RADIOACTIVITIES

NEWSLETTER OF THE ARGONNE AMATEUR RADIO CLUB

W9ANL

Volume XLVII, Number 10 **October 2006**

Jim Jorgenson SK

by Chuck, KB9UMF

Jim was many things to many people. He was a husband, father, Church leader, Argonne Division head, ham radio enthusiast/collector, and friend to everyone. Jim was a true one of a kind individual. Jim was involved with so many activities it's hard to believe how he was able to accomplish all that he did. He had the ability to analyze a situation and come up with a clear definition of the problem and possible solutions. He had a calm and gentle demeanor and was always open for listening to others opinions. He was well liked and respected by everyone he met. Jim fought a courageous fight with cancer for almost two years.

During AARC board meetings Jim would come prepared with an agenda and put things on the table for discussion. He always involved everyone and made the board members feel like they came up with the ideas, when actually it was Jim who usually had things already well thought out. I have only known Jim for about two years, but in that short time he has made a big impact on my life. We will all miss him.

The following is quoted from the Argonne Today, September 11, 2006: "*Jorgensen was the leader of the Material Science Division's Neutron and X-ray Scattering Group. He had an enormous impact on neutron scattering science both within the United States and throughout the world. He was a pioneer in the use of time-of-flight neutron powder diffraction, designing the first instruments at the prototype pulsed neutron sources built in the seventies at Argonne, and then building the first dedicated diffractometers at the Intense Pulsed Neutron Source. He is perhaps most famous for the first solution of the crystalline structure of the high-temperature superconductor YBa2Cu3O7, becoming one of the 100 most cited physicists for this and related work.*"

In lieu of flowers, the family suggests donations be made to the American Cancer Society.

Club Meeting

Nothing received.

The Treasurer's Report

by Jack Albert, WA9FVP

Members: East 20; Associate 39; Newsletter 6; Retired 12
Balances: Checking $3,527.84; Cash $0.00; ANL fund $30.00
Distributed as: Club $2,771.32; Repeater $564.52; Newsline $55.00
For the period Sep 1, 2006 thru Sep 30, 2006:
Income: Dues $8.00; Club $1.88; Rptr $0.36; Newsline $0.00; ANL $0.00
Expenses: Club $0.00; Rptr $0.00; Newsline $0.00

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 October

02	K9FAT	Jim	Crest Hill, IL
06	W9KJA	Clem	LaGrange Park, IL
31	N9JTV	James	Wilmington, IL
31	WA9FVP	Jack	New Lenox, IL

September Board Meeting Minutes Synopsis

by Jack Albert, WA9FVP

Most of the time was spent discussing the new repeater and problem where someone installed wifi antennas on our mast. We can't install the new repeater antenna, with out disrupting the data link, until we contact the owner.

Bruce mentioned that we need a new log book at the repeater site and that we need documentation to be up to date and accurate. Chuck Doose volunteered to generate the programming instructions and I generated a drawing

for an interface cable. I also created a contact list and presented it to the board. I explained that we need to keep this up to date and attached to the repeater equipment rack and that we need at least 3 names along with phone/pager numbers and email addresses.

There was a unanimous decision to send $100 to the American Cancer Society, in memory of Jim Jorgensen, K9RJ (SK).

Yagi Beams for 6 and 2 miscellaneous

by Deni, W9DS

Lew McCoy, W1ICP, wrote for QST a "beginners" column for QST October 1962. He wrote about a 5 element two meter beam. He explains that gain means adding more transmitting power or aerial gain by configurations and additions for RF radiation. You won't get more power out of these elements than goes in. Aerial gain comes about by forming a narrow beam in only one direction. You can achieve gains 20db to 40db and very narrow beam widths of 5 to 10 degrees can be accomplished with huge arrays especially at VHF and UHF.

Summing up. We up our power ten fold 75 watts to 750 watts we get a 10db power gain. We add reflectors and directors and stacking to our beam and we get a radiation gain of 10db. We raise our lowest elements to height of ⅝ λ of the frequency we lower the radiation angle and put more power into that angle with our signal. If it were possible to place a screen over the top of our beam thus stopping the 90 degree angle radiation from going straight up cloud warming compression would take place and add to the forward gain, but have found no experiments done on this issue.

The beam 5 element two meter: The boom is 72 inches with mounted reflector is 40 inches long and spaced 16 inches behind the driven element 38 inches long spaced 12 inches from first director 36 inches long and spaced 20 inches from the second director 35 ¾ inches long spaced 20 inches from the third director 35 inches long.

3 element six meter beam: Reflector 115 ½ inches long spaced 34 ½ inches from the director 106 ½ inches long. The formula is 5540 / freq in MHz.

A 4 element 6 meter beam resonant on 51mHz: Reflector 116 inches long spaced 46 inches from driven element 110 inches spaced 46 inches from director one 105 inches spaced 57 ½ inches from the 4th element 103 inches in length.

A 50.5mHz 5 element yagi beam: Reflector 116 inches long spaced 35 inches from the driven element 110 inches long spaced 35 inches from director one 105 inches long spaced 35 inches from director two 103 inches long spaced 35 inches from director three 101 inches long.

A 5 element 50mHz beam 6 meters: Reflector 111 ½ inches driven element 106 ½ inches director one 101 ½ inches director two 99 ½ inches in length and 3rd director 97 ½ inches.

A 6 element 50.4mHz beam: Reflector 116 inches spaced 36 inches from driven element 110 ½ inches spaced 36 inches from director one 105 ½ inches long spaced 42 inches from second director 104 inches long spaced 59 inches from third director 102 ¾ inches spaced 70 inches from the sixth element 101 ½ inches long.

All booms are non-metal plastic or wood or fiberglass. Choose a feed line and method of matching the aerials: delta or T match, baluns or gamma match.

W8DYF wrote an article April 1975, 73 Magazine using 7 elements on 2 meters. The spacing and element lengths are: reflector 40 inches long spaced 16 inches from driven element 38 inches and spaced 12 inches to first director 35 inches long spaced 20 inches to fourth director 35 inches and spaced 20 inches to forth director 34 ½ inches spaced 20 inches to fifth director 34 inches in length boom is 2 x 2 wood put on couple coats of shellac.

Its August 1975 K7PVZ article in 73 Magazine says he built a 48db front to back ratio beam. It has minor signals off sides of beam. The elements are ⅞ and ¾ inch aluminum tubing. The boom is (3) ten foot sections of 2 ¼ diameter aluminum. Each section is threaded one the end and so they can be coupled joined together into a sleeve ends. This beam is for 29mHz with 3 reflectors and 4 directors.

The last reflector is 17 feet 8 inches spaced 24 inches from second reflector 17' 8" spaced from the first reflector 17' 8" spaced 7' 5 ¾ inches from the driven element 15' 10" spaced 5' 9" to the first director 15' 9" spaced 4' 9" from the second director 15' spaced 4' 9" from 3rd director 14' 11" spaced 4' 9" from the second director 15 feet spaced 4' 9" to third director 14' 11" spaced 4' 9" from the fourth and final director 14' 10" in length. The boom length 27 feet 5 inches.

A 2 meter beam with 21db gain was presented June 1970 in 73 Magazine by ZL4TAH. The ZE lander called it 5LY beam. Here the use of booms and frame works suspensions are replaced by ropes under tension.

This 32 element yagi is 73 feet long with no metal boom, but nylon cords. Elements are made from aluminum ⅛ inch welding rod need 36 feet for all of the parasitic elements excluding the reflector and driven elements are brass ⅛ inch rod fed by delta matching.

Reflector 43 inches long spaced 12 inches from driven element 38 ½ inches spaced 6 ½ inches from first director 32.2 inches 32.2 spaced 7.4 inches from director 2) 35.2 inches long spaced 7.4 inches from director (3) 35.2 inches long spaced 16.4 inches from director (4) 35.2 inches long spaced 31.9 inches and so until 32 elements has been met. Masts 1 ½ inch pipe 3 guys at every 10 feet of height to top of 40 feet. Aerial bandwidth narrow about 0.5mHz and the E plane is ten degrees.

Along came Frank Jones, W6ATE. He wanted to find out if the yagi was better than driven arrays. He tested a 14 element beam that has the same gain as a 16 element sterba curtain array which had 5 to 6 years of weather abuse. Both had 14db over a dipole. The 14 element yagi has a sharper forward lobe and smaller back lobe as has the 16 element curtain tied in the test held on 2 meters with the results written and placed in 73 Magazine June 1976.

Long yagis have less gain than a sterba curtain for the same number of elements. The yagi suppresses the QRM and QRN better than curtains. A 12 element all driven vertical array was tried it has a broader beam bearing but picked up more noise. A pair of stacked 6 element beams will yield 12 db gain W6ATF became to believe stacked arrays vis-à-vis a single long john parasitic array are better.

Let's take up the case of the dopple quad two meter beam. Here we deal with 2 loops mounted vertical element, but has horizontal polarization. A German ham was first to publish this first described in the "UHF compendium" by Karl Weiner, DJ9HO. K8KK found the DJ9HO article and prepared his for QST appearing in February 1985 with the advantages of narrow vertical beam width reduces noise with a beam width over 60 degrees at half power points. Claims 9 to 10 db gain, nice front to back ratio, simple direct coax hook-up, by using very short leads at feed point, low SWR, and its compact, light weight, and easy to design and build.

The 2 vertical loops are stacked and connected in parallel backed by a reflecting plane. That's 3 to 5 reflector elements hung vertically horizontal. The whole thing fits on one frame. Each loop is one wavelength on same frequency. Connected in parallel radiation resistance is 50 to 70 ohms the legs are made of stiff wire. Formula 984 / freq MHz is one wave length at 146mHz has two lengths. ¼ wave equals 20.22 inches. Either a screen or 3 to 7 elements form the reflecting screen. The rods are ⅝ wave long each.

The spacing between the rods or screen and driven elements by K8KK 12.6 inches, but Germans 11 inches. For low SWR keep the leads short at the feed point. Happy designs.

Horizontal vs. Vertical DXing

by Deni, W9DS

Bob Nelson, K6ZGQ praises the horizontal aerials over verticals and tells us why in April 1966 73 Magazine. He is concerned about the radiation angle and the propagation via series of reflections off the ionosphere (it's a wonder it is still there) and the surface of the earth. Bob's Law say's the fact of nature that a signal looses 5db of signal strength on every bounce, thus the signal must radiate at a low angle and for DX aerial gain is least important than the aerial radiation angle. The latter called the angle between local horizon and the main radiation lobe of our aerial. The size of this lobe he says is caused by the polarization and aerial height above ground. That lobe should be as close to the ground as possible (for long haul, but you need short skip too). Example the Andaman Indian Island DXpedition. They were workable over the North Pole about 11am Chicago time. How did I know this and which band to use? DX spots on the local DX repeater (but this wasn't my way). I talked to W2NQ and the indexa group and got my bearings and listened. The DX sat on one frequency 24 hours. People called him split frequency where he told you he was listening. The propagation was in the toilet. Noise-a-plenty. I sat there my mouth shut. I didn't waste listening at night. No chance he would be heard here. Only the morning into darkness was the path open.

Don't play the policeman game! If it's jamming trouble from Europe or South America; shut up! Say nothing. If you can't take it, you will be an unhappy DXer. It's the way it is these days. Know the times when bands open and close. I use twenty and 15 meters and I'm serious about DX hunting. If I know his frequency, I will sit and listen when nine area opens AND I CAN HEAR HIM. Then I make my calls; not until then. Whow! I got off the track here, but there's really no train wreck.

Now, back to Bob, K6ZGQ. He dislikes verticals. The vertical radiation lobe always has a high value at a radiation angle of zero degrees, but sadly the surface is not perfect reflecting, thus surface raises the radiation angle, but cuts the signal strength by several db for average soil. Bob's Law 2: For equal heights over ground, horizontal polarization is always superior to vertical polarization at low angles by at least 3db where

DX frequencies are concerned. Adding radials won't help lower the radiation angle; it's the reflections off the ground occur good sized distances one quarter mile. (If we raise our vertical ⅜ wave above ground, it's an entirely different set of circumstances, and better at ⅝ wave stack 'em at 10, 12 meters.)

Best DX radiation angle:

60/40 meters	30/20 meters	17/15 meters	12/10 meters
10 – 35˚	7 – 22˚	6 – 20˚	5 - 14˚

Horizontal aerials the lowest lobe goes to lower angles as aerial height increases as number of lobes increases with shorter lengths and nulls are filled in. Thus, for horizontal multi-band aerials 10, 15, and 20 meters mounted at 70 feet rates optimum radiation angles.

Element Number	Max Yagi Gain	Max Quad Gain
1	0	0.9db
2	5.4db	5.7db
3	8.5db	7.2db
4	9.3db	8.0db
5	9.9db	8.5db

He writes conclusion "Horizontal superior to the vertical." Of course his conclusion is flawed!

Delta Loop for 30 Meters

by Deni, W9DS

The 30 meter band was turned on for ham use about October 1983. That's when K9AZG made a full wave loop delta. With a 100 ohm feed point impedance and a matching device such as a quarter wave of 75 ohm coax to wind on to a home made form that becomes the feed line anchor insulator and impedance transforming system, 100 to 50 ohms a choke like balun preventing aerial currents on feed line shield. His new aerial was much quieter than his 30 meter ground plane, and at 10.125mHz the full wave is 99 feet 3 inches. The balun was foam coax RG59U 17 feet 4 inches close wound it tight. Next solder the coax feed line to the coax balun and aerial, which hangs between two trees. Keep any 40 meter aerial away from this 30 meter aerial. Said aerial was barely twelve feet from the ground, yet K9AZG in six weeks time, since the band was opened, our author worked 18 countries, missing Asia for WAC on 30 meters. His barefoot rig is a TS-830S, and he would like to work JAs in the morning, but he over sleeps. I have another delta article about adding on stubs to make the aerial an efficient multi-band aerial. W7AAK wrote about this procedure, which appeared in QST December 1979, Harold, W7AAK, wrote that his stubs are ideal additions to quads, which allow the loop to operate on the fundamental, half, and quarter frequencies. The author uses his phantom stub on 20, 40, and 80 meters. Component dimensions may also be doubled for efficient use on 40, 80, and 160 meters. The author chose delta loop; his loop has three sides 47 feet from corner to corner. Dimensions are not bad must use tuner for matching network.

There are several ways to feed the delta. Use of balanced open wire is one way, then run that to a balun 4 to 1 and coax to the rig. The stub of 34 feet, not critical, made of 450ohm line and is held from blowing around in the wind by tying it straight down use 50 pound fish line. It attaches at the very top solder to the wire on insulator both sides.

Wire is 16 gauge and insulators at apex and base can be glass, ceramic, or surplus circuit board material. The low corners of the triangle tie back using fishing line. Legal power used is the maximum no trouble appeared. Compromise bands 14.2, 7.1, and 3.55 are chosen for math calculations. The delta loop perimeter of the loop comes by 1005 / freq mHz ratio which at 7.1 mHz equals 141.55 feet or 47 feet on each of 3 sides. The stub formula 246 / 7.1mHz * 98 = 33.95 feet where 0.98 is 450 ohm velocity factor. The loading stub is in the plane of the loop bisecting the top angle. It is perpendicular to the aerial polarization. The stub can be seen and performs well. The top of this modified X-Q loop, in this case the 20 meter loop, is open circuited. With no decrease from end-effect and therefore perimeter formula 1005 / freq MHz holds up. It is fed at the center of the bottom 47 feet with 450 ohm line tuning the stub wrap aluminum foil around the stub 300 ohm line then moving foil up or down until optimum adjustment is found. This stub hanging down is cut shorter than a ¼ wave 246/146 x 0.82 or 16 ½ inches. Use 2 inch long piece for tuning.

Happenings

by Deni, W9DS

----- Beware of protective diodes. ----- Using them across the aerial input terminals on solid-state receivers while using a separate outdoor aerial. While transmitting these diodes rectify the transmitted signals and re-radiate them on many frequencies in the RF spectrum.

You must consider not leaving other equipment on using this protective technique TVI may be created for those who don't use cable boxes.

Have you ever tried making trap dipoles using coax line across an insulator as both the capacitance and the inductor watch your mailbox for the next issue of RADIOACTIVITIES.

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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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