RADIOACTIVITIES

NEWSLETTER OF THE ARGONNE AMATEUR RADIO CLUB

W9ANL

Volume XLVIII, Number 4 **April 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

Members: ANL 11; Associate 24; Newsletter 5; Retired 10
Balances: Checking $3,821.43; Cash $2.00; ANL fund $30.00
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For the period Mar 1 thru Mar 31, 2007:
Income: Dues $2.00; General $0.00; Rptr $0.00; ANL $0.00
Expenses: General $39.00; Eqp $0.00; Rptr $60.90

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 April

02	N9ASC	Bill	South Elgin, IL
03	KC9AZJ	Thomas	La Grange, IL
05	N9GZX	Richard	Hinsdale, IL
05	K9ILX	Bruce	Morris, IL
19	KA9PMZ	Robert	Lansing, IL
19	WB9WOC	Jerry	Kankakee, IL
22	N9SXG	Georgiann	Ottawa, IL

The Impossible QTH

by Deni W9DS

No matter what equipment you borrowed, bought, or stole, nothing works well at the impossible QTH. If you are a renter apartment dweller, my sympathy. We are all different and creative, but one thing is for sure; you passed at the least a written examination. It took studying for hours in your spare time, and you made it, for whatever reason, you stuck it out. It was hard for some, easy for others, but you must be able to communicate. We are the public we must satisfy our beliefs. For whatever reason, you are in the public eye all over the world and so we hams must make friends by communicating and helping one another for the good of all man kind.

In this matter of communicating we must be heard from by using our equipment transceiver and aerial we are able to communicate in many different ways; CW, SSB, FM, PSK, RTTY, and so forth. In order to do this we must be able to make our signals heard. What are the means we use? If we speak into a microphone we can be heard through our loudspeaker, but what about the aerial. Most are not knowledgeable to roll their own. It is easier to buy the commercial aerials. How can we make a small aerial work like the big ones? We make do with small but efficient aerials. We sacrifice one thing for another in order to be heard. How about 20 watts into a small vertical mounted in an attc. We find ways to be heard by using very narrow bandwidths of just a few cycles. PSK31 uses just 31 cycles spread over a ten or twenty KHz band width. You need a computer, software programs, radio feed line, and aerial for indoor which is extremely hard to radiate especially on HF bands under 30 MHz. We must compromise our aerials.

Short dipole ¼ or ⅛ λ dipole efficenty 5% to 15% not good. Where are losses the greatest? Let's look at our feed line example. A 30 meter length of RG58U has a ten to one SWR 6.5db is our loss. Less than 25% power would reach radiating. RG8U is our feed line then loss is 2.8db and just a tad over half of our output radiates. RG8U has a 5 to 1 SWR loss is 1.7db two thirds of our power does not reach our aerial. What happens to our aerial with ¼ λ input impedance of 800 ohms and a ⅛ λ impedance is 1,300 ohms and highly reactive. So we must match our aerial with a tuner! Our impedance rises

or falls in line with reactance to resonate the entire circuit to send out all the energy possible. A ¼ λ has 30 ohm impedance, a ⅜ aerial has 10 ohms and 5 ohms at 1/16 λ long.

We can go into loop technology, which requires large size radiators or just thin wires, but they have more resistance losses. Use a thickness you can get away with. Make the aerial so it can be put away fast. Anyhow, 2 meters is a dwellers haven and small size here is 80 inches for a full wave loop. Good luck.

The BiConical Broadband Bowtie

by Deni W9DS

Well, I have found an article in 73 Magazine Oct 1984 by KC3HW, Jim Burtoft, which shows a better picture of a low band biconical. Jim got his idea from Bill Orr's Radio Handbook saying that aerials can be made broad banded to cover, for example, the whole 80 meter phone band with low SWR, 1.5:1.

Remember that an aerial resembles a series LC circuit. The resonant frequency depends on the (L) inductive and (C) capacitive values. So, by spreading two wires tied to an insulator per side forming a Vee per side each wire 55 feet each of four and the ends of the Vee 3 feet apart and a 3 foot wire soldered to the bow-tee ends closing the circuit at each end of the dipole. It will perform over the whole phone band this added end wire inductance and shorted the aerial's leg we can use PVC 3 feet long, run wire through it, solder the two legs at each end of the (L1) 55 foot lengths and hoist the whole thing up a pole and run it like an inverted Vee. 110 feet spread as less ground space is taken up. Feed point impedance 50 ohms using a multipole of ½ wave RG8U is 83 feet or use 450 open line and aerial tuner in the shack for multi-band use higher than 80 meters harmonically.

KC3HLN recommends electric-steel fence wire. It comes in ¼ mile spools and available in farm supply stores and used to be sold at Sears for ten bucks a roll.

Sterling: My Hot Air Engine Future

by Deni W9DS

Yes, if you've been listening to my transmission on the Argonne repeater, I have mentioned what we need and it's already been discovered back in the 1800s by a Scotch clergyman called Roberty Sterling no patents pending! Thousands of these hot-air engines came to be used in America as well as England and France for pumping water and light tasks.

Diesel power put the air engine on the back burner in an article by Alden P. Armagne published in Popular Science February 1948. Philips of Electrical Works of Eindhoven, Holland became interested in updating the Sterling Engine for modern hot-air engines. Tests show more efficiency than gas and diesel engines. Hot-air engines for automobiles show a new design with cushioned air with no transmission gears, long life, no corrosive gasses, no extreme temperatures, less wear, and can be used for home power plant and the Philips Sterling is silent, using air horse power large enough to drive a small car.

It uses an external burner that can burn wood alcohol, cheap naptha, etc. It is 20th century high-pressure high-speed design with 3,000 RPM. The hot-air engine uses heat directly to expand air (the gas) that drives its piston. Heated air expands in a hot cylinder drives a flywheel and drive shaft then the expanded air goes into a cold cylinder. Here a piston and flywheel compress this air to its original volume, then air without change enters the hot cylinder and the cycle repeats using the same air over and over shuttling between the 2 cylinders. 1,200 degrees F is maintained in the hot cylinder and 175 degrees in the cold cylinder. A pump keeps air in the crankcase under the same pressure as that in the cylinder. The counter pressure lessens the need for a tight fitting piston prevents air loss and reduces bearing load.

Each piston sends power on its down stroke. The pistons have a 90 degree phase difference. When number one is at the top of the stroke, number two is moving down delivering power. Number 3 is at the bottom of its stroke, and number 4 is rising and compressing air. Grouped four cylinders in radial fashion in 2 Vs has 30 horse power.

Now, let's travel in time to July 1965 and an article by Harry Walton published in Popular Science. Once again we are astonished at the uses and new chank design. He writes, "Strange crank geometry makes a perfectly balanced one cylinder motor working medium air, helium, or hydrogen. The engine has 2 power pulses every revolution."

It now generates electricity from sun heat while circumnavigating the globe from space. Now updated, the army was testing it for field use. The navy put it to use and gives a submarine eight times the range of battery drives. Oil heats aluminum pellets to 2,800 degrees. Circulating air carries the heat to Sterling Engines. The Sterling is as reliable as the postman. Its efficiency is high-up to 39 percent on test units. It equals the very best diesels and ahead of rotary and gas turbine engines.

General Motors was pushing research under a license from N.V. Philips Gloeilampenfabrieken. It took time and brains to build power plants five to 5,000 horse power and uses from below the sea to outer space engines for satellites to huge generating plants. Compression is a modest 2.5:1 and the peak torque without fly wheels is 3.5 its mean output torque and working pressure in cylinder is 1,500 to 2,100 PSI.

In space hydrogen is 50% more efficient at high speeds. Next best is helium, but air delivers more torque at low speeds. Back on earth a Serling car engine would need a radiator 2 ½ times bigger than a gas engine. The car won't need a transmission. Multi-cylinder Sterlings won't be heavier than a diesel. They have already been built in sizes up to several hundred horsepower with the ocean as a heat sink cooler. Sterling engines are a natural. General Motors Sterling Torpedo Engine is fueled by hydrogen peroxide and diesel oil and one design four cylinder opposed-piston design develops 580 horse power.

Non-nuclear subs tested a thermal storage test. Aluminum oxide is heated to 2,800 degrees F. A sterling 30 horse power develops 100 horse power hours. The full size version delivers 52,000 horsepower hours.

Finally the Sterling is thermally reversible. Run it backwards by another engine or motor and the heater tubes get hot. Drive it the other way and the tubes get warm while frost forms on the heater tubes. Philips designed refrigerators around it.

The Minooka Special

by Deni W9DS

An original article from friend and 160 meter guru Barry Boothe, W9UCW, now of Texas, appeared in Dec QST 1974. He did a lot of research and made friends with many broadcast engineers locally using low band aerials. He came up with many good questions in his low band aerial survey, which probably is still going on, under his supervision. His aerial pole began in 1969. Here are some of the answers from DXers: 60% favor verticals, 30% horizontal, 10% mixed. This included ¼, ½, ⅝ wave length, vertical arrays, and inverted Ls. These replies were from on the air signal comparisons and past experience. A vertical is more effective than a horizontal on one sixty. How about mobile? One used a heliwhip; most were center loaded, the rest were top hat top coil loaded. These authors experience results in a table for the best results using 6 different possibilities. Results are top loaded inductively dip metered and SWR bridge used for tune up. For 7 foot mobile types to 60 foot back yard DXpedition models, the fixed tuned mobile bandwidth was 10 KHz for mobile and 50 KHz for station models with 2 to 1 SWR or better.

Look at table one. Here is how it is done. With coil only and top section place aerial in the clear and where it can be tuned against car body or ground radials. Three turn link coil connect temporarily between lower end of coil and ground system. Insert dipper coil into link and adjust coil turns until dip is found near resonance. Completion of pruning then cover coil with waterproof tape or shrink tubing. Tune aerial between 1.85 or 2.00 MHz. Coil L3 will have 5 to ten turns #18 gauge spaced ⅛ inch between turns. It is possible to adjust the mobile aerial in its completely assembled form. L1 is adjusted for resonance, and then L3 is set for lowest SWR. L3 can be mounted inside the trunk or under the bumper in weatherproof enclosure. Home radial system should be at least ten #18 wire 10 to 50 feet in length, but 40 radials 60 feet long is better. Barry Boothe compared small verticals from Table.1 and they were 5db down. He used mobile version 4 from Table.1 with a 4 foot base section and from the car worked W1s through W6s, VP9, and KV4.

Because the loading coil acts like a RF choke at 3.5 MHz and above, other versions are successful 160 to 20 meters using L-network matching section installed at the base of the system.

X	No1	No2	No3	No4	No5	No6
	5'	8'	4'	4'	19'	3'3"
Y	2'	1'3"	3'6"	4'	11"	3'
Z	as long as possible					
wire size	#20	#19	#18	#16	#19	#22

Table.1 – Dimensions for Fig.1

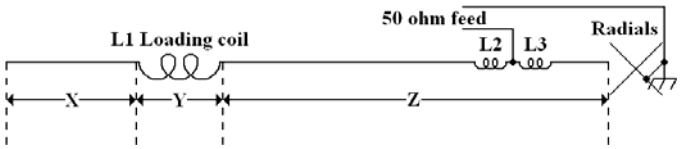


Fig.1 (laid horizontal to save space)

The DXer is on the ball at right times by using up to date computer software for propagation the time your signals will peak at the DXland and your schedule.

Always use your whole call, W9DS, when calling unless instructed to use your last two letters technique. Stay off the DX frequency unless he wants it that way. Look for a pile-up. Sorry that's where is listening. He is split up 5, 10, 10, and 20 KHz that's where the DX wants you to call. Listen for the station he talks to. Not easy in a pile up. The loudest mouth gets the first contact. Don't call on his frequency when he is split frequency. If naggers are nasty and annoying spin the dial – get coffee, cigar,

cigarette, or pull on a cats tail, but don't chastise those bums they want an audience.

DX will go by call area's don't use a portable or fabricate a mobile call if it's false. Let the DX work. If he is calling someone else don't keep calling it slows things down, because he will call the station he wants. Some DXers will never work anyone on the DXpedition, and mad enough to strike you out of all the DXpedition logs I know this to be true. I avoid very busy pile-ups unless I have a plan of attack. Watch how he listens. The DX works the strongest in the middle of his listening post. Then go 3KHz away to the top of band before going back to the beginning frequency for calling. I sit at the top end only moving to the middle unless it is the last day and I must work him. I will try anything if I hear them well. Many times the DX is weak, but he may hear you very strong always call in. Once or twice I had a 5 by 9 when the DX was 3 by 3 because of propagation.

The whole game is to keep your mouth shut until he is on your frequency. You have to listen whom he worked last then move up or down 1KHz at a time and listen 95% of the time and transmit what ever the time is left.

There are DX newssheets that subscribers are alerted to the next island or rare spot and dates DXpedition will start. Fortunately, we have wealthy well to-do ham operators that front the money and pay the way for proven DXpeditioneers or are millionaire businessmen that travel and pay for the whole trip out of their own or companies' wallet as business expenses. Each one is different. Each DXpedition is different and the game goes on. Things change and so are the challenges now. I here DX logging stations on computer has become the "in thing". Blogs and DX worked site appear so you can look up your contact with the DX, if good then you mail your QSL card for QSL DX card.

My thoughts on DXing is the guy who builds a ham shack first, before the house is built and has a Yaesu 9000 and the best linear on the market and a one hundred ten foot tower with one mono band six element engineered home brew one of a kind aerial – means business, is a serious hobbyer who travels to see who they are.

Are you hooked? Yup! I am just a little fry.

How Can We Increase Our Signals?

by Deni W9DS

The sky wave is the radiation which leaves the aerial at angles above the horizontal to earth and reflected back to earth and other radiation angles that combine signal strength. The reflected wave for horizontal and ½ λ verticals, DXing requires low angles of arrival and so for a radiation angle of 7 degrees we have an aerial 123 feet for 20 meters. These heights are needed to reinforce the sky wave. For general operations 65 feet seems to be the minimum height for good DX operations which both waves coincide for horizontal aerials of 16º on 20 meters, 10º on 15 meters, and 7 ½º on 10 meters so get that aerial up there for more DX QSOs. As for verticals height check out some of my past articles in this newsletter.

AM Forever

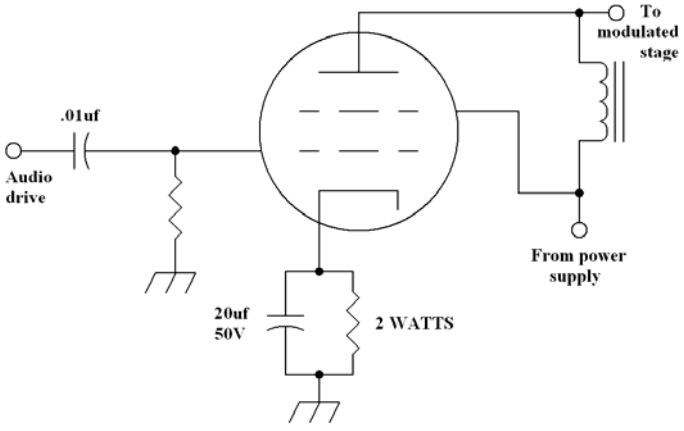
by Deni W9DS

My DX100, ARC-5 xmtr, DX-40, and FT101B are rigs of my past. I have operated AM recently on eighty and forty meters in areas set aside for gentleman's agreement with SSBers. It seemed so simple-a-day in those past years. All of my rigs were plate modulated, but many of that era used heising modulation or choke-coupled modular. You choose a pentode or tetrode with plate dissipation rating equal to or greater than the power input to the modulated stage.

Connect the tube as shown. Adjust cathode resistor for equal plate currents in final and modulator tubes. That's it. For tube life, don't exceed plate dissipation rating. If you run half as much current into the modulator as you run into the modulated stage, the modulation percentage can't exceed 50%. This can cause distortion. The choke must handle the sum of the modulator and modulated stage currents.

Example: the modulated stage is supplied with 250 volts current of 100ma. The lowest audio frequency of interest is 200Hz. Modulator must be pentode or tetrode with plate dissipation rating of 25 watts or more (250 volts X 100ma). The choke must have an inductance of 4 henries minimum at 200ma current rating (the sum of modulator and modulated stage currents). The power supply must be able to deliver this amount of current.

Typical audio drive voltage required by modulator will be 10 volts or so for tubes in 25 watt category.



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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
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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.