



November 2021  
Our 102<sup>th</sup> Year  
Volume 59, Issue 11

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Website:

<http://www.mvara.org/>

*The Voice Coil*  
**Newsletter of the Mahoning  
Valley Amateur Radio  
Association**  
Established 1919

# The Voice Coil

## Prez Sez

Prez is recovering from knee surgery, so we'll cut him a break this month. Following are news items FYI..

**\*\*ARRL's YouTube channel, ARRLHQ,** has launched a series of amateur radio Technician-class license courses. This series of videos features Dave Casler, KE0OG, QST's "Ask Dave" columnist, who leads viewers through The ARRL Ham Radio License Manual. These videos supplement the manual and provide an overview of the sections students will study, along with a few videos on how things work. Share this excellent resource with those who are preparing to take the Technician exam, and visit the ARRLHQ YouTube channel for more great amateur radio videos.

**\*\*The ARRL November Sweepstakes (SS)** weekends loom large on the amateur radio contest horizon. The CW weekend is November 6 - 8, while the phone weekend is November 20 - 22. Both events begin on Saturday at 2100 UTC and conclude on Monday at 0259 UTC.



**\*\*The sunspots are coming.** A comprehensive K7RA Solar Update is posted Fridays on the ARRL website. For more information concerning radio propagation, visit the ARRL Technical Information Service, read "What the Numbers Mean...", and check out the Propagation Page of Carl Luetzelschwab, K9LA.

**\*\* Print an Official or Unofficial Copy of Your Amateur Radio License** (By Anthony Luscre, K8ZT)

[Click here to download the instructions](#)

**NEXT**  
**MEETING**  
Monthly meeting  
November 11, 7 pm.  
GOP HQ  
8381 Market St,  
Boardman, OH 44512

## 2021 Officers

**President:** Scott Wilton, KE4UHC

**Vice President:** Mike McCleery,  
K8PRR

**Secretary:** Ray Bishop, W8CSM,

**Treasurer:** Dean DeMain, W8YSU

**Trustees:**

Andy Brinco, WA8ZLK

Mark Haverstock, K8MSH

John DeGutis, N8LVA

Joe Vasco, N8SEJ

**Newsletter Editor:** Mark

Haverstock, K8MSH

**Awards Manager:** Dave Fairbanks,  
N8NB, 330.759.6993, 4770 Logan  
Ave. Youngstown, OH 44505

The Mahoning Valley Amateur Radio Association, Inc, meets the second Thursday of every month. Location and time are subject to change. Dues are \$20.00 per year, \$10.00 each for additional family member. Contact Dean, [W8YSU@arrl.net](mailto:W8YSU@arrl.net) for membership details.

The club call is **W8QLY**; equipment operated under this call includes a two meter voice repeater at 146.745 (-600, 110.9 PL). Club email: [mvara.w8qly@gmail.com](mailto:mvara.w8qly@gmail.com)

MONDAY NIGHT NET operates every Monday at 9:00. PM on 146.745 MHz.

SKYWARN NET - First Wednesday of the month at 8:30 PM on 146.745 MHz as weather warrants.

ARES NET- First and third Mondays of each month at 8:30 PM on 146.745 MHz; prior to the Monday Night Net.

# Swapfest



The program for our November meeting is a MVARA Swapfest. We first did this in 2019 and had a great time, so we are doing it again as we emerge from Covid. Tables are free so there is no excuse not to unload some of that unused gear or accessories. Or if you have something you want to show and tell, bring it on in. Please bring a piece of cardboard to cover your table and prevent scratches.



**Refresher Answers:** E3B01 (A) E3B02 (C) G7A01 (B)  
G7A02 (D)

## Current Activities

**November 11:** Monthly meeting, SWAPFEST, 7pm. GOP HQ

### Comments, Questions?

Email: [mvara.W8QLY@gmail.com](mailto:mvara.W8QLY@gmail.com) Snail-mail: MVARA, P.O. Box 14141, Poland, OH 44514

**Meeting ideas/ suggestions?** Contact Dave, KD8NZF, [KD8NZF@zoominternet.net](mailto:KD8NZF@zoominternet.net)

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## **HAMFEST CALENDAR** *(Always subject to change—check before you go)*

**12/04/2021 FCARC WinterFest** Location: Ruyhley Park Pavilion, 401 W Holland St Archbold, OH 43502 Delta, OH 43515 **Website:** <http://k8bxq.org/hamfest> **Sponsor:** Fulton County Amateur Radio Club  
**Talk-In:** 147.195+ **Public Contact:** Bryan Patterson , KB8ELG 8202 County Rd 6-2 Delta, OH 43515  
Phone: 419-250-6694 **Email:** [kb8elg@hotmail.com](mailto:kb8elg@hotmail.com)

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## **Swap and Shop**

No items this month because of the November Swapfest.

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## **ARRL Clean Signal Initiative on the Horizon**

By Dan Romanchik, KB6NU

*In recent message to his Northwest Division membership, Mike Ritz, W7VO, described a new program that he's gotten the ARRL to take on—the Clean Signal Initiative. He writes:*



“After a few months gathering support from the amateur community for the project, the ARRL Clean Signal Initiative (CSI) is finally getting off the ground. The Board’s Programs and Services Committee approved the concept several months ago, and since then I have been canvassing some of the best known RF engineers in amateur radio to get their support and input. As a result, the team will be conducting our first Zoom call next week to lay out the next steps for the project. All I can say at this time is that there are some amateur radio “heavy hitters” behind this, and I believe will be a game changer for the ARRL.



For those that may be unaware of this project, here is a synopsis (or at least my vision):

1. The CSI gets the ARRL formally in the “technical standards” business. (Other technical organizations already do it: IEEE, UL, ASTM, and SAE, and others.) The ARRL currently tests new products to informal standards, with no real hard benchmarks for manufacturers to meet, other than the minimal standards outlined in FCC Part 97.307.
2. Creates and incorporates documented “best practice” standards and testing methodologies to ensure commercial amateur radio transmitters and amplifiers meet not only minimum FCC requirements for signal cleanliness, but push the envelope.
3. These new standards can be “home grown”, or passed through the IEEE, but I think it’s important they be also branded as “ARRL Technical Standards.”
4. Test new commercial transceivers and amplifiers against these standards.
5. Certify the transmitters and amplifiers that pass the standards: “CSI certified by the ARRL.”
6. Work with manufacturers to ensure compliance of those that don’t. (Market pressure will drive this.)
7. Market the program to the amateurs through QST.
8. Work with manufacturers and social media experts to create training materials to teach hams how to set up their equipment to ensure the cleanest transmitted signals. (This education part is key!)”

Rob Sherwood, NC0B, of Sherwood Engineering, who is most well-known for his ranking of receiver performance (<http://www.sherweng.com/table.html>), is part of this effort. You can see a video of a talk that he gave recently to the Sutton & Cheam Radio Society by going to <https://youtu.be/IioApKRecrI>. Also on the committee is Ward Silver, N0AX.

Based on my knowledge of how IEEE standards committees work, I stressed that the initiative should make every effort to get as many stakeholders—including manufacturers and users—involved as possible. Involving so many people may be cumbersome at times, but standards require consensus for them to be effective, and the only way to do that is to get everyone involved. I’d suggest that if you feel that you have something to contribute that you contact Mike directly. His email address is [w7vo@arrl.org](mailto:w7vo@arrl.org).

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Dan Romanchik, KB6NU, is the author of the KB6NU amateur radio blog (KB6NU.Com), the "No Nonsense" amateur radio license study guides (<https://KB6NU.Com/study-guides/>), and often appears on the ICQPodcast (<https://icqpodcast.com>). When he’s not worry about how clean his signal is, he operates CW on the HF bands and teaches ham radio classes.

 *Renew your MVARA membership—see next page*



# Ready, SET



On October 2, 2021 Mahoning County Amateur Radio Emergency Services (ARES) participated in the Ohio Simulated Emergency Test (SET). Every Ohio county was asked to develop a mock disaster scenario that would give operators multiple challenges to overcome.

Three goals were established for the SET:

1. Activation: County and district ARES units were to practice activating, checking in and staging operators as well as notifying District and State Emergency Coordinators of their activation.
2. Deployment: Operators were to be deployed to various key places in their county where they would set up radio communication and originate mock scenario messages
3. Communication: Operators would send basic messages such as would happen in a real emergency.

The mock disaster scenario used in Mahoning County was dealing with the immediate aftermath of a severe thunderstorm and a category F5 tornado that had touched down in Milton Township (western part of the county) and stayed on the ground to Struthers. The SET started at 10 am, Saturday October 2<sup>nd</sup>.

A brief introduction was given to operators monitoring the 146.745 repeater and then the scenario began in as realistic a way as possible. Operators had no prior knowledge of the type of event they would be dealing with or the actions and communications that would be involved. From their perspective it was something completely unexpected, just as a real event would be. The only indication they were dealing with an exercise was a regular announcement of “this is a drill, this is not a real emergency” from time to time so as to make sure there was no misunderstanding that this was not a real event.

Mahoning County can be proud of our ARES group’s response. With very little prior notification 19 county operators participated for well over an hour. Our county operators were dispatched within minutes to all corners of the county and dealt with many challenging issues efficiently and effectively. County control stations took messages from operators and net controls and relayed numerous messages to the Emergency Operations Center (EOC) in Columbus using the Ohio Digital Emergency Net (ODEN) via NBEMS, FLDIGI, FLMSG, ARRL Radiograms, and ICS forms.

The SET was concluded at 11:30 am. The quick evaluation of the SET was that it was a very good example of local ARES capabilities. The 2021 SET demonstrated that MC ARES can effectively deploy and respond to a disaster and serve our community’s needs in times of disaster. Not only was it a great exercise but it gave ARES some good ideas to work on for future activations.

Thanks to KC8SOY, WA8ZLK, KE8OKO, N8LVA, KE8NSW, WD8DFW, KD8ADY, KD8ADZ, W4ZIP, KD8NZF, KD8QNY, KA8YTS, KE4UHC, KB8GAE, KB8UNJ, KE8MOX, W8YSU, KE8LYY, KB3WPD, KC3NHE, N3OIK and WB8YHD for making the 2021 Mahoning County Amateur Radio Emergency Services SET a success.

Membership in MC ARES is free and all amateur radio operators are welcome to join. If you are interested in public service and emergency communications and would like to join please visit our web site at [www.mahoning-ares.org](http://www.mahoning-ares.org) and fill out and return an application form.

## Contest and Special Event Operating Information

Dave Fairbanks N8NB

Data below as well as more information courtesy of the following website:

<http://www.hornucopia.com/contestcal/index.html>.

### November 2021

+ K1USN Slow Speed Test	0000Z-0100Z, Nov 1
+ Silent Key Memorial Contest	0600Z-0859Z, Nov 1
+ RSGB 80m Autumn Series, Data	2000Z-2130Z, Nov 1
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Nov 2
+ ARS Spartan Sprint	0100Z-0300Z, Nov 2
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 2
+ Phone Weekly Test - Fray	0230Z-0300Z, Nov 3
+ CWops Mini-CWT Test	1300Z-1400Z, Nov 3
+ VHF-UHF FT8 Activity Contest	1700Z-2000Z, Nov 3
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 3
+ UKEICC 80m Contest	2000Z-2100Z, Nov 3
+ Walk for the Bacon QRP Contest	0000Z-0100Z, Nov 4 and 0200Z-0300Z, Nov 5
+ CWops Mini-CWT Test	0300Z-0400Z, Nov 4
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 4
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 4
+ NRAU 10m Activity Contest	1800Z-1900Z, Nov 4 (CW) and 1900Z-2000Z, Nov 4 (SSB) and 2000Z-2100Z, Nov 4 (FM) and 2100Z-2200Z, Nov 4 (Dig)
+ EACW Meeting	1900Z-2000Z, Nov 4
+ SKCC Sprint Europe	2000Z-2200Z, Nov 4
+ NCCC RTTY Sprint	0145Z-0215Z, Nov 5
+ NCCC Sprint	0230Z-0300Z, Nov 5
+ K1USN Slow Speed Test	2000Z-2100Z, Nov 5
+ IPARC Contest, CW	0500Z-1200Z, Nov 6
+ Ukrainian DX Contest	1200Z, Nov 6 to 1200Z, Nov 7
+ Two-Meter Classic Sprint	1300Z-1330Z, Nov 6
+ ARRL Sweepstakes Contest, CW	2100Z, Nov 6 to 0300Z, Nov 8
+ IPARC Contest, SSB	0500Z-1200Z, Nov 7
+ EANET Sprint	0800Z-1200Z, Nov 7
+ High Speed Club CW Contest	1400Z-1700Z, Nov 7
+ K1USN Slow Speed Test	0000Z-0100Z, Nov 8
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Nov 9
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 9
+ Phone Weekly Test - Fray	0230Z-0300Z, Nov 10
+ CWops Mini-CWT Test	1300Z-1400Z, Nov 10
+ VHF-UHF FT8 Activity Contest	1700Z-2000Z, Nov 10
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 10
+ RSGB 80m Autumn Series, SSB	2000Z-2130Z, Nov 10
+ CWops Mini-CWT Test	0300Z-0400Z, Nov 11
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 11

+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 11
+ EACW Meeting	1900Z-2000Z, Nov 11
+ NCCC RTTY Sprint	0145Z-0215Z, Nov 12
+ NCCC Sprint	0230Z-0300Z, Nov 12
+ K1USN Slow Speed Test	2000Z-2100Z, Nov 12
+ PODXS 070 Club Triple Play Low Band Sprint	0000Z, Nov 13 to 2359Z, Nov 15
+ WAE DX Contest, RTTY	0000Z, Nov 13 to 2359Z, Nov 14
+ Day of the YLs Contest	0000Z, Nov 13 to 2359Z, Nov 14
+ 10-10 Int. Fall Contest, Digital	0001Z, Nov 13 to 2359Z, Nov 14
+ SARL VHF/UHF Analogue Contest	0500Z-0700Z, Nov 13 (6m) and 0700Z-0900Z, Nov 13 (2m) and 0900Z-1100Z, Nov 13 (70cm) and 0500Z-0700Z, Nov 14 (6m) and 0700Z-0900Z, Nov 14 (2m) and 0900Z-1100Z, Nov 14 (70cm)
+ JIDX Phone Contest	0700Z, Nov 13 to 1300Z, Nov 14
+ RCA Transatlantic QSO Party	1200Z, Nov 13 to 0400Z, Nov 14
+ OK/OM DX Contest, CW	1200Z, Nov 13 to 1200Z, Nov 14
+ SKCC Weekend Sprintathon	1200Z, Nov 13 to 2400Z, Nov 14
+ FISTS Saturday Sprint	1600Z-1800Z, Nov 13
+ CQ-WE Contest	1900Z-2300Z, Nov 13 (CW/Digital) and 0100Z-0500Z, Nov 14 (Phone) and 1900Z-2300Z, Nov 14 (Phone) and 0100Z-0500Z, Nov 15 (CW/Digital)
+ AWA Bruce Kelley 1929 QSO Party	2300Z, Nov 13 to 0300Z, Nov 15 and 2300Z, Nov 20 to 0300Z, Nov 22
+ FIRAC HF Contest	0700Z to 1700Z, Nov 14
+ Classic Exchange, Phone	1400Z, Nov 14 to 0800Z, Nov 15 and 1400Z, Nov 16 to 0800Z, Nov 17
+ K1USN Slow Speed Test	0000Z-0100Z, Nov 15
+ 4 States QRP Group Second Sunday Sprint	0100Z-0300Z, Nov 15
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Nov 16
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 16
+ Phone Weekly Test - Fray	0230Z-0300Z, Nov 17
+ CWops Mini-CWT Test	1300Z-1400Z, Nov 17
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 17
+ Walk for the Bacon QRP Contest	0000Z-0100Z, Nov 18 and 0200Z-0300Z, Nov 19
+ NAQCC CW Sprint	0130Z-0330Z, Nov 18
+ CWops Mini-CWT Test	0300Z-0400Z, Nov 18
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 18
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 18
+ EACW Meeting	1900Z-2000Z, Nov 18
+ NCCC RTTY Sprint	0145Z-0215Z, Nov 19
+ NCCC Sprint	0230Z-0300Z, Nov 19
+ YO International PSK31 Contest	1600Z-2200Z, Nov 19
+ K1USN Slow Speed Test	2000Z-2100Z, Nov 19
+ ARRL EME Contest	0000Z, Nov 20 to 2359Z, Nov 21
+ SARL Field Day Contest	1000Z, Nov 20 to 1000Z, Nov 21



+ LZ DX Contest	1200Z, Nov 20 to 1200Z, Nov 21
+ All Austrian 160-Meter Contest	1600Z-2359Z, Nov 20
+ REF 160-Meter Contest	1700Z, Nov 20 to 0100Z, Nov 21
+ RSGB 1.8 MHz Contest	1900Z-2300Z, Nov 20
+ Feld Hell Sprint	1900Z-2059Z, Nov 20
+ ARRL Sweepstakes Contest, SSB	2100Z, Nov 20 to 0300Z, Nov 22
+ Homebrew and Oldtime Equipment Party	1300-1500Z, Nov 21 (40m) and 1500-1700Z, Nov 21 (80m)
+ FISTS Sunday Sprint	2100Z-2300Z, Nov 21
+ Run for the Bacon QRP Contest	2300Z, Nov 21 to 0100Z, Nov 22
+ K1USN Slow Speed Test	0000Z-0100Z, Nov 22
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Nov 23
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 23
+ SKCC Sprint	0000Z-0200Z, Nov 24
+ Phone Weekly Test - Fray	0230Z-0300Z, Nov 24
+ CWops Mini-CWT Test	1300Z-1400Z, Nov 24
+ CWops Mini-CWT Test	1900Z-2000Z, Nov 24
+ UKEICC 80m Contest	2000Z-2100Z, Nov 24
+ CWops Mini-CWT Test	0300Z-0400Z, Nov 25
+ CWops Mini-CWT Test	0700Z-0800Z, Nov 25
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 25
+ EACW Meeting	1900Z-2000Z, Nov 25
+ RSGB 80m Autumn Series, CW	2000Z-2130Z, Nov 25
+ NCCC RTTY Sprint	0145Z-0215Z, Nov 26
+ NCCC Sprint	0230Z-0300Z, Nov 26
+ K1USN Slow Speed Test	2000Z-2100Z, Nov 26
+ CQ Worldwide DX Contest, CW	0000Z, Nov 27 to 2400Z, Nov 28
+ K1USN Slow Speed Test	0000Z-0100Z, Nov 29
+ QCX Challenge	1300Z-1400Z, Nov 29
+ QCX Challenge	1900Z-2000Z, Nov 29
+ RSGB FT4 Contest Series	2000Z-2130Z, Nov 29
+ Worldwide Sideband Activity Contest	0100Z-0159Z, Nov 30
+ QCX Challenge	0300Z-0400Z, Nov 30
+ RTTYOPS Weeksprint	1700Z-1900Z, Nov 30

## DX Operating Information

Dave Fairbanks N8NB

Credit for the below information and further information on these operations and others can be found at the following website: <http://www.ng3k.com>

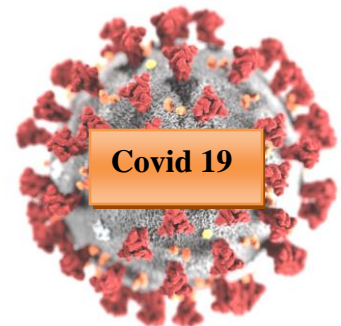
ember						
2021 Nov01	2021 Nov05	<b>eSwatini</b>	<b>3DA0LP</b>	ZS6DPL Direct	<a href="http://DXW.Net">DXW.Net</a> 20211007	By ZS6DPL fm Manzini; HF
2021 Nov01	2021 Nov30	<b>Maldives</b>	<b>8Q7RM</b>	HB9SHD	<a href="http://DXW.Net">DXW.Net</a> 20210916	By HB9SHD fm Kandolhu I; 40-6m, perhaps 80m; mainly FT8, some SSB, slow CW; spare time operation, especially nights for NA and SA

2021 Nov10	2021 Nov24	<b>St Kitts &amp; Nevis</b>	<a href="#">V47JA</a>	LoTW	W5JON 20201209	By W5JON fm Calypso Bay; 160-6m, incl 60m; SSB FT8; yagi, verticals; QSL also OK via W5JON direct
2021 Nov18	2021 Dec08	<b>Mali</b>	<b>TZ1CE</b>	DK1CE (B/d)	<a href="#">TDDX</a> 20211014	By DK1CE fm Bamako; 160-10m CW SSB FT8; log periodic, yagi, dipoles, inverted-V
2021 Nov19	2021 Nov24	<b>St Barthelemy</b>	<b>FJ</b>	KP4DO Direct	<a href="#">DXW.Net</a> 20210909	By KP4DO as FJ/KP4DO; 40-10m
2021 Nov22	2021 Dec01	<b>Mauritius</b>	<b>3B8</b> <small>NEW</small>	F5CWU	<a href="#">OPDX</a> 20211024	By KX7M and M0SDV as 3B8/KX7M; HF; QSL via <a href="#">F5CWU</a> <a href="#">OQRS</a>

## HAM HUMOR: RADIOS GO SILENT; AFRAID COVID VIRUS CAN BE TRANSMITTED VIA RADIO WAVES

By [K5KVN](#), on the scene

**PETALUMA, Calif.** — As the number of confirmed Covid cases continues to rise across the country, some amateur radio operators are turning off their radios in hopes of avoiding the virus. It's an outbreak, according to doctors, and some hams are taking no chances. "I heard that you get it from contact with people. I don't get out of the house much, so my contact with people is on the radio," said Clarence Bogart of Huntsville. "I don't want to get sick, so I'm keeping my radio off," he continued.



Harold Wisenheimer agrees. "They say the bug is in the air. Well, so are my radio signals, and I don't want to be anywhere near it."

Some enterprising ham radio stores are offering help in the form of a Covid filter, which can be installed between the radio and antenna, essentially keeping out the virus.

A local physician who wished to remain anonymous quietly says he is puzzled by the actions of the radio operators. "Look, I'm aware that many have a bug in their shack, but it's not *that* kind of bug. And someone really should tell them that the virus can indeed be transmitted, but not in *that* way."

### [www.hamhiiinks.com](http://www.hamhiiinks.com)

# Got \$50? Get Analyzed! (No Couch Needed)

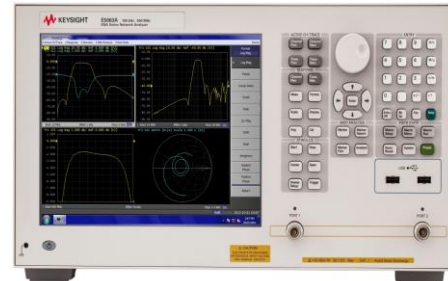
Have you noticed every time you turn around, you're bumping into ads and articles about the NanoVNA? So what's the story? VNA stands for Vector Network Analyzer. In the professional world, VNA's were the logical next step following Spectrum Analyzers for doing RF research and analysis. Full feature VNA's are available from all the major test equipment manufacturers and have price tags in the high thousands. You probably know that HP started out as a Test Equipment company. In 1999 they spun off the Test Equipment division (when they focused on the PC/Printer/Scanner/etc business). The spinoff was named Agilent. In 2014 Agilent spun off the electronic measurement division as Keysight Technologies. Incidentally Agilent kept the life sciences, diagnostics and applied chemical equipment businesses. Back to the point, a quick check today at Newark Electronics shows the Keysight E5063A/2H5 at a little less than \$42,000.00 each, including handy leatherette carrying case. Alright, I made up the carrying case part. Just checking how many of you remember the ads when small transistor radios came out.

Part of the reason they are so costly is the difference between a Spectrum Analyzer and a VNA. The SA is similar to an oscilloscope in that it has a horizontal trace across the face of a screen, but instead of displaying the amplitude of a voltage vs time, it displays the Amplitude vs Frequency. As the trace moves across the screen it represents the energy at various frequencies. The VNA goes a step farther and includes the circuits not only to display a signal connected to its input, but also to generate a signal, apply it to the output, and measure what is reflected or comes through the circuit under test. Measuring reflected signal is what Antenna Analyzers are all about, so the VNA is a dandy antenna analyzer, perhaps a little on the pricey side!

About 20 years or so ago, when Software Defined Radio was being adapted from the Commercial/Military markets to the consumer (Ham) markets, they faced the challenge of generating a stable RF frequency. They found the SI-5351 chip from Silicon Labs. The SI5351 is a nifty little signal generator that is spec'd to generate signals up to about 160Mhz and can be controlled with an I2C bus. I2C is a control standard that allows chips to be controlled using only two pins on the chip. About the same time, Microcontrollers had become widely available and dirt cheap, so the microcontroller could be used to set the frequency of the 5351 after reading a keyboard or similar device. Now put on your Ham Radio hat. 160 MHz covers all of HF and VHF. Wow, neat chip.

## Antenna Vector Network Analyzer

▶ 70dB (50kHz-300MHz) ▶ 60dB (300M-900MHz) ▶ 40dB (900M-1.5GHz)

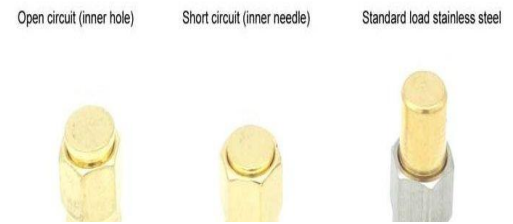


SILICON LABS

Si5351A/B/C

I<sup>2</sup>C-PROGRAMMABLE ANY-FREQUENCY CMOS CLOCK  
GENERATOR + VCXO

Getting back to more recent times, lets combine a microcontroller, an SI-5351, and an LCD touch screen. Voila, the beginnings of an inexpensive VNA. The major problem is they wanted the VNA to work at frequencies well above 160MHz. Recall that most signals generate harmonics – multiples of the base frequency. Using Harmonics and a couple other tricks, the NanoVNA can measure signals up to about 1.5 GHz, still using the 5351 as the oscillator. Now we're cooking with Gas!



If all you want to do is measure your antenna's SWR, then it's going to be hard to beat the \$50.00 price tag for a NanoVna. There are a few gotcha's, but they are easily overcome:

- **Calibration.** Like most VNA's, the NanoVNA needs to be calibrated to work accurately. Calibration is the process of connecting standard loads to the VNA and letting the software develop a correction factor for its measurements. The good news is that for your \$50.00 you usually also get three calibration loads. (If they don't include the calibration loads, buy a different brand) The three are an open load, a shorted load, and a 50 ohm load. The process is very simple. Using the touch screen, you simply connect the three loads one at a time and tap the screen. Takes about two minutes.
- **Ruggedness.** It ain't. Most of the NanoVNA's in the \$50.00 price range consist of two circuit boards sandwiched together. No forgiveness if you drop it or get it wet. For a few more dollars you can get a case for it, but still pretty fragile. Don't drop it.
- **Screen Size.** The \$50.00 version has a 2.8" touchscreen. Although small, it's pretty sharp and easily readable. There is another version with a 4" display for more bucks.
- **Learning curve.** We are talking about antenna measurements, but the NanoVNA is rooted in lab grade instruments and uses the same measurement protocols. Consequently you will face a lot of new terminology. One of the standards for using VNA's is known as the Scattering Parameters. Just the name is confusing, now add S11, S12, etc and it takes some getting used to. Once again, easily overcome. YouTube is your friend and I recommend the video NANOVNA Made Simple. Find it here: <https://www.youtube.com/watch?v=QJYeFpiqY8c> . He will have you measuring antenna SWR in about 15 minutes.





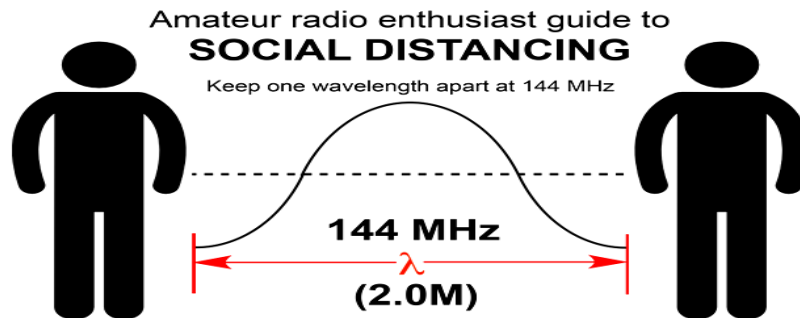
- Power. The latest NanoVNA's are coming with a built-in lithium battery, but it's small. If you are familiar with using any of the antenna analyzers from MFJ, Comet, RigExpert, etc., you are used to having the batteries last at least months if not years. Not so with the NanoVNA. Despite specs about a couple hours battery life, you better figure on a little less than an hour. Battery is rechargeable via the built in USB port, or better yet, if you need extended time, connect it to one of the battery packs designed to power cell phones. Cheap and easy – the one in the picture is \$7.00 at Harbor Freight.

After you work your way through some of the details, the result is a nice graphical picture of your antenna matching. I compared it to my MFJ and RigExpert analyzers and there was no significant difference in the results. Sorry the pic is a little blurred at the edges, the info there is the value of the SWR and the range of frequencies being checked. If you're not familiar with a graphical display like this, the points of interest are the dips where the graph is at a low point. There is a cursor that you can move to any point on the graph and the SWR and Frequency at that point will readout along the edges. In a bigger version of this picture, it looks like he was measuring from 6MHz to 40MHz. In that range there would be dips for the 40M, 20M, etc ham bands.

As mentioned, this instrument is capable of much more than measuring antenna performance. In the next few issues we can get into some of the details we skimmed over here. For instance, how to use the NanoVNA to measure the performance of a bandpass filter.



## THE LAST WORD



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Submissions must be received **no later than the 24th** of the month prior to the month of issue, unless otherwise specified. **Submissions should be in MS Word format or ASCII text—no PDF, please!** Material received after the deadline will be used in the next month's VOICE COIL if it is still current and /or newsworthy.

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