Nashoba Valley Amateur Radio Club

SIGNAL

A club since 1992

Since 1993

Since 1996

de N1NC April 2021 Volume 30 Number 4

In this Issue

NVARC Monthly Meetings

NVARC general meetings are scheduled for the third Thursday of the month at 2430 UTC (7:30pm, Eastern Time).

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.

Last Month's Meeting

Greg, WA1JXR, gave a great talk on the Nano VNA. It's a nice, cost-effective device for doing 2 port measurements.

This Month's Meeting

Frank, W3LPL, will speak on the Centennial of the 1921 Transatlantic Tests.

A Solution

***de* Skip, K1NKR**

If you're anything like me, you've probably got enough prowess in the shop to get mechanical projects done—but not done to your satisfaction. For instance, I've been plagued by the placement and precision of nut-and-bolt holes. Recently, while searching through my decades of accumulated (and forgotten) technical files, I came up with a solution.

Have you ever ended up with a hole placed just a little too near the edge of a chassis? Here's a bolt that will solve your problem.

Or how about that hole which you drilled in "English" (*i.e.*, American) measurements only to find that the hardware was metric (*i.e.*, universal, world-wide)?

The universal taper bolt solves the problem. There's actually a corollary to this bolt. It's the gun that will shoot any size bullet—called the Excalibur.

Finally, for times when the hole just wasn't in the right place and you corrected it, there's a bolt specifically designed to remedy the situation.

I was introduced back in the 70s to these clever items sold by Wayward Duck Racing, Inc. of the San Francisco Bay area.

I recently hit the Internet to re-connect with the Wayward Duck to restock my supply but couldn't find them.

I've been told, though, that these and various alternatives (*e.g.*, "spring" bolts for when you don't know the depth of the hole, bolts for oval holes, for holes not drilled straight, for unthreaded holes, spare threads for stripped bolts, and bolts that can be used in place of fuses) are available from vendors like Shade Tree Mechanics, Pacific Fasteners, and Checkered Flag Graphics.

-*de* Skip K1NKR

Monday 2m NVARC Information Net

The NVARC Information Net, is held Monday nights at 7:30pm, Eastern time on the 2m Pepperell repeater, N1MNX: 147.345MHz, PL: +100. Recent activity has been steady, with a dozen or so checkins.

NCS duties have been on an informal rotating basis, as Charlie, AB1ZN, is out of town for the next month or so. Jim, AB1WQ, was NCS on Monday, April 5.

As Jim put it in an eMail to the club: "If your cell phone or landline or utility power stop working, will you have communications capability through the N1MNX repeater in Pepperell? How will you know if you don't regularly test and demonstrate your own capability? So, join the Net!"

Restoring a Central Electronics 20A SSB Phasing Exciter – Part 2

***de* Bill, AB1XB**

In the Fall of 2020, I began to restore my Central Electronics 20A.

I removed the enclosure and examined the situation above and below chassis. A couple of tubes were bro ken, and dust covered all the wiring, which was the "push-back" fiber insulation variety used in the 1950's.

The 20A, out of the box, with some rust & dust.

Copper corrosion and a Dust Stalactite.

Coils in the band switching cage were covered in fine threads of dust.

I cleaned this using a small air blower and 91% isopropyl alcohol on cotton swabs. Then I could somewhat see the color coding of the wires.

I looked for signs of overheating, loose solder joints, etc. There was worrisome evidence of a power transformer leak.

Since this rig was special, I decided to replace all electrolytic capacitors, rather than re-form them, to avoid risk of shorting out a possibly compromised power transformer.

I decided to replace the paper/foil caps too, although CE used high quality Sangamo caps that were probably OK.

The two B+ filter caps were housed in a can, and I ordered an exact replacement made by CE Manufacturing (not to be mistaken for Central Electronics), who use the original Mallory manufacturing equipment. See: https://www.cemfg.com/videos for how they are made. These and the other caps and parts were ordered

through Antique Electronic Supply: https://www.tubesandmore.com.

Under chassis before re-capping. Fairly clean except for dusty wiring. Note custom antenna relay bracket at lower left.

While the caps were on order, I assessed the power transformer. After removing the tubes, I measured all PT windings and got continuity and some resistance.

The filter choke looked good, with 91 Ohms DC resistance. So, using a Variac and a 120V 60W light bulb in series as a current limiter, I very slowly brought the voltage up on the PT primary.

The 5.0V, 6.3V and 300V secondaries read high, which is expected with no load. So, the first hurdle was over – apparently the PT primary and secondaries were intact.

Next, I removed an antenna relay, added by a previous owner, that had exposed 115V on the rear terminal strip, and I re-wired the VOX relay according to the schematic.

I tested all tubes, replacing a couple of weak ones and the broken ones, and tested the balanced modulator diodes and a sampling of resistors and mica and ceramic capacitors, which were all good. (These do not normally need replacing.)

Then I tested the 9.000 MHz local oscillator crystal using the nanoVNA, which gave me 8.99415 MHz series resonance and 9.01065 MHz parallel resonance. Not bad!

After removing the control nuts and front panel, leaving controls dangling from their wires, I proceeded to clean and lubricate pots and selector switches with DeoxIT D5 and G5. Then removed the band switch and tank circuit section for cleaning and testing.

The nanoVNA revealed peaks and nulls at the right places in the ham bands, so I gained confidence that the corroded and very-closely-spaced windings in the air coils might be OK. We shall see.

Band switch unit after cleaning.

With band switch assembly removed, from left: AF driver transformer, PS-1 audio phase shift network (red tag), VOX relay, pair of modulation transformers, power transformer.

A common failure point in the 20A is the VOX relay coil. This part, essentially a vintage telephone relay, switches the bias voltage on the cathode follower and final amplifier tubes on key-down or voice activation, so it is critical to operation.

Using a DC supply, I was able to activate the relay and prove that the contacts worked.

Next job was to check the two matched modulation transformers. Secondaries were good. But primaries were both open – disaster! At this point, I went to the CE Reflector to ask for help.

Help arrived. Several hams had had the same issue with the 20A, and although the original transformers are no longer available, they had discovered a good substitute: a 12.6 VAC filament transformer from Radio Shack with the same impedance and turns ratio. Someone stocks them on eBay and I ordered a pair for a reasonable price.

The original modulation transformers are potted in metal cans. While waiting for the new transformers to arrive, I discovered that they have the same mounting hole distance as the original ones, so I decided to de-pot the old ones and use the cans to cover the new ones for shielding and to preserve the original look. After warming the cans with a heat gun, the transformers and black potting wax slid out easily.

Modulation transformers, old and new with can.

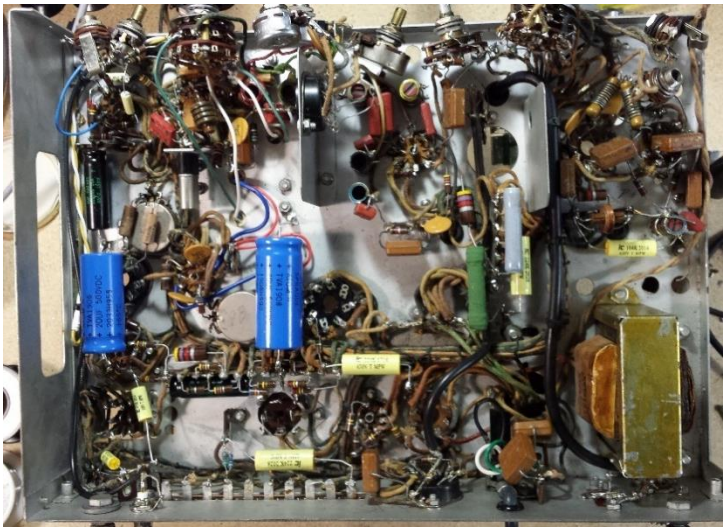
The new transformers are designed for 60 Hz service, so I wanted to be sure their response was linear at audio frequencies.

I set up the signal generator to output 3 volts to the primary and measured output voltage at the secondary for frequencies from 200 Hz to 3000 Hz.

The voltage was within .08% across this entire range, and importantly, identical for both transformers. Very good news.

After installing the new transformers, re-capping, and a few other tasks – replacing the 2-wire line cord with a 3-wire grounded cord, rewiring the coax output, replacing cracked rubber grommets – I was ready to reinstall the band switch unit and front panel.

The front panel was in fairly good shape without many scratches and only needed a gentle wash in dishwashing detergent, followed by a very light spray of WD-40 and soft wiping to give it a clean finish. I reinstalled it to the chassis and cleaned the knobs with detergent solution and toothbrush.



After re-capping and cleanup.

The moment of truth had arrived.

I inserted the 5U4 rectifier and brought up the Variac slowly. At 104 VAC input or 90% of line voltage, I got 400 VDC at the filter cap, good so far.

Adding the 6AL5 rectifier I got a nominal -103 VDC bias voltage.

Then I added the 12AT7 audio preamplifier and 6U8 audio driver; all had correct voltages, somewhat high because of the light load, but no smoke, and the power transformer was cool.

Then the bias voltage dropped out for no apparent reason. I traced this to intermittent filament pin contact on the 6AL5 bias rectifier.

After reinserting the tube a few times to clean it, without success, I added a 1N4007 diode from plate to cathode in parallel to the 6AL5 diode which solved the problem.

The 6U8 is a triode-pentode tube serving both as the AF driver and the local oscillator. So, on a whim, I tuned my transceiver to the LO frequency of 9 MHz, brought the antenna coax near, and listened. Sure enough, there was a clean, steady signal at 9.000.570.

And the magic eye tube was glowing a friendly green. The 20A lives after being on the shelf for 54 years!

I will end on that high note, because, as you might expect, there are several low notes to follow. Stay tuned for Part 3 next month.

References

To view a schematic diagram of the 20A, see:
https://bama.edebris.com/download/ce/20a/20a.pdf

starting at page 33 in the PDF.

-*de* Bill, AB1XB

SDRs on the Web
***de* Bruce, K1BG**

Last summer, I wrote an article for the Signal about using Software Defined Radios (SDRs) for a spectral display.

It turns out that there is a range of SDRs that can be listened to by connecting to them on the web. For someone who liked shortwave listening in the "old days", this opens up a whole new dimension of possibilities.

There are two web based "systems" that seem to be quite popular. The first can be found at websdr.org.

This is a collection of different types of SDRs (with different web interfaces, frequency coverages, etc.) found all over the world.

As of the day I'm writing this article, there are 193 separate SDRs on the page!

By scrolling down the web page, you can look at each and every SDR (and their frequency coverage, etc.) and connect individually to them.

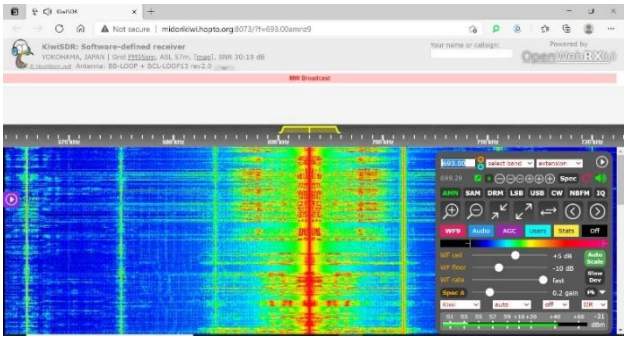
By scrolling to the bottom of the page, you can also find a world map with markers you can click on.

Much of the frequency coverage of the SDRs are SWL/Ham frequencies, but not all.

I believe that all of these SDRs use the same software (WebSDR by PA3FWM), but I'm not sure.

I much prefer the "KiwiSDR" system. The Kiwi SDR is different from other SDRs.

It's software-defined radio that attaches to a "Seeed BeagleBone Green" embedded computer.



A KiwiSDR screenshot.

Together, they form a standalone device that attaches to a local network and is optionally accessed through the Internet.

Frequency coverage of the KiwiSDR is "0 – 30 MHz", so you won't be listening to any VHF/UHF stations.

There are currently over 300 KiwiSDR nodes which can be accessed here: www.kiwisdr.com.

If you scroll slightly down the page, there are three links to choose from: A list of receivers, receivers on a map, and receivers sorted by SNR scores. Hopefully, these links will make it easier for you to pick a node to experiment with.

What this means for you is that every node has the same hardware and software interface, and differs only in the antennas connected and local conditions (like the signal-to-noise score at each node). Rather that go through the details here, this link kiwisdr.com/ks/using_Kiwi.html provides an easy-to-use tutorial on the user interface. There are many videos on YouTube that do the same.

Two of the more popular modes supported by the software is the WSPR viewer mode and the Time Difference of Arrival (TDoA) signal direction finder.

I don't have a huge interest in WSPR, but I know some club members are huge fans. TDoA basically allows a user to select a frequency (which presumably has a transmitter on it), and use multiple KiwiSDRs to remotely "triangulate" the location of transmitters. I say "triangulate", but you can have more than three receivers in use, so it's more than a "triangulation".

Let me give you an example of what you can hear. For whatever reason, I was tuning the medium wave broadcast band (what we generally call "AM radio broadcast") on a receiver in Tokyo, Japan, and came across the news in English. It turns out that NHK2 in Japan broadcasts a lot of English content. News, English lessons, that kind of thing. Click here http://midorikiwi.hopto.org:8073/?f=693.00amnz9 and check it out yourself.

I love shortwave, long wave, or "any" wave listening this way. You can do this with a tablet, laptop, or smart phone connected to the web. It's much different than "streaming" – you can tune stations, explore, and pick what you like.

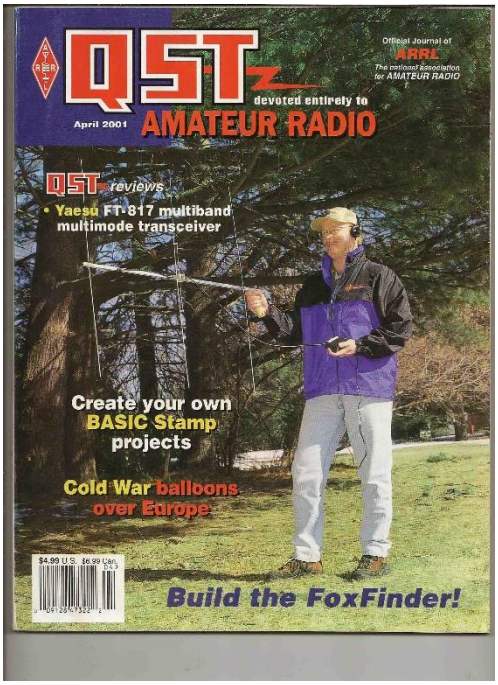
As always, if anyone has questions, please let me know. If there is enough interest, I'm available for a Zoom session to introduce these SDRs to interested club members.

-*de* Bruce, K1BG

It was 20 Years Ago Today!

That Sgt. Pepper taught the Band to play[1]...

But really, folks, it WAS 20 years ago this month that the NVARC FoxFinder was featured in QST:



Back then, Bob, W1XP, Ralph, KD1SM, and Stan, KD1LE designed, kitted out, and sold dozens of these cool devices. Others may have been involved; your editor apologizes for any lack of mention.

The full QST article may be viewed at: http://www.arrl.org/files/file/protected/Group/Members/Technology/tis/info/pdf/0104035.pdf

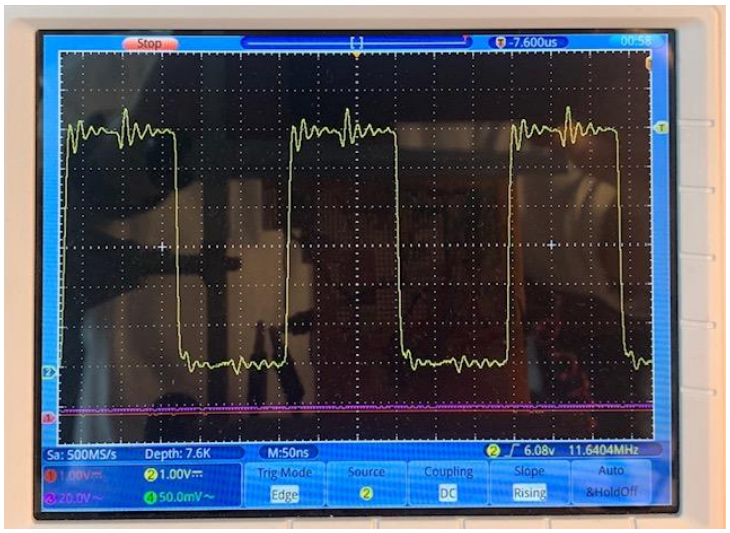
From the Shack
***de* George, KB1HFT**

I have kept my head down during the pandemic, staying occupied, as I have mentioned before, by hacking a hack VFO for the Phaser 20meter FT8 transceiver.

It is quite a learning experience, this RF circuitry, I'll tell you!

My EE design experience has mostly been at the integrated module level. Embedded processor applications and such. Not RF. Also, I have never really learned basic circuit design, much less RF considerations and testing techniques. Howsomever, with all this time available to follow my thought and experimental tangents, I've discovered a few cool things.

One of which is that lack of proper power supply bypass caps makes for bumpy ones & zeros from a flip-flop:



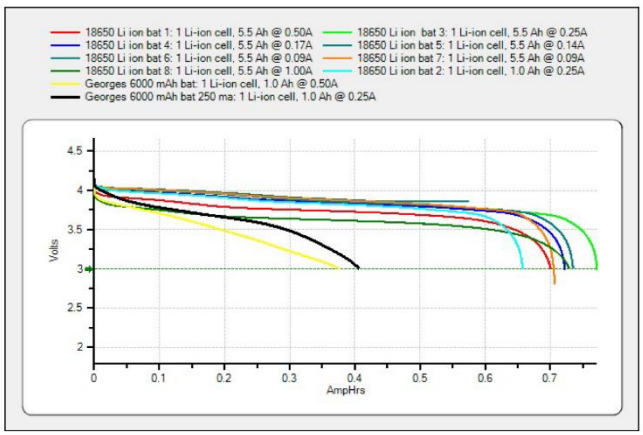
Not deadly, but ugly.

Stan, KD1LE, and I have been experimenting with Lithium-Ion batteries sold on the web. Many of the ads for these claim that the cells have high capacity (5000mAH & up) for low, low prices.

Suspecting scams, we have been cycling cells using West Mountain Radio's "CBA" computer battery analyzers.

A CBA allows one to set a discharge rate and a cutoff voltage, and then initiate a discharge cycle whilst plotting various data. We look at voltage vs AH discharged.

Here's a plot of several cells' discharge curves, that Stan composed. all were advertised and marked in excess of 5AH:



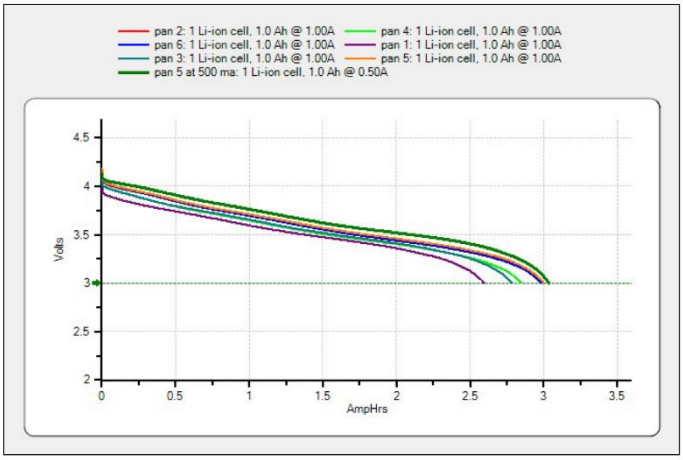
[1] [Ed: Depending upon what/how you count, it could have been 74 years ago! {2021 – 1967) + 20 = 74}. Yikes! See: https://en.wikipedia.org/wiki/Sgt._Pepper%27s_Lonely_Hearts_Club_Band]

The group of cells pooping out at ~ .7AH were a batch that Stan had; the yellow and black traces were from two “6000mAH” cells that I got from “overseas”.

The point to this effort is to document the false advertising and substandard parts that are being purveyed, and to alert those purveyors.

High-capacity cells from reputable distributors (read DigiKey, Mouser, etc.) are significantly more expensive than those found on some websites. So, caveat emptor: “let the buyer beware”.

Here’s a plot of cells from the current NVARC “Battery Challenge” kit, that are marked “2600mAH”:



Not too shabby, I’d say!

-*de* George, KB1HFT

Board Meeting 1APR2021

Attendees:
John KK1X, Bruce K1BG,
George KB1HFT, Skip K1NKR,
Jim N8VIM, Jim AB1WQ,
Ralph, KD1SM

- No objections to Treasurer's Report.
- Secretary reports transfer of mail to Ralph.
- Nomination committee is nearly done with a slate.
- Jim AB1WQ done with evaluation of Paddle Kit. He's going to update the instructions.
- Jim N8VIM has money invested in the kit parts. Work being done to cost out various counts of kits for production. Jim, AB1WQ, expects to have numbers crunched by next Board meeting.
- No maintenance operations on repeater, per Ralph.
- Field Day? Likely still under Covid restrictions - more like 2020 than 2019 Field Day.
- Plans for in-person meetings? John to contact Pepperell authorities to find out their plans.
- Upcoming card sort? Boxes for card sort? Any ideas for sorting boxes?
- April 18 is World Amateur Radio Day.

-*de* John, KK1X

Have **YOU** paid your NVARC Dues? See:
http://n1nc.org/Members/Roster
for your renewal month.

Treasurer’s Report

Income for March was $15 in membership renewals. There were no expenses recorded for the month.

Current balances:

General fund	$2,665.43
Community fund	$5,948.25

As of 1 April we have 40 members who are current with their dues and 28 renewals outstanding. Thank you to those of you who mail your renewals or use PayPal. Renewal months are in the member list on www.n1nc.org in the Member's area.

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

Of Note

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.

April 18: World Amateur Radio Day

As described on the ARRL Amateur Radio Day web page:

> On World Amateur Radio Day, all radio amateurs are invited to take to the airwaves to enjoy our global friendship with other amateurs, and to show our skills and capabilities to the public."[2]

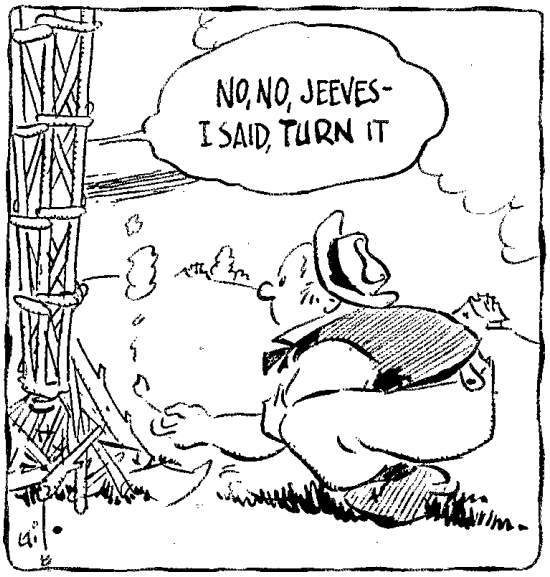
NVARC Calendar

April

15 Frank, W3LPL, on the Centennial of the 1921 Transatlantic Tests.

[2] http://www.arrl.org/world-amateur-radio-day

STRAYS



QST, May,1947

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Nashoba Valley
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Treasurer: Ralph Swick, KD1SM
Board Members:
Bruce Blain, K1BG, 2018-2021
Jim Wilber, AB1WQ, 2019-2022
Skip Youngberg, K1NKR, 2020-2023

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.

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.

Editor: George Kavanagh, KB1HFT

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