



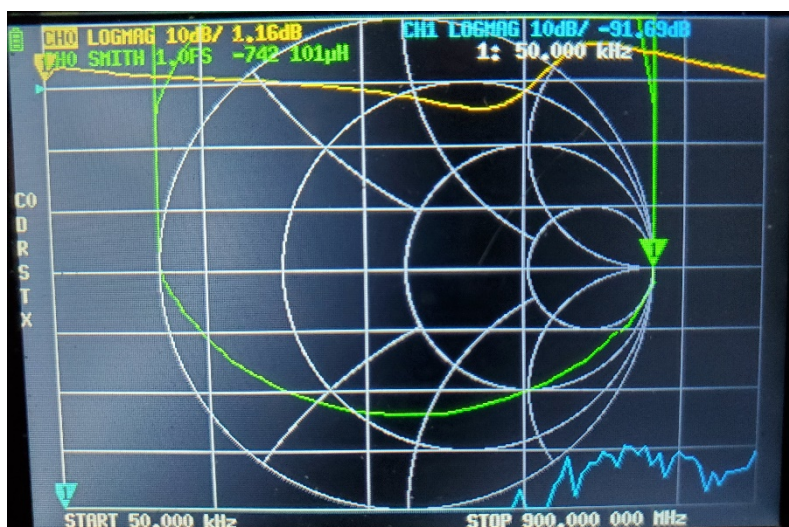
This procedure is for the use of a NanoVNA for measuring SWR of an antenna directly on the NanoVNA device. There are different hardware versions of the NanoVNA – The one used here is called the “NanoVNA-H 4” and it has a 4 inch touchscreen display. The firmware is version 0.5.0 (as originally installed).

The NanoVNA kit came with most of what is needed to make SWR measurements. The only additional thing I had to buy was a jumper cable to allow me to connect the PL-259 on the end of my antenna feed line to the SMA connector on the NanoVNA.

Reading the characteristics of a typical ham antenna only requires one of the two inputs on the NanoVNA – CH0 also described as S11 is used (upper connection). The other connector is not used in this procedure.

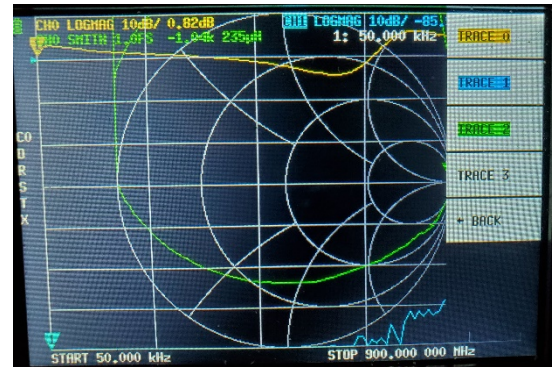
### **Initial Display Setup:**

1. Turn on the NanoVNA  
Your screen may look different than this view (right). Out-of-the-box, it should have the same range and may show four color traces instead of the three shown. The next steps will show you how to make the necessary changes.



2. Click anywhere on screen with the (guitar pick) stylus to open the Main Menu
  - a. Select “Display”
  - b. Select “Trace” – 4 traces will be listed initially, you can de-select or select traces.

I turn off trace #3 as it is unnecessary. If you momentarily click on “Trace 3” it un-highlights it and turns it off.



We need to do one more thing in this case – All 3 traces MUST be set to “CHO” and as you can see, my “Trace 1” is set to “CH1”

- c. Momentarily select “Trace 1” to highlight it and then click “BACK” to the previous menu and then select “CHANNEL” so you can set Trace 1 to “CHO – REFLECT”.

Now all three traces should be set to “CHO”

Notice that Trace 1 is set to “LOGMAG”  
We need to set it to “SWR”

- d. Select “Back” to go back to the previous menu
  - e. Select “Format”
    - i. Select “SWR”
    - ii. Select “Back”, then “Back” to the Main Menu



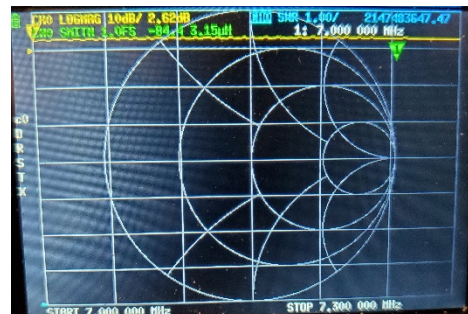
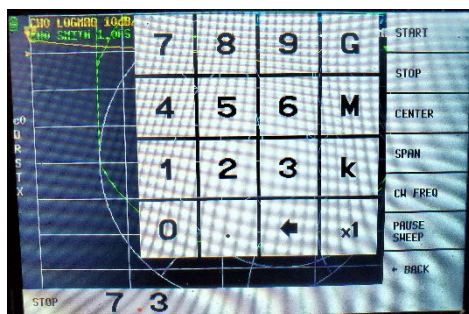
Now the screen should look like the figure on the right. (except for the curves)

**Set Desired Frequency Range:**

- f. Now select “Stimulus” from the main menu to set the Band Range (MHz)
    - i. Click on “Start” and enter the lower-end of the frequency range (ex: “7M”)
 

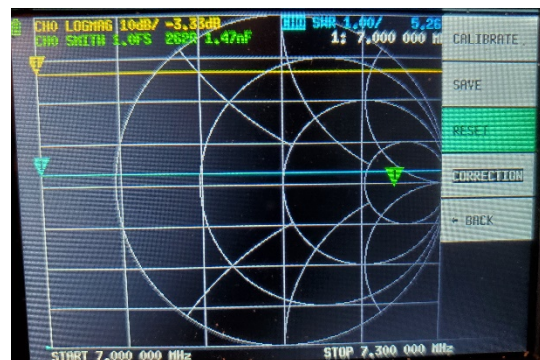
You must press either “M” (Megahertz) or “k” (Kilohertz) after the appropriate number.
    - ii. Click on “Stop” and enter the high-end of the frequency range (ex: “7.3M”)
 

You must press either “M” (Megahertz) or “k” (Kilohertz) after the appropriate number.
    - iii. “Back” to previous menu

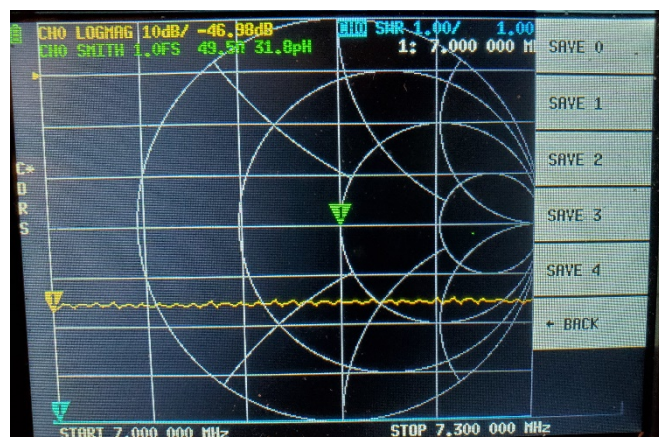
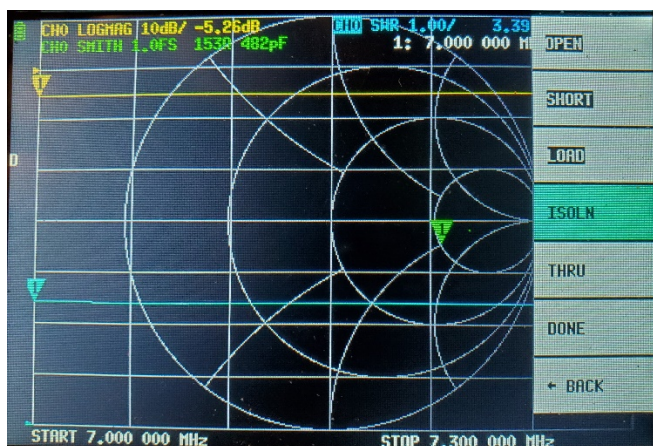


**Calibrate for the desired frequency range:**

- g. Select “Cal” to go to Calibration Menu
  - i. Select “Calibrate”
  - ii. Select “RESET” (very important!) in order to delete the previous calibration constants and replace with specific calibration values needed for your desired frequency range.
  - iii. Select “CALIBRATE” to bring up the calibration menu
    - 1. Screw on the OPEN calibration standard and Select “OPEN”
    - 2. Screw on the SHORT calibration standard and Select “SHORT”
    - 3. Screw on the LOAD calibration standard and Select “LOAD”
    - 4. Select “DONE” and you have the option of saving the Stimulus Range and Calibration in non-volatile memory locations S1-S4 – (Not required, but a good idea)



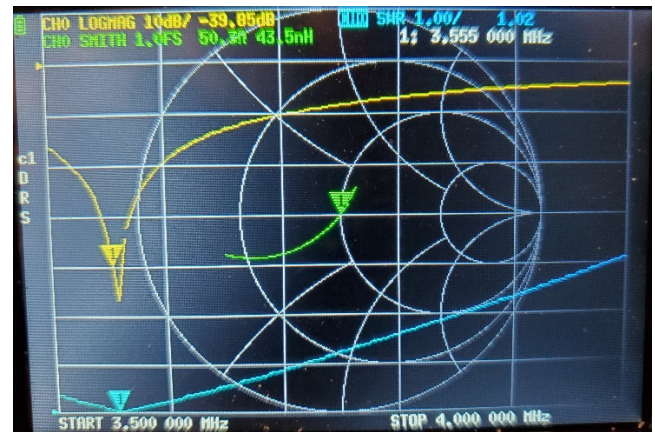
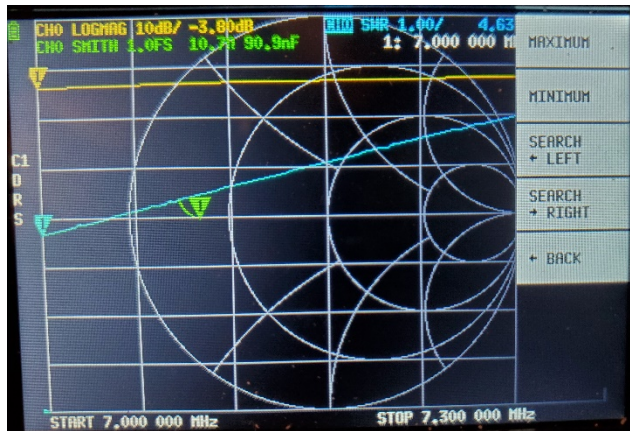
**TIP: Do NOT use S0 because factory calibration data is stored there.**



- 3. Now you are ready to analyze your antenna.

*Before connecting your feed line, always use a conductive tool (screwdriver, etc) to short between your feed line’s center connector and the outer shield of the connector so that you remove any static charge that may have accumulated in the feedline which might damage your sensitive NanoVNA.*

4. Now screw your feed line onto CH0 (S11) and you should see three traces: LogMag, Smith Chart and SWR. You can move the marker along the SWR curve and read specific SWR values at points along the frequency axis by using the multi-position switch on the top of the NanoVNA. You can also use the “MARKER” and then “SEARCH” feature from the main menu to locate the MAXIMUM or MINIMUM values of the curve.



5. To save the graph, you can take a picture with your phone or there is software available which will allow you to connect the NanoVNA to your computer via USB and record data as well. I have used NanoVNA-Saver software on my Windows10 pc connected to the NanoVNA via a USB connection. NanoVNA-Saver has additional functions for saving data and charts to your computer and you can put away the guitar pick, but the fundamentals are the same.
6. To analyze another band, go back up to step# 2f above and repeat the process using the desired stimulus frequency range and you must also re-calibrate for each new range. The combination of frequency range and calibration data can be saved in memories 1-4 for future use. I always make it a habit to recalibrate every time I make a new measurement. Once you get the hang of it, the time spent is a small cost for reliable measurements.