



NVARC

Signal



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Next Meeting

October's meeting will be held 7:30 PM on October 17, 2024 at the Pepperell Community Center at 4 Hollis Street in Pepperell Massachusetts.

Our guest speaker will be Philip Gladstone, N1DQ, author of PSKReporter, a web-based, world-wide signal reporting system.

Weekly 2-meter Net

The NVARC Information Net is held Monday nights at 7:30PM local time on the 2m N1MNX repeater – 147.345MHz+100pL.

President's Corner Bruce K1BG

Fall is finally upon us! NVARC activities are shifting into high gear. We recently held the first NVARC "Fox Hunt" that has taken place in many years. NVARC also had a booth at the Harvard Flea Market which generated a lot of interest, both in NVARC and Amateur Radio. More details can be found elsewhere in this Signal.

Kudos go out to Les, N1SV. Last month he donated a brand-new-in-the-box portable satellite antenna to NVARC to be raffled off at the meeting. NVARC netted \$85 which went directly into the treasury, and Bill, K1NS, walked away with the antenna. I'd also like to thank Eliot, W1MJ, for a great presentation on Fox Hunting. It resulted in the Fox Hunt I spoke of in the first paragraph here.

Besides serving as the club president, I also take on the un-official role of "membership chairperson". In this role, I have the task of sending emails to members letting them know that their membership has expired. Every once in a while, I check up on members who were active at one time and over time seemed to lose interest. Most of the time, life gets in the way, and their focus shifts to other things. Sometimes it's family, sometimes it's work related. Sometimes they move for one reason or another. Covid really played into this, because the lockdown seemed to shuffle-the-deck in that a lot of pre-covid members never came back to meetings post-covid. And other times, I have the sad experience of finding out that a past member became a silent key.

So this month I have the sad duty to report that two long-time members of NVARC have become silent keys. Phil Hopkins, KB1JKL, first joined NVARC in 2000. Phil grew up and lived in Ashby. He was a Vietnam era Navy veteran and later an electronics technician. I remember Phil bringing a box of transformer coils that he saved from the dumpster where he worked to a club meeting. He gave a brief talk on the differences between them, talked about how to test them for different parameters, and then let club members take what they want. Phil always liked discussing technical issues.

Ed Snapp, N1YFK, joined NVARC in 2010. He lived in West Townsend and was also a Vietnam era Navy veteran. Ed was one of those guys you could count on to "fill in the hole" when needed. In 2014 he rejuvenated the coffee "bar" at club meetings. Ed served two terms as an NVARC director, from 2014 – 2017, and again from 2017 – 2020. And finally, when Covid hit, Ed volunteered to help with perhaps one of the most unglamorous NVARC roles – the nominating committee. I worked with Ed (and Jim, AB1WQ) on that committee to get a full slate of officers for that 2020 Covid year.

Both Phil and Ed chose to remain inactive post-covid. RIP OMs.

On a lighter note, Jim, AB1WQ, has resurrected the coffee "Bar" again! He has donated a Keurig coffee maker so that you can have the coffee the way you like it. Rumor has it that doughnuts (OK, hint-hint, they are donuts) will be available at this month's meeting. Please make sure to leave a little something in the tip jar before you go.

And finally, I have been approached by Scout troops in both Littleton and Tewksbury to help them with a JOTA (scouting's Jamboree On The Air) demonstration. This will be coming up on Saturday, October 19th, which is the weekend after our October meeting. More details will come at the October meeting, but we will be looking for volunteers. Let me know if you are interested.

See you at the October meeting!



Treasurer's Report Ralph KD1SM

Income for September was \$90 in membership fees. No expenses were recorded for the month leaving a net income of \$90 for the period.

If any member has approved Field Day expenses that you intend to submit for reimbursement, please get those to me.

Current balances:

General fund	\$2,991.20
Community fund	\$7,128.25

As of 10 October we have 35 members who are current with their dues and 53 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.

Special 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 note ARRL's instructions to enter your NVARC membership information. As an Special Service Club, the ARRL expects a majority of Club members to also be ARRL members and will send a portion of your new or renewal ARRL membership fee back to the Club.

Contact Ralph for further information if you need it.

Board Meeting Report John K1JEB

Secretary John K1JEB has made 4 new member badges to bring to the October Meeting.

John KK1X will be publishing a 13-page Signal.

Bruce K1BG will be looking into creation of the Club Facebook group.

October meeting's guest speaker will be Philip Gladstone N1DQ and his presentation will be on PSK Reporter. November meeting will be QSL Sort

The October 7th 2-meter 7:30pm net had only 4 check-ins. There was a discussion on how to get more operators to check in to this net.

The Transmitter Hunting (Fox Hunt) Involved Bruce K1BG, Eliot W1MJ (who brought the transmitter), Les N1SV, and John K1JEB. Everyone had a blast even though it was raining.

Bruce K1BG is lining up the Technician Class for November 11th.

Bruce K1BG is planning a JOTA session but, a location is still to be determined. Help is solicited!

Discussed various suggestions to simplify the dues administration.

Antenna Testing

John KK1X

OK, perhaps “unscientific comparison” is a better title. One antenna in my arsenal of portable antennas is a 17 foot long vertical telescoping whip (MFJ-1979) atop an old photographer's tripod (from the transfer station!). I cobbled together a bit of metal to hold a CB-radio-style antenna mount (3/8" x 24 thread) to the tripod and added a few female quick-disconnect terminals for connecting radials. At the time I also made three radials about 33 feet in length. I was unimpressed with the results - and having to actually get up to change bands, well, that's beyond the pale for a lazy bloke like me, so I relegated that setup to the back of the growing pile in my car in favor of multi-band wire antennas.

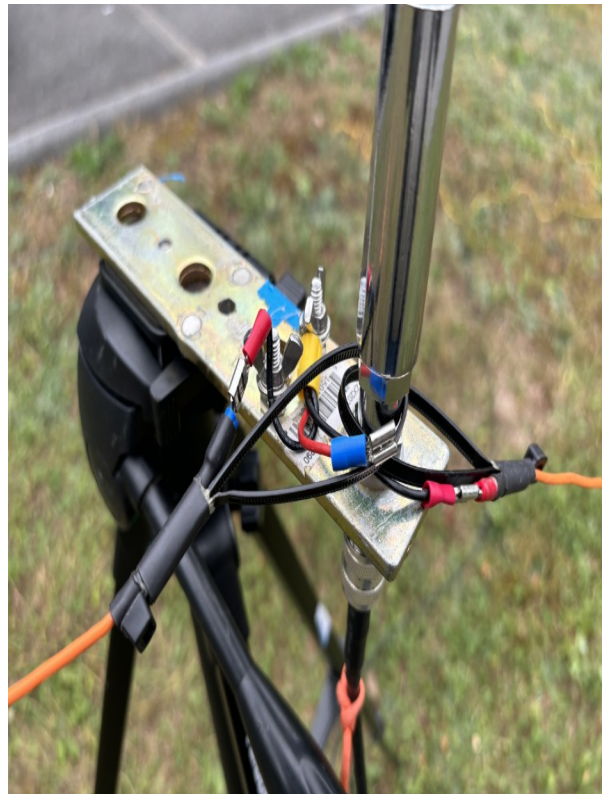
After recently watching a YouTube video by Michael, KB9VBR, I was motivated to give this setup another try. Michael's recent video demonstrated his testing of a tripod-mounted vertical with elevated, tuned radials. His prior vertical antennas typically employed ground-level radial wires or Faraday cloth. One of his subscribers, KJ6ER, designed the "POTA Performer", which Michael built and tested for this video. According to Michael's reporting, this is apparently the antenna on a tower...)

So, I figured I'd try it. I, like Michael, got a couple of plastic fence posts at Tractor Supply, and I made a set of linked radials similar to Michael's. Out at my test range, it worked quite well, and I managed to snag twenty contacts with that arrangement in an hour, which I consider "par". I find that on average I make about twenty contacts an hour using my FT8 modus operandi of mostly calling CQ and calling other POTA stations and "interesting" contacts.

So apparently it's an OK antenna.

I recently attended "Chowdercon", an annual event on Four Tree Island in the harbor of Portsmouth NH. Sponsored by the QRP Club of New England, it's a small gathering of QRP enthusiasts still hopeful of a warm day in mid-September. I'd brought my portable station, and faced with hiking to the island (maybe 1/4 mile?) I chose the elevated-radial vertical because of the low parts count. I stashed a feedline, the radials, and a bottle of water into a bag, slung my radio bag over my shoulder, and grabbed the tripod, antenna, and two fence posts. It's an easy setup - under five minutes unless it's difficult to push in the fence posts.

This setup with the elevated radials caused quite a buzz from the other operators, I think the very quick setup time was the big draw, but the elevated radials also appeared exotic. A question was posed by Carl, WA1ZCQ, another of the attendees. He has used a similar setup, but just let a bunch of radials dangle off to the ground. I'm using just two? The big question, of course, was which is better? And I couldn't answer - I had never done any "testing". Simply, if it works, I use it...



So, off again to my testing ground - the Bill Ashe Visitor Center on Devens. In the Oxbow National Wildlife Reserve, it counts as a POTA (Parks on the Air) site, plus it has a median in the parking area that affords a lot of room for antenna testing. I can easily stretch out a 40m end fed for NVIS (Near Vertical Incidence Skywave) testing. But I digress...

The first antenna being tested was the tripod-mounted version, with the antenna base about four feet from the ground, and tuned radials extending from the antenna to fence posts embedded in the turf. The radials were diametrically opposed to one another.

The second antenna consisted of another CB-style mount attached to a landscape timber spike, with six radials about sixteen feet long. As I "figure-8" wrap the radials for storage, they are far from straight when laid out on the ground, spaced roughly evenly. I had to swap the telescoping whip between the two setups. The constants in the experiment were the radio (KX3 running FT8 at 5W) and the feedline (about 50 feet long with five ferrites near one end as a choke).

Over the course of two hours I alternated setups, so 30 minutes of A, 30 minutes of B, repeat once. Mostly I just called CQ POTA, expecting stations who could hear me to respond. I push only 5 watts, and have a very good receiver. I can hear those who can't hear me. While the testing was going on, I used PSK Reporter to show where the signal was going. I observed very little difference. When the ADIF files were plotted to maps, the patterns were roughly equivalent. An hour of operation yielded 27 contacts - for each of the antennas. I've added some pictures, but the results stand for themselves. For that point in time, the antennas both worked above "par".

But that wasn't the question posed by Carl, was it? What about random radials on a tripod? On a subsequent POTA trip, I used the same antenna, set to the same length, atop the tripod, but with the six 16 foot radials dangling down from the feedpoint, roughly four feet from the ground, then spread out on the ground. I activated three sites in close proximity near the MA-CT-RI border. At each site I operated for an hour, essentially under the same conditions as the earlier half-hour tests - mostly calling CQ using FT8.

There are so many other variables involved that most certainly influenced these results that I'd be a fool to conclude that these antennas are all even roughly equivalent. I do think there's a really general correlation, though I'd have expected the tuned elevated radials to perform better. Be assured that I'm not waving my hands around, madly proclaiming "science!".



Subsequent to these "tests", I've activated other parks (always angling to increase my park count) using various configurations. The ground-mounted antenna proves to work very well, as did the elevated antenna with dangling radials. The last outing additionally produced 23 contacts on 17m after adjusting the vertical antenna length, leaving the untuned radials dangling. During one outing, yes, I neglected to even *connect* the radials. I suspect the feedline acted as a counterpoise, although there might have been incidental contact between the antenna and one of the radials. Haste does make waste. Based on 22 activations using one of these three (errr, four) antenna varieties, here are the rankings (contacts/hour):

No Radials	16
Tuned Radials	18.6
Untuned Radials	24.7
Ground Radials	24.6

It really is kind of amazing that the "no-radial" accident produced as many contacts as it did, and that the tuned radials came in next to last. Again, this isn't really science, so I will have to attempt this testing again. (uhh, toward that end, another 17 telescoping antenna mysteriously showed up on my porch today...) As I was writing this article and reviewing the unexpected results, I recall that KB9VBR tends to work in the phone bands, so his "tuned" radials likely are not tuned to the data portion of the bands where I operate. I'll make another set of tuned radials and check out that theory.

Repairing an old Swan 250C Part 1: The 117XC Power Supply

John K1JEB

I really like repairing/restoring old tube radios both, Ham Radio and old BC AM radios.

I did a search on eBay just to see what is available and spotted a Swan 250C 6-Meter SSB/AM/CW tube transceiver. It's unusual for a used radio to include the accessories as most sellers sell the radio accessories separately. But this radio included the external auxiliary Swan 210 6-meter VFO and the Swan 117xc power supply. When it arrived the radio, VFO and Power Supply seemed in reasonable condition. The unit was advertised as 'non-returnable', 'Non-Refundable' and 'As-Is'. So, I took a chance on it. It had a reasonable review in QRZ.com. Most Swan Transceiver in its day used sweep tube finals. However, the Swan 250C used a pair of 6146 for 100 Watts PEP output or 6146B for 150 Watts PEP output. That is quite reasonable for 6-meters. I also own a Commander VHF-1200 6-meter Linear amplifier which would work well with the Swan 250C. As such I could get 1200 Watts PEP on 6-meters.

As with any unknown old radio gear you can't assume that the radio was currently operational.. **As such plugging the radio into an AC mains is not a good idea.** It is a good idea to remove the cabinets to get a good look for any damaged components. I use an AC Variac variable transformer when I plug an unknown radio for the first time. Also, I add an AC watt meter/ammeter I find very useful. If you do not have any of these items then using two parallel 100-Watt light bulbs connected in parallel and then connecting them in series with the hot side of the AC mains will also work.

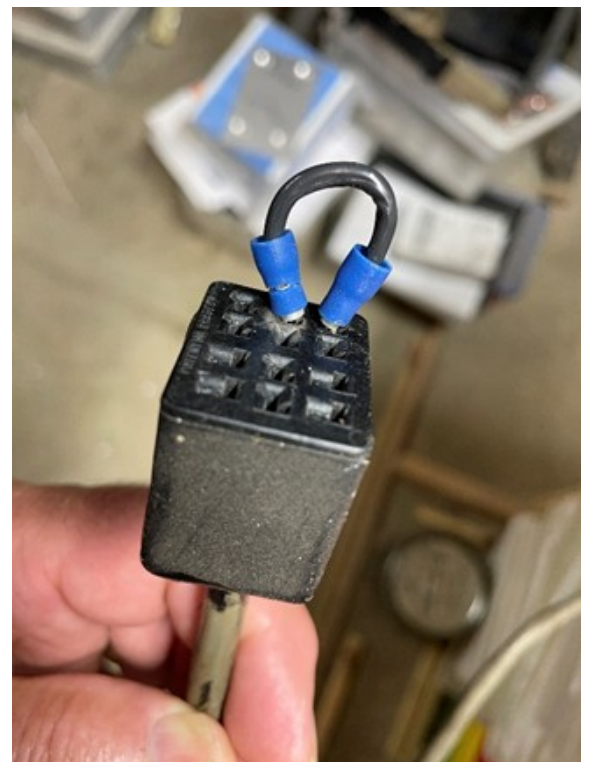
First look up the maximum power consumption of the radio from the radio's manual specifications. For the Swan 250C Transceiver the maximum power requirements are not specified. But the 117XC power supply has a 10 Amp fuse for the 117 VAC mains. A Swan bulletin advised replacing the 10 Amp fuse with a 5 Amp fuse for the Swan 250C radio. So, with that information I need the maximum VA (Watts) power required from the AC mains. The AC mains voltage runs 121 VAC where I live, so $VA \text{ (Watts)} = 121V \times 5 A$ is 605 VA(Watts) max.

When you plug in the radio for the first time you need to turn down the Variac to zero volts. Connect the Watt/Amp meter between the Variac and the radio power supply. Plug the radio into the Watt/Amp meter and then turn on the radio. Very slowly increase the AC voltage on the Variac while watching the Watt/Amp meter. If you start observing that the AC Watt/Amp meter is getting close to the calculated wattage or amperage of either 605 Watts or 5 Amps and the Variac is not close to the full 121 VAC then there is a problem in either the power supply or in the radio. Immediately turn the Variac OFF! In my case I got to the 5 ampere limit with 20 Vac! Not good...

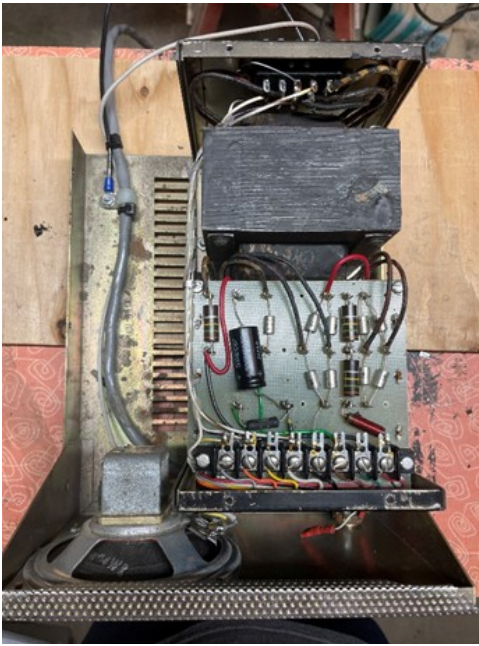
Trouble shooting now begins. Disconnect the power supply from the radio. Then jumper the two pins that go to the radio's AC power switch so the power supply can be turned on without the radio. You will need a schematic for this. In my case pins 1 and 2 on the Cinch power connector is where I added a DIY jumper wire.



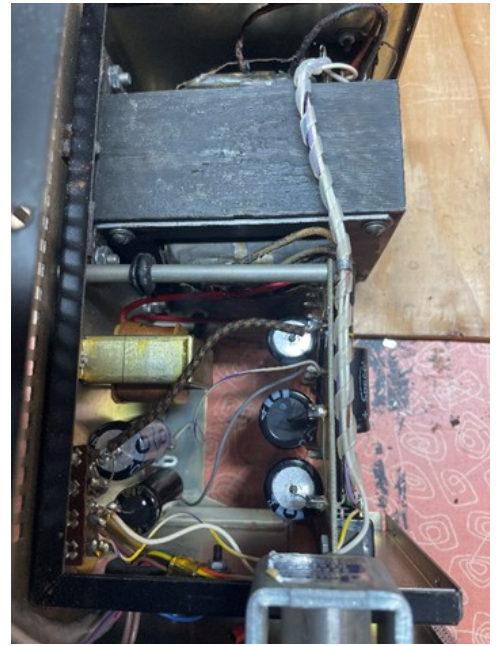
Swan 250C



Jumpering the Cinch connector



Next, I removed the top cover and the power supply chassis cover to reveal the innards of the power supply. To the right is the power supply tipped on its side.



Now again, I power the power supply as before using the Variac and again I got a high amperage reading at 20 VAC. So, the culprit is the power supply.

With the cover removed from the power supply I see five 100uF 350VDC electrolytic capacitors and one 150uF 150VDC electrolytic capacitor. Pictured are the replacement caps. Oops.

I then unsoldered the positive lead on each of the 100uF capacitors and the negative lead on the 150uF capacitor.

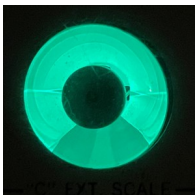
With a capacitor checker (I used a Heath IT-28) I put the negative terminal to the power supply ground and the positive to the capacitor positive lead. Turn on the IT-28 and allow it to warm up. When the magic eye (the green display on the top of the dial) spreads open the instrument is ready to use.

Initially set the vertical switch to 'Discharge' to make sure there is no DC voltage charge still present on the capacitor.

The Magic Eye is a greenish display at the top middle of the IT-28 Unit.

Then set the rotary switch 'Voltage' to 0 Volts.

The Magic Eye should now show open. Flip the vertical switch to 'Leakage'



Magic Eye open



Magic Eye closed

Heath IT-28 Capacitor Checker

Note the voltage rating as written on the side of the capacitor. In my case the 100uF capacitors were rated for 350VDC.

For each capacitor I tested, I rotate the 'voltage' switch one step at a time and wait till the Magic Eye opens. At first the Magic Eye will open immediately at the lower voltage switch settings. Then as I got closer to the rated voltage the eye was slower and slower to open. However, as I got to 150 Volts setting on the switch the eye never opened after 10 minutes of waiting.

That is 200 Volts short of the rating for a 350 VDC capacitor, indicating that the capacitor's electrolyte has dried up over the years and will not "reform". Over time without any voltage on an electrolytic capacitor the electrolyte insulating barrier decays and the capacitor barrier needs to be reformed again by the process of carefully placing a voltage in increasing small increments while the capacitor draws 2 to 4 milliamps of current.

This may be a 15 min to 2 hr process depending on how much the dielectric barrier has decayed. The dielectric is a paste applied between the two aluminum foils inside the capacitor. This paste can dry up over time or if the capacitor is used in hot environment during operation or in storage like an attic of a house. When this happens, it must be replaced. If an electrolytic capacitor is older than 20 years it is a good bet that it has dried up.

All the electrolytic capacitors failed to pass their rated leakage test. Bummer...

So, I went to see Fran at Electronic Plus in Littleton, MA and purchased 5 100uF 450 VDC electrolytic capacitors. (I wiped out his entire stock). I also got a 150uF 150 VDC electrolytic capacitor. All of them were axial lead capacitors, the leads come out at each end of the capacitor.

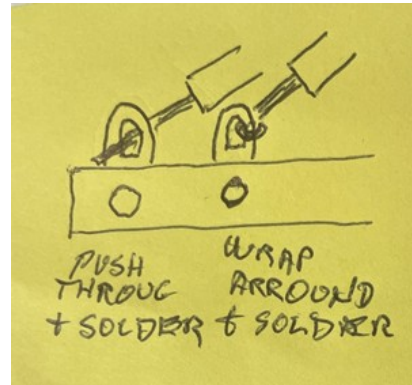


Before replacing the old capacitors with the new ones, I went ahead and checked the new capacitors on the IT-28 and reformed them to their rated voltages as I did not know how long the capacitors had been on the shelf.



(left) The capacitor on the right is an example of an old-style electrolytic capacitor.

The one on the left is a replacement modern electrolytic capacitor. Note that the leads are polarized either positive (+) or negative (-).



There are two ways to replace the capacitors.

The first requires more care and delicate work. This is the method I used on the power supply.

Before I removed the old capacitors I marked where the capacitor Positive (+) leads are located. I made a note on the chassis or the Printed Circuit Board (PCB) with a 0.5 Sharpie Pen. Cut the old capacitor leads at the body of each capacitor leaving $\frac{1}{2}$ in of lead on the soldering lugs. Then use a solder sucker tool to remove any solder from the terminal lugs. With care use both a small wire cutter and a stiff needle nose pliers to remove the leads from the solder lugs. Care is needed because if you break a solder lug you will have a lot more work to do replacing the whole solder terminal. Once the capacitor leads are removed from all the concerned solder lugs, start replacing the new capacitors, being very careful to maintain polarization.

I don't like to wrap the capacitor leads around the solder lugs. I just insert them through the lugs and solder them (above right). This way in the future you can easily remove the components. Trim the excess lead with the wire cutters.

The second method to replace the electrolytic capacitors is easier and is much less damaging to the soldering lugs. Cut the old capacitor leads as close to the capacitor body as possible leaving the leads soldered to the soldering lug. Cut the new capacitor lead to the proper length needed to wrap the capacitor lead around the old capacitor lead and then solder them together. (See right).

This method is best if working in a very tight spaces like tube sockets with a lot of components. Also, if you damage a tube socket it becomes a major project. On VHF and UHF circuits the second method should not be used. The added inductance may affect the performance of a circuit. Most service shops will use the second method.

After installing all six new electrolytic capacitors it's time to do the testing. After performing a recheck for wiring errors I plugged the AC Switch Jumper on the Cinch power plug. Using the Variac I then increased the AC voltage slowly while monitoring the High Voltage (the 800VDC) lug on the power supply with a digital volt meter. As I increased the AC voltage slowly, in 5V increments on the Variac voltage scale, I watched the high voltage increase and watched the AC Watt/Amp meter for any sudden increase in power or amperage which would indicate there are still some problems. However, everything came up normally. At 121 VAC the High Voltage was at 820VDC which is in line with the AC voltage being 121 VAC versus the designed 117VAC rating of the power supply. There are 3 150Kohm 2 Watt bleeder resistors connected in parallel to each of the High Voltage and the medium voltage Electrolytic Capacitors. These resistors all measured within the 10% tolerance ratings (Silver band).

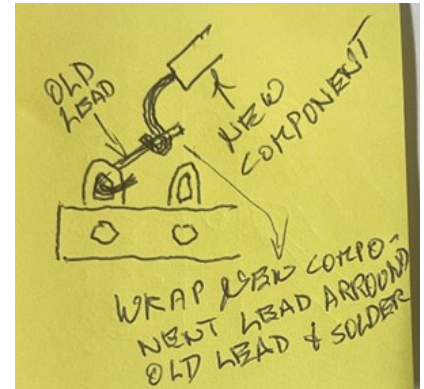
The medium Voltage lug showed 255VDC at 121VAC and 250VAC at 117VAC. The negative bias supply reads -105VDC and that is also within the design.

So, all is good.

Next, I buttoned up the covers and put the power supply aside.

Part 2 will go over restoring the Swan 250C transceiver.

73,
John K1JEB

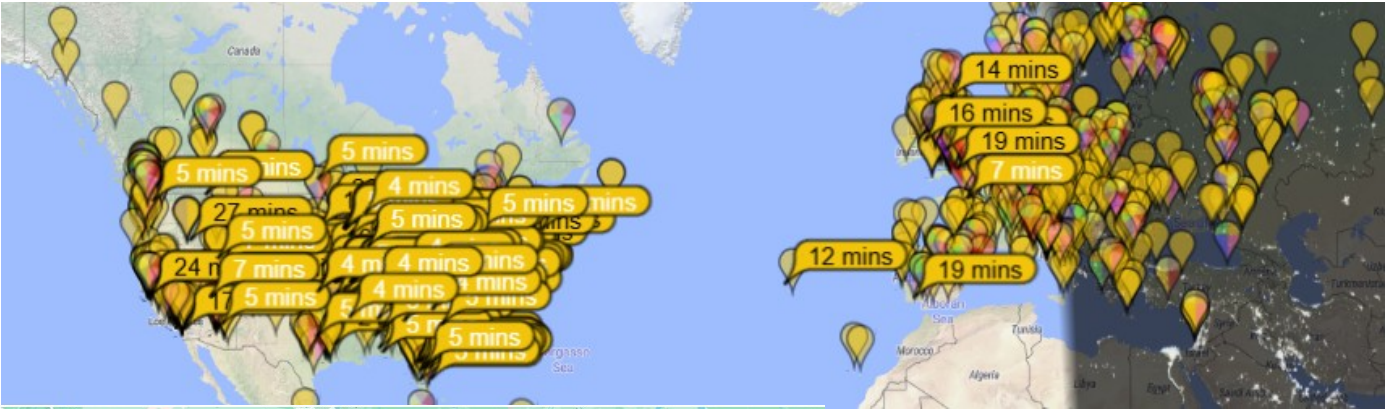


Working POTA John KK1X

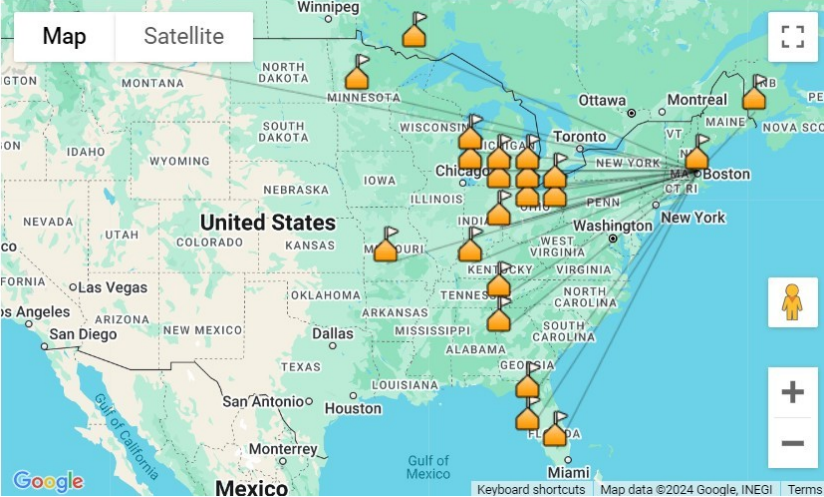
September turned out to be a very busy month for me on the POTA (Parks on the Air) front. I was doing some antenna testing, and really making a push to increase my park count. At the end of September, I was up to 135 parks. I made 38 activations in the month, 20 of them Wildlife Management Areas, most of them new to me. Most were single sites, with only one "two-fer", at "The Swamp", a spot in Ayer near Devens. Twice I set up and failed to hear anything - it's a good idea to check space weather before heading out. DOH! I also worked parks in RI, VT, ME and CT so I have checked off all New England states. Nerd that I am, I've printed out a POTA map approximately centered on Ayer, and most of those little yellow dots that indicating POTA sites are filled in...

Antenna testing is covered in another article, but I've learned to embrace the simplicity of a quarter-wave vertical regardless the configurations of its radials. I used the Rybakov (25' vertical, 4:1 unun, six 16' radials) once, off center fed dipole once, and an end fed half wave a dozen times. So two dozen activations were made with the quarter-wave vertical, in one of three configurations: ground mounted with six 16' radials, tripod mounted with six 16' radials just dangling, or tripod mounted with one or two elevated tuned radials. These configuration were the impetus for the other article.

Oh, and I grossly exceeded my 500 contact goal for the month. Be mindful that there were eight days when I didn't operate at all, but I managed to add 1,051 contacts to the log. I was at 495 contacts by mid-month, having activated 22 parks in 14 days. Add in a bunch of contacts from antenna testing, and I was close enough to 1000 that I just carried on. It's only a little bit crazy...



PSK Reporter display from Pulaski State Park RI



ADIF map of Pulaski State Park activation

NVARC Fox Hunt Bruce K1BG



Les N1SV, Noah, John K1JEB, and
Eliot W1JM

The sky was angry that day my friends. Like an old man trying to make a contact using FT8! On the rainy morning of Saturday, September 21st, NVARC held the first Fox Hunt that we've had in many years.

Eliot, W1MJ, gave a presentation on Fox Hunting (hidden transmitter hunting) at the September meeting. Two days later he hid his hidden transmitter in Pepperell's Heald Street Orchard, very close to our traditional Field Day site.

Four NVARC members braved the rainy conditions and participated. Eliot, W1MJ, and his dog Noah came out and hid the transmitter. John, K1JEB, Les, N1SV, and I chased the fox. After some tramping through the orchard, we all found it, and we all had a great time.

More fox hunts will be coming. Look for notices here and on the NVARC email reflector.

John K1JEB, Eliot W1MJ, Noah,
and Les N1SV



“We” (meaning *me*) are always hoping to publish articles of interest to our club members. Articles can be large (like K1JEB’s 4 page radio rebuild), or really small – a page or even less.

Below is an example of something I did recently. It doesn’t take a whole page. In layout, I could fit two of these onto a page, maybe three!

So this month, if you do something you think is clever, take a picture and write a paragraph or two. Even if you don’t think it’s *that* clever, someone might gain from your knowledge.

This antenna idea might help someone. Surely you have some slick stuff in your bag of tricks. Share.

A simple loaded vertical antenna



This came about after I watched a YouTube video by Tim G5TM.

Tim devised a center-loaded vertical for 20 and 40 meters. The lower 20m portion is a 200.5” (~quarter-wave on 20m) wire. The coil is placed between that wire and another wire roughly 51” long to match 40 meters.

Trim for VSWR. This is a quarter-wave antenna so no matching network is needed, but perhaps a choke somewhere along the feedline would be helpful? I used a BNC to binding post adapter and laid out six radials. The antenna was supported by a telescoping fiberglass mast.

And it works. It tuned up nicely on 20 and 40m, VSWR down around 1.2 (OK, I didn’t tune it). It also worked on 10m, and I was quite surprised that it tuned up and worked on 15m. 36 POTA contacts in 90 minutes.

Next month there will be an article on making coils like this 33uH example wound with 22ga solid insulated wire on a poly core from a roll of produce bags at the market.

Nashoba Valley Amateur Radio Club
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President: Bruce Blain K1BG
Vice President: Les Peters N1SV
Secretary: John Bielefeld K1JEB
Treasurer: Ralph Swick KD1SM

Board Members:
Fred Darling KB1RGT(2024-2025)
John Griswold KK1X (2024-2026)
Jim Hein N8VIM (2024-2027)

N1NC Trustee: Bruce Blain K1BG

Join NVARC! Annual dues are
\$15 individual, \$20 family

Contact us on the N1MNX repeater:
442.900(+) PL100
147.345(+) PL100
53.890(-) PL100

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to reach the newsletter editor.

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