RADIOACTIVITIES

NEWSLETTER OF THE ARGONNE AMATEUR RADIO CLUB

W9ANL

Volume XLIX, Number 8 **August 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.

Triangle 40 Meter DXing

by Deni, W9DS

Seems like hams sort of plan for upgrading their ¼ verticals in some phased array for a better aerial. The Delta each side 45.5' made of #12 copper wire is resonant at 7.100MHz. No radials are required because it is a loop. Most likely a counterpoise maybe of some service not ground though. A screen under this type may improve the radiated signal at that.

So, a single element triangle has length of one wavelength. Apex supported at least from a 55' mast. Bottom 12' above ground with lower corners going to ground stakes using guys. Easily fed at bottom, but I bet top feeding would work better 55' up you say! Yup, that's what I say. Straight up top or run up from mast through or tape to mast. Top is where most current should be. Where coax feeds the aerial is about 75 ohms not 50 ohms, so you use balun if necessary.

Another delta facing 90˚ to this one could be switched in at the bottom of these deltas for signal radiation into other directions that only one can capture. This aerial is superior over 2 ¼ wave verticals spaced ½ wave apart. Switching of the triangle can be at aerial top using relays if so you can combine the wires into different directions. High power can be used making other requirements a must, heavier parts for high voltage switching. The report I read used the radials and said DX was heard better with them.

So, I leave you with a 2-element triangle good for 15 meters as well, but check feed impedance it must be dealt with.

Two Simple Aerials

by Deni, W9DS

Do you need a simple easy multi-band vertical? Well, VE3FHS uses a well thought out aerial with ease of adjustment and lowest SWR. The aerial is a 22' not 19 and not 25 but 22' vertical aerial pipe. Larger the diameter the better and you need lots of ground radials running in all directions all different lengths long and short.

The 22' aerial is fed by RG8U coax for high power applications. A coil is needed at the end of the coax line LC network. 250pf with a coil inductance that can vary the capacitor and tap the inductance. Transmission line

is cut to one electrical wavelength on 40 meters. Line length, therefore is ½ wavelength on 80 meters, 2 wavelengths on 20 meters, 3 wavelengths on 15 meters, and 4 wavelengths on 10 meters. You see transmission line acts as a 1 to 1 transformer reflecting input impedance of vertical to the station end of the line. Vertical impedance varies widely.

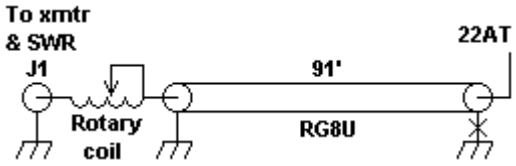


Fig.1 VE3FHS vertical. Place 250pf from one side or the other of rotary inductor to ground.

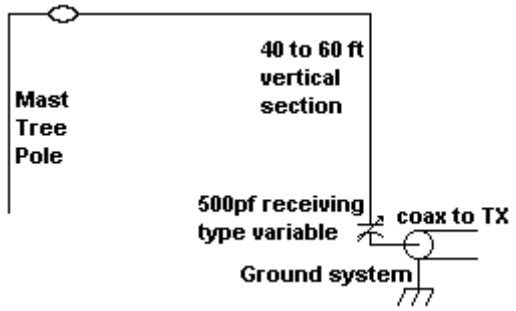
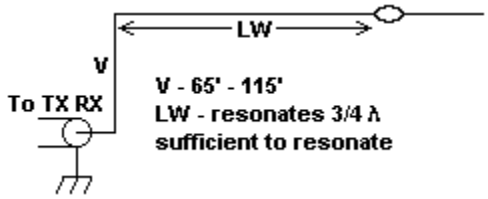


Fig.2 G3XAP 160 meter experimental aerial.

Fig.3



G3XAP one-wire single one-direction aerial for 160, 80, 40, 20 meter operation

Band width	Vertical length ft
1-8	95-170
3-5	48-85
7	28-42
14	12-21

From band to band, but a good match to fifty ohm line can be gotten by using enough inductance in series with the line so that the input of the matching device is at a point of high current. A rotor inductor works fine; or use a taped coil. Adjust inductor tap for lowest SWR at the operating frequency. The inductor can be placed at the station instead of outside at the aerial base for your convenience. Perfectionists use a roller coil and an auxiliary capacitor that can clip from ground to one side or the other of the coil. Adjusting capacitor and coil can get you the best SWR down to unity. For those not so fussy forget the capacitor and only use a tapped coil instead of the pricy roller variety. You do need a good ground system.

With any vertical, ground stakes driven into the soil are worthless except for lightning protection. How many, you ask. The closer to ground the vertical rests the more ¼ λ radials are needed; 60 to 120 are mentioned in books. Say that the vertical base is ten feet off the ground; you would be satisfied with fewer. Four radials for 40 meters and another four for twenty. The combination works on 15 and 10 meters too. Adding more for these two latter bands is a waste of time. Lower the frequency better the radials numbers works for performance.

How do you get directivity out of a single vertical? It has been tried on 160 meters by G3XAP. It is a short vertical with a single ¼ wave loading wire at the top. Then the aerial was series tuned to resonance. He could tell the aerial had directivity and to run tests the aerial had to be scaled down to ten meters and observed what happened on that band.

The 10 meter model showed directivity in the direction of the loading wire when it was sloped downwards to the ground. Maximum directivity came when wire ended in close proximity to the ground and less directive when the horizontal position was taken. Changes in the slope of wire had little effect on tuning or loading.

A second 10 meter model was erected near the first, but in the reverse direction. A switch in the coax line to the aerials allowed the operator to switch back & forth for comparative tests. The directivity between the 2 aerials was two S-units (12db).

If a compromise 160 aerial less than 60 feet tall could put out a DX signal that was only 6db down (1 S-unit) below that from a full size 160 meter ground plane aerial 135 feet high, then DXing has a good possibility.

A 160 meter version was put on the air. Wire sloped in the easterly direction from England, worked EP2BQ, Iran, while running less than 5 watts input and a few months later VK6HD was worked. Then the aerial was retuned for 80 meter operation. On this band, the aerial took the form of a half-wave loading wire fed by a ¼ λ vertical. Again, operation to the east was good, but stations from the USA were weak.

US Signal Corps technical manual TM11-486 table two shows the effects of height increase vs signal strength at the receiver by one S-unit, you must double the aerial height! Assuming one S-unit = 5db as a standard:

Freq MHz Skip	10’	20’	30’	40’
2-200	-10	-5	-3	-1
3.5-300	-9	-4	-2	-1
3.5-1,000	-17	-12	-10	-8
7-1,000	-13	-8	-6	-4
14-1,000	-9	-4	-2	+1

What is A Broad Banded Aerial

by Deni, W9DS

The Bazooka is a simple broad aerial. It was derived from multi wire fan shaped bowtie aerial ½ λ in length. This fan allowed the overall length to be shorter in length. The gain is the same as for the dipole. We can shorten a bazooka by using stubs and it will have a broader frequency response.

The folded dipole is one wavelength around the perimeter with wires separated by 2 to 3 inch spacers every few feet. This full wave is now a ½ wave dipole with ½ wave pattern and fed at the center of the lower wire impedance is a balanced 300Ω connection and another broad banded aerial.

A ¼ wavelength monopole uses the same wire technique. Using ½ wavelength of wire for the fold, and spacers, but used vertical tied slanted to a pole for lower frequencies without radials or with them. Now, at monopole base, the two open wires are at 165 ohm impedance. Cut for forty meters, our small monopole is 34’ long. Tied to pole 40’ up, using pulleys to hoist it up, and using 3 separated vertical wires spaced 10, 15 feet apart like a fan 71’ long each acting as a reflector in our favorite direction we get 3 to 4 db gain in the vertical plane. Broadened with good gain.

Next on the list is the Helix. We wrap our wire around a prepared circular form, wood, plastic, or any insulated material to serve our purpose. These windings are both inductive and capacitive along our length. They can be close wound or spaced widely for the frequency being used. These windings at low frequencies can compress the space reducing aerial length. There are trade offs though. It takes ⅝ or ½ wave of wire wound on a form to get our ¼ wave helix, but a full wave of wire is needed to get better bandwidth and less restrictive impedance.

Rudy, W9ZEW, sent me a copy of CQ March 1974 W6SAI antenna column, which featured a very compact 40 meter 6 foot dipole by VK5YS, a helix. It is center fed. 120 turns each side of center wound on a wooden 2 inch diameter 6 foot dowell form rod. This aerial sports one 6 inch wire capacity hat at each end of the coil, the last turn. Use 50 ohm coax, tie the center conductor to end of one 120 turn coil and shield to the other 120 turn coil. This helix used ⅝ wavelength of number 14 insulated wire. Tune aeral by bending end capacity hats to vary the angle between the hat and helix.

Bill Orrs’ article gave information on how to roll your own two meter ⅝ λ mobile whip. Parts needed are one PL259 plug that will screw into another connector mating to a female type, which bolts to a magnet or home brew ground plane for vehicle roof. Further needs are cut down CB whip, cut to 50 inches that will drop into a Lucite or polystyrene coil form. That is 2 ¾ inches long, ½ inch wide. One end is tapered to ½ to fit into a PL259 plug.

Drill holes at each Lucite end to fit aerial wire at one end and copper wire through coax connector into Lucite ¾ inches. Drill hole into Lucite to center to accept screw for one end of the coil to be held in place. With soldered PL259 center conductor and one side to coil wind 6 turns ½ diameter #18 wire one inch long. Whip goes into whip end of 2” Lucite holder. Drill hole so screw can be used to connect one coil end and make contact with whip wire too. Whip coil from plug are firmly joined with epoxy cement. Pl259 is force fitted into Lucite. Adjust SWR by adjusting spacing of turns on the coil or adjusting whip length. Coat with coil several thin coats of acrylic lacquer (Krylon) to waterproof your work. Now, brag about it.

121 Miles Per Gallon

by Deni, W9DS

In Popular Science January 2008 issue, a full page add appeared stating a vehicle was brought to a research facility got 39 miles to the gallon on our highways.

The research lab revamped the car. Installing their hydro-assist fell cell system into the vehicle scientifically controlled test conditions got 121 miles per gallon on the highway.

The process comes in two parts; a hydro-assist fuel cell kit. Your battery electricity now turns water into pure gas mixed in with your gas in car combustion chamber. This water gas HHO is so sweet (5 times potential energy of gasoline. That amount of gas used to get the same power needed is leaned out. Using a covalizer to break down these bonds of the fuel and heat, plus ionization for pre-treating car gas as well.

This combo reduces fuel usually needed and then your own cars computer is taught (must go to school) to lean

that amount of fuel needed. The company therefore will guarantee to run up fuel economy by not less than fifty percent with their universal kit. End of first process and beginning of step two.

Now an installation of their customized pre-ignition catalytic converter (ppic) this will really turn your fuel into plasma. Then burn it clean without old man pollution. Lab tests show it is possible to run pick-up trucks and great big pig SUV's get a smidgen over 100 pollution free miles per gallon.

They are all waiting for you call 'em up! So, don't waste a moment! Crank that computer up! Here is what you've been waiting for! www.picctv.com/ps and put those savings in your piggy bank.

One Half Delta Loop

by Deni, W9DS

This aerial uses a sloping wire ⅓ λ in length that attaches to the top of ground tower 1/6 λ high. Feed point is at lower end of this sloping wire and tower and radial grounds. This aerial supports an image in its lower half making it the grounded equivalent of a full wave delta, apex down, apex fed rotated 90 degrees. The author VE2CV, John Belruse in 1982 September QST said radiation is like that of a monopole.

Most of the engineering was done on 200MHz. Estimated dimensions for half wave delta loop for 80, 40, 30, & 20 meters. Mast height 48.4', length of sloping wire 98.6', and diameter of the mast 6.5 inches metal.

A loop designed for 160, 80, & 40 meters would have a height of 93' with slope wire 186.2'. It is important to know that the loop cannot be deployed on a tower that has a beam on top. If there is one then the configuration would be more like a shunt-fed tower with top loading.

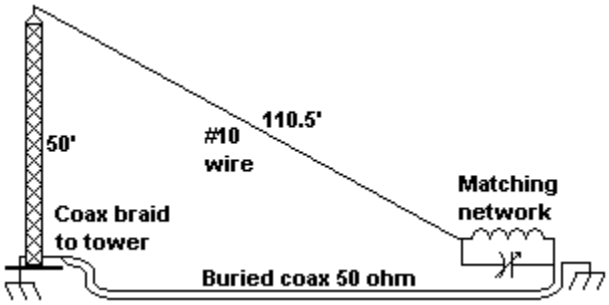
This top loading can be cancelled by using a ¼ wave stub. The use of more than one stub may be used to detune the tower at more than one frequency. Then the delta wire must be insulated from tower instead of being part of the tower. We want to minimize RF radiation from it. Ideally each leg of the tower should be stub tuned.

A cage type or parallel pair slope wire could be used to lower the Q of the loop and reduce impedance. A system of 16 radials extend out from tower vary 60 to 110 feet in length tied to 6' ground rod that is driven in at tower base. 4 ground rods 4' long were used at loop feed point. Recognize the need for an effective ground system. An electrical bond by using straps soldered at the junction of each tower leg joint for electrical integrity.

The impedances are greater than 50 ohms at 7MHz about 1,000 ohms. An L network can be used on all bands to provide step-up matching. The impedances are 3.5MHZ 228 ohms, 3.7MHz 620 ohms, 4.0MHz 140 ohms, 7.0MHz 1,000 ohms, 14.0MHz 251 ohms, 14.3MHz 345 ohms, 21.0MHz 100 ohms, & 1.8MHz 290 ohms.

The author claims the ½ λ delta loop surpassed his other 80/40 meter full slopers, half slopers, inverted Vees, & shunt fed towers. He received 599 CW contacts from Europe, South America, Australia, and JA stations on 40 meters long path early in the day. That did not happen before. Less man-made noise was heard on the loop. The S-meter showed no noise opposed to the usual S1 to S3 on 80 & 40 meters. At distances greater than 1,000 miles, the half delta loop greatly out performed the slopers.

There are indications the loop is omnidirectional on the lowest frequency, but worked on harmonics, it becomes more directive bidirectionally in the plane of the slant wire. The aerial can use a tree top drop wire. This wire can't touch trunk, limbs, or tree leaves. Good luck.



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In Urbana, IL. N40° 05.641' W88° 13.485'

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.

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EVENTS
SKYWARN ACTIVITIES Deni Lamoreaux W9DS

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