NVARC
Nashoba Valley
Amateur Radio Club

SIGNAL

SPECIAL SERVICE CLUB

de N1NC

February 2008 Volume 17 Number 2

This Month's Meeting

This months meeting program will be "Growing a Tower" by Les N1SV.

We will have the programming equipment for the FT-8900's at the meeting.

Wear your badge to the meeting so new members can tell your name and you can introduce your self to them. It may be worth your while.

Need a Ride?

Do you need a ride to the club meetings? Do you know someone who does? If you do please contact Bob W1XP 978-448-6559 and leave a message. We'll see that you get to the meeting.

Last Month's Meeting

Last month's meeting program was Members Short Subjects Night. Many members presented.

Above Leo K1LK showed us his antenna launcher. His first version on the table was hip held. With it he could launch a line over a 70 foot tree. The new model he is working on is intended to sit on the ground. It will have an improved charging and firing system.

John KK1X showed the Rockmite transceiver kit he built. The transceiver has a built in keyer and the tiny key was purchased to match the rig size.

Denis K1LGQ (above) showed the Tiny Tuna II kit and had a presentation on how it is assembled.

Larry gave a brief presentation on the equipment purchased for us by North Middlesex Area Emergency Planning Committee. The two FT-8900 radios are in the computer bags on the table and Larry holds one of the antennas. The radios are to be used for events we support, for emergencies and as part of our backup repeater system we developed.

The winner of an NVARC mug in the NVARC badge drawing was Leo K1LK. Entry into the drawing was based on your wearing of the club badge at the meeting.

Also presenting were Bob W1XP on the advantages and building of Moxon antennas The bill regulating the use of cell phones came up for discussion. People were encouraged to look into it and contact their legislator. The issue is an exemption for CB Radio but nothing for other users such as Amateurs, Police, Fire, etc.

January meeting attendance:

Dennis K1LGQ, Leo K1LK, Skip K1NKR, Tom K1NNJ, Gary K1YTS, Wolf KA1VOU, Larry KB1ESR, Ben KB1FJ, Phil KB1JKL, Peter KB1LZH, Stan KD1LE, Ralph KD1SM, John KK1X, Tony KX1G, Les N1SV, Jim N8VIM, Peter W1LLB, Jim W1TRC, Bob W1XP, Rod WA1TAC

Guests KB1JLE - Jim, N1ONE – Bill

From The Editor

Starting off the New Year I want to encourage members to write up activities or projects for the newsletter. Articles don't have to be long or complex. They can be about operating in a contest, building a kit or your own project. Local content is always better.

Please update your contact information with Ralph so it will be correct in the Yearbook update.

The HAARP EME Experiment

By Bob Reif W1XP

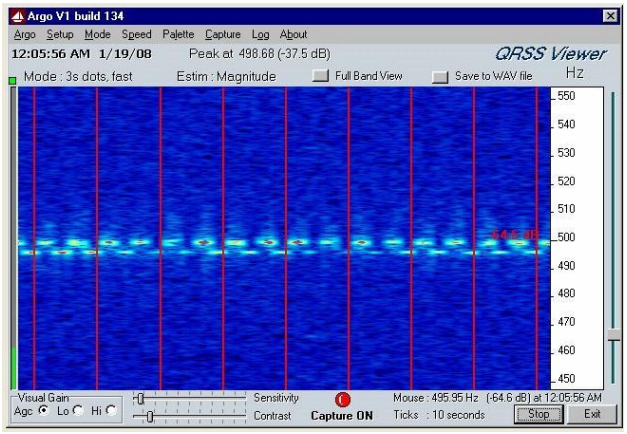
On January 19 and 20 of this year, there was a High Frequency EME (earth moon earth) experiment conducted between the HAARP (High Frequency Active Auroral Research Program) high power transmitter in Alaska, and the LWA (Long Wavelength Array) Radio Astronomy receiver in New Mexico. This was an experiment to bounce a 40 meter signal off the moon and receive the reflected signal back on earth. The announcement about the experiment did not come out until just before the experiment. I think if the event had been publicized earlier there would have

been a larger amateur participation. They were requesting that people copying the signal submit reception reports.

An earlier experiment between HAARP and LWA had been conducted in October of 2007. This test uses the frequencies of 7.4075 and 9.4075 MHz. Based on the results of this test a second series of tests was proposed for January 2008. In the October test the HAARP transmitter (details on the HAARP and LWA will be covered later in this article) was operated at each of the above frequencies for one hour. It transmitted a two second signal and then stood by for three seconds to allow reception of the reflected signal from the moon. The propagation time to the moon and back is about two and a half seconds. This allowed the moon echo to be heard after the transmitted signal. This is necessary as the ionosphere reflected signal may be received also. The two/three second pattern was repeated for one hour and then the frequency shifted to the second frequency. At the time of these tests the 7.4075 MHz frequency was believed to be the lowest frequency that echoes from the moon had been received. (See NRL press release 4-08r 1/8/2008 http://www.nrl.navy.mil/pressRelease.php?Y=2008&R=4-08r)

With the signal strengths received in the October tests it was suggested that reports from amateurs and SWLs could possibly provide further information on how the HAARP signal was being received and how the signals propagate through the ionosphere. Calculations indicate a dipole receiving antenna should provide a S5 signal under good conditions in a regular HF receiver. The January tests were scheduled for the early morning hours (local time) of January 19th, and 20th. The schedule was 0500z to 0600z on 6.7925 MHz and 0600z to 0700z on 7.4075 MHz on the 19th. The following morning the tests were scheduled for 0630z to 0730z on 6.7925 MHz and 0730z to 0830Z on 7.4072 MHz. The same two second on and three second off pattern was used as in the October tests. The moon at this time was passing south of the HAARP transmitter location in south central Alaska. That meant the moon was in the western sky here in New England. The moon was full and at this time of year the full moon is occurring when the moon is at high northern declinations so it was high in the sky and to the west at the start of the tests. (The high northern declination is required so HAARP can aim the antenna pattern at the moon.) Two hours later the moon was still well above the horizon here. The delay in the starting time of the tests on the second night is to allow for the later rising of the moon on successive days.

I used two antennas and two receivers for the tests. I used the FT 847 which is normally connected to the shack computer sound card for digital modes such as WSJT, RTTY, and PSK31. It is also used for Argo which is an FFT based program to copy weak signals buried in the noise. I use Argo to listen for the very slow CW signals that are being used in the 600 meter experimental work. I thought it should be good for listening to the EME signals. The first night I used a low 40 meter dipole that I consider the NVIS antenna on the FT847. The second receiver was the Orion II and the west looking Moxon for 40 meters. I suspected this antenna should be good for this and that did prove to be the case. But signals were fairly similar on the two antennas.



Screen shot by W1XP

When the test began I was hearing signals right away. Both the direct signal and the moon reflected signals were quite strong. The echo from the moon was weaker than the direct signal but still very good copy. I have included a sample screen capture of the Argo screen of the two signals. In the trace across the screen the signal is moving to the left. The right hand side of the screen is the latest received signal and the whole screen moves to the left slowly. The red time ticks are ten seconds apart. The vertical axis is frequency. Up screen is increasing frequency. Notice the frequency display on the right hand axes. This is calibrated in Hertz. The upper trace is the direct signal from HAARP and the lower trace is the reflected signal from the moon. Note the approximately 4 Hertz of frequency shift between the direct and reflected signal. This frequency shift is due to the Doppler change in the frequency of the signal off the moving moon. Due to the rotation of the earth the moon appears to be moving away from the observer when it is setting. This caused the lower frequency as observed here. A bright white trace is a good strong signal. A red signal is even stronger. So you can see the signal was very strong. I've heard big signals off the moon before. Especially

from the Arecibo dish in Puerto Rico some years ago, but I don't recall if they were as strong as the HAARP signal was off the moon at the early part of the test on the 19th. As the test progressed the signals were getting weaker. It is interesting to note that both signals were getting weaker. I suspected that the signal was moving out of the coverage on the NVIS dipole but the signals on the Moxon were behaving the same way. At times the difference between the direct and EME signal would swap, the EME signal being the stronger. I was curious if as part of the test HAARP was reducing the power. Later information from HAARP confirmed that they were not changing the power during the tests. So the difference in signal was due to propagation. At the end of the first hour they changed frequency. The signal was heard as soon as I tuned on frequency, but the strength was much lower than on the lower frequency. (Recall the test started on 6.7925 and moved to 7.4075 MHz). I copied the signal for about twenty minutes till it faded into the noise. I continued to listen for another twenty minutes and did not hear or see on Argo any indication of signal either direct or off the moon. So I switched off thinking that the moon may have moved out of the coverage of HAARP or they stopped the test. Later it was obvious that the signal had just faded here as there were many other observations of the signal up to the end of the test at 0700z. I wish I had struck around till the end to see if the signals did come back.

The second night was nothing like the first. I swapped the Moxon and NVIS dipole so that the Moxon was now on the FT 847 with the connection to the computer and Argo. The Moxon did provide the better signals on both nights. The signal was received right off again but it was only the signal off the moon. I was not hearing the direct signal. This was verified by timing the signal against the "atomic clock" set by WWVB. It was also confirmed later when the direct signal from HAARP came up out of the noise. The two signals were both fading in and out. Sometimes the signals faded together and at other times they faded separately. This continued till the frequency change at the start of the second hour. On this night the signal on the higher frequency was better than the lower. The same pattern of the signals fading in and out continued. Sometimes together and at other times just one of the signals would be present for minutes. Many times the signal off the moon was better or the only one. But at no time during the two hour test the second night did the signal either off the moon or direct approach anything like the strength on the first night. From these observations it seems that the ionosphere is playing a big role in the received signals. Since this is one of the things that the experiment is trying to study it is not surprising. It was fun to hear signals off the moon at this frequency in any case. I started actively moon bouncing in 1966 listening for the signals from the late Sam Harris W1FZJ/KP4 off the moon. It certainly has come a long way since those days.

HAARP

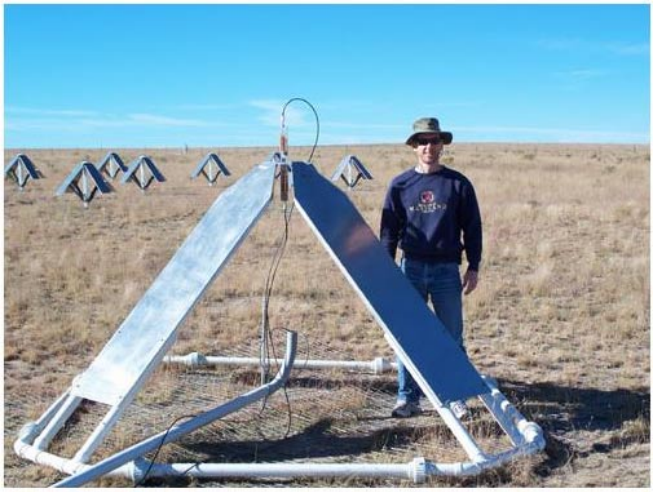
So you ask, "What does it take to bounce a signal off the moon at 40 meters?" Well HAARP (High Frequency Active Auroral Research Program) has been written up in the amateur literature several times. Simply it is a large HF transmitter capable of transmitting 3.6 megawatts into a high gain antenna pointed straight up. The purpose is to study the ionosphere. It is operated by a joint Air Force and Navy program. The site is near Gakona, Alaska, which is north east of Anchorage. The site consists of 180 seventy-two foot tall towers. Each tower has two sets of four elements. The upper set of four elements is a crossed cage dipole for the lower frequency range. The lower set of elements is a higher frequency set of crossed cage dipoles. Each dipole is feed via a feed line to a transmitter hut. Depending on the frequency of operation either the upper or lower dipoles are used. Each of the two dipoles is connected to a 10 KW output transmitter. So each antenna (two crossed dipoles) is feed 20 kW. Now multiply that by 180 antennas and you get 3.6 megawatts! The low frequency dipoles cover the frequency range of 2.8 to 7.6 MHz. The high frequency dipoles cover the 7.6 to 10 MHz range. (The operating range of the system is 2.8 to 10 MHz.) The gain of the planner array is 20 to 30 dB over the operating range. The antenna is completed with a ground screen that is hung 15 feet off the ground below the array. The overall dimensions of the array are 1200 by 1500 feet. The gain of the antenna at 40 meters is 28.6 dB or 735. Multiply the 3.6 megawatts by 735 and you get a radiated power of 2.65 billion watts!!

By independent phase control of the signal to each antenna the beam can be steered about the zenith. For the EME experiment the beam was moved every three minutes to track the moon across the sky. In a statement after the experiment the people at HAARP reported that they were on the air with all 360 transmitters. They also reported that they had received over 1500 reports of reception and that they planned to review them all. They thanked the amateur community for the support. (Another feather for our cap) There is an aerial photo of the HAARP installation in Alaska. You can also visit the HAARP web site at http://www.haarp.alaska.edu./haarp/index.html .

LWA

I also took a look at the receiving end of the primary experiment. The LWA (Long Wavelength Array) is located west of Socorro New Mexico. First of all it is

interesting what an Astrophysicist considers Long Waves. The primary coverage of the LWA is 20 MHz to 88 MHz. This is a radio telescope that operates in what we would call the high HF and low VHF regions of the spectrum. It operates between the shielding effect of the ionosphere at the low frequency end and the lower end of the FM broadcast band at the high frequency end. With the use of remote locations removed from local interference and with some active interference canceling it is possible to do radio astronomy over much of the 20 to 88 MHz band. There are good scientific reasons to do radio astronomy at frequencies lower than 100 MHz but I won't try and go into that now. The trick at this frequency range is to build an array large enough to have sufficiently narrow angular resolution to observe fine detail in the intergalactic sources. An angular resolution between two and eight arc seconds is desired. That is a pretty narrow beam width. This requires an array with a maximum extent of about 400 km. It all comes from the principle in optics that the finer the resolution of a lens, the larger the lens needs to be. This is measured in wavelengths which at 20 MHz is about fifty feet. Fortunately it is not required to have a solid antenna over the extent of the radio wave lens. (Directional radio antennas are just very low frequency lens). Large antenna area is required to collect enough energy to have a positive signal to noise ratio. This is why each planned LWA station will have an array of about 250 crossed dipoles. The same interferometer techniques have been used at higher frequencies for many years The Very Large Array is an example. The envisioned LWA when completed sometime in the next decade will use stations of 250 or more fixed crossed dipoles. (The dipole antennas are called Big Blades. See the photo). These stations will be arrayed into a larger array. The plan is to eventually array up to 50 or so of these stations. They will be scattered across southwest New Mexico with dimensions of 400 KM in both north/south and east/west directions. The current LWA (actually the LWDA, Long Wavelength Demonstration Array) is located at the VLA (Very Large Array) site and consists of only 16 pairs of dipoles. Current plans call for the start of the first three stations this year. The next step in construction is to go to sixteen stations and then gradual expansion into the next decade. This is a venture of an organization that is headed by the University of New Mexico called the South West Consortium (SWC). Members are, in addition to the UNM, the Naval Research Lab, University of Texas Austin, Los Alamos National Lab, University of Iowa and Virginia Tech. There is a photo of one of the dipole antennas of the LWDA. The antenna matching networks were modified to allow operation at the low frequency of the HAARP EME tests. This may mean an expanded role for the LWA in the future. For more information about the LWA see the web page at http://www.phys.unm.edu/~lwa/index.shtml



In conclusion, the primary goals of the bi static radar experiment with HAARP and the LWA is stated as a study of the lunar subsurface topography. It seems the high frequency radio waves will penetrate the lunar surface and reveal details about the topography below. It will be interesting to see what they learn. I hope they learn enough to want to try again so we have the chance to hear 40 meter signals off the moon again. 73 Bob W1XP

Site and antenna photo's from NRL Press Release 4.08r 1/8/2008.

Attention DXers!

The Club recently received an email from John Scott, K8YC, providing information about the International DX Association, INDEXA. INDEXA is celebrating their 25th anniversary this year, and in those 25 years, they've assisted over 175 expeditions to many of the DX "most wanted" entities. In their early years they often helped by providing equipment, but currently INDEXA primarily provides financial support to these operations.

In light of the beginning of Solar Cycle 24, INDEXA anticipates an increasing number of requests for assistance (they're currently helping the Guinea-Bissau team, and are helping to finance Cocos Island, Ducie Island, and Clipperton Island in coming months). They, in turn, depend on memberships and donations to provide this assistance. Please visit their website - http://www.indexa.org/ - and see if you'd like to help them support more DX operations.

John KK1X

Breakfast at Tinys

Breakfast at Tiny's continues Saturday mornings at 8:00 AM. Lately there have been days when there were over 20 people. The XYL's have their own table in the window nook (below).

Board Meeting

The monthly Board meeting was held February 14th

Ralph submitted the Treasurers report.

Authorized Ralph to purchase Yearbook binders.

We are collecting materials for the two additional sorting boxes we want to build.

Need ideas for new items for the raffle.

Present at the meeting KD1SM, N1SV, KB1ESR, W1XP, KD1LE.

Adopt A Highway

Next road cleanup is Sunday, April 20, 2008

Treasurers Report

Income for January was $45 in membership dues and $4 from ARRL membership renewals. Expenses were $16.40 for newsletter postage, $66.42 for the outgoing QSL bureau, and $75.04 for new stock of yearbook binders leaving a net expense of $108.86 for the month.

Current balances:

General fund	$4,178.12
Community fund	$2,386.83

As of 14 January we have 61 members who are current with their dues and 4 renewals outstanding. Please check the member roster that is circulated at the monthly meeting if you do not remember your renewal date. Your membership date also appears on your newsletter mailing label.

If you are not yet an ARRL member please consider joining and showing your support for the programs developed by our national organization. If you let me send in your membership then the Club pays for the stamp and receives a portion of your ARRL dues. Bring your check to a Club meeting or to Saturday breakfast payable to NVARC in the amount of your ARRL renewal and I'll do the rest.

Ralph KD1SM

ARRL Letter

AMATEURS LEND A HAND AS DEADLY STORMS SWEEP ACROSS SOUTHERN UNITED STATES

At least 54 people were killed and hundreds injured Tuesday and Wednesday by dozens of tornadoes that plowed across Mississippi, Arkansas, Tennessee, Kentucky and Alabama in the nation's deadliest barrage of twisters in almost 23 years. In spite of the disasters, state and local emergency management officials once again discovered that they could call on Amateur Radio operators to help out and get communications up and going again after the infrastructure failed.

According to ARRL Southeastern Division Director Greg Sarratt, W4OZK, "Four people were killed in Alabama as the storms damaged homes, caused flooding and downed trees and power lines. North Alabama SKYWARN, ARES and scores of Amateur Radio operators were up all night long, providing vital communications to the National Weather Service and Emergency Management Agencies all across the region. Once again, Amateur Radio operators played a critical role before, during and after the storms. I am proud of the level of professionalism and critical information that these operators provided our served agencies."

Hundreds of houses were damaged or destroyed across the region. Authorities had no immediate cost estimate of the damage. The storms flattened entire streets, smashed warehouses and sent tractor-trailers flying. Houses were reduced to splintered piles of lumber. Some looked like life-size doll-houses, their walls sheared away. Crews going door-to-door to search for bodies had to contend with downed power lines, snapped trees and flipped-over cars. Near hard-hit Lafayette, Tennessee, cattle wandered through the debris. At least 12 people died in and around the town; more than 30 were killed in Tennessee alone.

"It looks like the Lord took a Brillo pad and scrubbed the ground," Tennessee Governor Phil Bredesen said as he surveyed the damage from a helicopter. "I don't think that I have seen, since I've been governor, a tornado where the combination of the intensity of it and the length of the track was as large as this one," he said. "That track had to be 25 miles long. [The twister] didn't skip like a lot of them do...It's just 25 miles of a tornado sitting on the ground."

Most communities had ample warning that the storms were coming. Forecasters had warned for days that severe weather was possible. The National Weather Service issued more than 1000 tornado warnings from 3 PM Tuesday-6 AM Wednesday in the 11-state area where the weather was heading. The conditions for bad weather had lined up so perfectly that the Storm Prediction Center in Norman, Oklahoma put out an alert six days in advance.

Tennessee Section Emergency Coordinator Lowell Bennington, WD4DJW, said that approximately 25 hams in Madison County had participated in SKYWARN activities before the storm arrived; one ham actually spotted the twister. "Two hams reported to the Tennessee Emergency Management Agency-West, assisting in passing radio communication. A couple of hams assisted Madison County EMA in setting up their Mobile Command Post. On Wednesday, 10 teams were dispatched to do Damage Assessment. These teams were composed of three individuals, one of whom was an Amateur Radio operator," he said.

Bennington said that hams in Middle Tennessee "utilized our vast networks of linked 2 meter repeater systems as well as our UHF-linked system in support of the National Weather Service, Tennessee Emergency Management, law enforcement agencies and participating local EMA offices. Operators from Wilson County were dispatched to the Nashville NWS office and they operated from there until around 3:30 AM Thursday, giving and taking weather reports."

Alabama ARES District 6 Emergency Coordinator Doug Hilton, WD0UG, said his area was hit hard by a fast-moving line of severe weather; District 6 covers the northern counties of Alabama. Hilton contacted the NWS office in Huntsville early Wednesday regarding possible SKYWARN activation. "After discussing the situation with NWS personnel, it was decided that since this was going to be a long event, that would probably last all night, it was best not to tie up the local repeaters early on. I opened an informal SKYWARN net to get weather information out to the amateur community during the afternoon, and several Madison County hams participated in the net. We closed the net after about an hour and reopened it that evening at 7," he said. Madison County ARES was activated that evening and other hams in the area joined in. Hilton said Northern Alabama has a linked-repeater system that covers all 10 counties during emergency conditions.

The storm churned into Western Alabama from Mississippi about 9 PM. The main part of the storm started its destruction at 3 AM. Hilton said, "The storm was a killer, and the extra lead time that people got from the great staff at NWS probably led to a reduction in casualties. A massive long-track EF-3 tornado hit Lawrence County and caused 3 fatalities and more than 20 people were injured." Hilton said the NWS estimated the twister to be 1/2 mile wide with a path length of 18.7 miles, causing "extreme destruction of property." An EF-4 tornado with peak winds of 180 MPH went through Jackson County, causing one fatality.

Hilton said hams were able to provide many timely situation reports, "and 'ground truth' is always the best indicator of reality. Many of the hams who stayed up all night were also prepared to leave their homes at a moment's notice to go anywhere in the District, if needed. The incredible teamwork of this ARES/SKYWARN team and the level of professionalism was something to behold."

Chris Shaw, W4BGN, Kentucky District Emergency Coordinator, said several confirmed tornadoes touched down throughout his state. "Kentucky hams activated weather nets, while others were out and about spotting for severe weather. Allen and Monroe Counties in South Central Kentucky were especially hard hit. Some repeaters lost power and hams quickly adapted, going to emergency simplex frequencies on 2 meters. The communications went very smooth and seemed to be beneficial to many. Hams worked throughout the night to help provide communications, especially to those areas without power."

NVARC Club Net

Topics discussed on the Club net recently; emergency communications preparedness, NMAEPC radio programming, programming member's mobile radios with common frequencies, HDSCS hospital support group in CA, Winlink between local emergency management and MEMA.

Recent participants include Leo K1LK, Bob W1XP, Larry KB1ESR, Skip K1NKR, Stan KD1LE, Les N1SV, Richard W1LTN, Ken K1JKR, Den KD2S.

The net is 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.

Flea Markets

2008
February
16 Marlboro MA Algonquin ARC
17 Westford MA Antique Radio
23 Milton VT

March
8 Mt Tom ARA Westfield
15 Eastern CT ARA Pomfret
30 Southington ARA CT

April
4-5 Maine State Convention Lewistion
5 IRS Flea Market Londonderry NH
6 Framingham FARA Framingham
19 Manchester NH NE Antique Radio
19 Portland Hamfest South Portland

June
7 Southern Berkshire ARC Goshen CT

July
12 Pen-Bay ARC Union Me

August
9 Rason Hamfest Ledyard CT
22-24 NE Division Convention Boxboro

Advertisements

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

N1MNX Repeater Support

The N1MNX repeaters cover the area of our club members and are supported by user donations. Donations for support of the repeaters should go Dave N1MNX.

Contest, DXpeditions and Special Events

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 2008

February
16-17 ARRL Intl DX Contest CW
23-24 CQ 160 Meter Contest SSB
23-24 North American QSO Party RTTY

March
1-2 ARRL Intl DX Contest Phone

June
14-16 ARRL June VHF QSO Party
28-29 ARRL Field Day

July
12-13 IARU HF World Championships

August
2-3ARRL UHF Contest
16-17 ARRL 10 GHz and Up Contest

DXpeditions

Call	Location	Until
9V1CW	Singapore	2008
FO0	Clipperton Atoll	3/08

See www.425dxn.org for more listings

NVARC

Nashoba Valley
Amateur Radio Club

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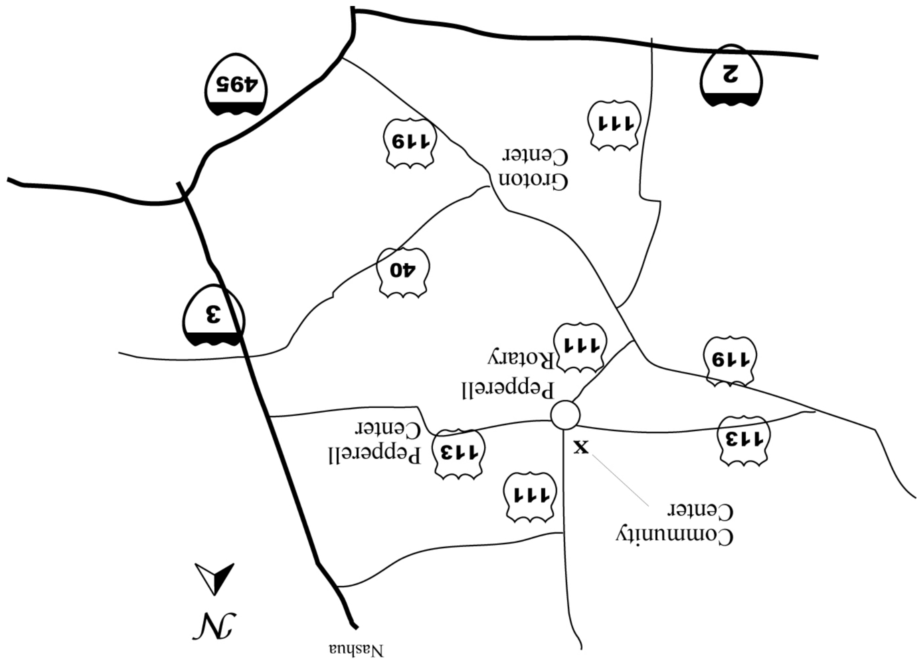
http://www.n1nc.org/

Meetings are held on the 3rd Thursday of the month
7:30 p.m. - Pepperell Community Ctr.
Talk-in 146.490 simplex
442.900 + 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.



NVARC

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