



BARA Facts

Newsletter of the Binghamton Amateur Radio Association

December 2010

Website: <http://w2ow.org> OR <http://www.wtsn.binghamton.edu/bara>

President's Corner December 2010

Well, I finally did it – finished up my new studio (which includes a corner of a desk dedicated to radio), and I'm back on the air...kind of. I fired up the Yaesu on shortwave, but had a bit more difficulty establishing a contact than usual...don't know if it was the conditions that night, or if the connections to my antenna are getting a bit weathered (I haven't serviced my antenna since I put it up quite some time ago, and I'm not using the finest coax nor connectors, so next spring it'll probably be time to check all that out). And I don't have an outdoor VHF/UHF antenna yet, and I no longer have a metal filing cabinet to stick my magnetic mount telescoping antenna on (went to all wood furniture). When you're trying to maintain a shack on a shoestring budget, these are the challenges I suppose one ought to expect!

This will be my **last** "President's Corner" column in the BARA Notes. Hopefully your new President, Brian Adeo (K2DLB), will keep up the tradition of sharing his thoughts with the membership on a monthly basis. I will try to submit an update once in a while, but I will be busy with many other projects and organizations (although I plan to work behind the scenes to bring some compelling programs to future BARA meetings). I trust that BARA will continue to be a valuable organization to New York's Southern Tier, and encourage the leadership to seek an increase in its membership by expanding its scope to include wireless technology in general (which is expanding tremendously), since amateur radio has a rich history of being at the forefront of this realm (including spread-spectrum modes, which are just now

beginning to be used more widely, especially for wireless network access). The club might even consider expanding its scope to include the electronic technology in general, including such topics as robotics, which is quite popular with young folks these days.

I would like to thank the Officers with whom I've served these past years, and offer congratulations and best of luck to the incoming Board & Officers. Hope to see y'all at the holiday party on the 15th of this month!

73 de Allen Lutins KC2KLC
KC2KLC@LUTINS.ORG

QSO from the Board...

BARA Board Meeting – New Location

Beginning on January 5, 2011 the BARA Board Meetings will be held at the Office of Emergency Services and for now the remainder of 2011. As always all members are welcome to attend these meetings that start at 7:30 PM. Those that are not board members and want to attend these meetings should plan on getting there early since there is security. Gong in as a group would make easier Paul N2NCB

BARA is spending a fair amount of money on postage to send out paper copies of the BARA Facts. The costs associated with this are contributing to our current budget deficit. If you are still receiving the paper version and have internet access, please consider reading the BARA Facts online (at W2OW.org) and canceling the mailed edition (by emailing Paul Slocum at n2ncb@stny.rr.com). By switching to the online edition, you'll not only save the club money, but also will gain quicker access to the BARA Facts. Thanks!

A Letter from the Editor

Happy Holidays to Everyone!!! Enjoy and Please Be Safe!!!!

Dear All

BARA again will be having our **Holiday Dinner** at the **Spot Restaurant on December 15th**. We need to give the restaurant some idea of how many people to expect that night. So if you could be so kind and e-mail me back if you are planning on attending and how many people will be coming with you (this is a family event not just for members). If you can't attend still e-mail me so I know. The purpose of e-mail me back either way is because the board will be calling those the either do not get this e-mail or to those that have not responded to this e-mail.

Thanks for your help
Paul N2NCB

BACK to the BASICS

In this article I would like to go over some basic questions, definitions and/or formulas. This will be old hat for most but for some, a refresher. I will split this up into Technician, General & the Extra class.

Technician Class

T1A05 – What is the FCC Part 97 definition of a space station?

- A. Any multi-stage satellite
- B. An Earth satellite that carries one of more amateur operators
- C. An amateur station located less than 25 km above the Earth's surface
- D. An amateur station located more than 50 km above the Earth's surface

General Class

G1A05 – Which of the following frequencies is in the General Class portion of the 40 meter band?

- A. 7.250 MHz
- B. 7.500 MHz
- C. 40.200 MHz
- D. 40.500 MHz

Extra Class

E1A05 – Which is the only amateur band that does not permit the transmission of phone or image emissions?

- A. 160 meters
 - B. 60 meters
 - C. 30 meters
 - D. 17 meters
-

Answers to Back to the Basics.....

Technician Class	D
General Class	A
Extra Class	C

Why the Math Matters

From "The Compass" The Great South Bay Amateur Radio Club

Nov 2010 Vol 38 Issue 11

By Kevin, AB2ZI

It's not just algebra or trigonometry, it's also about understanding

Units. Hang around hams long enough and you're going to hear a lot of different units thrown around: kilowatts, milliwatts, microvolts, kilohertz, picofarads and so on.

There's talk of antennas with 6 dB of gain and 45 degrees of half-power beam width. Transmission line losses of 1 dB per hundred feet. SWR ratios of 2 to 1 or 3.1 to 1 are often mentioned in passing as if we were talking about last night's football scores. Let's also not forget all the uses of the metric system. We work the 80 meter band, or we made a contact on 20 meters the other day. A quarter-wave vertical for 2 meters is 19 inches long! At the very least you are going to have to deal with some new units you may not be familiar with. In order to work in these units we need gain a working relationship with math.

When I teach ham radio I put a lot of emphasis on learning the math. I spend more time with the math than just about any other topic. This usually results in a lot of groans, eye rolling and statements of "I'm not too good at math," or "I haven't done math since high school." If you're happy with just memorizing all the math questions in the pool, which isn't that hard to do for the Technician license, then you can do that and not ever worry about math again.

At this point you will be what my friend Bob, K2TV, refers to as an "appliance operator." Nowadays a Technician license and a mobile rig can get you around the world with IRLP and Echolink ready repeaters. But if you want to tinker and build your own antennas and move on up to General and then Amateur Extra, you are going to have to do the math.

One of the tools I use when people have a hard time understanding fractions or decimal numbers is to introduce the subject of money. Everyone understands money!

We know one dollar is one hundred (100) pennies and is written 1.00 (one-point-zero-zero). A penny is point zero one (.01) dollars, so the second spot after the decimal point is the hundredths digit, and so on. For fractions I point out that our change is actually based on a percentage of a dollar, the dollar representing a single whole, or 100 percent, of something. That's where the cent comes from. A penny is one percent of the whole (dollar). Knowing this then, if you want to find 12 percent of any number you would just multiply the number by point one two (.12). 12 cents is 12 percent of a whole and is written .12, or for less confusion, with a leading zero: 0.12 Sure, if you are only using a 2 meter radio you can just program your frequency in directly by reading it from a listing. If a repeater frequency is listed as 146.685 MHz, you just key in 1-4-6-6-8-5, the rig beeps (usually) and with ARS (automatic repeater shift) you don't even have to worry about the 600 kHz offset for transmit. But suppose you needed to enter that transmit frequency? Would you know what frequency to enter for a negative shift? For a positive shift? After all, 146.685 MHz is 146,685,000 Hz. MHz means million hertz. In exponential notation (aka scientific or engineering notation) you might see the number written as 1.46685×10^8 Hz, or 146.685×10^6 Hz, etc. The positive exponent of the " $\times 10^n$ " tells you the decimal point moves to the right to express the entire number.

When we work with capacitors and inductors values are quite often expressed in thousandth, millionths or even smaller numbers. Doing math this way is awkward. Look at this example: $146,685,000 \times 0.000000009 = ?$ You could do the math and try to keep track of the decimal places, or you could convert the numbers to exponential notation, multiply the base numbers then add the exponents like this: $1.46685 \times 10^8 \times 9 \times 10^{-9} = 1.46685 \times 9 = 13.2$, $10^8 + (-9) = 10^{-1}$, and the final answer is 13.2×10^{-1} or written out, 1.32. A lot easier, right?

Even better, modern calculators, like the TI-30Xa I ask everyone to buy for class (they're about \$11 at Staples), can work with the exponents directly. The key is to become comfortable with the concept and use the exponents as much as possible so you start to think in their terms.

My mantra to all new students, which I keep drilling over and over, is "milli, micro, nano, pico." This

represents powers of 10 to the negative 3, negative 6, negative 9 and negative 12. The ideas being if I say 5 milliwatts you should automatically think 10 to the negative 3 (10⁻³) or 0.005 watts. Working with these groupings of 3 there is a units space, a tens space and a 100's space. So 1 milliwatt is 0.001 watts, 10 milliwatts is 0.010 watts and 100 milliwatts is 0.100 watts or just point one or 1/10th of a watt. This is an important concept to grasp because often you'll encounter numbers like 0.1 milliwatts. Looking at the group of 3 then, that point one is 0.0001 watts. See how that works? In the same manner as 1 watt is 1 thousand milliwatts.

Another stumbling ground is rearranging algebraic formulas. For simple multiplication or division formulas all of the license manuals use the trick of a formula circle. This is a circle divided horizontally in half with the lower half divided vertically in two. In a formula where the unknown is solved by two (2) other values being multiplied together, the unknown goes in the top with the other 2 variables to be multiplied in the bottom compartments. With Ohms law, $E = IR$ (E, voltage, equals I, current, times R, resistance) the circle looks like this

An unknown variable's formula is derived by covering up the unknown with a finger and seeing what's left. So to find "I" the formula showing is E over R, or E/R which is E divided by R. R is E divided by I. Knowing how to plug your formula into these circles means you only need to remember one version of the formula. Given $P = EI$ we would put the "P" where the "E" is on top, the "E" goes where the "R" is (it doesn't matter in multiplication if we do E times I or I times E, the answer is the same).

Now, you may not use Ohm's law all that often, but a basic understanding of decibels and what they represent will come in very handy when you're installing antennas for your base station radios. Most of the time with an HF radio you can get away with just picking out whatever coax other hams are using. Unless you're using very small diameter coax, the losses at HF frequency aren't that bad in runs less than 100 feet. However, once you start putting up UHF or VHF antennas, that same coax you use at HF frequencies may have substantial loss these higher frequencies.

That RG-8 coax that has a loss of 1 dB per 100 feet at 10 MHz has a loss of about 8 dB at 400 MHz. Do you know how much a 35 watt UHF radio will be getting to the antenna at the end of a 100 foot run of RG-8? Just 5 and a half watts! You can see that being able to do the math, or at least understand the relationships involved can save you from making some costly mistakes. There's a lot more I could go on about, especially the trigonometry used for power factors and phase relationships in antennas and feed lines, but that should be enough, I hope, to illustrate why learning the math, even if you forget it later, is worthwhile and so important to this hobby.

2010 Club Officers

President	Allen Lutins	KC2KLC	729-4817
Vice President	James Lawson	KC2JED	761-5595
Secretary	Andrew Rudy	KC2QYA	
Treasurer	Paul Slocum	N2NCB	687-2057
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	Bill Jaker	WB8RAE	785-5361
	John Rudy	WB2FQZ	669-4308
	John Carrington	WB2SGS	648-8364
W2OW Trustee	Mel Snitchler	WE2K	723-9612
Editor	William Jakaitis	KB2SIN	648-2112

Next General Meeting

7:30 PM, Wednesday, December 15th

Town of Binghamton Town Hall, 279 Park Avenue, South of the Ross Park Entrance

Board Meeting

7:00 PM, Wednesday January 5th

*Office of Emergency Services
Lt. Vanwinkle Dr. (Behind BCC)*

Exam Session

December 20th – 7PM

Vestal Public Library, Route 434 Vestal

BARA Dues

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

Local Repeater Nets

146.73 (PL-100) MHz STAR Net (NTS Feeder) Every Evening at 6:30 PM Local Time

146.865 (PL 146.2) MHz BRAT Net (Informal BARA) Sunday Evening at 8:00 PM Local Time

BARA, The Binghamton Amateur Radio Association is an ARRL Affiliated Club

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