RADIOACTIVITIES

NEWSLETTER OF THE ARGONNE AMATEUR RADIO CLUB

W9ANL

Volume XLIX, Number 7 **July 2008**

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

Nothing Received.

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 November

Nothing Received.

Brit's Moxon Rectangle

by Deni, W9DS

The concept and first experiments were done by Les Moxon, G6XN, outlined in his book "HF Antennas For All Locations." He wrote about a rectangle in which he remotely tuned the driver and tuner. Other work on this type has been done by VK2ABQ, Fred Caton. An article was published in QST June 2000 by W4RNL, LB Cebik, web site www.cebik.com.

This aerials radiation pattern using the rectangle shape with director and reflector shows small rear radiation in the horizontal plane front to back ratio can reach 30db. Dimensions for 80 through 10 meters follow in Fig.1 in its fully developed monoband form. A is the side-to-side length of parallel driver and reflector wires. B shows driven element bent 90 degrees length. D is the length of reflector element bend 90 degrees toward B which is bent toward D. C is the gap opening distance between tips of the two sets of tails. C, E is the critical dimension of Moxon rectangle. The front-to-back of the array is the sum of B, C, D, or E. This aerials advantage is back side QRM is much less than a yagi though yagi gain is higher.

The Moxon squelches rear QRM. Beam width is broader than a yagi. Signals coming from the beam sides are stronger than a yagis. At heights of ⅜ to 1 λ, the Moxon side gain ranges 2 to 6 db greater than that of a yagi, and with QRM suppression from the rear. This function is caused by mutual coupling between parallel element parts and coupling between element tips (dimension C) don't let this dimension change over time. Setting of this gap determines performance characteristics.

Front-to-back ratio peaks near the design frequency. It tapers off more rapidly below design frequency than above it. You can add or subtract wire, but gap C must be held constant. Increasing driver tail by one inch raises the resonant frequency of 70KHz. Lowers frequency impedance.

Increasing in reflector one inch the impedance will be higher also effecting the peak front-to-back ratio. Gain increases with height above ground. The semi enclosed Moxon design tends to yield fewer interactions with surrounding structures than an aerial with linear elements.

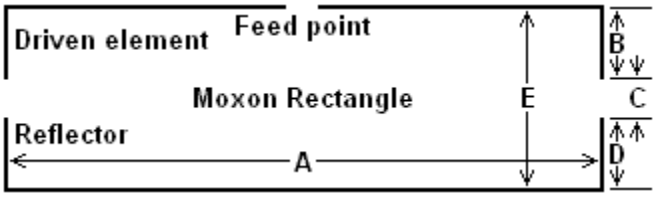
Band	Freq	A	B	C	D	E
80	3.6	99.98	15.47	2.16	18.33	36.96
75	3.9	92.28	14.28	2.00	16.92	33.30
40	7.09	50.69	7.82	1.15	9.35	18.32
20	14.175	25.30	3.87	0.62	4.70	9.19

15	21.225	16.83	2.56	0.44	3.14	6.14
10	28.30	12.65	1.90	0.35	2.36	4.61

Above #14 AWG bare wire dimensions in feet. Below performance of Moxon at heights above ground:

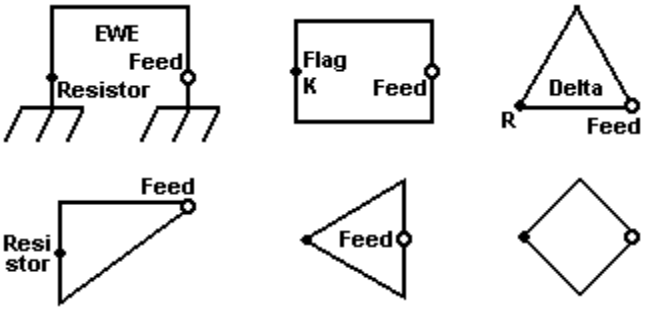
Height (λ)	To angle degrees	Gain (dbi)	F/B (db)	VBW degrees	HBW degrees	Feedpoint R±jx ohms
0.375	34	9.5	30.1	44	86	53+j8
0.500	26	10.5	21.3	32	82	59+j3
0.750	18	11.0	23.5	20	79	50 j1
1.000	14	4.3	30.4	5	79	56 j3

The aerial is 10 meter 14 # wire Moxon 28.5MHz (to) take off angle refers to elevation angle of max radiation. The 180° F/B is used in table (VBW) vertical bandwidth (HBW) horizontal band width refer to beam width between points at which power is down 3db relative to maximum power. Feed point impedance (z) is given in usual resistance / reactance terms.



Outline of aerial with dimensions labeled. See text.

Configurations of aerials described. Flag and both pennants and the diamond are 29' by 14'. Delta is 17' high, 28' long. All 6' above earth.



Point-fed Pennant | Point Terminated Pennant | Diamond

W8JK Background

by Deni, W9DS

John Kraus, W8JK, wrote about his aerial in June 1982 QST, and I found this most interesting. His credentials are from the beginning of radio. He writes "Less than 100 years ago, in 1888, Heinrich Hertz built first radio transmitter and receiver. His aerial was a ½ λ dipole and receiver one-turn loop. The frequency was 5 meters was able to show a transmission a distance of a few paces. Hertz's experiments were a curiosity until Marconi repeated them."

Guglielmo Marconi added tuning, bigger aerial, ground systems, and at longer wavelengths communicated across the Atlantic in 1901 Canada. Wireless worked wonders passing messages from land to sea for help or disasters at sea. So that nearby vessels could respond to SOS/QEB signals "King Spark." Commercial radio broadcasted on wavelengths of 1000s of meters fro long distance communications. Ham radio operators proved wavelengths of less than 100 meters were useful for long distances. At these shorter wavelengths, dipoles are easily arrayed to make directional aerials.

A half-wave dipole is a directional simple aerial with a similar dipole parallel to and a quarter wavelength spacing it as a reflector. ¼ wave spacing was used until George H. Brown of RCA showed smaller spacing may be better. So, this idea rang a bell for John Kraus and he lost no time in designing the first W8JK beam with two parallel dipoles driven in opposite phase separated by the spacing of ⅛ wavelength.

It was the first popular aerial to use such closely spaced elements. That aerial proved the gain that Brown predicted mathematically. So, John Kraus gives us some of its characteristics that:

1. It can operate at any wavelength over a frequency range of more than 3 to 1.
2. It has no traps and no loading coils at aerial.
3. No critical aerial dimensions via resonant aerial feed.
4. Elements can be rotated horizontal or vertical to get best angle of radiation or reception.
5. It finds open round world communication paths.
6. It has zero radiation off element ends and perpendicular to the plane of the elements.
7. Nicely fed with low loss twin lead 300 Ω.
8. Compact design covers 20, 17, 15, 12, 10, and 6 meters being 7.3 meters long.

W8JK consists of 2 parallel conductors of 2 parallel linear conductors or elements with equal oppositely phased currents as shown in Fig.1. The elements may be end or center fed. The center-fed array is shown in Fig.2. Usually the spacing S is about ⅛ wavelength on the lowest frequency used. Length L can be less than ½ λ to more than 3 half wavelengths.

If L is somewhat less than ½ wavelength for 20 meters, the same aerial can be used on 6 meters and on all

wavelengths in between, 17, 15, 12, and 10 meters. The center crossover gap G can be any convenient value, such as 250mm.

Aerial elements are fed with a resonant twin-line connected to points FF with tuning done at the station end by means of a balance to unbalance, inductor-capacitor tuner. The bad point is that high voltage points on the twin lead are going into the station.

We can short the twin lead at a current maximum and couple coax at that point. To do this, use a section of open twin-lead made from aluminum tubing with a sliding section or "trombone".

Values for W8JK aerial:

Band	Gain(dbi)	Half-power horizontal	Beam width vertical
20	5.7	62	90
15	6.7	60	93
10	7.7	56	96
6	8.2	30	105

Any aerial performance depends on environment or surroundings. The ideal is that it is all alone, the other is that aerial is above flat perfect conducting earth. This permits a ground reflection that, at best, will double the field strength giving equivalent of a four-fold increase in power (db) gain. At worst, complete cancellation of signal via trees, imperfect ground, buildings, which absorb or scatter your radiation.

With any aerial one full wavelength above ground the horizontal aerial maximum single will radiate at 15 degrees, but a vertically polarized aerial at the height is zero degrees. The vertical polarized aerial at ½ wavelength will have a 30 degree maximum radiation and the same at a full wave above ground. So, horizontal and vertical polarization is best at 30 degrees for them both.

Owning to Faraday, rotation of the polarized horizontal wave sent via ionosphere can arrive at any polarization. The polarization can fluctuate all the time. W8JK array is bidirectional, ideal for finding open path to DX. A simple way is to send out tap on key while rotating aerial. Echo returning back means that is an open path around the world. Time delay is one seventh of a second.

Zero radiation perpendicular to page.

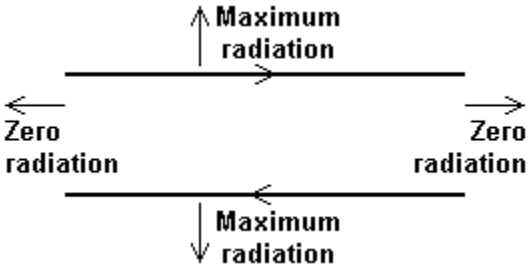


Fig.1 W8JK aerial conductors carry equal out of phase currents.

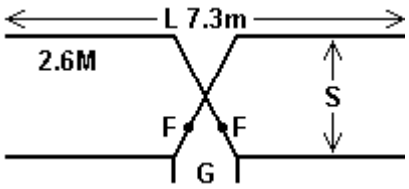


Fig.2 Center fed aerial two wire feed line connects to FF.

W9UCW Barry Boothe

by Deni, W9DS

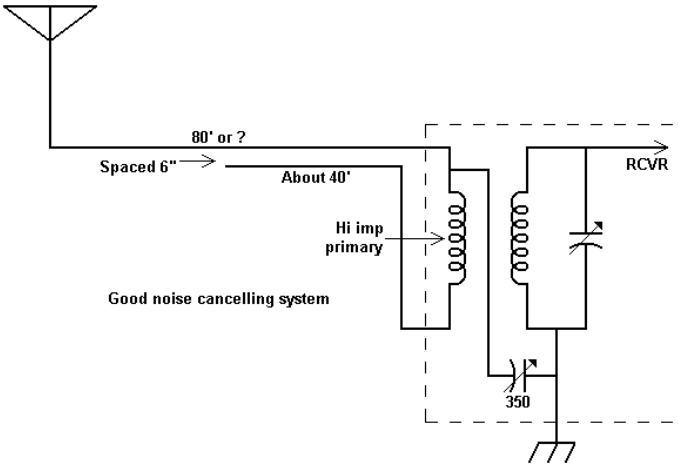
These two drawings of Barry's appeared in 1977 QST believe there were two all together. He had a manual that held things old time radio engineers did and I wrote a past article about him, Sep 2007.

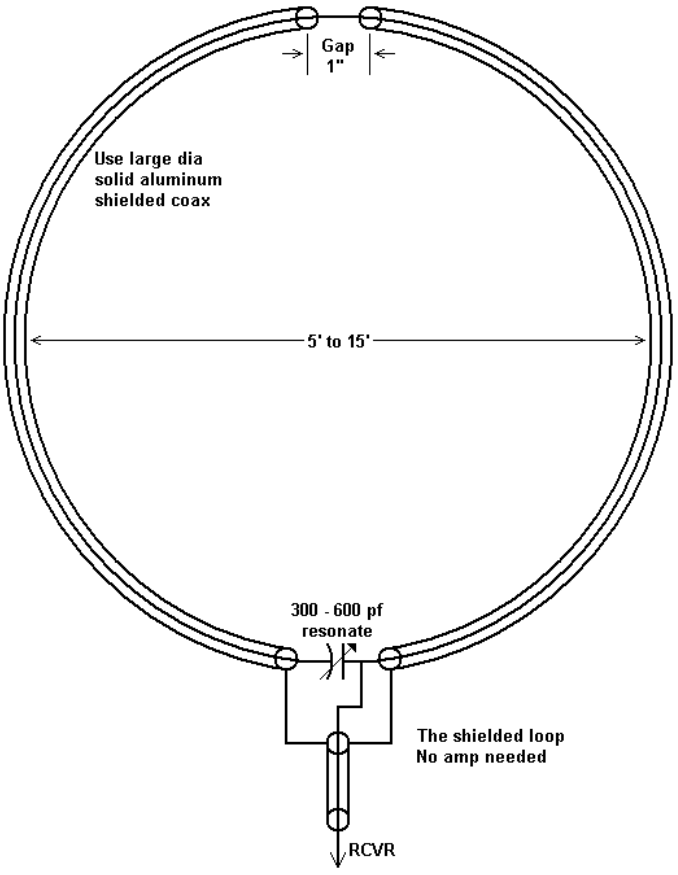
I do have those two drawings and they appear here. W9LP helped Barry out in many ways. He was featured in my 2006 May issue of Radio Activities.

Out of Barry's manual two systems appear. One, he was using at that time for noise canceling was the shielded loop hung from a tree away from the house. It was a 13' shielded loop and the tuner was brought into his home so he could tune the aerial from his easy chair. No preamplifier was used.

Next came the noise canceling system. The shield must have a good ground and all important parts are covered by a mesh screen. This keeps straying down to minimum.

Barry used beverage aerials and we'll look into those later on down the road.





Arising Air Electric Wireless World

by Deni, W9DS

Yup! A cord free home is just around the corner. Popular Science Kalee Thomson article in February 2008 issue. This can really be something most unusually successful with more time.

It is not new, but 200 years ago man knew how to send electricity without wires. Thoughts have been stired recently by the phenomenon using personal electric devices. Three companies have debuted wire free power prototype devices, although their distance range is sadly limited. In steps MIT (massa-chew-sits in-sah-toot of technicks) now known as power brokers whom have shot power across a room. Right now that's just about one room. They are hoping to power up more rooms with wireless resonance frequencies. Using air as a singer inhales air, then exhales resonant frequency.

Group of singers tone matches glass efficiency and absorbs singers energy cracks the glass across the room Much the same way, using magnetic induction and twin copper coils that resonate together at one resonant frequency, powered a 60 watt bulb from 7 feet away.

The invention is called witricity (short for wireless electricity). Next step is to widen the distance. The circuit plugged into a wall socket changes the standard 60Hz current to 10MHz and sends it to a transmitting coil. This sine wave current inside the coil causes the coil to emit 10MHz magnetic field.

A receiving coil exactly like the sending coil resonates at the same frequency, thus magnetic induction picks up energy from the transmitting coil. Now, oscillating magnetic field sets up an electrically energized current that lights a bulb.

This could do away with light cords and AC outlets. Your house can be powered in this manner; in fact each room would have this system through home garage tool shed, etc.

Fulton Innovations coupled uses paired coils to send power to short spaces. This company works with Motorola and Herman Miller to make gadgets for office furniture. Powercast in Pennsylvania showcased several inventions unveiled powered via radio waves from transmitters put into home objects microwave oven to desk lamp. Anybody want to bet the FCC hasn't been called by a ham yet.

ARGONNE AMATEUR RADIO CLUB
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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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Please send club and editorial correspondence to the club address, or to travisdj@bigfoot.com Please include "AARC" in the subject.