

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



FIRST CLASS MAIL



THE COMMUNICATOR
THE COMMUNICATOR

July 2019

Upcoming Events

- Aug 3 Sat 8:00 am **Breakfast**, Denny's; 10 am *Note the breakfast is early this month because we have a public service event on the Saturday before the second Monday*
- Aug 4 Sun 7:00 a.m Public Service: **Greenfield Triathlon**, Nash's Mill Rd, Greenfield. *Contact Erika, KC1IJJ or another club officer to volunteer.* Aug 10 Sat 7:00 a.m Public Service: **Bridge of Flowers Road Race**, Shelburne Falls. *Contact Chris, KB1NEK or another club officer to volunteer.*
- Aug 12 Mon 6:00 pm **E-Board**, GCC East Building Room 110
- Aug 17 Sat 9 am-5 pm Public Service: **D2R2 (Franklin Land Trust Bicycle Tour)**, Deerfield to Vermont. *Contact Al, N1AW or another club officer to volunteer.*

July 2019

Secretary's Report

E-board meeting, 8 July 2019

1. There have been reports of noise on the repeater signal, sometimes even on the recorded announcements. Ask Al if he has any ideas. Suggest that maybe Aaron Dulles, W1AMD, might be interested in helping, since he lives near the site.
2. A motion was made and accepted to give Dick Merriott \$20 to reimburse him for the mileage on his truck during Field Day operations. A motion was made and accepted to reimburse Erika \$54.95 for the food she purchased at FD. Finally, another motion was made and passed to reimburse Anne and Keith \$102.33 for the food they purchased for FD.
3. There was an extensive discussion about the problem of the crowded storage space the club shares with FRCOG, on Woodard Rd. in Greenfield. The previous Saturday, six of us went to the site after the monthly club breakfast. There were several strategies offered to deal with it, and no consensus could be reached. Chris and Aaron asked the manager if a larger size unit is currently available. It is not. Several thought that if the FCARC paid FRCOG the difference, it might agree to move everything to a larger space. The manager said a 10 x 15 ft space costs \$10 more a month than the 10 x 10 currently used. A 10 x 20 ft space would cost \$20 more a month. Over the week end, Keith sent a message voicing his reasons for urging us to make better use of the space we are in, and save the money. For the last year, the club has had the use of a small part of the 10 x 10 ft space for free. We recognize that the free space gives us the incentive to do the work of reorganizing FRCOG's supplies.

After much discussion at the e-board meeting, we agreed to try to reorganize the space we have, on Saturday, July 20. By then, Greg Lewis, our contact at FRCOG will return from vacation, and we can try to get his permission to discard the wood pallets and extra large size cardboard containers. If he doesn't want to get rid of the entirely, our plan B is to offer to take them to the storage container next to Mohawk Trail High School, under the joint control of the towns of Buckland and Shelburne. Since Chris is the EMD for Shelburne, he has access to that container. Last summer, Greg Lewis and Chris transferred some of the FRCOG supplies to the High School storage site.

Keith urged us to purge our own collection of unnecessary items. Aaron urged us to have everyone with club equipment still in their homes, to make a list of that equipment, so the members will know what else should ideally be stored in common space. The hex beam at Chris's house is one example. It is too large to store in a 10 x 10 ft space, but might fit in one of the larger spaces if we could find a way to suspend it from supports in two corners. One member even suggested discarding the hex beam and using a Mosley junior sized beam, or equivalent. He says they can be disassembled, so would not need so much storage space. [Of course, the hex beam was made by Bob Solosko, who did not charge the club, even for the parts. A new beam, even if used, would cost something.]

Members present agreed we should aggressively get rid of things we don't need, and avoid spending club money to store them.

4. We took up the problem of teaching for new licensees. Aaron announced that he has received a notice from GCC saying it would no longer list license classes in its catalog, at least not under the category used for the last two years. Erika suggested there is another section of the catalog where we might fit in. Chris said we could probably use Room 110 to teach classes, even if GCC no longer lists them in the catalog, although the catalog announcements seem to have been very useful in attracting students. Aaron said he will write a letter to the appropriate official to ask for

listing under the different category.

Keith pointed out that those who have done the teaching have reached a rift over methodology, which Aaron says is serious enough to make him not want to do it anymore. Obviously, additional discussion will be needed to solve this problem

Review of planned public service events:

a. Erika passed out a map for the Triathlon route. (Sunday August 4) Everyone agreed it looks more dangerous for the race participants this year, because a stretch of Green River Rd., from the junction of Plain Rd. to Eunice Williams Dr. will have cyclists and runners moving in both directions at the same time. The Greenfield Recreation Director, Christy Moore, pointed out to Erika where the high priority spots would be for radio operators. If we have enough volunteers, we can obviously add locations.

An ambulance will be parked at the Polish Picnic Grounds, at the intersection of Meadow Lane and Plain Rd. Chris asked Erika to find out what the chain of command will be. Does Christy Moore want all notices of injury to go through her first, and not directly to the ambulance crew, or doesn't she care.

b. Chris reports planning for Bridge of Flowers Race in Shelburne Falls, Saturday Aug. 10 is going smoothly. 12 club members have signed up to participate. The race director wants one of our people to shadow her during the race, a job Anne has done for several years, and would like to do again. Again this year, several members of the Northwest Incident Management team will participate, including John Taylor, Shelburne Center Fire Chief, and public safety organizer for the event.

c. None of the organizers for the Deerfield Dirt Road Rondonee, Sat. Aug. 17, was present to make a report.

d. No one was present to report on the Green River Marathon, Saturday, Sept. 1.

e. Ron reported that he has had preliminary contacts with the Food Bank of Western Mass, which has requested our help for the Bike for Food cycling tour on Sept. 29th. In spite of some early doubts, board members expressed support for providing our participation.

News, Activities & Articles

The Quick and Dirty Guide to Ham Radio Satellites

Aaron Dulles, W1AMD (July 23, 2019)

Introduction

Working satellites can be a lot easier and cheaper than you might think. This aspect of ham radio is surprisingly accessible. Even new hams with Technician licenses and an HT can jump right in!

This article aims to provide direct, practical advice so you can start working the “birds.” For that reason, the background information will be somewhat limited, and focused on just a few key points. You will be guided through the process of using a pair of HT transceivers¹ and a dual-band Yagi to make a QSO on one of the FM birds.

Background

What kinds of satellites are there? The first type, which are best for beginners, are the “easy” birds with cross-band FM transponders, especially the 2m/70cm ones. Others use different bands; some have telemetry beacons; and yet others have “linear” transponders. The linear ones re-transmit the full passband from their uplink, making them interesting for SSB. (Some will even invert the signal, so uplink could be USB and downlink LSB, or vice-versa.)

Why do the birds have so many names? Yes, they tend to have lots of names. You don’t need to be too concerned about this yet, since this article will focus on just two birds. The reason is that each satellite gets (1) named before launch, (2) given an AMSAT identifier once in orbit; and (3) given other identifier numbers assigned by various agencies that track things in space. For example, AO-91 had the names Fox-1B *and* RadFxSat before launch. Once in orbit, it got the name AMSAT OSCAR 91, abbreviated as AO-91. And, it is number “43017” in the Satellite Catalog. (That number is sometimes called a NORAD catalog number, or TLE number. Again, don’t fret about this.)

What is “mode”? In satellites, “mode” refers to the bands used for uplink and downlink. For example, mode U/V means an uplink on UHF (70cm) and a downlink on VHF (2m). This system of describing modes replaces an older, more confusing system that used single letters. So don’t get confused if you hear about mode J. A quick Internet search will reveal that it’s just the older way of saying mode V/U.

What birds should I start with? At the moment, both AO-91 and SO-50 are very reliable “easy” FM satellites. AO-91 is mode U/V, and SO-50 is mode V/U. Their exact uplink and downlink frequencies, and the uplink CTCSS tones, can be found online.² These birds are good to start with, since most everyone has a 2m/70cm HT laying around.

Equipment

What kind of antenna do I need? This is critically important. You need highly directional antennas for both 2m and 70cm in order to work AO-91 and SO-50. I *very* strongly recommend getting a Arrow II Satellite Antenna. These have both a 2m Yagi and a 70cm Yagi, mounted perpendicular to one another on the same boom. Prices range from about \$100 to about \$160,³ with the biggest cost factor being whether you get a duplexer.⁴ You also have the option of building an Arrow-style antenna,⁵ and/or building your own duplexer.⁶ Note that the Arrows have BNC connectors, so you may need an adapter.⁷

Should I have a duplexer? An important question. Generally, you’ll want to be listening during 100% of the satellite pass, including when you’re transmitting (so you can hear yourself and know that you’re getting through). If your HT is capable of this kind of dual-band, full-duplex operation, and you can afford (or build) a duplexer, that will be helpful.⁸ Another option is to skip the duplexer and just use two radios, one to receive and one to transmit. This article assumes you will use two HTs.

Wait... HTs? Really? Yes, really. You only need one if you have a duplexer, otherwise you’ll need one to transmit and one to receive. If you use two HTs, and they’re different models, find out which one has better transmit power—use the stronger one to transmit, and the other to receive. Even 5W will be enough to get through. Of course, your signal is subject to FM capture by folks with stronger transmitters. Even so, you can do very well indeed with an HT.

When will the satellite be passing overhead? This brings us to the final piece of equipment you need: software.⁹ There are datasets called “Keplerian elements” (or “orbital elements”) that can be used to predict exactly when the satellites will

¹ As will be explained, it is possible to use one HT transceiver if its specifications are right.

² <https://www.amsat.org/fm-satellite-frequency-summary/>

³ E.g., <http://www.arrowantennas.com/arrowii/146-437.html>

⁴ Technically, it would be a diplexer, but there’s no need to bicker over this point.

⁵ E.g., http://ve2zaz.net/Arrow_Ant/Arrow_Style_Ant.htm

⁶ E.g., <http://www.zs6wr.co.za/ham-mag/Diplexer.pdf>

⁷ E.g., <https://www.amazon.com/Coaxial-Adapter-Female-Connector-Pieces/dp/B017SOLCMU/>

⁸ Note as well that some of these radios have “desense” on the receive side while transmitting, which effectively undermines the whole point of full duplex. See, e.g., Comment of N1EN dated 2015-06-25 on <https://forums.qrz.com/index.php?threads/trying-to-get-answers-on-full-duplex-ht-for-satellite.484629/>.

⁹ Let’s pretend “software” is a species of “equipment.”

pass by. The software uses this data to calculate upcoming passes. You will rely on the software to know (1) the “acquisition of signal” time, or AOS, which is when the bird comes up over the horizon; (2) the “loss of signal” time, or LOS, which is when the bird goes down over the horizon later on; (3) the compass directions for both AOS and LOS; (4) the maximum elevation¹⁰ of the pass; and, (5) Doppler offsets. Since you will be standing outside, and wanting to glance at this information during the pass, smartphone software is recommended. iPhone users may want to check out “Satellite Tracker.”¹¹ You will probably need to program the uplink and downlink frequencies into the software so it can do Doppler calculations for you. The software should be capable of downloading and refreshing its own Keplerian element dataset.

Getting Ready

First, after you’ve updated the Keplerian elements in your software (do this every few days at least), use the program to find out when the next AO-91 or SO-50 pass will occur. The higher elevation passes are best because the passes last longer (up to 10+ minutes) and the bird is getting physically closer as it peaks. (Be sure to look up the uplink and downlink frequencies and program into the software so that it can calculate Doppler offsets for you!) Some of the satellites have battery problems when they fly around the dark side of the earth, so daytime and evening passes are probably best, as the solar panels are illuminated.

Second, get your HTs ready. For now, don’t bother programming them; tuning them manually is fine.¹² Tune the transmitter to the uplink frequency, and the receiver to the downlink frequency. Both radios should have a step of 5 kHz to deal with Doppler.¹³ Set the CTCSS tone on the transmitter. Set the transmitter to high power. On the receiving radio, open your squelch up all the way so you’re constantly listening. Headphones may be helpful. (Adjust these instructions as necessary if you’re using a single, full-duplex HT.)

Third, find a good location for the pass. If you can be out in a large field, that’s best. Stay away from buildings, trees, or large hills/mountains.

At this point, you’ll find yourself out in a field with a somewhat unwieldy handheld antenna, two radios, a smartphone displaying data, and possibly a pen and paper as well. That’s a lot for two hands! Consider taking a buddy to help. You can also take a music stand to hold things for you—your pen and paper, your smartphone, and radios clipped onto the top. It will be key to be able to glance quickly at the smartphone to read Doppler offsets regularly, so prioritize placing the phone somewhere you can see it without having to pick it up and unlock it, *etc.* Some software will also display a compass and a live “map” of where in the sky the bird can be found. That’s very handy, too.

Make that QSO!

Just before AOS, take a gander at the Doppler offsets. The transmit radio will need to be adjusted downward, and the receive radio will need to be adjusted upward. It’s fine to round things off to the nearest 5 kHz.

When you hit AOS, turn up the receiver volume and point that antenna at the bird. You may not hear it at first, but soon enough you should hear full FM quieting, and very likely, lots of voices making very fast, terse transmissions. Polarization is key. Even if you’re pointed directly at the satellite, you may hear nothing until you start rotating the antenna along its boom. Aim matters, but total precision isn’t absolutely critical. With polarization, though, even minor adjustments can make a major difference.

Every minute or so, check on the Doppler offsets and adjust as necessary. And be sure to have a sense of the satellite position and adjust the aim as needed. Since the satellites rotate, you will also have to adjust for polarization.¹⁴

You might decide to just listen during a full pass before attempting to make your own QSO. Either way, when you’re ready to go, you need to know that these are fast and to-the-point contacts, with only an exchange of callsigns and four digit grid square information. *Always* standard ITU phonetic lettering. And, do *not* call CQ.¹⁵ There’s lots of folks trying to get one or two QSOs into their logs, and time is limited. Finally, you should be listening for the sound of your own voice when you transmit, as this will confirm your transmission is getting into the satellite and not being captured by another, stronger FM signal.¹⁶

¹⁰ This refers to how far “up” the bird will go. An elevation of 0° is directly horizontal towards the horizon, and an elevation of 90° is directly overhead at the center of the sky.

¹¹ The developer’s prior App, “HamSat,” cost money to purchase. It appears the software is now free, but requires a paid subscription service for downloading Keplerian elements. There may be other alternatives.

¹² Once you’ve gotten the hang of things, and a sense of how much Doppler shift you need to be concerned with on VHF and on UHF, you’ll be ready to program the radios if you want.

¹³ You can use 2.5 kHz steps, but that may induce you to worry excessively about re-tuning during the pass, and it doesn’t help that much anyway.

¹⁴ Sometimes the satellite may seem to disappear for a moment. This can happen while it’s rotating, but it will come back around soon enough.

¹⁵ You may hear “CQ Satellite” sometimes, but it’s quite unnecessary and eats up valuable time.

¹⁶ Sometimes the receiving radio will experience significant “desense” during transmissions, and you’ll end up not hearing yourself at all even though you *are* getting through. Whether this happens, and how much desense happens, depends of course on your particular set up and equipment.

Here's an example of what you might hear... Assume that the participants are using ITU phonetic lettering¹⁷ throughout for callsigns and for grid squares:

- > ... thank you, 73.
- > W1AMD, KB2YSI FN22
- > KB2YSI from W1AMD, thank you for FN22. I am FN32. QSL?
- > W1AMD Roger, QSL thank you, 73.
- > 73

Here, YSI called someone he presumably heard earlier, AMD. The reply was terse but courteous, and both sides exchanged grid squares.

- > KB2YSI, KG4ZXM EM77
- > KG4ZXM from KB2YSI thank you I am FN22. QSL?
- > Received FN22. My call is ZXM. Repeat ZXM. QSL?
- > Roger KG4ZXM. QSL thank you 73.

ZXM overheard a part of the exchange and tries to reach YSI. ZXM has to correct the callsign.

- > W1AMD, VA3NNA FN03
- > *brief pause*
- > VA3NNA... (*another voice*) RMS
- > Something RMS from VA3NNA come again with your call?

NNA has called out to AMD, whom he must have overheard earlier. After a brief pause without a response, and without someone else chiming in, NNA advertises his general availability. It turns out his FM transmission "captured" a weaker signal from a callsign ending in RMS, but NNA heard this and seeks out RMS, asking for the full callsign.

Final Words

Do not be discouraged if you don't get a QSO on your very first attempt. AO-91 and SO-50 can get rather crowded. Be persistent. If you feel like your calls to others aren't be answered, just drop your callsign when you can, which is an invitation for others to call *you*. You may want to try high elevation, mid-day passes during weekdays, as they might be less crowded. Contest days can be very frustrating. Also do not be discouraged if you don't hear your own transmission.¹⁸ Juggling the radios, smartphone, pen/paper, *etc.*, and re-tuning and re-aiming can get a bit stressful, given that you have only a few minutes, so bring a buddy if you can. Perhaps one of the best jobs for your buddy is to be the "scribe," and write down the callsigns and grid squares. That information can be easy to forget in the moment, especially when you've just completed a QSO and someone else calls out to you right away. Another good job for your buddy is to read you the uplink and downlink frequencies every minute or so, so you can fiddle the knobs and get back to work more quickly.

Soon enough, you should be able to reliably get at least one QSO during a pass, and sometimes two or three. It won't take you long to get to that point. Then maybe you'll start thinking about upgrades and what *else* you can do in the world of amateur satellites...

Good luck and 73! de Aaron W1AMD

¹⁷ In practice, there are a few moments when you don't really need to use phonetic lettering. You'll get a feel for that after a few QSOs.

¹⁸ See n.16, *supra*.

Thoughts on DB

As we have seen several articles on DB, I thought I would weigh in with my version of how they work. In practice for radio, you need to remember just 2 things.

3DB is twice as much, or half as much.
10DB is ten times as much, or one tenth.

So 100 watts of power with with 3DB of loss, is 50 watts. 100 Watts of power with 10DB of loss is 10 Watts. And 10 watts with 3DB of gain is like having 20 watts, 10 watts with 10DB of gain is 100 watts.

Just add and subtract all of the losses and gain from antennas and feedline etc and then follow that simple rule to calculate your effective power.

Aaron Addison, KC1CXX

Field Day News FCARC Field Day 2019 Report

AI N1AW

In terms of points (but Field Day is not a contest!) the FCARC 2019 Field Day effort at Poets Seat did not match our superb 2018 and 2014 scores, but with an estimated final score of 4312 points this seems to have been the third best year in the fourteen years for which scores have been reported on our website. Considering the state of the ionosphere (no sunspots seen for a month, HF propagation was lousy) and windy weather which caused premature antenna failures, we did well.

For many years we had used AC1L, the callsign of Dick Burnham as our Field Day call. Dick passed away, at age 97, about a month before Field Day. We used N1AW's callsign for the CW and SSB stations this year. As in past years we used KB1MSU, callsign of the Greenfield High School Amateur Radio Club, for the Get On The Air (GOTA) station.

For the first time ever we made a significant number of contacts using digital modes (and all of these at the GOTA station). W1AMD demonstrated equipment and techniques for satellite contacts and digital modes and CW demonstrations conducted by N1YL constituted a serious educational activity. The largest number of contacts for each station were made by these individuals - CW: WG1H, 511; SSB: KB1NOG, 43; GOTA: KC1IJJ and KC1JQJ, 21 each.

| | |
|---------------------|-----------------------------------|
| Number of QSOs: | |
| CW | 637 |
| SSB | 149 (includes 39 at GOTA station) |
| Digital | 44 (all at GOTA station) |
| ----- | |
| Total QSO points: | 3022 |
| | |
| GOTA bonus: | 40 |
| GOTA Coach Bonus | 40 |
| Youth Bonus | 60 |
| Other bonus points | 1150 |
| ----- | |
| Total bonus points: | 1290 |
| | |
| Final score: | 4312 |

- These licensed amateurs made contacts as recorded in the logs:
KB1NOG, KB1NOX, KC1DCQ, KC1HEG, KC1JQD, KC1IJJ, KC1JQJ, KU1N, N1AW, W1AMD, W1SRB, WG1H

- In addition, these non-ham visitors logged contacts at the GOTA station: Asha, Daniel, Julia, Lucy Michael, Sahaley

- Although not shown in the logs, KC5KKS and WA1VGA assisted with logging, K1BKY, KB1NEK, and KC1CXX assisted with publicity and other essential support, and N1YL was the GOTA coach.

(If I missed anyone, please let me know: n1aw@arrl.net)

-30-

(rev 7/19/2018)

FD Interference

This year the club used 3 completely different radios at Field Day: Al Mason used his TS-850 minus CAT control for the CW station, Anne used her TS-590S for the GOTA station, and the SSB station was another TS-590S that the club purchased just prior to FD. Antenna placement was the same as last year though CW and GOTA used different dipole models. GOTA used a Cobra Ultralite Junior and CW used an 80 meter dipole in addition to its usual Hex Beam. Interstation 2 meter communication between distant CW station and SSB/GOTA was in place but not really used. Bands were kept track of via foot as needed. Significant gains were made this year with only 1 report from the GOTA station of CW interference briefly which was probably harmonically related. SSB/CW operated on the same band at times with no interference noted. It should be noted that GOTA was on 40 meters for the duration.

Band pass filters were used at all 3 stations. Of note, SSB had a delayed start account the club's new TS-590S USB Comm port is defective and will not communicate with N1MM via computer. It has not yet been determined if the second DB9 Comm port will communicate with a computer.

It was significantly pleasant not having cw splattering across the bands interfering with the SSB\GOTA stations this year.

Keith, KU1N

My favorite memory from the 2019 field day

I had the pleasure of meeting a woman who was coming to Poet Seat Tower for a walk and got so excited to hear what our field day event was all about. Once I explained and showed her the equipment, she told me over and over that she was so happy to see that people were still doing amateur radio. She told me about how much her mother's radio time had meant for them as a family during the 50's and 60's. Her mom was from England and at that time international phone calls were unaffordable. Amateur radio allowed her mom to keep in touch with all the family she had left behind. I could feel her pure joy as she told me of these wonderful, happy memories of the mother she has so loved and how amateur radio had made such a difference for her family. One stranger today made me feel how relevant ham radio was and is to their family who immigrated to the US "from the other side of the pond". Anne N1YL

My worst nightmare at field day 2019

Many years ago I gave a presentation in Canada at international meetings about my worst nightmares in seating and mobility. In reality I stood up and shared all the mistakes I had made in prescribing wheelchairs and complex seating systems. I thought a few people would come but they had to open up a double room because it appears everyone likes to hear about someone else's mistakes. I expect the response to this story will be no different. My OM/Elmer and I with the help of other club members had worked for most of the year on improving field day operation. We did an amazing job on addressing interference with new radios and filters. We added a SDR and second screen to GOTA station and had N1MM working just right. We were able to operate on voice and digital (PSK31 and FT-8) at the GOTA station. We had a new and better dipole antenna. We even had a station with a MFJ Keyer and Key set up so people could try Morse code out. Let me tell you, we were pretty proud of ourselves. Our only worry was that perhaps we hadn't had quite enough practice with our new more complicated system and that I the GOTA coach got no sleep for about 36 hours as we were using my radio. I am getting older so let me tell you sleep leaves me a much nicer and happier person. What could go wrong? I thought I could muscle through and get sleep after field day. Did I tell you that our great antenna came from my house and that we had very carefully brought the antenna and set it up without difficulty? We made it

through a couple of hours of very strong winds Saturday without difficulty. Then on Sunday several hours before field day ended something crashed into the truck parked outside the GOTA tent, the radio stopped working, and along with the other components started sliding off the table. I very calmly stabilized the equipment, turned off the power, and undid the very tight antenna feedline from the radio. When I got outside my worst fears were confirmed. The north end of my dipole, the one deep in the woods, high in a large tree had broken free and my antenna was on the ground. Someone at that moment told me I should hold it in the air as a car was coming down the road. After standing there making a bridge of my antenna for a few minutes my inner tired and very whinny child appeared and I gathered up the north end of my antenna (I claim neatly and my husband/OM says as tangled mass) and placed it (my husband says fired it) into the trunk of our car. My husband told me later it took 3 people to untangle the antenna. Lessons learned bring more power cord or rope (no twine), get rest before or during field day, and do not let my inner child out to play on field day.

Anne, N1YL

And closing out field day news. We have some pictures.

From Tim Gilkes.



From Anne Kring





And From Bob Solosko



Upcoming Ham Fests and conventions:

NoBARC Hamfest

Saturday Aug. 17, 2019

Bowe Field (Adams Agricultural Fair Grounds)

Right off of Route 8 in Adams, Ma.

09/06/2019

HamXposition @ Boxboro, 2019 New England Division Convention

Location: Boxborough, MA

Website: <http://hamxposition.org>

NEAR-Fest XXVI

October 11 & 12, 2019

Deerfield, N.H.

THE COMMUNICATOR is an informational publication for members of the Franklin County Amateur Radio Club. Officers: President: Aaron Addison (kc1cxx@arrl.net), Vice President: Richard Merriott KC1JQJ, Treasurer: Howard Field, N1LUP (howfield@comcast.net), Secretary: Chris Myers, KB1NEK (camyers1@verizon.net), Director: Belle Dyer, KB1NOG (bdyer582@juno.com), Director: Ron Niswander, K8HSF (reniswander@gmail.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: Jeanne A. Dodge, KC1DCQ (j.anndodge@gmail.com).

Back issues of the Communcicator are online at <http://www.fcarc.org/commun.htm>