

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

FIRST CLASS MAIL



THE COMMUNICATOR THE COMMUNICATOR

March and April 2017

Upcoming Events

- MTARA Hamfest: Saturday Mar 11, 8:30 a.m.: Knight's Castle. Chicopee
- Club Breakfast: Saturday, Mar 18, 8:00 a.m.: Denny's, Greenfield
- E-Board Meeting: Monday, Mar 20, 6:00 p.m.: GCC Hammond Lounge, East Building
- Program Meeting: Monday, Mar 20, 7:15 p.m.:GCC Hammond Lounge, East Building - Antenna Modelling, Bob W1SRB
- Club Breakfast: Saturday, Apr 15, 8:00 a.m.: Denny's, Greenfield
- E-Board Meeting: Monday, Apr 24, 6:00 p.m.: GCC Hammond Lounge, East Building
- Program Meeting: Monday, Apr 24, 7:15 p.m.: GCC Hammond Lounge, East Building

March and April 2017

Calendar

The full FCARC calendar of activities is on the club website: <http://www.fcarc.org/activities.htm>

MTARA HAMFEST AND FLEA MARKET, SATURDAY MARCH 11, CHICOPEE

The FCARC will again took advantage of the sponsors' offer of a free table for neighbor radio clubs. The club sold a fair amount of equipment, especially some heavy stuff, so it was a success.

MARCH PROGRAM MEETING: MONDAY MARCH 20 AT 7:15 PM.

6:00 PM Eboard meeting

7:15 General Meeting. General Meeting at GCC East Building, Main Topic:
Antenna Modelling, Bob W1SRB

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, and keeps his interest in antenna modeling alive with work on amateur antennas.

Other activities are:

APRIL

- Apr 15 Sat 8:00 am Breakfast at Denny's 10:00 am
- Franklin County Amateur Radio Emergency Communications Group at GCC
- Apr 16 Sun Easter
- Apr 17 Mon Patriots Day, Boston Marathon
- Apr 24 Mon 6:00 pm E-Board; 7:15 p.m. General Meeting at GCC, Topic:*Field Day Planning*
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MAY

- May 13 Sat 8:00 am Breakfast at Denny's 10:00 am Franklin County Amateur Radio Emergency Communications group at GCC Hammond Studio
- May 15 Mon 7:00 pm E-Board at GCC Hammond Studio
- May 22 Mon *7:00 pm VE exams at Northfield Unitarian Church (Date corrected)*
- May 27 Sat 11:00 am Club Picnic (Date uncertain, time, & location TBA)
- May 29 Mon Memorial Day

News, Activities & Articles

LATE NEWS: THE GREENFIELD REPEATERS ARE UP AND RUNNING!

On Friday March 3rd our Greenfield 147.12 MHz and 448.875MHz repeaters were put back in service, both using duplexers for combined reception and transmission on their respective antennas. The Greenfield Fire Department helped us in several ways, including donating an unused rack panel for mounting both repeaters and the duplexers. As this Communicator goes to press, the repeaters are undergoing initial testing. Club members are encouraged to try them out, and report both normal and unexpected performance. Email Al, N1AW (n1aw@arrl.net). Look for more details next month.



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 well 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 operate 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 27 – AL WOODHULL N1AW

February VE Session Report

For our February 27th Volunteer Examiner (VE) license exam session we had one candidate, Justin Norman of Greenfield. About a week later his new callsign was posted on the FCC site: KC1HEG

The FCARC VE Team's next regularly scheduled VE session date is May 22nd and will be held as usual at the Northfield Unitarian Church.

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 so you can understand (or not) the joke.

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 that 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. Since the equations are presented in complex math, even a beginner's understanding of them 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 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.

Editors note: the developers and proponents of the so called "Cross Field Antennas" claim or imply that Maxwell's equations don't apply to these antennas, and that new, unpredicted, laws of electrodynamics and field theory explain their operation and performance. Professional antenna engineers are waiting for credible explanations of the claims made, but are reportedly not holding their breath.

WEB PAGE CLEANUP!!!

In order to make the club web page load faster the webmaster is removing many obsolete articles. Articles thought to be of continuing interest are saved to the [News Archive page](#). But almost everything is backed up offline. Contact the webmaster if you are looking for information that has been removed. Also, note that the *FCARC Communicator* [newsletter on-line archives](#) go back more than 10 years.

[THE COMMUNICATOR](#) is an informational publication for members of the Franklin County Amateur Radio Club and any other interested folks, and is edited by Roy Morgan, K1LKY (k1lky68@gmail.com). The club officers are: President: Al Woodhull, N1AW (n1aw@arrl.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 (<mailto:bdyer58@mtdata.com>), Director: Bruce Fuller KB1TLX, (perkindsdowns@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 and any suggestions for the newsletter to Roy Morgan, K1LKY (k1lky68@gmail.com)