SOLID COPY

Winter 2003

SOL and Hams: It's Not What You Think!

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Did you ever wonder where those magic numbers (such as 468/f) that give you antenna lengths come from? Well, I did, and did some gozintas and cipherin' and came up with a way you can derive those numbers for yourself, or come up with new ones to fit your own personal needs.

It all starts with the speed of light (SoL). Since radio waves travel at the speed of light, those are the numbers we'll be using. Here they are:

**299,792,458 meters per second
299.792 million meters per second
186,282.397051 miles per second**

Some people think that miles are not the best units for measuring antennas (Hey, Sam, my 40 meter antenna needs to be 0.0125 miles long!), Let's convert that to feet per second by multiplying by 5280:

**983,571,056 feet per second or
983.571 million feet per second**

I added the million units per second numbers because it makes the calculations really convenient if you specify the frequency in millions of cycles per second (megahertz).

FrostFest Volunteers Still Needed!
Call (804) 275-9951 or email FF@compudata.net ASAP!

As we have been making calls and talking with RATS members over the past few weeks concerning *FrostFest* 2003, it is alarmingly apparent that the membership has forgotten that *FrostFest* is supposed to be a fund raising event for the club—not just a Hamfest they attend to purchase goodies.

As of this writing, we have much less than half the necessary volunteer slots filled, and we are going to be hard pressed to do a minimal job of covering the REQUIRED jobs.

We all have busy lives and many other things that occupy our time and energies. However, we all know that *FrostFest* has been the reason our club is able to continue to have very low dues, exceptional repeaters, and the wherewithal to do many things without assessing extra fees of its membership.

This all may come to and end after this year. We simply cannot operate without the volunteers and manpower of the club. Our membership is dwindling and that makes it even more imperative that YOU participate and do MORE than one measly shift on security. Why can't you work a shift helping in the RATS lounge AND a security shift? Why can't you work a shift on Saturday *and* Sunday? We hear over and over, "Well, I can work Saturday from 'x' to 'x,' but I want to be able to buy things too." We've even heard "so-and-so ham dealer is probably not going to be there, so I'm not coming to *FrostFest*." If you continue to think *FrostFest* is just a Hamfest for you to attend, then we are done.

The committee chairs who work in the background to try and get everything done are getting tired and without the volunteers to help us out, we may have to give up the ghost.

Membership, it's up to *you* if you want *FrostFest* to continue, because the few who are aware that they need to provide more than lip service are not going to continue much longer.

In closing, we want to thank those who give willingly of their time and energies to try and make the *FrostFest* the fund raiser it was intended to be all along. And there are many of you who work tirelessly, but there aren't enough to keep it going much longer.

The *FrostFest* Committee

Pat Wilson, W4PW & Jim Clark, N3JJF

So how do you get wavelength now that you know the speed of light? Let's use 14.260 MHz as an example.

We know the speed of the waves in feet/sec and we know the cycles/second of the desired frequency. Knowing this we can determine how many cycles there are in the distance that the waves travel in one second. Divide feet/second by cycles/second the answer will be in feet/cycle because the seconds cancel. And, by golly, we want our answer in feet per cycle. Here is how the units work out:

$$\frac{Feet/\sec(SoL)}{Cycles/\sec(MHz)} = \frac{Feet}{\sec} \times \frac{\sec}{cycle} = \frac{Feet}{cycle}$$

Now with some numbers:

$$\frac{983.571}{14.260} = 68.974$$

The same example, except with meters:

$$\frac{299.792}{14.260} = 21.02$$

The answer is that one wavelength at 14.26 MHz is 68.974 feet, or 21.02 meters. (It's interesting to note that the band names we use aren't terribly precise. From this example you can see that 14.260 MHz is 21 meters, not 20. Other bands have similar margins of error.) If you want to know what a half wavelength is, divide the answer by two. Divide by 4 for 1/4 wave. For a 5/8 wave, multiply by 5 and divide by 8.

The answer is probably a little too large because we used the speed of light in free space. Radio waves go slower through wire than they do in free space. This is where it's handy to know the velocity factor of the wire you are using. Velocity factor is the percent of the speed of light that radio waves travel through a conductor. Simply multiply the answer above by the velocity factor. Copper wire has a velocity factor of about 95%; in this case multiply the

answer by 0.95. When in doubt use a velocity factor of 1, that will make the antenna too long and you can always cut it. Keep in mind, though, that 5% of a 160 meter antenna is about 25 feet. You may want to research the velocity factor of the wire you are using if you are working with one of the low bands; this will keep you from wasting too much wire.

The ARRL handbook has velocity factors for most transmission lines. If you are making a balun out of coax, it's probably best to try to get it right the first time. Baluns are not as easy to adjust as antennas.

So where do those magic numbers come from? They are just a simplification of the above formulas with units, velocity factor, and wavelength fraction built in. Let's make one for 1/2 wave and a velocity factor of 95% that gives the answer in feet. Once again, 983.571 is the speed of light in millions of feet per second.

$$\frac{983.571}{f} \times \frac{1}{2} \times 0.95 = \frac{467.2}{f}$$

Now it's easy to see where that 468 came from. Just a little rounding of our answer will give you the 468 you may already be familiar with. To make your own number, just substitute the wave fraction and velocity factor for your own. To do the above on your own calculator:

$$983.571 \times 1 \div 2 \times 0.95 =$$

Hopefully, you'll get 467.2.

$$\frac{983.571}{14.260} \times \frac{1}{2} \times 0.95 = \frac{467.2}{14.260} = 32.76$$

A half wave antenna at 14.26 MHz using copper wire is 32.76 feet long.

If you are not a real stickler for precision, you could use 984 for the speed of light in feet/sec and 300 for meters/sec. The answers will be close enough to not cause any problems.

Now you should have enough information to come up with your own numbers. Maybe you like your answers in inches or centimeters (for 900 or 1240 MHz crowd). No problem! Just determine the speed of light in your favorite units (for example 1,490,259 furlongs / second) and substitute accordingly in the formulas given above.

I've written a small Windows program that will do these calculations for you; it's available for free at:

http://www.rmonet.com/ham/

And you never thought you'd have a practical use for the speed of light, did you?

NATION MOURNS LOSS OF *COLUMBIA*—INCLUDES THREE SILENT KEYS

February 1, 2003, brought sorrow to the nation when *Columbia*, Space Shuttle Misson STS-107, exploded and broke apart upon reentry into the earth's atmosphere.

The astronaut community includes a high percentage of hams among its ranks. Three of the seven members of STS-107 were licensed amateurs:

Rick D. Husband, Commander

William C. McCool, Pilot

Michael P. Anderson, Payload Commander

David M. Brown, KC5ZTC Mission Specialist

Kalpana Chawla, KD5ESI Mission Specialist

Laurel Clark, KC5ZSU Mission Specialist

Ilan Ramon, Payload Specialist

VE EXAMS

Exams for licensing or up-grading for the next three months are as follows. There are two locations, one in Chester and the other in Richmond. To take an exam you must bring $12.00 cash (exact change) and two forms of ID, one of which must be a photo ID. If you are upgrading, you must bring the original of your current license *and* a photocopy of it.

If you have credit for previously passed element(s) bring your original CSCE *and* a photocopy of it. Arrive 15 minutes early Preregistration is preferred, but not required (unless you are taking the CW element in Chester, then required). Walk-ins are welcome if seating and materials are available.

The first exam is on February 8, 2003, at 9:00 AM at J. Sargeant Reynolds Community College, 1651 E. Parham Road, Richmond, Building B. For more information or to preregister contact Patrick Wilson, W4PW, (804) 932-9424 or go to:

http://www.w4pw.org/hamtests.htm

The second exam is March 3rd at Pietro's Restaurant at the corner of Jeff Davis Highway and Osborne Road in Chester. The time is 7:30 PM. For more information or to pre-register call (804) 768-2255 or visit:

http://www.kr4uq.org/V__E__EXAM
S/v__e__exams.html

The third exam is April 12th at the J. Sargeant Reynolds Community College location at 9:00 AM.

Gleanings . . .

HOW & WHEN TO BREAK INTO A CONVERSATION

This article comes from the June 2002 Ragchewer, *newsletter of CARA, the Catalina Repeater Association of Garden Grove, California, and is brought to our attention by Parke Slater, N4KFT*

Repeaters are a shared resource. A given repeater will have many members and users, but only one person can talk on it at a time. Sometimes you may need to make a call, and the repeater is in use. Other times you may hear an interesting conversation and want to join in. How do you do so? Well, it depends how urgent things are.

1) For emergency traffic (and ONLY true emergency traffic) you would use a "BREAK BREAK". This should clear the frequency immediately (like the plague) so you can make your call. Once your emergency traffic has been passed or you are taken care of, the frequency can be returned to whoever was using it.

2) If you would like to make a non-emergency call, and it doesn't appear that the conversation in progress is likely to wind up shortly, your call sign or its suffix will let the other users know that you want to get in and use the repeater. Courtesy dictates that you keep your call or contact brief, and a "Thank you for the interruption" will go a long way to showing your appreciation for allowing you to jump in.

3) If an interesting conversation is in progress and you want to join in, again, throw out your call sign when the courtesey tone sounds… And it doesn't seem to interrupt the conversation as much as a "BREAK" does! Once you join into the conversation, it is polite to keep with the topic that the other stations were talking about. This way, you are joining and contributing to the conversation the others were having, and not breaking it up.

The Catalina Repeaters are wide coverage repeaters that get a lot of use. They are also the most friendly repeaters I have heard. Other stations are always welcomed into a conversation or allowed to make a call in the middle of a QSO. Using the guidelines above will help us all use the repeater smoothly together.

IN & AROUND THE COMMONWEALTH

Winterfest will be February 23rd. Hosted by the Vienna Wireless Society, this hamfest will be at the Northern Virginia Community College at 8333 Little River Turnpike in Annandale, Virginia. Admission is $6.00. Talk-In will be 146.91(-). For more information go to:

http://www.viennawireless.org/flyer/v.
05.pdf

You can also contact Jim Parsons, W4JTP, at:

winterfest@viennawireless.org

or (703) 392-0150 by phone.

The Mecklenburg Amateur Radio Society will host the Charlotte Hamfest and Computer Fair on March 8th & 9th. The location will be the Charlotte Merchandise Mart, 2500 East Independence Boulevard, Charlotte, North Carolina. For more information email:

Hamfest@w4bfb.org

Or call (704) 948-7373. Preregister by February 26th for $6.00 tickets. Tickets at the door will be $8.00. On Saturday hours will be 8:30 AM until 5:00 PM. Sunday doors will open at 8:30 AM and close at 2:00 PM. Parking will be $5.00 unless you preregister for $3.00 parking. Talk-In will be on 145.29 (-).

MONTHLY MEETINGS

The February meeting of the Richmond Amateur Telecommunications Society will be the *Frostfest* activities on Sunday, February 8th & 9th.

Normally RATS meets the third Friday of each month at 7:30 PM at the West End Volunteer Rescue Squad Building, 1802 Chantilly Street, Richmond. Coming from either direction on Broad Street, Chantilly is the first intersection east of Staples Mill Road. The WEVRS building is ½ block south of Broad on Chantilly.

The purpose of **Solid Copy**^{TM} is to provide club information and amateur radio news to members of the Richmond Amateur Telecommunications Society. Information or articles for inclusion must be received no later than the first of the publication month. Submit via the Internet at editor@rats.net. Opinions expressed in **Solid Copy**™ do not necessarily represent the views of the officers, directors, or members of RATS, Inc. Material in this data file may not be reproduced or distributed **IN ANY FORM** without express written permission from RATS. Inc.

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