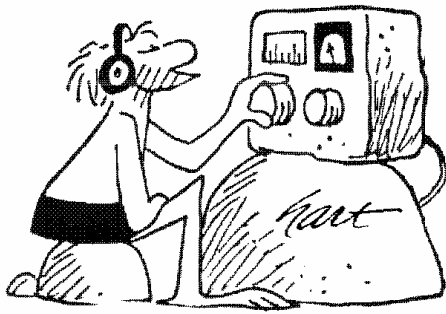




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BARA Facts

Newsletter of the Binghamton Amateur Radio Association

September 2003

Website: <http://www.wtsn.binghamton.edu/bara>

Changes in the Air

By ARRL Letters and communications in the various Amateur Publications we are advised of some significant changes in the International Regulations as a result of WRC 2003. Some are long overdue, others are liable to ignite passionate debate, but change is in the air and the face of Radio Communications is changing — whether for the better or the worse, though, depends on us.

First and most significant to many is the fact that Morse Proficiency is now a matter left to the individual National Administrations. While this means no immediate change for Amateurs in the United States several countries have already dropped their Morse requirement and several petitions have been placed before the FCC. For its part, the FCC has indicated to the Amateur Community that it does not regard Morse Proficiency as necessary, but that it will follow the general desire of the Amateur Community.

Second, we gain an additional allocation on 40-Meters as the Amateur Band is adjusted in the various ITU Regions. This change will become effective in 2009 and will result in an additional 100 kHz of spectrum. At the same time, Satellite-Borne Synthetic Aperture Radars will be permitted on 70-Centimeters on a secondary basis.

Third, the regulations concerned with Third-Party Traffic and “who we can talk to” have been adjusted slightly to recognize that the world we live in is no longer a world in which governments enjoy a monopoly control of Postal and Telecommunications Networks.

Picnic in the Park

The 2003 BARA Picnic was a great success. About forty Members, Spouses, Friends, and Family showed for the shindig at the Ross Park Pavilion and a splendid time was had by all. Hedy, AA2MU, rounded up beverages and various and sundry supplies while Ron, N2RWK, ran the grills bringing burgers, dogs, and speedies to culinary perfection. Salads, hot dishes, veggies, fruits, and treats contributed by various

members rounded out the menu and elicited sounds of satisfaction from the gorged multitude.

Tailgating before the party was slim, although Ford, AB2HS, was spotted heading for his car with a mysterious package while Jerry, KA2WQR, sauntered back to his seat patting his wallet.

A BARA Picnic without HF Operations would be a poor event indeed and we kept our Operating Traditions alive with a portable HF Station running QRP-on-Steroids off a Gel Cell Supply. Our resident Antenna Engineers loadined up the metal roof of the Pavilion and two radials were run to provide a counterpoise for the roof to work “against”. Matching was through a SGC 239 Coupler and the rig was an SGC 2020 with Mike and Key attached. As we ate, drank, and talked the crash of static and the music of the Low Bands filled the air. Several Members were spotted twisting knobs and scanning the bands and “we” checked in to at least one Net over the course of the evening.

The festivities broke up by 8:00 PM after a pleasant and harmonious evening and as this account closes it would be most remiss if we did not recognize Jack, WB2GHH, who suggested a Picnic in the Park back in January and who took the necessary steps to reserve the date and a Pavilion.

Hats Off to Ithaca!

The Hams up in Ithaca have been running a project that involves kids (and adults) in radio technology. The Cornell Center for Materials Research has teamed up with the Tompkins County Amateur Radio Club (TCARC) and the Sciencenter at Ithaca to produce a series of Radio Projects using a grant from the National Science Foundation. The resulting programs are presented at the Sciencenter, Schools, and at local Hamfests.

The group had a table set up at the Ithaca Hamfest this year and I had the opportunity to experience their project at “ground level” through the eyes of my 6-year old son, Alex.

A group of tables with metal trays, soldering

irons, glue guns, tools, and parts had been set up inside the hanger. Instructors (Students from Cornell and Volunteers from the Club) were paired up with kids who wanted to build a Crystal Radio. Each instructor worked with one or two kids and provided a technical

The radio design was pretty straightforward. The group had found a source for Mylar-insulated air variable capacitors so capacitive tuning could be used (Wulf, KC2KCF, explained that the previous design had used permeability tuning and that it had been less successful and more complex than the new design). The front-end is an autotransformer of 140 turns of #28 wire wound on a PVC pipe (1.5 inch inside diameter) with three sets of windings. The Ground is at zero turns and the Antenna taps in 20 turns from the ground.

The Variable Capacitor (141 pF) is connected across the ground and the top turn of the coil. A Diode connects at turn 40 from the ground. The audio is taken out between the other side of the diode and ground. Since the Earpiece used for this project was a piezoelectric (crystal) unit the output of the Diode and Ground, the earphone, and a 10K Matching Resistor were connected in parallel. Overall, the design is pretty foolproof and the only “easy” openings for error were in winding the coil and in choosing the connections to the Capacitor.

The kids and their instructors worked at an appropriate pace and as each radio was completed it was taken outside for testing. The smiles on the faces of the kids were priceless and careful instruction combined with a solid design and care in construction almost assured success.

It's heartening to know that in a day of Video Games, the Internet, and widespread technology something as simple and unpretentious as a Crystal Radio can still work its special magic on kids and the crew up in Ithaca deserves full praise for making this magic happen for kids throughout the year. Carl, KB2KDV, tells me that TCARC sponsors other projects in partnership with Cornell and the Sciencenter.

A Practical Example

For a while now your editor has been gassing about various concepts of Antenna and Transmission Line theory. Now it's time to fit this information into the “real world” with a practical example.

Recently I had trouble getting a local Repeater using my Base Station. Although others seemed to be having trouble as well, reports were that my signal was pretty bad. The Antenna and Coax had been installed in 1996 and although the Antenna had been down for repairs last year, the Coax was original and it seemed like a good idea to run a few measurements on my system. Since I had just purchased a new (to me) Bird Wattmeter I had both the opportunity and the equipment I needed.

I decided to make a series of three

overview of how the radio would work as well as a safety orientation on soldering, hot glue, tools, and — most important — Antennas and Power Lines.

measurements on the system. Two would be with Dummy Loads and one would be a test with the Antenna in the System. I planned to make the tests at the highest power setting on the transceiver so that I would have the greatest (and hence most accurate and reliable) deflection of the meter. Each measurement was repeated twice (At 146.52 MHZ) to verify repeatability. Here are the Forward (Pf) and Reflected (Pr) readings:

Test	Pf	Pr	Notes
1	24W	0.5W	Transmitter to Meter & Dummy Load
2	36W	0.5W	Meter & Dummy Load at Antenna end
			of Feedline
3	27W	6W	Meter at Transmitter with Antenna

Next, the raw data was used to compute the (scalar) Reflection Coefficient (Rho) which is the basis for SWR and the basic indicator of how the Forward and Reflected Power divide in the system. *Rho was computed by dividing the reflected power by the forward power and extracting the square root.* Note that the formula defines three important facts: *First, total reflection of power results in Rho=1; second if no power is reflected Rho=0. Third, Rho can never be greater than one.*

SWR (Standing Wave Ratio) is computed from Rho by dividing $(1+Rho)$ by $(1-Rho)$. Although the formula is not difficult to apply, the difference between one and Rho in the denominator is the reason SWR values leap towards infinity in a very poorly matched system. Rho itself is much better behaved and the Bird Wattmeter manual makes the point that Rho is just as informative as SWR. In fact, Bird recommends that users learn to think in terms of Rho instead of SWR.

The final piece of information to be computed is the Feedline Attenuation. This value is a “pure number” in the sense that the units disappear and are replaced with “Decibels” signifying a ratio. Since Loss and Gain are two sides of the same coin a power ratio that appears as a loss at one end of a Transmission Line appears as a gain from the other. At the Antenna End of the Transmission line we choose a negative sign (to denote loss) while measurements on the performance of an Amplifier would use a positive sign. *Anyway, Attenuation is computed by taking the ratio of the forward and reflected powers, taking the common Logarithm of the result and multiplying by ten. In other words, compute $10 \log (P1/P2)$.*

Applying the formulas to the Test Data we obtain the following results:

Test	Rho	SWR	Attenuation
1	0.14	1.3	-1.8 dB
2	0.12	1.3	+1.8 db
3	0.40	2.3	not applicable

Note the behavior of the Attenuation: The sign

Reviewing the measurements: The Line Attenuation is not unreasonable. The System SWR (while it could be improved) is not out of line, but it would have been more informative if I had made an SWR Measurement at the Antenna Feedpoint so that Line Attenuation did not distort the picture. I did not have time to make this measurement, so it will have to wait until “next time”, but it is well to note that an SWR reading at the Antenna is always more informative than one made at the Transmitter.

One anomaly in my measurements was the behavior of Reflected Power with a Dummy Load in the circuit. Reason would suggest a change in Reflected Power due to Line Attenuation that I did not observe, however 0.5 Watts is very close to the low (less accurate) end of the Wattmeter Scale. To clear up the matter I used the computed Line Attenuation and a Power of 0.5 Watts with the Decibel Formula to solve for the “Unknown Power”. The computed result was 0.67 Watts which was not resolvable on my meter scale. The lesson here is that readings at low power levels require a low-power Wattmeter Slug and extreme care in making the measurements.

Comments, criticisms, and suggestions are always welcome!

BPL Notes

Broadband Over Power Line (BPL) Internet connections are attractive to Internet Service Providers (ISPs) and are being tested in many areas. Since this technology has the potential to create interference for Amateur Operations the ARRL has been monitoring the tests and carefully measuring the interference developed. The results are cause for concern.

In an append to the W2OW Reflector, Fred Stevens, K2FRD, provided details reported by Joel Gilly, N3GXY, on the results of measurements made by ARRL’s Ed Hare, W1RFI, in the Allentown/Reading area of Pennsylvania. The particular BPL implementation in this area sounded like a Geiger Counter and the strength of the BPL interference sometimes made HF signals uncopiable. The type of Power Line (aerial vs. underground) made a difference as did the location of the measuring equipment vs. the BPL Injection Point. Mr. Hare indicated that tests in other areas showed an increase in interference as the BPL Network Load increased.

The “Bottom Line” is that BPL at its current stage of technical development has produced interference at HF. Comments to the FCC on *technical*

changes (as expected) depending on whether we compute it from the Transmitter or the Antenna end of the Feedline. However we can't determine if the Attenuation is “good” or “bad” unless we know the length of the Feedline. In this case, it is about 50 feet and within reasonable values for the Coax type.

grounds to are invited and should be made by any Amateurs who feel competent in this area, however the ARRL has stressed that this matter must be addressed on a technical and not an “emotional” level.

BPL is being touted as a “Next Big Thing” in Internet Connections and it presents a tempting network view that does not require an extensive and expensive investment in cables and connections. We can expect many in the ISP Community to jump on this bandwagon and to push the technology as way of bringing the benefits of the Internet to people in isolated and remote areas. We can also suspect — perhaps with good reason — that the same interests will be less than candid about the demerits and side-effects of the new technology. There is good news, though, and that is in the fact that 9/11 has reminded many agencies of the reality of easily deployed and versatile High-Frequency Communications Networks. In its current form BPL represents a threat that can make those same frequencies unusable.

Reminder — Junkyard Wars

Remember to bring your creations to the September General Meeting for our first annual “Junkyard Wars” at BARA. Entries will consist of any creation associated with radio and built from junk, homemade parts, castoffs, trash, odds & ends, or any combination of the above. We hope to see plenty examples of imagination and creativity in this fun and “anything goes” event. Since you don't need to be a Ham or even a BARA Member to participate it would be nice to have a few visitors demonstrating creativity “outside the box” and this is an open invitation to “stop by” so pass the word!

You don't need to register in advance, but a call or e-Mail to Ed, KB2SCF, at (607) 754-3820 or kb2scf@arrl.net to let us know you are participating will help us to plan for the event.

Friends Helping Friends

Mel, WE2K, has volunteered to coordinate a fund-raiser with Boscov's Department Store in Binghamton. This is a follow-on to an activity we ran on a small scale last year and it netted a few dollars for the BARA treasury. This year, we hope to be a little more organized and to raise a little more for Our Club.

What the program entails is the purchase of a ticket for \$5.00. The ticket entitles the bearer for a discount of 20% on all purchases made at the Binghamton Boscov's on October 7th. BARA gets to

keep the money raised by selling the tickets and the people who buy the tickets get a nice discount; Boscov's sees a little extra business on the 7th and everybody gets some benefit.

It goes without saying that you can buy a ticket for yourself, but you can also sell tickets to friends, family members, and others. Each ticket sold represents \$5.00 for BARA and a discount of 20% for the purchaser for all Boscov's purchases on October 7th. If you would like to participate, please see Mel at the next general meeting or get in touch with him at your earliest convenience. He will also be looking for people to man a table and set up a display in the store on the 7th and this will be discussed at the meeting also.

Please give the matter some thought and please consider helping raise a little extra cash for BARA. Although the treasury is healthy, we can expect our financial resources to take a sharp dip when we finally locate a new Shack Site and begin the process of rebuilding our Club Shack. Thanks to Mel, WE2K, for noticing this opportunity and for heading up a response by Our Club.

Club Officers and Committees			
President	Bob McCabe	KC2DSS	748-9808
Vice President	Jack Connors	WB2GHH	724-8822
Secretary	Ron Regan	N2RWK	722-6790
Treasurer	Paul Slocum	N2NCB	687-2057
Directors	Bob Handel	K2FU	693-4310
	Steve Orzelek	N2MSB	775-0281
	Ed Plesnar	KB2SCF	754-3810
	Mel Snitchler	WE2K	723-9612
W2OW Trustee	Frank Scoblick	N2HR	729-4249
Newsletter	Ed Plesnar	KB2SCF	754-3810

BARA, The Binghamton Amateur Radio Association is



an ARRL Affiliated Club

Next General Meeting

7:30 PM, Wednesday, September 17th Unitarian Universalist Church Riverside Drive, Binghamton, Next to Lourdes Hospital

Board Meeting

7:00 PM, Wednesday October 1st

Broome Community College Campus, Office of Emergency Services (West Side of Campus)

Exam Session

7:00 PM Monday, September 29th

Vestal Public Library, Route 434 Vestal

1:30 PM, Saturday October 11th

Endicott Fire Station, Across from UE High School

BARA Dues

\$18/year Single Member; \$27/year Family