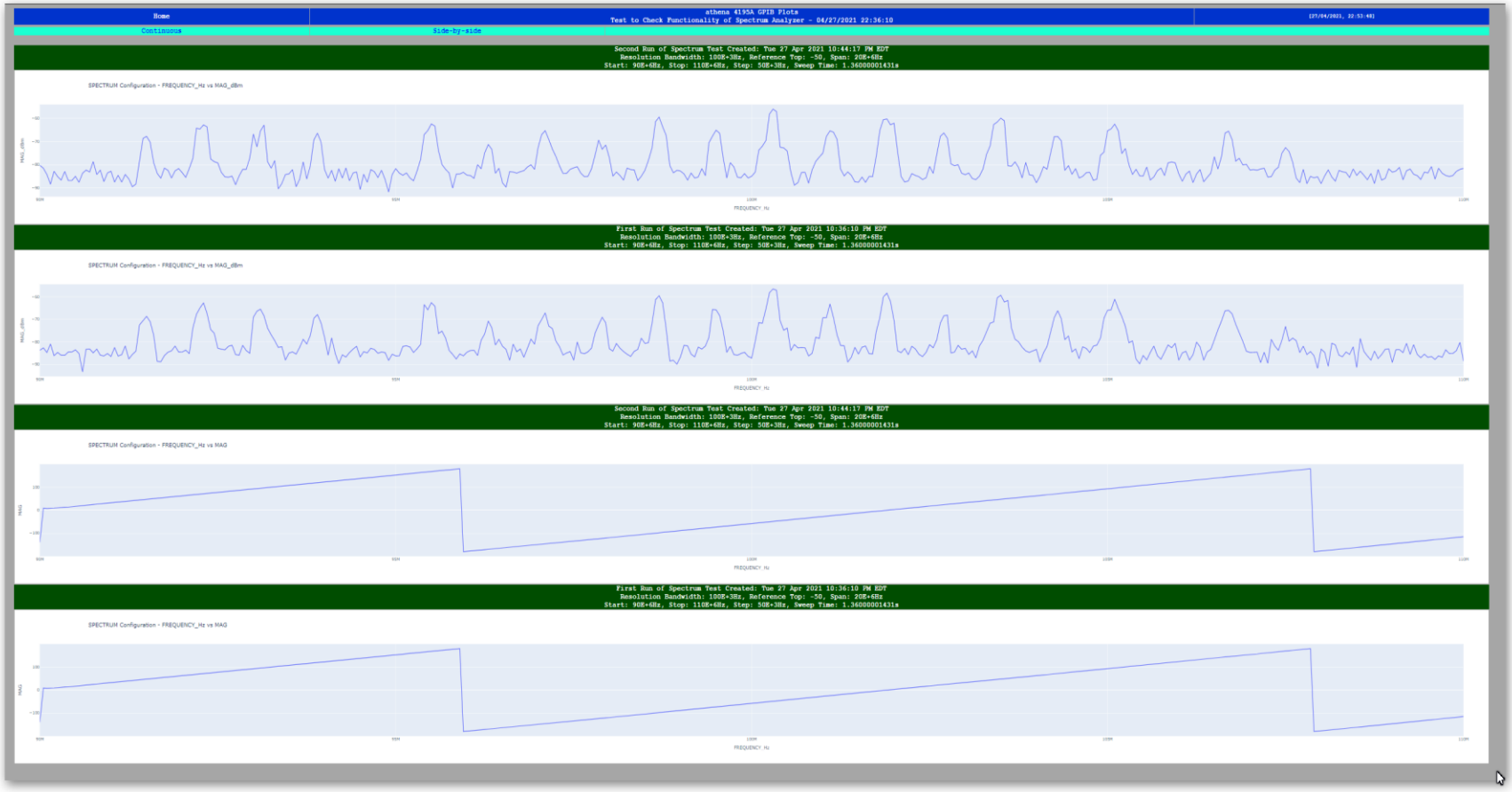
No need to change the fourth parameter. It was established from before.
The source directory (parameter 2) remains the same for this project.
The Run Description (parameter 3) is changed to reflect the second run.
The run version (parameter 1) has been changed. It we kept it at 1 it would overwrite the previous run.

Now, let’s look at the HTML page:

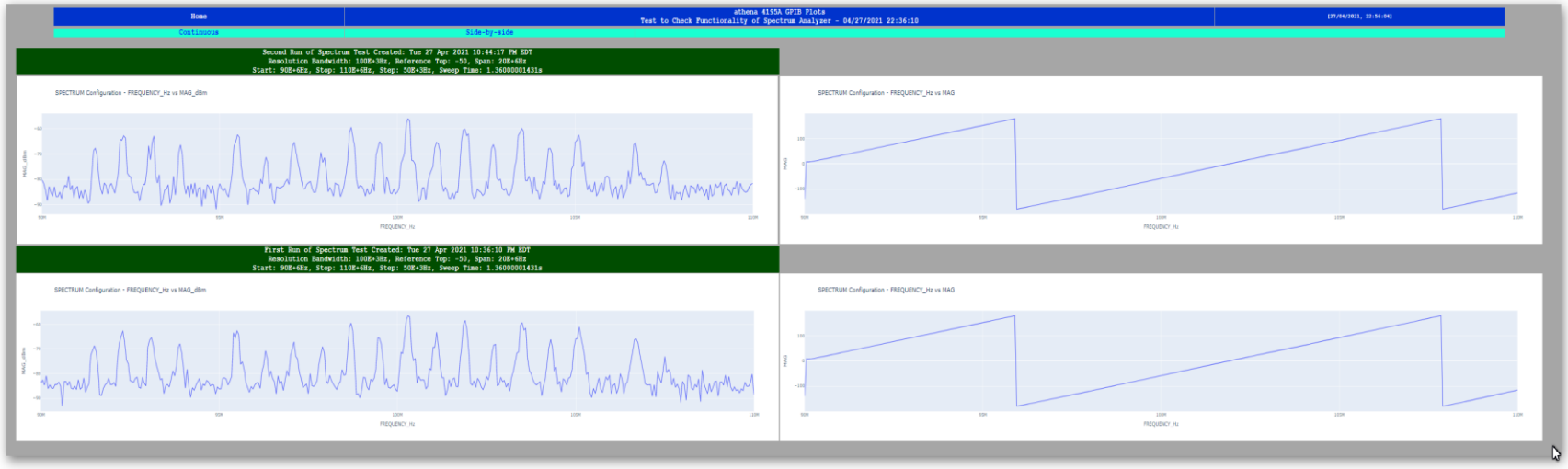


As expected, nothing changed because we are under the same project name.

Now, let’s click on the project.



We get the spectrum list first, (sorted by latest date/time on top) and then the phase scan below. For the spectrum function, phase means nothing.
And if we click on the “side-by-side”, we get:



Now we have spectrum and phase side-by side. You can add as many as you want.

Enjoy !