NVARC
Nashoba Valley
Amateur Radio Club

SIGNAL

A club since 1992
Since 1993
Since 1996

de N1NC October 2019 Volume 28 Number 10

In this Issue

This Month's Meeting

The October meeting (7:30pm, October 17) will feature George Whitehead, W1BOF, discussing the communications side of the Apollo Missions.

From the President
***de* Stan, KD1LE**

As I start this column, we are preparing demonstrations for the Boy Scout "Massasoit Fall Camporee". Like other events that we organize or in which we participate, our goal is to recruit new hams, an aspect that is important to the long-term health of our hobby. A full description of the event and our NVARC participation follows in this issue of Signal.

de Stan KD1LE

Boy Scouts of America
Massasoit Fall Camporee

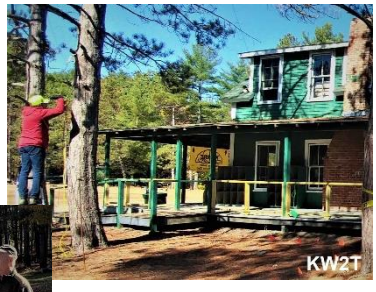
On October 4th & 5th, members of NVARC participated in the Eastern Massachusetts Council of the Boy Scouts of America's "Massasoit Fall Camporee" at Camp Collier, just north of Gardner, MA. NVARC Members that attended were:

Bruce, K1BG	Stan, KD1LE	Jim, AB1WQ
Owen, KC1KZT,	Skip, K1NKR,	Phil, K1PJE,
Dan, KW2T,	Dennis, K1LGQ	George, KB1HFT

Camp Collier is a beautiful site deep in the woods of a 500-acre tract owned by a preservation trust, and leased to the Scouts.

NVARC was mainly situated in the "Administration Building", a bare bones camp operations center, on the left in the photo above. It had power, tables & chairs, some heat, and trees nearby!

Here, Jim, AB1WQ hangs his 130-foot longwire[1].

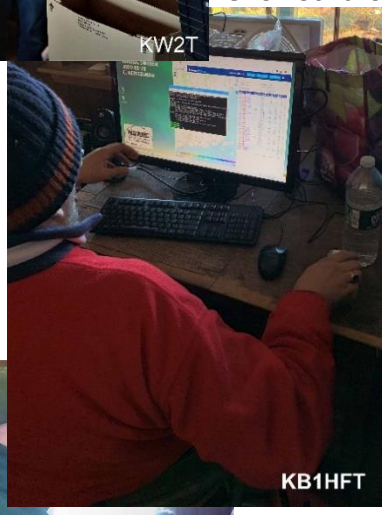


Bruce K1BG, got to show off his fly-casting skills, by almost effortlessly casting a leaded monofilament line

[1] Jim's antenna, an EFHW-8010P from myantennas.com served us well, mainly on 40meters

through the branches in order to hoist your Editor's vertical. Skip, K1NKR, assisted in aiming.

Bruce, who ignited NVARC participation in the event (thanks Bruce!), Phil, K1PJE, and George, KB1HFT showed the Scouts several facets of Amateur Radio.



Bruce introduced Scouts to the reasons Hams do Radio, and what Radio can do. He made several contacts wherein the Scouts got to converse with people thousands of miles away. Several of the contacted Hams had been Scouts themselves, so encouragement did abound.

Phil, K1PJE, brought a very cool demonstration of what one can do with Radio without being licensed: Listen in!!

Phil demonstrated some capabilities of an RTL-SDR dongle combined with a simple Raspberry-Pi and software setup. Using his rig, Phil showed an application that decodes telemetry data sent by all aircraft, and displays the data on a map; data such as flight#, heading, airspeed, etc[2]. Another application uses data from the dongle to tune the RF spectrum. Phil explained that by using such a setup one can easily become a "Short Wave Listener" without being licensed.

Stan, KD1LE, coordinated a series of FoxHunts, wherein Scouts had to find the Fox using NVARC FoxFinder[3] rigs. Stan reports:

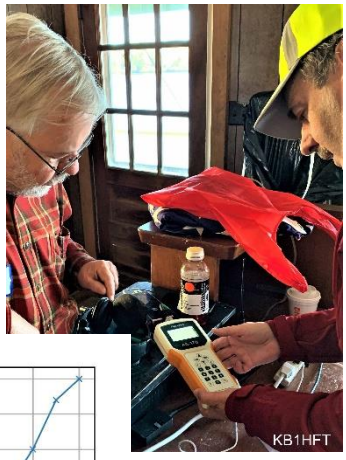
> "Using a small patch of woods on the edge of the field I put the fox out in three different spots during the day as the Scouts moved through the events.
>
> They came by in groups of three or four. I started by giving some examples of applications for RDF. Then I had them draw a sketch of the area using some landmarks like buildings, path, lake, and some landmarks that I provided (plastic buckets).
>
> Then we worked our way around the area with the Scouts taking bearings using a Foxfinder and plotting them on the sketch. In all I had seven or eight groups DF and find the fox.
>
> We all learn something when we run an event.
>
> I had to re-learn running the fox which has a number of commands. One of the Scouts learned that rotating the antenna attenuated the signal making receiving the signal very precise."

Your Editor, KB1HFT, demonstrated PSK31, PSK63, and WSPR modes of digital radio, using a simple wire vertical, supposedly cut to 14.070MHz. It has four on-the-ground radials, and is 5.2m high; the radials are 2.21m long. An EZnec simulation is in progress.

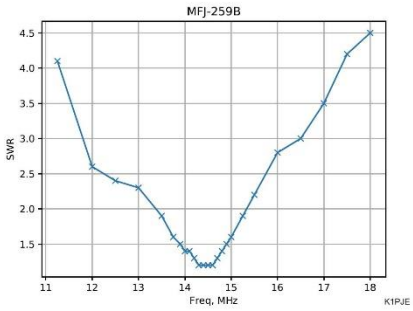
By a fortunate coincidence, three "Antenna Analyzers" were available on site to test the vertical: my MFJ-259b, and Arduino-based W8TEE "AA", along with Jim, AB1WQ's RigExpert AA-170. The oppor-

[2] See https://flightaware.com/adsb/piaware/
[3] See http://www.n1nc.org/FoxFinder/.

tunity to field test the performance of the three analyzers was seized.



Dan, KW2T, and Jim, AB1WQ, set up for a test run.



Phil, K1PJE, plotted readings taken from the MFJ-259b.

It was concluded that The MFJ and the AA-170 agree within an acceptable margin, while KB1HFT's "AA" is in dire need of calibration.

Dennis, K1LGQ, brought his nice QRP rig to the Camporee. Dennis reports:

"It's a Chinese transceiver: Xiegu G90, a QRP radio with max output of 20 watts, with the right antenna. With the antenna I was using at the Camporee, maybe 3 watts hit the airwaves.

The G90 is an all band 160-10 XVCR with AM, SSB, and of course, CW. I was using a 35amp gel-cell battery which allowed me to run full power and cruise the CW and phone bands. Conditions were not in my favor and I was competing with kilowatt stations on 40meter phone.

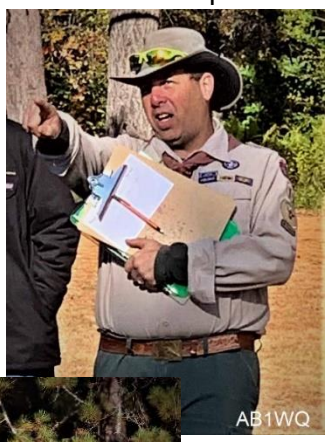
The antenna is a home brew vertical with spare parts from everywhere. The coils are independently wound for each band. I was on 40 meters in the accompanying picture.

Quarter inch aluminum rods were cut and tapped for 1/4-20 thread with couplers for length. A top section is an extending telescopic AM antenna which allows me to raise or lower for best SWR.

Overall, the Xiegu G90 transceiver is one of many I use and each QRP adventure is better than the last. I have favorite QRP rigs, but much like a dad to his kids, you'll never know which one."

de Dennis, K1LGQ

Far fewer Scouts turned out for the Camporee than were expected, perhaps due to the frigid weather, however those that did show up had a full day of Scout activities, expertly managed by Rob Kosman, of Pepperell Troop 13.



The Scouts' activities, were all "pumpkin"-themed exercises in Boy Scout skills such as "Lash and raise a round object 10 feet off the ground. In the accompanying photo, a Troop succeeds in lashing and raising a medicine-ball sized pumpkin.

Your Editor was the last of the NVARC to secure & decamp. On my way out I was hailed down by a Scout's father, who wanted to know where & how one goes about getting licensed. He related that his 17-year old son had seen Bruce's & Phil's demos, and, while being nonchalant about it with his buddies, came to his dad saying, "Dad, this is cool stuff; let's find out more about it"

I filled him in on licensing and pointed him to the ARRL.org website. Unfortunately, in my haste, I neglected to get his son's name & Troop number.

As Stan has said repeatedly:

> "We must follow up these events with Scouts to both assist any that are interested in delving deeper, and to demonstrate to ourselves that our participation is having the desired result."

Bruce is following up with Rob Kosman in an attempt to track down this and other interested Scouts.

73, *de* George, KB1HFT

The Next Hundred Years
***de* Skip, K1NKR**

I got to attend two events at the end of September which made me think about the hobby and the club.

The first was a banquet celebrating the centennial anniversary of the Providence Radio Association, W1OP. The PRA was the first radio club I ever joined. My Uncle Jack, 1JP, was an early PRA member and he inducted me shortly after I was licensed at age 13. Thirteen and a radio club member: that was the most common reminiscence of attendees at the banquet.

The second event was the annual muster (the 49th, in fact) hosted by the Sudbury Ancient Fife and Drum Companie at Longfellow's Wayside Inn. The muster brought together hundreds of people representing dozens of musical organizations from throughout the Northeast. A sizeable number of the musicians were kids, particularly an amazing group called the William Diamond Junior Fife and Drum Corps.

Modeling on Dad, Mom, or a family friend leads to interest in their hobby, perhaps leading to participation on one's own.

Two things brought us thirteen-year-olds into the Radio hobby generations ago: discoveries resulting from SWLing (what I call the "Lowell Thomas effect"—realizing that there's a big, interesting world out there) and our own role modeling of adults already in the hobby.

There's only one licensed ham for every 300 people in the US. (That's 0.3%. Versus 6% for veterans, 7% for golfers, and 20% for at-least-once-a-year bowlers.)

In your conversations, do others even know (*really know*) what amateur Radio is? Probably not. "It's like CB, isn't it," is the usual reply.

In the business world survival is based on sales, sales are based on advertising—and advertising establishes recognition. In the Amateur world licenses are based on newcomers' identification with the hobby —and identification is based on a recognition that the Amateur Service exists at all.

A few years ago, Jill, KB1SWV, introduced the club to Girl Scout Thinking Day On The Air (TDOTA)—and, thereby, introduced Girl Scouts to Amateur Radio.

Similarly, Bruce, K1BG, spearheaded our participation in last Spring's Harvard town science fair and introduced us to the high school crowd. And Owen, KC1KZT, connected us with his Boy Scout community and the recent Camporee.

TDOTA, JOTA, and science fair sponsorship are NVARC's ways of contributing to recognition, discovery, and role modeling. They are events which serve the public with no expectation of *quid pro quo*. (That's what public service is, isn't it?)

But who needs recognition, discovery, or role modeling if it doesn't lead to immediate licensing interest? After all, you could argue that the lack of resulting licensing enthusiasm makes spending the effort a total waste. But ask any salesman if every single contact results in a sale.

The answer, of course, is that the club and the hobby could benefit greatly by a wider recognition as entities that have[4]:

- value to the public: (97.1(a)),
- contribute to the state of the art (97.1(b)),
- advance skills in communications (97.1(c)),
- provide a reservoir of experts (97.1(d)),

[4] References are to FCC Electronic Code of Federal Regulations, Title 47, Chapter 1, Sub-Chapter D, Part 97.1 "Amateur Radio Service: Basis and purpose", which may be found here.

- and enhance international goodwill (97.1(e)).

Otherwise it's just It's like CB, isn't it?

de Skip, K1NKR

A 6 Meter 100W Amp The Easy Way – Part Three

***de* Dan, KW2T**

Last month I talked about the Low Pass Filter needed at the output of this 100W 6M power amplifier. I said then that I'd talk this month about the bias circuit, but I worked on something else with this amp, getting a power supply to run it. So instead, I'll talk about that. Bias will be next month.

The FET specs for highest power output are with 50 Volts on the Drain of the device. The data sheet says this is a 50V part, and the breakdown (blow-it-up) max voltage is listed as 133 volts. That latter maximum is the total of the DC and the RF signal at the positive peak of the RF output. If it's putting out 100W, that's 70V RMS, and 100V peak on the 50 ohm coax. But the output impedance at the drain of the FET is not 50 ohms, it's lower, more like 15 ohms, so the RF voltage swing is lower there on the FET drain, and is stepped up to the output 100V peak by the output matching circuit. 100W at 15 ohms is 55 volts peak. So, this plus 50VDC to power the part makes 105 V peak, getting close to the 133 max that blows up the part. If you mismatch the antenna, or leave it disconnected, the RF voltage at the drain of the FET could swing even higher. So maybe let's not run this part at full power, to save money on part replacements ($18).

There's an interesting curve in the datasheet, for the 230 MHz amplifier, that shows what happens when you lower the supply voltage. If you get 100W out at 50V, it shows that at 45V you get about 75 Watts out, and at 40V about 55W. Dropping off pretty fast. 30V is 25-30W out. Also, the gain drops off with these lower voltages. So, let's pick 45V. That still gets significant power out and gain, but is a lot safer for the part.

How much current do we need at 45V? Well, let's say we get 75W out, then we need to know the efficiency, to add in the power going into heat. Another penalty of lowering the supply voltage for safety (ruggedness), is that the efficiency goes down a little. We'd normally get like 70-80% efficiency out of this running at full power. At 75W, judging by curves at other frequencies, I'm going to guess the efficiency might be like 60%. That means that 75W output is 60% of the power in, so that means the total power needed is 125W. 75W of RF and 50W of heat. So 125W at 45V is 2.78 Amps. We have to have at least that, preferably more so we aren't right at the limits of power. So, let's say 3 Amps, or maybe say a 150W power supply. Note that for FT-8 operation, we don't need a linear amp, we can bias this part more into class-C, and maybe get the efficiency up a lot higher.

The way I see it, there are 3 ways to get a power supply like this:

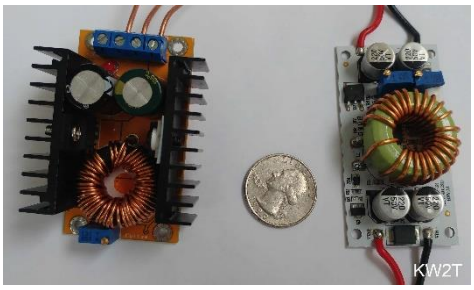
1. Buy one, like an open frame one, 48V is quite common, some have adjustments that you can crank down to 45. A switcher would work fine. Mouser has one for $21 - 85-264VAC input, 48V 3.3A output. 43.2 to 53.8V adjust range, the MeanWell LRS-150-48: Most likely a switcher will not have enough noise on it to bother the amplifier and add junk to the signal. Maybe you'll have to put a couple of capacitors on the output if it does. You have to add a power cord and maybe a box and you're done.

2. If you want to take this portable, like I do, you would like some battery supply that runs this. I could buy some LiPo batteries from HobbyKing that are like 12V and put 4 in series (do total of 16 cells in series). But this is too high when fully charged (51V). It would be nice also if it were regulated. Maybe we can find a DC-DC converter that will take 12V and switch it up to 45V. Looking at Amazon, there's some cool cheapo ones that do this. One is rated at 250W for $11, one is rated at 150W for $8.39. 400W for $8.45. Lots of choices, shipped from US supplier, mostly free shipping. More amazing, these have wide input ranges as well, you could run these on 24V and still get 45V output. Some have settable current limit.

3. There are lots of things you can scrounge that have a power supply in them you can use. For $5 I bought an old Stereo Receiver at a flea market, like from Pioneer or Kenwood or Fisher or Scott. You look on the back and see how much audio output power they do, and look in the top for a big power transformer, and if you get one that's about 100W/channel or so, it has a power transformer that will work nicely.

These come with the power cord and on-off switch and fuse and rectifiers and filter caps, all the parts you need to build a supply. Some end up with too high a voltage, might have to put a Variac on them and crank it down.

I went with Option 2. I bought a couple of the 150W and 250W DC-DC converters and tested them.



These are real simple switchers that have nothing but a series inductor and a big Schottky rectifier, and a FET switch that charges up the inductor from the input voltage, then lets it fly back to create the output voltage. A little control IC monitors the output voltage and controls the switch to get you exactly 45V all the time, then you can feed it with 12 or 24V. It will pull like 12-15 Amps on the input with 12V, so probably 24V battery setup would be better to keep the wire losses down. The switchers run at just over 100 KHz. They have nice big electrolytic caps on input and output. The 250W one has settable current limit.
I set them to 45.0 V out and put a 3 Amp load on them, and they both work great. The efficiency measures almost identical between them, 89.2%. The 150W one has 2 heatsinks on it that seem to be adequate for continuous (FT-8) duty. The 250W one needs a heat sink added.

So, get yourself set up with a power supply, and next month we'll do the bias setup and see what Watts we get out of this. For bias, I will be using an LR12 voltage regulator, rated for 100V input. I use a little one that's in a TO-92 package, since we need almost zero power for the bias voltage (LR12N3-G). More on this next time.

-*de* Dan, KW2T

Fox Batteries Wanted

The Fox has always been powered by three cells recovered from a UPS battery pack. The cell was produced by a number of manufacturers like GE, Gates, Hawker, EnerSys.

They are two-volt five-amp hour cells that look like a big D cell. If anyone knows where I might find one of those packs I would be interested. Usually they get replaced when a few cells fail, but many of the cells are still good. I take them apart and charge the cells individually so I can recover batteries from a “failed” battery module that usually has 24 cells.

de Stan KD1LE

Around & About
***de* KB1HFT**

In my wanderings about the area, I have discovered some “Hidden Gems of the Retail Kind”, that may be of interest to fellow Hams. Stan, KD1LE, had mentioned that he visited a store that has a good selection of wire at good prices.

The vendor is Rexel Electric, 3 Progress Avenue, Nashua, NH. “Provider of a wide range of electrical supplies for industrial, commercial, and residential use.”

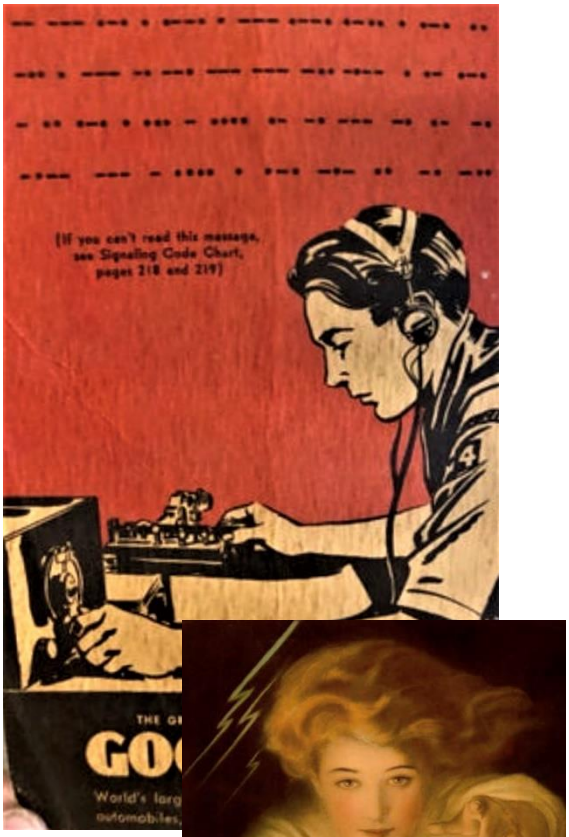
Upon entering, the manager warned me that they were not like Radio Shack; they didn’t sell hobby stuff. I reassured him that his stock is of great interest to Hams. “We are not just into transistors”, I said.

I realized that this is the sort of place where my Electrician would shop. And, what do you know, around the corner was Bill, my Electrician, who has done work for me for over 20 years!

Rexel's prices on wire and such hardware are better than the BigBox home centers. They do have an array of high-quality equipment & tools, that can be pricy, but you get what you pay for.

de KB1HFT

STRAYS



Is _your_ NVARC membership up to date?

Calendar

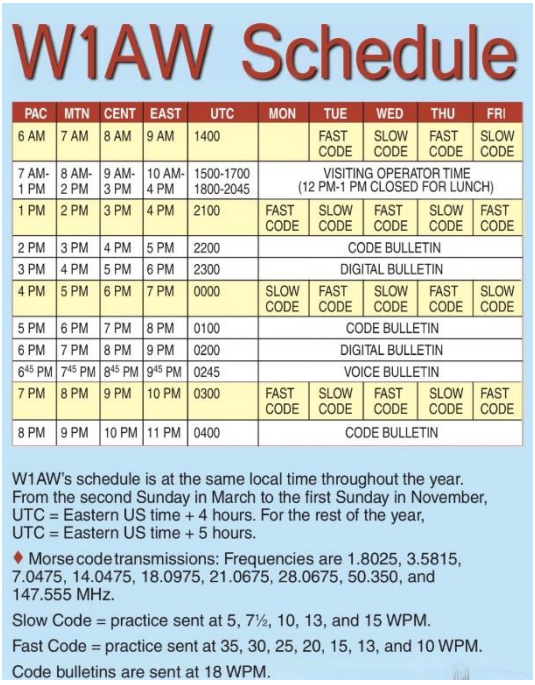
All Year

WA1WCC celebrates 100 years of RCA

WA1WCC is commemorating the founding of RCA in a year-long celebration. Watch for WA1WCC/100RCA on the bands during 2019. Participants can request the RCA Special Event Certificate.

https://ema.arrl.org/2019/01/19/wcc-ara-celebrates-rca-centennial/

W1AW Code Practice



W1AW Schedule

PAC	MTN	CENT	EAST	UTC	MON	TUE	WED	THU	FRI
6 AM	7 AM	8 AM	9 AM	1400		FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
7 AM-1 PM	8 AM-2 PM	9 AM-3 PM	10 AM-4 PM	1500-1700 1800-2045	VISITING OPERATOR TIME (12 PM-1 PM CLOSED FOR LUNCH)				
1 PM	2 PM	3 PM	4 PM	2100	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
2 PM	3 PM	4 PM	5 PM	2200	CODE BULLETIN				
3 PM	4 PM	5 PM	6 PM	2300	DIGITAL BULLETIN				
4 PM	5 PM	6 PM	7 PM	0000	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE
5 PM	6 PM	7 PM	8 PM	0100	CODE BULLETIN				
6 PM	7 PM	8 PM	9 PM	0200	DIGITAL BULLETIN				
6:45 PM	7:45 PM	8:45 PM	9:45 PM	0245	VOICE BULLETIN				
7 PM	8 PM	9 PM	10 PM	0300	FAST CODE	SLOW CODE	FAST CODE	SLOW CODE	FAST CODE
8 PM	9 PM	10 PM	11 PM	0400	CODE BULLETIN				

W1AW's schedule is at the same local time throughout the year. From the second Sunday in March to the first Sunday in November, UTC = Eastern US time + 4 hours. For the rest of the year, UTC = Eastern US time + 5 hours.

♦ Morse code transmissions: Frequencies are 1.8025, 3.5815, 7.0475, 14.0475, 18.0975, 21.0675, 28.0675, 50.350, and 147.555 MHz.

Slow Code = practice sent at 5, 7½, 10, 13, and 15 WPM.

Fast Code = practice sent at 35, 30, 25, 20, 15, 13, and 10 WPM.

Code bulletins are sent at 18 WPM.

October

10	Dan's Tech Night: 7pm, Grady Building, Ayer http://dandtechnight.com
11-12	NearFest http://www.near-fest.com
16	ARRL EME Contest. CW, Phone, Digital. 50-1296 MHz. www.arrl.org/eme-contest

16	ARRL Sweepstakes Contest, SSB. 1.8-28MHz. www.arrl.org/sweepstakes
17	NVARC Monthly meeting. Peperell Community Center, Pepperell, MA 7:30pm
24	CQ worldwide DX Contest. CW. 1.8-28 MHz www.cqww.com
20	Flea at MIT. http://www.swapfest.us/
26	Tri-City Amateur Radio Club Auction. 9am-3pm. Gales Ferry Volunteer Fire Station, 1772 Route 12, Gales Ferry, CT. 06335 https://tricityarc.net/event/tri-city-amateur-radio-club-auction/
30	Russian WW Multimode Contest. 1.8-28 MHz. .http://www.rdclub.ru/news-radio

November

2	FARAFest, Bourne, MA. Sponsored by the Falmouth Amateur Radio Association. Upper Cape Regional Vocational School, 220 Sandwich Road, Bourne, MA https://www.farara.org

NVARC Swap Shoppe

There have been no bids for the remaining equipment on this list, so this is the last call for bids before it goes to the dump. The following items are available for a donation to NVARC. Monies to be paid to the Treasurer. Items to be picked up from me.

- Kenwood TM-D700A dual band radio body $25
- An almost complete Kenwood TM-D700A with remote adapter panel but no serial cable or microphone $45
- MFJ 944 Versa Tuner II $20
- Ranger Communications RCI-600 VHF/FM Marine Radio with microphone. Looks brand new/unused $45
- Yaesu FT 7800 with Kantronics 3+ attached $40
- Yaesu FT 7800 marked ”hot on transmit” $5
- MFJ 12728BX mic/tnc switch $5
- MFJ 12738BTV mic/tnc switch $5
- HP V1905-24 POE switch $50
- Regency ARU9PLRH606B don’t know what it is, but it has a nice heat sink, looks like a VHF transceiver vintage $10
- MFJ Versa Turner II MFJ-949E $50
- LINKSYS WRT54G, BEFSR41, BEFW11S4 $5 each

de Stan KD1LE

Board Meeting Notes

Attendees:

Stan, KD1LE
John, KK1X
Ed, N1YFK
George, KB1HFT
Jim, N8VIM
Ralph, KD1SM
Jim, AB1WQ

- The Club approved $230+ expenditure for NVARC coffee mugs.
- George Whitehead to present in October. Apollo Communications is the subject.
- Discussion about Saturday's Boy Scout event: Jim and George will join Bruce on site Friday to start setup.
- Thinking Day on The Air: Do we want to continue? Shirley Girl Scouts have requested our help. Can other Troops be coordinated with Shirley scouts to join forces?

Respectfully submitted, John KK1X

Treasurer’s Report

Income for September was $15 from membership dues and $12 from Field Day pin purchases.

Expenses were $231.80 for restocking NVARC coffee mugs, leaving a net expense for the month of $204.80.

Current balances:

General fund	$2,403.17
Community fund	$5,548.25

Welcome to new member Mike Chandonnet, N1KMH from Tyngsboro. Mike came to our September meeting.

As of October 3rd, we have 37 members who are current with their dues and 29 renewals outstanding. Thank you to those of you who mail or hand in your dues before Ralph comes to you. Please check your renewal status on the roster circulated at the monthly meeting or ask Ralph.

NVARC membership payment is now accepted online via PayPal:

Some of our members are not able to attend the monthly meeting on a regular basis and our Treasurer hasn't been able to catch up with them. As a result, some of them have requested the ability to renew their Club membership on-line. This is now possible.

Use the link: https://paypal.me/nvarc, and enter "membership and your callsign" in the notes field. Please uncheck the "Paying for goods or a service?" checkbox, otherwise PayPal deducts a service fee (i.e. the Club receives less money.)

Annual dues remain $15 for an individual and $20 for a family.

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. ARRL membership checks should be made payable to NVARC; Ralph deducts the Club commission before forwarding your paperwork to Newington. As a Special Service Club, the ARRL expects a majority of Club members to also be ARRL members.

de Ralph KD1SM

Elmering

If you know of a young person who has recently become licensed, or who might be interested in becoming a Ham Radio Operator, and is in need of equipment to set up a station, an NVARC member has the resources to assist.

Through the generous donation of a fellow ham, he can supply the hardware and setup know-how to get a young-un up and on the air. If you know of such a person, please contact Jim, N8VIM at: N8VIM@arrl.net

--... ...--

NVARC
Nashoba Valley
Amateur Radio Club
PO Box # 900
Pepperell Mass 01463-0900
http://www.n1nc.org/

President: Stan Pozerski, KD1LE
Vice President: Jim Hein, N8VIM
Secretary: John Griswold, KK1X
Treasurer: Ralph Swick, KD1SM

Board Members:
Jim Wilber, AB1WQ, 2016-2019
Ed Snapp, N1YFK, 2017-2020
Bruce Blain, K1BG, 2018-2021

Property Master: John Griswold, KK1X
Librarian: Peter Nordberg, N1ZRG
Emergency Coordinator: [open]
N1NC Trustee: Bruce Blain, K1BG

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

Meetings are held on the 3rd Thursday of the month at 7:30 p.m. in the Pepperell Community Center.

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.
Editor: George Kavanagh, KB1HFT

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