

# **The Reflector Reflector Reflector Reflector Reflector**

**The Monthly Bulletin of the Oak Ridge Amateur Radio Club, Inc., Oak Ridge, TN – March 2024**

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**March 2024**

**President's Message**

**Bob Parks W4JRP**

Well March is here and things are starting to warm up and some of the trees are blooming. I guess it is time to start planning our Field Day activities. Field day will be June 22-23 running from 1800 UTC Saturday to 2059 UTC Sunday. Field Day should have over 35,000 radio amateurs with their clubs, groups or simply with friends to operate from remote locations.

Dan Mantooth informed me that only 31 of our 43 members have paid their dues for this year. If you have not paid your dues yet please do so.

Our program for Monday, June 11<sup>th</sup> will be Robert Kennedy. He will be bringing us up date on some exciting news from Stellar Corp.

On February 25<sup>th</sup>, the Oak Ridge Children's Museum had their annual International Fest. ORARC had the Morse code outreach open from 10:00 am to 4:00 pm. We had around 75 children learn about Morse Code and send there name using Morse Code. Many thanks to Art Pettit (W4AJP), Jim Bogard (KY4L), Bob Parks (W4JRP) and Norm Melton (KG4GMU) from the Knoxville Club. We were short handed and did not have time to take pictures. Any of you that have not been to the outreach, you should stop by. It's a lot of fun.

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**Hi All,**

I had the opportunity to attend the 2024 Dalton, GA hamfest this year. I was able to camp inside the fairgrounds arriving Friday afternoon hoping to get an early start on Saturday morning. Setup for the vendors started at noon Friday. I had enough provisions in the camper since the gates close at 5pm. It was quite cold Friday evening so I had to turn on the furnace in the camper to stay warm while watching tv and getting items ready for sale the next day. At about 6:45am Saturday the gates opened to the fairgrounds and a solid stream of headlights were headed towards the midway. It was hovering around the freezing mark so I donned my three layers of jackets and went out to meet the crowd. The sun was not quite up yet and already I had visitors coming up around my tables. About that time my friend Bruce K4CMC from Crossville came to set up a table next to mine to sell some of his stuff. After a brisk morning of wheeling and dealing I was able to break away and look around other areas of the hamfest. I noticed there were not as many attendees and vendors as there have been in the past. I remember there used to be barely elbow room for inside and outside vendors and visitors. Not so much this time. Participation had fallen off dramatically. However, for myself and from other tailgaters I talked to everyone had a great day for sales. We are looking forward to returning next year.

### **73 Jim Womack KC4RD**







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I found the following article about the NanoVNA interesting. I know several of you have the NanoVNA. Thanks to Practical Wireless for allowing us to share it.



## Feature

**Michael Jones GW7BBY/GB2MOP**  
michael@gb2mop.org

**T**he tinySA Spectrum Analyser and NanoVNA Vector Network Analyser are so affordable that many of us now own one, or both of these instruments. Brilliant as both these instruments are, they have some physical shortcomings, notably the use of PCB-mounted SMA connectors and the open 'sandwich' construction of my NanoVNA is not the best for outdoor or benchtop use.

### SMA vs BNC

It may well seem intuitive having bought a NanoVNA or tinySA to utilise their SMA connectors, but there are good reasons for not doing so:

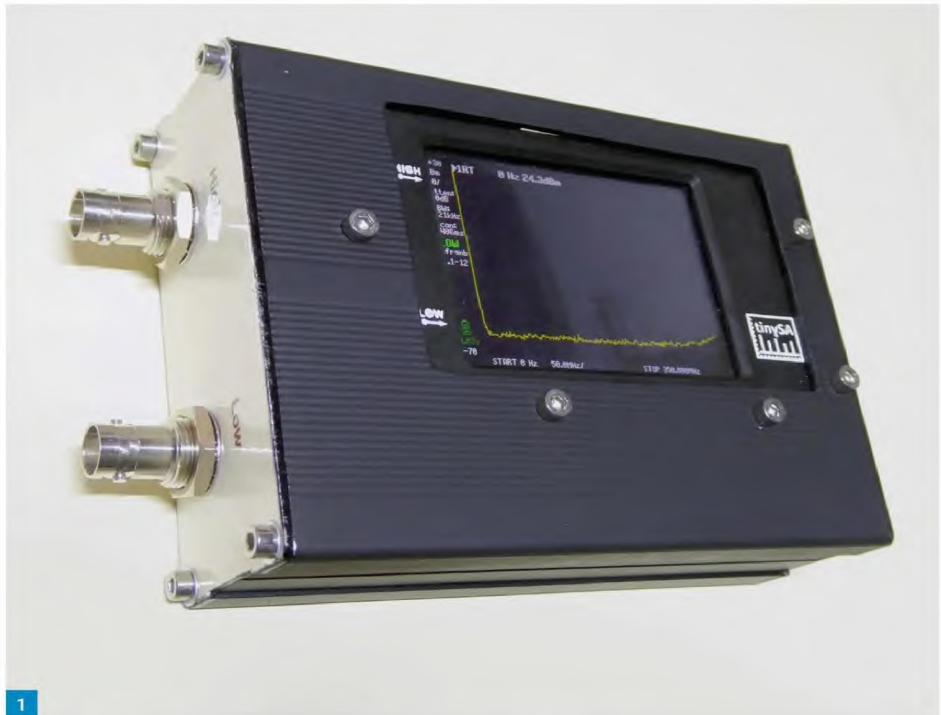
- The standard connector used on most test equipment, certainly on mine, is the BNC so it makes sense to standardise on these.
- SMAs are only specified for a limited number of connection cycles, about 100 for good SMAs, substantially less for cheap ones.
- Their specifications only hold if the nuts are tightened to a specified torque: 3 – 5 in lbf or 0.3 – 0.6 Nm for brass; 7 – 10 in lbf or 0.8 – 1.1 Nm for stainless steel.
- Attaching heavy adapters, joined to heavy cables – even RG58 coax is heavy compared to an SMA and may put undue stress on the SMA and its attachment to the PCB.
- Using adapters introduces a risk of losses, poor connections and impedance mismatching. They also add weight that will bear on the SMA attachments.
- SMAs are really intended for interconnections between modules within a piece of equipment where they will only be disturbed infrequently.

### Enclosures

Handy as these units might be, an enclosure, **Fig. 1**, adds protection and weight.

Weight is important as a lightweight instrument like the tinySA will often not stay put on the bench with a couple of test leads attached while you poke around the innards of a recalcitrant radio. Even a long length of RG58 with an adapter to fit the SMA connector will overpower a tinySA and can drag it off the bench, whereupon striking the floor the SMA's attachment to the PCB can be easily damaged. Bringing the connections from the instrument to the outside world via miniature coax isolates the SMA connectors from physical strain, extends their service life and removes the need for precision torquing.

I chose to use extruded aluminium cases, **Figs 2 & 3**, which come in two halves that slide together and are kept together by the endplates. I used a smaller version to enclose attenuators (PW January 2023) **Fig. 4**.



## Enclosures for the NanoVNA and tinySA

**Michael Jones GW7BBY/GB2MOP** has a solution for improving the use and life of your NanoVNA or similar test equipment.

Although I am describing an application for the NanoVNA and tinySA, these cases and the methods described will be applicable to many other devices home built or commercial. They are available on eBay in many different sizes, different colours and have slots for PCBs: all in all, very versatile enclosures.

### Metalwork

An aperture (80 x 48mm for NanoVNA, 85 x 55mm for tinySA) needs to be cut for the screen, a slot for access to the controls and a backing plate to hold the device in place against the front panel. Pictures illustrating the process are shown in **Figs 5 to 11**. I'll not go into great detail about actually cutting the apertures as you will adopt your own methods based on the tools and skills available. For the larger holes I favour drilling a large hole in the waste material and then using an Abra-File to actually cut the sides of the aperture out. You might use a hacksaw, junior or full size, or you might drill a series of overlapping holes (trepanning) and then knock the middle out and file to size. Remember to measure and check

your measurements before cutting and cut on the small side leaving a small amount to be finished with a fine file to the final dimensions.

### Calibration

Changing to BNC connectors means that you will need a BNC calibration set comprising 50Ω, short, open and through pieces for the VNA, **Fig. 12**. They are easy enough to find online. CCS Connectors carry a good range, look for Shorting Cap, Dust Cap (open) and 50Ω terminator from the same manufacturer to try and ensure that the measurement or reference plane is as near the same as possible for all connectors in the set. That is to say that the total distance from the measuring port to the open/short/50Ω plane should be as near as possible the same otherwise phase differences can be introduced. Having said this, do not get hung up about it unless you are working in the high MHz or GHz ranges. The differences will be insignificant at HF/VHF.

### Flight cases

For storage and transport I found these small

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Fig. 1: TinySA in its enclosure.

Fig. 2: Enclosure parts as supplied.

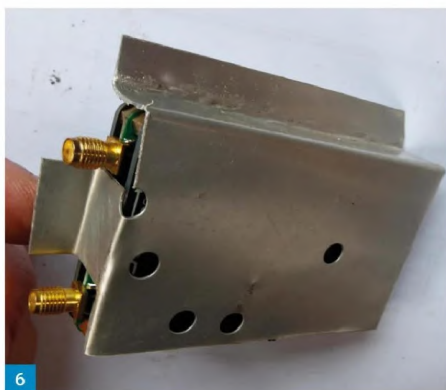
Fig. 3: How the two halves fit together.

Fig. 4: Enclosures for attenuators.

Fig. 5: Using Abra-File to cut out aperture.

Fig. 6: First attempt at retainer for NanoVNA.

Fig. 7: Front with aperture cut out and holes drilled.



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## Feature



flight cases, **Figs 13 & 14**, three for about £25.00 from eBay. Some come with foam blocks that you have to cut out, for others you may have to source your own foam. These are ideal for my NanoVNA, tinySA and USB Oscilloscope. Another option is to use an 'organiser' box with the segments arranged and/or cut to accommodate the VNA or tinySA. Other segments can be arranged to hold test leads and calibration pieces.

### Conclusion

I am very pleased with the results of this project. I feel the equipment is robustly housed and the BNC connectors are much better suited to the test environment. The extruded enclosures are available in many sizes and with the methods described here can be adapted to suit other projects. **PW**



**Fig. 8: Final retaining plate. Fig. 9: Retaining plate and VNA assembled to front panel.**

**Fig. 10: Two halves ready to assemble. Fig. 11: Top controls.**

**Fig. 12: NanoVNA with calibration pieces. Fig. 13: VNA in flight case. Fig. 14: Flight cases.**



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## ***Handy ARRL Links***

ARRL Home: [www.arrl.org](http://www.arrl.org)

Find help with RF assessments: <http://www.arrl.org/rf-exposure>

Find an ARRL Affiliated Club: [www.arrl.org/clubs](http://www.arrl.org/clubs)

Find your ARRL Section: [www.arrl.org/sections](http://www.arrl.org/sections)

Find a license class in your area: [www.arrl.org/class](http://www.arrl.org/class)

Find a license exam in your area: [www.arrl.org/exam](http://www.arrl.org/exam)

Find a hamfest or convention: [www.arrl.org/hamfests](http://www.arrl.org/hamfests)

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## **Hamfests and Conventions – save the dates!**

<b>March 16, 2024</b>	<b>Sevier County 2024 Hamfest</b>	<a href="http://seviercountyars.com/">http://seviercountyars.com/</a>
<b>April 13, 2024</b>	<b>Columbus (Indiana) Hamfest</b>	<a href="http://seviercountyars.com/">Columbus, IN</a>
<b>April 20, 2024</b>	<b>Greeneville TN Hamfest</b>	<a href="http://greenevillehamfest.com/">http://greenevillehamfest.com/</a>
<b>APRIL 27, 2024</b>	<b>1st Annual Short Mountain Repeater Club Hamfest, Murfreesboro, TN</b>	<a href="http://www.smrclub.com/">http://www.smrclub.com/</a>
<b>June 15, 2024</b>	<b>Knoxville Hamfest &amp; Electronics Convention</b>	<a href="http://www.w4bbb.org/">http://www.w4bbb.org/</a>
<b>May 17-19, 2024</b>	<b>Dayton, OH Hamvention</b>	<a href="http://www.hamvention.org">www.hamvention.org</a>

## Regular Meetups and Volunteer Activities

### **ORARC Club Meeting - every second Monday**

Next meeting is March 11 at 7 PM

at the FIRST UNITED METHODIST CHURCH, OAK RIDGE, TN

Board meeting at 6:45 – all are welcome

Contact: Bob Parks, W4JRP, [bparks100@gmail.com](mailto:bparks100@gmail.com)

### **ORARC Eatin' Meetin' every Wednesday 11 AM at Shoney's Restaurant, Oak Ridge**

For an email reminder for the lunch, write to Willard Sitton at [sitton008@outlook.com](mailto:sitton008@outlook.com)

### **Amateur Radio Outreach at the Children's Museum of Oak Ridge (CMOR)**

Next session is on **Third Sunday (March 17)** of the month, 1-4 PM

Contact: Jim Bogard KY4L, email [KY4L@ARRL.NET](mailto:KY4L@ARRL.NET)

## Nets

### **Middle East Tennessee Emergency Radio Service (METERS) – every Monday**

Every **Monday** evening at **7:00 pm** local time, over the air

WB4GBI 146.94 MHz repeater (-0.6 MHz input offset, 118.8 Hz tone)

Affiliation with ARES or METERS is NOT required to participate.

### **Clinton Amateur Radio Service (CARS) Weekly Radio Net – every Tuesday**

Every **Tuesday** evening at **8:00 pm**, over the air

147.36 MHz KA4OAK repeater (-0.6 MHz offset, 100.0 Hz tone)

### **American Red Cross Amateur Net – every Wednesday**

Every **Wednesday** evening at **8:00 pm** local time, over the air

WB4GBI 147.15 MHz repeater (+600 kHz input offset, 118.8 Hz tone)

### **Anderson County ARES Net – every Thursday**

Every **Thursday** evening at **7:00 pm** local time, over the air

WB4GBI 147.15 MHz repeater (+600 kHz input offset, 118.8 Hz tone)

### **Hospital Net (Meters) – **Last Friday of the month at 6:30 pm** local time. In the Homestead room in the Oak Ridge Methodist Hospital.**



## Club Repeaters

**W4SKH 2 meter: 146.97** (-600 kHz input offset, 88.5 Hz tone)

**W4SKH 70-cm: 443.200 MHz** (+5 MHz input offset CTCSS sub-audible tone 88.5 Hz)

***Please test 443.200 to establish its range and power – thanks!***

**Oak Ridge Amateur Radio Club, Inc.**

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**Visit our Web Site at [www.orarc.net](http://www.orarc.net)**

Club meetings every second Monday are held at the First United Methodist Church in Oak Ridge, TN.

The Reflector is the monthly newsletter of the Oak Ridge Amateur Radio Club, Inc.

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