NVARC
Nashoba Valley
Amateur Radio Club

SIGNAL

SPECIAL SERVICE CLUB
ARRL

de N1NC

August 2003 Volume 12 Number 8

This Month's Meeting

This month we have no regular meeting. The cookout will be Saturday August 16th 4:00PM at the KD2S QTH. Bring what you want to cook on the grill. The fire, condiments and drinks will be provided.

Look for the "C" on the telephone pole at the end of the driveway. If you need more specific directions contact a club officer.

Member Short Presentations

The November meeting program is going to be "Member Short Subjects". Our goal is to have four members do a ten or fifteen minute presentation on a topic of interest to them.

These presentations don't have to be radio related. It could be what you do when you're not "playing radio", or some other hobby you have.

We currently have three topics and speakers. If you have a short subject of ten or fifteen minutes that you would like to present contact a Board member. If you need help putting together the slides, need handouts copied, or need equipment we can probably help.

Adopt-A-Highway

Due to schedule problems and since the June-July-August cleanups were compressed I canceled the July cleanup. I'll need a full crew for the next cleanup which will be and August 24th. As always we will meet at the Groton school complex at 9:00 A.M.

Public Service of Another Kind

Larry KB1ESR has been working on a public service project of his own for several years now. He has been mapping fire hydrants and helicopter landing/evacuation sites for the Groton Fire Department. Larry was featured in an article in the Lowell Sun March 31st detailing his efforts. Kudos to Larry for his efforts.

August Board Meeting

There was no July Board of Directors Meeting and the August meeting (if any issues need to be addressed) will take place at the cookout.

Ralph submitted the monthly Treasurers report and the details are published later in the newsletter.

Field Day and NVARC mug bills were submitted and settled.

From the President

The Fall program schedule is shaping up but as always we are open to suggestions on subject matter or specific speakers.

There are many public service events during the summer to keep those of us so inclined out of trouble. See the PSLIST for those opportunities.

We plan to set up a Ham Radio display at the Grotonfest in September. Ron W1PLW has volunteered to coordinate this activity. This one event was the source of most of the students that filled our license classes so we will be taking signups for a class there. Ron will need your help and ideas for the event. We will be running a license class following Grotonfest and are making arrangements Pepperell Parks and Recreation which will provide space and a town wide mailing. If anyone has any other suggestions please let us know.

We have been asked to support the Pepperell Soccer Tournament in the Fall and John KB1HDO has taken

on the coordinating task. Help him out by volunteering some time during the three days of Columbus Day weekend.

We don't have a formal request yet, but I expect we will be asked to support he Groton-Pepperell Rotary Rail Trail Charity Walk in the Fall.

On the emergency preparedness side besides practice and participation one of the things that is becoming more common in discussions is the idea of a stay-at-home response to an emergency. Many of the new disaster scenarios require that people not move around. That changes the preparation to home preparedness and home station preparedness.

Hope to see you at the cookout. Stan KD1LE

NVARC Loaner Equipment

Kenwood TS-451 transceiver
Cushcraft R-7 antenna
Astron RS-35M power supply
Practice Oscillators MFJ557 keyer

Ham Radio History 101

Beginning Amateur Radio History
By Bob Reif W1XP

Last month I discussed the changes that took place in amateur radio as a result of the first contact between amateurs on each side of the Atlantic. This month I would like to go back and describe what amateur radio was like prior to these events.

AMATEUR RADIO IN 1923

So what was amateur radio like in 1923? Well 1923 had seen changes in the hobby. There was increasing pressure and necessity to revise the basic radio law of the country. The 1912 law that had moved the amateurs to 200 meters and down was grossly inadequate to administer the exploding radio broadcast industry that had not even existed when the law was written. A conference was held by the Dept. of Commerce in Washington in early 1922 to draft recommendations for a new federal radio law. This conference was attended by representatives of all of the interests, including the ARRL representing the amateurs, the broadcast industry, government, military and commercial radio services. The result of this conference was a congressional bill, which was known as the White-Kellogg or simply the White bill. It was passed by the House but the Senate failed to even consider it due to pressure by some in the broadcast industry that did not favor the bill. The White bill died when the congress recessed at the end of its term. Amateur radio was still stuck with the 1912 law. But there were changes in the wind anyway.

In 1923 the amateur radio hobby was dominated by what was called Relaying. This was the forwarding of messages. What today is called traffic handling. The volume of this message relaying had grown to a peak of over 120 thousand a month, in February of 1923. Most of this was handled by CW. About ten percent of the messages were sent via Spark. Spark transmission was still legal but there was a movement to eliminate it. CW was a superior mode. The spark signal was very broad. It was coherent but had many sidebands due to both the random nature of the spark discharge and the modulation of the rotary gap. It cut a wide path through the band. The wide signal on 200 meters easily spilled over into the broadcast band where the receivers of the day picked up the transmissions much to the disgust of the broadcast listener. Not all amateur related interference was caused by spark transmission. The wide responding broadcast receiver of the day used by the ever-increasing number of broadcast listeners was a growing problem. To make matters worse, the broadcast stations of the day were scattered in between government and shipping stations. It was chaos. And every time a broadcast listener heard any thing that sounded like code transmission the local amateur got the blame. Most of the time it wasn't an amateur but the ham received the blame. The White bill had addressed this issue by trying to assign broadcasting and the other services to separate bands. It would have helped but the broadcasters didn't like their share of the pie and killed the bill. At least that is one view. Because of the interference issues there was a lot of pressure to get rid of amateur radio. There were city ordnances passed in several towns to outlaw ham radio. Most were not legal and removed before they were enforced. But this indicates the mood of some of the country toward amateur radio. The amateur community and the ARRL were quick to recognize the danger and proposed a voluntary program of "Quiet Hours". This was an agreement that the amateurs would not transmit during the prime listening hours in the evening. The exact times varied from place to place. But in general they were between 8 pm to 10:30 pm. There was also a period on Sunday morning that was supposed to coincide with local church broadcasts. This voluntary plan did a lot to smooth over the relations with the broadcast listener community and helped the amateur's case that he was not responsible for most of the interference. But the interference problems continued. In the spring of 1923 Secretary of Commerce, Hoover, called another Wash-

ington conference to discuss what might be done under the 1912 law that they were stuck with because of the failure of congress to pass the White bill. This conference was attended by the same groups that had attended the previous 1922 conference. The result of the conference was an agreement to expand and shift the broadcast assignments, move some of the services out of the broadcast assignment, and to restructure the amateur regulations. Some of these changes to the amateur regulations were things that had been on the amateur agenda for some time. Amateurs were supposed to have access to all frequencies below 200 meters as a result of the 1912 law that was still the law of the land, but it had never really happened. Licenses were only issued for a specific wavelength. Usually 200 meters because that is what everyone requested. A longer wavelength had been authorizes for special purposes. This had been typically 375 meters. This was authorized to special stations for spanning the greater distances in the western part of the country to provide communications between the mid west and west coast. These stations had a "Z" call. For example, 1ZA, 2ZB, 9ZC. This activity was to be moved to the 220 to 200 meter region and was restricted to Pure CW only. (Note that Pure CW in this time period meant a plate voltage source that had the characteristics of a battery supply. Not a simple requirement for a line operated transmitter in 1923.) It was recognized by now that the distances could be covered on 200 meter CW but a separate wavelength was desired for QRM reduction. It is interesting that the Dept. of Commerce agreed with the amateurs need for this coverage. Spark and other modulated modes including phone and modulated CW were restricted to 200 to 176 meters. CW only was allowed between 176 to 150 meters. These changes to the regulations gave CW 200 to 150 meter and 220 to 200 meters under special license. More on this later. There are several big changes here. For the first time a station was free to move around the band. Prior to this you were licensed for a particular wavelength and also a particular type of transmitter. If you had a spark license and you built a CW transmitter you had to apply for a license for it. Like wise with a phone transmitter. This was still true, but you could hold a license with multiple transmitter types on it. Under the new regulations you could move from one end of the amateur assignment to the other with out getting permission from the local radio inspector as was necessary before. Before this change you were licensed for 200 meters, for example. The wavelength you were on was likely to be that in name only. The ability to measure the wavelength (frequency) was limited and once set the frequency changed as a result of many things, only some of which the operator could control. But it was still limited to a small part of the 200 to 150 meter band. Now stations could move off at will. There was also some information that the shorter wave end of the band might actually be better, but much of this was attributed to the reduced interference and increased antenna efficiency. The amateur could have moved before the regulation change. All he had to do was ask, but there was a strong feeling to stay on 200. After the changes in 1923 there was a need to develop transmitting equipment that could be moved around in an easy fashion. The typical CW transmitter was a tube or tubes arranged as an oscillator. Tuning was usually accomplished by moving taps on large coils. The coils likely had one to two kilovolts of poorly regulated AC or DC on it. You took your life in your hands every time you tuned the transmitter. It could take thirty minutes of tap changes and tuning to get the transmitter to operate efficiently on a different wavelength. You were reluctant to QSY once you got the transmitter working on a wavelength, but now that others could move off 200 there was a real incentive to do so, if only to get away from the QRM.

So an up to date station in 1923 was probably on CW. There were some diehards on spark but they were seeing what CW could do and changing over to CW. Here is one interesting story along this line. In late 1922 the old spark transmitter at 1AW suffered a major failure and a CW transmitter was quickly put on the air while the spark transmitter was to be repaired. As a result of the remarkable change in performance Mr. Maxim announced the spark transmitter would not be but back on the air. This was another nail in the spark coffin.

The station tuner, recall that's the receiver, was probably a two stage regenerative design. It probably had one detector tube and one stage of audio amplification. More audio stages may have been used if a loud speaker was used. Some stations used RF amplification. There is some question how much improvement it gained and it made the tuner harder to tune. The tuning controls were not ganged together so it took two hands to tune at least in principle. This made tuning the band for signals difficult. More stages of RF amplification were even more of a bother to tune. There were a few stations working on shorter wavelengths (around 100 meters) with special permission and experiencing encouraging results. It had been hoped that free access to the shorter waves could be secured but that had been denied in the 1923 changes to the amateur regulations. The big disappointment in the 1923 changes to the amateur regulations was mandatory Quiet Hours. All amateur licenses were recalled and stamped that operation was not permitted between 8pm and 10:30 pm local time and then returned. The Dept of Commence rejected the voluntary plan because there were some stations that did not abide by the voluntary plan. The licensing authority swept away the voluntary plan and made quiet hours the law. The amateurs that had been following the voluntary plan were little affected and since they were

the majority little changed but it did point out how the actions of a few can affect the majority.

One other change of the amateur regulations in 1923 was the creation of a second amateur radio license class. This was the "Amateur Extra First Grade" license. These amateurs were to have use of the wavelength band between 220 and 200 meters. This satisfied the requirement of the 1912 radio law that gave the use of waves longer than 200 meters under special license. It is interesting to see that this license had the requirements of two years experience, and a 20 words per minute code test. One last requirement was that the operator has a clean record of following the amateur regulations. A holder of this license had access to the 220 to 200 meter segment with a Pure CW transmitter. This pure CW requirement was to try and reduce the possibility of interference between the amateurs using this sub band and the low power broadcast station that were located up the band. The biggest problem was the wide receivers of the day, but the reduction of modulation on the amateur signal went a long way to reduce the interference. Key clicks continued to be a problem. The Z call designation was continued with the Amateur Extra First Grade license.

So at the start of the 1923/24 winter radio season the amateur had a new set of Regulations. Some he did not want, and some he had yet to learn how to use. (The regulations would all change again in another year.) Those stations not involved in "relaying" were probably interested in just "rag chewing" or improving their operating range. "DX", but it had a different meaning in 1923. There were also the "tinkers". Those either just getting into the hobby and not knowing what they wanted to do yet, or those with limited means to build a transmitting station. The next 12 months would see the opening of the short waves and discovery of the magic of short-wave radio. Ionospheric propagation would put the world at the fingertips of all amateurs regardless of their background, or resources. We were indeed on the threshold of an exciting time!

Till next time, hope you are finding this as interesting as I am. 73 Bob W1XP

PSList July 2003

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 12 Provincetown to Dennis MA MS Challenge Walk John N1PYN 508-588-3250 n1pyn@arrl.net

Sep 13 Dennis to Truro MA MS Challenge Walk
John N1PYN 508-588-3250 n1pyn@arrl.net

Sep 14 Dennis to Brewster MA MS Challenge Walk
John N1PYN 508-588-3250 n1pyn@arrl.net

Sep 21 Madison to Moodus CT Bike Tour for MS
Scott AA1WM 203-676-1016 aa1wm@arrl.net

Sep 22 Moodus to Madison CT Bike Tour for MS
Scott AA1WM 203-676-1016 aa1wm@arrl.net

Oct 11-13 Pepperell Fall Classic Soccer Tournament
John KB1HDO 978-772-5406 kb1hdo@hotmail.com

Oct 17-19 Boston MA Head of the Charles Regatta
Jeff N1FWV 978-536-2842 rwjeffa@attbi.com

This list is published periodically as demand warrants by Stan KD1LE and Ralph KD1SM. Our usual distribution is via packet to NEBBS, via Internet mail to the arrl-nediv-list and ema-arrl distribution lists, and on the World Wide Web (see URL above). If other mailing list owners wish us to distribute via their lists we will be happy to oblige. Permission is herewith granted to republish this list in its entirety provided credit is given to the authors and the URL below is included. Send comments, corrections, and updates to:

(via packet) KD1SM@K1UGM.#EMA.MA.USA,
(via Internet) KD1SM@ARRL.NET.

Field Day 2003 (part 2)

I would like to thank everyone who came out and supported this years NVARC Field Day. We had a total of 26 participants and guests. It was a lot of work but it was a lot of fun as well. While we decided to do things a little differently this year, everyone seemed to enjoy themselves. For those who participated you should be

BAND	CW	PHONE
80m	102	124
40m	210	226
20m	136	463
15m		28
6m		15
2m		5
440		2
SAT	26	9
GOTA		78
TOTAL	474	950

receiving or already have received an official ARRL 2003 Field Day pin from the club in appreciation for your efforts. A number of people took photos this year so I have created an Online Photo Gallery. Thanks to KB1JZU, KD1LE, and WX1J for the photos.
This year we made a total of 1,502 contacts and submitted a claimed score of 3,796 points in the 2A category. This includes a total of 600 bonus points including those for media publicity (articles in local newspapers) and completing a Satellite QSO. The table provides detailed breakdown of contacts by band and mode and contacts made by the GOTA station.

Above N1ZRG making a few contacts

The propagation on the higher HF bands was poor, 10m never opened and 15m only opened briefly at the very end of the contest. The two HF tribanders worked very well on 20m where we were able to run stations from all over the US and several foreign countries including Bermuda, Cuba, and even New Zealand. The 40 and 80m bands were typically noisy but we were able to work stations up and down the East coast as well as out to the West.

The ***Messenger,*** a local area newspaper, had a full-page article on the NVARC Field Day in the ***Nashoba Valley Journal*** section of the July 25th edition. There were three pictures and detailed text of the operation.

Thanks to N1MNX we had a dedicated VHF/UHF station this year which was active on 6m, 2m, and 440 MHz. On 6m we worked stations all over New England and into Eastern New York on SSB.

Above is the satellite station set up by Bob W1XP at the-UHF/VHF spot. Present (l-r) are Dave N1MNX, Bob W1XP, Karen KA1JVU, Peter N1ZRG.

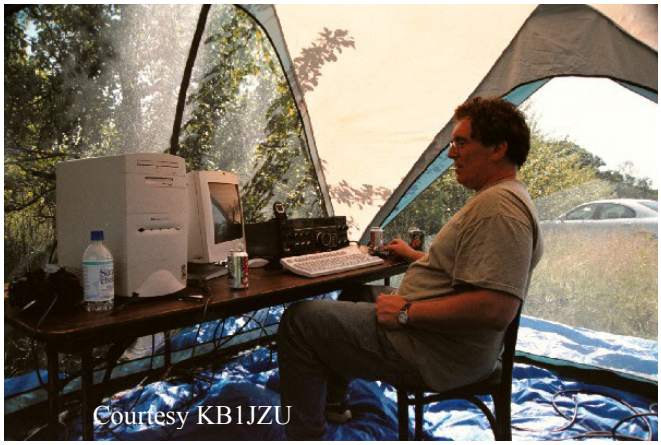
Sunday morning the VHF / UHF station was taken off the air so that W1XP could make some satellite QSOs via AO40. Bob did a super job and worked a total of 35 stations from all over North America. As you can see from the photo above Bob generated a lot of interest with his satellite station.

Above John KB1HDO at the GOTA station he set up and operated.

New this year was our Get On The Air (GOTA) station operated by KB1HDO. John had to contend with interference from the two main HF stations as well as having to use an unfamiliar radio (FT-1000MP). Still John managed to work 78 stations, Nice job!

Above is a worm's eye view of the ladder "tower" with the tri-band beam on top and several dipoles strung from it. The antenna mast is clamped to the ladder with brackets made by Stan KD1LE. This arrangement is still one of the easiest to set up and use. There is no assembly beyond attaching the mast to the ladder and the yagi to the mast. It may be stood up at half height, which is easy for three or four people to manage, and then extended. Used this way no climbing is required.

Another view of the satellite crew. (lL-R) Les N1SV, Dave N1MNX, Erik W1ZBT, and Bob W1XP.



Above Bruce K1BG running some CW contacts.

Here Bob W1XP and Larry KB1ESR relax at the information table in front of Larry's RV. The RV housed one of the HF stations in addition to being the source of power for the Two HF stations and the GOTA station. The RV also provided cooking facilities and was the source of welcome hot beverages.

Above (L-R) Scot KO1A, Stan KD1LE, and Les N1SV relax at the feeding station.

For the most part take down was uneventful and with the removal of the Beltronics crank-up tower, and tri-bander on Monday the site was returned to its natural state. Thanks to Beltronics for the loan of the tower and the Pepperell Conservation Commission for the use of the site.

73, Les N1SV

Advertisements

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

From The ARRL Letter and Bulletins

BPL IS "SPECTRUM POLLUTION," ARRL PRESIDENT SAYS

ARRL President Jim Haynie, W5JBP, says Broadband over Power Line (BPL)—if widely deployed--would represent "spectrum pollution" on a level that is "difficult to imagine." Haynie reacted after seeing videotape and early data from recent ARRL field studies in four states where BPL is undergoing testing.

"BPL is the most crucial issue facing Amateur Radio and the one that has the most devastating potential," Haynie said. In terms of interference potential on HF and low-VHF frequencies, "nothing is on the same scale as BPL."

A form of power line carrier (PLC) technology, BPL would use existing low and medium-voltage power lines to deliver broadband services to homes and businesses. Because it uses frequencies between 2 and 80 MHz, BPL could affect HF and low-VHF amateur allocations wherever it's deployed. BPL proponents--primarily electric power utilities--already are testing BPL systems in several markets, and one reportedly is already offering the service. FCC rules already allow BPL, although industry proponents want the FCC to relax radiation limits. It's feared such a change could exacerbate BPL's interference potential.

During the ARRL forum at the West Gulf Division Convention (Austin Summerfest 2003) August 1-2 in Austin, Texas, Haynie previewed a short video highlighting a recent tour of BPL field trial sites by ARRL Lab Manager Ed Hare, W1RFI. In late July, Hare traveled to BPL trial communities in Maryland, Virginia, Pennsylvania and New York to take measurements over significant parts of the HF spectrum and initial readings at low-VHF. Driving a specially equipped vehicle loaded with radio gear and measurement devices, Hare said he didn't need to look long to find BPL interference. "The signals were all over," he said. "The interference found ranged from moderate to extremely strong."

The video shows the S meter of an HF transceiver holding steady in excess of S9 as the speaker emits a crackling din, which one observer described as sounding like a Geiger counter. Only the very strongest amateur signals broke through on 20 and 15 meters. Hare noted, however, that the field strengths of the various systems all were within FCC Part 15 limits for power line carrier (PLC) devices.

Each BPL system exhibited a unique sound depending upon the modulation scheme it used. While in most cases it sounded like static or pulse noise, in one city warbling "birdies" blanketed the bands at closely spaced intervals.

The ARRL already has filed a 120-page package of text and technical exhibits in response to the FCC's Notice of Inquiry in late May. The League plans to file reply comments--responses to comments already filed--by the recently extended August 20 FCC deadline.

Haynie has been doing a bit of traveling of his own, including more than two weeks in Washington so far this year dealing with the FCC and with members of Congress on BPL and other Amateur Radio-related issues.

Countering critics who suggest that the League is only using BPL as a fund-raising ploy, Haynie said the League would not be putting as much effort into attempting to quantify the BPL threat and to put a face on it if it weren't real.

"The BPL industry and their associations have told the FCC and the world that there is no interference potential from BPL systems," Haynie said. "Anyone seeing these BPL signals for megahertz after megahertz for miles along a power line should be convinced that BPL--even operating at the present FCC limits--poses

a serious threat to all HF and low-VHF communications."

More information is available on the ARRL Web site <http://www.arrl.org/news/features/2003/07/08/1/>. Additional information and video clips are on the ARRL "Power Line Communications (PLC) and Amateur Radio" page <http://www.arrl.org/tis/info/HTML/plc/>.

NCVEC COMMITTEE STUDYING NEW ENTRY-LEVEL LICENSE PROPOSALS

The National Conference of Volunteer Examiner Coordinators (NCVEC) has formed a committee to develop an FCC rule making proposal for a new entry-level Amateur Service license. The move came during the NCVEC's annual meeting July 25 in Gettysburg, Pennsylvania, where attendees heard presentations on the possibilities for such a new ticket. At the same session, the NCVEC also approved plans to draft and submit a rule making petition to eliminate the current 5 WPM Morse code requirement (Element 1) and to give Novice/Tech Plus HF privileges to all current Technician licensees. NCVEC Chair John Creel, WB3GXW, of the Laurel VEC presided over the gathering, which included representatives of 12 of the nation's 14 VECs.

NCVEC Question Pool Committee Chair Scotty Neustadter, W4WW, and Rules Committee Chair Fred Maia, W5YI, offered separate proposals for an entry-level license. Neustadter said while the current entry-level license, the Technician class, provides full VHF and UHF privileges, it does not offer a simple entry path. He recommended a 50-W maximum power output level, Novice/Tech HF subbands plus 12 and 17-meter privileges and a 20-question written exam.

Maia's proposal suggested upgrading all current Tech and Tech Plus licensees to General and allowing their use of all bands. Beginner licensees should be granted call signs from the NA-NZ#xxx call sign block, he said. Both Maia and Neustadter suggest ways to streamline the number of license classes. Maia offered up the possibility of asking the FCC to eliminate the Morse testing requirement immediately, easing code exam format restrictions and giving serious thought to dropping CW-only subbands as well. Neustadter recommended no changes in CW/phone allocations, at least for now.

Maia, Neustadter, Jim Wiley, KL7CC, and John Johnston, W3BE, will serve on the entry-level license study committee. The panel is to report back to the NCVEC within a few weeks.

The NCVEC representatives' approval to petition the FCC seeking the deletion of the Element 1 Morse code examination requirement for HF access was in reaction to the World Radiocommunication Conference 2003 (WRC-03) decision to leave such requirements up to individual administrations. The ARRL-VEC abstained from voting on the issue.

Responding to a question, the FCC's Bill Cross, W3TN, told the group that he did not believe the Administrative Procedures Act would permit the FCC to drop the Morse code testing requirement on its own motion. He predicted a lively debate during any proposal-and-comment period.

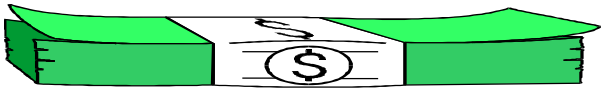
In remarks at the meeting, FCC Special Counsel for Enforcement Riley Hollingsworth complimented the VECs for their efforts. He noted that complaints concerning the administration of amateur exams were at their lowest point in the five years he's been handling amateur enforcement. He also said VECs should not underestimate the FCC's concerns regarding examination integrity.

Members of the Licensing and Technical Analysis Branch staff at the FCC's Gettysburg office demonstrated a beta version of new Universal Licensing System <http://wireless.fcc.gov/uls/> on-line filing software expected to go live in September. Among other features, the new, user-friendly software will incorporate on-screen links to context-relevant "common questions" and ease the process of applying for a vanity call sign. It also will provide compatibility with screen-reading software employed by sight-impaired users.

The NCVEC unanimously approved an extension of an experiment to use videoconferencing technology to conduct Amateur Radio testing in remote areas of Alaska. The NCVEC had voted last year to back a one-year trial run to be conducted by the Anchorage Volunteer Examiner Coordinator. Jim Wiley, KL7CC, of the Anchorage VEC told his colleagues that, after unexpected delays, his VEC expects to be testing within three months.

$August Treasurers Report$

Income for July was $35 in membership dues and $20 from PowerPole connector distributions. Expenses were $22.20 for newsletter postage and $197.24 for Field Day, leaving a net expense of $164.44 for the month.



Current balances:

General fund	$4641.90
Community fund	$1842.55

Welcome to new member Ed Miller AB1CW.

Are you supporting the ARRL's effort to make the FCC fully aware of the negative impact on all HF+ 6M frequencies if Broadband over Power Lines were permitted?

If you are not yet an ARRL Member and are thinking of becoming one, consider letting NVARC handle the paperwork for you. ARRL rebates a portion of new membership dues back to the Club. There is no longer an ARRL rebate for ordinary membership renewals handled through the Club.

73, Ralph KD1SM

Nashoba Valley Amateur Radio Club

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Vice President: Peter Nordberg N1ZRG
Secretary: John Griswold KB1HDO
Treasurer: Ralph Swick KD1SM
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Les Peters 2002-2005
Dave Peabody 2003-2006
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Photographer: Ralph Swick KD1SM
PIO: Ron Wood W1PLW
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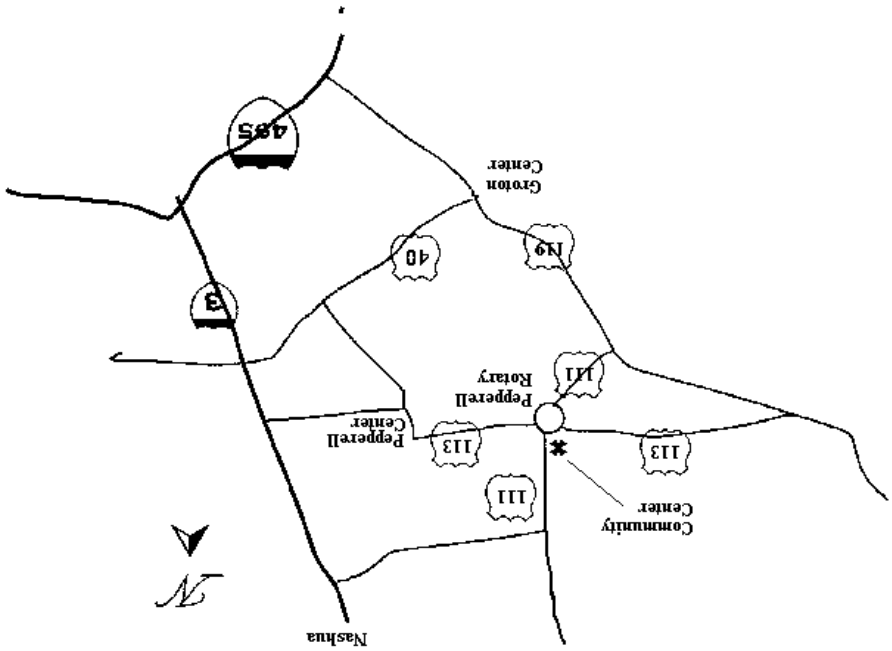
Property Master: John Griswold KB1HDO
N1NC Trustee: Bruce Blain K1BG
Meetings are held on the 3rd Thursday of the month - 7:30 p.m. - Pepperell Community Ctr. Talk-in 146.490 simplex
442.90 + 100Hz Repeater
147.345 + 100 Hz Repeater
53.890 – 100Hz Repeater
This newsletter is published monthly. Submissions, 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 pozerski@net1plus.com



NVARC

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