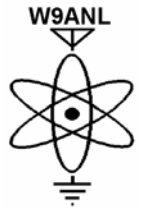


RADIOACTIVITIES

NEWSLETTER OF THE ARGONNE AMATEUR RADIO CLUB



Volume XLVIII, Number 7

July 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

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 June

Nothing received.

Ferrite DF

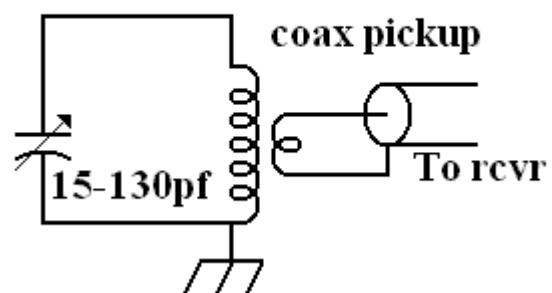
by Deni W9DS

73 Magazine April 1966, W1DFS writes about his contraption using only the bidirectional design. The efficiency is up when tuned to resonance. The ferrite DF is made from a tuned ferrite rod tightly coupled to a short piece of coaxial cable, which goes to the receiver. We need maximum signal transfer. The rod is much

more effective and less number of turns needed. A grid dip meter is used to tune to resonance in the 75/80 meter bands before completing assembly. Aluminum box minimizes hand capacity and wood pieces were made to clear the turns on the coil with a few turns of plastic tape fit tightly on the rod.

Plan to run radio RF gain full on after finding a signal and turn rod broadside to get strongest null. Tuning capacitor set for maximum signal. Find true north. Magnetic north is not true a declination correction must be made. In mobile work roadmaps must be used. Get a reading drive perpendicular to the line and after a while take fix by crossing these lines. For close up readings a field strength meter with sensitivity control could be used; that's another story!

17 turns #24 for tuning **5 turns over tuning inductance for coax pickup**



A ZL special DF is another beam type presented in 73 Magazine March 1981 Jane Rice ADGZ mounted on car passenger side through the window it has a driven a rod and reflector elements. These elements are positioned so a null makes the direction of a strong signal. Now rotate the aerial 180 degrees and a peak bearing on a very weak signal. The aerial is vertical a 2 meter version weighs one pound has 13 inches for a turning radius. Mounted on a closet pole which goes through a car window is lashed to the door into a 5 1/2 ounce orange juice can screwed to car floor.

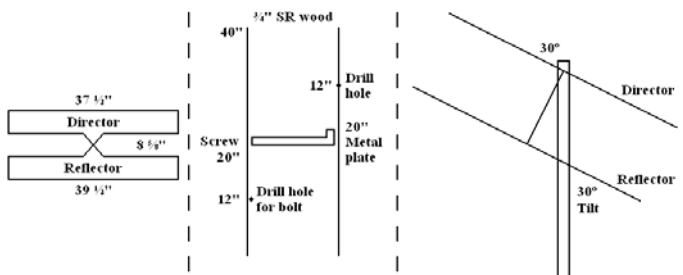
The modified ZL special consists of 2 driven folded dipoles phased to get a cardioid-heart-shaped pattern. It's a unidirectional pattern with sharp null in receive strength when reflector driven elements is exactly between a RF signal and our driven director. This null gives more precise signal direction than any other way. So flowing the null makes the best use of the ZL special.

When strength of the fox is weak switch 180 degrees and follow peak readings. As you get closer and peak readings get broad swing aerial 180 degrees. This aerial has best directivity with low gain. Front to back ration is 22db. Its forward gain is 3db. Tilt the aerial frame work 30 degrees forward from vertical. The aerial isn't prone to signal reflections from power poles, sign posts, etc.

The best front to back ratio, spacing between the 2 driven elements should be close to 0.123 wavelengths. Never go below 0.10 wavelengths as pattern distortion and impedance changes will result. The authors' was 1/9 wavelength 0.112 because of the spacing needed to hold the phasing line section. In calculating spacing as well as element lengths, a K factor of 0.965 is for the twinlead at 2 meter frequencies. Standard formula $984 * 0.965 / \text{MHz}$ results divided by nine is workable. The ZL phasing line acts as part of transmission line to get as close as possible to the 135 electrical degrees phase difference between director and reflector which requires a cardioid pattern. 300 ohm twin lead is used with a 0.82 velocity factor and a 1/2 wave at 146.5MHz is $492 * 0.82 / \text{MHz}$ or 2.75 feet then the 180 degrees in 1/2 wave / 2.75 = 65.36 electrical degrees per foot. A 300 ohm twin lead 0.70 feet long will yield $(0.72 * 65.36)$ 47 electrical degrees.

This combined with a 180 degree twist in phasing comes close to ideal phasing. So $360 / (180^\circ + 47) = 133$ degrees. This will provide 133 degrees at any 2 meter frequency. Feed point impedance 70 ohms RG59U or 11U will work the aerial has SWR of 1.5:1.

(Math: 1 wave $984 / \text{MHz}$ feet or $11805 / \text{MHz}$ for inches. $1/2 * 492 / \text{MHz} = \text{ft}$ or $5904 / \text{MHz} = \text{inches}$. K factor of 300 ohm lead at 2 meters = 0.965. Velocity factor for 300 ohm = 0.82. $1/2$ of 300 ohm line at 146.5 is $5904 \text{ inches} * 0.965 / \text{MHz} = 38 \frac{7}{8}$ inches. Velocity factor RG59 = $3904 * 0.66$. $1/4$ wave of RG59U is at $146.5 \text{ MHz} * 11808 / 4 * 0.66 / 146.5 = 13 \frac{1}{4}$ inches.)



Bi-Conical 4-10
by Deni W9DS

It's QST Nov 1956 when E.T. Bishop, K6OFM, wrote his article sadly the last page was lost. So, what we can

do without it, because another article will be called "Bi-Conical 4-20". We deal with efficiency and performance it's a little bugger 8' tip-to-tip performance for K6OFM was beyond all expectations. He used parts from a cone type TV aerial and you need 2 standoff insulators, B&W miniductor (3013). (12 turns No. 16, 1" diameter 3" long and a few nuts & bolts. I personally haven't seen a conical aerial since the 50s. So 1/2 OD aluminum tubing can be used [4] 48" lengths are needed for cross bars on the outer ends. And one end of these four for all is placed in a vise and pressed flat for 1" distance, if you don't have a vise your unlucky. We will just get out the sledgehammer and hammer it flat. Then drill a hole big enough to put a bolt your chosen size through. Then the center mounting plate is cut down to size and drilled through. Any non-conducting weatherproof material like plastic, Formica, etc. can be the mounting plate.

Halves of the cone-type aerial are held in place by aluminum clamp mountings the 4 legs 8' each come off the plate at a 33° angle about at the end of each 2 legs fasten a 30" length 2" standoff insulators are placed 3" apart on the center panel. Mini inductor is connected to one of the aerial sections with short length of #12 bare wire. The other side is taped on the opposite end of the miniductor. A 2 turn link was placed over the inductor in exact middle. A hole drilled so coax can go through the backside and go to the 2 turn link. There are about $10 \frac{3}{8}$ turns on minicoil. Thelink is #14 wire and optimum match is achieved by using SWR meter and both loading coil tap and coupling adjusted for 1:1.

Ends of coupling loop connect to RG58U or RG8U to keep coil from shifting. Cement where leads go through the panel. The far ends of aluminum are joined by metal strip or wire. Another thing to consider is using a coax trap in place of the link. Seems to me the coil trap would be better suited for use today. So, get cracking for those formulas I have given for coaxial traps. This aerial only spins 180 degrees to get to any country you need. 100 watts works the world.

For 10 meters radials are 24" long the 2 ends 9 1/2" long 72Ω or 52Ω can be used for a coax trap or as feed line the major coil 1" diameter 10 turns 1/8" spacing 3" long #14 wire and use a 2 turn link for link coupling.

Bi-Conical Four 20
by Deni W9DS

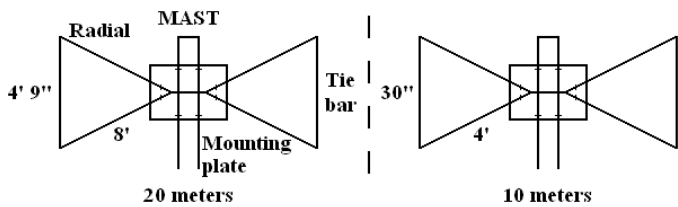
Along comes Ralph Rosen Baun, W5ECP, QST June 1957, and down converts our little ten wonder bar into stretching it out 8' per side. A 16 foot wing span has arrived, as before, link coupling is used, but today we can use the coax trap at the center instead. All you have

to do is the math from formulas presented before. Ralph says he had so much fun with 12 watts on ten meters that he doubled his power for 20 meters.

Ralph claims, rightly so, that fanning these elements makes a broad band width and is 1/2 the length of a standard dipole. The two 8 foot lengths diameter size is 3/4 inch aluminum as element radials. Electrical conduit or thin-wall steel tubing can be used. One end of each for two inches is crushed by a vise or anvil and sledgehammer with mighty blows until it is as flat as can be. Now drill a hole through it for 8-32 machine screws. A mighty solder lug is fastened to the rod through the hole. Center support is a board 1/2" by 8" by 15". Two 8' radials make up one bow, forming an 83 degree angle. The rod ends are 5' apart tied with #14 wire 4' 9" soldered to each of 4 ends. U-bolts clamp legs to board, the coil and link or coax trap are at center, but if you use high power as you must on this band then use 6 standoff insulators can be used and not 4 u-bolts. Tension is produced by lack of 3 inches of #14 wire adds rigidity.

A 5" spacing between bows was left for coil mounting. 30 turns of #12 plastic covered wire close wound on a 1 1/4" diameter Lucite form, 6" in length. A hole is drilled at each end of the winding and 1" standoff insulator is bolted to the form at each end. Coupling coil has 5 turns of #12 wire wound 2" diameter centered over loading coil. Only 13 turns resonate at 14.15MHz the rest 17 turns are shorted out. SWR measurements show the number of turns is critical and trial and error will show the right tap on a turn of the coil.

Twenty feet in the yard at Albuquerque, NM the conical performed excellent on CW and phone. It is suggested elements should be broadside to the DX country you want to work. He suggests a beam of two conicals should be tried.



Light Bulbs as RF Indicators

by Deni W9DS

Power output meters are expensive. I have used them for years to check the brilliance of a 75 watt DX-40 into a bulb of that rating. I even have one 1,000 watt light bulb.

Feed factors like wild impedance ranges from hot to cold must be handled by the link output or pi-network in your

rig. These filament resistance ranges for bulb ratings on 115VAC with cold and hot and ratio between cold to hot filament resistance are table form

Bulb rating	Cold filament resistance	Hot filament resistance	Ratio cold to hot filament resistance
115VAC			
7.5	166	1750	1 to 10
25	40	529	1 to 13
40	27	331	1 to 12
60	20	219	1 to 11
100	9	132	1 to 15
150	6	83	1 to 14
200	4.5	65	1 to 14
250	3.5	53	1 to 15
500	2	26	1 to 13
750	1+	17.7	1 to 15

As shown, 250 watt works for a FT101B, which has, at full power, 260 watts so I slide the power slowly up until full brilliance and wattage. I say to myself "baby your looking good". My finals didn't get cooked after all that tuning up those aerials.

Configurations of various outputs and impedances a nominal 70 to 73Ω impedance loads:

- 175 W load 3-60W bulbs in parallel 73Ω or 7-25W bulbs in parallel 70Ω.
- 3,000 W load 4-750W bulbs in series 71Ω.

Bi) nominal 50 to 55 Ω impedance loads:

- 250 watt load 4-60W bulbs in parallel 54.9Ω
- 500 watt load 2-150W bulbs in series both paralld by 1-150W bulb 55Ω
- 1,000 watt 2-500W bulbs in series 53.6Ω
- 2,250 watt 3-750W bulbs in series 53.1Ω

160 Receiving Systems

by Deni W9DS

Anti-QRM methods were exposed by Ed Noll, W3FQJ, in Ham Radio May, December issues in 1971. But, we will look at Chuck Bird, KH6TM, loop read by fans in May, 1974 Ham Radio. What is unusual is he uses only the outer shield of 2 turns of coax 23 inches diameter. The larger the diameter the better. Semi-flexible aluminum-sheated with a vinyl jacket is acting like a dielectric. These 2 turns are taped with ends close enough to bridge the double loop with enough capacity to resonate at any 160 frequency you choose.

The center conductor is ignored KH6TM used a voltage divider across the ends coupling to the impedance transmission line. You can make yours bigger if you

like. A somewhat accurate formula to put you in the ballpark is: $L = (R^2 * N^2) / (9 * R + 105)$ equals coil inductance in microhenries radius in inches. S is length of coil in inches and N is the number of turns. Doing the math = 4.66uH approximately. We look in the Radio Amateur Handbook and from a resonance table 50th edition 1973 page 34.

So, at 1.835MHz, about 1600pf we use a variable receiving capacitor minimal spacing thus low voltage types can be used in parallel. Hooking up transmission line a receiver can be used to find a peak noise hump, the resonant frequency, and the resonating includes the parallel capacity of input voltage divider of about 1424pf. The actual loop inductance is 5.28uH, a 1735pf capacitor exhibits 50 ohms reactance and a 100pf coupling capacitor for the transmission line. This loop turns on the light. Noise and strong signals are 20 to 40 db reduced in gain. However, unknown stations now are clearly hearable at a height of 80 feet suspended from a quad boom. Rotate the loop away from noise, QRM, or any reflecting objects.

DX Pileup Techniques

by Deni W9DS

We start with being on the air at the right times of the day. Using propagation software and magazine charts tells us peak times for our signals to reach our chosen region.

Call DX with either full call or just “the last two letters”. Follow DX stations instructions follow their technique.

Don’t call on DX frequency when they are working split frequency. Look for the pile up.

If you hear harassments on the DX frequency and it makes you mad, take a break & come back later.

Don’t call in as a portable station in another call area. You should wait for your home call area to come around and call then. Don’t make up a call sign.

When DX calls with a particular call he has heard, standby! Don’t call him! Let the DX make the contact. Have some courtesy. Handling a big pile up is a chore for the DX, and standby until they are done.

Listen, listen, and listen above all else.

The DX will tell you where he is listening. If all else falls short, listen for the station the DX is working; zero beat his frequency and make your call on that frequency.

Listen for the technique the DX is using moving up or down 1KHz at a time after each QSO.

Working DX pileups is 90% listening and 10% calling. You will eventually figure it out and become a happy DXer. Then you will have your own fighting the pileup stories to tell your friends. I have quite a few myself. 73’s, CU in the pileups.

Vertical Tip

by Deni W9DS

From QST 1984 we acknowledge from Demaws statements from Oct QST 1983 that as operating frequency approaches the upper end of the HF bands 40 and up to ten meters, the vertical height above ground is the difference between contacts and no DX. He says others have best performance on 15 and ten meters aerial is mounted 20 feet above the ground level with 4 radials. On twenty height isn’t mandatory, but it will help. The reason it works of course is because of the Brewster angle, which cancels low angle radiation at these frequencies. Get that vertical up off the ground!

Hanging Low Aerials

by Deni W9DS

W1GV, Stan Gibilisco, wrote a 73 Magazine Article for October 1984. As we know high horizontal aerial above ground gives us low angle radiation with little high radiation. A vertical however, takes up less space and by its nature has a low angle vertical polarized radiation angle. This is its nature. A 160 meter horizontal aerial radiates at very high angles unless you put it up 250 to 300 feet above ground and an 80 meter dipole up 125 to 150 feet high. From the aerial point of view of propagation is the familiar rule of optics applies to rays of light. The angle of reflection is equal to angle of incidence, and ground. reflections occur at all possible angles of incidence; energy sent down from the aerial gets sent straight up and so we do the best we can with a horizontal and vertical wire array using multiple wire schemes using common sense.

<p>ARGONNE AMATEUR RADIO CLUB P.O. Box 741 Lemont, IL 60439</p> <p>————— Officers —————</p> <p>PRESIDENT Bruce Epperson KA9H VICE PRESIDENT SECRETARY Kurt Boerste KB9ZFR TREASURER Charles Doose KB9UMF DIRECTOR Dick Konecny K9IB DIRECTOR Torben Lauritsen KF9MI DIRECTOR Charles Doose KB9UMF DIRECTOR Tim Smith N9UEB DIRECTOR Dale Travis AG9H</p> <p>e-mail: w9anl@bigfoot.com www.bigfoot.com/~w9anl</p>	<p>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.</p> <p>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.</p> <p>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.</p>	<p>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.</p> <p>EDITOR Dale Travis AG9H EVENTS SKYWARN ACTIVITIES Deni Lamoreaux W9DS</p> <p>Please send club and editorial correspondence to the club address, or to travisdj@bigfoot.com Please include "AARC" in the subject.</p>
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