

F.C.A.R.C. Inc.
P.O. Box 773
Greenfield, MA 01302



FIRST CLASS MAIL



THE COMMUNICATOR

THE COMMUNICATOR

March 2015

Upcoming Events

- MTARA Hamfest: Saturday Mar 7, 8:30 a.m.: Chicopee Moose Lodge
- Club Breakfast: Saturday, Mar 14, 8:00 a.m.: Denny's, Greenfield
- E-Board Meeting: Monday, Mar 16, 6:00 p.m.: GCC Room S301 Main Building
- Program Meeting: Monday, Mar 16, 7:15 p.m.: GCC Room S301 Main Building: The Wired West initiative
- E-Board Meeting: Monday, Apr 13, 6:00 p.m.: GCC Room S301 Main Building
- Program Meeting: Monday, Apr 13, 7:15 p.m.: GCC Room S301 Main Building
- Club Breakfast: Saturday, Apr 18, 8:00 a.m.: Denny's, Greenfield

March 2015

Calendar

MTARA HAMFEST AND FLEA MARKET, SATURDAY MARCH 7, 8:30 A.M., CHICOPEE

The Mt Tom ARA Hamfest and Flea Market will take place on Saturday March 2nd at the Moose Family Center/Chicopee Falls Moose Lodge 1849, 244 Fuller Road, Chicopee, MA. More information at <http://mtara.org/wp-content/uploads/2015/01/Flyer15.pdf>.

MTARA have invited FCARC and other local clubs to have tables, and we will do so. We plan to sell some surplus club equipment and club members with things they would like to sell can put them on our table.

We need volunteers to help out at the FCARC table and we will try to sell items on behalf of members who can't make it there for a small commission; we also are willing to accept and try to sell items donated to the club for possible sale with the provision that if an item doesn't sell and the club has no use for the item the donor will take it back. Contact Al Woodhull N1AW to volunteer.

MARCH PROGRAM MEETING: MONDAY MARCH 16 AT 7:15 PM.

At the March Meeting, Al Woodhull N1AW and Bob Solosko W1SRB will talk about the Wired West initiative to bring high speed internet to the underserved towns in Western Massachusetts. Al is the Wired West alternate delegate for Leyden and Bob, a former Bell Labs engineer, worked on the development of network equipment of the type that will be used for the Wired West infrastructure.

Secretary's Report

E-BOARD MEETING SATURDAY, FEBRUARY 14, 2015 AT GCC, CHRIS MYERS KB1NEK

1. Mention was made of MTARA hamfest scheduled for March 7, in Chicopee, at the Moose Family Lodge, on Fuller St. Bruce and Ron volunteered to coordinate a table for the club. Others are encouraged to help. Al mentioned that in the past, members brought their own equipment to sell, or have the coordinators take it to try to sell, with the club getting a 15% cut.
2. Chris mentioned that he had done some research on the LDG AT-100II Pro automatic antenna tuner. It works with any radio running less than 125 watts. Special cables can be ordered to work in more integrated way with radios such as the Icom 706. This allows the tune button on the radio to trigger the tuning. A motion was made and accepted unanimously to have Chris go ahead and purchase the unit.
3. There will be a shelter drill at UMass in Amherst on April 2. Last year several members of the club and a couple of other hams provided communication within the Mullens Center. Bruce volunteered to discuss radio operator participation in the coming drill with the UMass coordinator, Ann Becker. Bruce will suggest that he or other club member participate in pre-event planning meetings. We will suggest having one or more operators off-site this year, to simulate more closely what an actual shelter operation would be like. Chris suggested it could even be helpful to have people at home or work check in to the shelter frequency, again to simulate the way things really do work. (Bob D. Jeanne, and Belle offered to do this.)
4. Bob D. led a discussion of problems with 2m repeater equipment. He has done repeat tests on the antenna relay of the receiver unit that had lost sensitivity. He found resistance across the relay varies from less than an ohm to more than 20 ohms. He suggests shorting the relay, since in the receive mode it is supposed to be closed. He thinks shorting the relay will be much easier, and safer, than trying to replace it. The relay is housed in shielding that is closely bonded to the antenna jack, so disassembling it would be invasive surgery, possibly doing serious damage. The consensus was to

encourage Bob to go ahead and try it. Al suggested that when done, Bob should leave a note of what he did taped to the cover of the unit for future reference. We discussed a plan to start installing a stand-by 2m repeater unit at Rocky Mount in Greenfield, once the snow clears. We first need to restore the 440 repeater there to decent working condition.

5. Rich suggested that in the future we skip membership meetings in January and February, since this year we had to cancel both because of bad weather. Al suggested the alternative is to avoid inviting speakers who have to travel far to get to Greenfield. The March meeting will be on the plans to install extensive fiber optic internet connections in our area under the Wired West initiative. Al and Bob S. will be leading the discussion. The April meeting will be on the subject of Go Kits, organized by Jeanne, Belle, and Bruce.

6. We will plan a picnic in May, in the park in Leyden where we were last year. We agreed to have Al spend \$75 to reserve the park.

7. The June meeting will be devoted to club elections, and planning for Field Day.

8. Bruce suggested we put up a table at the Franklin County Fair. However, Belle said that the organizers now charge \$200 for a table. In the past when the club did have a (free) table, we didn't get much traffic.

PS. The LDG AT-100 has been purchased, and tested. However, in the process of testing, the 706 began to malfunction. Chris is in the process of seeing what it takes to get it fixed by an Icom approved repair shop, in Michigan.

News, Activities & Articles

SLEIGH BELL ROAD RACE, SATURDAY FEBRUARY 7 - RICHARD STEWART KB1NOX

Well another winter event has come and gone. The sleigh bell race in Greenfield which is associated with the Greenfield Winter Festival, went off with only a minor glitch, fortunately, not because of the Franklin County Radio Club members. There were 13 people signed up and only 7 showed up down to the Hope and Olive Restaurant. Still we pulled off a wonderful event which made Christy Moore director of the Greenfield Recreation Department very happy. I would have liked to have had 2 more people but we did with those who did show. I was at Net Control and Chet N1XPT was going to be my alternate. As things turned out, Chet and new licensee KC1DCQ Jeanne Dodge sat and talked radio, and Jeanne purchased an FT-60 from Chet. Those in the field were K8HSF Ron, K1SMY Chris, WA1QKT Bob, KB1SNA Cathy, WA1TVS Carter, KB1TLX Bruce who brought a female friend who is a new licensee, KC1CWZ Jackie from Northampton. This was Jackie's first field event and Bruce made Jackie man the radio, while coaching her along the way.

During the race three runners were misdirected by Civil Air Patrol volunteers. The three runners realized a short time later that they had been misdirected and turned around. This threw us radio people a minor curve because the last runner was already called as going by a certain point. Fortunately our team members corrected the mistake, and kept the Ambulance/Sag Wagon from getting too far ahead, and the Ambulance driver held back until the three runners and the actual last runner, a very senior gentleman in his late 70s, who was actually running, not walking, came by the Ambulance and was followed the rest of the way in. Christy Moore gave me big smiles and a hardy well done and many thanks once again for the radio communications assistance from the Franklin County Radio Club. As for myself, as net control, my sincerest thanks to everyone who showed and participated and to Chet for bringing me down and home again.

VE SESSION IN NORTHFIELD, FEBRUARY 23 – AL WOODHULL N1AW

Our VE sessions continue to be quite busy. Interest in ham radio is not dead.

On Monday Feb 23 nine candidates for new or upgraded licenses came to the Northfield Unitarian Church. Seven tests were passed. Anne KC1CRS upgraded to Extra Class. David KC1DDQ and Aaron KC1CXX upgraded to General. Four new Technician callsigns should be coming soon, but were not available at this time.

VEs who participated were Amy AB1WH, Belle KB1NOG, Ron K8HSF, Chris KB1NEK, Jamie N1ZOJ, and Al N1AW. That sounds like a lot of help, but the necessity of having three people confirm the score on each test really keeps the crew busy.

MAXWELL'S EQUATIONS (ALMOST) WITHOUT THE MATH – BOB SOLOSKO W1SRB

I've occasionally joked about solving Maxwell's equations for some boundary value problem – here's a little background.

Maxwell's Equations are a set of 4 complicated equations that describe the world of electromagnetics. These equations describe how electric and magnetic fields propagate, interact, and how they are influenced by objects.

Scottish physicist James Clerk Maxwell took a set of known experimental laws (Faraday's Law, Ampere's Law) and unified them into a symmetric coherent set of Equations known as Maxwell's Equations, which was published in 1865. Maxwell was one of the first to determine the speed of propagation of electromagnetic (EM) waves was the same as the speed of light - and hence to conclude that EM waves and visible light were really the same thing.

Maxwell's Equations are critical in understanding Antennas and Electromagnetics. They are formidable to look at - so complicated that most electrical engineers and physicists don't even really know what they mean. Shrouded in complex math, true understanding of these equations is hard to come by.

Maxwell's Equations are laws - just like the law of gravity. These equations are rules the universe uses to govern the behavior of electric and magnetic fields. A flow of electric current will produce a magnetic field. If the current flow varies with time (as in any wave or periodic signal), the magnetic field will also give rise to an electric field. Maxwell's Equations shows that separated charge (positive and negative) gives rise to an electric field - and if this is varying in time as well will give rise to a propagating electric field, further giving rise to a propagating magnetic field.

Here are the equations:

$$\begin{aligned}\nabla \cdot \mathbf{D} &= \rho_v && \text{(Gauss' Law)} \\ \nabla \cdot \mathbf{B} &= 0 && \text{(Gauss' Law for Magnetic Fields)} \\ \nabla \times \mathbf{E} &= -\partial \mathbf{B} / \partial t && \text{(Faraday's Law)} \\ \nabla \times \mathbf{H} &= \partial \mathbf{D} / \partial t + \mathbf{J} && \text{(Ampere's Law)}\end{aligned}$$

The first 2 equations describe non-changing static electric charges \mathbf{D} and magnetic fields \mathbf{B} . The last 2 equations describe changing electric fields \mathbf{E} and magnetic fields \mathbf{H} . ρ_v is the electric charge density and \mathbf{J} is the electric current density.

Here's all you need to know about the math: the " $\nabla \cdot$ " and " $\nabla \times$ " are three dimension vector mathematical operators, like "+", "x", and "÷" (but a little more complex). The " $\nabla \cdot$ " is about the directional flow out of, or in to, a point in space, like water flowing out of a pipe. The " $\nabla \times$ " is about the

rotation of a field around a point, like water flowing over a waterwheel. The $\partial\mathbf{B}/\partial t$ and $\partial\mathbf{D}/\partial t$ are about the change of the electric and magnetic fields over time.

The first equation, Gauss' Law, is equivalent to the Force Equation for Electric Charges: like charges repel each other and opposite charges (i.e. positive and negative charge) attract. Gauss' Law also says that Electric Field lines diverge away from Electric Charges. This means that positive charge acts as a source of Electric Fields (like the way a faucet is a source of water). Gauss' Law means that negative charges acts as a sink for Electric Fields (the way water drains or exits a region via a sink hole). This means Electric Field lines start and stop on Electric Charge.

Maxwell's Second Equation says that magnetic monopoles do not exist. While we have Electric Charges (Electric Monopoles), we have never found the magnetic equivalent - magnetic charge or a magnetic monopoles. This equation states that the magnetic field tends to wrap around things - since the divergence (i.e., the equation) equals is zero, the magnetic fields tend to form closed loops.

The third equation, Faraday's Law, tells us that a magnetic field that is changing in time will give rise to a circulating E-field. This means we have two ways of generating E-fields - from Electric Charges (or flowing electric charge, current) or from a magnetic field that is changing.

The last equation, Ampere's Law, tells us that a flowing electric current gives rise to a magnetic field that circles the wire. In addition to this, it also says that an Electric Field that is changing in time gives rise to a magnetic field that encircles the E-field. This means there are 2 ways to generate a solenoidal (circulating) H-field - a flowing electric current or a changing Electric Field. Both give rise to the same phenomenon.

As a whole, what do Maxwell's Equations mean?

The first two equations are mainly used at D.C. - i.e. when all the voltages and currents are constant and nothing is changing with time.

The 3rd and 4th equations really dictate the rules for Electric and Magnetic Fields. Let's look at the 3rd and 4th equations, two succinct statements that govern all of E- and H- field propagation: Faraday's Law says that a changing Magnetic Field gives rise to a circling Electric Field. Now, things in the universe do not continually grow or continually shrink - they oscillate. This means the Magnetic Field increases and then decreases - which means the Electric Field wraps back and forth around a changing Magnetic Field. And this means that the Electric Field is changing in time as well.

Look now at Ampere's Law. This says that a changing Electric Field gives rise to a circling Magnetic Field. And in the same way, the Electric Field will be oscillating in time, the encircling Magnetic Field will be wrapping around it and changing in time as well. What is this? This phenomenon is known as propagation. This is what gives rise to the propagation of Electromagnetic Waves.

MAKE YOUR OWN DIPOLES WITH THESE CENTER INSULATORS- DAN ROMANCHIK, KB6NU

One of the things that always gets my goat is the price some companies charge for dipole antennas. It's not that they're charging an outrageously large sum of money, and I certainly don't begrudge them making a profit for their efforts. It's just that if hams would just buy their own wire and parts, they would not only save money over the long run, but be encouraged to experiment with antennas. That's what I started doing about ten years ago, and I've been very happy with the results.

One of the first things that I did was to purchase ten Budwig HQ-1 center insulators and ten HQ-2 end insulators (<http://www.budwig.com/antenna-connector-insulators.html>). I've made a bunch of antennas with these insulators, including several 40m/20m inverted vees for portable use (such as Field Day and special events), a 17m dipole, and a 10m loop antenna. These insulators are very well-made, and can easily be reused, too.

Universal Radio sells the set (<http://universal-radio.com/catalog/antsup/1782.html>) for \$18.50. I just placed another order for ten HQ-1s and 20 HQ-2s (the minimum number that you can purchase to get a quantity discount). The price, including shipping, is \$143.

There are a bunch of other center insulators on the market, including:

- The Alpha Delta Delta-C antenna hardware kit (<http://universal-radio.com/catalog/antsup/0297.html>) consists of a Delta-C Center Insulator, antenna connecting hardware, 1 SEP Arc-Plug™ static protector (installed in Delta-C) and 2 Delta-CIN end insulators. This is a little heavier-duty than the Budwig insulators, but it costs more, too (\$30 at Universal Radio). Unless you're going to be running a kW, I don't see the need to spend nearly twice as much money on these insulators.
- The TEN-TEC ACRO-BAT Antenna Connector & Hanger (<http://www.tentec.com/products/ACRO%252dBAT-Antenna-Connector-%26-Hanger.html>) is an interesting product. Unlike the Budwig and Alpha-Delta insulators, this product does not have an SO-239. Instead, this insulator clamps over the coax and antenna wire, and in doing so, provides strain relief. I haven't tried this one, but it seems like a nice design. The cost is \$10, directly from TEN-TEC or from Universal Radio.
- The Unadilla W2AU ANsulator (<http://universal-radio.com/catalog/antsup/0913.html>) is made from PCV tubing and include eyelets for terminating the antenna wire and for supporting the insulator in the middle. For \$15, I think I'd rather have the Budwig insulator. Also, you should be able to make one of these insulators for less than 15 bucks.
- The Hy-Gain C-1C Center Insulator (<http://www.hy-gain.com/Product.php?productid=C-1C>) has a screw for tightening down the antenna wire, so you don't have to do any soldering, but overall, I don't think I like the looks of this model. And, at 30 bucks, it seems kind of pricey.
- The W8AMZ Dipole Antenna Starter Kit (http://www.w8amz.com/W8AMZ_ACC_Page.html) comes a center insulator made from PVC pipe, similar to the Unadilla W2AU ANsulator and two end insulators. It costs \$18.

If none of these strikes your fancy, you can always make your own. WP4AOH has some very good instructions on how to do this using PVC pipe and fasteners that you can find at your local hardware store (<http://wp4aoh.blogspot.com/2012/07/dipole-antenna-center-insulator.html>).

Whatever route you take, I encourage you to keep several on hand and enough antenna wire and coax to complete the antenna. You never know when the urge will strike you to build an antenna, and if you don't have the parts you've missed an opportunity to do some experimenting.

THE COMMUNICATOR is an informational publication for members of the Franklin County Amateur Radio Club. Officers: President: Al Woodhull, N1AW (n1aw@arri.net), Vice President: Ron Niswander, K8HSF (reniswander@gmail.com), Treasurer: Howard Field, N1LUP (howfield@comcast.net), Secretary: Chris Myers, KB1NEK (camyers1@verizon.net), Director: Belle Dyer, KB1NOG (bdyer58@mtdata.com), Director: Bruce Fuller KB1TLX, perkinsdowns@yahoo.com. This is your newsletter! Amateur radio information of general interest, club member project descriptions and doings, radio applications to other activities, corrections, or suggestions are all welcome. Individual submissions make for variety! We need more writers! Send submissions to Bob Solosko at w1srb@arri.net.