Rochester DX Association

April Monthly Meeting

RADIO INTERFACING

K2MTH and W3OAB will demonstrate their recent experience interfacing:
A. Dell Tower running WinXP
B. N1MM control program
C. Green Heron Radio Boss Interface
D. FT990 XCVR
We will go over:
A. Loading of N1MM .wav files for phone contesting.
B. Verifying Yaesu CAT Control interface to N1MM.
C. Interfacing the Radio Boss in functional increments.
D. Explanation of all cabling and possible alternatives.

Tuesday, April 16, 7:30pm
Monroe County EOC
1190 Scottsville Road

Don't forget to check RDXA.com for the 2012 NYQP scores and winners!

The Annual Joint RDXA/RVHFG Awards Banquet.

DETAILS

When: Saturday, April 20, 2013

Where: Lillian's Restaurant and Party House

Address: 2200 Penfield Rd.
Penfield, NY 14526

Time: 6PM Cocktails & 7PM Dinner

To make things easy, Lillian's has agree to offer you a choice of one of four (4) Main Entrees. They are Prime Rib, Chicken French, Fish (Haddock Florentine), or Pasta (Lasagna or Ravioli). Soup and Salad will be included with ALL MEALS, as well a desert plus Coffee & Tea *****If you have any special dietary needs, please contact Lillian's directly to see what they can do for you. 585-377-1300*****

Cost: $20.00 Per Person. (Price INCLUDES tax & tip) Cash will be collected at the door.

I need to provide a final count to Lillian's by April 16th. All RSVP's should be sent to: k2fx@arrl.net. YOU MUST INDICATE YOUR MEAL CHOICE IN THE RSVP!! This is one of the highlight events of the year for both clubs, so I hope you will all come out to join us.

Wire Antennas for Limited Space (Part One of a Series)

Build Your Score with a few dB Here and There Bill, N6ZFO, has a nice piece in the Sweepstakes Handbook showing the statistical relationship between the strength of our signals and our Sweepstakes score. His analysis shows that each 1 dB improvement is good for a 2.6% increase in our score. Making three 1 dB improvements is good for nearly 8%. Those improvements may come from a power amp, a more efficient antenna tuner, a better antenna, a better ground system, or any combination thereof. The difference between a 1.5kW power amp and 1 kW is 1.7 dB and at least $1.5K. Often that 1.7 dB can be obtained for a few hundred dollars and a few hours invested in the antenna system!

Many of our members have limited space for antennas, but we don't need to let that prevent us from having fun in contests. That was certainly the story of my life until I moved to the Santa Cruz Mountains two years ago. While still in Chicago, I found some good solutions to the space problem, and, thanks to some research, two good reasons to avoid multiband dipoles fed with twinlead (like the G5RV and various windoms). This series presenting various "how to" antenna ideas is intended to help us think about how we can pick up those relatively inexpensive extra dB, and have more fun.

Why not multiband with twinlead? Two good reasons. First, the commonly used "window" lines may have low loss when they're dry, but N7WS showed (in ARRL Antenna Compendium #6) that losses soar (much higher than coax) when they're wet. Second, any imbalance in the antenna will cause common mode current that couples noise from the feedline to the antenna (and transmitted RF to your shack). The only cure is a very good common mode choke at the feedpoint. To build a good one that will handle high power and kill the noise, it must be wound with coax, not twinlead. Since most contest activity occurs during our rainy season, because virtually all ham antennas are unbalanced by their surroundings, and because most of us live around lots of HF noise sources, mutltband wires fed with twinlead look a lot better on paper than in practice.

So lets look at three much better solutions.

1) Fit more bands into the same space with a "fan" dipole. It's nothing more than two or more dipoles connected to the same feedpoint. Each behaves as a classic dipole. Feed it with coax and a good coaxial choke at the feedpoint. A 20/15/10M dipole fits into 35 ft of space.

2) Use a loaded dipole to cover 80 and 40 meters. Barry, KU3X, operating as Hypower Antenna Company, builds some very nice limited space antennas using loading coils that act as traps on the next highest band. His 2B4080L is a great solution for 40M and 75/80M meters, and is only 90 ft long. The loading coils are self resonant on 40 with their own capacitance and a are each a quarter wave from the feedpoint (33 ft), and, so they act as end insulators on that band. On the other side of each loading coil is another 10 ft or so of wire that combines with the loading coils to resonate on 75/80M. This was my only antenna for160/80/40M in Chicago, and it worked very well. (More later about how I made it work on 160).

3) Build a top-loaded (Tee) vertical or inverted L for 80 and 160 meters. Antennas can be loaded with series inductance near the feedpoint or along their length, or with capacitance at their ends. The capacitive approach is generally much more efficient (that is, more radiated power, less loss). The inverted L is one form of this antenna, the Tee is another. The vertical portion has the highest current so it does the most radiating; its radiation is at a low vertical angle, which makes this a good DX antenna. The top section brings it to resonance (making it a better match to the transmitter) and may also contribute some high angle radiation. With a Tee vertical, radiation from the opposing halves of the top section cancel each other. This antenna needs radials (or at least some form of counterpoise) to be efficient. We'll talk more about this antenna and radials later.

Building Fan Dipoles is easy. I build wire antennas using either #10 copper (for very long antennas that must withstand considerable stress) or #12 THHN (house wire). For a fan, I use #10 for the longest element, #12 (or even #14) for the shorter ones. A center insulator should be easy, but it isn't, simply because there's more junk for sale than good stuff. The one that The Wireman sells looks to me like the best of a bad lot. The Alpha Delta might be good, but I'm concerned about how waterproof it is. For end insulators, I like the squarish PVC egg insulators or medium sized porcelain eggs.

Spacers are easy to fabricate from 1⁄2-inch PVC conduit (the UV-resistant type). Cut it into short pieces (about 8 inches for two-wires, about 15

inches for three). Drill 3/16-inch holes about 3/4 inch from each end, and another at the center of the 3-wire spacers, for the wires to pass through. A 20/15/10 fan needs six 3-wire spacers – a pair each side of center, a pair at the ends of the 10M elements, and a pair at the ends of the 15M elements. An 80/40 fan needs at least 12 spacers.

I use copper split bolt connectors from McMaster Carr to hold the spacers in place on the antenna. Part number 6921K56 is the smallest one they sell, $1.80 each in boxes of 25. I also use these connectors to tie the elements together at the center insulator. I use eyelets sold by The Wireman on each wire where it mechanically lashes to the center insulator, then loop it back to the point where I connect it electrically.

When building the antenna, I cut all the wires for the elements at least 24 inches long, using part of the extra length for mechanical termination at the center insulator and some to go through the end insulator and wrap back on itself. I trim each element for length to be about 5% long before raising it the first time, then again once I've had the rig up in the air and checked it (either with an analyzer or an SWR bridge). I determine element lengths based on modeling in W7EL's EZNEC.

Assembling the fan: I build the longest element first, putting the needed spacers on each half of the antenna, connecting both elements at the center insulator, then temporarily tying off each end through the egg insulator. Then I temporarily hang the antenna between two supports about 5 ft or so off the ground where I can work on it, and build the other elements of the fan. First I string all the elements through the spacers and temporarily tie the spacers in place with the split-bolt connectors. Next, I terminate all the elements at the center insulator, again using one or more split bolts. Then I add a piece of UV-resistant rope between the spacer at the end of the 15M element and the spacer at the end of the 10M element, and pull it tight. This tends to give the antenna better mechanical stability. At this point, the antenna should be pretty well put together, but I let it sit for a week or so under tension to settle in place mechanically.

After that settling period, I tighten up the rigging at the center insulator, the spacers, and the ends, trimming each element so that it's a few percent long. Then I screw the split-bolt connectors down nice and tight, lash them to the spacers using UV-resistant tie-wraps, and tape that lashing with Scotch 88 (for more UV protection). Now the antenna is ready to fly.

Trimming for length: Horizontal antennas interact with surrounding objects, including the earth. Before final trimming to length, any antenna should be rigged to its intended operating position and checked for resonance, then lowered and trimmed if needed. In general, proximity to ground lowers the resonant frequency by a few percent.

Rigging the Antenna:

I use either marine pulleys (West Marine is a good source) or pulleys sold by a B&B Small Engine, a supply house in Capitola that caters to tree climbers.

I use the 5/16-inch UV-resistant rope sold by DX Engineering (and others) to hang my wires high in trees that get a lot of wind and can sway a lot. The smaller 3/16- inch version is fine for smaller antennas strung between fixed supports. Be careful about this rope in conditions where it will rub and abraid – I've had expensive failures when this rope could rub against a limb or tower element.

It's long been good practice to use a weight on one end of a rope or wire suspended between trees to allow the rig to adjust to wind whip (the word "sway" is far too mild mannered to describe what happens in a real storm). Some hams use old window weights, others use plastic bottles or buckets filled with sand. I use 6.5 gal drinking water containers from the local hardware store. Filled with water they're about 60#. I fill them with sand (about 95#).

Within the limits of most city lots, and most terrain, higher is better. I fight for every foot of height I can get. On 80 and 40, every five feet or so of additional height, especially for the center of the antenna, increases low angle radiation, making us a bit louder on the east coast or working DX.

Avoid the Braided copper antenna wire. I've used a bunch of it, both bare and insulated, and regretted it each time (on at least three occasions, with considerable cost to re-rig the antennas that fell apart). It simply does not stand up to stress.

Electrical considerations:

Insulated wire is electrically longer than bare copper – that is, an antenna made with insulated wire must be about 2% shorter than a bare copper wire to hit the same resonant frequency.

Combining dipoles into a fan narrows the SWR bandwidth of the higher frequency dipoles by about 50%. There is no loss of bandwidth for the longest dipole.

A low fan dipole for 80/40 meters is a good match to 50 ohms, but a high 80/40 fan is closer to 75 ohms. A fan dipole for 20/15/10 meters is a good match to 50 ohms whether its low or high.

All of the above are predicted by NEC modeling and I have confirmed them with my real antennas.

Don't play cheap with coax on a long feedline. The difference between 150 ft of RG59 and RG11 (or between RG58 and RG8) is 1-2 dB over the width of most ham bands, VSWR taken into account. My 80/40 fans both load well on 30M and 17M; and since I'm feeding them with RG11, they're pretty efficient on those bands too.

Top-Loaded End Fed Wire for 80 and 160 My first 160M antenna was completely improvised. I was in Chicago, had that loaded 80/40 dipole up in the air (fed with RG59 and a "string of beads" choke balun) and wanted to work 160. The first thing I tried was end-feeding it against that wrought iron fence. It worked – sort of – but fried the choke balun with 100 watts in a contest weekend. The next step was to replace the coax with some vintage 75 ohm Belden KW twinlead (a lucky hamfest purchase) and get rid of the choke balun. That antenna worked even better – I managed to work the lower 48 states with 100 watts and a lot of persistence.

Note that this antenna was FAR from ideal. The shack was on the 2nd floor, about 25 ft under one end of the dipole. There was 75 ft of feedline (which became the antenna), which ran horizontally for about 45 ft before rising 25 ft to the center of the horizontal wire. There were also two wires running down to the fence (the counterpoise). While we might call them "ground" wires, they carried antenna current, so they were part of the antenna (and their radiation contributed to the total).

Vertical Antennas, Radials, and Efficiency

Radial systems (or counterpoises) don't need to be perfect to work, but the closer they are to ideal, the better the efficiency. First, let's clarify the difference between elevated radials

and radials that are in/on the ground.

Elevated radials should be resonant (one quarter wave), and have the advantage that only four radials are as good as 40-60 radials on the ground. Sounds great – BUT to be elevated, they must be at least 1/10 wavelength above ground. That's 25 ft on 80M, 50 ft on 160M. Few of us can build elevated radial systems for these bands.

Radials in/on the ground do not need to be any certain length. There are several simple "rules of thumb." 1) More copper is better. 2) Copper close to the feedpoint matters a lot more than copper far from the feedpoint. That is, if we have a limited length of wire, it's better to have more short radials than a few long ones. 3) Symmetry of the radial system is good, but not crucial. If you can't run radials in some directions (for example, there's a driveway or building in the way), run more radials in the directions where you can.

An improvised counterpoise can be used in place of (or in addition to) a radial system. In Chicago, I used a big wrought iron fence that ran around the front of my property, with a few wire radials added. My friend KK9H uses the power system ground and the aluminum ducts of the HVAC system in his house as a counterpoise. He doesn't have a big signal, but I've worked him three times on 160 from here in Santa Cruz!

When I moved to Santa Cruz, I brought along that loaded 80/40 dipole, with the 75 ft of twinlead attached, and it was the first antenna I hung here. It was up about 75 ft, and it worked very well, but I wanted more. So I got pulleys installed at about 110 ft in a redwood and at 75 ft in a madrone, and strung ropes between them to rig a taller Tee vertical – this one is about 86 ft. Does it work any better? I've done the math, which is summarized in Table 1 below. The taller antenna gives me more radiation resistance, which should improve the efficiency by 0.25dB.

Radials improve the efficiency of the antenna. Without radials, antenna current would flow in the earth, which is pretty lossy. With radials, more of the current flows in them, reducing the loss. Think of the antenna as a series circuit consisting of Rr (radiation resistance), Rw (wire resistance), and Rg (the loss of the ground system). Because the same current flows through the series circuit, the efficiency is Rr / (Rr + Rw + Rg). So the key to efficiency is to make Rr large while making Rw and Rg small. 70 ft of #12 wire is about 1Ω (with skin effect). From the ARRL Antenna Book, we learn that 16 radials as short as 0.1λ will yield about 11Ω; 32 yields Rg = 9Ω; and 64 radials should bring Rg down to about 7 ohms. Table 1 shows that that isn't a big improvement for a lot of copper! While I haven't seen data, my guess is that four λ/8 radials would probably yield an Rg of 20 ohms.

It should be noted that what I've presented here is a simplified analysis, and the ARRL Antenna Book includes a far more detailed one by Rudy Severns, N6LF. In it, he shows how and why ground losses increase with short antennas, in some cases more than predicted by the simpler analysis.

— James W. Brown, K9YC

Antenna Dimensions (ft)			Efficiency for Rg+Rw		
Vertical	Horizontal	Rr (Ω)	8Ω	12Ω	20Ω
70ft	81ft	21.7	-1.36db	-1.91db	-2.84db
80ft	64.5ft	25.9	-1.17db	-1.65db	-2.49db
85ft	57ft	27.8	-1.1db	-1.56db	-2.35db
90ft	49.7ft	29.6	-1.04db	-1.48db	-2.2db

Table 1 – Dimensions and Losses in a Tee Vertical

ROC City Net

The premier HF net from Upstate New York

Every Wednesday at 8:00 PM (0000 UTC) @ 3826 KHz +/-

And Now on 145.11 Bristol Repeater, Sunday @ 7:30 PM

Join Us!

1st Annual "Irv Fest"

Save the date, August 7th, 2013 after work at the QTH of Irv, AF2K

More info to follow later !!!

Put it on the calendar !!!

Paul K2DB

Announced DXpeditions for May 2013

2013 May01	2013 May07	**Tonga**	**A35UD**	UT6UD	UT6UD 20130402	By UT6UD fm Tongatapu I (OC-049); 40-10m; CW SSB RTTY
2013 May01	2013 May31	**Mauritania**	**5T1FOC** NEW	ON8RA Buro	VA3RJ 20130411	By 5T0JL; SES for 75th anniversary of the The First Class CW Operators' Club
2013 May02	2013 May05	**Mariana Is**	**KH0**	Home Call	VA3RJ 20130221	By JL1UTS as KH0TH and 7L3PFH as KH0TG fm Saipan (OC-086, USi NI002S, WLOTA 1333); HF; all modes; QSL OK via JARL Buro or direct
2013 May03	2013 May14	**South Cook Is**	**E51AAO**	LotW	VA3RJ 20130322	By ZL1AAO fm Rarotonga I (OC-013, BG08dr); 40-10m; SSB; 100w; wires; QSL also OK via ZL1AAO, Buro or direct
2013 May03	2013 May19	**Egypt**	**SU8N**		OPDX 20130225	By SU1SK SU1AO SU1HM SU1AR fm Geziret Disuqi (AF-109, Nelson's Island); HF
2013 May03	2013 May12	**Norfolk I**	**VK9NT**	LotW	DXW.Net 20130120	By VK3QB VK3HJ VK3GK VK3CBV VK2CA VK4GH VK4IO VK3GB VK3IJ VK3GL K5YY fm OC-005; 80-10m; CW SSB RTTY; 4 stations; OQRS available and preferred (your QSL not required)
2013 May04	2013 May18	**Belize**	**V31RD**	K4UUK	ATDX 20121121	By K4UUK; 80-6m; SSB
2013 May05	2013 May22	**Tonga**	**A35JP** NEW	LotW	OPDX 20130408	By JA0RQV fm Tongatapu I (OC-049); 80-10m; CW SSB; 100w; ground plane; QSL also OK via JA0RQV, Buro or direct: Masato Tamura, 891-4 Tomitake Nagano-city 381-0006 Japan (w/ SASE + 1 IRC)
2013 May07	2013 May11	**Mozambique**	**C91GR**	ZS6AYU	ZS6AYU 20130304	By ZS6AYU fm Bilene; 40-10m; CW; 350 watts; R7000 vertical
2013 May07	2013 May31	**South Cook Is**	**E51AGY**	ZL2AGY	VA3RJ 20130322	By ZL1AGY fm Rarotonga I (OC-013); CW; QSL also OK via ZL1AGR, Buro OK, but direct prefrred
2013 May08	2013 May12	**Mariana Is**	**KH0**	Home Call	VA3RJ 20130221	By KH8XGS as W3ANA/KHO and JA1RTS as KH0/JA1RTS fm Saipan (OC-086, USi NI002S, WLOTA 1333); HF; all modes; QSL OK via JARL Buro or direct
2013 May09	2013 May16	**Anguilla**	**VP2E** NEW	LotW	DXW.Net 20130411	By KE1B as VP2EAQ and W6NN as VP2EAR; 40-10m; CW SSB RTTY; 100w; Buddipole; additional QSL info at qrz.com
2013 May11	2013 May12	**Reunion**	**TO1PF**	FR1GZ	OPDX 20130211	By FR team fm Piton de la Fournaise (AF-016, DIFO FR-001, WWFF FFF-011, WLOTA 1812) at 2,632 meters; HF; all modes
2013 May12	2013 May20	**Madeira**	**CT9** NEW	Home Call	425DXN 20130413	By IW2NXD as CT9/IW2NXD and IK2ZJR as CT9/IK2ZJR fm AF-014; SSB CW PSK31; QSL via ARI Buro preferred
2013 May13	2013 May26	**Maldives**	**8Q** NEW	G3VDB	VA3RJ 20130411	By G3VDB as TBA fm Komandoo I (AS-013); 20m, check 14020-14025 and 14212 kHz; CW, perhaps SSB
2013 May13	2013 May30	**Senegal**	**6V7S**	RK4FF Direct	DXW.Net 20130124	By RK4FF; HF
2013 May24	2013 May30	**Jersey**	**MJ**	ON4ANN	ON4ANN 20130213	By ON team as MJ/ON6NB; 160-2m; SSB CW PSK; QSL OK via ON Buro or direct

From the April VHF Journal:

Progress report on the 6M Skimmer:

We have the computer and it is being set-up with Windows 7, a wireless card, a 124 dB dynamic rage sound card and the skimmer software. Difficulties we have run into include finding proper drivers for the proprietary hardware imbedded in the HP motherboard that will allow the wireless card and the sound card to function. It is progressing though, and a few more evenings at the keyboard should put it in order.

We have the antenna now, a Par OM-50 and 120ft of fresh LMR-400. Paul K2DB has the 6M Softrock board reconfigured, and with a little troubleshooting we hope to have that tested shortly.

Stay tuned to the web site and the email reflector for announcement of a work party for the installation.

There are not many examples of 6 Meter Skimmers at play around the world, so in some ways this project is quite an intriguing experiment. With the preponderances of beacons on the band, and the sporadic nature to the propagation, this tool may prove to be an interesting way to monitor and alert for band openings.

As always, look for the RVHFG on the Monday and Thursday Night 144.260/50.200 Nets at 2100 local for more info.

Thanks,
John Stevens — WB2BYP

RDXA - Red WIngs Night

Fri. July 19 - 7:15 p.m. vs. Syracuse (Nationals)

Post-game Fireworks, presented by Batavia Downs Casino and Racetrack... **Tote Bag Giveaway (1st 3,000 fans)**, presented by The College at Brockport... **Mercy Flight Central Night and Jersey Auction**... **Magnet Giveaway (1st 2,500 fans)**... Hillside Family of Agencies **Pre-Game Autograph Booth.**

Mark, K2MTH will be organizing an RDXA Night at Frontier Field.

Tickets will be $6.00 each and we will all sit together. Mark will be coming out with details on how to get your ticket !!!

73 & see you at the ball park for a fun filled evening !!

—Paul K2DB

Attention Ham Radio Ops
Tail Gate Fest
Saturday May 4th, 8am to noon
Parking lot of the old GE (Powerex) plant in Auburn
Admission: A few Canned goods for the food pantry or Two Dollars

For GPS users:
357 Genesee Street Auburn 13021
If you get lost, check in on 147.00 repeater for help
Hot coffee or rest rooms available, next door at MacDonald's
All proceeds go to charity.
Come and have fun, it's an outdoor flea only.
Rain or shine, but hopefully shine!
Plenty of parking and easy to find.

Rochester DX Association

Club Station — W2RDX

Club Website — http://www.rdxa.com

This Bulletin is the official publication of the Rochester DX Association and is published monthly, September through June. Email your articles, tips, ham ads, etc. to Andrew, W2FG at alesny@rochester.rr.com by the second Tuesday of the month for inclusion in that month's issue.

All those with an interest in amateur radio and DXing and contesting are cordially invited to any meeting and to join RDXA. Meetings are held at 19:30 Local time on the 3rd Tuesday of each month, September through June.

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Membership Dues can be sent to:

Brent Hungate
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Rochester, NY 14619

Regular Membership	$20.00
Family Membership	$5.00
Full-Time Student	$5.00
Lifetime Membership	$200.00

Any other correspondence to: Irv Goodman, AF2K