NVARC
Nashoba Valley
Amateur Radio Club

SIGNAL

SPECIAL SERVICE CLUB

de N1NC January 2001 Volume 10 Number 1

This Month's Meeting

The program this month will bean Intro to Internet Firewalls. In the past this has been the realm of system administrators protecting corporate assets but as home users move from dialup to cable providers and other 24 hour online networking systems it will become important to protect yourself.

We are looking for someone to coordinate a Field Day activity for this year. June is only about four months away.

Bring your short Show-and-Tells to the meetings. They are always welcome. Its always interesting to see the variety of things people are working on.

We are always looking for ideas for the meeting program. Don't be afraid to suggest something that seems interesting to you.

We gather at Tiny's for breakfast Saturday mornings at 8:00 AM. We sit in the back dining area.

Last Month's Meeting

In the December ARRL book raffle we had two drawings. Peter N1ZRG was our first winner getting an RFI book and Erik KA1RV was the second winner getting an FCC Rule Book and "Morse Code: The Essential Language" Book.

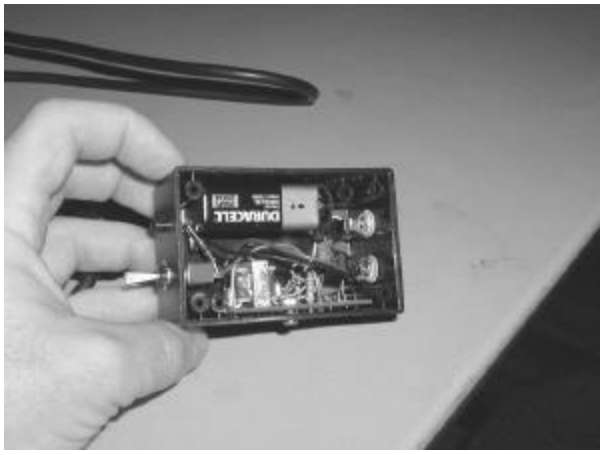
Stan presented Earl WR1Y (see picture below) with the shirt and pins that were given to the communications team for the Lowell Marathon.

Erik KA1RV showed the low noise power supplies (see picture above) he built to power the CCD camera he assembled for his astronomical observatory.

Ralph set up the ULS registration again and a few members took advantage of it.

The meeting program was our annual "Homebrew Nite". There were quite a few presentations.

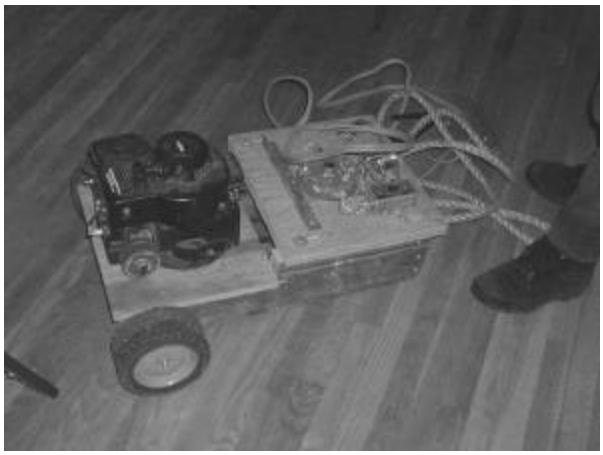
Bob W1XP setup and demonstrated his remote control device for activating a transmitter. The core of Bob's new device is the active speaker indicator he showed last year.

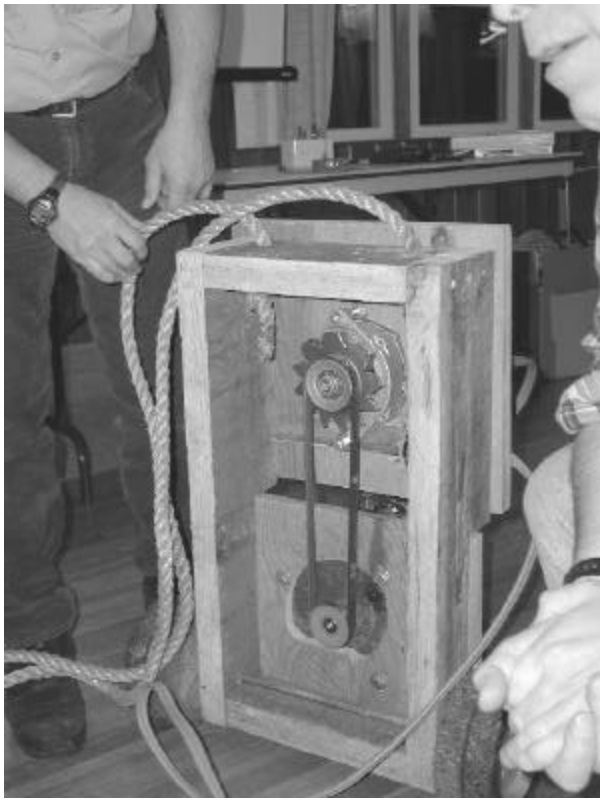


Ralph KD1SM demonstrated a schematic capture program IVEX WinDraft and the circuit board layout program WinBoard that were used to produce the artwork for the FoxFinder and the active speaker indicator that Bob designed. See the website http://www.ivex.com/ for more information. This was much more than a show and tell. More like a regular meeting presentation.

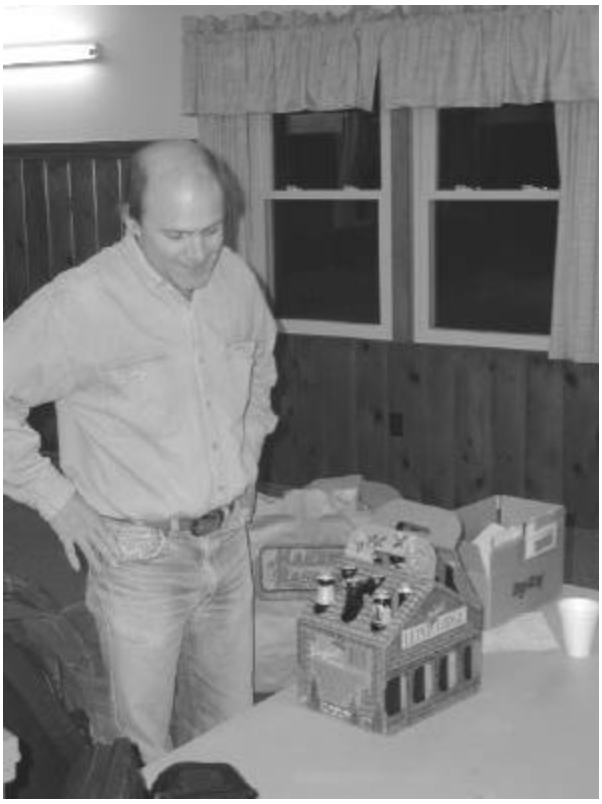
Earl WR1Y showed the variable inductors he was working on to tune an old time receiver.

Stan KD1LE showed the version of the Lil Pup (from QST) generator he and Bob W1XP had built. This can charge twelve volt batteries such as those at the repeater site during an extended power failure. It had been used once when lightning had knocked out power there.





Rod WA1TAC showed off his unfinished audio amplifier part of a larger unfinished project. This was really just a cover for his real project; a twelve pack of real "brew" he had produced.



Harvard Classic

Included in this issue is a copy of the Thank You letter from the Northeast Bicycle Club for our communications support of the Harvard 100K Classic last Summer.

Public Service Jan 2001

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.

Every event listed is looking for volunteers
Date Location Event Contact Tel/Email

Apr 1 Boston MA Multiple Sclerosis Walkathon Bob WA1IDA 508.650.9440 wa1ida@arrl.net
Apr 16 Hopkinton MA Boston Marathon (course) Bob WA1IDA 508.650.9440 to Boston wa1ida@arrl.net

Apr 16 Hopkinton MA Boston Marathon (start) Steve K1ST 508-435-5178 k1st@arrl.net

Apr 16 Boston MA Boston Marathon (finish) Paul W1SEX 978-632-9432 ptopolski@net1plus.com

Apr 29 Groton MA Groton Road Race Erik KA1RV 978-448-5536 erik@eggo.org

World Wide Web users: the most recent copy of this list is maintained as http://purl.org/hamradio/publicservice/nediv.
AR

Board of Directors Meeting

The Board meeting was held January 12th. We worked on possible meeting programs for the upcoming meetings.

The Treasurer gave his report which is printed elsewhere in the newsletter.

We discussed the need to fill the Vice Presidents position and are looking for a volunteer.

Ground Mounted Vs Elevated Radials For Low Frequency Verticals: Another Look by W1XP

Introduction

The controversy of which is better ground mounted or elevated radials for low frequency (160,80, and 40 meter) vertical antennas has been going on for some time. So I thought it would be interesting to attempt to measure the difference between two antennas. I planned to measure how much antenna performance is gained, or lost, by using a large number of ground mounted, (or buried) radials, vs. a small number of radials raised above the ground. There has been much heated discussion and some quantitative work done comparing the two systems for handling the vertical antenna return current. I decided to do some of my own quantitative as well as qualitative tests of the two vertical antenna systems. Not so much to provide the definitive test, but to put another point on the curve. So a trip to my father-in-laws water front location in North Carolina during November/December of last year gave me the opportunity to conduct such a test. This article will describe the test antennas used and the results obtained, for two 40 meter verticals. The antenna vertical elements are identical, while one antenna used a field of 104 radials, one quarter wavelength long, mounted on the surface of the ground. The second antenna used three shortened (66%) radials mounted two feet above the ground. Antenna performance was compared on transmit over several paths of over three thousand miles, and receiving only tests were conducted on signals at greater distances.
Background

I have been interested in vertical antennas for many years both professionally and as an amateur. Much of the professional work was at considerably lower frequencies, ELF, VLF, and LF, where any practical antenna is small. I was also involved in MF, HF and VHF automatic tuning antennas for use on all kinds of moving platforms. Over ten years ago I became interested in building amateur antennas that were simple, effective, and could be put up and taken down quickly. I wanted a vertical antenna that was reasonably effective and could be put up and taken down in a few hours or less. Hopefully less. The vertical with a few raised radials seem a natural so I began pursing such designs. The work of Christian[1], and Dory[2] among many others was instrumental in getting me started down the path of raised radial, vertical antennas. I did a lot of modeling with both Mininec and NEC recognizing the short comings of both with regards to ground mounted antennas. In addition I was doing field testing with a General Radio Impedance Bridge and other home made antenna test equipment to try and tie the theory and practice together. Much of this work was in preparation for a talk I gave on the subject at the RSGB-HF convention in London in 1993. By this time I had developed a simple vertical design that consisted of a vertical element made of copper tubing 33 ft high or one using aluminum down spout sections fastened together. The aluminum version is very light in weight. It can be assembled and erected by only two people and is relatively inexpensive. I moved on to arraying two of these verticals into directive arrays and using them as loaded antennas on 80 meters. I also developed 80 and 160 meter verticals using a combination of top loading and bottom loading and shortened elevated radials. In these cases the vertical elements were made of wire held up by horizontal wires which served both as support and loading. In all of these cases the antennas seemed to perform well and in

[1]Al Christman KB8I "Elevated Vertical Antenna Systems" QST Aug. 1988 p. 35
Al Christman WD8CBJ "Ground Systems for Vertical Antennas" Ham Radio Aug. 1979 p.31

[2]A. C. Doty K8CFU et. al. "Efficient Ground Systems for Vertical Antennas" QST Feb. 1983 p20
A. C. Doty K8CFU "Improving Vertical Antenna Efficiency: A Study of Radial Wire Ground Systems" CQ Apr. 1984 P. 24

qualitative tests compared well with more elaborate antennas. I became convinced that such antennas were a reasonable substitute for the "full sized" antennas and although they probably didn't work as well, provided a very good return on the investment of money, time and material. Especially time. For these reasons I have championed these simpler designs and encouraged their use especially in locations where more elaborate antennas would present a problem. The experiments described here were an attempt to quantify the performance of a simple raised radial design against a benchmark antenna.

Test Description

The proposed test was to compare a quarter wave length vertical with three raised radials, sixty-six percent of a quarter wave long, and an identical vertical element and a radial field of 104 quarter wave length elements mounted on the surface of the ground. The selection of the 104 radials is based on the work of N7CL[3]. He suggests the distance between the ends of the radials should not exceed 0.015 wavelength. This is 104 radials for quarter wavelength radials, and a tip to tip spacing of 2 ft at 40 meters. He claims this configuration is within 0.1dB of maximum gain. For comparison testing, it was proposed to run regular schedules with several stations and conduct A/B tests between the two antennas. For receiving tests, we proposed to use the same stations plus other stations observed on the band. HF antenna comparison is difficult at best with the second to second variation in signal strength. For this reason it was decided to not solicit on the air tests from random stations that might be well meaning but inclined to give an abrupt opinion and desire to move on. This did limit the test paths, but not necessarily the number of tests. In addition field strength measurements were proposed and conducted at various bearings and ranges out to over three miles.

Antenna Construction

The test site, is located at the waters edge at my father-in-laws house in Hampstead North Carolina. The area the antennas were located is a level plane. It is about two feet above mean high tide and covered with grass. The antennas were about 50 feet from the water and the line between the two antennas is parallel to the coast. The path to Europe is along the line of the antennas and over salt marsh and water. Africa and South America are over water paths. The pacific and Asia paths are over land. This soil is open pine forest and agriculture land of a sandy nature. Probably not a good conductor. The ground in the immediate area under the antennas is very moist and probably a good conductor. Soil conductivity tests were planned but not completed.

Each vertical antenna is made out of three and a third pieces of aluminum down spout. They are fastened together with self tapping sheet metal screws. The verticals are held up with one set of three guys of nylon string and stakes. The bottom of the vertical sets on a glass bottle as an insulator. Figure 2 and 3, show detail of the downspout setting on the glass bottle. The bottles just sit on the ground. The guy points are about two thirds up the height of the vertical. The two antennas can be seen in figure 1. The white bucket with the green lid half way between the two antennas contains the switching relays that select one antenna or the other. The bucket originally contained wall board compound, then a phasing network for a phased array of the two same antennas with raised radials. These buckets make handy waterproof enclosures for such things.

The field of 104 radials contains about 3400 feet of wire. I chose to make the radials out of #14 AWG copper. I bought a 1000 ft roll of Romex electrical wire. This contains two insulated conductors plus a ground wire for a total of 3000 ft. I had enough #14 wire from the same source that was left over from other projects to make up the additional 400 feet I needed. I cut the wire into 30 ft lengths. The radials were grouped into threes and soldered to #10 lugs which were connected to the center ring at the vertical base. See fig 2.

The center ring (read triangle) was made by cutting three one foot by two inch strips of copper flashing. These were stacked up and drilled with 12 holes for 10-32 stainless steel bolts. The triangle was assembled on the end holes and all corners soldered at the seams. The bolts were placed in the holes and double washers and nuts were added to secure the lugs on the radials. But not yet.

The center triangle was centered about the glass bottle insulator at the base of the North East antenna. This one was chosen as the antenna with the 104 radials. The ring was held in place with 20 penny nails pushed into the ground The groups of three radials were then fastened to the ring. The three wires were spread out in one direction and the ends of the radials pinned to the ground with more 20 penny spikes. A small loop was formed in the end of the wire and secured by a half turn of the wire. The spike was placed through the loop in the end of the radial, pulled tight and pushed into the ground. The second and third

[3]See Devoldere, ON4UN Low-band Dxing, Eric Gustafson, N7CL,Chap. 9 par. 2.1.3

wires were like wise secured on either side of the first, with the distance between the tips two feet. Now the same was done with a trio of wires directly opposite the first. A carpenters square was used to do the same with the third and forth sets of three. The square was used to get the angles 90 degrees between the four sets of three radials. Once this was completed the radials in between were filled in, keeping the ends spaced two feet with the square as the gauge at the ends. I didn't strip the wires out of the jacket till just before I put them down as I wanted to avoid a tangle of wires. This all went very well and it only took about a day to put the 104 radials down. The smooth level nature of the ground helped a great deal in this regard, See figure 2 for a picture of the radials. Note that the black and copper colored radials don't show up in the picture and the density of wires is about three times what you see.

The construction of the elevated radials for the other antenna was much simpler. The three radials were terminated in a #10 diameter. lug. This was taped to a fiberglass stake with the lug about even with the bottom of the vertical element. The three radials were then run at about a 45 degree angle to the ground to three stakes set around the first stake at 120 degree intervals. The ends of the three radial wires were supported by three more fiber glass stakes. The height of the horizontal portion of the radials was 24 inches. Note that this is far less than the height recommended for raised radials. This should lead to higher ground losses below the radials, but the good conductivity of the ground (suspected) should help keep this loss low. The total length of the radial wire is 21 feet. Because the radial wires are short, the antenna is not resonant on 7 MHz. To resonant the impedance at the feed point a coil was added between the junction of the three radials and coax shield. This air wound coil was adjusted for resonance. The inductance was about 2.45 Uhy. Normally I would increase the height of the vertical to compensate for the short radials, but for these tests I wanted to keep the vertical elements identical. A balun of 50 beads of ferrite over the coax cable was used on the raised radial antenna.

To select either antenna a pair of relays was mounted in the bucket half way between the two antennas. To eliminate the possibility of coupling between the two antennas the intent was to open circuit the base of the vertical element. To do this quarter wave length lines were used between the elements and the bucket. The relay configuration was such that the relay shorted the quarter wave line to the unused antenna. This placed an open circuit (high impedance) at the base of the unused antenna and stopped the flow of current in the vertical. Quarter wave resonance can not support zero current at each end of the element, so the coupling between the two elements should be zero. I carefully trimmed the cable lengths which included the balun on the raised radial vertical, for resonance at 7.015 MHz. the test frequency. I later placed relays at the base of the vertical elements to ensure the open circuit condition at the element ends. These relays are located in the black boxes which can be seen in figures 2 and 3. The separation between the two antennas was 45 feet. After the addition of the relays at the base the separation could have been increased, but this was not done. The relays were controlled from the operating position by means of a three conductor control cable. The base relay control line on the raised radial antenna was isolated with RF chokes in the control lines. Switching between the two antennas was as fast as you could operate the switch. Either antenna was a reasonable match to the transmitter at the shack, but the sensitive SWR meter gave visual indication that the antennas were switching. The antennas were located about 200 feet from the ham shack.

Evaluation

The evaluation plan was to conduct a series of tests at far enough range to require low angle propagation and record the difference in both the transmitted and received signal strength between the two antennas. This was done on transmit by sending a series of "A's" using a randomly selected antenna, and then a series of "B's" using the other antenna. Each letter was sent four to five times at about 20 to 30 wpm, CW, and then the switch. A test would normally consist of five or more cycles through the two antennas. At this point the receiving station would be asked to state which antenna he felt was working better, I.E. strongest signal. The receiving station never knew which antenna A or B was. I preferred at least an estimate of the difference if observed, but a "better than" or "the same" was O.K. With the ever present QSB on HF, the above is not as easy to do as it is to describe. Three paths were chosen that were close to 120 degrees apart. They were G3RTE near London, P43JB, Aruba, and VE6DXX, near Edmonton, AB. By and large the majority of tests were run with David, VE6DXX. I certainly want to thank them all for the support in running the tests. For coming on and listening to "just one more A/B test OK?". Thanks so much!. And while we are in the Thank You department, I want to also thank WA5IOD Bill, for his help in putting the antennas together, and putting down the radials. And last but not least, KA1JVU, Karen for her help with the antennas and helping in the hours of field strength tests. And putting up with all this.

Receiving tests were straightforward enough. Just trying to do what I was asking of the others to do as I switched the antennas. I am afraid I was not always as attentive to the QSO in progress, while I was switching back and forth between the two antennas, or more! Just to make it interesting there were three other 40 meter antennas on site, but I pretty well stuck to the two antennas on receive.

Conclusions

Well the most obvious thing right away, was not the difference between the two antennas but the similarity. I would never have argued that the two antennas should be equal. It was the difference I wanted to measure, but I expected it to be there. Initial tests with VE6DXX indicated the antennas to be essentially equal in performance. I spent a lot of time looking for something that was not working right, or providing coupling between the two antennas. In short I never really found it. I did add relays at the base of the antennas to disconnect the unused antenna. I believe this had some effect that was indicated in the field strength measurements. The receiving tests seemed to show even stronger that the antennas were receiving equal energy. I spent lots of hours comparing signals between the two antennas. I tried going up to the high end of the band and tuning in AM Short-wave Broadcast stations and using the carrier to try and see a difference between the two antennas. The results were almost always the same. After modifications and checks to the antennas, to be certain that the antennas were operating as planned I ran tests with P43JB, and G3RTE. Jim G3RTE, on the longest over water path, gave the edge to the antenna with the ground mounted radials, most every time. "About an S point". This is in line with what has been measured by others[4] and not unexpected. On the path to P43JB, which is entirely over open water, the results were less consistent, but about the same. The difference was about as great, but not as consistent. The VE6 path was the most confusing. In most of the tests David was not able to tell the antennas apart. I ran a blind test with him on several occasions where instead of switching the antennas, I turned down the power 3 dB on the transmitter. With out him knowing what I was doing he would always correctly identify not only the higher power signal as stronger, but the magnitude of the change. So the conclusion I came to was that when he reported "no change " there WAS no noticeable change. At other times he notes a better signal of about 4 dB on the antennas with the ground mounted radials. Just slightly better than the 3dB power change. This is of course the over land path from this location. All the time the receive tests were running with the same signal or with the ground mounted radial antenna with a slight edge. One interesting comment that David observed was that the difference between the antennas seemed to change with the QSB. He comments that on many occasions it appeared that the 102 radial antenna would be better at the peak of the QSB, and at the cusp of the QSB the raised radial antenna would be better. Obviously with the QSB present there was multiple paths involved. It does strike me interesting that there is the seemingly consistent correlation between the fading and the antennas. Is the vertical lobe pulled down by the better ground under the 104 radial antenna? The small extent of the ground plane in terms of the ground reflection geometry would not lead one to think that the vertical pattern would be much different. This is an area where further study might be interesting. The antennas are board side to the VE6 path which should rule out any interaction between the antennas in a endfire manner.

Obviously these are more qualitative results and less quantitative results that I would have liked, but the tests indicated the differences were no larger and possibly smaller than those measured by others on other bands. I will call it 4 dB for the ground mounted radial antenna, over the antenna with the three short raised radials. Not an insignificant difference. But, you can still make a lot of contacts on such an antenna. Especially if the choice is between a simple antenna such as this or no antenna.

The field strength tests provided interesting if not confusing results. The field strength tests were limited to only 7 locations, but multiple tests were run from these sites and the results from these locations was repeatable day to day. I was trying to determine if there was any coupling between the test antennas and other existing antennas at the site. I took down other 40 meter antennas and cranked down the tower all to see if this had any effect on the field strength test results. It didn't. The field strength tests indicated the ground mounted radial antenna was better on the over water path, and this agrees with the on the air tests. The over the ground paths favored the raised radial antenna, and this goes along with the results with VE6DXX. I wish that more time had been available to do more field strength testing. Also moving the raised radial antenna was considered. I plan to continue with this testing program in the future. As always, so many questions, so little time.

It took two people about 20 minutes to take down the raised radial antenna, and about 2 hours to take down the ground mounted antenna. Rolling up the radials was easy using power cord reels. It will be

[4]ON4UN op. cit. W8JI Tom Rauch, chapter 9, p.17

interesting to see how it goes back together next time. Figure 4, shows the quantity of "stuff" necessary, less the two vertical elements.

I hope you have found this interesting and informative. 73 Bob W1XP

Figure 1, Two Test Antennas, Ground Mounted Radials Vertical on the right, Raised Radials Vertical on the left. Antennas hard to see against trees in background.

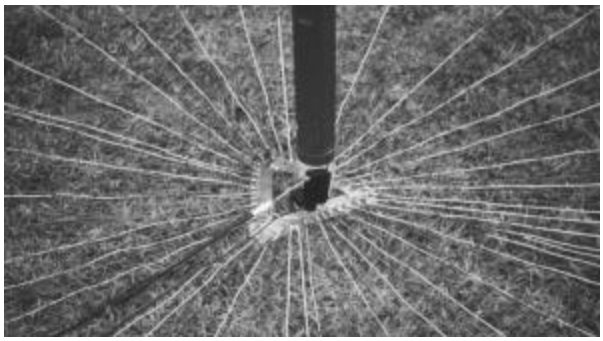


Figure 2, Base of Ground Mounted Radials Vertical Antenna. Note that only about one third of the radial wires show up in the picture. The black and copper colored wires are lost in the grass.

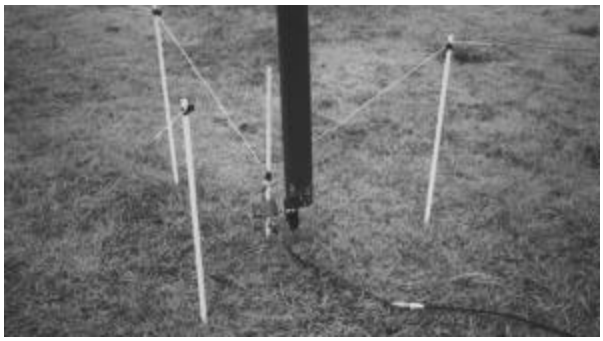


Figure 3, Base of Raised Radial Vertical Antenna. Note the bottle insulator, coil and relay box. See text.

Figure 4, Note the quantity of "Stuff" required for the tests of the two verticals. Not in the photo are the two vertical elements. They fit under the house when not in use.

From The ARRL Letter

SECOND ARISS SCHOOL CONTACT A SUCCESS!

Students at the Armstrong Fundamental Elementary School in Hampton, Virginia, got to interview Space Station Alpha Commander William "Shep" Shepherd, KD5GSL, via Amateur Radio on January 5.The contact was the second successful Amateur Radio on the International Space Station—or ARISS--school contact.

During the afternoon contact, about 10 students posed questions to Shepherd, who identified using the special NA1SS call sign. On the ground and using the Virginia Air and Space Center's KA4ZXW call sign, control operator Wally Carter, K4OGT, finally linked up with Shepherd about four minutes into the scheduled 10-minute pass. Signals were somewhat noisy but readable.

Students seemed fascinated with the effects of launch and space flight. Being launched from Earth into space felt like "someone standing on your chest," Shepherd told Mandy, the first questioner. But after about eight minutes or so, he said, you become weightless and can go anywhere you want. Shepherd told another questioner, who asked if he'd gotten dizzy or sick during launch that being weightless was "a very nice experience." He told another youngster that keeping food down in a zero-gravity environment was not a problem.

Students at Jan Sheldon Elementary School, Varysburg, New York, hope to complete their ARISS contact in the January 15-19 time frame, but all school QSO schedules are subject to change. For more information, visit the ARISS Web site, http://ariss.gsfc.nasa.gov/.--ARISS

"MOTHER OF ALL JAMMING STATIONS" CONTINUES TO PLAGUE 40 METERS

For some months now, regular users of the 40-meter band have been plagued from time to time by strong, very broad, frequency-hopping signals that somewhat resemble a slow-scan TV transmission. The signals, it turns out, originate from jamming stations in the Middle East.

"We know exactly what this is," said ARRL Monitoring System Coordinator Brennan Price, N4QX. "This is a very high-power Iraqi jammer of a very high-power Iranian shortwave broadcast station."

The loud buzzing signals have been heard on the 40-meter CW and phone bands and have even been "spotted" on packet. The jammers occupy about 10 kHz of spectrum.

Price says the shortwave broadcast station involved is The Voice of the People of Kurdistan, transmitted via The Voice of the Islamic Republic of Iran facility in Teheran. "The Iranian station has a daily transmission on 7100 kHz from the same facility, and Iraq has jammed that one also," he says.

Price explains that the Iranian station--which broadcasts anti-Saddam Hussein propaganda, hence the jamming--jumps frequencies several times each broadcast in order to avoid the jamming. Unfortunately for 40-meter users, the Iraqi transmissions follow. This results in a situation where it's hard to predict when the jammers might show up on a given frequency block or how long they'll stay.

Price said that neither station is transmitting where it is supposed to be. "The Iranian and Iraqi telecommunications administrations have been advised of this," he said.

Price says that such "politically motivated" intruders typically don't disappear until the political situation changes. "The 'woodpecker' went away when the Cold War did," he said. "This one will probably not go away until Saddam Hussein does."

ESCAPEES MAY HAVE STOLEN RADIOS; HAMS ASKED TO MONITOR

According to news reports, the seven Texas prison escapees still at large and now wanted in connection with the murder of Irving, Texas, police officer Aubrey Hawkins, KC5USI, also may have stolen radios from a Houston Radio Shack store. The radios are said to include Amateur Radio 2-meter H-Ts as well as Business Radio Service (programmed for 156.400 MHz) and Family Radio Service (462.5625-467.7125 MHz) radios.

Hams have been asked to monitor these bands and report any suspicious activity any hour of the day to the Huntsville Command Center, 936-437-6735, and to their local law enforcement agency. Police advise that anyone spotting these suspects not try to approach them but contact local authorities immediately.

More information on the escapees is at http://people.txucom.net/tdcj-iad/
.--Jerry Karlovich, KD5OM

HAMS HELP CONTINUES IN ICE STORM EMERGENCY

Ice storms this week have caused power and telephone outages and hazardous driving conditions in Texas, Arkansas and Oklahoma, and more bad weather was on the way. Amateur Radio Emergency Service nets have been activated on HF and on local repeaters to handle emergency traffic and to support public safety and relief agencies. Several deaths have been attributed to the severe weather. President Clinton has declared a state of emergency in Oklahoma and Arkansas. At week's end, hundreds of thousands still were without power, and many still had no telephone service--even cellular systems were out. Utility companies were saying it might be a week or longer before power could be restored. Hams also have been locating and assisting the many stranded motorists. South Texas Section Manager Ray Taylor, N5NAV, says an estimated 200 Texas hams have been pitching in. At one point, ARES members helped with communication after hospital telephones were knocked out; they also got a generator going after one hospital's emergency power system failed. Hams also have been supporting relief activities of the Red Cross, the Salvation Army and the Baptist Men's Kitchen as well as state police. The Red Cross has opened shelters to assist those stranded by the inclement weather or left without utilities. At Taylor's urging, the FCC asked the amateur community to cooperate in recognizing the existence of a voluntary communications emergency and to stay clear of 3870 to 3878 kHz to accommodate the Texas ARES Net. The Net has been on 7285 kHz during daylight hours. Taylor said he requested the voluntary declaration because the nighttime emergency and tactical traffic net frequency on 3873 kHz was being subjected to apparent intentional QRM. Taylor said Thursday that his latest concern was possible flooding in South Texas from runoff in the north and

west. Hams were preparing to monitor levels on several rivers in that part of the state, he said. In Arkansas, Amateur Radio reportedly served as the only link between the state capital and DeQueen, a city in southwestern Arkansas that was particularly hard hit by the latest ice storm. The state suffered another ice storm in mid-December. Arkansas Section Manager Roger Gray, N5QS, says a TV report credited Amateur Radio with facilitating communication between Gov Mike Huckabee and the mayor of DeQueen. Residents in up to a dozen counties reportedly have lost power, telephone service and water. At week's end, the storm that affected the US Southwest was moving eastward and expected to join another system to create blizzard conditions in the Northeast.

OUTGOING QSL SERVICE TOPS 1999 STATS

ARRL Outgoing QSL Service Manager Martin Cook, N1FOC, reports that in 2000 the bureau shipped 1,868,895 QSL cards to various QSL Bureaus around the world. This is 15,025 more cards than during 1999.

73,-Ralph KD1SM

In the printed newsletter this page contained a copy of the Thank You letter from the Northeast Bicycle Club for our support at the Harvard 100K Classic.

2000-2001 Fleamarkets

27 Jan Nashua NH NE Antique RC $5@8 $1@9 @ Res Ctr Church Joe 617 923 2665 F

17 Feb Marlborough Algonquin ARC Flea Market @ Marlborough Middle School Ann KA1PON 508-481-4988

18 Feb Westford MA GBARC Radio32 Antique @Regency @8 Tammy ARC 978 371 0512 F+

24 Feb Milton VT NVT WinterHamfest @8 @HS Rt7 Mitch W1SJ 802 879 6589

17 Mar Eastern Connecticut ARA Pomfret CT. kelli@arrl.net

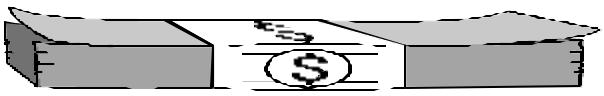
25 March Framingham MA FARA @HS $14/T@7:30 $2@9 Bev N1LOO 508 626 2012

$January Treasurer Report$

Income for December was $20 from the book drawing, $15 from membership renewal, and $2 from ARRL membership renewal. Expenses were $13.60 for newsletter postage, leaving a net income of $23.40.

Fund balances as of January 10 are:

General Fund:	$813.17
Community Fund:	$1192.55



One clever member saved himself a stamp and a check by writing one check for both NVARC and ARRL dues to NVARC. If your renewal dates do not match, that's ok; I'll accept your NVARC renewal early and credit you from your regular NVARC anniversary date.

NVARC

Nashoba Valley Amateur Radio Club

PO Box # 900
Pepperell Mass 01463-0900

mailto:nvarc_n1nc@arrl.net
http://purl.org/hamradio/club/nvarc/

Pres.: Erik Piip KA1RV
V Pres.: OPEN
Secretary: Ian Norrish NZ1B
Treasurer: Ralph Swick KD1SM
Editor: Stan Pozerski KD1LE
Photographer Ralph Swick KD1SM
PIO: open

Board Members
Earl Russell 1998

Bob Reif 1999

Den Connors 2000

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

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