ATCO NEWSLETTER

VOLUME 38 NUMBER 3 **July 2021**

The ATCO newsletter is the official publication of a group of amateur television operators known as "AMATEUR TELEVISION IN CENTRAL OHIO Group Inc" published quarterly (January, April, July, October)

ATCO SPOTLIGHT TOPICS

OK, I couldn't resist sharing this. It's especially funny to me because I'm the HOA (Home Owners Association) leader in our housing subdivision. I'm supposed to enforce the restrictions in our neighborhood. So, if you haven't guessed, the picture below depicts a vertical antenna disguised as an umbrella over a picnic table. (Well, at least I laughed!). **Maybe a Yagi on top of the umbrella would help!!**

ACTIVITIES ... from my Workbench

Well, here we are again guys, still within the grasp of the Pandemic. The good news is I see the light at the end of the tunnel, and this time I hope it's not a train. Hamfests are again a reality which is a relief for most of us. We've been cooped up too long. I am DEFINITELY planning to go to the Columbus Hamfest on Saturday August 7 and show up early as I believe it will be a crowded event.

Since we have been cooped up for so long, repeater activity has simply stopped. Because of the Pandemic, I have not been allowed there unless it is an emergency. They have not defined the term "emergency" but I'm not going to test it and simply stay away unless what we have working now breaks. So far, so good! However, I'm compiling a "to do" list so sometime soon I'd like to return there to see if I can repair the malfunctioned MESH transceiver. Even now, it's a nightmare getting to the antenna as it's consumed by the vast array of cables and rigging needed to repair the building structure. It's been a 3-year project so far with at least another year to go.

The interference on 439MHz is still there. I've notified the FCC about it and followed up with them twice. Each time they told me the case is still active but Pandemic issues have slowed response to all requests. (I'll bet that if interference to commercial aviation showed up, that wouldn't be the case). I plan another call soon. We will just have to wait. However, there has been no activity on 439 lately so the issue is not that important right now. Since the interference shows up only at night, I must go there after dark if I wanted to "snoop around". However, walking around after dark in central downtown Columbus is NOT a very good idea at this time. I don't want to get shot.

Home activities wait for me to get more excited about pursuing them. My tower camera still has a cable short circuit. The short caused the switching power supply driving it to keep switching on and off due to the overload and thereby causing receiver interference. I reported this the last time but as you see the priority order hasn't gotten to this task yet. I suppose a visual inspection of the cable is in order first but that requires a tower climb.

I'm still working on my new DATV receiver design which is taking up the majority of my time right now. I hope to have it complete but the software is the main holdup right now. Hardware is designed and prototype circuit boards are in process but my best guess for completion is the end of this year. More on the features at a later date.

That's about it for now. I'm hoping we WILL have a Fall Event this year in late October or first of November but need to check with Ken, W8RUT, to see if the ABB café be available. If not, I'll search for an alternate location. It's early yet so I'll investigate and inform everyone as soon as concrete plans emerge.
…73 WA8RMC

IMPORTANT FIELD DAY NEWS!

(It's too late to give you an advanced notice this year but mark it on your calendar for next year. WA8RMC)
We have received from Governor DeWine a Proclamation that June 26-27 have been declared "Amateur Radio Operators' Appreciation Days" in the State of Ohio! A .pdf of this is available to you on the ARRL OH web site at www.arrl-ohio.org to reference this in any and all of your public press releases regarding Field Day operations this year. The Proclamation reads: "WHEREAS, amateur radio operators play a vital role in emergency communications preparedness plans for the United States, the state of Ohio and many other local government agencies; and WHEREAS, Ohio has more than 28,000 licensed amateur radio operators, many of whom have provided valuable public assistance through emergency radio communication on a local, statewide, national and international basis in time of need; and WHEREAS amateur radio operators donate the time, equipment and expertise to help provide the public with free emergency communications; and WHEREAS, June 26-27 have been set aside in Ohio and nationally as amateur radio field day for emergency communications preparedness exercises. Now, THEREFORE, We, Mike DeWine and Jon Husted, Governor and Lieutenant Governor of the State of Ohio, do hereby recognize June 26-27, 2021 as AMATEUR RADIO OPERATORS' APPRECIATION DAYS On this 26thday of June 2021.

PS: Is this real? I've not heard of it before. I can't find information about it on the ARRL web site. WA8RMC

FCC SEEKS PROCEEDING COMMENTS ABOUT 70 & 5 CENTIMETERS

The FCC is soliciting a second round of comments on whether to authorize commercial space entities to obtain licenses for frequencies used exclusively during space launch activities. The proposals include parts of the 70-centimeter (420 - 430 MHz) and 5-centimeter (5650 - 5925 MHz) bands. The federal government has allocated this spectrum on a primary basis and routinely uses it during space launches, but commercial space companies must obtain short-term Special Temporary Authority (STA) authorizations from the FCC to use it for the same purpose.

The last decade has seen a dramatic increase in commercial space launches. In March, the Federal Aviation Administration (FAA) streamlined its commercial space launch and reentry licensing regulations. In April, the FCC adopted some of its proposals from 2013 and solicited additional comment in a *Further Notice* on proposals in ET Docket No. 13-115, "Allocation of Spectrum for Non-Federal Space Launch Operations."

The proposals would allow private commercial space companies to obtain regular FCC licenses instead of launch-specific STAs in a number of bands, including 420 - 430 MHz and 5650 - 5925 MHz. The federal government, including the US Department of Defense, is the primary user of both bands. Amateur operations are allocated on a secondary basis. The FCC again seeks comment on whether it should authorize use by commercial space launch entities limited to space launch uses identical to those employed by the federal government on this spectrum.

Primary federal users heavily employ the 70-centimeter segment for radiolocation applications. Frequencies in the 420 - 430 MHz segment can also be used during space launches to send a flight self-destruct signal if a launch goes off course and poses danger to a populated area. The Commission's 2013 proposal, repeated in 2021, would permit use restricted to flight termination during launches by commercial space launch companies.

Primary federal users also make use of 5650 - 5925 MHz for radiolocation applications, with channels used during launches for radar tracking. The Commission proposes to permit use by commercial entities similarly limited to use for radar tracking of launch vehicles.

The Commission notes in its *Further Notice of Proposed Rulemaking* that since 2013, commercial entities have become established in space launch operations that were formerly the province of NASA. "To support these commercial space ventures, entities such as the New Mexico Spaceport Authority, the Virginia Commercial Space

Flight Authority, and the Houston Airport System have established non-Federal spaceports," the FCC said, noting that five bands -- including 420 - 430 MHz and 5650 - 5925 MHz -- are commonly used for communication with and tracking of launch vehicles.

The Commission noted, however, that several commercial space launch providers indicated that they do not use either band for their operations. The FCC concluded, "Given the limited current use of these bands during space launches [by commercial space entities], we are not convinced that there is need for new allocations for either band."

Comments are due on or before July 12, 2021; reply comments are due on or before August 9, 2021. Read an expanded version.

ROPE TIGHTENER

Guys, have you ever seen something like this before? It caught my eye so I thought I'd pass it on. It would seem valuable for field day to tighten those antenna guy lines. WA8RMC

Bill Jones, K8CU reports, "PS those rope tighteners are good for some smaller jobs, but not for serious tower work. I used one for tightening a support rope for a wire antenna and it seemed ok, but I eventually removed it.

FIRST X-CLASS MAJOR SOLAR FLARE BLACKS OUT HF ON JULY 3

Guys, I know this is not ATV related (or IS it???) but it's of interest to most of us. Solar flares normally don't bother VHF/UHF communication but it's nice to see what the HF guys have put up with.) WA8RMC

For a brief time on July 3, a lot of radio amateurs were wondering, "Where did the bands go?" as the first X-class solar flare in 4 years blacked out HF propagation for a time.

"I was on 20-meter FT8, and my waterfall display went from solid red signals to solid nothing in the blink of an eye," Scott Craig, WA4TTK, told "K7RA Solar Update" Editor Tad Cook, K7RA. "It lasted about 10 minutes." Craig was not alone.

"Many American radio amateurs reported sudden HF propagation blackouts on Saturday morning, July 3, when solar active region 12838 produced an X1.5 major solar flare that reached maximum intensity at 1429 UTC, the first X-class solar flare of Solar Cycle 25 and the first since 2017," said Frank Donovan, W3LPL. "HF propagation blackouts are caused when x-ray and extreme ultraviolet radiation from X-class solar flares strongly ionizes the absorbing D-region in the Earth's sun-facing dense lower ionosphere," he explained. Such a radio blackout occurs when a pulse of x-rays ionizes the top layer of the atmosphere, the exosphere.

In this instance, it caused what NOAA's Space Weather Prediction Center (SWPC) calls an R3-level or "strong" radio blackout (on a scale of R1 - R5). An R3 incident can cause a "wide-area blackout of HF radio communication [and] loss of radio contact for about an hour on [the] sunlit side of Earth. Low-frequency navigation signals degraded for about an hour."

Donovan said that X-class major solar flares are necessary consequences of steadily increasing Solar Cycle 25 activity. "95% of all X-class solar flares occur when the solar flux index is 90 or greater. The remaining 5% can occur any time during the solar cycle," he points out. "X1-class major solar flares typically degrade HF propagation for only an hour or two at mid and high latitudes, only on Earth's sunlit side."

X-class major flares are measured on an open-ended scale. The strongest one ever recorded was an X28 flare in 2003, hundreds of times more powerful than the July 3 X1.5 solar flare. X10-class and stronger solar flares typically have effects that last for most of a day and affect the entire sunlit side of the Earth. Fortunately, X10-class solar flares occur only about once every 20 years or more.

"Much more severe and long-lasting HF propagation degradations are often caused by the coronal mass ejections (CMEs) often associated with -- but not caused by -- major solar flares," Donovan explained. "HF propagation degradation caused by CMEs typically begins about 2 days after the effects of the associated solar flare, the duration of the delay depending on interactions between the CME and the solar wind."

The CME associated with the July 3 X1.5 solar flare is likely to have little to no effect on HF propagation going forward, because the active region was very close to the western edge of the visible solar disk when the CME erupted. Region 12838 rotated off the visible disk on Sunday, July 4.

Solar flares have no significant effect on VHF ionospheric propagation, but can degrade satellite communications passing through the ionosphere. More frequent, less powerful M-class medium solar flares produce short-duration degradation at high latitudes. Very frequent, much weaker A-, B-, and C-class solar flares do not degrade HF propagation. -- *Thanks to Frank Donovan, W3LPL*

FIRST-TIME EXAM APPLICANTS MUST OBTAIN FCC REGISTRATION NUMBER BEFORE TAKING EXAM

05/06/2021

Beginning May 20, 2021, all amateur examination applicants will be required to provide an FCC Registration Number (**FRN**) to the Volunteer Examiners (VEs) before taking an amateur exam. This is necessary due to changes the FCC has made to its licensing system.

Amateur candidates who already have an FCC license, whether for amateur radio or in another service, already have an FRN and can use the same number. All prospective new FCC licensees, however, will be required to obtain an FRN *before* the examination and provide that number to the volunteer examiners on the Form 605 license application. An FCC **instructional video** provides step-by-step instructions on how to obtain an FRN through the FCC's Commission Registration System (CORES).

The FRN is required for all new applicants to take an amateur exam and is used afterward by the applicant to download the license document from the FCC Universal Licensing System (**ULS**), upgrade the license, apply for a vanity call sign, and to submit administrative updates (such as address and email changes) and renewal applications.

In addition, after June 29, all applications will be required to contain an email address for FCC correspondence. Applicants will receive an email direct from the FCC with a link to the official electronic copy of their license whenever a license is issued or changed. ARRL VEC suggests that those without access to email to use the email address of a family member or friend. Licensees will be able to log in to the ULS using their FRN and password to download the latest version of their license at any time. The FCC no longer provides paper license documents.

From ARRL web site. www.ARRL.org/news

LOCAL TOWER RECONSTRUCTION EFFORT

A friend of mine Bill, K8CU, who lives close to me has had a tragedy of sorts recently. A guy wire turnbuckle holding his 100-foot tower came unscrewed releasing the tower so the whole thing came crashing down. This tower held his 40, 30 and 20 meter full sized beams which came down with it. The tower is Rohn 55 that is turned at the 40-foot level so he didn't need a separate antenna rotor, ***he turns the whole tower!*** *Fortunately, the tower was not bent as the trees cushioned the fall. The antennas were a different story. They were destroyed. Since the accident Bill has been busy single handedly repairing the damage, fixing the guy wires and returning the tower to vertical status. Since the tower is rotated from the 40-foot level, only the upper 60 feet fell leaving the bottom 40 feet in useable condition as is!*

On the right is a picture of the 100-foot tower before the crash. Below is what it looks like afterward.

I've been following his progress illustrated below. Bill describes it in his own words as follows:

4/18/21
Today I was able to get the tower lowered to the ground, although there are large pieces of boom and long elements still hung up in the trees. I may need to rent a short man lift. A second look shows the tower sections are not bent.

It appears these broken antennas are a complete loss. Both are heavy duty full-size elements and worked very well. The 30-meter Yagi weighed in at a tidy 215-pounds while the 2-el on 40-meters was at 104-pounds. Commercial equivalents from JK Antennas weigh less than 100-pounds each. This means my home-made two-wire tram can raise them over the house with minimal sagging. This is good news.
6/2/21
I have been busy with the tower construction effort. The bearing half weighs about 200-pounds.

I do the lifting from the ground, then climb up with a remote-control pendulum for final positioning for installation from the ground. I use a tag line to keep the stuff away from the tower legs. So far, I haven't needed any help but I do have a professional climber available when he is free if I need it.

6/5/21
Things are looking good. Today saw the raising of the repaired base bearing to the standard height of 40-feet. It was more straightforward than I hoped. I may be able to get the first tower section raised tomorrow!
Remaining big steps: - add two tower sections, place temporary guys at 60-feet, -raise two more tower sections, add permanent guys at 80-feet, remove temporary guys, raise two final tower sections, install antennas.
So far, I haven't needed any outside assistance.

6/6/21
I'm careful to be nowhere near a supported load when raising. Positioning a resting load with one hand and lowering the load a few inches with the remote winch control is relatively easy. I raise the loads from the ground when I'm about 40-feet from the tower. I use binoculars to fine tune the final positioning to within a few inches of target. Then I start climbing. There's no way I could man-handle this thing by brute force, especially at age 72.

6/12/21
With no rain, the first section in the picture on the right was raised today and is now bolted in place. There are five sections remaining. It seems that one section every day is a possibility. The rainy weather remains a problem. For now, the base bearing has been repaired and one tower section installed. Things are looking good. So far, I haven't needed any help. The biggest effort is positioning the gin pole.

6/13/21
Starting after 8 AM this morning, another section was raised and bolted on by noon. Only four sections remain. Temporary guys at 60-feet are required now...I will try to put up the three temporary guys this late afternoon - early evening.... My three-point lifting harness works well. It's designed for either tower bearings or tower sections. The loads stay almost level and are relatively easy to position once hoisted to their destination.

A single hoist wire (1/4-inch wire rope) goes down the center of the hoisted tower section. Using heavy (500-pound) carabiners, each of three short (2-feet long) wire ropes branch from the center hoist wire to each of three tower legs at approximately the same length. The hoisted tower section is pretty much level and goes onto the tower without much fuss. In my case, one hand guides the tower, and the other hand controls the winch. I lubricate the mating tower legs with anti-seize paste for easy insertion. I made the short wire ropes using 1/4-inch wire rope with loops terminated with aluminum ferrules. These ropes are very rugged and easily handle Rohn 55 tower. This same rigging worked for hoisting the base bearing assembly too. I will use it for the top guy ring as well. Classic rigging for tower sections uses a single point to hoist triangular tower which results in the hoisted tower section having a tilt.

6/13/21

I'm historically a home-brew antenna guy but my brand-new antenna arrived today. Made in Germany by Opti-Beam, it's an OB 40-2M, a two element 40-meter Moxon Yagi. It's expensive and sold by DX Engineering, but has features I find attractive, with F/B rejection comparable to three-element beams.

6/14/21
Today I cleaned up the upper guy ring assembly shown at right. There was visible rust. The ring was cleaned twice with spray-on automotive brake cleaner and wiped immediately with a clean cloth. I have used Rust Oleum Hammered paint for years with excellent results. The silver-colored version looks almost like fresh galvanizing. This stuff isn't like earlier paint that would rub off on your hands after a few days.

6/19/21
Here is another view of the lift rigging used on the top rotating bearing.
This may go up tomorrow.

6/20/21
Right now, there is 80-feet of tower and the gin pole top is at 90-feet. Looking to add the top guy ring bearing next, followed by the three Phillystran main guys. Funny, there doesn't seem to be enough clearance to install the guy ring bearing with the gin pole that I have, but used the same setup years ago with no problem. Not sure what's going on.

This heavy gin pole is difficult to position. The pole pipe is 15-feet long aluminum, with a .25-inch wall thickness. The gin pole clamp is a legacy WB0W design from 20-years ago, and it's a heavy bear...I needed to modify it recently to make it easier to use.

6/27/21
I spent Field Day finishing the tower sections. No bearings or tower sections in the back yard anymore. The gin pole and some ropes are still on the tower for now. The stainless chain still needs to be installed and of course, the antennas and coax. The last section was finally delivered to within three-inches of target, and it was fun bolting the last one in. Time for a nap!

6/29/21
Photo (far right) of the stainless steel #50 roller drive chain upgrade. No maintenance ever required as specified by the K5IU design engr.

6/30/21

The photo at left shows an antenna trolley support that mounts at the tower top. This support holds two wire rope trolley "tracks" for raising antennas from the front yard and over the house to the radio tower. This one is made from mostly scrap steel stock. Stainless bolts hold it to the tower. My cost is about eight dollars and a few hours.
Plus, I had the excuse to get out the MIG welder…

7/2/21
The tower is "done", so time to open the antenna box. The Moxon design gives nearly the gain of a classic 2-el design, but the F/B of a classic 3-el Yagi. Hearing on 40 meters can be important sometimes. Upon opening the box, the square boom looks impressive and rugged. Most parts are already assembled. I was disappointed to see the design used inductors. No inductors were on my list. It seems the sales photo wasn't clear enough to determine. At this point, I'm keeping the antenna. If it meets published specs, I will be happy. Everything seems well made. Built like a tank? No, sorry. Adequate is more descriptive, I think. Initial impression on a scale of ten is a solid seven.

7/18/21

The new 40-meter Yagi is about ready for installation, but there are some particular problems with the project. **The manufacturer's photo at right** shows the Moxon style antenna has a closed top loop which prevents raising the antenna unless the tram angle is over 60-degrees. This way, the antenna can be situated to clear the tower top. Usually, my aerial tram uses a fixed angle of about 45-degrees. This method is necessary to clear the house rooftop and at the same time, not hit the ground level during the first liftoff. However, the required 60-degree angle won't work near the ground. A workaround is two selectable tram angles. So, two haulage ropes with different "tillers" are needed. When near the ground, the 45-degree tiller works, and when high up the tower, the 60-degree tiller arm works. Today I'm ordering more haulage rope and unique pulleys for this two-wire, dual tiller aerial tram. I've never seen one described in the literature. This design looks promising to me. Hopefully, I can erect it soon and see what happens.

That's it so far guys. When he completes the antenna installation, I'll report on it again in the next Newsletrter. Wish him good luck and to stay safe!
…WA8RMC

MICROWAVE DXING CAN BE DANGEROUS!

From the Boulder Amateur Television Club TV Repeater's REPEATER May 2021 issue 77

I am not talking about RF exposure. I am instead referring to irate land owners, especially in rural areas.

We recently were alerted to the problem by a microwave ham on the east coast. He stumbled onto an angry posting online on the Reddit web site about one of our Colorado microwave enthusiasts. He solicited our assistance in warning him of the potentially lethal danger posed by this very irate land owner. The land owner posted on the internet this photo of the ham with his big microwave dish. This land owner has had legal issues with the government and thought the microwave truck was the FBI spying on him.

The political environment in the USA has become very negative and confrontational recently. This was evidenced dramatically on January 6th with the violent insurrection and storming of our national capital in Washington, D.C. Add to that the gun control issue and the alarming increase in mass shootings, of which we here in Boulder recently experienced at our own King Soopers grocery store with ten victims. Especially in the rural areas of our county, the residents seem to be more and more paranoid about the government trying to control their lives and guns.

Captain Bill, K0RZ, of the Boulder County Sheriff's Dept. (now retired), has been a long-time microwave DXer, moon-bouncer & ATV ham. Bill's advice to the rest of us is to be aware of the changing times and attitudes. He would hate to see us stop doing our microwave experiments. But be extra cautious and vigilant about our surroundings. Best not to go out alone, but have a buddy along to keep eyes on the surroundings. This has always been BCARES policy when sending ATV teams out in the field. Send two persons, never be alone. Bill also now recommends we pick our sites extra carefully. He suggests only going to public locations, such as parks, etc. and avoid rural private lands. Even though we have never been trespassing on private land, but parking on the side of public highways, the rural land owners still sometimes get upset. Several of us have in fact, at times in the past, been confronted by a nearby land owner who was antagonistic about our presence.

…Jim, KH6HTV, Boulder, CO

Thanks to NEVARC NEWS, N-E Victoria Amateur Radio Club newsletter, May, 2021

THE STORY BEHIND OHM'S LAW

*OK Guys. Time for an electronics science lesson. (Did you think we'd cover **ONLY** ATV topics). However, since OHM's Law is utilized in ALL ATV projects with wires, it is only natural to include it here too… see the connection? WA8RMC*

By Al Williams July 20, 2021 in HACKADAY.com

Do you ever wonder how much of what we do you could figure out from scratch? Tying your shoe might seem simple now, but kids have trouble mastering the skill, and dreaming it up for the first time is even harder. The same holds true for a lot of technology we use every day. Would you think up the computer mouse or even the computer if they didn't already exist? Surely, though, one of the simplest and most useful math equations that is fundamental to electronics — Ohm's law — would be easy to figure out, right? It is often the first thing you learn about electronics, but figuring it out that first time turned out to be quite difficult.

The fellow who discovered the relationship was Georg Ohm, a high school math and physics teacher from Köln. What you might not know is that the first time he published it, he got it wrong. But, lucky for us, he figured out his mistake and was able to correct it.

It isn't Just a Good Idea…

Ohm's law is easy. For a linear resistor, the current through the resistor is proportional to the voltage applied across it. The proportionality constant is the reciprocal of the resistance value in — no surprise — ohms. That's just a fancy math way of saying I=E/R where E is voltage, I is current, and R is resistance. Of course, algebra will tell you that E=IR and R=E/I.

Measure Twice

Volta's pile of copper and zinc.

While that seems obvious today, in the 1800s, not so much. There had been some awareness of electricity dating back to ancient Greece. However, until 1800 when Volta created the "hydro-electric" battery — meaning it was a wet cell — there was no easy way to create a steady current for scientific investigation.

From 1800 to 1820, then, science was able to use a voltaic pile to generate electricity. But there was a big limitation. There was no way to measure the current flow in the circuit. In 1781 Henry Cavendish experimented with Leyden jars (basically a high-voltage capacitor) and glass tubes of varying diameter and length filled with saline. Having no way to measure current, he would use his body and note how strong a shock he felt. He noted that current was related to voltage but did not mention it to other scientists and it remained largely unknown until Maxwell published the result in 1879.

The current measurement problem resolved in 1820 when Oersted showed that a current would produce a magnetic field. That led Schweigger and Poggendorff to invent the galvanoscope in 1821. This is essentially a coil with a compass inside of it. Current in the wire would deflect the compass needle and the amount of deflection told you how much current was in the wire.

Ohm wanted to study the nature of electric current flow and built both a battery and a galvanoscope. His experiments aimed to describe the amount of current that would flow through a given length of wire. He would measure the current flowing from the battery using only his galvanoscope and then insert a length of wire and note the difference in the reading.

Oops…

In 1825, Ohm announced his formula to the world in a paper entitled, "Preliminary Notice of the Law According to which Metals Conduct Contact Electricity." Not exactly a click-bait title. However, there was a problem: the formula he had was incorrect. Keep in mind that there were not all the units we are used to today, so Ohm's formula was measuring V, the reduction in needle deflection caused by the test wire. The length of the wire X and the applied voltage M were key factors as well as the resistivity of the wire, R. The incorrect formula was: $V=M \log(1+X/R)$. With what we know today, you can look at this and immediately know it is incorrect. However, in 1825, that wasn't so obvious. The paper was accepted for publication but before it went to print, Ohm ran new experiments with a different power source. He realized his formula was wrong, but it was too late.

Correction

The problem was the battery. While it might seem obvious today, in 1825 there wasn't a general realization that a wet cell's voltage will vary under load. Ohm's friend Poggendorff suggested he use a thermoelectric battery — what we would call a thermocouple. In "Determination of the Law According to which Metals Conduct Contact Electricity, together with the Outlines of a Theory of Volta's Apparatus and the Schweigger Galvanscope" Ohm got it right. (He liked the long titles.) The formula there didn't exactly look like what we think of as Ohm's law, but it actually is, if you account for the resistance of the power source. In modern notation, we would write: $E=I*(Rb+R)$
Here, Rb is the battery resistance. In 1827, Ohm also published "The Galvanic Battery Treated Mathematically" showing that, at least, his ability to write good titles had improved. That's all, right?

Not So Fast

You would think that everyone would be happy to see Ohm's law and would start to apply it immediately. That didn't happen. Science was skeptical then — as you might argue it still is — and the establishment of the day thought Ohm's law was too simple to have eluded the community for thirty-some-odd years. There was also strong sentiment that Ohm had rushed to formulation, and a distaste for his practical experimental methods. The establishment saw Ohm as — more or less – a poser. The German Minister of Education proclaimed that "a professor who preached such heresies was unworthy to teach science." Others said that the work was a "web of naked fancies." For six years, the world continued to ignore Ohm's law, for the most part. However, Pouillet published a paper in 1831 where he — without being aware of it — rediscovered Ohm's formula. He was probably disappointed when, upon publication of Pouillet's law, others pointed out that Ohm had done the same work years earlier.

Errata

You might think it is odd that Ohm published a wrong formula or Pouillet repeated an experiment, but things were a lot different then. Barlow, in fact, tried to solve the same problem in 1825 and had published a finding that current through a wire was inversely proportional to the square root of the wire's length. This result was incorrect but fit the data because Barlow failed to account for the internal resistance of the battery, as Ohm did. Even Barlow accepted that he was uncertain his law was correct. On the plus side, Barlow did invent Barlow's Wheel which was a clever form of motor using a metal wheel, a magnet, and mercury.

Acknowledged

In the end, Ohm's work was acknowledged and he not only received the credit he was due, but his name is still on our lips every day. If you want to read more details about Ohm, the Annual Report of the Board of Regents of the Smithsonian Institute for 1891 has the translation of an address given to the Royal Bavarian Academy of Sciences that covers the story in great detail. You'll read that after his work was recognized, he began new experiments and made contributions to acoustics, too, although his acoustic law is not quite correct, apparently. If you really want to go to the source, brush up on your German and check out this archive of Ohm's original papers. While Ohm gets all the credit, Kirchhoff has some pretty important laws, too.

Posted in Featured, History, Original Art, SliderTagged barlows law, barlows wheel, georg ohm, ohms law, pile, voltaic pile

USA ATV REPEATER DIRECTORY June 2021

NOTES:
1. All repeaters are NTSC, VUSB-TV, 6 MHz channel, unless otherwise noted. Some repeaters are using non-standard, lower sideband instead of upper sideband. The frequency listed is the video carrier frequency.
2. Digital TV lists center frequency. 6 MHz channel, unless otherwise noted. dt = DVB-T, ds = DVB-S, da = ATSC
3. For full details, go to the listed web site, or send an e-mail to the contact person
4. Some ATV groups also post repeater info on www.qrz.com under their call sign

Location	Call Sign	Output	Input(s)	Modes	Web Site & Contact for info
ARIZONA					note: AZ is linked to W6ATN in S. CA & NV www.atn-tv.org
Phoenix, White Tank	W7ATN	1253.25	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	wb9kmo@gmail.com kwjacob@icsaero.com
Mesa	W7ATN	1289.25	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	wb9kmo@gmail.com kwjacob@icsaero.com
Tucson, Mt. Lemmon	W7ATN	1277.25	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	wb9kmo@gmail.com kwjacob@icsaero.com
N.E. AZ & NM Green's Peak	W7ATN	1289.25	434.0	VUSB	wb9kmo@gmail.com kwjacob@icsaero.com
CALIFORNIA					W6ATN rptrs linked to AZ & NV
Orange Santiago Peak	W6ATN	1253.25 5910 fm	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	www.atn-tv.org wa6svt@gmail.com
Los Angeles, central Mt. Wilson	W6ATN	1265.25	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	www.atn-tv.org wa6svt@gmail.com
Los Angeles, north Oat Mtn.	W6ATN	919.25 3380 fm	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	www.atn-tv.org wa6svt@gmail.com
Jobs Peak	W6ATN	1253.25	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	www.atn-tv.org wa6svt@gmail.com
San Bernardino Snow Peak	W6ATN	1242 / 4 dt	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	www.atn-tv.org wa6svt@gmail.com
Santa Barbara	WB9KMO	1289.25	434.0, 434 / 2 dt 2441.5 fm	VUSB, FM DVB-T	www.atn-tv.org wb9kmo@gmail.com linked with W6ATN
San Diego	KD6ILO	423 dt 1243 dt 1268 ds	441 dt 1286 ds 5885 fm	DVB-T, DVB-S, FM	kd6ilo@yahoo.com also AREDN mesh
San Jose	W6SVA	427.25	910 fm, 1255 fm	VUSB, FM	www.k6ben.com :w2nyc@pacbell.net
Clayton	W6CX	1244.5 ds	1292.5, 1273, 915 ds, & 1273 fm	DVB-S, FM	www.mdarc.org info@mdarc.org
Palomar	W6NWG	1241.25	915 fm 2441.5 fm	VUSB, FM soon be DVB-S	w6nwg@palomararc.org mountain.michelle@gmail.com
COLORADO					
Boulder	W0BTV	423 / 6 dt or 421.25 5905 FM	1243 / 6 dt 441 / 6 dt 439.25	DVB-T, VUSB, FM	www.kh6htv.com kh6htv@arrl.net
Pueblo	W0PHC	423 / 6 dt	441 / 6 dt	DVB-T	billn@billnicoll.com www.puebloradio.org
DELAWARE					
Wilmigton	KC3AM	423 / 6 dt	439.25 AM, LSB	DVB-T AM	KC3AM@verizon.net qrz.com
FLORIDA					
Cape Coral	W1RP	421.25	439.25	VUSB	paul@cardlink.com
Cocoa Beach	K4ATV	427.2	439.25	VUSB	www.lisats.org
Panama City	KV4ATV	434.0	919.25	?	kv4atv@gmail.com
S.W. Idaho	WI7ATV	1257 fm	426.25	VUSB, FM	ka7anm@yahoo.com under construction
IOWA					
Davenport	W0BXR	421.25	439.25	VUSB	http://www.arcsupport.com/drac/

KANSAS					
Wichita	KA0TV	421.25	439.25	VUSB	k0wws@arrl.net
KENTUCKY					
Bowling Green	KY4TV	421.25	439.25 1280 fm	VUSB FM	w4htb@ieee.org www.qrz.com www.atn-tv.org
LOUISIANA					
New Orleans	WD0GIV	421.25	439.25	VUSB	wd0giv@att.net
MARYLAND					
Laurel	W3BAB	421.25	434.0	VUSB	www.qsl.net/w3bab
Towson	W3BAB	1291 fm	434	VUSB, FM	www.qsl.net/w3bab
Baltimore	W3WCQ	439.25 911.25	426.25 1253.25	VUSB	http://bratsatv.org/ brats@bratsatv.org
MICHIGAN					
Jackson	KC8LMI	923.25	439.25, AM LSB	VUSB	KC8LMI@hotmail.com
Grand Rapids	K8DMR	421.25	439.25	VUSB	ron_fredricks@att.net
Flushing	KC8KCG	1253.25	439.25 AM LSB	AM	kf8ui@mscginc.org
Flint	KC8KGZ	1253.25	439.25	VUSB	www.mscginc.org kf8ui@mscginc.org
MINNESOTA					
Wabasha	KD0HWX	421.25	439.25	VUSB	jonmcpete@yahoo.com
MISSOURI					
St. Louis	W0ATN	426 / 4 dt	440 / 4 dt	DVB-T	k0pfx@arrl.net
NEBRASKA					
Omaha	WB0CMC	421.25	434.0	VUSB	wb0cmc@cox.net
NEVADA					
Las Vegas	N7ZEV	1253.25 912 fm	434.0, 434.0 / 2 dt 2441 fm	VUSB, FM DVB-T	frank.n7zev@gmail.com linked to W6ATN S. CA & AZ
NEW JERSEY					
Vernon	W2VER	5885 fm	5665 fm	FM	jaythienel@yahoo.com
OHIO					
Columbus	WR8ATV	423 / 2 dt 427.25 1258 fm 1268 ds 2397 mesh 10350 fm	439 / 2 dt 439.25 AM LSB 1288 fm 1288 ds 10450 fm	VUSB AM FM DVB-T DVB-S MESH	www.ATCO.tv gkenmorris@gmail.com towslee1@ee.net
Dayton	W8BI	421.25 428 / 2 dt 1258 fm	439.25, 439 / 2 dt 1280 fm	VUSB, FM DVB-T	www.w8bi.org dpel@aaahawk.com
Van Wert	W8FY	434.0	923.25	VUSB	ka8zge@w8fy.org
OREGON					
Portland	W7AMQ	1257 fm	426.25	FM, VUSB	belles73@comcast.net
Portland	WB2QHS	426.0	910 fm	VUSB, FM	emellnik@emavideo.com
PENNSYLVANIA					
Delaware Cty	KC3AM	421.25	439.25 AM, LSB	VUSB, AM	KC3AM@verizon.net
PUERTO RICO					
Aguas Buenas	KP4IA	426.25	439.25, 1252 fm	VUSB, FM	kp4ia@yahoo.com
WASHINGTON					
Seattle	WW7ATS	1253.25	434.0	VUSB	https://www.qsl.net/ww7ats/ ww7ats@gmail.com qrz.com

Revision Notes:
Aug. 2019 --(1) corrected data for Kentucky (2) changed call sign for Boulder, CO Sept. 2019 - -added Pueblo, CO
Oct. 2019 --added San Diego, CA Feb. 2020 -- changed K6BEN to W6SVA, CA --added KC8KGZ, MI Mar. 2020 -- added Davenport, IA
May 2020 --corrected typos Jan. 2021 -- updated Boulder, CO rptr info June 2021 -- found 20 more ATV repeaters listed on www.repeaterbook.com -- attempted to contact all of their trustees to confirm them. Most are obsolete listings and are no longer on the air. Added only two -- Cocoa Beach, FL, Wichita, KS,

2021 COLUMBUS HAMFEST

ARRL SANCTIONED HAMFEST

Saturday, August 7, 2021

Sponsored by:

The Aladdin Shrine Audio Unit – W8FEZ

8:00am -1:00pm
Talk-In 146.760 – PL 123.0
(Doors open at 6:00am for vendor set-up)
Located at:

Aladdin Shrine Center
1801 Gateway Circle
Grove City, Ohio 43123
(Behind TJ's restaurant, off of Stringtown Road at I-71)

FOOD TRAILER

DOOR PRIZES

For MORE Hamfest Information visit our Website
www.aladdinshrine.org/hamfest/

Admission	Indoor Tables	Outdoor Space
$5.00 at the gate	$10.00 perTable	$10.00 per space
12 and under FREE		

NO ADVANCED TICKET, TABLE OR SPACE SALES

LOCAL HAMFEST SCHEDULE

This section is reserved for upcoming Hamfests. They are limited to Ohio and vicinity easily accessible in one day. Anyone aware of an event incorrectly or not listed here; notify me so it can be corrected. This list will be amended, as further information becomes available. To see additional details for each Hamfest, Control Click on the blue title and the magic of the Internet will give you the details complete with a map! To search the ARRL Hamfest database for more details, CTL click ARRLWeb: Hamfest and Convention Calendar …WA8RMC.

08/07/2021 - 2021 Columbus Hamfest
Location: Grove City, OH
Type: ARRL Hamfest
Sponsor: Aladdin Shrine Audio Unit
Website: http://columbushamfest.com

08/07/2021 - MOVARC HAMFEST
Location: **Bidwell, OH**
Type: **ARRL Hamfest**
Sponsor: **Mid-Ohio Valley Amateur Radio**

08/28/2021 - Cincinnati Hamfest℠
Location: Owensville, OH
Type: ARRL Hamfest
Sponsor: Milford ARC
Website: http://CincinnatiHamfest.org

09/12/2021 - Findlay Hamfest
Location: **Findlay, OH**
Type: **ARRL Hamfest**
Sponsor: **Findlay Radio Club**
Website: **http://www.findlayradioclub.org**

09/18/2021 - Miami County Swap Meet
Location: **Troy, OH**
Type: **ARRL Hamfest**
Sponsor: **Miami County Amateur Radio Club**
Website: **http://W8FW.org**

09/18/2021 - Mound Amateur Radio Assoc. Swap Meet
Location: **Miamisburg, OH**
Type: **ARRL Hamfest**
Sponsor: **MARA**
Website: **http://W8DYY.ORG**

09/26/2021 - Cleveland Hamfest
Location: Berea, OH
Type: ARRL Hamfest
Sponsor: Hamfest Association of Cleveland
Website: http://www.hac.org

10/09/2021 - Northwest Ohio Amateur Radio Club (NWOARC) hamfest
Location: **Westminster, OH**
Type: **ARRL Hamfest**
Sponsor: **NWOARC, Northwest Ohio Amateur Radio Club**
Website: **http://www.nwoarc.com**

12/04/2021 - FCARC WinterFest
Location: Delta, OH
Type: ARRL Hamfest
Sponsor: Fulton County Amateur Radio Club
Website: http://k8bxq.org/hamfest

10/31/2021 - Massillon (Ohio)
Location: **Green, OH**
Type: **ARRL Hamfest**
Sponsor: **Massillon Amateur Radio Club**
Website: **http://w8np.org**

TUESDAY NITE ZOOM NET (We listen to 147.48 also)

Every Tuesday night @ 8:00PM WA8RMC hosts a net for ATV topic discussion. There is no need to belong to the club to participate, only an interest in ATV. All are invited. We usually chat for about an hour so please join us via the internet using ZOOM on your computer. We also listen to 147.48 during the meeting so if there is anyone checking in there you will be heard and included. It would be great if some of the previous ATCO members would join us as it's been a long time since we've heard from you.

We normally have 10-15 check-ins from various parts of USA and beyond. It's a fun informal time with various topics and jokes. Share with us a funny story or one liner you have if you can.

To join ZOOM for the first time, simply type **https://zoom.us/join** then download, install the .exe program and run it. ZOOM will start. Click on **join**, enter the **9670918666 meeting ID** then the **191593 password.** Use video or just audio if you don't have a camera.

Note: The DARA ATV ZOOM Net is on Wednesday at 8PM using this same ZOOM link. Feel free to join the discussion there as well.

ATCO TREASURER REPORT - de N8NT

OPENING BALANCE (04/22/21)	$ 3689.40
Receipts (dues)	$ 20.00
ATCO website hosting	$ (193.00)
PayPal fee	$ (1.18)
CLOSING BALANCE (07/22/21	$ 3515.22

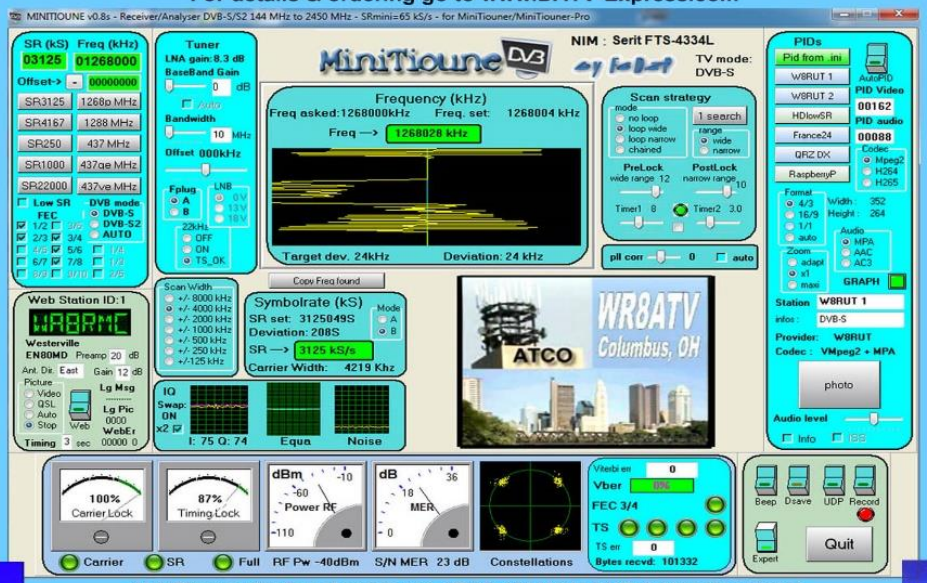
MiniTiouner-Express

Digital Amateur Television DVB-S/S2 Receiver / Analyzer

Available at DATV-Express.com

- Operates with Windows PC using free MiniTioune software from Jean-Pierre F6DZP
- Smaller than a stack of 2 decks of cards (picture above is full size)
- Two independent simultaneous RF inputs with internal preamps
- High sensitivity -100dBm @1288MHz – at 1/2 FEC
- Fully assembled/tested in aluminum enclosure
- Covers 144-2420MHz (ideal for Space Station DATV reception)
- Symbol rates from 75 KSymb/s to >20 MSymbols/sec
- Uses external 8-24VDC supply or +5V from USB-3 port (with small modification)
- Real time signal modulation constellation & dBm signal strength display
- Price: US $75 + shipping – order with PayPal

For details & ordering go to www.DATV-Express.com



(MiniTioune display above is the ATCO 1268MHz DVB-S repeater signal at WA8RMC QTH 15 miles away).

ATCO REPEATER TECHNICAL DATA SUMMARY

Location:	Downtown Columbus, Ohio
Coordinates:	39 degrees 57 minutes 47 seconds (latitude) 82 degrees 59 minutes 58 seconds (longitude)
Elevation:	630 feet above the average street level of 760 feet (1390 feet above sea level)

TV Transmitters:	423.00 MHz DVB-T, 10 W cont. FEC=7/8, Guard=1/32, Const=QPSK, FFT=2K, BW=2MHz, PMT=4095, PCR=256, Video=256, audio=257
	427.25 MHz Analog VSB AM, 50 watts average 100 watts sync tip (cable channel 58)
	1258 MHz 40 watts FM analog
	1268 MHz DVB-S QPSK 20W continuous. SR=3.125MS, FEC=3/4, PMT=32, Video=162, Teletext=304, PCR=133, Audio=88, Service =5004) **Two** video channels in this output: Channel 1 is fed from all receivers. Channel 2 is fed direct from 439.25 analog receiver only.
	2397 MHz Mesh Net transceiver 600mw output (channel 1 minus 2). ID is WR8ATV-2
	10.350 GHz: 1watt continuous analog FM
Link transmitter:	446.350 MHz: 5 watts NBFM 5 kHz audio. This is an output used for control signals and to repeat the 147.48 MHz and 449.975 MHz input.

Identification:	423, 427, 1258, 1268 MHz, 10.350 GHz transmitters video ID every 10 min. with active video and information bulletin board every 30 minutes.
	423 MHz digital, 1268 MHz digital & 10.350 GHz analog - Continuous transmission of ATCO & WR8ATV with no input signal present.

Transmit antennas:	423.00 MHz - 8 element Lindsay horizontally polarized 5 dBd gain "omni"
	427.25 MHz - Dual slot horizontally polarized 7 dBd gain "omni" major lobe east/west, 5dBd gain north/south
	1258 MHz - Diamond vertically polarized 12 dBd gain omni
	1268 MHz - Diamond vertically polarized 12 dBd gain omni
	2397 MHz - Ubiquiti dual polarity omni 13dBi gain slot for channel 1 minus 2 MESH Rx/Tx operation
	2397 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni (Used for experimental Mesh operation)
	10.350 GHz - Commercial 40 slot waveguide horizontally polarized 16 dBd gain omni

Receivers:	147.480 MHz - F1 audio input with touch tone control. (Input here = output on 446.350)
	439.000 MHz - DVB-T QPSK, 2MHz BW. Receiver will auto configure for FEC's. (Input here = output on all TV transmitters)
	439.250 MHz - A5 NTSC video with FM subcarrier audio, **lower sideband**. (Input here = output on all TV transmitters & also direct to 1268 MHz DVB-S output channel 2.)
	449.975 MHz - F1 audio input aux touch tone control. 131.8 Hz PL tone. (Input here = output on 446.350).
	1288.00 MHz - F5 video analog NTSC. (Input here = output on all TV transmitters)
	1288.00 MHz - DVB-S QPSK SR=4.167MS, fec=7/8. PIDs: PMT=133, PCR=33, Video=33, Audio=49 (Input here=output on all Transmitters)
	2398.00 MHz - F5 video analog NTSC. (Input here = output on all TV transmitters) (inactive at this time because of MESH on 2397)
	10.450 GHz - F5 video analog NTSC. (Input here = output on all TV transmitters)

Receive antennas:	147.480 MHz - Vert. polar. Diamond 6dBd dual band (Shared with 446.350 MHz link output transmitter)
	438.00/439.250 MHz - Horizontally polarized dual slot 7 dBd gain major lobe west (Shared with 438 & 439 receivers)
	1288.00 MHz - Diamond vertically polarized 12 dBd gain omni (shared with analog and DVB-S receivers)
	2398.00 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni (inactive at this time because MESH is on 2397)
	10.450 GHz - Commercial 40 slot waveguide horizontally polarized 16 dBd gain omni

Auto mode	Touch Tone	Result (if third digit is * function turns ON, if it is # function turns OFF)
Input control:	00*	turn transmitters **on** (enter manual mode-keeps transmitters on till 00# sequence is pressed)
	00#	turn transmitters **off** (exit manual mode and return to auto scan mode)
	264	Select Channel 4 Doppler radar. (Stays on for 5 minutes) Select # to shut down before timeout.
	004	Select 10.450 GHz receiver. **(Always exit by selecting 001)**
	001	Select 2398 MHz receiver then 00# for auto scan to continue

Manual mode Functions:	00* then 1 for Ch. 1	Select 439.25 analog /438 digital receiver (if video present on digital, it is selected. Otherwise, analog)
	00* then 2 for Ch. 2	Select 1288 digital receiver
	00* then 3 for Ch. 3	Select 1288 analog receiver
	00* then 4 for Ch. 4	Select 2398 receiver
	00* then 5 for Ch. 5	Select video ID (17 identification screens)
	01* or 01#	Channel 1 439.25 MHz scan enable (hit 01* to scan this channel & 01# to disable it)
	02* or 02#	Channel 2 1288 MHz digital receiver scan enable
	03* or 03#	Channel 3 1288 MHz analog receiver scan enable
	04* or 04#	Channel 4 2398 MHz scan enable
	A1* or A1#	Manual mode select for 439.25 receiver audio
	A2* or A2#	Manual mode select for 1288 digital receiver audio
	A3* or A3#	Manual mode select for 1288 analog receiver audio
	A4* or A4#	Manual mode select for 2398 receiver audio
	C0* or C0#	Beacon mode – transmit ID for twenty seconds every ten minutes
	C1* or C1#	No function at this time
	C2* or C2#	No function at this time

ATCO MEMBERS as of July 2021

Call	Name	Address	City	St	Zip	Phone
KD8ACU	Robert Vieth	3180 North Star Rd	Upper Arlington	OH	43221	614-457-9511
KC3AM	Dave Stepnowski	735 W Birchtree Ln	Claymont	DE	19703	
AH2AR	Dave Pelaez	1348 Leaf Tree Lane	Vandalia	OH	45377	937-264-9812
W8ARE	Terry Meredith III	6070 Langton Circle	Westerville	OH	43082-8964	
K9BIF	Charlie Short	415 West Pike Street	Goshen	IN	46527-0554	
VK3BFG	Peter Cossins	14 Coleman Road	Melbourne	Au	03152	
N9BNN	Michael Glass	6836 N. Caldwell Rd	Lebanon	IN	46052	
WB8CJW	Dale Elshoff	8904 Winoak Pl	Powell	OH	43065	614-210-0551
N8COO	C Mark Cring	2844 Sussex Place Dr.	Grove City	OH	43123	614-836-2521
N3DC	William Thompson	6327 Kilmer St	Cheverly	MD	20785	301-772-7382
K8DMR	Ron Fredricks	8900 Stonepoint Ct	Jennison	MI	49428-8641	
WA8DNI	John Busic	2700 Bixby Road	Groveport	OH	43125	614-491-8198
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	OH	43026	614-405-1710
KB8EMD	Larry Baker	4330 Chippewa Trail	Jamestown	OH	45335-1210	
WB4IR	Bob Holden	7725 Tressa Circle	Powell	TN	37849	865-314 - 4285
WA8HFK,KC8HIP	Frank & Pat Amore	P.O. Box 2252	Helendale	CA	92342-2252	760-503-8106
W8KHP	Allen Vinegar	2043 Treetop Lane	Hebron	Ky	41048	
WA8KKN	Chuck Wood	5322 Spruce Lane	Westerville	OH	43082-9005	614-523-3494
WB9KMO	Rod Fritz	8334 E. Culver Street	Mesa	AZ	85207	
WA8KQQ	Dale Waymire	225 Riffle Ave	Greenville	OH	45331	937-548-2492
WB8LGA	Charles Beener	2540 State Route 61	Marengo	OH	43334	
W8MA	Phil Morrison	154 Llewellyn Ave	Westerville	OH	43081	
KA8MID	Bill Dean	2630 Green Ridge Rd	Peebles	OH	45660	
N8NT	Bob Tournoux	3569 Oarlock Ct	Hilliard	OH	43026	614-876-2127
W8NX, KA8LTG	John & Linda Beal	5001 State Rt. 37 East	Delaware	OH	43015	740-369-5856
KB8OFF	Jess Nicely	1888 Woods Drive	Beavercreek	OH	45432	
W6ORG,WB6YSS	Tom, Maryann O'Hara	2522 Paxson Lane	Arcadia	CA	91007-8537	626-447-4565
AE6QU	Ron Phillips	2227Via Puerta unit N	Laguna Woods	CA	92637	
WA8RMC	Art Towslee	438 Maplebrooke Dr W	Westerville	OH	43082	614-891-9273
W8RUT,N8KCB	Ken & Chris Morris	2895 Sunbury Rd	Galina	OH	43021	
KB8RVI	Dave Jenkins	100 Miller Ave Apt. 108	Ashville	OH	43103	740 954-9221
W8RWR	Bob Rector	135 S. Algonquin Ave	Columbus	OH	43204-1904	614-276-1689
W8RXX, KA8IWB	John & Laura Perone	3477 Africa Road	Galena	OH	43021	614-579-0522
WA6RZW	Ed Mersich	34401 Columbine Trl West	Elizabeth	CO	80107	
WA6SVT	Mike Collis	PO Box 1594	Crestline	CA	92325	
NR8TV	Dave Kibler	243 Dwyer Rd	Greenfield	OH	45123	937-981-1392
KB8UWI	Milton McFarland	115 N. Walnut St.	New Castle	PA	16101	
WA8UZP	James Reed	818 Northwest Blvd	Columbus	OH	43212	614-297-1328
KB9VGD	Gary Oaks	472 Storle Ave	Burlington	WI	53105-1028	
KC8WRI	Tom Bloomer	PO Box 595	Grove City	OH	43123	
AA8XA	Stan Diggs	2825 Southridge Dr	Columbus	OH	43224-3011	
AC8XP,KE8GTT,KE8HPA	Troy,Seamus Bonte	5210 Smothers Road	Westerville	OH	43081	
AC8YE	Larry Howell	4080 Dill Road	Centerburg	OH	43011-9771	
KB8YMQ	Jay Caldwell	4740 Timmons Dr	Plain City	OH	43064	
KC8YPD	Joe Ebright	3497 Ontario St	Columbus	OH	43224	
KD8YYP	Anna Reed	818 Northwest Blvd	Columbus	OH	43212	
WB8YTZ	Joe Coffman	233 S. Hamilton Rd	Gahanna	OH	43230-3347	
N8YZ	DaveTkach	2063 Torchwood Loop S	Columbus	OH	43229	614-882-0771
W8ZCF	Farrell Winder	6686 Hitching Post Ln.	Cincinnati	OH	45230	513-218-3876
N8ZM	Tom Holmes	1055 Wilderness Bluff	Tipp City	OH	45371	

ATCO CLUB OFFICERS

President: Art Towslee WA8RMC
V. President: Ken Morris W8RUT
Treasurer: Bob Tournoux N8NT
Secretary: Mark Cring N8COO
Corporate trustees: Same as officers

Repeater trustees: Art Towslee WA8RMC
Ken Morris W8RUT
Dale Elshoff WB8CJW
Statutory agent: Stan Diggs AA8XA
Newsletter editor: Art Towslee WA8RMC

NEW MEMBER(S)

Let's welcome the new members to our group! If any of you know anyone who might be interested, let one of us know so we can flood them with information. New members are our group's lifeblood so it's important we aggressively recruit new faces.

No new members this time.

ATCO MEMBERSHIP INFORMATION

Membership in ATCO (Amateur Television in Central Ohio) is open to any licensed radio amateur who has an interest in amateur television. The annual dues are $10 per person. Additional members within an immediate family and at the same address are included at no extra cost.

ATCO publishes this Newsletter quarterly in January, April, July and October. It is sent to each member without additional cost. All Newsletters are sent via Email unless the member does not have an internet connection. Dues payments are as of the date paid and will expire on the same month/year on the due date year.

Your support of ATCO is welcomed and encouraged.

Membership expiration notices will be sent out via Email starting 30 days prior to expiration date.
NOTE: Dues records on your individual portion of the ATCO website are listed as the date money is received and shows due one year from that date.

ATCO MEMBERSHIP APPLICATION

RENEWAL ○ NEW MEMBER ○ DATE _____
CALL _____
OK TO PUBLISH PHONE # IN NEWSLETTER YES ○ NO ○
HOME PHONE _____
NAME_____
INTERNET Email ADDRESS_____
ADDRESS _____
CITY _____ STATE _____ ZIP _____-_____
FCC LICENSED OPERATORS IN THE IMMEDIATE FAMILY
_____
COMMENTS_____
_____
_____
ANNUAL DUES PAYMENT OF $10.00 ENCLOSED CHECK ○ MONEY ORDER ○

Make check payable to ATCO or Bob Tournoux & mail to: Bob Tournoux N8NT 3569 Oarlock CT Hilliard, Ohio 43026. Or, if you prefer, pay dues via the Internet with your credit card. Go to www.atco.tv and fill out the "pay ATCO dues" section. Alternately, you can use the ATCO web site www.atco.tv/PayDues.aspx directly. Credit card payment is made through "PayPal" but you DO NOT need to join PayPal to send your dues. Simply DO NOT fill out the password details and there will be no "PayPal" involvement.

ATCO Newsletter
c/o Art Towslee -WA8RMC
438 Maplebrooke Dr. West
Westerville, Ohio 43082

FIRST CLASS MAIL

REMEMBER...CLUB DUES ARE NEEDED.
CHECK THE
MEMBERS PAGE OF ATCO WEBSITE FOR THE EXPIRATION DATE.
SEND N8NT A CHECK OR USE PAYPAL IF MEMBERSHIP IS EXPIRED.