RADIOACTIVITIES

NEWSLETTER OF THE ARGONNE AMATEUR RADIO CLUB

W9ANL

Volume XLVIII, Number 3 **March 2007**

Club Meeting

Unless otherwise noted, AARC general meetings are the second Tuesday of the month at the Argonne cafeteria at a table on the north end of the room. Any club member is welcome. To arrange for a gate pass contact Bruce Epperson at epperson@aps.anl.gov phone 630-252-3495 or Chuck Doose at doose@aps.anl.gov phone 630-252-6037.

The Treasurer's Report

by Chuck KB9UMF

Members: ANL 9; Associate 24; Newsletter 5; Retired 11
Balances: Checking $ $3,869.01; Cash $0.00; ANL fund $0.00
Distributed as: Dues $216.00; General Fund $2914.63; Repeater $656.38; Newsline $82.00
For the period Jan 1 thru Mar 1, 2007:
Income: Dues $216; General Fund $139; Rptr $83.00; ANL $0.00
Expenses: General $18.72; Eqp $0.00; Rptr $33.00

REMINDERS

CLUB BREAKFAST: Always the 2nd Saturday of each month, 8:30 AM at:

Old◆Country Buffet◆

59th Street and LaGrange Road in LaGrange

CLUB NETS: Thru our Club Repeater 145.19.
SKYWARN NET: Mondays in season at 7 PM with Deni, W9DS.
THE CLUB'S 9PM NET: every Monday with Jack WA9FVP.
THE NIGHT PATROL: every night at 10:30 PM with Paul, W9FNM.
THE BREAKFAST CLUB: every morning at 8 AM.
THE NOONTIME NET: every weekday at noon.

Mil's Corner for March

15	W9SKD	Dick	Plainfield, IL
17	W9TIE	Bob	Glen Ellyn, IL
19	KA9QGT	Tom	Romeoville, IL
28	KA9H	Bruce	Westmont, IL
29	K9FFK	Dick	Joliet, IL
29	WA9PWA	Ken	Wheaton, IL
30	KB9UMF	Chuck	Clarendon Hills, IL
31	N9NWA	Randy	Downers Grove, IL

Presidents Corner

by Bruce KA9H

Wow! I am so glad that we have the repeater back on the air! Our repeater went missing for almost a month, noticed the most by those who use it regularly.

Back in December we were put the new repeater into use. It worked fine, with a few differences, until the weekend of the Wheaton hamfest when I had a member come up to me and mention that the repeater had stopped working the Friday before. Instead of going to my shack and playing with the new toys that I bought at the hamfest that Sunday afternoon I went and checked out what was going on at the repeater site. The new repeater had failed and an attempt to put the original machine back on the air met with a measurement of "high VSWR". I was forced to leave it off the air completely.

After checking out the "high VSWR" we who did the testing were left to scratch our heads in puzzlement. We assumed that there was something wrong with the repeaters antenna or cavities. Then someone suggested that we use an alternate transmitter to verify the "high VSWR" situation. We did this and saw a nice low VSWR (which we were used to) on the repeater antenna system. More head scratching was in order.

Our repeater trustee suggested that we look at the original repeaters transmitter and power amplifier combination using a spectrum analyzer. What we saw was something to raise ones eyebrows like Mr. Spock. The transmitter was putting out the familiar and proper 145.19mHz carrier but was also putting out other carriers about every other MHz of almost the same strength from about DC to 300MHz!! The cavities that keep the transmitter out of the receiver will pass only about 25kHz to either side of 145.19kHz so all of those extra (read unwanted) carriers were being reflected back to the transmitter/amplifier and causing the apparent high VSWR.

The transmitter and power amplifier were taken to the bench and given a close eyeball inspection, which at first revealed nothing. It was decided to realign the transmitter per instructions. About half way through the procedure a strange thing was noticed. A little pressure on the right spot caused the transmitter to operate

properly or not at all! Yes sirree! we had a bad connection. Upon close eyeball inspection of the area we found a transistor that had been put into the printed circuit board sockets instead of being soldered directly to the board. The transistor was then soldered directly to the board and all was well. It was such a pleasure to see just the one carrier we wanted and not a forest of them!!! The alignment procedure was completed, frequencies were adjusted, and back to the repeater site it all went. It seems to be operating just fine once again. (Fingers crossed and may the Devil take Murphy!!)

On another note, membership applications are being processed at a good clip. Between work, family, home, fixing the repeater, and all of the other things that demand our time we have been striving to keep up. We need to see your application as soon as possible so get it in the mail soon.

Wrap Your House in A Giant Loop

by Deni W9DS

Well, something different. We have an article from New Zealand ZL2AMJ wrote about it in June 1980 73 Magazine. Hearing aids with "telephone coils fitted were used as a pick-up loop which can be switched in place of the hearing aid microphone. The loop is held alongside phone so stray energy from induction coil or earpiece can induce a signal into this loop. Which is amplified and fed to the hearing aid earpiece.

Thus a deaf person can hear on the phone better than normal. ZL2GA, Fred's father, Joe Johnson, asked him to feed the audio output from his FT101B to his hearing aid directly to cut out the speaker and go to a hearing aid audible link. Boosting the acoustic quality by eliminating shack noises from the pickup by the hearing aid microphone. This article deals with hearing aids with induction or phone coils.

ZL2AMJ looped 5 turns of 25 gauge wire around, get this, the whole house which was a two story. Wound around the upper floor level outside. Number of turns on the loop isn't critical 5 to 10 will do fine. Loop position isn't critical, anywhere between floor and ceiling is ok. Other houses have been wound and all work well. The wire gauge doesn't seem to matter. You can get a multiple wire cable and connect the individual conductors in series.

The 2 ends of this loop must run through the building and are connected in place of the loud speaker in a FT101B, a tape recorder, CD player, AM-FM radio, or TV set. Set the audio level the same as normal room speaker use. This system won't harm the equipment. It has been used by listening on two meter gear for monitoring a local repeater. You can now walk around the house and listen to hams, music, etc. unhindered as you move around.

Coverage from the wireless induction unit distances inside the loop is fine, but outside the loop signals fall quickly, but heard to about one loop diameter or more away. As always, how much power can you pump into these little wires?

Receiver units are hearing aids with telephone coils make good monitors the spectacle type works well as a induction receiver these hearing aids reject low frequency hum from power lines. So the uses this idea can benefit anyone. Break away from ipod's and the rest of those fancy expensive devices to waste your time and deplete your bank account they are not necessary. What good were last year at New Orleans – nothing, but radio shack family radio units were used for communication. Everything computer was dead, in the water, phone lines were out. Even this tragedy hasn't woke people up. Good luck listening.

The Super Duper of Aerials

by Deni W9DS

The rhomboid was introduced to me in 73 Magazine August 1977. I had no use for it, but thought about it for lower frequencies. It is a parallelogram with no right angles and adjacent sides of unequal length. It is a rhombic variation used for decades to achieve high gain. The gain comes by combining 2 aerials in a way useful. Side lobes are reinforced while not wanted directions are cancelled.

First appearing through Bill Parker, W8DMR, his is scaled for 420 to 890 MHz the gains are 20 to 30 db. A second article deals with 1296 MHz designs for 1100 MHz and useful for 903 and 1296 MHz providing beam widths between 5 and 10 degrees. Gains more than 30db gets you half power beam widths of less than 5 degrees and requires most accurate pointing systems. 20db systems are used on VHF and UHF. These aerials must tower higher above surrounding obstructions. A 26db rhomboid creates an effective radiated power increase of 400 times.

The dual rhomboid with judicious choice of side length and apex angle can cause destructive interference of unwanted side lobes, but designed for a high order of side lobe suppression at one frequency retains this over a wide frequency range. Design principles are the same as for Vee aerials and rhombus aerials. Angles are tilt angles for selected zero radiation from each rhomboid.

The length of sides L1 and L2 differ by ½ wavelength. The array radiation pattern is the product of patterns for component sides at all points in space. A single connection between two or four rhomboids is at the common feed points. The dual aerial has 2 rhomboid elements connected in parallel at their common apex where a lanced feed line hooks up. Terminated resistors must be non inductive capable of dissipating ¼ of the input power and values 600 to 800 ohms are recommended. The parameters for 435 MHz design side lengths are: L feet = [984 * (N-0.05)] / (freq MHz) where N is the number of full waves. L1 and L2 for a design frequency of 435 MHz are 93.5 and 161.5 inches respectfully.

The side lengths are used to get boom length and the 3 cross arms lengths.

Apex angles α and β are given by: α = 2 * (90 – Φ2) and β = 2 * (90 – Φ1) and are 46 and 58 degrees. Tilt angles Φ1 and Φ2 were chosen for side lengths of 3.5 and 6.0 wavelengths as well as zero angles radiation.

Dimensions for boom, cross arms, and cross arm spacing is seen in Fig.1. The angle between the diagonal of each rhomboid is equal to (β – α) / 2 = (58 – 46) / 2 = 6 degrees.

An isossolies triangle at forward end the beam by the rhomboids crossover and the two terminators. Dimensions for construction of 420 to 890 MHz are in Fig.1. Non metal is the boom or trouble ensues.

Design center frequency: 435MHz:
Side length L1 = 3.5λ, L2 = 6.0λ
Tilt angle Φ1 = 61º, Φ2 = 67º
Apex angle α = 46º, β = 58º
Beam width V = 5.8º, H = 9.7º
Termination R = 820Ω, R = 820Ω
Half power level
#L1 – 7.8 feet, L2 = 13.46 feet, wire is 14AWG, feed line is 300Ω.

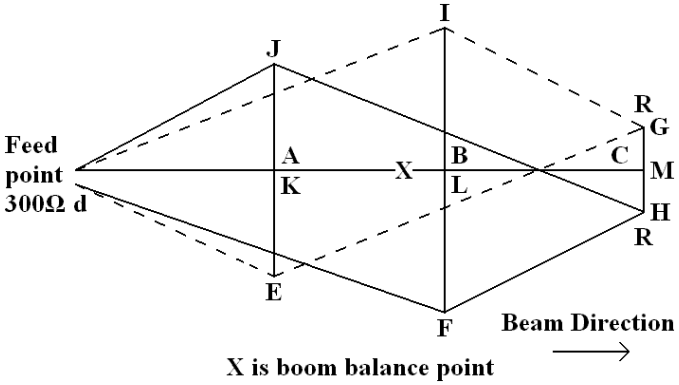

Fig.1

Dual rhomboid 435 – 870 MHz, beam width ~10º, Hx 6º, gain over DP ~26db, boom length: dM = 19’ 6”, dK = 7’ 3”, KL = 5’ 6”, LM = 7’, support length JE = 7’ 3”, IF = 10’ 3”, GH = 3’ 0”. Rhomboid sides dJ, dE, IG, FR = 7’ 9.5”, dI, dF, JH, EG = 13’ 5.5”, wire needed 14AWG for mvar, ~86’ 0”, boom wood dK, LM, KL = metal. Cross support JE, IF, GH = wood. R1 R2 resistors 600 ohm watts, each dissipating ¼ of the input power. Can be made by connecting 5 3,000Ω 2 watt carbon resistors in parallel. This is good for 40 watts continuous power at the feed point, 80 watts SSB/CW. Leave resistors off and you have a bidirectional and resonant at the design frequency. Rhomboid.

This aerial beats out a 21 foot parabolic dish, long 100 foot yagi, broadside, collinear, and quad arrays.

The Amazing 10, 15, 20 Meter Parabolic Beam

by Deni W9DS

Appearing in January 73 Magazine, 1974, WB2AEB built one. It works like a corner reflector. It takes one inch diameter aluminum tubing shaped like part of a circle. It is 20 feet long before shaping. It’s bent so 100 degrees appears between A, B, and C. Fig.1 and Fig.2 shows another piece of tubing bolted at right angles to the tubing ABC. This added is like Fig.1 and is as a straight line – DBE, and DBE is bent the same as tubing ABC. Now, bare copper wire is used to hold ABC and DBE elements in Fig.2. This wire supports aluminum sheet metal like in Fig.3. The sheet metal is 0.04 inch thick 3 feet wide 80 feet long.

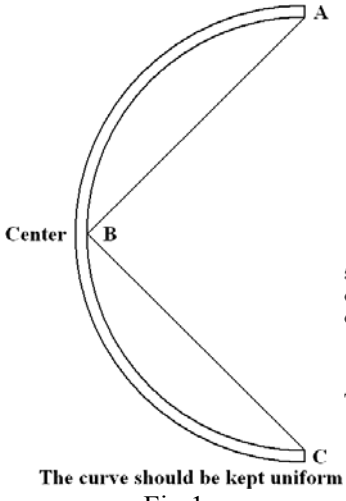

Fig.1

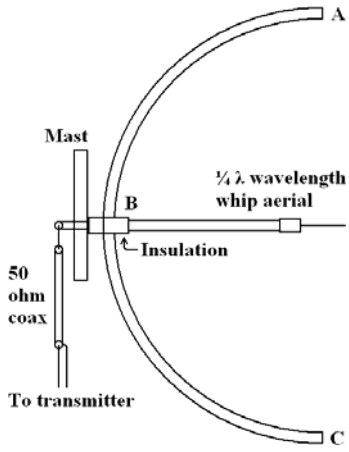

Fig.4

This is our reflector causing a 40db front to back ratio. Fig.4 shows driven element FG, a Hustler Top Whip vertical resonant either on 10, 15, or 20 meters and it must be insulated from the aerial system. Use plastic

sheets and tape for this. FG should be kept ¼ inch or more away from the system at point B of Fig.4.

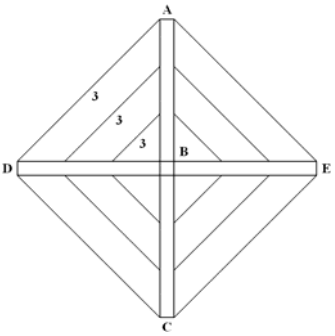

Fig.2

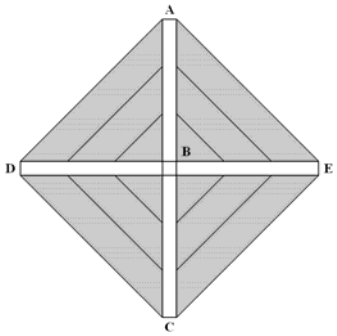

Fig.3

Feed line is 52 ohms. Feed point F should be bolted and taped. The coax shield connects to non-rotating part of the reflecting section of the aerial system. WB2AEB claims 14db to 25db gain depending on the type of driven element used and the band chosen. 15 and 10 meters will give improved performance. Good DX reports have been given using low power on top of a 20 foot tower.

Other Frequencies With Dipoles

by Deni W9DS

A ½ dipole needs 70 ohms transmission line center impedance changes as we go higher in frequency at 2nd harmonic impedance reaches 1,000 ohms about. On the third harmonic, our feed point sees a low resistance impedance, and as we continue this impedance swings between high and low values, and they are very high on even harmonics 2, 4, 6 for example, but the odd harmonics 1, 3, 5 for example are low impedance points.

Facts say 7MHz aerials work on 21MHz and we operate 21MHz the tuner handles the mismatch, but losses are little less on 7MHz than 21MHz. We are talking about adding 20 inches of wire to each end of the 7MHz aerial. A ½ on 3.925 119 feet 3 inches and is 2 ½ waves on 15 meters. Adding more wire extensions hanging down can put you on 3.5 and 28 MHz. L = [492 * (N – 0.05)] / F, N = number of half waves in the aerial length, F = frequency, L = length in feet inches.

Did you know a 21 MHz dipole with 18 ½ wave lengths is near 145 MHz it will radiate at about 18 degrees off the axis of the aerial with 10db gain over 2 meter dipole. Let's see 260 feet of 160 meter ½ λ would must likely not work. Should I try it? Tune into 145.190 and ask me.

The number of ½ waves tells us the number of lobes ½ wave 1 lobe, 3 ½ waves 3 lobes, etc we calculate it is 78 ½ waves for my 160 meter aerial.

Ok I tried it Bolingbrook and Argonne repeaters came up 100 watts FM pumped into 160 meter dipole SWR lowest at Argonne frequency 145.190 and Bolingbrook 147.330 came up ten to 1 SWR but did not raise 145.805 Hazel Crest. A smaller tuner might have worked better. The dips were very hard to dip and lowest coil setting of course was too much inductance. The aerial is up 40 feet the isopole is up 20 feet and so goes the experiments. You can likely load up the rain gutters on two meters, but someone ambitious could load even them onto 2 meters it would be an outdoor aerial made of open line, the 450 ohm kind should work.

Here is your table:

Length	Gain db	Radiation angle degrees	Radiation resistance
1 ½	0.8	42 & 90	110
2 ½	1.8	31	120
3 ½	2.3	26	130
4 ½	3.5	22	138
5 ½	4.25	21	145
6 ½	5	20	150

Using coax feed lines will transpose high impedance to low impedance. Estimate the length of transmission line to reach the aerial is 50 feet L = 246 * V / freq MHz, V is 0.66 for conventional RG cable, 0.8 for poly foam and 0.71 for kilowatt 75 ohm twin lead. So, RG11U at 21.3 MHz is 7 feet 6 inches so we use 7 electrical ¼ waves which is 51 ⅓ feet.

Summer is just beginning we should work on our outdoor aerials now before the snow flies. This idea originated with Herb Brier, W9EGQ, presented June 1971 73 Magazine.

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MEMBERSHIP is open to all who are interested in amateur radio. This club is sponsored by Argonne National Laboratory. Employees of ANL or DOE-Chicago are eligible for full membership. Auxiliary membership is available to non-employees.

W9ANL/R is an open repeater, coordinated on 145.19 MHz (-600 input). The AARC repeater has been in operation on this frequency pair continuously since February 5, 1982.

CLUB NETS: 2 meter fm 1) Regular, every Monday evening at 9:00 and 2) the Night Patrol every night at 10:30, both on W9ANL/R. The Peanut Whistle Net (PWN) every Sunday at 1:30 p.m., and many evenings at 8:30 p.m. on 1932 kHz (cw/am/ssb), QRP.

RADIOACTIVITIES is published monthly by the Argonne Amateur Radio Club as a nonprofit newsletter intended only for the use of its membership. Material appearing here does not represent the official position of Argonne National Laboratory or the U. S. Department of Energy. Please give credit to the author and to Radioactivities or the Argonne Amateur Radio Club, when using original material published here. Deadline for submissions normally is the 20th of the preceding month.

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EVENTS
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