

SIGNAL



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MESSAGE FROM THE EDITOR

de VLAD W1MTI

The Club has no President. The Club needs a President. What happened? Bruce, K1BG, one of the founding members of the club, and N1NC callsign trustee, decided not to run for the next term instead opting for a director's seat. Nobody else expressed interest to run for the position, and the presidential seat became vacant. The official results of NVARC's Special meeting on April 20, 2023 are:

President - Vacant

Vice President - Phil, W1PJE

Secretary - John, K1JEB

Treasurer - Ralph, KD1SM

Director 2021-2024 - Jim, N8VIM

Director 2022-2025 - Bruce K1BG

Director 2023-2026 - Bob, K1QT

The vacancy has to be filled by special election at the next general meeting¹ which is scheduled for May 18, 2023. In the absence of the President, the Vice President assumes his duties. To maintain orderly conduct of business, the further order of succession² is:

1. Secretary
2. Treasurer
3. The Director present who has served the longest period of their current term



NE QSO Party, Millenium Park, May 7 2023.

The weather was beautiful in Massachusetts last Sunday. Spotless sky, gentle breeze and tranquil atmosphere in and around Boston. The New England QSO Party was in full swing, and radio

¹NVARC Constitution and By-Laws, Section 3.

²NVARC Constitution and By-Laws, Section 6.

amateurs across New England were enjoying the first summerish mini-field day of the year. Yet, what one may have seen on Earth was quite different from outer space. There, several bursts of high energy particles flew just missing the upper levels of Earth Atmosphere causing G1-G2 class geomagnetic storm on May 6 with some unsettling perturbations through May 7. If you operated, and want to share your story, send your reflections to be published in the next issue of the newsletter to editor@n1nc.org.



Another notable event that happened over the last weekend is Groton Road Race.

Several club members helped providing communications support for the race³: Jim, AB1WQ, Skip, K1NKR, George, KB1HFT, John, KK1X, Tony, KX1G, and James N8VIM .



The ARRL Field Day is about a month away on June 24-25. The organizing committee for the event includes Skip, K1NKR, Bruce, K1BG, John KK1X and Les N1SV. The tentative location is the same as in previous years -the Heald Street Orchard in Pepperell. MA.

73!

Letters From Our Members

JIM, N8VIM



I have been participating in the support of the Groton Road Race for at least 20 years, maybe more. After I first moved to Pepperell from Michigan (hence the '8' call), in August 2000, I met my neighbor, Den Connors (KD2S - SK). He introduced me to NVARC, and several volunteering opportunities. The Groton Road Race was one of them. Up until last year, I was on the course, and for many years was at the intersection of Chicoppe Row and Longley. This year, for the second year in a row, I was assigned to the Deputy Chief (Rachael Bielecki) and rode along in

³If I missed your name let me know - I will make corrections in the next issue.

her car trailing the runners (or in a few cases, the walkers) using the tactical call of "Police Command". How I got assigned to this position last year was an interesting story in itself! The now Deputy Chief (at the time was not yet promoted) before the pandemic, was assigned to my traffic point on the course, and I guess I made quite an impression on her since she specifically requested me to be assigned to her! Even now, I don't know what I did to impress her, but I am very grateful to have made that impression and also now can appreciate all the hams along the course, being able to see them and occasionally chat with them while waiting for runners to go by.



As a side note, the repeater performance was solid; I had made a modification to the repeater controller a few days before to correct an issue with some radios that the tone decoder had problems with.

73 de James, N8VIM

REPORT ON THE 2023 MICROWAVE UPDATE (MUD) & EASTERN VHF CONFERENCE

de LES PETERS, N1SV

Each year Microwave Update, a conference of international microwave enthusiasts is held. In past years it's been held in TX, CA, and OH. This year the event was held in Windsor, CT in conjunction with the Eastern States VHF/UHF conference. The event was sponsored by the Northeast Weak Signal Society and held from April 14-16. Attendees came from all over the US and Canada and as far away as UK and the Netherlands.

Those who arrived early on Thursday were treated to a tour of the ARRL head-

quarters in the morning followed by a visit to the New England Air Museum in the afternoon. In the evening there was a social gathering at the Hilton Garden Inn.

There were many presentations on Friday that were of interest to both microwave enthusiasts and VHF/UHF enthusiasts alike. One of the presentations that caught my eye was by Tony Long (KC6QHP) entitled "122 GHz Experiments and construction". Tony showed how he and others took a 122 GHz commercial collision avoidance radar chip and de-

signed a simple transceiver PCB around it. He showed how communicating at distances of several miles was possible with horn antennas and up to 80 miles had been achieved with 24" dish antennas.

Other presentations of interest included Dave Olean (K1WHS) who showed how he took a surplus 1.5 KW Larcan TV amplifier tray and converted it to a 222 MHz operation (similar to what I'm trying to do but on a smaller 1KW scale). Several folks from the ARRL presented a "ARRL Contests & Operating Events Update" with the general theme of trying to increase activity on VHF / UHF bands. I spoke to one of the presenters Rus Healy (K2UA) later that evening about the 222 and up contest and indicated that the current start and end times weren't conducive for hilltoppers having to navigate the opening and closing schedules of state parks. I also suggested using 6-digit grid squares instead of 4-digit ones as it would increase the potential hilltop locations that portable stations could drive to. I think my feedback was well received.

Saturday was a continuation of some really good presentations including Tom William (WA1MBA) who talked about a

47 GHz quadrupler he had designed and built over a 7-year period of time. Incidentally 47 GHz is one of the very few microwave amateur radio bands where we have a primary allocation. Hisen Zhang (KD2TI) gave a thought-provoking presentation on "A Minimal Software-defined Radio VHF/UHF/SHF Transceiver". Hisen showed how he had been able to build a multi-band rover transceiver and use it to make contacts. Throughout the weekend the commercial test equipment company Rhode & Schwartz had test equipment setup for attendees to make measurements on their projects. The test equipment was capable of making measurements at up to 85 GHz.

Sunday morning there was a flea market held at the Vintage Radio & Communications Museum in Windsor, CT. While the flea market was fun, I really enjoyed the museum. There was a lot of old ham gear including an early 1900s Atwater Kent radio. I really enjoyed navigating the aisles and seeing either gear I have owned or wish I had owned from my past. But by midday things started to break up and everyone went their separate ways.

HF POWER AMPLIFIER

Part 2.

de VLAD, W1MTI

LOW PASS FILTER

LDMOS transistors could produce a substantial amount of harmonics. This is the major issue with solid state design that we discussed in the first part of the article. But how bad is it really is? In Fig 2, one can see that for the 160m band, up to 9th order harmonics are present in the output. The odd harmonics dominate, and even harmonics are also present at this band. From this figure, it should be obvious that one should never let operate a kilowatt solid state PA on the air without good quality low pass filter.



FIG 1. 2kW HF LPF filter similar to the one installed in the PA described in this article.

The "good quality LPF" has to conform to the FCC requirements spelled out in CFR Title 47 Chapter I Subchapter D Part

97 Subpart D paragraph 307: " For transmitters installed after January 1, 2003, the mean power of any spurious emission from a station transmitter or external RF power amplifier transmitting on a frequency below 30 MHz must be at least 43 dB below the mean power of the fundamental emission.... "



FIG 2. 160m band. Unfiltered output. The spectrum analyzer is connected via -50dB sampler.



FIG 3. After passing 7-pole Chebyshev filter.

The LPF is designed as 50/50 Ohm 7-pole Chebyshev low pass filter with 0.05 ripple. Table 1 shows the L and C values used. Figure 4 shows 40 meter band filter

schematics and Figure 5 shows the relay interconnect schematics. The inductors are wound with 1.5mm diameter copper magnet wire with polyamide coating and an operating temperature of 200C. The inductor cores are

Micrometals type 2 and type 6 powder iron toroids size 130. As one can see from Table 2, on all four bands all harmonics are suppressed better than -43dB.

7 MHz FILTER UNIT

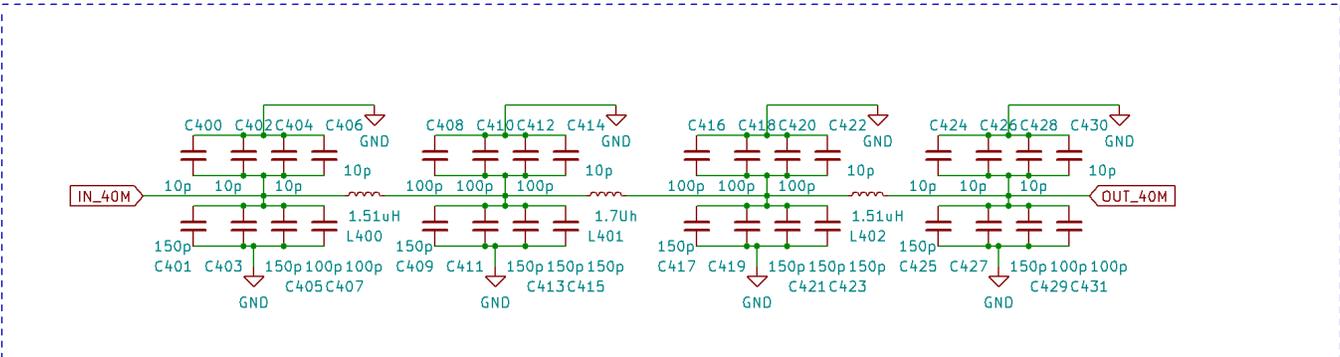


FIG 4.

RELAYS, INTERCONNECT

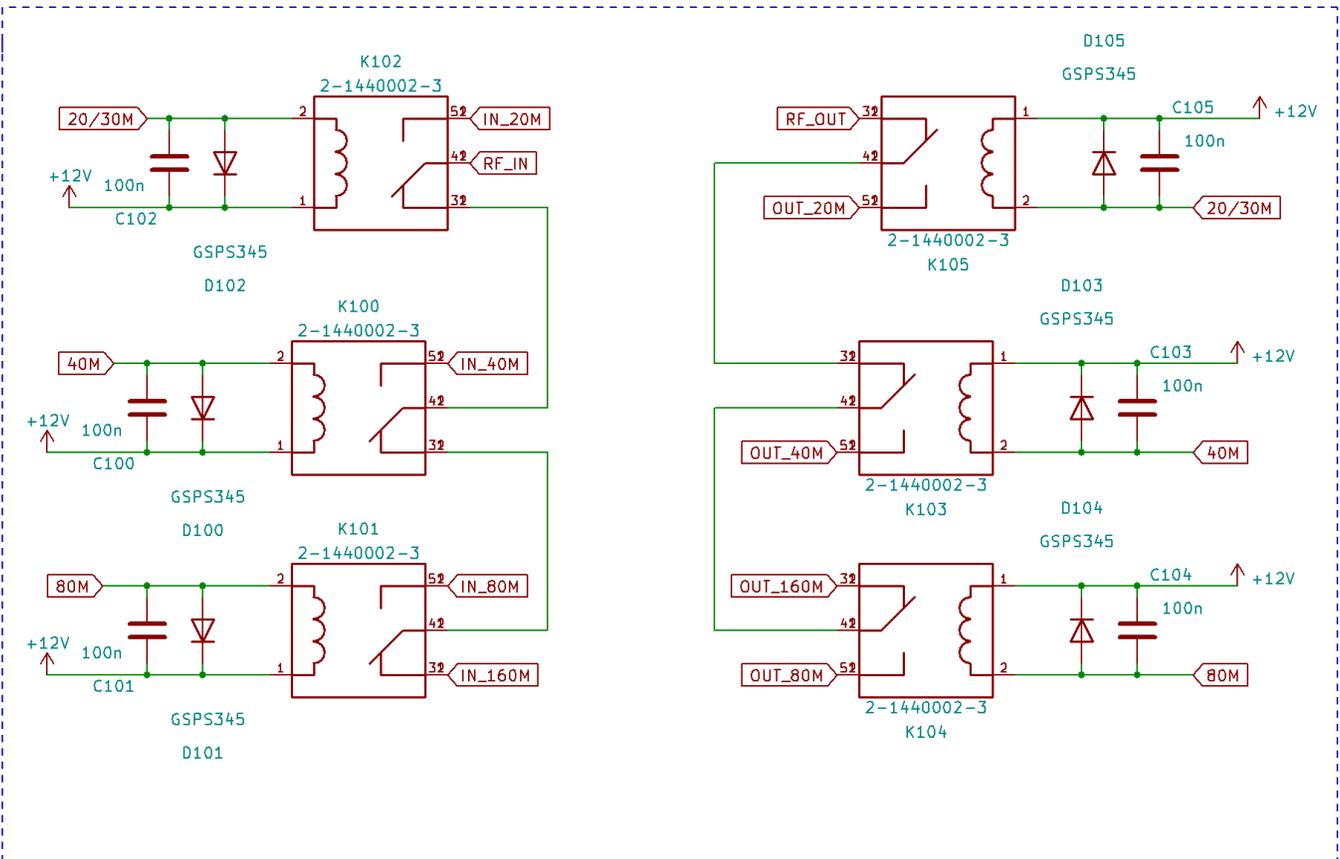


FIG 5.

Table 1: LPF design data

Band	C1, C7	C3, C5	L2, L6 (μ H)	L4 (μ H)
160m	1.432n	2.718n	4.972	5.592
75/80m	716p	1.359n	2.486	2.796
40m	383p	727p	1.33	1.495
20m	200p	379p	0.693	0.78

Table 2: LPF performance data

Harmonic	160m		75/80m		40m		20m	
	f(MHz)	P_{rel} (dBc)						
0	1.915	0	3.8	0	7.12	0	14.2	0
2	3.83	-57	7.6	-61	14.24	-65	28.4	-58
3	5.745	-60	11.4	-61	21.36	-64	42.6	-63
5	9.575	-66	19	-65	35.6	-65	71	-64

PROTECTION UNIT



FIG 6. Protection board.

There are basically two approaches to what may be called a "protection unit" One, based on a microprocessor, and another one based on analog circuitry. The MCU based unit is of course more interesting, but for a simple homebrew design the analog protection offers simplicity, robustness and therefore could be made by anyone who cares to hold a soldering iron. The protection unit is build around a high side current switch BTS50085 (BTS), which is essentially a power MOS-FET with additional control logic. Pin 5

of the BTS is used both to set and monitor the current. When the current exceeds the value set by potentiometer RV3, it trips Q5 that in turn makes Q2 to conduct and short the pin 3 of the BTS. When pin 3 is low, BTS goes into a disable mode and stops the current flow. Forward power voltage from a tandem match is trimmed by Rv1 is applied to Q3. When it exceeds the treshhold, it trips Q3, which in turn makes Q3 to conduct and shuts down BTS.



FIG 7. Power/SWR sensor.

Finally, Return power and forward power voltages from a tandem match are

POWER SUPPLY

There are many used and new switching PSUs with suitable characteristics. I used Eltek Flatpack2 HE 2kW, 48V. It can supply 53.5V and up to 37.4A of DC current from 120V or 240V AC.



FIG 9. Flatpack2 PSU.

MECHANICAL: PUTTING IT ALL TOGETHER

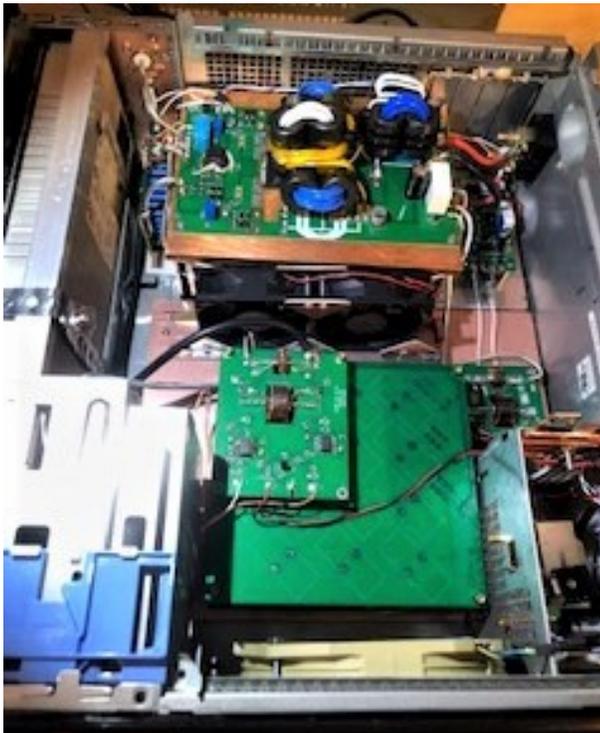


FIG 10. PA with cover off.

The amplifier is assembled inside of repurposed case from Dell PowerEdge server. Figure 10 shows the PA's interior. On the center back is the PA unit with

two fans in front, attenuator on the left, protection unit on the right. Center front has a 120mm fan inserted in front of LPF unit with SWR/Power meter unit at the top. Main 48V PSU is mounted along the left side. Auxiliary 12V PSU is mounted on the front right side inside a steel cage.

CONCLUSION

The design turned out to be viable. I had tested it on the air first using WebSDR's and then making a number of SSB contacts and asking people to evaluate the signal. The reports were all favorable.



FIG 11. PA operating.



FIG 12. With 15W in, PA gives about 730W out on 40m SSB.

It was a fun project, and the end result is a quite useful piece of equipment. Now, I might look into building 6 meter and perhaps UHF amplifiers.

73, and GUD DX.

REFERENCES:

1. [DJ0ABR website.](#)
2. [The 100th Edition of the ARRL Handbook.](#)

THE MISSING Q SIGNALS⁴

See <http://www.zerobeat.net/drakelist/missingq.html> for the full list.

QDR - Damn Right the frequency is busy! In response to QRL

QDR? - Do you have a Receiver? In response to QRL

QET - Phone home.

QET? - Has anyone called me from another planet?

QEW - Copy is difficult due to Ear Wax.

QEW? - Is copy difficult due to Ear Wax?

QFH - This frequency is MINE! - go elsewhere.

QFH? - Is this frequency hogged?

QKB? - How many knobs does your radio have?

QKB n - My radio has "n" knobs.

QKN? - How many of them do you know how to use?

QKN n - I think I know how to use "n" of them.

QLF - I am sending with my left foot.

QLF? - Are you sending with your left foot?

QLK - I am sending with my left foot and keyboard.

QLK? - Are you sending with your left foot and keyboard?

QPM - Your signal is purr modulated.

QPM? - Is my signal purr modulated?

QRG - You are transmitting in or near the ... (wave length or frequency) amateur band.

QRG? - Am I transmitting in or near an amateur band, and if so which one?

QRW - Means Qrp - Really Weak

QRW? - Qrp, you are Really Weak?

QWC? - Who cares? Courtesy of Fred Bonavita, K5QLF

QWC - I don't care

QWC - I have to go to the bathroom Courtesy of Fred Bonavita, K5QLF

QWC? - Do you have to go to the bathroom?

QZZ - I fell asleep at the mike.

QZZ? - Is that a 60Hz hum, or are you snoring?

⁴Excerpt from <http://www.zerobeat.net/drakelist/missingq.html>

NEXT GENERAL MEETING

The next General meeting will be held in person at the Pepperell Community Center, 2 Hollis St, Pepperell, MA 01463 on May, 1823 at 7:30pm. The doors will open at 7pm for socializing. The invited speaker will be Ray Lajoie AA1SE, ARRL section manager in western MA, with the topic "The Big E".

NVARC BOARD MEETING

May 4, 2023

Attendees:

Bruce, K1BG, John, K1JEB,
Les, N1SV, Vlad, W1MTI,
James, N8VIM , Rob K1QT.

Call to Order: 7:34pm

Absent an elected club president the board meeting was conducted in a committee fashion. Future board meetings will continue in this fashion until a new president is installed.

Bruce K1BG went over the duties of the top officers (President and Vice President).

Vlad W1MTI suggested that General meetings will be simulcast on ZOOM (in addition to meeting in person).

Vlad W1MTI asked the board members present at the meeting to respond to questionnaire he sent out by e-mail to spotlight their profiles in the Signal. He will contact other club members as well.

John K1KX will be handling the Groton Road Race during Ralph's (KD1SM) absence.

Jim Hain N8VIM will be making some changes/repairs to the Pepperell repeater.

Next June meeting the guest speaker will be Tim Duffy K3LR to talk about his DX experience.

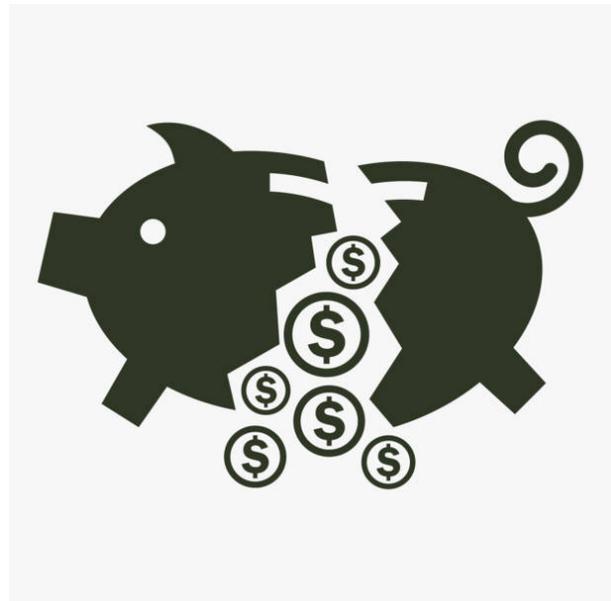
John K1JEB (Secretary) has made 16 new club badges to date. It was decided that in order to obtain one's new badge you will need to attend a club monthly meeting.

Adjournment: 8:18pm

de John, K1JEB

THE TREASURER'S REPORT

At the time of publication, the treasurer's report has not been submitted.



NVARC'S 2 METER NET

The NVARC Information Net is held Monday nights at 7:30pm, Eastern time on the 2m Pepperell repeater, N1MNX: 147.345MHz +100.

The repeater has been recently repaired by James, N8VIM - check it out!

NVARC GENERAL MEETINGS

NVARC General Meetings are scheduled for the third Thursday of the month at 2430 UTC (7:30pm, Eastern Time), except for July and August, when no General Meetings are held. When held, meetings are at the Pepperell Community center.

Strays



What does this picture has to do with radio???

Contest Calendar

MAY

- 15 [4 States QRP Group Second Sunday Sprint](#)
- 18 [QRP Minimal Art Session](#)
- 20 [UN DX Contest](#)
- 20/21 [His Maj. King of Spain Contest, CW](#)
- 20/21 [Baltic Contest](#)
- 22 [QRP ARCI Hootowl Sprint](#)
- 25 [RSGB 80m Club Championship, CW](#)
- 27/28 [CQ WW WPX Contest, CW](#)
- 29 [QCX Challenge](#)

JUNE

- 1 [NRAU 10m Activity Contest](#)
 - 2-4 [PODXS 070 Club Three Day Weekend Contest](#)
 - 3/4 [PVRC Reunion](#)
 - 3/4 [ARRL Inter. Digital Contest](#)
 - 3 [Tisza Cup CW Contest](#)
 - 10 [Asia-Pacific Sprint, SSB](#)
 - 10-12 [ARRL June VHF Contest](#)
 - 13/14 [50 MHz Spring Sprint](#)
 - 13/14 [VOLTA WW RTTY Contest](#)
-
-



**Nashoba Valley
Amateur Radio Club**

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www.youtube.com/@nvarc

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

Board Members:

Bruce Blain, K1BG, 2022-2025
Robert J. McArthur, K1QT, 2020-2023
James Hein, N8VIM 2021-2024

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

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

NVARC general meetings are scheduled for the third Thursday of the month at 7:30pm, Eastern Time. 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(+), 100Hz
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: Vladimir A. Goncharov, W1MTI

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**Have YOU Paid Your
NVARC Dues?**



See: <http://www.n1nc.org/MembersRoste> for your renewal month.

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