



SIGNAL

A club since 1992



Since 1993

de N1NC

September 2022

Volume 31 Number 9

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NVARC Monthly Meetings

NVARC General Meetings are scheduled for the third Thursday of the month at 2430 UTC (7:30pm, Eastern Time), except for July and August, when no General Meetings are held. When held, meetings are at the Pepperell Community center and are generally simulcast via Zoom. Non-members who are interested in attending may send an email to meetings@n1nc.org requesting the teleconference details.

NVARC thanks **Medtronic, Inc** for providing the teleconferencing services under their employee volunteer support program for non-profit organizations.

Upcoming General Meeting

Ditch the metaverse. The next General meeting will be held **in person** at the Pepperell Community Center, 2 Hollis St, Pepperell, MA 01463 on September 15, 2022. No Zoom simulcast is scheduled. The guest speaker will be Ron Evett N1QY, who will speak on Understanding SWR. You are cordially invited.

The President's Corner

de Bruce, K1BG

While autumn doesn't officially start until later this month, I always think of Labor Day weekend as being the "end of summer". And what a summer it's been! Besides the bevy of amateur radio related activities – Field Day, Lobstercon, HamXposition etc. – HF conditions have been steadily improving. 10 meter openings in the summer indicate truly fantastic conditions ahead during the winter months. Conditions should be better than they have been in a long time. Exciting times are ahead!

HamXposition is in the rear-view mirror now, and NVARC had a strong showing with many members attending. John, KK1X, organized a club table which got a lot of attention on Saturday by both club members and guests. I spoke twice on CW-Academy, once on Saturday and once on Sunday.

As is customary, our monthly meetings start-up again in September. Our speaker this month is Ron Evett, N1QY, who will present "Understanding SWR - Getting Power to the Load". I've seen a preview of the presentation, and I strongly encourage you to attend. Some valuable information that you will find very interesting. BTW, the presentation will be captured for the club's YouTube channel.

We are also going back to 100% in person meetings, meaning that Zoom meetings will be discontinued. The board discussed this at some length, and the consensus was that it was time to meet in person again and encourage members to attend. I look forward to things getting back to normal and seeing you at a meeting, in person.

For the rest of the Autumn, things are busy for

radio amateurs in New England. Please mark your calendars. As you know, the “Big E” is being staged in West Springfield, MA, from Friday September 16th through Sunday October 2nd (<https://nediv.arrl.org/project-big-e/>). They are still looking for additional last-minute volunteers to fill some remaining time slots. Volunteers receive free tickets and free parking. I’ve signed up, and I hope to see you there, either as a volunteer or an attendee.

It may be a little early, but October 14th and 15th are the dates for this Autumn’s NEAR-Fest (“New England Amateur Radio Festival”, <https://near-fest.com/>) which is held in Deerfield, NH. For a complete agenda, have a look at the website. It features a large flea market, exhibit halls, seminars, and exam sessions. It’s very popular and many club members can be found looking for bargains or selling excess parts or equipment at the flea market.

BTW, don’t forget that the “breakfast crew” continues to meet for breakfast on Saturday mornings at Tiny’s Restaurant in Ayer. We gather 15 or 20 minutes before, but we order food at 8 AM sharp. You can find us at the large table in the back of the restaurant.

Finally, I would like to have an additional technician class this autumn. Some New England clubs like to run them in September or early October so that graduating students can attend NEAR-Fest and get a taste of what amateur radio is all about. While I am not averse to organizing and running a technician class, I have a busy work schedule coming up. I’d like a volunteer (or more!) to work with me on the class so that if I have to travel the class is covered. It’s incredibly easy and very rewarding! When I say easy – the program is so simple that any licensed ham can easily handle it...

Again, I hope to see you – in person – at the September meeting on Thursday, September 15th.

Until then – 73!

-de Bruce, K1BG

**2022 ARRL 222 MHz & Up Distance Contest
From Mt Wachusett
de Les Peters, N1SV**

The ARRL 222 MHz & Up Distance contest provides a great opportunity for VHF+ enthusiasts to

exercise their stations and try out new equipment. During the contest, stations exchange their 6-digit grid square (IE. FN42bl) with each other. Each contact is scored based on the distance in kilometers from grid square center to grid square center. Because elevation plays such an important role in how far you can communicate, there is a number of rover and portable operations that are active.

This year I wanted to try and operate from the summit of Mt Wachusett (2001-foot elevation). While it’s easy to operate from the parking lot at the top of Mt Wachusett, operating from the actual summit requires a special permit from the state. Several months ahead I applied for a special permit and posted a \$1M liability insurance certificate. My permit arrived about a week before the contest, just in time.



Fig 1. Portable 222/432/1296 MHz Antennas

From the top of Mt Wachusett, you get some great views in all directions. I set up to the West of the fire tower and erected my 25-foot portable mast on my trailer hitch. At the top of the mast is a 15-el 432 yagi and below it is a 10-el 222 yagi. At the bottom is a 25-el loop yagi for 1296 MHz (the mast is rotated by hand).

The equipment on 222 MHz was a Kenwood TS-2000 connected to a DEMI transverter and a 100w TE Systems solid state amplifier. On 432 MHz I used an ICOM IC-9100 (100w). And on 1296 MHz I used a Yaesu FT-817 connected to a Q5 Signal transverter (25w). All equipment was set up on the backseat of my truck and powered from a Honda generator.

Since I didn’t want to stay up overnight, I operated about 4.5 hrs on Saturday, tore everything down and returned Sunday morning, and set everything back up to operate the last 4.5 hrs of the contest. During the weekend I got a lot of inquiries from

visitors as to what I was doing and at times it was a little distracting.

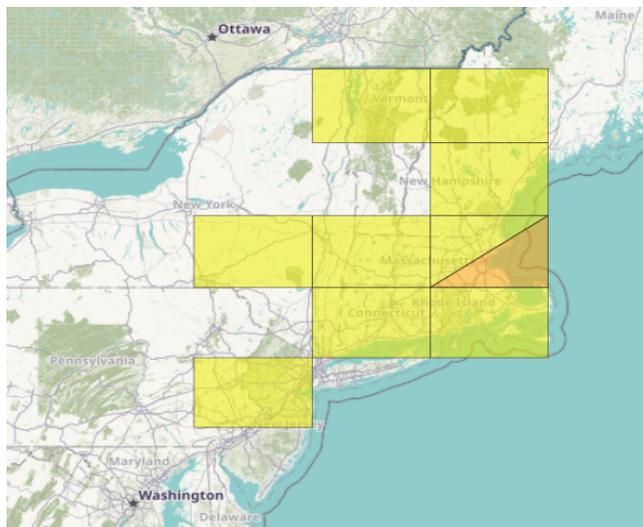


Fig 2. 4-digit Grids Worked on 1296 MHZ

My farthest contact on 222 & 432 MHz was W8ZN (FM18dv) @ 657 Km (408 miles). On 1296 MHz my farthest was K3FQS (FN20jf) @ 374 Km (232 miles). In the end I made 98 contacts (39 on 222 MHz, 41 on 432 MHz, and 18 on 1296 MHz). While I don't expect to win anything, it was a heck of a lot of fun and something I would definitely do again.

-de Les, N1SV

Musings and Worries de Skip, K1NKR

I've got a problem. Maybe you can help.

We're an aging demographic. Technology and the public's ability to communicate aren't as limited as they were in 1934 when the tenets of our licensure were codified in the then-new FCC rules. We're continually battling to ensure the continuation of the Amateur Radio Service for us licensees.

Really, the only unique thing that we can do by virtue of our licenses is generate and transmit RF energy. The underlying problem I'm having then, is "what's the essence of Amateur Radio?"

I've often gotten on the soapbox reminding listeners that our licenses are special. With only a very few nit-picking exceptions, no other radio licenses are issued to people; all other licenses go to governments, businesses, or organizations (for very tightly constrained purposes, frequencies, powers, modulations, etc.). Due to the trustworthiness and

skill we've demonstrated, we're a special lot entrusted with a special privilege.

Now look at the legal justification for our existence in Part 97.

97.1(a) (voluntary, emergency communications). There are plenty of professionals, volunteers, and hero-wannabe's who can provide comms using existing facilities. Is there anything sorely lacking nowadays that really requires an Amateur Radio license?

97.1(b) (advancement of the state of the art). We led the way in the progression of CW to AM and AM to SSB. The APRS we invented found its way into emergency vehicle location management. As long as we severely limit the information content of our QSOs, FT8 has dramatically reduced our bandwidth needs (don't tell any spectrum managers about this). But each of these has been easily out-advanced by work at well-funded research and commercial institutions who have contributed as much or more without the need for Amateur Radio licenses.

97.1(c) (communication and technical skills). Yes, we have skills that would challenge the average cellphone user. He just pays his bill and demands communication in return. We've got net discipline. We can get through in the pileup. We know how to assemble a station—at home or in the field. Do those skills actually require generating RF or could they be gained in another manner?

97.1(d) (reservoir of experts). Yes, we live in an increasingly technical world populated by a decreasingly adept population. Despite a growing minority of builders and hackers, the "I did it myself" mentality still identifies the geeks among us. Many hams are adept in the various two-, three-, and four-or-more-letter technologies (IP, DHCP, HDMI, CDMA, and on). What portion of today's communications requires the RF expertise that only an Amateur Radio license provides?

97.1(e) (international good will). We already live in an interconnected world. Everyone is wearing the same torn jeans and faded t-shirts. The "Lowell Thomas" era of discovering new lands and new people is long over—if anyone nowadays even knows who Lowell Thomas was. Plus, depending on your political proclivities, promoting international good will may not be such a good thing. (And do we really think that shouting "59, thanks for the new country [summit, grid square,

etc.], 73" is enough to promote international good will?)

I'm stumped. I love this hobby. I grew up with it and it made me who I am. The citizenry and legislators probably don't see it the same way as I do, if they see it at all.

So, what's the real essence—the *sine qua non*—the real necessity—of Amateur Radio? We hams really experience it but how do we explain it?

-de Skip, K1NKR

Nickerson State Park

de Vlad, W1MTI

Nickerson State Park is probably the best State Park in Massachusetts. It is a relatively large park of approximately 1900 acres, located close to Cape Code Bay between Brewster and Orleans. One may not only walk, bike, boat and swim there, but also stay overnight, since it has a campground with approximately 400 camping sites and all the facilities necessary for comfortable lodging. The camping sites are mostly scattered around several fresh water ponds, with a number of "tent only" sites.



Sandy soil, curly pines and the gentle breeze of the Atlantic Ocean immerse you into quintessential Cape Cod atmosphere.

The ponds, of which the largest is approximately 1 km in diameter are quite scenic. Some ponds are stocked with trout, and fishing is permitted. Water

is pleasantly warm and clean. So don't forget your trunks!



The park has K-2451 POTA designation and its grid square is FN41xs. At the time of writing, there were 15 activations, with the first done by WC4Y on 2018-09-08.



We started our journey on a sunny and unusually dry for Massachusetts summer day. After uneventful 155 miles we stopped near Race Point Beach for lunch, then retraced our steps slowly through the historic towns Provincetown, Truro, Wellfleet and finally checked into the park in the evening.

We chose the “tent only” campsite on a ridge overlooking beautiful Flax pond. I must say that the site was quite compact, but I have managed to stretch out 20 meter dipole by using an aluminum painter’s pole to lift the dipole’s center, and to tie the ends to a nearby tree on the southern side and to a sign post on the northern side. The propagation conditions were good and I have made a few contacts with stations in Europe and had a pleasant chat with MW0JKU who gave me compliments on the signal clarity and strength of my “near QRP” transceiver (57). I didn’t do a formal activation, because I have forgot to look up POTA data, and (oh shame!) didn’t know my grid square, although I knew my coordinates: (N41deg 46’ 8.27”; W70deg 1’ 32.89”).

For equipment I only had TX-500 transceiver and Zeus 20 A*hour LiFePO4 battery. The set up fits in a glove box compartment. The antenna wires with rope, insulators, Diamond BU-50A balun and RG-8X cable fits under the back seat. The aluminum pole was the only large item that had to be transported in the trunk. The transceiver draws only 100mA in receive, and around 1 A in transmit, thus I have never been able to draw the battery to exhaustion so far.

- de_Vlad, W1MTI

Batteries and Solar for Amateur Radio Emergency Part 2

de Greg Troxel, N1DAM

Solar

I mainly consider off-grid solar with 12V nominal panels, which functions when utility power is disrupted (because it was never connected).

Off-grid 12V solar

Briefly, one can get a nominal 12V panel, which has an open-circuit voltage in full sun of about 20V, and is well matched to charging 12V batteries. There are two key points for sustainable emergency power: permanent installation and charge controllers.

In an emergency, one would like station batteries to be recharged as much as possible, and battery charge may be a scarce resource. If a panel is permanently installed and will charge the battery if there is sun, it will be quite useful. A panel that is intended to be placed outside during sun seems far less likely to be useful. Therefore, panels

should be installed semi-permanently and left outside facing the sun at all times, with wiring back inside.

A panel will overcharge a battery if simply connected, destroying it if lead acid, and at best tripping the BMS overcharge circuit on LiFePO4. Additionally, controllers can extract more power via Maximum Power Point Tracking (MPPT), essentially finding the best point on the V-I curve, between the high open-circuit voltage and the short-circuit current. While MPPT controllers are more expensive and can have RFI issues, they enable getting more power out of a given panel, especially in other than full sun. Most amateurs seem limited by the ability to install panels outside, leading to MPPT being the best approach.

Consider how many hours of sun a location gets in the worst season. Depending on house occlusion and trees in winter, this could be as bad as 2h/day. With a 50W panel and MPPT, that translates to about 7 Ah on a sunny day. A guess that on average it is about half sunny is at least plausible. So that would provide 3.5 Ah/day in the winter on average, with the possibility of multiple grey days in a row (e.g. November).

Grid-tied solar

Typical household solar shuts down when the grid is down, and is thus completely useless for emergencies. There are two useful grid-connected configurations: an inverter with a solar-only emergency outlet, and systems with large batteries (on the order of 10-50 kWh). The former could power a 12V supply to recharge batteries on sunny days, and the second is whole-house emergency power. Assuming such a system has been professionally installed and inspected etc., use of such a system is left as an exercise for the reader. (Note that a 20-60 Ah LiFePO4 battery may still be useful to be able to take to other locations.)

Safety

Batteries

This is merely a reminder; people should only work on batteries and DC power if they understand the issues.

Batteries can supply enormous currents if shorted, and this is dangerous even at 12V. Therefore, do not drop tools across terminals, and ensure that terminals are covered with electrical tape.

Remove all jewelry, especially rings, when working with batteries.

Batteries are heavy, which can cause crushing injuries and strained backs.

Flooded batteries are not safe indoors due to hydrogen.

I am not comfortable with large (non-LiFePO4) lithium batteries indoors, and certainly not being charged unattended.

Temperature

I have seen statements that LiFePO4 batteries should not be charged below 0C. This article should be extended to discuss that issue. Of course, readers should read about temperature requirements for any equipment they choose to use.

Fusing

Fuses are used to protect wiring and devices. A lead acid battery can supply hundreds of amps, and if one uses 14ga wire from the battery to a radio, it is necessary to add a fuse to prevent more current in the wire than the wire's ampacity. Even if a LiFePO4 has a BMS that is limited to 40A, a fuse is still needed for any wiring with an ampacity of less than 40A. And, the BMS is probably not rated as a fuse – its purpose is to protect the battery.

Note that some DC distribution blocks (e.g. RigRunner) have a fuse slot for each connector, so that one can size fuses to the wire that is plugged in. However, those cables are not necessarily safe plugged into an 8-way unfused block if a battery with a 40A fuse is connected to the block, so often individual cables are fused.

Grid connection

Connecting solar to feed power back to the grid is complicated, potentially hazardous, and requires a lot of certified equipment for code compliance. This article only considers solar power that charges batteries and has no grid connection at all.

Capacity calculations

Earlier I posited 4, 15 and 30 Ah/day for basic,

capable local, and capable stations. I'll round that to 5, 15, 30 and consider only 15, with the others being simple scaling. All discussion will be in terms of usable capacity.

15 Ah/day and 14 days leads to 210 Ah, assuming no recharging. To keep such a system going with solar, one needs 15 Ah/day average charge, which is 30 Ah on a sunny day. Assuming decent sun for 5h, that's 6A, so a 100W panel with an MPPT charge controller is reasonable. (Plus, one gets a bit of charge in shade, often 10% of full sun on a bright day.)

With solar recharging, one still wants perhaps 4 days of capacity, which is 60 Ah. Remember that this is for the mid-grade station.

Rounding a bit, this leads to the following capacity w/o solar, capacity with solar, and sunny-day solar charge and wattage (at 5h): - basic: 60 Ah, 16 Ah, 10 Ah/day, 40W - capable local: 200 Ah, 60 Ah, 30 Ah/day, 100W - capable: 400 Ah, 120 Ah, 60 Ah/day, 200W

Overall, the conclusion is that emergency power for a basic station is feasible without solar, and that a capable station requires solar for extended operations, or an enormous amount of batteries. However, a capable station with 60 Ah and no solar is vastly better than a capable station and a utility-powered 12V supply only!

Also, note that the required Ah per day for stations are based on a lot of assumptions; being able to operate part of the time is still very useful. Even a 10 Ah battery and a 50W panel is a huge improvement for a station with a handheld.

Note that this is usable capacity; nameplate capacities of lead acid should be double these figures.

Approaches

This section attempts to give many possible solutions; I only list an approach if it seems likely that someone would want to use it, and if I think that once installed it will be in a state of readiness without constant work.

Obviously every approach can be modified.

People sometimes joke that one should buy the professional-quality type of Device X the first time for \$Y, because otherwise they will spend \$0.1Y for the budget version, and then \$0.4Y for the mid-grade version, and finally the pro one, resulting in spending \$1.4Y. However, with battery

systems the calculus is different: for emergency equipment, only reliable, high-quality equipment should be considered, and the variable is system size. By getting a smallish battery, and then one that is 4x, and finally 16x, one has three useful items for different circumstances, rather than lesser versions of X that one doesn't want to use. That said, it's probably better not to want to upgrade from 20 Ah to 30 Ah, but 20 Ah to 60 Ah makes sense.

I do list specific products and link to manufactures, but tend to refrain from linking to non-manufacturer dealers. I will however mention that hamsource had excellent prices on Bioenno batteries at a previous Boxboro convention, and before that good prices on 35 Ah lead acid batteries (that were good quality).

Note that I do not yet have experience with the PowerWerx boxes. Based on their photos they appear straightforward, and PowerWerx has a good reputation. I have received positive comments from one ham about an earlier version of the smaller box.

Currently, I do not have discharge test results from TalentCell batteries and thus cannot recommend for or against them, but I have heard positive non-quantitative things from two people.

PowerPole cabling

All solutions require either pre-made cabling or wire, PowerPoles and a crimp tool.

Lead Acid Free to Good Home

One can often get lead acid batteries removed from some other kind of service at no cost. With considerable effort and skill, one can build fused cables with connectors, test the batteries under realistic loads, and assemble a complete system. Used batteries are sometimes ok, and sometimes they are very troubled. Batteries that were previously in a UPS have, in my experience, been almost universally troubled. Each battery absolutely needs to be discharge tested at intake, and perhaps annually, but certainly every 2 years. As an example at one point I had 3 * 73 Ah, 2 * 35 Ah, 1 * 12 Ah, and 5 * 7 Ah nominal, guessing at 219 Ah actual tested capacity. Of these I only bought the two 35 Ah batteries; the 73 Ah are wheelchair pulls and the rest pulls from UPS/etc.. With lead acid, I consider the usable capacity half

or about 110 Ah. I also have a 55W and a 100W panel, not ideally situated, but did recently observe about 15 Ah/day typical while recharging batteries after discharge tests.

This option has become less and less appealing. It remains sensible for those with technical skills willing to spend a fair bit of time, rather than expense, who are able to obtain free used batteries, who have a discharge tester, and who are willing to test batteries on intake and annually thereafter. It is no longer a reasonable option for most people. I would very likely not choose this option if starting out.

Bioenno 12 Ah (budget)

- [Bioenno 12 Ah battery](#)
- [4A Bioenno charger](#)

Per the sizing discussion above, this won't meet the 2 week goal, but it is a vast step up over nothing. The cost is moderate (perhaps \$150), and a good first step. Having a portable 12 Ah battery is useful, even if a larger system is acquired later.

Bioenno 20 Ah in a box (budget)

- <https://powerwerx.com/pwrbox-portable-power-bioenno-batteries>
- 20 Ah Bioenno battery
- 4 or 6A Bioenno charger (check connectors on charger)

This requires manual charging, which may require opening the box or changing connectors, but the box has a voltmeter for checking state of charge and the battery should hold a charge very well. It will be necessary to reconfigure power wiring to use it, but that is easy with PowerPoles.

This box has 2 USB outlets and 2 PowerPole outlets.

Bioenno 20 Ah in a box

As above, but with solar. Note that you probably only need one charger even if you have several batteries.

- <https://powerwerx.com/pwrbox-portable-power-bioenno-batteries>
- 20 Ah Bioenno battery
- 4A Bioenno charger
- Epic PWRgate
- 50W panel

- 14.1V power supply

Bioenno 40 Ah in box

As above, but swap to 40 Ah and add a distribution device to be able to power more devices, and a small LED light.

- [RigRunner 4008](#)
- [PWRbrite](#)

Bioenno 60 Ah in a bigger box

- <https://powerwerx.com/megabox-portable-power-box-bioenno-batteries>
- 60 Ah Bioenno battery
- 14.1V power supply
- Epic PWRgate
- 100W panel
- [RigRunner 4008](#)
- [PWRbrite](#)
- 4A Bioenno charger (for cloudy days before a storm, if needed)

This box has one USB-C outlet, 3 USB outlets and 4 powerpole outlets.

100 Ah battery

This is an option requiring more effort/skill, but particularly coupled with a decision to use a less expensive battery brand, could possibly obtain a more capable setup at lower cost. Note that “less expensive battery brand” should be taken with a huge grain of salt, as one must consider the actual capacity, rather than the nameplate capacity, and the actual longevity of two approaches being compared. I am not making assertions about these values, only saying that if you haven’t measured something, or read many reports of measurements from others, it is unwise to make assumptions. Believing a manufacturer’s specification is an assumption, until validated by testing by you or many others.

- power cabling and voltage monitoring, like the box would have done
- 100 Ah LiFePO4
- 14.1V power supply
- Epic PWRgate
- 100W panel
- [RigRunner 4008](#)
- [PWRbrite](#)
- 4A LiFePO4 charger

One should consider USB power sockets with this setup.

Links

As usual, these are links I found interesting enough to want to remember, and they are not recommendations.

- <https://www.mobile-solarpower.com/diy-lifepo4-solar-battery1.html>
- <https://www.mobile-solarpower.com/battery-monitors.html>

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- *de* Greg N1DAM

Treasurer’s Report

Income for August was \$45 in membership fees and \$30 for ad placement in the Signal. Expenses were \$0.45 for PayPal fees leaving a net income of \$74.55 for the month.

Current balances:

General fund \$2,694.48

Community fund \$6,628.25

As of 1 September we have 42 members who are current with their dues and 35 renewals outstanding. Renewal months are in the member list on www.n1nc.org in the Member’s area; check yours on <https://www.n1nc.org/Members/Roster> or you may also email me. Thank you to those of you who mail your renewals or use PayPal without a reminder.

To pay membership dues via PayPal see the instructions in the same Members area.

If you are joining ARRL or renewing your membership please consider letting Ralph send in the paperwork for you. The Club will buy the stamp and will get a commission from ARRL.

As an Special Service Club, the ARRL expects a majority of Club members to also be ARRL members. Contact Ralph for further information if you need it.

- *de* Ralph, KD1SM

Informal Board Meeting: September 6, 2022

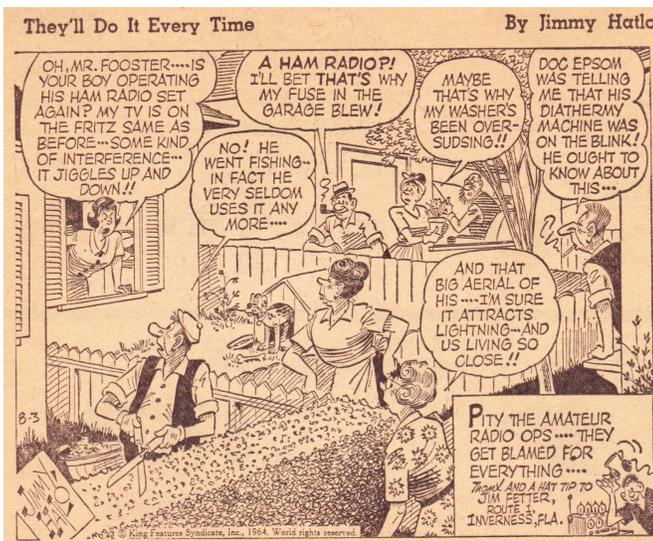
Attendees:

Bruce, K1BG, John, K1JEB,
Phil, W1PJE, Shawn, KC1ONO,
Skip, K1NKR Vlad, W1MTI

Due to exhaustion from a long summer vacation, instead of a formal board meeting, the board members gathered to discuss various aspects of legacy microwave technology, building code and the art of antique books collection. The chat ended with the critical analysis of HamXposition.

- de NVARC, N1NC

Strays



Some things never change¹...

Calendar

September

10/18 Route 66 On the Air

<http://arri-wtx.org/route-66-on-the-air-special-event/>

10 Ohio State Parks on The Air

<http://ospota.org/>

10/12 ARRL September VHF contest

<http://arri.org/september-vhf>

17/18 New Hampshire QSO Party

http://www.w1wqm.org/nhqso/NEW_HAMPSHIRE_QSO_PARTY_RULES.pdf

17/18 New Jersey QSO Party

http://www.k2td-bcrc.org/njqp/njqp_rules.html

17/18 Washington State Salmon Run

<http://salmonrun.wwdxc.org/>

19 144 MHz Fall Sprint

<https://svhfs.org/2022VHFSprintRules.pdf>

24/25 Maine QSO Party

<http://www.ws1sm.com/MEQP.html>

25 UBA ON Contest, 6m

<http://www.uba.be/en/hf/contest-rules/on-contest>

26 RSGB FT4 Contest

https://www.rsgbcc.org/hf/rules/2022/r80m_ft4.shtml

October

1/2 Oceania DX Contest, Phone

<http://www.oceaniadxcontest.com/>

1/2 Worked All Provinces of China, CW

http://www.mulandxc.com/index/match_info?i_d=4&_locale=en_US

2 RSGB DX Contest

<https://www.rsgbcc.org/hf/rules/2022/rOctoberDX.shtml>

1/2 California Republic QSO Party

<http://www.cqp.org/Rules.html>

2 UBA ON Contest, SSB

<http://www.uba.be/en/hf/contest-rules/on-contest>

3 German Telegraphy Contest

<https://www.agcw.de/contest/dtc/>

5 423 MHz Fall Sprint

<https://svhfs.org/2022VHFSprintRules.pdf>

6 SARL 80m QSO Party

<http://www.sarl.org.za/public/contests/contestrules.asp>

6 NRAU 10m Activity Contest

<https://nrrlcontest.no/index.php/nrrl-contests/nrau-nac/10m/nrau-nac-10m-english-rules/278-nrau-nac-10m-english-rules.html>

8/9 Makrothen RTTY Contest

<http://www.pl259.org/makrothen/makrothen-rules/>

8/9 Nevada QSO Party

<http://nvqso.com/contest-rules/>

¹Submitted by Skip, K1NKR

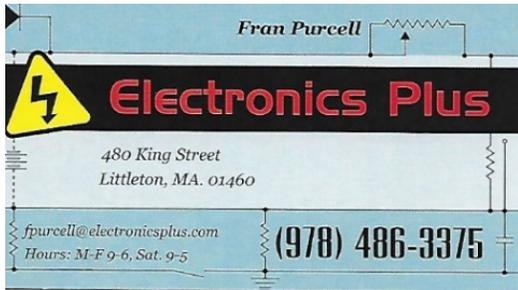
Have YOU paid your NVARC Dues?



See: <http://n1nc.org/Members/Roster>
for your renewal month.

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<http://www.n1nc.org/>

President: Bruce Blain, K1BG
Vice President: Phil Erickson, W1PJE
Secretary: John Bielefeld, K1JEB
Treasurer: Ralph Swick, KD1SM

Board Members:

Sean Pearson, KC1ONO, 2022-2025
Skip Youngberg, K1NKR, 2020-2023
Jim Hein, N8VIM 2021-2024

Property Master: John Griswold, KK1X
Librarian: Peter Nordberg, N1ZRG
N1NC Trustee: Bruce Blain, K1BG

Join NVARC! Annual membership dues
are \$15; \$20 for a family.

NVARC general meetings are scheduled for the third Thursday of the month at 2330 UTC (7:30pm, Eastern Time). Non-members interested in attending may send an email to meetings@n1nc.org requesting the teleconference details. NVARC thanks Medtronic, Inc for providing the teleconferencing services under their employee volunteer support program for non-profit organizations.

Contact us on the N1MNX repeater.
442.900 (+), 100Hz
147.345 (+), 100 Hz
53.890 (-), 100Hz

This newsletter is published monthly. Submissions, corrections and inquiries should be directed to the newsletter editor: editor@n1nc.org.

Articles and graphics in most PC-compatible formats are OK.

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