



SIGNAL



de NINC

July 2004 Volume 13 Number 7

This Month's Meeting

We have no regular meeting in August.

The cookout will probably be in August at a time and date set by our host. Details will be published in the August newsletter if timing permits and via the club email list.

Last Month's Meeting

Les N1SV and John KB1HDO reported on the status of Field Day planning. They hope to see many members come out and participate.

The June program was a presentation on Marconi by Ray Minichiello. Ray is one of the founders of the Marconi Museum in Bedford NH.



Courtesy KD1SM

Ray was looking for some volunteers to do some outside repairs the museum as we discussed before. Unfortunately it was a weekday work party.



Courtesy KD1SM

In attendance were KB1JKL, KB1KEF, KB1HDO, W1PLW, KB1JLA, AB1CV, KA1RV, W1XP, WR1Y, KB1ESR, KD1SM, N1MNX, KD1LE, K1KEY, K1YTS, N1SV.

Ralph KD1SM gave the Treasurers report. The Field Day budget and expenses for Members Year-books were approved.

GM3TCW Heads Home



Courtesy N1SV

John GM3TCW heads home to Scotland on July 12th. John participated in our Field Day this year. He has been a regular at breakfast and meetings while here on summer visits to his daughter. Les N1SV held a going away party July 5th. Attending were Karen KA1JVU, Bob W1XP, Erik W1ZBT, Peter N1ZRG and MaryLou, Dennis K1LGQ, Gary K1YTS, Nancy KB1KEF, Dave N1MNX and Bruce K1BG.

For our hospitality John presented the club a copy of the RSGB Communications Handbook last week at breakfast. This is the RSGB equivalent of our ARRL Handbook.

From the President

With the last meeting in June we have no formal meetings till September. That doesn't mean we have no activities.

Many of us meet at Tiny's for breakfast on Saturdays at 8:00 AM. Besides the open discussion format for questions this is a good way to check up on what is going on.

The club net is another way and we will continue the net on Monday nights at 8:00 PM. If there doesn't appear to be a net control station to take the net a minute of two after the regular start time I encourage any one to pick it up. You may not have the "official" preamble but that isn't necessary. What is important is that the net meet consistently so that people tune in on a regular basis.

I want thank Les and John for the fine work making Field Day a success.

I also want to thank Ralph for providing the current printing of Yearbooks.

Stan KD1LE

Adopt A Highway

The June cleanup took place on the 20th. Participating in the cleanup were

Ralph KD1SM, Bob W1XP, Stan KD1LE, and Jim AA1PO.

We cleaned almost the entire section in less than one hour. We are supposed to have a minimum of six for a cleanup and for our section of road the right number is eight. This allows us to stay in pairs and finish the entire route in less than one hour.

The next cleanup is Sunday July 18th. We meet at the traffic island on the east side of the Nashua River.

Board Meeting Notes

Ron W1PLW volunteered to run the Grotonfest which will be September 18th. He is looking for help and any suggestions. Current plans are to do our usual with the addition of an APRS demonstration.

Field Day wrap up of bills, suggestions and comments. Les N1SV will submit the document package to the League this week. John KB1HDO will collect the Field Day info and add it to the Field Day Log Book.

We discussed the cookout and a prospective host will be contacted by Stan KD1LE

Ralph presented the Treasurers report and membership information.

We discussed meeting programs for the fall.

Bob W1XP submitted bills for outgoing cards sent to the QSL Bureau. Remember to give your outgoing QSL cards to Bob to be sent out.

NVARC Club Net

The NVARC Information Net has been running three months now. We started just after the April club meeting.

The net on June 28th was called by Stan KD1LE. as net control. Participating were Gary K1YTS, Les N1SV, Dave N1MNX, Larry KB1ESR, Ralph KD1SM, and Stan KD1LE.

Nets continue to be called and are a good place to bring information for the club and questions or discussions. The net meets at 8:00 PM Monday evenings on the 442.900 N1MNX repeater.

Field Day

Field Day 2004 (or, the Pepper Hill Gang "Back In Action")

Though the day started off in typical Field Day tradition ("the last rainy weekend in June"), the weather cleared up, and most of the dedicated (or is that crazy?) hams setting up were nearly dry by mid afternoon when the contest jumped into full swing.

Thanks to Stan, Ralph, and Dave, the paths at the site were mowed clean to make it easier to get around.



This year the N1NC station team consisted of 19 participating hams: Les N1SV and John KB1HDO headed up the organization effort, with a great deal of help from Stan KD1LE, Ralph KD1SM, Dave N1NMX, and Bob W1XP. Ron W1PLW got the word out to the local media outlets, and Larry KB1ESR planned and provided the meals. Setup, operating, and teardown assistance was provided by Dan N1KJN, Doug KB1JCY, Karen KA1JVU, Erik W1ZBT, Ken K1KEY, Scott K1OA, Bruce K1BG, and John GM3TCW. Jim N8VIM provided solar cells and batteries, and Bob AB1CV provided the callsign to run the GOTA station. Jim also provided a number of ground level as well as aerial photos of the Field Day site.

Guests included Mike Raisbeck K1TWF (New England Vice Director) and Bill Shute (Emergency Manager Groton), as well as a number of former and latent hams who followed the signs in out of curiosity. Another guest, John Rose WW1Z joined in on Sunday afternoon to help with takedown an policing the area.

Two prospective new members, Dan Rajczyk N1KJN and Doug Perry KB1JCY, searched the web to find an accommodating Field Day team, got directions and some encouragement from Les, and came down to help operate and tear down.

Again this year we amassed four operating positions: CW, SSB, VHF, and GOTA. All four stations were quite active this year with little downtime. Nearly everybody got a chance to work the VHF station, including Bob W1XP who managed to squeak in a satellite contact with Stan and John acting as

human antenna rotators to keep up with the satellite's track across the southeastern sky. The CW station was ably manned by Scott, Bruce, Stan and Bob for nearly the entire 24 hours, capturing 1079 Qs in that mode. The SSB station racked up 661 Qs, 440 of them on 20m! The GOTA station, under Bob Johnson's AB1CV callsign, made 112 contacts, adding 100 bonus points to the total. GOTA station operators included AB1CV, KB1ESR, N1KJN, K1KEY, and KB1JCY. Additionally, the VHF station pulled in 103 contacts, mostly phone, but five CW contacts, including the satellite contact, were made by Bob and Stan. There were some pretty impressive Sporadic-E openings on 6 meters though the day.

Bonus points were earned by using solar power for the GOTA station, 100% emergency power for other operating positions, sending an NTS-format message to Phil Temples K9HI, our Section Manager, and copying the W1AW Field Day Bulletin. We also got bonuses for the satellite contact, media coverage, a Public Relations booth, and visits from elected and local emergency management officials. Finally, bonus points were also earned for our public location and demonstrations of non-traditional modes of operation - APRS and Packet.



The Antenna Consortium (Stan, Ralph, Bruce, Larry) did a fine job demonstrating their 100 foot crank-up

tower, cautiously extended to a "mere" 70 feet for this event. Atop the tower was a tri-bander covering 10-15-20 for the CW station. A 160m inverted vee, and 80m sloper used the tower for support, and a 40m ZL Special was strung between the tower and a guyed 40 foot extension ladder.



The NVARC flag (made by Jeanine N1QIT) flew over its first Field Day from the tower trailer. The spreader from one end of the ZL Special is visible below the flags.

The VHF station had 6m, 2m, and 70cm yagis on a 30' mast sitting atop the hill. The SSB position utilized an 80m inverted vee in the trees, as well as a tri-bander set atop another extension ladder. (Rumors abound that the ladders are also used for painting and such, but that's poppycock!) The ladder supported a 40m inverted vee for the GOTA station which alternately made use of the club's R7 vertical.



Chef Larry (with help from Bob AB1CV) did an awesome job providing meals for the crew. Dinner on Saturday evening consisted of succulent marinated chicken (we might need to start a Signal recipe column!), hamburgers, hot dogs and kielbasa, along

with potato and macaroni salad, chips, and all the fixings. We breakfasted the next morning on scrambled eggs, bacon, French toast, and toast, with plenty of coffee and orange juice to get us going again for the next six or seven hours of operating.

We increased our contact count by over 500 QSO's this year (37%), and our total claimed score of 7458 (6058 plus 1400 bonus points) is up nearly 70% over last year, due in large part to the 1400 bonus points we earned. We only left a few bonus points on the table this year (passing message traffic and another "non-traditional" mode). This year's score would have placed us at number 20 overall based on last years 2A category scores, and number 3 in W1 land. While conditions for everybody were better this year, we might leap into the top 10 overall, and we should certainly stay in the top 3 in W1 (we are hoping for better).



Jim N8VIM provided aerial coverage of the site. Last years pictures were used this year during planning to determine the station locations and estimate distances

Planning for next year is already underway (Larry can we use the RV again?), with expectations for computer-keyed CW and an additional station for digital operation (RTTY/PSK31), placing us in the 3A category. As always, Field Day is the last full weekend in June, and in 2005, that's June 25-26. Because of the additional station, we will need another antenna crew, and we will need more operators.

Congratulations to all who helped make this a Field Day to remember. Thanks much & 73.

Article by John KB1HDO with additions and pictures added by the editor.

PSLIST JUNE

Listing public events at which Amateur Radio communications is providing a public service and for which additional volunteers from the Amateur Community are needed and welcome. Please contact the person listed to identify how you may serve and what equipment you may need to bring. The most up-to-date copy of this list is maintained as <http://purl.org/hamradio/publicservice/nediv>.

**** Every event listed is looking for communications volunteers ****

Date	Location	Event
Contact	Tel/Email	

Sep 10	Hyannis-Brewster MA	MS Challenge Walk
Sep 11	Brewster-Eastham MA	MS Challenge Walk
Sep 12	Brewster-Dennis MA	MS Challenge Walk
	John N1PYN	508-588-3250 n1pyn@arrl.net

Sep 18	Madison to Modus CT	MS Tour 150
Sep 19	Modus to Madison CT	MS Tour 150
Scott	AA1WM	203-676-1016 sbicycles@comcast.net

See <http://purl.org/hamradio/publicservice/nediv>

ARRL Letter

UTILITY CUTS SHORT BPL TRIAL THAT WAS TARGET OF AMATEUR COMPLAINTS

Alliant Energy has called an early end to its broadband over power line (BPL) pilot project in Cedar Rapids, Iowa. The "evaluation system" went live March 30, and plans called for keeping it active until August or September. Alliant shut it down June 25. Ongoing, unresolved HF interference from the system to retired engineer Jim Spencer, W0SR, and other amateurs prompted the ARRL to file a complaint to the FCC on Spencer's behalf demanding it be shut down and the utility fined.

Alliant Energy's BPL Project Leader Dan Hinz says the ARRL complaint "certainly was a factor" in the utility's decision to pull the plug prematurely but "not the overriding factor." The main reason, he said, was that Alliant accomplished most of its objectives ahead of schedule. The primary purpose of the Cedar Rapids evaluation was to gain an understanding of BPL technology and what issues might be involved in a real-world deployment, Hinz explained. But, he added, regulatory uncertainty and other unspecified technical issues also factored into the choice to end the pilot early.

Hinz said Alliant is "mashing the data" to compile a written evaluation of the Cedar Rapids pilot, but the

company has no plans at this point to move forward with BPL. Alliant did not partner with a broadband services provider, and it has no other BPL test systems in operation. The system used Amperion BPL equipment.

According to Spencer, five fixed Amateur Radio stations within proximity of the BPL evaluation system and two mobile stations formally reported BPL interference on HF. "The radio amateurs and Alliant Energy cooperated by sharing interference information," he said. "Alliant Energy turned the BPL evaluation system off twice to allow collection of extensive BPL frequency and signal level data--with and without BPL." He said Alliant and Amperion tried various "notching" schemes to rid amateur frequencies of the BPL interference with only limited success.

The system included both overhead and underground BPL links to feed 2.4 GHz wireless "hot spots" for end user access. Hinz said the area's topography presented some challenges, especially with the wireless links. "I think in the end, we actually over-challenged ourselves with this specific pilot location," he said. And, despite "substantial progress" in mitigating interference, Alliant decided at this point that "it wasn't worth the extra effort" to resolve the thornier technical issues, Hinz added.

As for any broader implications, Hinz says he's always viewed BPL as a "strategic deployment technology," not one a company could roll out just anywhere and expect to be competitive with existing broadband services such as cable and DSL. "At least that's how we were looking at it," he said. "You have to find the right areas with the right topography with the right concentration of certain types of customers," he said.

"It's never been in my mind that BPL has to compete with the speeds of cable today," Hinz added. "It has to compete with the speeds of cable and the next best thing tomorrow as well, if it's going to be usable well into the future." He hinted that Alliant might want to take another look at BPL once the FCC has put BPL rules and regulations into place, and the technology has further evolved.

The ARRL's formal complaint to FCC Enforcement Bureau Chief David H. Solomon called on the Commission not only to close down Alliant's BPL field trial system but to fine the utility \$10,000 for violating the Communications Act of 1934 and FCC Part 15 rules. Commenting on the termination of the Cedar Rapids BPL trial, ARRL CEO David Sumner, K1ZZ, pointed out that Alliant had tried for more than 12

weeks to fix the interference problem to a station 600 feet from its installation.

"In the end," Sumner said, "the interference was not eliminated except by shutting down the BPL system. Could the case against BPL deployment be any clearer?" Spencer said he was happy with Alliant's decision, and he was gracious in expressing appreciation to the utility for working with him. "And thanks also to the ARRL and the Cedar Rapids BPL Steering Committee for their knowledge and efforts in making a truly professional evaluation," he added.

Still outstanding are some chronic power line noise problems Spencer has experienced.

For additional information, visit the "Broadband Over Power Line (BPL) and Amateur Radio" page on the ARRL Web site <<http://www.arrl.org/bpl>>. To support the League's efforts in this area, visit the ARRL's secure BPL Web site <<https://www.arrl.org/forms/development/donations/bpl/>>.

ISS CREW PLEASES FIELD DAY CROWD WITH HAM RADIO "FIRST"

For the first time, an astronaut and a cosmonaut were on the air simultaneously from both Amateur Radio on the International Space Station (ARISS) operating positions. Astronaut Mike Fincke, KE5AIT, operated during Field Day 2004 as NA1SS, while Expedition 9 Commander Gennady Padalka, RN3DT, was on the air as RS0ISS. Between them, they racked up more than five dozen QSOs.

"Mike Fincke and Gennady Padalka both participated on June 27 by making voice contacts with stations in the United States (including Alaska), Canada, Mexico, Puerto Rico, Costa Rica, Venezuela, Argentina, Paraguay and Brazil," said ISS Ham Radio Project Engineer Kenneth Ransom, N5VHO. "This was Mike's first time to make general contacts, and he did really well." Fincke was active during five US passes as well as during two over Central and South America.

Fincke snagged some 60 contacts on 2 meters--some of them in Spanish--using the Ericsson handheld transceiver in the Zarya Functional Cargo Block or FGB. Padalka picked up four US contacts on 70 cm using the Kenwood D700E in the ISS Zvezda Service Module. The packet system now is back in operation.

Fincke called the Field Day operation "a great experience!" and suggested he'll be on the air more

frequently as a result. "Both Gennady and I were very happy to have 'met' so many different people in North, Central and South America," he said. "I know I will be using the ham radio more often, now that I could feel the warmth of the community."

ARISS mentor Tim Bosma, W6MU (ex-W6ISS) said his Field Day crew worked Fincke on three consecutive passes. "He impressed a lot of scouts and hams here at our Field Day site and made a very positive impression for ARISS and AMSAT," he said on the SAREX reflector.

Drew Glasbrenner, KO4MA, was one of the stations fortunate enough to work Padalka. "What an awesome signal on 70 cm!" he exclaimed. "Forty over S9.

Speaking on behalf of the ARISS Team, Scott Stevens, N3ASA, expressed appreciation for the Field Day operation. "Thank you gentlemen for your time and outstanding effort in making the 2004 Field Day an excellent experience."

AMSAT-OSCAR ECHO SATELLITE LAUNCHED!

A Russian Dnepr LV rocket carrying the AMSAT-OSCAR Echo Amateur Radio satellite and several other payloads launched on schedule June 29 at 0630 UTC from Baikonur Cosmodrome in Kazakhstan. Ground controllers made their first contact with Echo at 1452 UTC and collected some telemetry for analysis before shutting down the 435.150 MHz digital downlink transmitter.

"This achievement is due to many individuals around the world, who have helped in the design, building, integration, testing and launching of this satellite," said AMSAT-NA President Robin Haighton, VE3FRH. "Also the members of AMSATs in many countries who have helped us by funding this 'electronic adventure.' Without your financial support the satellite could not have been completed and would never have been launched. Give yourselves a pat on the back for a job well done."

Jim White, WD0E, of the AO-Echo project team reports that an initial analysis of Echo's telemetry indicates everything is looking good. "The battery, solar panels and temperatures were all as expected," he said. Housekeeping software now is uploaded and running, and the transmitter was left on at a power level of 1.2 W.

Earth stations should not attempt to transmit on the satellite's uplink until checkout and commissioning are complete and AO-Echo has been made avail-

able for general use. White says that won't happen for at least one week. AMSAT will release bulletins when the satellite becomes available.

A telemetry decoding program, TLMEcho, is available for those who would like to view and report data from Echo. It may be downloaded from the "Echo Satellite User Software and Documentation page." AMSAT-NA requests that anyone recording Echo telemetry to send the CSV files to Mike Kingery, KE4AZN. A telemetry database has been established and will be tested over the next few days. When testing is complete it will be made available to directly upload telemetry files and query all data.

AO-Echo's sun-synchronous orbit is some 800 km (nearly 500 miles) above Earth. Among other capabilities, the 10-inch-square microsat—equipped with a transmitter capable of up to 7 W output—will allow voice communication using handheld FM transceivers. Echo will feature V/U, L/S and HF/U operational configurations, with V/S, L/U and HF/S also possible. FM voice and various digital modes—including PSK31 on a 10-meter SSB uplink—also will be available.

At last report, the AO-Echo project was still some \$12,500 shy of its \$110,000 fund-raising goal. AMSAT—a 501(c)(3) organization—welcomes additional donations to bridge the funding gap. Visit the AMSAT AO-Echo Web page for additional details.--AMSAT News Service

ASTRONAUT RADIOS BIRTH ANNOUNCEMENT, CELEBRATES SPECIAL FATHER'S DAY IN SPACE

International Space Station astronaut Mike Fincke, KE5AIT, and his wife Renita became parents for the second time Friday, June 18. Unable to contain his paternal pride, Fincke altered the beacon message on the RS0ISS Amateur Radio packet system aboard the spacecraft to transmit "It's a girl! Tarali Fincke" about once every minute as the ISS circled Earth.

"Sure beats a stork sign in the front yard," quipped ISS Ham Radio Project Engineer Kenneth Ranson, N5VHO, at Johnson Space Center. Fincke is the first US astronaut to celebrate the birth of a child from space. Father's Day was Sunday, June 20. Tarali is the couple's second child. She'll join a brother, Chandra, in the Fincke household.

Fincke said his children's names have astronomical significance. "Her name is Tarali Paulina, and Tara is the Indian dialect meaning star," he radioed Mis-

sion Control in Houston shortly after the birth. "Our first boy, his name is Chandra, which means moon. So, my wife had already given me the moon, and now she's given me a star, and it's a privilege to happen aboard the International Space Station."

Of Indian heritage, Renita Fincke, an engineer for Wyle Laboratories, works at Johnson Space Center. Until her husband returns to Earth in October, she says she'll help him experience the first few months of their daughter's life via teleconferences, video and e-mails.

"This is a wonderful, exciting adventure for both of us," she said. "I hope that everything is successful for his mission, that he comes home safely." The couple has been married since 1999.

NASA and Russian mission controllers extended congratulations to Fincke, who is NASA ISS science officer and flight engineer. He and ISS Commander Gennady Padalka, RN3DT, have been in space since April.

US and Russian flight controllers decided to end Expedition 9's first spacewalk June 24 after about 14 minutes when it was observed that Fincke's primary oxygen bottle was losing pressure faster than expected. The crew will try again the week of June 28.

More info is available on the NASA Web site <http://www.nasa.gov/vision/space/features/fincke_baby.html>.

MARITIME MOBILE SERVICE NET HANDLES AT- SEA MEDICAL EMERGENCY

Members of the Maritime Mobile Service Net <<http://mmsn.org>> recently were instrumental in the successful handling of yet another medical emergency at sea. The crisis arose when a young hand aboard a commercial fishing vessel in the Caribbean Sea off the coast of Central America suffered serious knife wounds May 25 in a fight with a crewmate. Although not an amateur licensee, the captain of the Motor Vessel Brandon Travis knew he could get prompt assistance on the net's 14.300 MHz frequency.

"Under normal conditions, transmissions by non-amateur stations on this frequency are prohibited by international law," said Assistant Net Manager Tom Job, VE3II, who lives near Toronto and took the initial call for help. "But when an emergency occurs at sea, anyone can use the frequency for assistance." At the time, the 80-foot, steel-hulled Brandon Travis was reported two days east of Roatan, Honduras.

The captain, who identified himself as "Chris," explained that the most serious injury the 17-year-old crew member suffered was a stab wound in the back, just a few inches from the victim's spine.

After obtaining critical information, Job contacted the Coast Guard's District 7 Search and Rescue Center in Miami and relayed the situation report. The Coast Guard in turn contacted Honduran authorities to arrange to evacuate the injured man.

The net also was able to get physician Jim Hirschman, K4TCV, a net member in Miami, on frequency. Hirschman has extensive experience assisting with injuries and medical emergencies via the radio. He was one of the principal MMSN members to provide assistance and advice to the parents of Willem van Tuyl, then 13, after he was shot and seriously injured in a pirate attack on the family's sailboat in 2000.

The injured man was reported in pain and apparent shock and having difficulty breathing. Hirschman advised the captain on how to stabilize the victim and treat his injuries. No oxygen was available aboard the vessel. "The injury was life-threatening, and medical evacuation was of the utmost urgency," Job pointed out. Hirschman was joined by fellow physician Peter Sosnow, W1KY, an emergency room trauma specialist.

The net remained open past its normal closing time to keep an ear on the situation. Early the next morning, the captain of the Brandon Travis informed the net that the injured man had been removed to a Honduran naval vessel and taken to a hospital.

"Without the assistance of the net, this situation could have resulted in the death of the crew member," Job added. The stabbing victim spent a couple of days in the hospital and was released.

The captain of the Brandon Travis checked into the net two days after the incident to thank everyone for their help. At the captain's request, the net supplied him with a copy of ARRL Amateur Radio license study materials.

"He was super impressed with the net's response and now has 14.300 in the ship SSB radio's memory," Job said. "Chalk up another one for the good guys."

Contest Calendar and DXpeditions

The information for a DXpedition can be quite detailed and may include bands, dates, number of stations, and times of day they plan to work certain continents so I can not list it all here. But if a country or prefix is of interest you can get more information at www.425dxn.org.

CONTESTS (JULY - AUGUST)

July 10-11 IARU HF World Championships

DXpeditions

5H	Tanzania	1 year
5V	Togo	current
8Q7WP	Maldives	till 09/05
VK0DX	Antartica	till December
VQ9LA	Diego Garcia	till December
5H3HK	Tanzania	till March 2006
ZD8I	Ascension Is	till March 2006
HS0ZCW	Thailand	till August 25

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Tell them you saw it in the Signal. Advertisers should contact the NVARC Treasurer for information.

\$July Treasurers Report\$

Income for June was \$65 in membership dues and \$35 from PowerPole connector distribution. Expenses were \$14.80 for postage, \$48.61 for outgoing QSL Bureau, \$107.20 for yearbook supplies, and \$10.48 for brochure supplies, leaving a net expense of \$81.09 for the month.



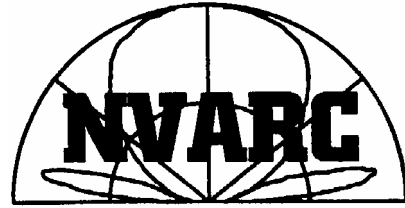
Current balances:

General fund \$4743.43
Community fund \$1722.95

We have 57 current members, with several renewals outstanding.

I have notified all Members whose renewals are currently due.

73,
Ralph KD1SM



**Nashoba Valley
Amateur Radio Club**

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<http://www.n1nc.org/>

President: Stan Pozerski KD1LE
Vice President: Peter Nordberg N1ZRG
Secretary: John Griswold KB1HDO
Treasurer: Ralph Swick KD1SM

Board Members:

Bob Reif 2001-2004

Les Peters 2002-2005

Dave Peabody 2003-2006

Editor: Stan Pozerski KD1LE

Emergency Coordinator: Den Connors KD2S

Photographer: Ralph Swick KD1SM

PIO: Ron Wood W1PLW

Librarian: Peter Nordberg N1ZRG

Property Master: John Griswold KB1HDO

N1NC Trustee: Bruce Blain K1BG

Meetings are held on the 3rd Thursday of the month

- 7:30 p.m. - Pepperell Community Ctr. Talk-in

146.490 simplex

442.90 + 100Hz Repeater

147.345 + 100 Hz Repeater

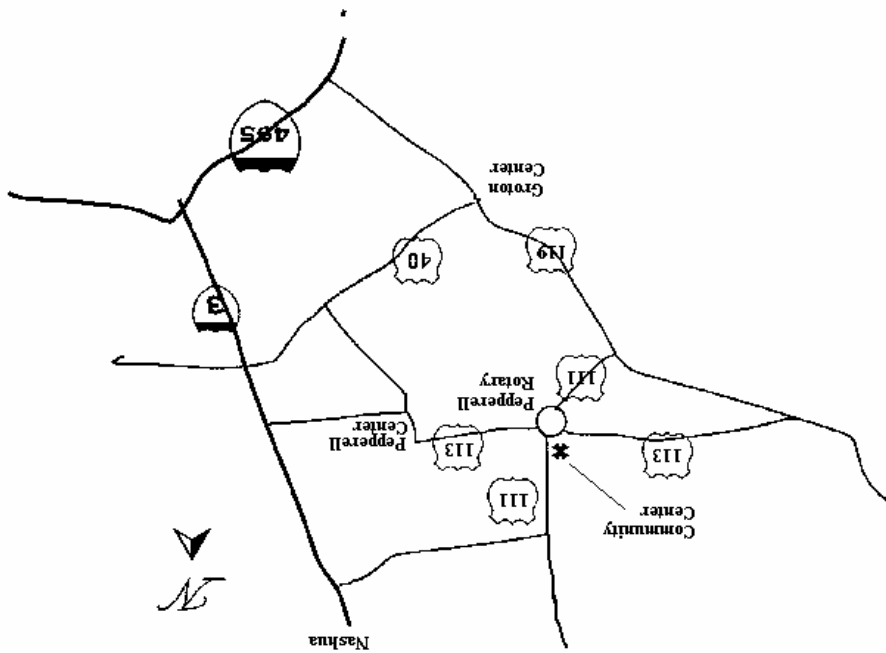
53.890 – 100Hz Repeater

This newsletter is published monthly. Submissions, corrections and inquiries should be directed to the newsletter editor. Articles and graphics in most IBM-

PC formats are OK. You can send items to

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