NVARC
Nashoba Valley Amateur Radio Club

SIGNAL

A club since 1992
Since 1993
Since 1996

de N1NC March 2020 Volume 29 Number 3

In this Issue

Last Month's Meeting
Short Subjects Night

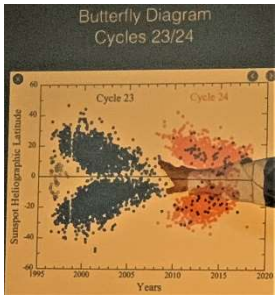
The February NVARC meeting was Member's Short Subjects night, during which several folks gave interesting talks.

Bruce, K1BG, spoke on his newly appointed role in the Eastern Massachusetts ARRL: that of "Affiliated Club Coordinator", or ACC.[1,2] See the links in the footnotes for detailed descriptions of his new duties.

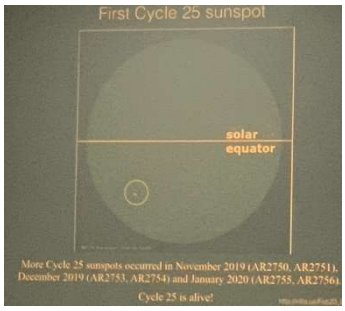
Rod, W1TAC, gave a short history of the Penn State Electrical Engineering Department's installation of a huge "curtain array" antenna[3], Southwest of State College, PA.

[1] http://www.arrl.org/affiliated-club-coordinator
[2] https://ema.arrl.org/affiliated-clubs/
[3] https://en.wikipedia.org/wiki/Curtain_array

Phil, W1PJE, spoke on the likely (maybe, perhaps) beginning of sunspot cycle 25! YaaY!



Phil displayed historic data cycles and trends that indicate a high probability of our being at the nadir turning point in the solar cycle.



Encouraging signs include the appearance of a sunspot with the magnetic polarity and solar latitude that are consistent with the beginnings of historic new cycles.

The new sunspot is circled in the photo above.

This Month's Meeting

As of this writing, no speaker is scheduled for the March Meeting, however, feelers are out to several potential speakers. Hey, come on down anyway! Thursday, March 19, 7:30, at the Pepperell Community Center.

Next Month's Meeting: Elections
(This is Important)

By the NVARC Constitution[4], Article 2, Section 2:

> "Election of Club officers shall be by ballot of the members present at Special Meeting conducted within the general meeting in April…".

[4] http://www.n1nc.org/Members/Constitution%20and%20Bylaws

Ibid[5], Article 3:

"**Section 1 - The President** shall be elected for a term of one year. He shall preside at all meetings of the club and conduct them according to the rules adopted. He shall enforce observance of this Constitution and the By-Laws, decide all questions of order, sign all official documents that are adopted by the club and none other, and perform all customary duties pertaining to the Office of President. He shall, at the expiration of his term, turn over everything pertaining to the commission of his office to his successor.

Section 2 - The Vice-President shall be elected for a term of one year. He shall assume all duties of the President in the absence of the latter. The Vice-President or his appointee shall act in the capacity of Activities Manager. He shall maintain close liaison with the ARRL Emergency Coordinator or SEC to promote the fullest possible club participation in the Amateur Radio Emergency Service. He shall, at the expiration of his term, turn over everything pertaining to the commission of his office to his successor.

Section 3 - The Secretary shall be elected for a term of one year. He shall keep a record of the proceedings of all meetings and publish minutes of each in a timely fashion. He shall carry on all correspondence, read communications at meetings as directed by the Board. He shall mail written notices to each member as required in the By-Laws. He shall keep informed by questionnaires or other means of the capabilities and type of operation of such members as possess station equipment to facilitate emergency organization and to help in planning general interest activities. It shall be the duty of the Secretary to keep the Constitution and By-Laws of the Nashoba Valley Amateur Radio Club and have them with him at every general and special meeting. The Secretary shall cause all amendments, changes and additions to be noted thereon and shall permit them to be consulted by members upon request. He shall, at the expiration of his term, turn over everything pertaining to the commission of his office to his successor.

Section 4 - The Treasurer shall be elected for a term of one year. He shall receive and receipt (as required) for all moneys paid to the club. He shall keep an accurate account of all moneys received and expended. He shall make disbursements as directed by the club or its officers. He shall publish regular summaries of club accounts for the general membership. At the end of each quarter he shall submit an itemized statement of disbursements and receipts to the club directors. He shall receive applications for membership and keep the official roll of current NVARC members. He shall have such roll with him at each general and special meeting. He shall, at the expiration of his term, turn over everything pertaining to the commission of his office to his successor.

Section 5 - The Directors will be elected for a term of three years. They are charged with the responsibility of guiding the club in all its endeavors. They shall interpret the wishes of the general membership and guide the officers in that direction. They shall decide questions of interpretation of the NVARC constitution when required. They may elect Honorary members. They shall audit the financial accounts of the club. They shall review and approve agreements prior to submittal to the general membership for approval. They shall monitor agreements accepted by the club for compliance."

[5] "Ibid" is an abbreviation for the Latin word *ibīdem*, meaning "in the same place"

Note well: Ibid, Article VIII - **Dissolution**:

"The Nashoba Valley Amateur Radio Club will be dissolved if any of the following conditions exist:

a. The membership is unable or unwilling to fill the positions of President and Vice President for a period of sixty days after both offices become vacant.

b. NVARC does not hold a regular monthly meeting for more than four consecutive normal meeting months as defined in Section 2 of the Bylaws.

c. The membership votes to dissolve the club with a majority vote at a special meeting conducted in accordance with Article IV.

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

Next month will be club elections. Each year the Officers and one Board member are up for election or re-election.

Candidates are needed for at least President and one Board member.

The Tech Morning Group continues to meet at the Community Center at 10:15 AM on Mondays.

Recently the following projects, mentoring, and demonstrations happened:

- Peter N1ZRG demonstrated his new Metcal® soldering station[6], and we all got to try some soldering with it. The Metcal® system is quite different from a traditional soldering station or iron.

  When in the holder the soldering tip is at an idle temperature at about 5% power. When the handpiece is removed from the stand it is sensed, and the power needed at the tip is determined via a clever application of RF and the Curie Principle within the tip, which comes up to temperature in a second or two.

  The handpiece is very light and slim and the tips can be changed on the fly. The basic soldering station has a single port but some of the larger stations have two

[6] https://www.okinternational.com/metcal/english/globalnavigation/products/hand-soldering-systems

ports so you can have two different tips or for a rework station.

- We have also started laying out a project for controlling a sixteen-relay module with an Arduino which I'll call the master. The master will be controlled by multiple remote Arduinos that all communicate by RF using nRF24L01[7] modules at 2.4 GHz.

- We spent some time helping Peter install a programming language called Julia that he wants to use for exploring Linear Algebra.

- Bob, W1XP, showed his progress in building an amplifier for 630m. See the details in a later article in this issue of Signal.

[Ed Note.] We also gabbed a lot about antennas, radios, and the like. Come join us if you can: Mondays @ 10:15 in the Pepperell Community Center.

Hands Free Law is now in effect in Massachusetts.

Amateur Radio is exempt, but you must have one hand on the steering wheel.

It is suggested you have a copy of the relevant sections of the law (MGL Part 1 Title XIV Chapter 90 Section 13) and a copy of your Amateur Radio license in your vehicle.

I put copies in the glove compartment of each vehicle.

I attended the Boston Marathon training session on March 7th. Met NVARC members Ralph, KD1SM, and Jim, AB1WQ, there. There were a lot of people there for their first Marathon, but there were well over one hundred people present.

There were several presentations to the entire group by Marathon officials which covered changes this year, some increased data collection procedures, and current medical issues.

Then we broke off into groups for Start, Course, and Finish for specific information. I also got to catch up with some MARS members, Rob Macedo, KD1CY, of East Mass ARES and SKYWARN, and a number of people I know from the Marathon NCOC operations.

-*de* Stan, KD1LE

[7] https://www.sparkfun.com/datasheets/Components/nRF24L01_prelim_prod_spec_1_2.pdf

The End of Amateur Radio?

***de* Skip, K1NKR**

Phil, W1PJE, and I were at the Algonquin ARC (Marlborough) flea market a few weekends ago talking with a brand-new licensee.

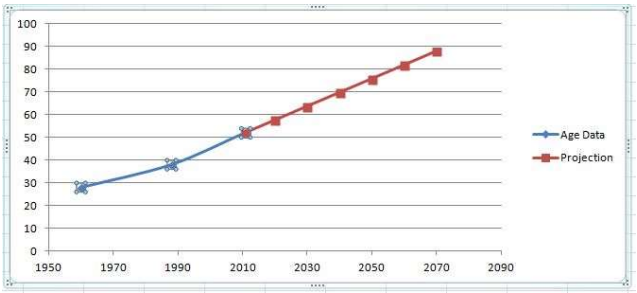
I launched into my "you can do anything you want with your license" spiel. Phil continued, commenting on the state of the ionosphere. We three concluded that this is a great time for new people to join the hobby, since every day for the next half-dozen-or-so years will be a better radio day than the last.

When Phil gave his talk at our Short Subjects night at the February meeting, a couple of folks said, "and this next one will be my last solar max."

Last night, though, I awoke from a prescient nightmare: what happens after the next "half-dozen-or-so years" have passed? What happens when we, the core of today's hobby, do see our last solar max?

No new news here. We practitioners of this, the greatest learning/participating/serving hobby, are getting older.

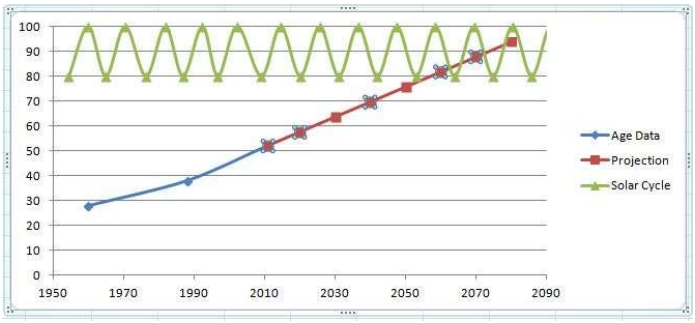
The average ham in 1960 was 28. In 1988, the average age of an amateur radio operator was 38 years old. In 2011, the average ham was over 50. (Let's take that conservatively as 52. Your mileage may vary, but at least I'm not overestimating.) Here's a plot:



So, by 2060 the average age of hams will be over 80 and by 2080 the average age will be well over 90.

Now, maybe life expectancy will be at or over 90 by then, but I'm not sure someone over 90 will still have the liveliness to make the best of propagation conditions. (Again, your liveliness may vary but I expect I'm really not too far off.)

Now let's lay a plot of the solar cycle on our age graph.



Let's say Joe or Juliette Ham is approaching 90 in 2070. The bands are medium dead and getting worse. It'll be almost another eleven years before propagation will be even as good as it is now.

Question: is it worth investing in a new rig or putting up a replacement antenna to be ready for the solar upturn?

Ham radio dies before the turn of the century.

Before you pick me up on "average age" and say, "well some hams will be older than that and some will be younger," think about the math. Let's say some thirteen-year-old Sheldon comes into the hobby. He's numerically balancing off a 163-year-old (*RIGHT!*) or an immense handful of nonagenarians. How likely is that?

Or we could drive the age progression curve down by recruiting. …Now.

-*de* Skip, K1NKR

Bromfield Science Fair

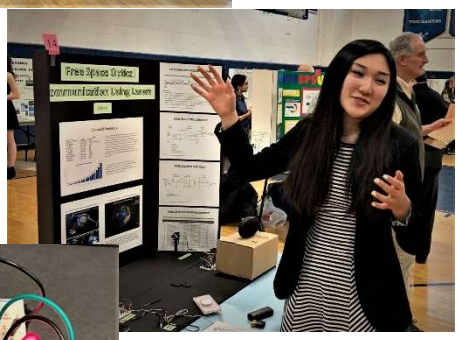
Once again, NVARC members volunteered to judge radio-related entries in the Bromfield School's annual Science Fair. There were fifty-two entries, five of which were in the areas of NVARC expertise.

The students were quite knowledgeable in their subjects, some more than others, but **all** of them were impressive. The projects NVARC judged were:

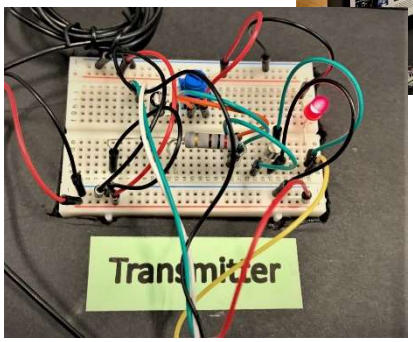
1. "Warping WiFi: The Attenuation of WiFi Signals by Different Materials"
2. "Free Space Optical Communications using Lasers"
3. "Making GPS Use Safer"
4. "Simple Aurora Monitor"
5. "The Construction and Research of MagLev Trains"

Of these, NVARC judged numbers 1, 2, & 4, as superior works, and awarded the students with a Certificate of Merit, , an RTL-SDR HF/VHF radio dongle, and a private tour of Haystack Observatory.

The scene at Bromfield (photos by Bruce, K1BG).



Liza Jo explains Free Space Optical Laser Communications.



Liza's laser's modulator.

The Aurora Monitor Group hand soldered a magnetometer kit to measure fluctuations in the earth's magnetic field, perhaps correlated with significant Auroral activity.

Working DX on 630m

***de* Les, N1SV**

Last winter was my first try at operating 630m and with a power limit of only 5w EIRP, my expectations were quite low. Knowing very little about the band, including what communications range was possible, I was thrilled to work more than 50 unique stations

from as far away as WA State (2,300+ miles) using the JT9 digital mode.

Building on last year's success, this winter I wanted to see if I could reach stations even farther away and if working DX was possible. Technically you can work DX many nights on 630m as several Canadians are usually active, and occasionally ZF1EJ (Cayman Islands) is on. But I guess what I was really trying to get at is could I make a transatlantic QSO?

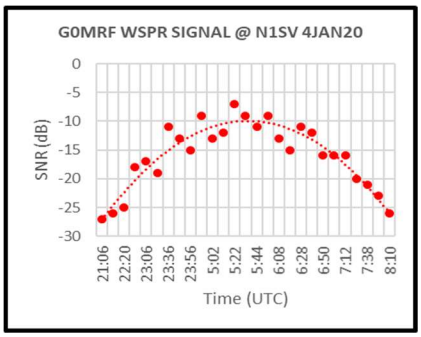
One of the best ways to investigate 630m propagation is by using WSPR, a communications beacon mode found in the WSJT-X PC application.

Overnight on many weekends I have my WSPR beacon transmitting and in the morning I'll collect receive reports from the http://wsprnet.org/drupal/ database. Typically I get at least one or two reports from Europe and on a good night sometimes 20 or more. Using these reports, it's possible to determine the best time to try a potential 2-way QSO with Europe. It's also a good way to identify potential stations to work.

WSPR receive map from 1/12/2019

630m propagation to Europe seems similar to that on 160m in that distance is limited by high static levels and large QSB.

Signals to the East peak from our sunset to as much as 1-2 hours past. There's also another peak looking East at European sunrise and a distinct peak directly in the middle between our sunset and European sunrise.



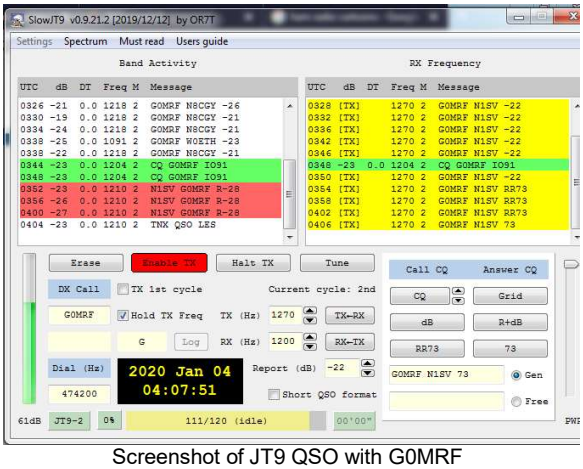
G0MRF's WSPR report by N1SV

The biggest challenge to being heard across the pond is the 5w EIRP limit followed by the small number of active stations in Europe.

From what I can tell, there are about seven different European stations that either regularly or occasionally hear my WSPR signal or where I hear theirs. Still, each winter season, I'm told 10-15 stations are able to make a 2-way transatlantic contact using the JT9 digital mode.

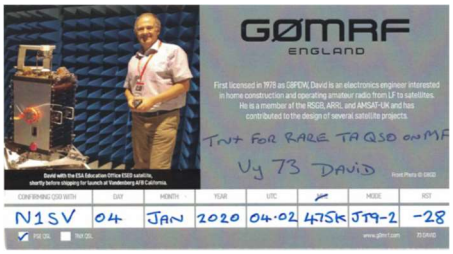
Like some other low bands, it seems the best time for a long distance (East ⇔ West) 630m contact is at or near the winter solstice (December 21st).

Most transatlantic contacts therefore occur between December and January.



Screenshot of JT9 QSO with G0MRF

On January 4, 2020 after several failed attempts I was fortunate enough to make my first 630m transatlantic QSO, working G0MRF.



The contact was made using a JT9 sub-mode called JT9-2 (the number after the dash signifies the duration of the transmission in minutes). The more common JT9-1 (AKA JT9) mode has an S/N threshold of -27 dB while JT9-2 has a threshold of -30 dB. There also a JT9-5 and -10 sub-modes with higher thresholds but the greater time required for a QSO and the QSB issues make it less popular.

OR7T has developed a free application, "Slow JT9", for using these sub-modes.[8]

[8] http://www.472khz.org/SlowJT9/

The SlowJT9 program works pretty well, but can be buggy at times so caveat emptor.

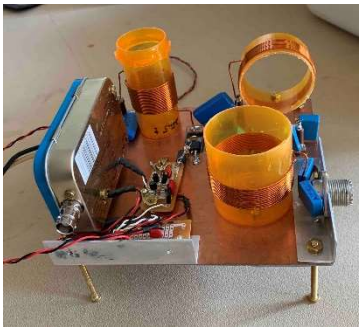
I hope you give 630m DXing a try and if you have any questions feel free to contact me at n1sv@comcast.net .

-de Les, N1SV

A 100w 630m Amplifier

Last week, Bob, W1XP, brought one of his latest creations to the Monday Tech Morning session. It is a 630m power amplifier, modified from a relatively popular design by GW3UEP[9]. Bob has made small but significant mods to the original design. Bob's marked-up schematic may be accessed at http://n1nc.org/Newsletters/2020/W1XP_amp .

The design uses a single IRF740A MOSFET[10], in class E operation, driven by 501–504 KHz square waves. The Altoids box holds Bob's square wave shaper logic gates. CW keying is done by switching the MOSFET's 24v V+ line.



The MOSFET is cleverly mounted THROUGH a hole in the copper clad board, and is bonded to a massive, fan-cooled heatsink on the underside.

Nice, clean, construction: FB, Bob!

[9] http://www.gw3uep.ukfsn.org/100W_QTX/100WTX/PA_cmos.gif

[10] https://www.vishay.com/docs/91051/91051.pdf

A Neat Trick: 80m on a 40m Vee

de George, KB1HFT

As some of you know, I occasionally take part in a very informal slow-to-medium speed CW "net'' with other NVARCers. I put "net" in quotes because its really just a short "Good Morning!" chat session, using CW, between friends. We aim to practice our code as well as proper network protocol. Informally.

Although the other guys can all copy somewhat faster than I can, which is about 8-10 wpm, I can usually get the jist of the discussion. And, truth be told, I do "cheat" somewhat, by using the tools I have at hand, namely HamRadioDeluxe, to assist in copying.

We are all geographically close, so NVIS propagation is indicated. We had been using 40m, but NVIS has been seen to be suboptimal by Stan's recent studies of ionosonde data, as well as our group's empiric evidence. Subsequently, a move was made to 80m (3.652MHz).

Unfortunately, I did not have an antenna usable on 80m. What to do…

I do have a 40m inverted Vee installed downwards from an attic window. The arms are ~35' long, and are spread ~90 degrees apart.

The wires are highlighted in orange in the accompanying photo:

While researching 80m antennas, I found mention of the "Shorty Forty" by Jack, W5VM[11]. It is a 20m dipole with a center loading coil to tune the assembly to resonate within the 40m band. I thought, "why not do the same thing with my 40m wires: center-load them to resonate on 80! Hmmm…

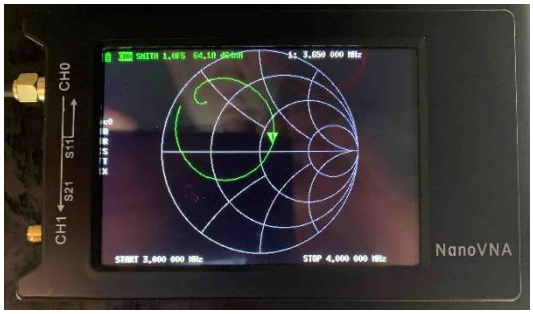
So, I put together a "remote" tuner in the window at the Vee's feed point, which is conveniently in the Attic!

[11] http://www.flashwebhost.com/circuit/shortant.php

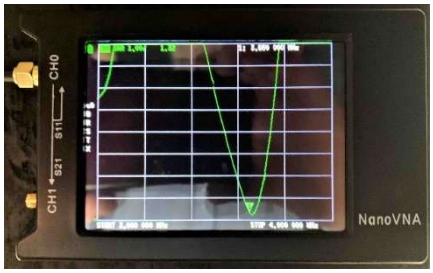
The tuner consists of a long, 2" diameter, 10TPI, AirDux coil; with clips to pick out tapping points.

I included a switchable NanoVNA (in the lower right of the above photo) to graphically assist in picking coil taps.

Tuning by using a Smith Chart is quite interesting. The pictured scan, from 3 to 4MHz, shows that I've adjusted the coil taps so that the impedance at my frequency of interest is seen to be close to the center 50-ohm point, but a little reactive.



An SWR plot of the same tuning shows 1.32:1 at my desired frequency.



Bingo! I am now on the air (sometimes) on 80m for the 0930 CW QSOs!

Calendar

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.

March

14 Tesla Memorial HF CW Contest. 80m, 40m
http://www.radiosport.org.rs/HFTeslaMemorial/index.php/rules

15 Run for the Bacon QRP contest. 1900 – 2400Z CW. 160, 80, 40, 20, 15, 10m. Max 5w.
http://qrpcontest.com/pigrun/

19 NVARC Monthly Meeting: Pepperell Community Center. 7:30pm.

21-22 Russian DX Contest. 1200Z – 1200Z. 160, 80, 40, 15, 10m. http://www.rdxc.org/asp/pages/rulesg.asp

26 RSGB 80m Club Championship, SSB.
https://www.rsgbcc.org/hf/rules/2020/r80mcc.shtml

April

1-2 CWops Mini-CWT Test 160, 80, 40, 20, 15, 10m.
https://cwops.org/cwops-tests/

3 NCCC Sprint. 0230-0300Z. CW.
http://www.ncccsprint.com/rules.html

4-5 Florida State Parks On The Air. 1400-2200Z both days. 80, 40, 20, 15, 10m. CW, SSB, Digital. http://flspota.org/rules/

5 North American SSB Sprint Contest. 0000-0400Z. 80, 40, 20m. http://ssbsprint.com/rules/

Board Meeting Notes

Attendees:

Stan, KD1LE
John, KK1X
Ralph, KD1SM
Jim, N8VIM,
Bruce, K1BG,
Jim, AB1WQ

- No speaker has been arranged for March meeting.
- Science Fair Friday 2/6/2020.
- John to find a speaker for the March meeting.

-*de* John, KK1X

Treasurer's Report

Income for February was $75 from membership dues and $2 from ARRL membership renewals. Expenses were $145 for the Field Day porta-john leaving a net expense for the month of $68.

Current balances:

General fund $2,572.67

Community fund $5,948.25

As of 5 March we have 51 members who are current with their dues and 13 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.

Membership dues can now be paid via PayPal:

Go to https://www.paypal.me/nvarc

- **Please <u>remove</u> the checkmark in the box "Paying for goods or a service"**, as PayPal deducts a fee for their "purchase protection" if you leave this checked. If your "shipping address" is still displayed, then the box is still checked, adding an expense to the Club.
- (Optional) enter your callsign in the "Add a note" field.

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

The Australia Institute has analyzed meteorological records and found that on average summer temperatures over the past 20 years last 31 days longer than they did in 1950. Some areas of Australia were as much as 7 weeks longer.

Ever heard of Ampere and I don't mean a measure of current. The company Ampere has begun showing its new computer server processor "Altra" which has 80 cores! You won't see it in your laptop soon, it consumes 210 watts!

Sponsors

NVARC
Nashoba Valley
Amateur Radio Club
PO Box # 900
Pepperell Mass 01463-0900

http://www.n1nc.org/

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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