



SIGNAL

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Since 1993



Since 1996

de N1NC

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In this Issue

- An exclusive, profusely illustrated, report on a Field Day to Remember..... 2
- Phil, W1PJE, discusses a previously unknown ionospheric propagation effect that you can measure 3
- Bruce, W1BG, relates his thoughts on Contesting 5
- An update on the NVARC Picnic 6
- The NVARC Swap Shoppe has a Beautiful Bunch of Bargains 7
- An update in the N1MX repeaters..... 8
- Along with all of Signal's monthly features: The President's Letter, Board Meeting Minutes, Treasurer's Report, and an Amateur Radio Calendar.

This Month's Meeting

By custom, there is no NVARC meeting in July or August

Last Month's Meeting

Harry Chase, WA1VVH, spoke on his experiences working at HCJB, The Voice of the Andes in Quito Ecuador. Harry was involved in disassembling this powerful shortwave station over several seasons. Harry displays mementos of his work at HCJB, including a well-melted screwdriver that had been inadvertently left inside a 500KW exciter's enclosure during transmission!



Jim, AB1WQ, presents John, KK1X, with an award for John's meritorious service last year in his assistance at Field Day 2018. He helped set up, then headed to his employment for the duration of the FiD event, but returned to assist in take down. Well Done, thank you John!



The President's Corner

de Stan, KD1LE

I want to thank Jim AB1WQ for taking on the Field Day Coordinator duties again this year. He tried some new things this year and everything came together nicely. Jim scheduled great weather, though a little windy, and got volunteers for the many things that needed to be done.

Some members put in quite a bit of work, outside of the Field Day weekend. Unseen tasks are done that would become painfully obvious if they had not been done. Specifically, I thank:

- Bruce, K1BG, who set up the computers and antenna switching system,
- Bob, W1XP, and Peter, N1ZRG, who helped me load and unload a trailer of equipment: tables, chairs, coax, tent floors, etc.,
- Ralph, KD1SM, who towed the tower trailer to the site, and helped manage its set up,
- Jim, N8VIM, who designed, maintains, and operates the PC networking and 110v power grid.

Thank you all.

I was pleased at the general FD participation. There were many people there at all times of day and night for the entire weekend, which resulted in quick and easy set up, smooth operation, delicious meals, and fast takedown.

FD is really an all year task: the equipment must be tuned, tested, maintained, safely tucked away for next year, and then rolled out again. And it gets done, but only with the help of an awesome crew.

I hope everyone has a safe and enjoyable summer, stay cool and see you in September.

-de Stan KD1LE

Field Day 2019, Redux

Wow! What a good time. Jim, AB1WQ, arranged for a perfect Field Day. He coordinated all facets of the event (AKA "Incident"), including food, invitations to ARRL & local officials, publicity, operations scheduling, sanitation, AND the weather!

As Stan mentioned earlier, many other NVARCers contributed to the setup as well, lending a hand in feeding, consulting, operating, ragchewing, and teardown. Thank you all!

FD was attended by 37 folks, 23 of which are NVARC members. Several attendees were dignitaries, including Tom Walsh, K1TW, EMA Section Manager, and Captain David Querze, the Pepperell Emergency Management Director.

The weather cooperated, although we dodged some pretty impressive thunderstorms:



Operations were suspended for a only a few minutes while a nearby storm cell passed us, and we *did* get a smattering of rain, but overall it was breezy, in the mid 80's, and there were no bugs!

Set up went smoothly. (It is as if we have done this before!) We began at 8am, and were complete within 2 hours.



The tower gets carefully levelled before it goes up:

The FD site, ready to go:



Jim, N8VIM, with his trusty generator that powered us through the weekend:

Bob, W1XP, driving in the golden ground rod:



The dogs, Brownie & Ragnar, were part of the excitement. Brownie maybe had too much excitement:



Dinner was a catered affair (thanks, Jim!), and delicious. I had the ever popular "Chicken with Cashews", paired with Rod's awesome Baked Beans. Mmmm!

The Night Shift:



After setup there is always a wait for the official FD start time of 2pm: a good time to sit, enjoy the weather, and discuss the latest issues.

Once operations began, there was plenty of operating activity at three stations, on seven bands, and in several modes. Here's Bruce, K1BG, and Jessica, WU3C, dealing with a Windows error dialog:



(I hate it when that happens!)



Sunday morning Breakfast was another delicious meal, expertly prepared by Bob, AB1CW, Sandie, and Jessica.

In all, a good time was had by all !

Ralph has posted many more FD photos at: <http://www.n1nc.org/Events/2019/FD/>

-de George, KB1HFT

Multiband Propagation Monitoring at Your QTH using FT8 and Red Pityaya
de Phil, W1PJE

The amateur radio hobby, and the Electronic Arts in general, are undergoing a rapid explosion of new technology at a previously unheard-of very low cost.

This explosion is driven by commercial interest in the product potential of inexpensive, powerful computer processors and peripherals, which can be configured to "automate" many things, for instance: your car, phone, inventory system, shipment tracking system,

Skip, K1NKR, and Phil, W1PJE working the VHF station:



Rod Hersh, WA1TAC, makes a contact:

toll roads, point-of-sale terminal, radio, and probably hundreds of other, as yet unimagined, applications.

New Possibilities for Amateur Investigation

The availability of these powerful and inexpensive, tools opens up vast new possibilities for Amateur enjoyment and learning.

I stumbled across one such possibility: real-time monitoring of propagation openings. By playing around with some hardware and software that I had read about on the 'net, I discovered that you can do this monitoring yourself, from your own QTH!

Digital Modes

Most of us have heard about the digital modes now occupying a huge segment of the Amateur Radio community. Despite the arguments over whether contacts using the digital modes are "Ham Radio" or not, and I will not pursue that path further here, I think we all must admit that Joe Taylor K1JT and Steve Franke K9AN's brilliant work in frequency shift keying based error correcting codes, with deep fade resistance, has led to a revolution in weak signal communications.

Even now, at the depths of solar minimum, Hams with very modest HF and VHF antennas and transmitters have used these audio frequency bandwidth modes to make impressive, intercontinental contacts.

Red Pitaya

A couple of years ago, I became involved in testing and evaluating a very interesting hybrid computer and transceiver board developed in the Baltic states called the Red Pitaya (<https://www.redpitaya.com>).

Dubbed the "Swiss Army Knife for engineers", this \$250 single board (available from Mouser in the US) is aimed at STEM teaching, as you can turn the board into an oscilloscope, function generator, and many other applications through loading specific applications software available for free on the Red Pitaya site.

Pitaya features of interest to Amateur Radio types include two fully independent receiver inputs and two fully independent outputs, all on SMA jacks. It runs a form of embedded Linux (Alpine Linux), and best of all has an Ethernet jack. This puts it a class above the currentlt-common types of RTL dongles and other software defined radios, as Ethernet tends to be less prone to operating system glitches, unlike USB.

The board has a good size FPGA with enough horsepower to do solid radio work. The sampling clock is just above 125 MHz, which if you know your Nyquist sampling theory means that onboard software can direct sample incoming RF all the way to ~66 MHz, well beyond the 6 meter band.

The only drawback for Amateurs is that the input impedance of the RX ports is high (close to 1 MOhm) because the board was designed as a flexible piece of test equipment, not what we Amateurs expect: a 50 Ohm input impedance. Fortunately, an outboard 14:1 transformer available for \$35 from Red Pitaya itself (<https://www.redpitaya.com/159/impedance-transformer>), that exhibits only 1 dB of insertion loss, can be used to mitigate that impedance mismatch.

Red Pitaya + FT8+ PSKReporter

A clever engineer, Pavel Demin, has released a number of combination FPGA + OS application code stacks that can be loaded on the Pitaya, as described on his home page (<http://pavel-demin.github.io/red-pitaya-notes/>). I discovered just after Field Day that one of them is a standalone FT8 decoder capable of running 8 receiver slices on 8 different bands simultaneously!

Once decoding of the 15 second cadence FT8 frames occurs, the results are tabulated and uploaded to Phillip Gladstone's PSKReporter site, where they can be visualized on a map.

So, I downloaded the code, made a couple configuration file adjustments - described below - and hooked it to my home DSL class router. Power on; it found my DHCP server, booted, and silently began working. Easy! Hook the RX1 port with transformer to the modest fan dipole in the backyard (whose supports were graciously installed by Bruce K1GB, Jim AB1WQ, and Forrest KD2MZH - thanks guys), and waited a few minutes.

Unanticipated Propagation Effects

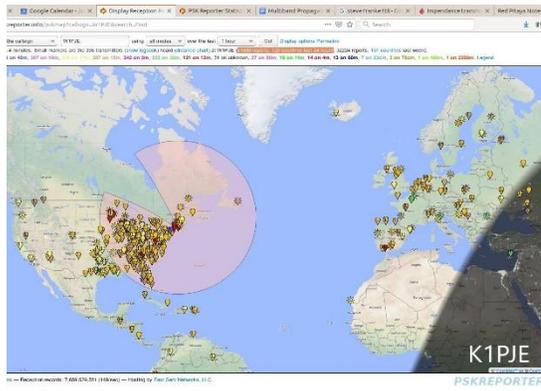
The results from my little test have been absolutely stunning.

By monitoring for a period of time, I realized that all those eyes and hands working FT8 and JT65 have unearthed quiet time propagation paths that were completely unanticipated by the professional scientific community.

When I plotted results from a 24 hour period, from my QTH, using PSKReporter's very nice mapping

capability, I saw that the little Pitaya had heard **21,688** stations on FT8 across all bands from **125** countries!! *AT SOLAR MINIMUM*. For the competitive among you, my little monitor instantly rocketed up to 15th in the world for number of reports in 24 hours.

The sample map here shows all the stations heard



on all bands in just 1 hour. (The color of the dot indicates band). Daytime 20 meter propagation

was the best, but reports all the way up to 15 meters are in there too.

Now the learning begins:

Q: Is FT8 really that popular?

A: Look at all those spots.

Q: Why is there a gap in the western US?

A: the map from ALL PSKReporter reports show the same thing: it seems that there are not as many people on FT8 from there.

Q: Can you see grayline propagation from your monitor alone?

A: Definitely yes.

Q: Can you pick the best band for your DX, CW, or other work from your monitor alone?

A: Yes!

Q: Can you feel better about HF DX at solar minimum?

A: Yes, yes! - time to get out there and brush up CW skills for long haul traditional contacts, or go the FT8 route.

I must note that these results do NOT indicate an easy way to make transmissions TO all those countries in 24 hours: the ionosphere's propagation is not reciprocal, due to Earth's strong magnetic field. Considerable skill is still required. Nevertheless, if you have some spare funds, curiosity, and interest, try this DIY multiband monitor yourself. It's easy, and I think you might be amazed, just as I was.

=====
Appendix: Configuration details:

1. Download Pavel's code from <http://pavel-demin.github.io/red-pitaya-notes/sdr-transceiver-ft8/>. Transfer to a MicroSD card of 4 GB or greater capacity.
2. On the card, navigate in the file system to apps/sdr-transceiver-ft8. Edit the file "write-c2-files.cfg" and select the bands you want to monitor - up to 8 total. (I chose 80, 60, 40, 30, 20, 17, 15, and 12 meters.)
3. Edit the file "upload-ft8.sh" and put in your call and 6 digit grid square, to enable uploads to PSKReporter.
4. Copy the file "start.sh" to the top level directory in the card, so the FT8 monitor, decoder, and uploader processes will auto-start at boot.
5. Eject the SD card from your computer and install in Red Pitaya, remembering to keep the gold connectors up.
6. Attach antenna cable and Ethernet cable.
7. Apply power. Be amazed.

-de Phil, K1PJE

On Contesting
de Bruce, K1BG

After every field day, someone asks me questions like "Why do you contest" and "What do you like about contesting"?

In a way, I've been "contesting" all my life. I was always competitive in sports (though not particularly good), and I still like to play softball on Sundays. As a kid, I always wanted to be faster than the kid I was running home with (even though I wasn't particularly fast).

Perhaps millions of years of evolution has imprinted on us that when the lion is chasing you, it's important that you are faster than the other person you're running with.

Evidence of this natural desire is all around us: two sailboats on the ocean and you have a sailboat race, two horse riders and it's a horse race, two drivers and it's an auto race. So as to the "why", I suppose it tickles some primeval funny bone that gives me great satisfaction.

My first experience with radio contesting came four or five weeks after I first got on the air.

For years, the ARRL Novice Roundup was the low key entry level “contest” that novices got their start with. I was petrified of participating. Self conscious, inexperienced, and nervous, I didn’t think I would have fun (sound familiar?). So I avoided contests.

Several months later, I participated with my local radio club in my first field day. Two great things happened – I watched experienced operators operate and have fun doing it, and I had the opportunity to set-up and run the novice station.

I did logging for the experiences guys, and I made a whopping 8 contacts in 24 hours as the novice operator. Wow!

And I learned that the skills needed for a beginner are a lot more about finding a rhythm and knowing what to expect in a QSO than it is about operating ability. I enjoyed the opportunity for fellowship with other club members, and I looked forward to our next field day.

What do I like about contesting? I love the basic competition. How many contacts can I put in the logbook? Can I get a really good run going? How many contacts can I make in 10 minutes (the time I have while my wife is getting ready before we go out to dinner)? Can I get a new DXCC country in the logbook (with the help of an operator in that country who IS a serious contesteer)? I love the camaraderie one develops with other contesters, both big guns and little pistols.

At our N1NC field day, I get the biggest satisfaction in mentoring others who want to sit down and operate and learn. But when I’m operating, it’s about doing the best I can in the limited time I have to operate.

You may notice that “winning” isn’t on the list. It’s not that I have anything against winning; it’s just that there are many contestants and few winners. Watch people in non-amateur radio “contests”. Joggers, golfers, video gamers, and the ladies and gentlemen I play softball with on Sunday, just to name a few. It’s not about winning; it’s about participating and having fun.

There are other benefits to participating in contests. Participating in a contest will tell you what is working (and what is not) at your station. You will become very familiar with N1MM or whatever logging pro-

gram you are using. If you are trying to improve your CW skills, you will be amazed at how quickly a contest will help.

Most competitive entrants are competing against, or with themselves, or competing for what I would call small awards (for instance, first place QRP in eastern Massachusetts, single band, 10 meters).

Many belong to contesting clubs like the Yankee Clipper Contest Club who compete with an “aggregate” club score, where members’ scores are aggregated and clubs compete amongst themselves.

Many operators with modest stations never enter a contest. Why? They just don’t believe that they could compete or that it’s worth the time or effort. Here’s a little secret that nobody talks about. The “big gun” stations NEED the “little pistols”. Their scores depend on them.

Next time you are tuning the bands and you hear “CQ Contest”, respond, and ask the participant “what contest is it?” Google for the rules. You can find out who the sponsor is, what the goal of the contest is, and most important, what the exchange is. Work a few stations and have some fun. Let me know how it works out.

-de Bruce, K1BG

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, NVARC has the resources to assist.

Through the generous donation of a fellow ham, NVARC 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 Picnic

Due to a change in circumstances Gene is unable to host the cookout this year. Therefore, I will be hosting the cookout this year at my QTH. As in the past it is BYOE (Bring Your Own Everything). I will have some tables, chairs, condiments. It will be the same date as was previously planned: July 28th from 1-4 PM.

-de Stan KD1LE

NVARC Swap Shoppe

The following items are available for a donation to the NVARC Treasurer:

- Kenwood TM-D700A dual band radio body: \$25
- Almost complete Kenwood TM-D700A with remote adapter panel but no serial cable or microphone: \$45
- MFJ 944 Versa Tuner II: \$20
- Henry Electronics two meter amplifier 1 to 5 watts in, 80 watts out max: \$25
- KLM 10-70B two meter amp 10 watts in, 70 watts out: \$25
- Ranger Communications RCI-600 VHF/FM Marine Radio with microphone. Looks brand new/unused: \$45
- Stanley Electric pencil sharpener \$5
- Velleman VTSS5 soldering station \$5
- GE External speaker \$5 (there are two)
- Alinco DR570 dual band mobile \$20
- Yaesu FT 7800 attached to Kantronics 3+ \$40
- Yaesu FT 7800 marked "hot on transmit" \$5
- MFJ 12728BX mic/tnc switch \$5
- MFJ 12738BTV mic/tnc switch \$5
- HP V1905-24 pole 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
- Astatic 104 microphone \$25

-de Stan, KD1LE

Board Meeting Notes

Attendees:

Stan, KD1LE	Jim, N8VIM
John, KK1X	Bruce, K1BG,
Ralph, KD1SM	Jim, AB1WQ
George, KB1HFT	

The budget and expenditures for Field Day were reviewed. We believe all the requests for reimbursement are in. In planning for FD, we neglected to pre-define sub-budgets for breakfast and

awards, so the overall FD spend was \$37.73 over its allotted budget.

An extension to the Awards budget was approved.

A proposal to subsidize Field Day pins for those who attended and signed the log was discussed and approved. The price of the pins is now \$6. It was agreed to pay \$3 toward a FD pin for those who wished one. The Treasurer was to send out an email to participants with the details. For participants who may have already purchased a pin the Treasurer will reimburse them. For those who want a pin, we will order them and split the cost when they are delivered.

Bruce, K1BG, reported on the final tour of Haystack by the students from Harvard who received awards from NVARC at their Science Fair. Besides the tour hosted by Phil, W1PJE, those who took the tour received a SDR USB dongle kit which Phil demonstrated during the tour.

The Board is working on presentations for the fall. We have some possible presentations lined up for September and October which if confirmed will take us through to February. We are always looking for possible speakers or programs. If you see something somewhere like Boxboro let us know.

We are considering whether to order another batch of NVARC mugs. Ralph KD1SM is looking into the cost. We have used the mugs as speaker gifts and for club members to purchase.

-de John, KK1X and Stan, KD1LE

Treasurer's Report

Income for June was \$215 from membership renewals, \$15 for Signal advertisement placement, and \$35 from Field Day meal ticket sales.

Expenses were \$30.05 for the outgoing QSL bureau and \$200 for liability insurance renewal, leaving a net income for the month of \$34.95.

Donations from the sale of miscellaneous items of the estate of Larry Sweezey W1ESR brought \$85.

We received a \$50 donation from the Townsend Lions Club for our assistance with the Squannacook Canoe and Kayak Race.

Per custom, these donations are placed in the Community Fund for future use to contribute back to our local communities.

Current balances:

General fund	\$3,073.06
Community fund	\$5,596.52

As of 4 July we have 49 members who are current with their dues and 17 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.

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

N1MNX Repeater Update

The N1MNX repeaters have been a resource to the local Amateur Radio community for over 30 years. They are privately owned and maintained by volunteers selected by the owner, Dave N1MNX, one of the founding members of NVARC. Dave has documented some history of the repeaters on his web site, <http://n1mnx.com>.

As Dave's health has declined over the past several years more and more of the maintenance of the repeaters has been done by a group that Dave selected: Stan KD1LE, Bob W1XP, and Ralph KD1SM. The lion's share of the effort has fallen to Stan, thus his periodic requests for assistance from NVARC members with regular chores such as mowing around the site and painting the repeater shack.

Dave recently made the decision to formally transfer ownership of the repeaters to Stan, Bob, and Ralph. As of 30 June, the coordination transfer was formally completed with the New England Spectrum Management Council (nesmc.org). The repeaters will continue to operate under Dave's call sign and continue to be open to the community and available for ARES and RACES usage when needed.

We thank Dave for creating this system and the many who have contributed labor, materials, and financially over the years. This transfer should be completely transparent to the community and is intended to ensure that the N1MNX repeaters remain the valuable resource they have become.

-de Stan, KD1LE, Bob W1XP, and Ralph KD1SM

Calendar

July

- 13 FISTS Summer Unlimited Speed Sprint 0000 – 0400Z
<http://www.fistsna.org/operating.html#sprints>
- 13/14 IARU HF World Championship
<http://www.arrl.org/iaru-hf-championship>
- 20 CQ Worldwide VHF Contest 1800Z – 21July, 2100Z
<http://www.cqww-vhf.com/>
- 21 Flea at MIT 0900-1400Z
<http://w1mx.mit.edu/flea-at-mit/>

August

- 3 North American CW QSO Party 1400-1800Z
<http://www.ncjweb.com/NAQP-Rules.pdf>
- 17 North American QSO Party: SSB 1800-2359Z
<http://www.ncjweb.com>
- 17/18 International Lighthouse Lightship Weekend 0001Z – 18Aug, 2400Z
<http://www.illw.net>
- 17/18 ARRL 10GHz & Up
<http://www.arrl.org/10-ghz-up>
- 18 ARRL Rookie Roundup 1800 – 2359Z
<http://www.arrl.org/rookie-roundup>
- 18 Flea at MIT
<http://w1mx.mit.edu/flea-at-mit/>
- 31 World Wide Digi DX Contest 0000Z – 1SEPT, 2400Z
<https://ww-digi.com/>

Editor's Note

de George, KB1HFT

NVARC's FD of 2019 was a great exercise, fulfilling one of the main goals of FD: to assure that operating equipment is in operating condition, and that we know how to set it up & repair it quickly.

Equipment failures are to be anticipated, and they should be understood so that they can be avoided in the future. There was one equipment failure at NVARC FD 2019: the 20M "Ugly Filter" became inoperative. The problem was resolved quickly by Stan, KD1LE, who provided a spare replacement filter well in time for the 2pm start time for operations. The cause of the failure is under investigation.

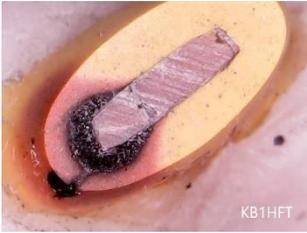


Bob, KE1JH, opening the filter to inspect the innards.

Aha! A discolored capacitor!



After FD, I sliced the capacitor down in ~200 micron increments (on a precision, 2500 grit, wheel), photographing each exposed surface.



Capacitor Tomography!

Analysis of these images has indicated an abrupt failure. Here is seen one of the micrographs in

which the capacitor has been sliced down to the point of maximum heating.

The investigation continues: Bob, W1XP, plans to make a Spice model of the filter to analyze possible failure modes.

Bob & I have discussed doing a "Short Subjects" presentation on the anatomy of this failure at the January NVARC meeting. Stay Tuned.

-de George, KB1HFT

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Nashoba Valley Amateur Radio Club

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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

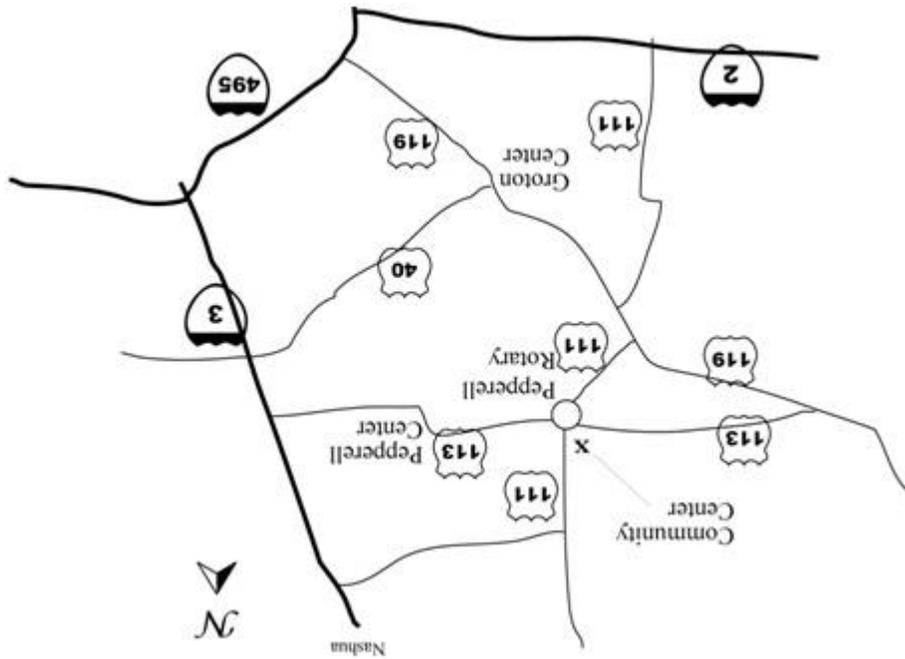
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