

RADIOACTIVITIES

NEWSLETTER OF THE ARGONNE AMATEUR RADIO CLUB



Volume XLVII, Number 6

June 2006

Club Meeting

This month there will be an informal meeting at the Argonne Cafeteria (building 213, north end). Associate members needing access to the lab should contact me on the Monday night 9:00 net or contact me via phone or email; check the roster. I'm hoping that everyone, including full members, can attend. It's a chance for all of us to meet during lunch.

The Treasurer's Report

by Jack Albert, WA9FVP

Members: East 15; Associate 37; Newsletter 6; Retired 12

Balances: Checking \$5,150.01; Cash \$0.00; ANL fund \$30.00

Distributed as: Club \$2,762.25; Repeater \$2,212.76; Newline \$55.00

For the period May 1, 2006 thru May 31, 2006:

Income: Dues \$6.00; Club \$6.47; Rptr \$15.10; Newline \$0.00; ANL \$0.00

Expenses: Club \$140.00; Rptr \$0.00; Newline \$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 June

10	N9ALE	Billie	Lemont, IL
13	N9S	Kay	Willowbrook, IL
16	W9FNM	Paul	Homer Glen, IL

Members, we need members, we need lots and lots of members!

by Jack, WA9FVP

With membership falling off this year, I think it's time that we start a membership drive. I will bring it up at the next Board meeting. The low Argonne Employee membership is one that really hurts. You probably don't know that for every employee club member, Argonne will reimburse the club 2 dollars. Here's how it works.

Each year a sanctioned Argonne club (the AARC for example) sends a club roster that includes employees and family members belonging to the club to the reimbursement coordinator (associate members are not counted). The club treasurer must include a check for one dollar per member. The AARC only has 15 employee members; therefore I will send a check for 15 dollars. If we have expenses that equal \$75 for example, I will send the receipts to the club coordinator and he will issue a check to the club for the maximum amount of \$45. The expenses can include postage, refreshments during meetings, room rental and equipment.

Keep in mind, if we had 200 employee members, I would send the coordinator \$200 along with receipts that equal \$600! I don't think we ever had 200 employee members but I could be wrong.

The bottom line is, if we can get more employees and family members to join the club, we will get \$2 worth of expense money for each member. The money will supplement our expenses and we can use it to pay for pay for postage, refreshments and other activities.

What's Wrong With our Energy Crisis?

by Deni, W9DS

I read, ten years ago, an article in the Chicago Sun Times Feb 11, 1996 stating that one Rudolph Gunnerman had developed A-21 A water based gasoline in his laboratory in Reno, Nevada. He truly had found a way to bond oil and water. The Illinois based Caterpillar Company was his partner, but now Caterpillar is leaving Illinois for warmer pastures. Anyway, the fuel turns white when Rudolph adds his compound to water and naphtha. They attract each other, whereas, normally the water and oil would repel each other.

This oil with water blend can be 30 percent water and 69 percent naphtha, or up to 55 percent water and 45 percent naphtha. The additives are a lubricant-bonding agent with rust inhibitor making up one percent of the

mix. This fuel won't burn outside the engine combustion chambers. It can be stored above ground safely without exploding. Mileage tests show slightly better per gallon than gasoline.

Caterpillar ran emission test trials; unknown outcome, but trials in Nevada surpassed EPA tail pipe standards, and two trials of the California Air Resources Board Standards. White gas has passed tests on a city bus in Reno and on a power generator four months feeding electricity to Reno's electric grid. EPA questions about water freezing, but enough anti-freeze was added so test vehicles had no problem.

The EPA and DOE wanted more trials, so as March 2006 approaches, they refuse to certify this fuel's use. Government people clamor this would cause water shortages across the continent. White gas has the lowest emissions over all.

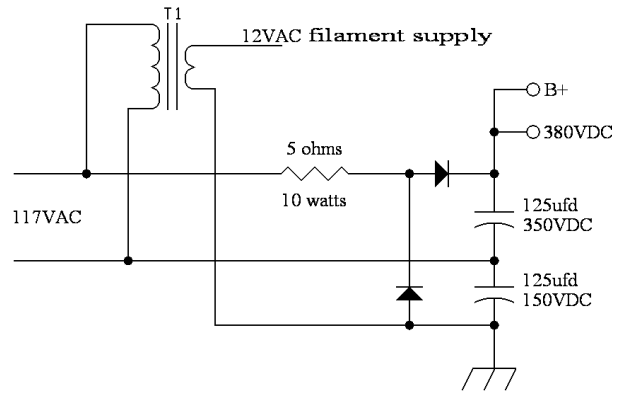
My Starved Circuit Audio Amplifier With Zero Bias Modulator

by Deni, W9DS

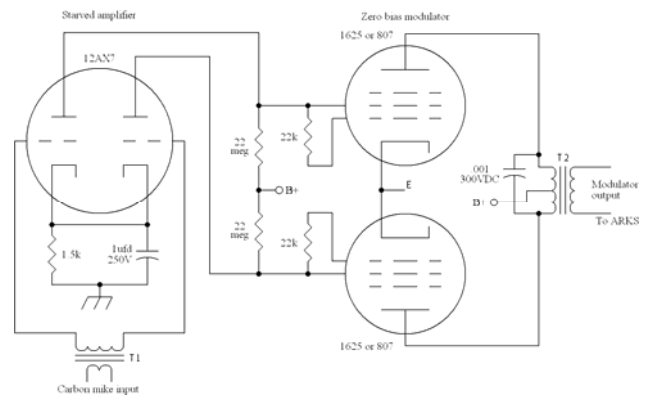
A few club members are restoring old relics going all the way to class C operation of AM/CW hamming. I have found the schematics of the audio / modulator / power supply used and built by me and used on 160 meters. It is as simple as it gets; low in parts and using some WWII surplus gear. A ARC-5 transmitter was an 80 meter type with Hartley oscillator and crystal calibrator finals in push-pull 1625's. The Hartley oscillator was padded to 160 meters. The RF section I double wound the final amplifier output coil via W9CPS supervision.

A dual triode 12AX7, favored audio tube, was used with a military carbon mike. No basey audio here with the supper highs of the starved circuit. I removed many parts and ended with 3 resistors and one capacitor.

The 12AX7 cathodes were tied together with one cathode having a 1.5k-ohm resistor to ground and a 1ufd 200VDC capacitor to ground at the other cathode. The mike transformer was already on the MD7 modulator module. The plate voltage for the 12AX7 dual plates came through a resistor divider using a 22 meg ohm, 1 watt resistor at each plate dropping the B+ to around ten volts on each plate; a huge voltage drop raising the gain. The 12AX7 push-pull plates were each tied to the grid of the zero biased push-pull modulator and each through a 22k 2-watt resistor to the control grid of the pair of 1625's and each modulator plate was tied to transformer T2 on the modulator board center tap B+ and output to the ARC-5 transmitter final tubes.



This power supply drove my 160-meter ARC-5 transmitter. The starved circuit audio amplifier and zero bias modulator plus the Hartley oscillator and final amplifier using push-pull 1625's.



It was built because my DX100 had broken down. The VFO in the DX100 jumped around and was struck by lightning. It was fun to build and was handy for a second emergency transmitter and AC supply.

Vertical Mish Mash

by Deni, W9DS

P.J. Ferrell (the first guy to hold W7PUG) wrote about a sewer pipe special in May '72 73 Magazine. It is two half waves in phase with a 1/4 wave open line open ended and fed with open wire. Most antenna books carry this type of aerial. He deletes the left 1/2 wave section. What is left is a "J" aerial made up of balanced 1/4 wave stub feeding a half wave load unbalanced. Is this good? Currents aren't equal, the matching stub radiates, causes RF currents to distort the radiation pattern, and tuning tough. W7PUG wants you to use a chrome plated brass pipe of 1 1/2 inch diameter 19 inches long slipped over the bottom quarter wave section. Coax semi rigid 3/4 wave is inserted into this 19 inch section center insulated from the section then 1/4 wave out of the brass remove the dielectric and just have the center conductor for the top of the aerial.

Next W6TKA has his favorite J pole published in 73 Magazine May 1965 has another version. The “J” pole is a ½ wave vertical with ¼ wave matching for 2 meters. The 19 inch section copper wire one end bent into a circle at the bottom end soldered to a PL259 and bent away from the center “2” inches then go vertical. Elements are ⅛ inch half hard brass rod. Try a metal shop. Length above connector “38” inches and 19 inches after bend – simple to make, it would seem. Place a spacer between the wires near the bottom and top to keep them from shorting. This J has low wind resistance. Using one watt, W6TKA worked San Diego while driving through downtown Los Angeles 100 miles away.

W6TKA writes further in the second part about a coaxial 2-meter aerial, which acts like a discone, which has its “funnel look” about it.

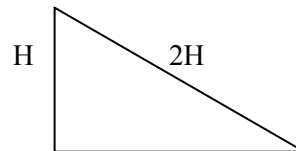
The coaxial aerial uses a cylinder sleeve attached to the shield of the coax and has no more gain than a dipole and is more costly on time and money. At least the discone looks odd, but about the same results. I’m using a discone; its element is steel 20 inches long and it covers the whole band with 1.8 SWR. I can work Indiana and Wisconsin on it with 35 watts of power.

Now W9LI, a late broadcast engineer, deceased before his article came out in August 1980 QST says, “It was after WWII that the vertical came into fame though DXers looking for low angle radiation aerials along with short lot city slickers who couldn’t handle horizontal dipoles.” W9LI through trial and error engineered a 3 element vertical array for 20 meters low angle gain DXing on CW. Each element ½ wave 33 feet (this is ¼ wave on 40 meters also but no mention of any 40 meter operating). He fed each vertical through a ten foot 450 ohm transmission open wire line exactly ten feet each. Each vertical is zepp fed called voltage feed, designed for additional gain and choice of directional patterns. It is a 360 degree equilateral triangle. Each side is 17 ½ feet about ¼ wave. Each element was fed one wire at the bottom. The other open wire feeder wire was fastened to a empty insulator. The signal is beamed through the two in-phase elements and in the direction of the out of phase element. Relays switch the elements so that 360 degree coverage is obtained thus 1db gain for the in-phase elements at the indicated spacing and 4db gain for the out of phase elements is about 5db.

Each element is mounted on 4x4 redwood posts 16 feet set 4 feet in the ground. The aerials 32-foot elements are 11 ½ feet above ground on the side of the redwood posts were drilled and bolts to GIST aluminum tubing. This tubing is 0.058 inch wall thickness. This allows the elements to telescope with 0.009 inch clearance. The

first segment of each element has 1 ½ inch OD with a 1 ⅜ inch OD piece inserted in the full 12 foot length. The reason for this is that high winds bending will be able to bend in a arc with no damage. The next second formed 1 ¼ inch OD tubing 12 feet long then 3 four foot sections 1 ⅛ inch OD 1 inch diameter and last ⅞ OD. Each section is telescoped 9 inches into the next larger section and hose clamped. Each element is now 33 feet. Stainless steel strapping insures a good electrical connection at the bottom of each element.

Ten feet of open line exactly runs from the relay box to each element one wire to bottom of one vertical and the other lead dead ends at an insulator on the pole. The switching relays must be rugged for high power 3kw use. He used advance relays. A series tuner is good for matching. The tuner is fed by buried RG8U. Regular rotor cable carries the relay control voltage. Two knife switches control tune up. Another switch keys the transmitter. Radials aren’t needed. A ground for lightning is approved. A good ground to the braid of the coaxial cable at the aerial is needed. No vertical is an ideal receiving aerial, but this one shows good directivity and low angle DX signals. Side discrimination is good for DX, but bad for state side signals. The first morning he tried the aerial he worked two VU’s with little effort.



The half wave delta loop a different vertical polarized aerial appeared in 1980 Ham Radio September issue by VE2CV famous John Belrose. Canadians can dream up aerials too. He has his aerial run a wire 2 H long from ground to a tower H height and grounded. The loop is completed by the image in the ground plane and thus ½ wave above ground equals one wavelength. But every aerial has this same image even sky high beams horizontal or vertical have a image. They add that’s good they don’t work; oh well! Its in aerial books to take advantage of this image even a stacked pair of ½ wave vertical dipoles add gain this way.

A ground screen is needed to provide a low resistance for return current flow in the ground to the grounded side of the coaxial feed.

	tower height	length of slopping wire	band
MHz	feet	feet	
1.8	100	206	160,80,40
3.6	50	103	80,40,30,20
7.15	25	52	40,20,15,10

The aerial is about 5db over a free space dipole.

Simple fifteen meter beam by WA8MUR appeared in 73 Magazine July 1966. This shortened beam director 468 / freq MHz = overall driven element spacing .15 wave length and reflector 501 / freq MHz what made this different is the fact that one fourth of the elements length on each end is bent down 90° 50 eleven feet flat 5 ½ feet pointing down at each end and the same done to the reflectors length. A shortened aerial with smaller turning radius. Gain near 5db. This looks much simpler aerial to build than many other aerials of its kind.

Oh Really

by Deni, W9DS

Seems some aerials get classified under Why Bother. There is something better. That's the way I feel about W4VON rendition of Single Boom G4ZU Beam. It's aerial complexity with open line feeder stubs and trombones tuning. Europe marketed it as "Panda Minibeam" maybe there is an orchestra that can play that tune on trombones in Chinese. It is the way you feel when reading this article. Why bother? So, here it comes. Let's turn to CQ April 1971 by W4VON. Wonder if it's a April fool joke. Let's go anyway. We need a stepladder to make adjustments for trombone resonances, and you stick a grid dip meter directly into the trombone while sliding adjustments. (Maybe looking for the key of "C"?)

Arthur Blave ON4BX comes to the rescue. He gets an honorable mention because he found that 43 feet of open wire line attached to the aerial (it doesn't say where) and now connect 50 ohm coax. Might that be the feed line?

Under performance paragraph it says "excellent" then comes "we had no facility for installing a dipole and make comparative gain figures. But it radiates very well; then, "Worries of radiation by feed lines is dispelled because of "excellent directivity in receiving." Then he moves into a home "with no room for a full size 20 meter beam" and "time and band conditions did not permit extensive testing before dismantling the aerial." I think that open line allows high power to be used. A couple KW will make any aerial heard, especially verticals on any band. Lastly, W4VON says, "A poor man's version could be made by taping copper wires to bamboo poles."

I'm taking my bamboo poles and Gone Fishing, Ole Bean!

Spring and Helical's

by Deni, W9DS

Spring is here time to get going on your indoor and outdoor aerial projects. Little coils should be dancing in your head. Let's take a look at these big, small, long, and short pesky coils. We can simply calculate the diameter, length, number of turns, pitch or wire spacing between each turn, and wire size. A wire wound upon a rope is called a rope coil. It, the rope, can be made of nylon, dacron, polypropylene, hemp, vinyl-plastic clothesline, or fiberglass core clothesline, or PVC pipe.

Maybe you can think of other forms like coiling a tree, perhaps. Wire sizes range from large to small. You may need stealth and practicality to lead the way. To get your coil to work as an aerial we need the frequencies of interest and formula to do so. Understand it takes a full half wave of wire or cable wound onto a form in order to make a ¼ wave vertical or one half of a dipole. And a dipole needs one full wave of wire done whineing. Let the ends dangle a few feet so to cut off excess when adjusting to frequency desired. It is possible to form a quad element, delta loop, or rhombic this way.

Mounted vertically as W0FEV did in his article of November '73 in 73 Magazine. He used mailing tubes as a 3" diameter form. He painted the inside of the tube with spar varnish, rolling it around to cover the entire inside of the tube; shellac could be used as an alternate. The frequency chosen 3.5 MHz seven feet long plus a few inches and wound 174 turns every ½ inch. About the 160th turn, tap every second turn from then onto the last turn. This will allow you to be able to cover the whole band. Scrape the wire insulation off and twist a loop in it and solder before proceeding winding. Terminate the wire by drilling the form and thread the wire through the holes now provided to hold things in place. Now attach a top hat to the top wire. To hold wires in place, varnish them in place.

Power up your rig, watch the SWR, & tune the rig for lowest SWR. That's the resonant frequency for that tap when 1:1 or whatever it might be. You will have to retune your rig and/or add more turns or unwind a turn at a time from the bottom.

You can use link coupling. Use a tuning capacitor in the transmitter link, which is wound outside around the aerial coil bottom.

Helical loading gives us inductive and capacitive loading and so the bandwidth and impedance are less restrictive. As the diameter of the wire winding gets larger at about 10% in wavelength or when the diameter gets to the length of one half of the lineal length, axial radiation will be as strong as the broadside radiation. Axial mode radiation is the bases for UHF helical aerials very high gain.

We fit our aerial into our available space. The formula for wire length is L/P times the square root of $(P^2 + (\pi \times d)^2)$. L/P is the number of turns and the length of one turn.

WA0WHE in Jan 1972 QST built a 75 meter helical using a home made form 4" in diameter and overall length of 20 feet. He used 123 feet of 12-gauge plastic coated copper wire to wind the 20 feet form.

The form PVC tubing had 2 ten-foot lengths 2x2 wood shims for internal bracing. Top hat was ten inches metal disc attached to the top wire. SWR of 1.5 to 1 at 3.995 MHz and 3.5 to 1 at 3.910 MHz. Four radials were used each 65' long and an 8 foot copper ground rod was sunk into the ground. The feed point coax had a 150pf variable capacitor from the center of the coax to the last turn at the base of the coil end.

Please don't get all tangled up in the wire. I did help.

<p>ARGONNE AMATEUR RADIO CLUB P.O. Box 741 Lemont, IL 60439</p> <p>Officers</p> <p>PRESIDENT Bruce Epperson KA9H VICE PRESIDENT SECRETARY Jack Albert WA9FVP TREASURER Jack Albert WA9FVP DIRECTOR Dick Konecny K9IB DIRECTOR Torben Lauritsen KF9MI DIRECTOR Charles Doose KB9UMF DIRECTOR Jim Jorgensen K9RJ 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>
---	--	--