



The

February 2020

Propagator

The Monthly Newsletter of the South Orange County Amateur Radio Association

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General Meeting

February 25,
2020 7:00 PM

NP Murray
Center
Veterans Way
Mission Viejo

President's Message, February 2020

For my President's ramblings this month, I want first to do a recruiting spiel: SOARA is searching for an Activities Director. This position is a non-voting seat on the SOARA Board, and is a great opportunity to learn and give input into the decisions and inner workings of your club. The duties primarily consist of basic planning and coordinating the three major club activities for the year: Field Day, Picnic, and Holiday Banquet.

It's not as daunting as it may sound, as generally once your call for help, along with the promise of food, is put out, there is no shortage of volunteers to help. So, if you are an organizer, or want to become one, this is a fantastic way to help out the club. I like to tell those folks who have done the organizing before, that's it's very much like the line from Kevin Costner's movie, Field of Dreams: "If you build it, they will come" add in, if you offer them food, as a big incentive.

Again, you don't have to cook, clean, or bottle wash: we have ample volunteers that gladly help out. The dates are already set, so you just have to present the opportunity to the members. Please contact me, or any SOARA Board member for more information, if you're interested think you can help out.

Lastly, I'm going to give a shameless plug: Check your March '20 issue of QST. SOARA and OC Fire Watch are prominently presented in an article in the Public Service Section. I think It's a really great article, but then, I'm not completely unbiased; I wrote it!

**73 to all,
Ray, AE6H
SOARA President**

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[General Meeting - January 27, 2020](#)

Norman P. Murray Center, 24932 Veterans Way, Mission Viejo



Michael Rickey AF6FB from PAPA will present make a presentation about DMR. In this talk he will cover a little about the PAPA System, the history and features of DMR, using & programming the AnyTone D878, and hotspots.

Michael is mostly active on VHF and UHF - Analog and DMR, but you will find him on D-STAR occasionally. He is frequently on the BrandMeister DMR talkgroup SoCal/31066. He also does a little HF work, mostly portable. Michael is a member of The PAPA System and MARC (The Motorcycling Amateur Radio Club)

Ham Radio Examinations will be administered at 6:00 PM, prior to the start of our general meeting. Cost is \$15/attempt. Pre-registration is not required and you don't need to be a SOARA member to take the test.

Erik Wresch W6INE
Vice President/SOARA

[SOARA Elmer Saturday \(SES\) March 14](#) [Software Defined Radio - Gilleran Park](#)

The next SOARA Elmer Saturday will be March 14, 9am-noon at Gilleran Park in Mission Viejo, CA. Coffee and donuts will be provided. Bring your SDR, software defined radio and demo an application. There are many types of SDRs these days. I plan to bring something interesting and portable!

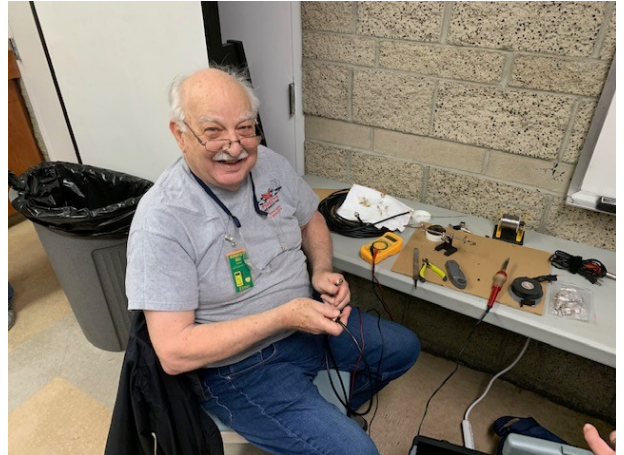
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February 2020 SES Solering and Kit Building

The kit building February SOARA Saturday was awesome. We had 20+ attendees and at least 6 soldering stations smoldering. We all had fun and learned a bit along the way.



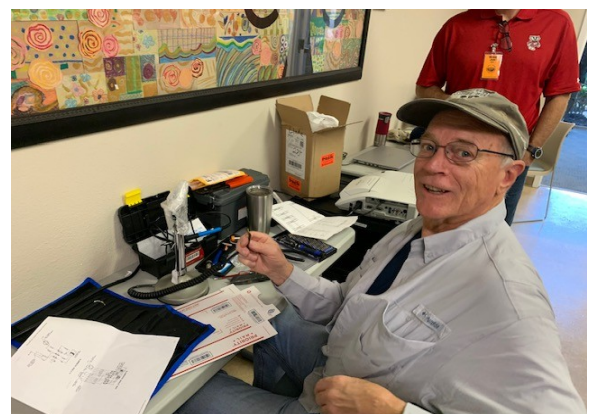
Alex, K6FTL, left, and Dale, W6EDT, right repairing a radio!



Bill, KM6FOY soldering coax connectors!



Brian, NJ6N was demonstrating past projects



Jim, N6JCN repairing a lollipop microphone!

Ed, WA6ED demoed a Tesla coil kit and a a LED clock with plenty of blinkin lights.

I really appreciate the coffee and donut fund donations. This helps SOARA defer the cost and then SOARA can spend funds on more important things like radios, and equipment. Also, coffee and donut donations are more fair since those that benefit (drink the coffee and eat the donuts) support the cost. A great all around win-win!

73,
Ed Barnes, WA6ED
wa6ed@soara.org

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[Building a KISS mode TNC using an Arduino](#)

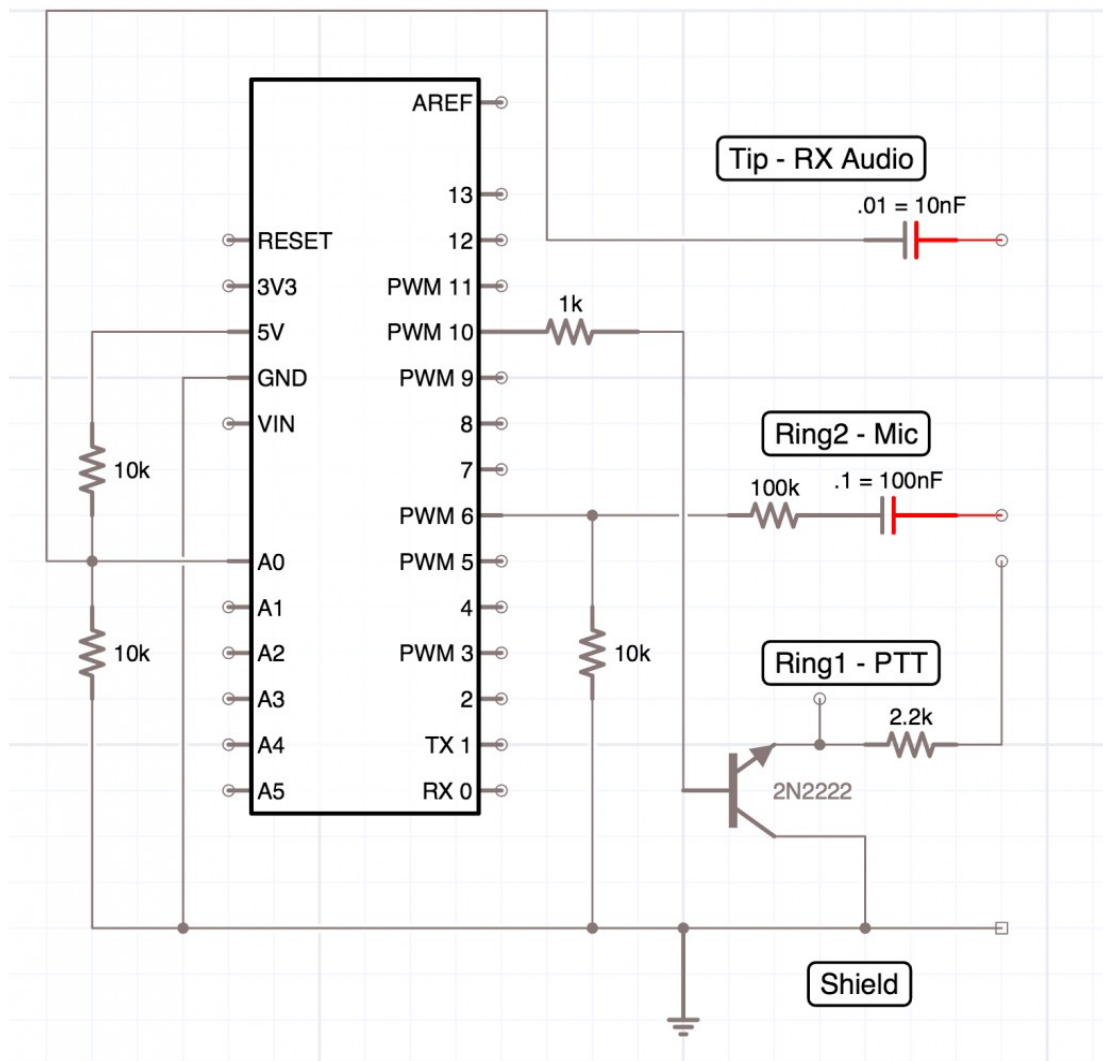
Mobilinkd (<http://www.mobilinkd.com>) is the producer of very compact and capable bluetooth enabled KISS mode TNCs that are used with APRS applications on Android, iOS, Windows, and Linux, and Mac OS.

Their original prototype was built using the Arduino platform.

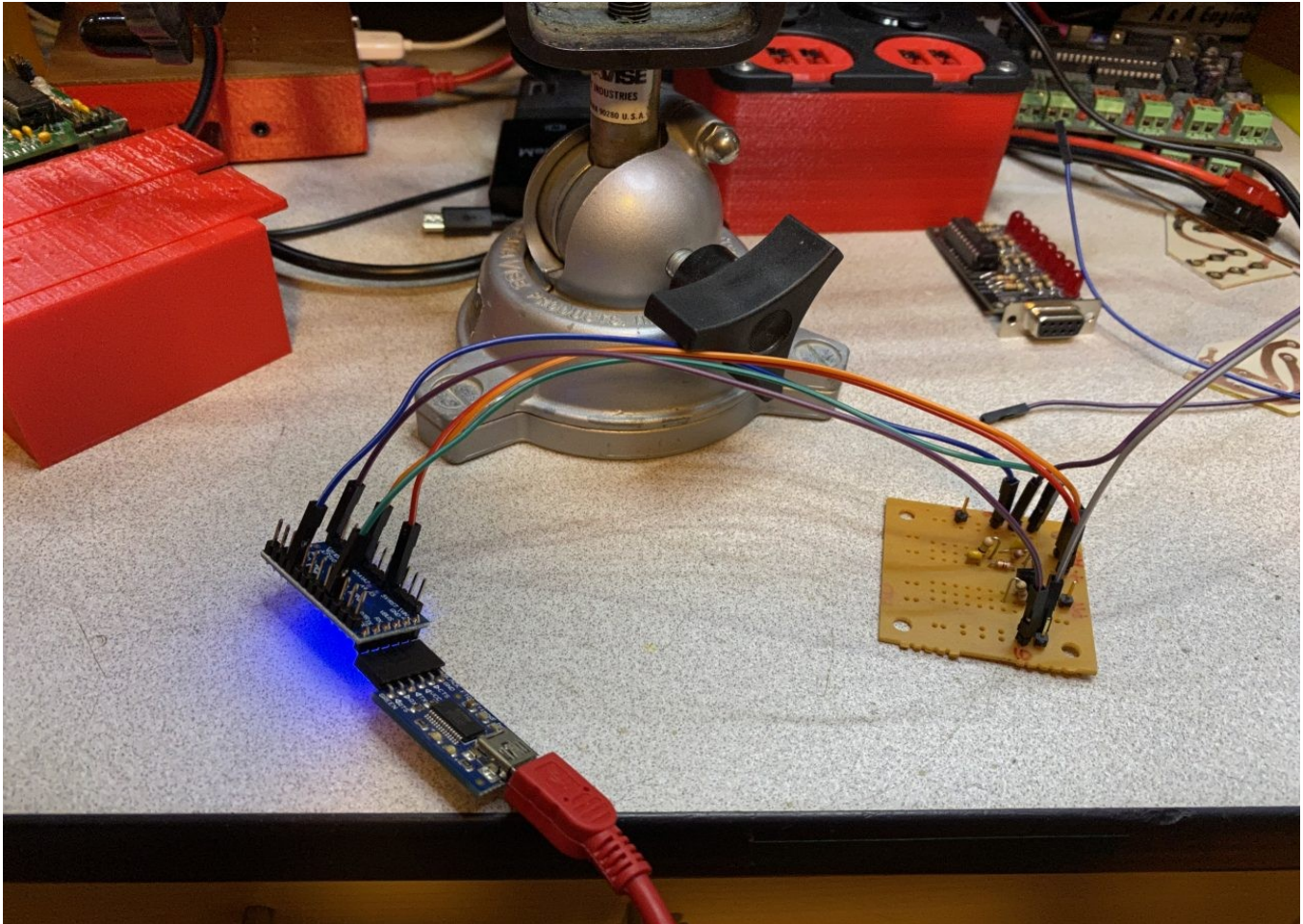
On their website, they provide breadboard descriptions of various TNC designs including an Arduino based KISS TNC: <http://www.mobilinkd.com/2014/09/11/arduino-kiss-tnc/>

Having a few spare Arduino boards lying around, I though it would be fun to build one.

First I drew a schematic based on their breadboard design using iCircuit:



Then I built the simple circuit on a Radio Shack prototype DIP IC circuit board that I had on hand:



Mobilinkd provides the firmware for the project in the form of a HEX file that can be uploaded to the Arduino using "avrdude". I used a Raspberry Pi 3 to flash the firmware onto the Arduino board.

I connected the finished KISS TNC to an Icom IC-91AD via the Speaker/Mic jack (RX/TX+PTT). I used the same Raspberry Pi 3 to test the KISS mode TNC using the AX25 utilities *kissattach* and *axlisten*:

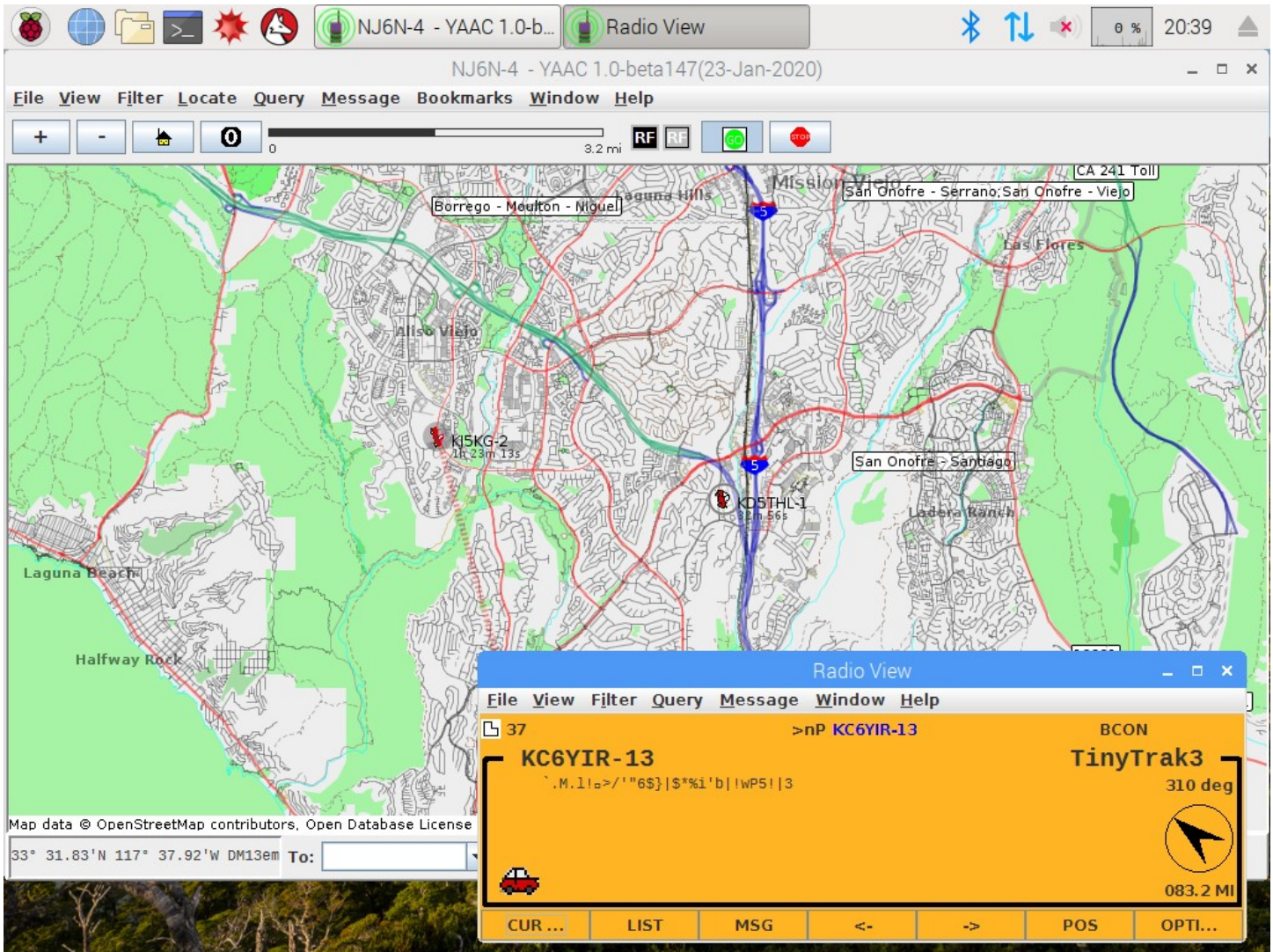
```
root@red-tncpi:/home/pi# kissattach /dev/ttyUSB0 2 10.1.1.44
AX.25 port 2 bound to device ax0
root@red-tncpi:/home/pi# axlisten -a

2: fm NT6T-2 to ID via WA6ZSN* WIDE1* N6EX-4* ctl UI pid=F0(Text) len 28
0000 NT6T-2/R WIDE1-1/D NT6T-3/B.
2: fm KB6CIA-9 to S3UQRU via N6EX-4* ctl UIv pid=F0(Text) len 56
0000 `~QBppt>/`"3p}SPONGEBOB ENROUTE TO THE KRUSTY KRAB!!!_%.

```

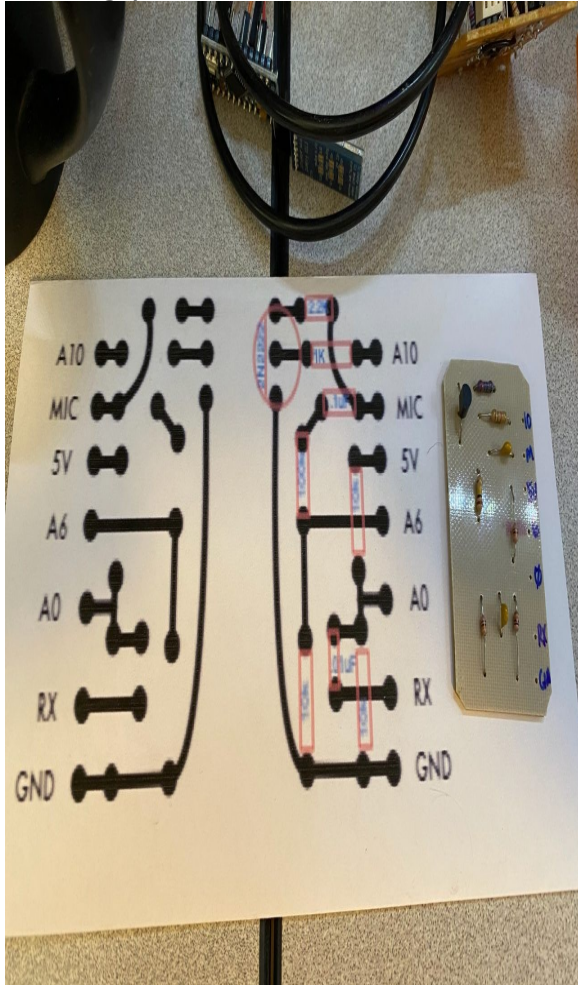
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It worked right off the bat! Next, I configured the Java based “Yet Another APRS Client” (YAAC) software on the Raspberry Pi computer to use the new KISS mode TNC. That worked right off the bat also.



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To build a more permanent interface board, I drew up a PCB design using OmniGraffle Pro. I saved that as a JPEG and then used my Cricut (pronounced "Cricket") die cut machine to cut the design out of vinyl. I wasn't sure the vinyl would hold up to the PCB etching process, but it did! I used a Dremel drill press to drill the circuit board holes.



OmniGraffle Design & parts overlay



Cricut PCB on FR4

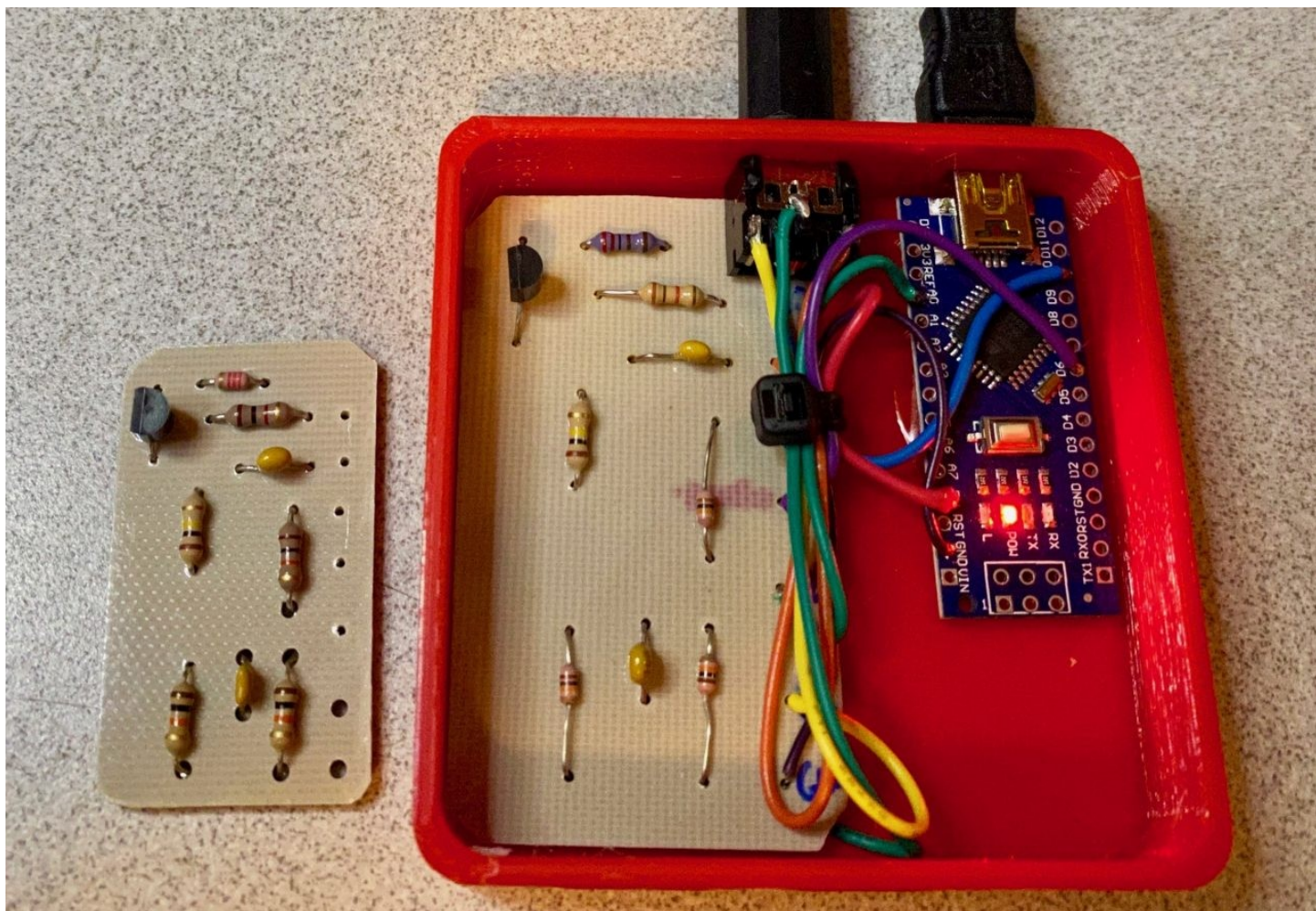
Lastly, I designed a custom 3D enclosure. I wanted it to be as small as possible, so instead of building in circuit board stand-offs, I simply used hot glue to fix the boards to the case.

Later I'll try to figure out a clever snap-in design for the Arduino board and will probably use stand-offs for the interface board. The interface board can be scaled down to make it smaller. I'm also thinking about adding solder pads for my standard TX+PTT/RX 3.5mm stereo jack to the PCB.

Using the Cricut cutter software, it was easy to scale the PCB etch pattern down. Since I'm using through-hole parts without critical dimensions like resistors and transistors, I don't have to worry too much about the parts fitting the new spacing.

I made a smaller version of the interface PCB. However, I forgot that I had the larger PCB drill installed in my Dremel drill press that I used for a PowerPole circuit board project, so some of the through-holes were drilled too large.

Here's a comparison of my original board (right) and my new scaled-down board (left)



The new board is much closer to the size of the Arduino Nano board that runs the KISS firmware. The first enclosure was 70 x 70mm square. The new one is 60mm x 52mm.

Brian NJ6N

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Membership Report

Currently, we are 234 active members with 34 unpaid dues. If you wish to continue your membership please pay your dues now. Regular dues are \$50. Renewal reminders have been sent monthly since last October. I will be inactivating unpaid memberships on or about April 2nd.

Welcome New Members!

Andy, KN6HDF
Thom, KM6ZPK
Tom, W6FT
Ben, KN6HDB
James, KN6GAG
Jeff, W6BIK

If you need a new badge, let me know. I typically make badges monthly. If I forgot your badge, please remind me. If you forgot your badge, see me and pick it up. I have a stack of badges. Wearing your badge is a great way for others to get to know your callsign and name plus show your SOARA support!

**73,
Ed, WA6ED
SOARA Membership Director**

Net Etiquette

Recently there was some confusion on one of our nets. People were passing off to others without going through net control, talking on top of each other without waiting for a clear space and a myriad of other behavior not conducive to good net protocol. Technically all our nets are directed nets and it is up to the net control to decide if he wishes to run it as a round robin type net, but it is still a directed net and what I heard this morning did not follow the rules. If the net control operator does not step in to stop this then we will have confusion out there and that is not the way it should be. Everyone taking part in the net should respect the net control and defer to him/her under all conditions. Net control should, on the other hand, always leave breaks, when possible, during the check-in so that as many operators as are available can check in without being run over by an eager net control. If necessary net control can limit the amount of operators checking in at one time to simplify recording their information.

Below is some information cribbed from other sources to emphasize the importance of a net control's job.

The moderator in a radio net is called the Net Control Station, formally abbreviated NCS, and has the following duties: Establishes the net and closes the net; Directs Net activities, such as passing traffic, to maintain optimum efficiency; Chooses net frequency, maintains circuit discipline and frequency accuracy;

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A Net Control Station (NCS) is an operator responsible for controlling all radio traffic on the repeater during a directed net. The NCS should view themselves as an emergency dispatcher. The NCS needs to remain professional at all times and needs to maintain a calm collected demeanor. While serving as the net control station, you maintain total responsibility and authority in providing a smooth running net. Remember that you are in charge. Do not allow any arguments or unregulated operating to take place. When transmitting, be sure to 'hang back' after the courtesy tone, in order to give stations a chance to break in.

A directed net is formal, has a set of rules or net directives, all communications must go through net control. It controls the frequency with net related traffic only, and has a specified person in charge, the Net Control Station (NCS). The NCS will issue specific instructions on how he/she wants the net to run. A directed net is one in which it is necessary to obtain permission from the NCS before transmitting to other stations in the net.

At all times please remember that we are doing this because we want to. Please remember also that one of the purposes of these nets is practice for the real emergencies

Heiko AD6OI
Communications Director for SOARA

[How to Calibrate the NanoVNA and Measure Antenna Standing Wave Ratio \(SWR\)](#)

By: Charlie KC6FZY
January 31, 2020

Introduction

The purpose of this document is to help the first-time user of the NanoVNA calibrate the device and the use it to make antenna (Voltage) SWR measurements. The document is organized into five parts.

- 1. NanoVNA Parts Required for Calibration and SWR Measurement**
- 2. How to Calibrate the NanoVNA**
 - A. The NanoVNA Calibration Method Described in the Chinese-to-English User Guide**
 - B. Calibration for First-Time Users of the NanoVNA**
- 3. How to Measure SWR with the NanoVNA Using its Built-in Command Menus**
- 4. Miscellaneous Comments on NanoVNA Setup and Displays, etc.**
- 5. Sample SWR versus Frequency Traces**

If the reader is somewhat familiar with the NanoVNA display screen and how to select functions from the main screen then sections 2B and 3 are most pertinent and will allow

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the user to calibrate and measure SWR without reading the other sections or the other information sources identified in them. However, reading all the sections and reviewing the other information found at the Internet locations identified in the document is strongly suggested for the new user. Photos of SWR for a VHF/UHF handheld transceiver and HF antenna are shown in Section 5.

For a more detailed discussion of the NanoVNA and its capabilities compared to a laboratory Vector Network Analyzer (VNA), the user is directed to the article located at <https://groups.io/g/nanovna-users/attachment/896/0/NanoVNA%20Calibration%20Considerations%20and%20Procedure%20FINAL.pdf>. It also contains a step-by-step procedure for calibrating the NanoVNA like the one described in Section 2B of this paper.

1. NanoVNA Parts Required for Calibration and SWR Measurement

The following items are required to calibrate the NanoVNA and measuring Standing Wave Ratio (SWR) of an antenna. Depending on the antenna connector, an SMA adaptor of the proper type may be needed (for example, a UHF to SMA male adaptor for HF antennas connected to RG-8 coax using a PL-259 connector).

These parts come as part of the NanoVNA package except for the adaptor(s) and the stylus needed to facilitate use of the touchscreen.

- a. The NanoVNA assembly
- b. Two coax cables with male SMA connectors on both ends for calibration use and connecting to devices under test (DUT)
- c. Three SMA connector caps (a 50 Ohm load, a Short, and an Open) These connectors are not labeled so you will need to identify each one and mark it with a Sharpie so you can use the correct SMA load cap during the calibration process. The OPEN load SMA cap has no center pin; The SHORT load SMA cap has a pin in the center surrounded by metal; the 50 Ohm SMA cap has a pin in the center surrounded by a white ring of material inset into the metal cap. It is advisable to use two of the SMA load caps to cover the two NanoVNA female SMA ports to avoid damage or contamination when the device is not in use.
- d. Two SMA female to female connectors (you can get by with only one for the THRU calibration test)
- e. One programming/power charging cable with a USB connector on one end and a smaller connector for the top of the NanoVNA

Also useful is a soft tip stylus to bring up list of commands, selecting commands, and moving markers. I used one from a PDA I no longer use. Using a sharp object as a stylus is not recommended. **More importantly, even through the sliding lever can be used to do the above it is very difficult to set frequencies (i.e. entering numbers) using the sliding lever and a stylus is a necessity.**

A useful introduction to the NanoVNA is a user's guide translated from the original Chinese user's manual. This guide can be found on the Internet at http://nanovna.com/?page_id=60. Unfortunately, it has its limitations due to the differences between languages but generally clarifies how information is presented on the display, how to

select commands, and enter numerical data such as the devices starting and stopping frequencies. **However, reading the first three topics in the guide is essential before following the directions in this paper since they introduce the device, and more importantly, describe how information is presented on the touch screen.**

If you want a Graphical User Interface (GUI) for you laptop or desk computer go to <https://github.com/mihtjel/nanovna-saver/releases> and download the latest version of NanoVNASaver (e.g., nanovan-saver.v0.2.2.1). This version was released January 17, 2020. This makes the NanoVNA operate like a much more expensive Vector Network Analyzer (VNA).

Since I wanted an inexpensive and convenient way to measure my antenna's SWR in my backyard and at my cabin the following SWR measurement procedure only uses the menu commands available on the NanoVNA display and does not require the GUI running on a laptop or desktop computer. In fact, you can carry everything you need to measure SWR in your shirt pocket!

2. How to Calibrate the NanoVNA

A. The NanoVNA Calibration Method Described in the Chinese-to-English User Guide

The instructions on how to calibrate the NanoVNA are described in the nanovna.com guide mentioned above. The calibration procedure is the fourth item in the guide titled "Calibration NanoVNA." The steps are repeated below:

1. Reset the current calibration state CAL RESET
2. Connect OPEN standard to CH0 port and execute CAL CALIBRATE OPEN.
3. Connect SHORT standard to CH0 port and execute CAL CALIBRATE SHORT.
4. Connect the LOAD standard to the CH0 port and execute CAL CALIBRATE LOAD.
5. Connect the LOAD standard to CH0 and CH1 ports and execute CAL CALIBRATE ISOLN. If there is only one load, the CH0 port can be left unconnected.
6. Connect cables to the CH0 and CH1 ports, connect the cables with the through connector, and execute CAL CALIBRATE THRU.
7. End calibration and calculate error correction information CAL CALIBRATE DONE Specify the data number and save. CAL CALIBRATE SAVE SAVE 0.

Of course, this procedure assumes you have read the first three topics in the NanoVNA user's guide and understand how to navigate the display. For a first-time user this is incredibly difficult, so I prepared the following step-by-step calibration description to help the reader get through the process until it becomes automatic after doing it a few times.

B. Calibration for First-Time Users of the NanoVNA

Calibration is done using the two coax cables that came with your NanoVNA for full reflection and transmission from and through a device along with the three SMA load

caps and one female-to-female SMA adaptor. However, since measuring SWR only uses the reflection CH0 port, calibration of the transmission port CH1 is not required. However, the following procedure will include calibration of both port CH0 and port CH1 since you may want to use other capabilities of the NanoVNA in the future that require the use of port CH1 (like a bandpass filter).

1. Connect the end of one calibration cable to the CH0 SMA port (set aside the SMA load protecting the port you will need it later)
2. Connect the end of the other calibration cable to the CH1 SMA port (set aside the SMA load protecting the port you will need it later)
3. Turn on the NanoVNA by sliding the power switch to the right.
4. Tap the screen to bring up the main menu with DISPLAY at the top and CLOSE at the bottom (if this menu doesn't come up continue tapping BACK until it does).
6. Attach the SMA open load to port CH0
7. Set the frequency range over which calibration is desired (in this example START will be 50kHz and STOP will be 900 MHz) by tapping START
8. Tap STIMULUS
9. Tap START to begin entering the starting scan frequency
10. Tap the righthand portion of the white band at the bottom of the screen to bring up the numeric entry pad. Note START appears at the left of the number in the white band
11. Use the stylus to type in 50 and then k to set the start frequency at 50 KHz
12. The numeric pad disappears after tapping k
13. Tap the screen to bring back the menu with START at the top
14. Tap STOP to begin entering the scan frequency upper limit
15. Repeat steps 11 through 13 but enter 900 M
16. The numeric pad disappears after tapping M
17. Tap the screen to bring back the menu with START at the top
18. Tap the bottom entry on the menu BACK to return to the main menu with DISPLAY at the top
19. To begin the calibration process Tap CAL
20. Tap CALIBRATE
21. Connect the SMA open load cap to SMA port CH0 by connecting it to the open end of the test cable connected to CH0
22. Tap OPEN
23. The SHORT menu item is highlighted automatically
24. Connect the SMA short load cap to the SMA port CH0 by connecting it to the open end of the test cable connected to CH0
25. Tap SHORT
27. The LOAD menu item is highlighted automatically
28. Connect the SMA 50 Ohm LOAD cap to the SMA port CH0 by connecting it to the open end of the test cable connected to CH0
29. Tap LOAD
30. The ISOLN menu item is highlighted automatically
31. Remove the SMA 50 Ohm load cap from the test cable connected to SMA port CH0 and leave it open
32. Connect the SMA 50 Ohm load cap to port CH1 by connecting it to the open end of the test cable connected to CH1

33. Tap ISOLATION

34. The THRU menu item is highlighted automatically

35. Use the SMA female-to-female adaptor to connect the open ends of the two test cables together

36. Tap THRU

37. The DONE menu item is automatically displayed (calibration is almost done; now you must store the data so it can be recalled when you make a measurement)

38. Tap DONE

39. A new menu appears with SAVE 0 at the top and BACK at the bottom

40. Save the data in memory location C0 if this is the first time you are calibrating the device. Otherwise choose one of the remaining memory locations to store calibration data (for instance you may want to calibrate over the HF/VHF/UHF bands from 50 kHz to 600 MHz instead of 50kHz to 900 MHz and save this in memory location C1)

41. The menu automatically disappears

42. If you are going to measure SWR next remove the test cable connected to port CH1 and put the SMA 50 Ohm load cap back on to protect it from damage or contamination

43. Tap the screen to bring up the menu with CALIBRATE at the top and tap BACK to return to the main menu with DISPLAY at the top.

44. This completes the calibration procedure

45. Look at the left center of the screen and you should see

C0

D

R

S

T

X

This means calibration has been completed and the data is stored in memory C0. If you don't see this while making a measurement of any kind, then something is wrong since the measurement is being made with an uncalibrated NanoVNA. If this happens use DISPLAY to RECALL and Choose Memory Location (RECALL n) where n is the memory number you saved the desired calibration data in (i.e. SAVE 0, SAVE1, SAVE2, SAVE3, SAVE4, or SAVE 5).

The calibrations you just finished are:

D : Indicates that directivity error correction is applied

R : reflection tracking Indicates that error correction is applied

S : source match Indicates that error correction is applied

T : transmission tracking Indicates that error correction is applied

X : indicates that isolation (crosstalk) error correction is applied

Note that future measurements should always use one or two of the test cables used in this calibration process since any effect they may have on a measurement has been compensated as part of the calibration process. Presumably both cables have identical electrical properties so there is no need to keep track of which cable was connected to ports CH0 or CH1.

Now you are ready to measure SWR as described in the next section.

3. How to Measure SWR with the NanoVNA Using its Built-in Command Menus

After successful calibration of the NanoVNA over the desired frequency range (assuming you use the default range starting at 50 KHz and stopping at 900 MHz that more than covers the most used amateur bands), the following instructions describe how to measure an antenna's SWR using the battery powered NanoVNA. As mentioned earlier, the NanoVNA is extremely well suited for situations where the antenna is in a remote or difficult to reach location.

With the NanoVNA powered off connect one end of a calibration cable to the CH0 (aka S11) SMA connector at the top of the NanoVNA. Then connect to other end of the calibration cable to the antenna under test (you may need an adaptor from the antenna connector to the SMA male connector on the end of the cable). The antenna on my Btech UV 5 x 3 didn't need an adaptor but my Yeasu FT 60 needed a SMA female to SMA female adaptor. For my ICOM 7300 antenna cable I needed a UHF female to male SMA adaptor. Now you have the antenna connected to the NanoVNA and can proceed to the SWR measurement process.

Turn on the NanoVNA by pushing the power slide switch on the top of the device to the right. Two blue lights will come on (no one seems to know why) and the screen will display a jumble of different color traces (at least mine did; you may come up differently). If more than one trace comes up, you need to turn off all but the first one to clear up the screen. This is done using the menu that has DISPLAY at the top. Tapping the screen anywhere will bring up the main menu with DISPLAY at the top and CLOSE at the bottom (if another menu comes up just keep tapping BACK until you get to the Main menu with DISPLAY at the top. Tap DISPLAY and then tap TRACE. Four traces will be shown on the TRACE menu. Leave Trace 0 (yellow) as is but turn off the remaining three traces (blue, green, and magenta) by tapping the color and then tapping OFF. After each color is turned off the TRACE menu disappears, and you will need to tap the screen to bring it up again so you can turn OFF the next color. Now Tap the display again and go back to the DISPLAY menu by tapping BACK then BACK again. Tap CLOSE to make the menu go away and display one trace. Hopefully only one gold trace will remain and the LOGMAG format as shown in the upper left of the display (you should see CH0 LOGMAG 10dB/0.00dB). Note that an upside-down triangular marker will be displayed on the trace at the START frequency (50 kHz shown at the bottom left of the display). You can move the marker around with the stylus or moving the lever switch left or right. Tapping the marker will show the frequency it is on at the upper right of the display. Note where the dip(s) are in the LOGMAG display. This is where the antenna is reflecting minimum RF power back into the NanoVNA (i.e., the RF is being radiated out the antenna most efficiently). These nulls are where you want to measure SWR assuming the antenna was tuned to the desired frequency or frequencies in a multiband antenna. I used a metal rod touching the SMA connector at the bottom of the antenna to simulate a ground plane to stabilize the trace.

The next step is to change the trace format to display SWR versus frequency. Tap the screen to bring up the main menu (Tapping anywhere on the screen) with DISPLAY at the top and tap DISPLAY. Then tap FORMAT followed by a tap on SWR. The trace now shows SWR versus frequency. If a pointer is set at a null (i.e., dip) the display shows the best antenna SWR at the upper left of the screen (for example - CH0 SWR 1.0/1.20). The number after the slash is the SWR at the frequency the marker is on. The marker can be moved with the pointer to other frequencies so you can see how SWR varies with frequency. My ICOM 7300 requires SWR be ≤ 3.0 for its internal tuner to work and transmit full power; otherwise it reduces output power to ≤ 25 Watts. Using this technique, I know how far I can change frequencies when operating and maintain maximum output power or I need to adjust my antenna to a new frequency.

When testing is completed turn off the NanoVNA by pushing the power switch to the left (the blue light stays on for a short time after power is turned off). Disconnect the test cable from the NanoVNA SMA CH0 connector and put an SMA load cap on this port (any one of the test caps will do). Also put one on the CH1 SMA port if not ready there. Disconnect the test coax from the antenna removing any adaptors. Put the NanoVNA parts back into the box they came in so they will be available the next time you want to use them.

4. Miscellaneous Comments on NanoVNA Setup and Displays, etc.

The following paragraphs are a collection of random findings or comments I noted while preparing this document. They are presented in no special order and are provided for the reader to examine since they will have many similar issues, and these may help resolve them or at least let them know they are not alone in wondering how the NanoVNA works.

When I turn on the NanoVNA the display that comes up uses the calibrations stored in C0 and shows four traces corresponding to the following formats: CH0 LOGMAG (yellow), CH1 LOGMAG (blue), CH0 SMITH (green), and CH1 PHASE (magenta). Each color trace has one marker with all markers at the START frequency except the SMITH trace whose marker is at the SMA load position (for a 50 Ohm load the marker is in the middle of the SMITH chart. The startup display is probably fixed by firmware and not user selectable.

Commands are entered into the NanoVNA using the stylus to tap the action that appears in the righthand of the display after gently tapping once anywhere on the screen. The touch screen is a little touchy (no pun intended). Sometimes the first tap doesn't work, and a second tap (or more) is needed to select the desired action

Numbers can be entered into the NanoVNA using the sliding lever, but this is very time consuming. Using a stylus on the numerical pad is must faster. Note tapping on the k, M, or G after Tapping in the number will enter the number and the numerical pad will disappear.

Battery charging with the USB cable causes the blue lights to blink until the battery is charged and the blue lights stay on. Best to disconnect the charging cable when this happens to prolong battery life.

After turning off power with the power switch the blue light stays on for a short time before going out.

By taking the case apart with the four screws on each side you can see the battery and it looks like you can replace it yourself when it wears out.

To change the display frequency range and calibration data use DISPLAY to RECALL and Choose Memory Location (RECALL n). Another option is to enter the desired center frequency and frequency span desired (I didn't use this option).

Menus are brought up by tapping anywhere on the display. A second tap will make the menu disappear.

Up to four markers can be placed on a trace by going to TRACE and tapping each marker in turn

The first marker is automatically placed at the START frequency in LOGMAG format

Markers can be hidden if the trace flatlines at the top of the display. Change the FORMAT to LINEAR and the markers will be displayed, and you can move them to a frequency where they will be seen when going back to the LOGMAG or SWR format.

Tap a marker and read its frequency at the upper right of the display (e.g., 1:441.025 500 MHZ).

To place markers on the SWR trace go to the main menu with DISPLAY at the top then tap MARKER then tap SELECT MARKER then tap MARKER n where n is a number 1 through 4. You can turn off the markers by selecting ALL OFF.

To recall a calibration setting go to the Main Menu with DISPLAY at the top and tap RECALL SAVE then tap RECALL then tap the calibration location you want e.g., RECALL 4.

5. Sample SWR versus Frequency Traces

This section shows SWR traces for the dual band antenna on my VHF/UHF BTECH transceiver and the 40-meter center fed vertical antenna connected to my ICOM 7300 by RG-8 coax cable.

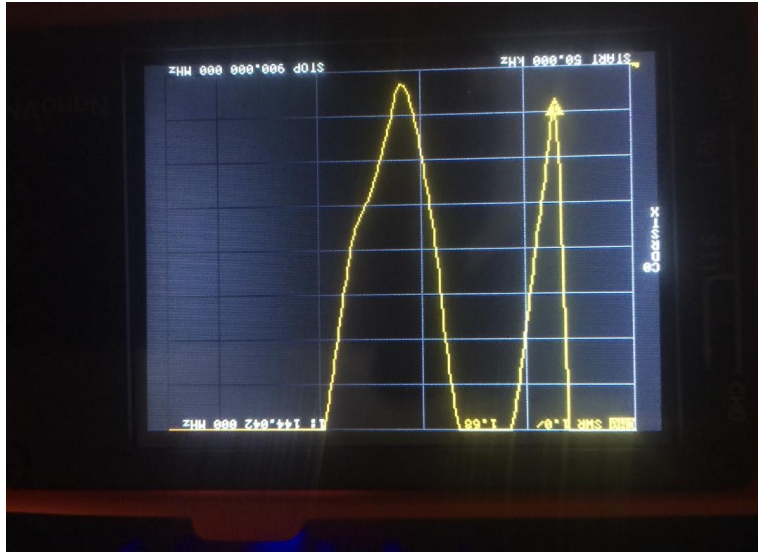


Figure 1. NanoVNA SWR Trace for a Dual Band Btech UV 5x3 HT Rubber Duck Antenna (Frequency Range 50 kHz to 900 MHz) - SWR at 144.042 MHz is 1.68

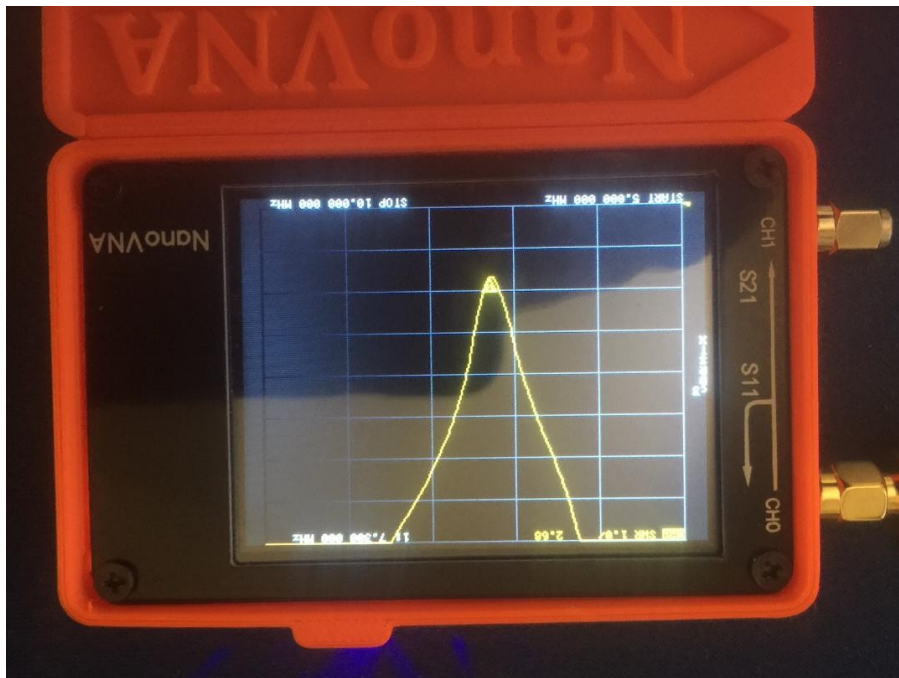


Figure 2. NanoVNA SWR Trace for a Home Brew Buddy Stick Antenna Tuned for 7.250 MHz in the 40 Meter Band (Frequency range 5 MHz to 10 MHz) - SWR at 7.3 MHz is 2.68

Contacting Soara: Questions about SOARA? Postal mail: P.O. Box 2545, Mission Viejo, CA 92690
Send e-mail to membership@soara.org or leave a message at 949-667-0173
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[SOARA Equipment For Sale Online Site](#)

Based on numerous requests from SOARA members for a place to post Ham Radio related items for sale to other club members, we have set up an opt-in based Mailman mailing list on our server. Interested SOARA members are invited to join the mailing list. The SOARA organization and Board of Directors do not provide any warranty or guarantee for the items being advertised, buyer beware!

To subscribe, navigate to:

<https://soara.org/mailman/listinfo/forsale>

Enter your "real" email address, not your at "soara dot org" alias. You must be able to send and receive email from the address you provide.

Once subscribed, you will receive email when other members post items for sale. When posting to the list, you should provide an accurate description of the item for sale, its condition, and asking price. Replies to postings should be sent to the poster of the item, and not the list.

The archives of postings are publicly available on the web here:

<https://soara.org/pipermail/forsale/>

This mailing list may be suspended or discontinued at the discretion of the SOARA Board of Directors should that become necessary.

Brian NJ6N

[LA Marathon - Help Needed](#)

The 2020 Los Angeles Marathon on Sunday, March 8, needs additional amateur radio operators along the 26.2-mile route through Los Angeles, West Hollywood, Beverly Hills, and Santa Monica.

Ham radio has long-provided vital safety and welfare communication during this annual high-profile event attracting 25,000 runners and thousands of spectators. Hams are positioned at Mile locations and medical aid sites, plus the finish line in Santa Monica and multi-agency command center near downtown Los Angeles.

If you are available to serve please register now on the Los Angeles Marathon's website at: <https://www.lamarathon.com/race-weekend/volunteer> and click the "Sign Up to Volunteer" button. On the following screen click the Volunteer Shift, "G1 Radio Operators."

Registered ham operators will receive their Marathon credentials, parking and street access passes, operating procedures, and T-shirts during either of two orientation sessions at the L.A. Marathon headquarters near Dodger Stadium: Saturday, February 29 at 12:30 pm or Wednesday, March 4, at 4:30 pm.

Greg Powell, KD6AIS, is the Los Angeles Marathon's amateur radio coordinator and will contact those who register.

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2020 SOARA Calendar

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
General Meeting 7:00 PM	27	24	16	20	18	15	20	17	21	19	16	-
Program	-	-	-	-	Spring Auction	Field Day Prep	-	SOARA Fair	-	-	Fall Auction	-
FCC Ham Exam 6:00 PM	27	24	16	20	18	At Field Day (2pm)	20	17	21	19	16	-
Education Classes 8:00 AM	Tech 25	General 22	-	-	Tech 16	-	-	Tech 15	Extra 19	-	Tech 14	-
SOARA Elmer Saturday 9:00 AM	11 Murray	8 Murray	14 Gilleran	11 Gilleran	9 Murray	13 Gilleran	11 Murray	8 Gilleran	12 Murray	10 Gilleran	14 Murray	12 Gilleran
SOARA T-Hunt 1:00 pm	-	-	-	-	-	-	-	-	-	-	-	-
Board Meeting	Feb 3	Mar 2	23	27	26	-	27	24	28	26	23	-
Special Events	Quartz-fest 19-25	Yuma 14-16		Visalia DX 24-26	Dayton Ham-vention 15-17	ARRL Field Day 26-28	HRO Ham Jam -	SOARA Picnic 3		JOTA 16-18		SOARA Holiday Party 6
Major HF Contests		ARRL DX-CW 15-16	ARRL DX-SSB 7-8 CQWPX SSB		CQWPX CW 30-31	ARRL Field Day 21-23			CQWW RTTY 26-27	CQWW SSB 24-25	CQWW CW 28-29	
Volunteer Events	OC Chili Run	Paws Fur Pink OC Chili Run	OC Chili Run Baker to Vegas	Dessert Storm Rally Ride for Rwanda	HD Trails OC Marathon LH Marathon	ARRL Field Day 26-28	MV Fire-works 4			Vision Quest		Run for a Claus

Dates subject to Change - Check the SOARA Web Site (<http://www.soara.org>) to verify locations and times

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SOARA Information

SOARA meets at the Norman P. Murray Center, 24932 Veterans Way, Mission Viejo, CA on the third Monday of every month at 7:00 PM. For the months of January and February the third Monday is a holiday and the meeting is held on the fourth Monday.



License Exams: Amateur License Exams are given prior to SOARA meetings, except June. Exams are at 6pm. Prior registration is not required and walk-in applicants are welcome. For June, exams are held at Field Day. For further information, email Sean Reigle, AJ6B, at aj6b@soara.org.

SOARA Library: SOARA has many amateur radio related books such as hand books, books about electrical theory, etc. available to lend out to club members. Contact Heiko Peschel ad6oi@soara.org for more info.

Web Site: SOARA maintains a web site with current club information. The URL is: <http://www.soara.org/>

Repeaters: The Laguna Beach, San Clemente, and Trabuco repeaters are open. The Santiago Peak repeaters are closed. For details or questions on the repeaters contact the repeater director, or repeater@soara.org.

2m	—	147.645	-	(110.9)	Laguna Beach
2m	—	146.025	+	(110.9)	San Clemente
2m	—	145.240	-	(110.9)	Trabuco
D-STAR 2m	—	146.115	+	(K6SOA C)	Laguna Beach
220	—	224.100	-	(110.9)	Laguna Beach
220	—	224.640	-	(pvt)	Santiago Peak. (C)
440	—	445.660	-	(110.9)	Laguna Beach
D-STAR 440	—	445.705	-	(K6SOA B)	Laguna Beach
440	—	447.180	-	(pvt)	Santiago Peak. (C)
D-STAR 1.2G	1282.600	-	(K6SOA A)	Laguna Beach	

Nets:

UHF/VHF (447.180, 147.645 & 224.640): Tuesdays @ 8:00PM

D-STAR (146.115 C module): Wednesdays @ 8:00PM

40 meter HF (7.200 MHz +/- for QRM), Sundays @ 8:00AM

10 meter HF (28.410 +/-) Sundays after the 40m net.

Gordo HF (7.250 MHz +/- for QRM), Weekdays @ 8:30AM



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