ATCO NEWSLETTER

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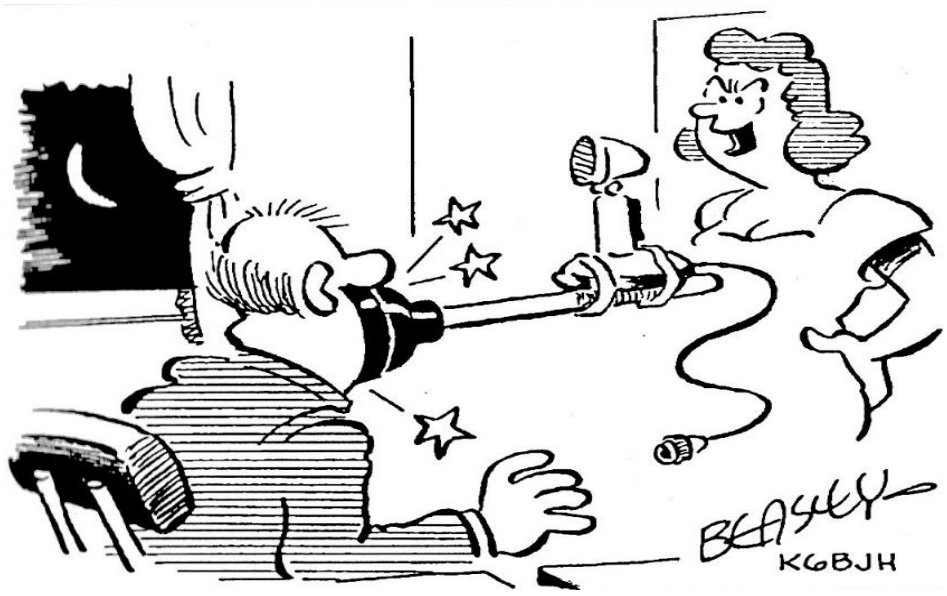
The ATCO newsletter is the official publication of a group of amateur television operators known as "AMATEUR TELEVISION IN CENTRAL OHIO Group Inc" published quarterly (January, April, July, and October)

ATCO SPOTLIGHT TOPIC

Thanks to Beasley, K6BJH (SK) for allowing us to share his cartoons. For the complete book on "The Best of Beasley" go to the ATVQ Magazine web site (http://atvquarterly.com/) available for purchase.



There --- I designed a microphone holder for your late-night ATV operation.

ACTIVITIES ... from my Workbench

It's me again guys! ……. Wait a minute, I think I see sunshine out there! How about that, sun **AND** warm weather at the same time. That's it, it's antenna time! No, let's not get ahead of myself because I must finish the Newsletter first. However, I **DO** have tower maintenance to do. Somehow the slack coax that goes around the rotor has decreased so the rotor jams when I swing the beam north. That's easy to fix but first, the lawn waits its first cutting. Oh, it's easy for me to get distracted …. Squirrel!!!!!!!

OK, first item. It's a strange anomaly with the repeater 1268 MHz transmitted signal. The other day I noticed the signal randomly dropping out on my monitor. At first, I thought it was atmospheric issues but it continued the next day. Jay, KB8YMQ also reported he could not see it consistently either. That prompted me to look at the signal with my spectrum analyzer. Low and behold the signal was there at normal strength but there was another narrow carrier signal riding 10 dB on top of the haystack signal right in the middle of the carrier. After scratching my head for a while, I determined it was something amiss with the repeater transmitter but couldn't imagine what would be causing it so a trip was scheduled but first, I thought it best to remotely power it down and back up. The first time I did it the interfering signal immediately came back. I tried it again but waited for a half hour for things to cool down. Then the normal good signal appeared. Wow, that's it, a thermal issue. It stayed that way for a day before the interfering signal re-appeared. I felt confident it was going to be something that required removing the unit and taking it home for repair. The next day I checked it again, saw the interfering signal and re-cycled the power as before. This time the interfering signal momentarily came back then disappeared and has not come back since. It has now been running flawlessly for over 3 weeks! (If it ain't broke, I'm not going to try to fix it so I cancelled my scheduled trip). I have no idea what caused it and why it went away. It'll probably be back!!!

Next, Dale has a new slide for the repeater ID sequence which is on an SD card waiting for a scheduled repeater trip. I was going to do this at the above trip but not now. It'll have to wait till I make a more important trip.

Meanwhile, other activities are in the planning stages. The Jones Road link is again in the spotlight. Since Dayton activity has increased, we want to again try to link the ATCO and DARA repeaters together. Dave Pelaez, AH2AR, ran some tests from DARA to Jones and found a good 23cm DATV DVB-T signal was achieved with his test receiver at Jones on a portable mast only 20 feet off the ground. That's amazing since the topo map data says it isn't possible. We should repeat this test a few times when tree leaves are out to be sure before we commit to anything. Dave also reported he could see the ATCO repeater 423 MHz DVB-T signal at Jones Road with the antenna hand held 6 feet off the ground!!!

Another subject, coming soon is the commercial release of the next TV broadcast standard ATSC 3.0. Since that signal is CODFM encoded and a close match to DVB-T, it may be possible to see DVB-T DATV signals with a standard unmodified TV set as long as the set will tune to the ham frequency. It's too early now to know for sure but if it can, that could spark DATV activity in the near future! Read articles in this Newsletter for more information.

More later, Stay tuned! See you at the Spring Event on May 5th.
...73 WA8RMC

SPACE STATION HAMVIDEO TRANSMITTER UPDATE

...From the ARRL Letter for January 24, 2019 and edited by WA8RMC

The malfunctioning Amateur Radio on the International Space Station (ARISS) "HamTV" transmitter now is back on Earth for repair or replacement, and it likely won't be until sometime in 2020 at the earliest that Amateur Radio TV (DATV) capability will be restored to the orbiting laboratory. Onboard repair was not possible.

European Space Agency Astronaut Tim Peake, KG5BVI/GB1SS, was the first to use HamTV for an ARISS school contact.

Also known as "HamVideo," the DATV system transmissions were not seen by ARISS ground stations as of last April, and a subsequent test using a second L/S band patch antenna on the ISS *Columbus* module failed. Since February 2016, the DATV transmitter has served to provide a visual dimension to ARISS school and group ham radio events.

Late last year, the ISS crew packed the HamTV unit and stowed it on the SpaceX-16 *Dragon* vehicle, which undocked and departed from the ISS on January 13, 2019. The HamTV unit returned to Earth when *Dragon* successfully splashed down in the Pacific Ocean, the first nighttime splashdown and recovery of a *Dragon* vehicle.

ARISS Ham Project Coordinator Kenneth Ransom, N5VHO, told those attending the January ARISS meeting that the HamTV unit would be processed and sent to NASA's Johnson Space Center. The unit is now in transit to Italy where Kayser-Italia, who built the transmitter, will undergo a full failure investigation by ARISS, AMSAT-Italia, and the Kayser-Italia team. Depending on the outcome of the inspection, ARISS will decide the best way to move forward.

ARISS expressed gratitude to NASA, CASIS, and the team working with NASA Ham Payload Integration Manager Mitch Polt for organizing the return of the unit.

If the HamTV unit is able to be repaired or refurbished, another wait would ensue. Documentation is required 50 days before a safety certification meeting, and all must be approved 2 months prior to launch, which could take place in a little more than a year. ARISS said it also will prepare for the possibility that repairs are not feasible and be ready to move forward with a new, improved HamTV unit. The specifications for a new HamVideo2 module is in process at this time.

AMSAT INDIA SATELLITE LAUNCH

Ground-Station@lists.openresearch.institute

AMSAT India will launch AISAT carrying ham radio transponders on April 1. One of the designers is Ashar Farhan, VU2ESE, of BitX20 fame. This innovative ham satellite will use the fourth stage of the rocket as power base for the ham and other payloads. No solar panels initially....6-month life span. APRS digipeater on board. Wonderful what could be done with no cumbersome committees to slow things down. No government involvement/meddling to sink the project... All ham hardware was designed, built and tested in six working days. http://amsatindia.org

Es'hail-2 HAM SATELLITE (QO-100) OPENED FOR AMATEUR RADIO

…from ARRL Letter. 2/14/19

The Es-hail-2 narrowband transponder went live a couple of days early and now is open for Amateur Radio. Thursday, February 14, was Teleport Inauguration Day in Qatar, celebrating the opening of the new Es'hailSat teleport and the "official" opening of Es'hail-2, which carries the first geostationary Amateur Radio payload, a German P4A package. Es'hail-2 launched last November from Cape Canaveral. The two Amateur Radio transponders onboard what's now known as Qatar OSCAR 100 (QO-100) became available on February 12 for general operation by stations within QO-100's footprint. Emceeing the opening ceremony was Qatar's former Deputy Prime Minister Abdullah bin Hamad al-Attiya, A71AU, who chairs the Qatar Amateur Radio Society (QARS) and is a satellite patron. Unfortunately, the satellite is not operable from the USA.

A delegation from Germany -- AMSAT-DL President Peter Guelzow, DB2OS; Achim Vollhardt, DH2VA, and Thomas Kleffel, DG5NGI, of the P4A team -- went to Qatar to set up and commission the ground segment of P4A, which includes a club station that will operate under the auspices of QARS as A71A.

An AMSAT-DL ground station at the Bochum Observatory in Germany has been set up for QO-100, and operation via the satellite will be carried out using the call sign DL50AMSAT, recognizing AMSAT's 50th anniversary.

The satellite transponder offers a 250-kHz passband for modes such as SSB, FreeDV, CW, RTTY, and other modes, plus an 8-MHz wideband downlink for digital amateur TV (DATV DVB-S2) modes. Downlink frequencies are 10 GHz and uplink frequency is 2.4 GHz.

Stations located outside of the QO-100 footprint or lacking 10 GHz receive capability can monitor the proceeding using online WebSDR resources. In cooperation with AMSAT-DL, the British Amateur Television Club (BATC) will operate a WebSDR for the narrowband segment, and a spectrum viewer for the wideband (DATV) segment. The satellite is in geostationary orbit at 25.9° E. Read more. -- *Thanks to* AMSAT News Service *via AMSAT-DL*

The approximate footprint of Es'hail - Sorry guys, it doesn't include the USA.

MIDATLANTIC ATV MEETING SUMMARY

March 9, 2019 Dan Rapak, WA3ATV *(Reproduced here by permission)*

Mid-Atlantic ATV is a coalition of ATV repeater owners, hams interested in constructing ATV repeaters and hams generally interested in this aspect of amateur radio. As the name implies, members are from the various states that make up the Mid-Atlantic region of the US. A strategic planning meeting of sorts took place this afternoon at Hoss' Restaurant in York, Pennsylvania. There were seven ATV hams in attendance for the initial brainstorming session. Pennsylvania, Delaware and Maryland were represented. The meeting was held with an eye toward the future of this branch of our hobby, including the possibility of linking ATV repeaters in the region together. A great deal was accomplished!

White Rock Remote Receiver Results from the remote receiver our group has at the White Rock, PA tower site (with video viewable via the web) were discussed. There has been an issue where, under certain signal conditions, the receiver will hang up and become stupid. When this happens, someone needs to physically go to the receiver to reset / power cycle it as there is currently no way to reboot it via the web. This is a relatively remote site. It might be many days before someone is able to go to the site, and so Jeff Elliot (W3JVU) is going to supply an Internet controllable power switch that will permit us to do a hard reboot via the web when necessary. The receiver is currently connected to a directional antenna as that particular antenna was already in place on the tower. It was felt that more testing should be done with an omni-directional antenna. That change out can be made with an antenna yet to be determined as weather conditions improve.

Rib-Cage Antenna Dave Stepenowski (KC3AM) and Vince Vitullo (N3BFZ) brought along a new, omni-directional, horizontally polarized, rib cage antenna they had constructed. Dave has been using a similar model at his Ebright, Delaware ATV repeater for some time. Vince did the physical blacksmithing on this one and did a great job! What remains is to tweak the antenna's matching transformer. To that end, yours truly brought the antenna to the home QTH in order to sweep it out with a return loss bridge to see where things stand and possibly make adjustments. We'll see how that goes.

Results of Our First DTV Beacon Transmitter Test Tests of the beacon transmitter which had been located at the WA3ATV QTH near Summerdale, PA are complete. Rich Reese (KR3EE) performed field reception tests at multiple locations. In a previous life, Rich performed field testing for a cellular company and so had his test procedures down pat. Rich did a super job! Many thanks for all the time and effort he put in on behalf of our group! The bottom line of the tests is that Rich found that the actual field test results tallied very closely with coverage predicted by the Radio Mobile software modeling our group has been using. This will hopefully reduce the number of field locations that need to be tested for future beacon tests at other locations. A discussion of the next location for beacon transmitter tests ensued. Based on the Radio Mobile propagation modeling, it is hoped that we can obtain permission to place the beacon at the Cornwall, PA repeater / CPIN microwave relay site. This site is a stone's throw from the former location of the Cornwall analog ATV repeater which has since gone dark. If Dave's rib cage antenna can be tuned up in time, the hope would be to use it as an omni-directional antenna for the next beacon test.

Repeater Antenna Polarization The question of standardizing the polarity of DTV signals came up. The pros and cons of each mode for our application were discussed at length. Ultimately, the group unanimously decided to use horizontal polarization for repeater outputs. Advantages include the inherent isolation from interference to / from vertically polarized voice repeaters and compatibility with U.S. over-the-air broadcast television. The biggest obstacle is the need for omni-directional, horizontally polarized antennas at the repeater sites. The off-the-shelf pickings are rather slim and leave something to be desired in terms of performance. It is hoped that Dave's rib-cage antenna will provide a solution, hence the desire to use it in the next beacon test. It's important to note that only the repeater sites themselves require the horizontally polarized, omni-directional antennas. Thus, only a few such antennas will be needed. Individual hams accessing a repeater will all be using directional antennas and therefore have multiple, readily available antennas to choose.

Frequency coordination. The group reached the conclusion that it would make sense to coordinate a common output frequency for all repeaters in the region, with input frequencies coordinated by the individual repeater operators as they see fit based on local operating practices and conditions. Given the antenna systems and power levels we will be using, the terrain and predicted coverage plots from various active and potential repeater sites, it is unlikely that one repeater will interfere with another. In addition, with COFDM modulation in use for both DVB-T and ATSC 3.0 it will eventually be possible to operate linked repeaters as a Single Frequency Network (SFN) that would allow the signals from multiple repeaters to augment rather than interfere with one another. Finally, the use of a common output frequency will allow much more efficient use of valuable ham radio spectrum and (hopefully) make frequency coordination an easier task.

Power Amps. Rich Reese, KR3EE, has also done a fair amount of research into the availability of power amplifiers that might be suitable for DTV use. The issue of course is the need for an absolutely linear amplifier since any sort of phase distortion will corrupt a DTV signal. This eliminates the use of Class B or Class C amplifiers. Rich has found a number of amps on the web that are allegedly suitable for digital voice use. Whether they would be linear enough for application in the DTV world is another matter. However, Rich did purchase surplus power amp modules from a decommissioned DTV broadcast transmitter that might serve as a PA. He also purchased a lower power linear amplifier that could be used as an IPA to drive the PA. He will keep us informed on how his experimentation progresses.

Status of ATSC 3.0 Deployment. The status of deployment of the new ATSC 3.0 standard for over-the-air broadcast television here in the U.S.A. was discussed. This is similar to DVB-T in that both use COFDM modulation. However, ATSC 3.0 uses an IP based data protocol that more easily supports simultaneously connecting consumer devices to the web for interactive television programming. ATSC 3.0 is also more spectrally efficient, so much so that it can transmit full motion 4K images over the air in a standard 6 MHz U.S. television channel. Sinclair Broadcast Group will be partnering with Nexstar Broadcast Group to facilitate the rollout of ATSC 3.0, the two largest TV station group owners in the U.S. and owns several stations here in the Mid-Atlantic region. During the transition, it will be necessary for two stations to broadcast their programming on one ATSC 1.0 transmitter while the second transmitter is being converted to ATSC 3.0. Surprisingly, Sinclair expects to have more than thirty (30) ATSC 3.0 stations on the air by the end of this year! This is a much faster rollout than most people would have predicted. This means we will likely be seeing ATSC 3.0 television receivers on store shelves and in Internet stores much sooner than expected. Sinclair is pushing hard for the new format as they view the interactive aspects of the system as a whole new revenue stream. What does this mean of those of us interested in amateur DTV? If a repeater transmits using the ATSC 3.0 format, hams will be able to use consumer TV sets to receive the signals, similar to the situation we had in the analog NTSC days. To facilitate the rollout, Sinclair is also involving itself in the hardware end. They will be partnering with manufacturers to build and distribute low cost converter boxes for existing TV sets as well as dongles to permit reception on smart phones, notebook computers and desktop PCs. It is unknown whether these devices will be capable of receiving ATSC 3.0 COFDM modulation on cable channels, but if this proves to be the case, it will be possible to tune these consumer devices directly to the 70cm ham band. An immediate question is, what does this mean for hams in the U.S. that already have an investment in DVB-T, DVB-S or analog equipment? The answer is, not much. ATSC 3.0 does *not* make other formats that hams are currently using obsolete. If anything, ATSC 3.0 simply adds to your tool belt. A repeater may transmit using ATSC 3.0, but that repeater can still receive whatever format is in use in the area in its input(s.) Just as it is possible to receive analog video at a repeater and re-transmit it as a DVB signal, it will be possible to receive DVB-T, DVB-S, ATSC 1.0, VSB, FM-TV or any other format and retransmit it as ATSC 3.0. Repeater owners are free to accept whatever signal formats on their inputs they choose based on their particular local practices and preferences. There was brief discussion about the merits of making MidAtlantic ATV a 501(c)3 tax exempt organization which would allow companies and individuals to donate equipment and/or funds with tax benefits for the donor. It was decided that we are not yet at that point. In the meantime, should any opportunity to accept such a donation present itself, the donation could be made by way of one of the 501(c)3 clubs affiliated with our coalition. Join the MidAtlantic ATV group's page at https://groups.io/g/MidAtlanticATV to keep abreast of future developments.
…73, Dan Rapak, WA3ATV

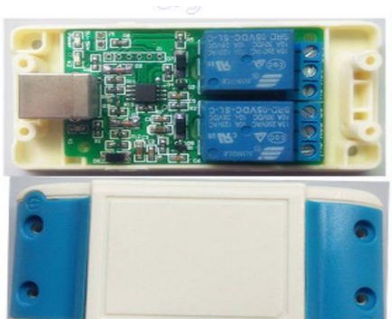
USB DEVICE CONROL

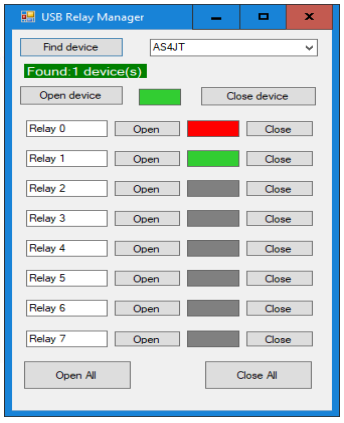
USB to parallel printer port

These days pc's typically do not have parallel or serial ports to connect external devices like a printer or scanner. According to wikipedia.org the USB (Universal Serial Bus) supersedes the serial port, parallel port, game port, Apple Desktop Bus, PS/2 port and Firewire (IEEE 1394).

USB to serial RS-232

I find the number of devices that need to be connected to my pc always seem to exceed the number of USB ports available. Even with a four-port expansion module it is necessary to unplug some things for what is needed at the time. The radio bench has become a gnarled nest of cables to go through when trying to track down what is connected where. I don't know what goes on down here when I turn the lights off but it seems like I gain more of a mess when I return. Even after spending the time to unravel the mess, it ends up being just as bad or worse in a couple days again. Well, that's my excuse anyway. Locating a spare cable for the type of connector involved can be another problem and then the question of whether or not it works or has become intermittent from frequent plugging and unplugging is another.





USB to HID

If you are looking to support older devices like a Zip drive or interconnect another computer for data transfer, chances are the USB to parallel adapters aren't going to work. A USB to parallel port converter was purchased a few months ago then found to be unusable. It has no capability to directly control equipment the same as what I was able to do on older computers with a *real* parallel port either on an expansion card or built onto the mother board. As a matter of fact, it was a challenge trying to get it to work with an old Epson dot matrix printer. I checked for advice on line only to find literally hundreds of rants about these parallel adapters being unreliable and giving limited support for what they are intended for. The same is true for the USB to serial adapters with cloned chip problems, unreliable drivers or compatibility problems with more recent operating systems.

So, my plans to use the parallel adapter for controlling the bulletin board computer as I have been doing for years or to perform a couple simple on/off functions like an antenna selection relay were nixed. I knew I had to use something that operates from the USB – there's no other practical I/O choice especially on a laptop and I figured at some point I may want to have a backup for the bulletin board pc that will likely be replaced with one that doesn't have a parallel port or a spare expansion slot.

Since there were a couple types of USB to serial adapters on hand and there have been no problems getting them to work with what they are intended for at least, it was a matter of experimenting a bit to find a way to get one to communicate with my test board that I built up for checking the parallel adapter cable. Serial data isn't needed and one or two hardware handshake bits like RTS, CTS, DSR, DTR, DCD or whatever was available for on/off switching. That would be enough to do what was needed. For the ATV bulletin board only one control line to turn the link transmitter on and off time was needed. The same for an antenna control relay but a spare output bit or more would be useful if I want to automate something else such as controlling the ATV transmitter.

I managed to light my test LED board using a batch file that contains the old DOS command "mode COM1 BAUD=9600 PARITY=n DATA=8 rts=on". At least that was a successful start. I built up the antenna control relay box to switch between the 2m omni-directional and my 440 MHz antenna using the mode command in a batch file. That seemed to work for a while but I later discovered COM1 was now being used by another device and the serial adapter had a different number. A utility was tracked down to list the status of all the pc com ports. Since there were a number of virtual com ports to choose from a port with a high number was used hoping the system changes them in numerical order. But then sometime later it also was taken over and no longer available. Maybe after a system reboot the ports get shuffled around or when a cable is unplugged then reconnected a new assignment is automatically made. This was a real nuisance plus at times the serial control still wasn't working after a restart until I pulled the USB cable and reinserted it to apparently reset the USB module or the hub. I also checked through all the power settings to make sure Windows doesn't power devices off when the laptop lid is closed or when it goes into the sleep mode. The power settings had caused problems for me before so that was one of the first things I looked at.

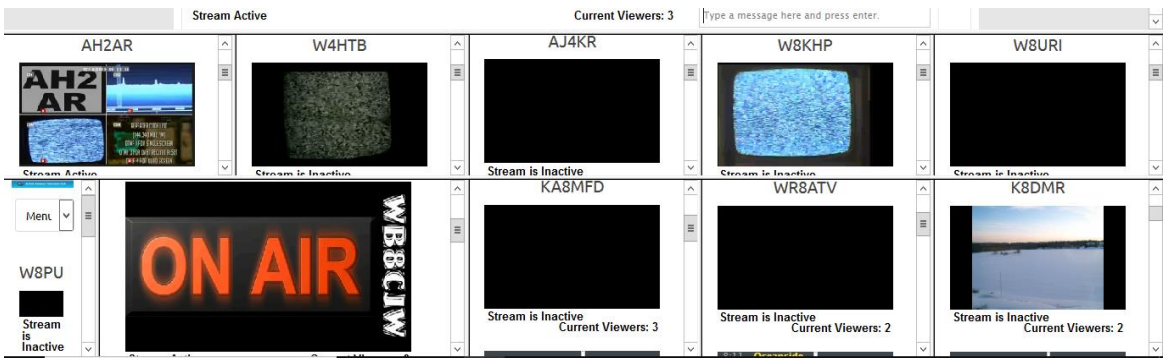
There have been a lot of Chinese "USB to relay" boards show up on eBay and all over the web with anywhere from 1 to 16 or more channels for home automation or just about anything you want controlled from your pc. Some are very basic direct wire controlled; some RS-232 or RS-485 controlled plus some can communicate over the local area network and may have a wireless smart phone interface that will operate up to about 400 meters – nearly a quarter mile! The particular module I purchased uses the HID (Human Interface Device) control. HID is part of the operating system that communicates through the USB and is compatible on various platforms and there is no device driver to be concerned with. These modules are compact with a relay for each channel that has contacts (SPDT) with typically a 10 Amp, 250 VAC / 10 Amp, 30 VDC rating with screw-down terminals to make wire connections to the common terminal and the normally open or normally closed contact. The relay provides complete electrical isolation so there are no ground loops to contend with through other equipment. The modules have an electronic serial number for HID identification. This ID needs to be read as a 1st step with a free utility.

The reliability of the HID control has been excellent. Even after the computer goes into "sleep" mode or heaven help us another Microsoft update occurs the device does not lose its mind or forget what it is supposed to do. Even after power has been removed the last state the relay was in (open or closed) is remembered.

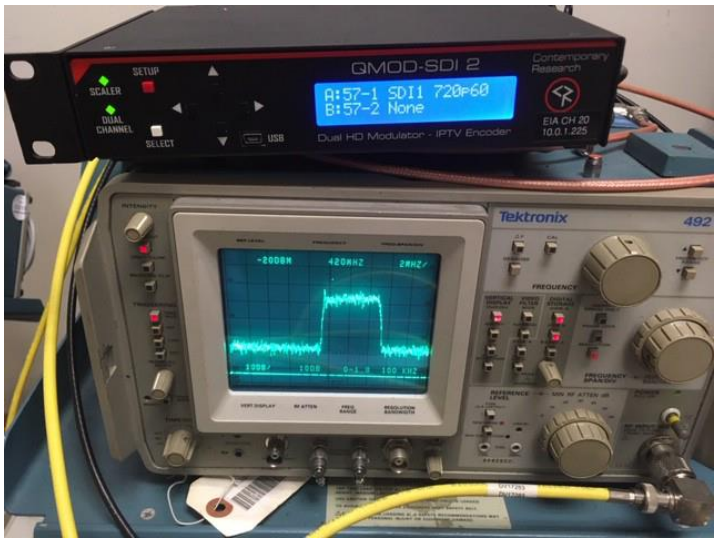
The USB-HID module is being used to switch the ATV transmitter on and off from the pc. I use OBS Studio to stream video to the BATC and the same AutoHotKey command that turns the relay module on also is set in the OBS macro definitions to put up a graphic that flashes "ON-AIR" (see picture). I have been happy with it although the plastic enclosure is pretty marginal. For $11 it was still a good deal. I probably couldn't purchase the individual parts to breadboard the circuit for less.

Various web control applications are available. Two applications I found are in the download file USB_Relay2.zip to control the relays. Extract the files then inside the \USBRelay2\TestApp folder is GuiApp_English.exe that gives a visual status of the on/off state and CommandApp_USBRelay.exe a command line application that can be used in batch files and scripts. Download at: http://www.giga.co.za/Kit_Drivers/USB_Relay2.zip

This is a portion of WB8LGA's multiple streams page I use so we can get a glimpse of how well our ATV signal is being received at each other's QTH or to show off our latest creation on camera. Thanks Charles and to the BATC for providing this service.
…WB8CJW Dale

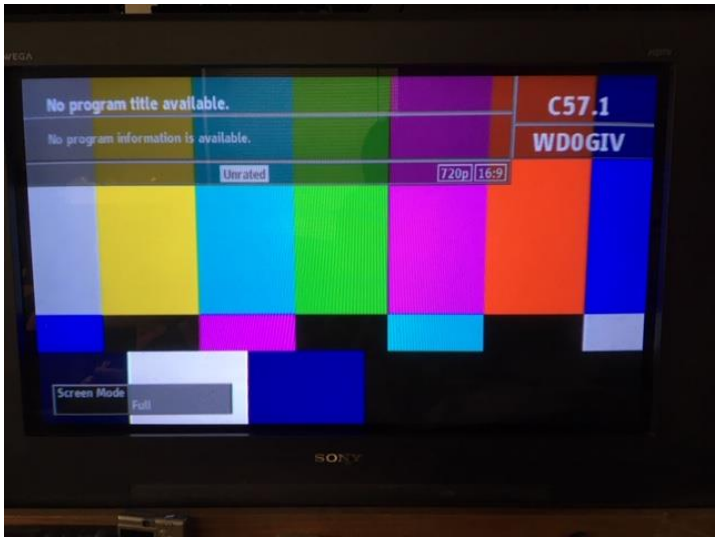


NEW ATSC - 8VSB ATV REPEATER *(reproduced here by permission from wd0giv)*



The WD0GIV ATV repeater is going HD. The input will still be on CH60 438-444 but now you can send in either NTSC or 256 QAM 720P. No matter what comes in it will be output CH57 420-426 8VSB 720P on .1 480I on .2 The .2 will be repeater info only. Yes, that is two streams. In order to RX the user will have to down convert as switching to 57 cable puts most receivers in QAM only mode not 8VSB. The system is under construction and to the best of my knowledge it will be the only 8VSB/ATSC system in the state if not the country.

The above picture shows the exciter modulator under test. I do not have a launch date yet. Also, if anyone is interested in 8VSB encoders/modulators let me know. I have a very small amount of them with special firmware that allows 8VSB on the "cable" channels of 57 through 60 (the ATV band) 420 to 444Mhz. It is not normal to do 8VSB on this band. They retail for $2,700 but for Ham repeater owners I have two I can let go for $1100. There are two HD SDI ins and an analog in, all scale-able. I am keeping two as one on air and one as a spare. Threw some fancy switching and upconverting I will have both analog NTSC and QAM HD in on the same frequency 438- 444mhz. This way I can use the same VSB/bandpass filter duplexer. If interested I can send you a block diagram. I am using all broadcast Evertz terminal gear (DA`s, up and down converters, embedders, de-embedders etc.) all in a 3RU 7800 frame.



The first HD visual test was completed on 3/29/19 marking the first 100Watt 8VSB test of the new wd0giv HDATV repeater as shown in the picture above.
…73 Richard wd0giv

FCC ADOPTS NEW RULES FOR SPECTRUM ABOVE 95 GHZ

From ARRL Headquarters March 21, 2019 SB QST ARL ARLB012
ARLB012 FCC Adopts New Rules for Spectrum above 95 GHz in Branded "Spectrum Horizons" Initiative

The FCC has adopted new rules to encourage development of new communication technologies and expedite the deployment of new services above 95 GHz. The action was the latest move in the Commission's "Spectrum Horizons" branded initiative. The rules can be found online in PDF format at, https://docs.fcc.gov/public/attachments/DOC-356297A1.pdf .

"This spectrum has long been considered the outermost horizon of the usable spectrum range, but rapid advancements in radio technology have made these bands especially ripe for new development," the FCC said in announcing the March 15 move.

Prior to its "historic" decision last week, the FCC had no rules for authorizing communication above 95 GHz other than by radio amateurs or through experimental operations. Under current rules, specific Amateur Radio allocations exist at 122.25 - 123.00 GHz; 134 – 141 GHz; 241 - 250 GHz, and at frequencies above 300 GHz, and limited experimentation has taken place in this region of the radio spectrum.

Among radio amateurs active in that region of the spectrum is Brian Justin, WA1ZMS, in Virginia - who has made at least one contact on every available Amateur Radio band. He earned the first-ever ARRL VUCC awards for 122 GHz, 134 GHz, and 241 GHz, and even went so far as to make the first contact on a less-than-1-millimeter band, 322 GHz. "Many world DX records were made as well along the way," he said last spring. "The most rewarding one for me was 114 kilometers [about 71 miles] on 241 GHz."

In announcing adoption of the new rules for spectrum above 95 GHz, the FCC cited "substantial opportunities for innovation on these frequencies, especially for data-intensive high-bandwidth applications as well as imaging and sensing operations."

The new rules create a new category of experimental licenses for using frequencies between 95 GHz and 3 GHz. "These licenses will give innovators the flexibility to conduct experiments lasting up to 10 years, and to more easily market equipment during the experimental period," the FCC said. The FCC action also makes a total of 21.2 gigahertz of spectrum available for use by unlicensed devices. The Commission says it selected "bands with propagation characteristics that will permit large numbers of unlicensed devices to use the spectrum, while limiting the potential for interference to existing governmental and scientific operations in the above-95 GHz bands, such as space research and atmospheric sensing."

The FCC said study of these uses could ultimately lead to further rulemaking actions and additional licensing opportunities within the Spectrum Horizons bands.

At the invitation of FCC Chairman Ajit Pai, well-known academic researcher, entrepreneur, contester, and DXer Theodore "Ted" Rappaport, N9NB, delivered remarks prior to the Spectrum Horizons vote.

The docket for the proceeding, ET Docket No. 18-21, incorporates the terminated 2013 Petition for Rule Making RM-11795, submitted by James Whedbee, N0ECN, of Missouri. Whedbee has asked the Commission to create rules for the operation of intentional radiators in the band 95 - 1,000 GHz under Part 15.

VIDEO TRANSMISSION USING IP WITH OFF-THE-SHELF DEVICES

By Gary Sutton - WB5PJB *(reproduced here by permission)*

The following was submitted by a fellow member of the Boulder ATV group, Gary Sutton, WB5PJB. Gary lives the farthest away from our TV repeater in Castle Rock. Here is his brief ham radio bio taken from www.qrz.- com "I have been in the ham radio hobby for over 40 years and enjoy operating a diversity of modes: HF digital & CW, VHF/UHF digital, SSB, FM & ATV, microwave on 10GHz SSB and optical communications. Also enjoy using computers and microcontrollers in ham radio applications and writing software when time permits. Always have more projects than I have time (or money) to do. Currently living in Castle Rock, CO located about halfway between Denver and Colorado Springs. I am active in our local, ARES group and enjoy the challenge of providing emergency communications."

Introduction

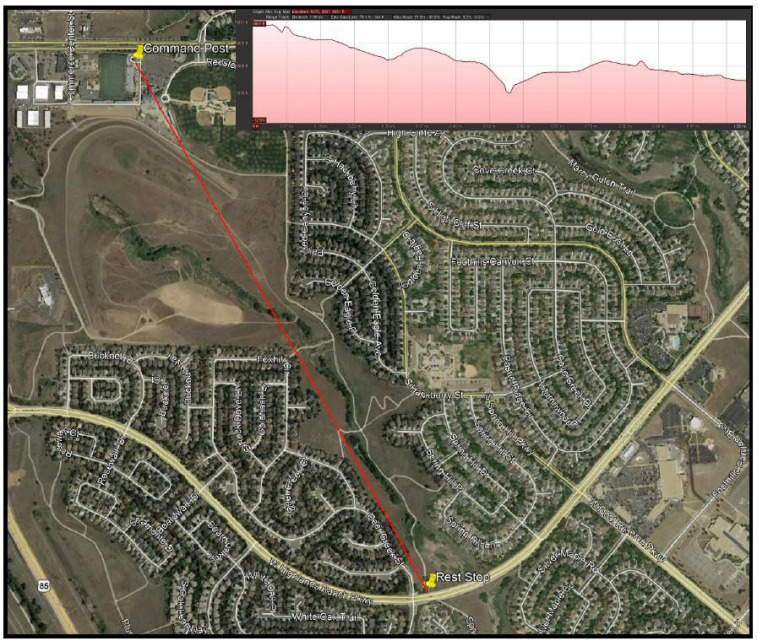
While live full-motion video using NTSC or one of the DVB variants has now been a mainstay of amateur radio for years, there is an alternative to those transmission protocols that can sometimes be more beneficial to use in public events where amateur radio is providing support communications and the geographic area of the event is relatively small. Using Internet Protocol (IP) as a medium for video transmission has proven to be a successful means of getting live images from temporary field locations back to a Command Post.

Many of us have IP cameras in our homes for security reasons, and they make convenient tools for checking our property from anywhere in the world if Internet access is available. In public outdoor events where amateur radio is providing support communications to a served agency, the same technology may be used in an ad-hoc wireless network to send live video images to a central Command Post. The task for hams is to setup such a network and make it reliable enough to handle full-motion video from one or more IP cameras. With the availability of off-the-shelf products from companies such as Ubiquiti, Mikrotik and others, the hardware tools are available to hams to setup wireless networks that have the ability to convey video information from IP cameras setup in various locations around the geographic area of the event. While this may sound fairly easy to do on the surface, there is a combination of RF knowledge and networking knowledge required by hams to successfully accomplish this task. The off-the-shelf products operate in the microwave bands assigned to amateur radio operators, so being familiar with microwave antennas and propagation is important, as well as, understanding how to setup a network with switches and routers, and administering IP addresses and host names. Pre-planning is essential to increase the chances of a successful outcome and understanding the limitations of these devices will help you to not overreach on expectations. The purpose of this article is not to get into the details of the Ubiquiti or Mikrotik products, but to give an example of a simple outdoor event where a single IP camera feed located a mile away is used to send full-motion video to operators in the Command Post. This particular event is a 5K walk/run held each Thanksgiving morning in Highlands Ranch. A rest stop is located one mile away from the Command Post (CP) and the desire is to have video in the CP showing the activity at the rest stop.

Step 1

Step one was to investigate the feasibility of such a request based on the geography of the area. As stated above, the RF transmissions would be using either the amateur radio 13 cm band (2.4 GHz.) or the 5cm band (5 GHz.) because those are the frequencies used by the off-the-shelf products. A physical site visit to both the rest stop location and the CP location, along with Goggle Earth analysis of the path between the two locations, made the possibility look somewhat favorable for obtaining a successful microwave path. As it so happens, a length of open space land existed between the two locations, so any blockage of microwave RF from houses would be minimal. Likewise, no land features would significantly protrude into the Fresnel zone (https://en.wikipedia.org/wiki/Fresnel_zone) of the path between the two microwave transceivers. There were some trees and tall bushes in the path, which would definitely be protruding into the Fresnel zone, so that raised some concern. Experience with using microwave frequencies around trees has shown that trees and their leaves love to absorb microwave energy, so there is always some concern when there are a lot of trees in a microwave path. The only advantage we would have is that this was a Thanksgiving Day event, so the deciduous trees had

dropped their leaves. Overall, it was determined that the RF path had a reasonably good chance at success, and this was an amateur radio endeavor, so experimentation to see if something works or doesn't work is all part of the fun.



Goggle Earth© map and elevation profile of the path between the rest stop and the CP.

Step 2

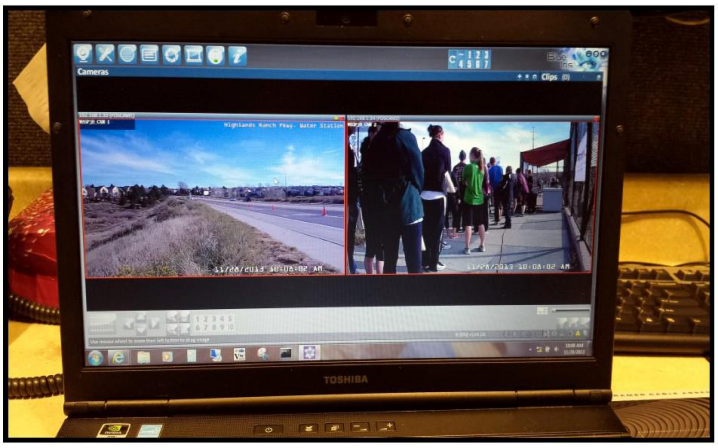
Step two was to pick the RF and camera hardware. The RF choice was between using 2.4 GHz. or using 5 GHz. This was an easy decision because there was no budget for new equipment, so based on the hardware that was on-hand, 5 GHz. was the chosen band to use. As a note, we have done this event with video for several years and we have always used 5 GHz. The camera source has evolved over the years, with initially using an analog NTSC camcorder camera (provided by the Douglas County Sheriff's office) combined with an analog-to-digital IP converter to using strictly an IP camera that streams H.264 or MJPEG video out a network port.

Step 3

Step three was to gather the necessary accessory parts and pieces to make a complete operational setup. This involves power sources, tripods, masts, cables, etc. This step needs special attention in pre-planning, as there is nothing worse than getting everything setup in the field and then finding out a cable is missing that keeps the whole system from functioning. It is advisable to create a detailed checklist of the various parts and pieces that will be required and check off all of the items as you load them into your vehicle for transport to the site. The checklist can also be used at the end of the event to make sure all of the items have been retrieved.

Step 4

Step four was to plan and pre-test the operational functionality of the entire system. This includes configuring all of the IP devices with appropriate IP addresses and subnet masks. This includes the camera source, the RF transceivers and the laptop at the receiving end that will display the video. Setting the devices up in a test scenario at home and testing the video path prior to going on-site can help guarantee a smooth implementation in the field. It doesn't totally eliminate the "it-worked-on-the-bench" scenario, because you can't account for all of the variables that can happen in the field on the day of the event, but it does increase the chance of success significantly. It is during this step that knowing how to configure and use the off-the-shelf RF transceivers comes into play. The details of configuring these devices is beyond the purpose of this article, so for the purposes of keeping this to an overview of using video over IP, it is sufficient to think of the transceivers as a wireless data path similar to using a Wireless Access Point (WAP) in your home or work, except it is working over a much greater distance.



Implementation

The actual implementation of this very simple video system has gone quite well over the years. Some of the initial concerns about vegetation causing an issue with the microwave signal have been alleviated, as the 5 GHz. signal makes the one mile path with no problem.

Initial site visit raised some concern over the vegetation in the microwave path.

Setup of the equipment in the field has been relatively easy and we have had no issues with the hardware itself. The transceivers we have used (both Ubiquiti and Mikrotik) are designed to be used outdoors, so extreme temperatures or wet conditions should have no effect on their operation.

First year setup at the rest stop using a Ubiquiti PowerStation on a short mast and an analog NTSC camera that was converted to IP.

At the rest stop, we have switched from using the analog camcorder camera to using an IP camera. There are some advantages using the camcorder camera in that it has good zoom capabilities and can also record audio and video locally, so in some instances an analog camcorder might still be a valuable asset. The advantage of the IP camera is the quicker setup, fewer parts to make it work and better video quality compared to the analog-to-IP converter. At the Command Post, we have primarily used a laptop running either Blue Iris or VLC Media Player software. The Blue Iris software is primarily a security camera software and it has the ability to work with most IP cameras on the market and is regularly updated. It is not freeware, but it has always performed well for this task and has worked out better than some of the free software we have tried. RF-wise at the CP, we have primarily used a very small and lightweight transceiver mounted either on a push-up mast or on top of the stands of a stadium that happens to be next door to the CP.

At the CP, a Ubiquiti 5 GHz. NanoStation on a push-up mast to the left of the dual band V/UHF vertical antenna.

Blue Iris software running on a laptop in the CP.

This past Thanksgiving (2018) we used an IP camera at the rest stop and another on top of the stadium looking down on the Start/Finish area. The stadium camera was a PTZ camera, so that offered the ability to remotely pan, tilt and zoom - easy to do with IP camera systems.

Summary of experience

Over the years of using IP for video transport at this particular event, the success rate has been 100 percent. Using IP cameras for video and Ubiquiti or Mikrotik for RF transmission is not exactly plug-and-play, however. It does take some upfront planning to make the system function properly and there are a number of configuration settings that can be “gotchas” if they aren't set properly. The RF reliability of the Ubiquiti and Mikrotik devices is excellent. They simply work. If you can get a good microwave path, then the chances of the devices "seeing" each other RF-wise is good. Issues arise when the RF paths are anything less than perfect. Data rates will drop off very rapidly as the signal strength between two nodes is reduced. The nodes may show they are connected to one another (a "connection" requires very little bandwidth), but if the signal strength isn't very strong, they may not be able to provide adequate bandwidth for video. These are low power devices, relatively speaking. Typically, the power output of the device is a Watt or two, at best. The antenna may provide a lot of gain, such that a higher EIRP is obtained, but that comes at the cost of a narrower antenna beamwidth, which begins to eliminate an easily obtainable omnidirectional setup that has decent gain. A high gain omnidirectional setup may be obtained by combining multiple transceivers at a location and pointing them in different directions, but that comes with greater complexity in system setup and higher cost. These are microwave devices that operate at a wide bandwidth, so it must be kept in mind that their useable working distance is limited. Where you might be able to get a 70 cm or 23 cm DVB-T signal out of a not-so-prime RF location, these off-the-shelf transceivers may not work at all. Like anything else in a ham radio operator's communications toolbox, the off-the-shelf IP transceivers can serve a useful purpose as video transmission devices if used properly within their limitations.

ATSC 3.0 IN 40 U.S. MARKETS BY END OF 2020

The following is in part by Tom Butts from TV Technology Magazine April 9 2019. For complete article go to: https://www.tvtechnology.com/atsc3/atsc-3-0-to-be-deployed-in-40-u-s-markets-by-end-of-year

It was announced at the Las Vegas NAB show ATSC 3.0 will be rolled out in 40 U.S. markets by the end of 2020.

Subject to final engineering and required approvals, consents and FCC license modifications, the participating broadcasters have identified the first stations that will convert to ATSC 3.0 service in this rollout. Primary broadcast programming currently broadcast on the stations planning to upgrade will be hosted by other stations in their respective markets.

Station groups involved in the deployment include Fox Television Stations, NBCUniversal Owned Television Stations, Univision, Spectrum Co. and members of the Pearl TV Group, a coalition of broadcasters and manufacturers testing ATSC 3.0 in the Phoenix Model Market.

The first transitioning stations have been identified (ranked by population) include:

- Dallas-Ft. Worth, TX
- Houston, TX
- San Francisco-Oakland-San Jose, CA
- Phoenix, AZ
- Seattle-Tacoma, WA
- Detroit, MI
- Orlando-Daytona Beach-Melbourne, FL
- Portland, OR
- Pittsburgh, PA
- Raleigh-Durham, NC
- Baltimore, MD
- Nashville, TN
- Salt Lake City, UT
- San Antonio, TX
- Kansas City, KS-MO
- Columbus, OH
- West Palm Beach-Ft. Pierce, FL
- Las Vegas, NV
- Austin, TX

The Next-Gen TV stations in these Top 40 markets (ranked by population), with details to follow are:

- New York, NY
- Los Angeles, CA
- Chicago, IL
- Philadelphia, PA
- Washington, DC
- Boston, MA
- Atlanta, GA
- Tampa-St.Petersburg-Sarasota, FL
- Minneapolis - St. Paul, MN
- Miami - Ft. Lauderdale, FL
- Denver, CO
- Cleveland-Akron, OH
- Sacramento-Stockton-Modesto, CA
- St. Louis, MO

- Charlotte, NC
- Indianapolis, IN
- San Diego, CA
- Hartford-New Haven, CT
- Cincinnati, OH
- Milwaukee, WI
- Greenville-Spartanburg, SC - Asheville, NC

Additional TV markets for Next-Gen TV service (ranked by population) include:

- Norfolk-Portsmouth-Newport News, VA
- Oklahoma City, OK
- Albuquerque - Santa Fe, NM
- Grand Rapids - Kalamazoo, MI
- Memphis, TN
- Buffalo, NY
- Providence - New Bedford, RI
- Little Rock - Pine Bluff, AR
- Mobile, AL - Pensacola, FL
- Albany-Schenectady - Troy, NY
- Flint-Saginaw - Bay City, MI
- Omaha, NE
- Charleston - Huntington, WV
- Springfield, MO
- Rochester, NY
- Syracuse, NY
- Chattanooga, TN
- Charleston, SC
- Burlington, VT - Plattsburgh, NY
- Davenport, IA - Moline, IL
- Santa Barbara - Santa Maria - San Luis Obispo, CA

ATSC 3.0 enabled sets and devices are expected to hit the market by 2020. FCC Commissioner Brendan Carr advocated for broadcasters to use ATSC 3.0 to innovate and better compete with telecommunications companies.

“It’s important that the FCC authorized broadcasters to start experimenting with ATSC 3.0, giving you the freedom to innovate—a freedom that your competitors and many others in the tech sector already enjoyed,” he said. “And when I think about the ways that broadcasters can use that freedom to innovate, one use case stands out to me: ATSC 3.0 as a new and competitive broadband pipe.”

For a comprehensive source of TV Technology’s ATSC 3.0 coverage, see our ATSC3 silo.

A T C O
2019 SPRING EVENT

11:30 AM – SUNDAY (For Hamfest)
(Lunch starts about 12:30 PM)
May 5, 2019
ABB PROCESS AUTOMATION CAFETERIA
579 EXECUTIVE CAMPUS DRIVE, WESTERVILLE
FOR MORE DETAILS, CONTACT
ART – WA8RMC - 891-9273
FREE LUNCH PROVIDED – DOOR PRIZES
BRING A FRIEND AND SEE OLD BUDDIES
MINI HAMFEST – SHOW AND TELL

DIRECTIONS TO THE ATCO EVENT

From I-70 WEST Bound:

Take I-270 Northbound around and turning to the west to Cleveland Ave. Exit north onto Cleveland Ave and travel north about 2 miles to Executive Campus drive. (It's the next street past Westar Crossing Street). Turn left (west) to the ABB building at the end of the street.

From I-70 EAST Bound:

Take I-270 Northbound around and turning to the east past SR 315 and past I-71. Get off on the Cleveland Ave second exit and travel north (to Westerville). Continue north on Cleveland past Schrock road and then past Main Street. Continue north about ½ mile past Main Street to Executive Campus Drive. (It's the next street past Westar Crossing Street) Turn left (west) to the ABB building at the end of the street

From I-71 NORTH bound toward Columbus:

Drive through Columbus on I-71 to I-270 on the north side. Take I-270 east to the first exit, Cleveland Ave. Get off the Cleveland Ave second exit and travel north (to Westerville). Continue north past Schrock road and then past Main street. Continue north about ½ mile past Main Street to Executive Campus Drive. (It's the next street past Westar Crossing Street) Turn left (west) to the ABB building at the end of the street.

From I-71 traveling SOUTH bound toward Columbus (North of I-270):

Exit the Polaris Ave exit and travel East about 1 mile to Cleveland Ave. Turn right on Cleveland Ave to Executive Campus Drive. Turn right again on Executive Campus Drive. ABB is on the right side of the street about half way around the semi-circle.

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.

04/28/2019 | Athens Hamfest
Location: Athens, OH
Type: ARRL Hamfest
Sponsor: Athens County Amateur Radio Association
Website: http://www.ac-ara.org/

05/17/2019 | 2019 ARRL Nat. Conv. / Hamvention®
Location: Xenia, OH
Type: ARRL Convention
Sponsor: Dayton Amateur Radio Association
Website: http://hamvention.org

06/01/2019 | FCARC Summer Swap
Location: Wauseon, OH
Type: ARRL Hamfest
Sponsor: Fulton County Amateur Radio Club
Website: http://k8bxq.org/hamfest

06/08/2019 | Union County ARC TailGate & TrunkFest
Location: Marysville, OH
Type: ARRL Hamfest
Sponsor: Union County Amateur Radio Club
Website: http://www.ohiohams.net

06/15/2019 | Milford Hamfest
Location: **Owensville, OH**
Type: **ARRL Hamfest**
Sponsor: **Milford Amateur Radio Club**
Website: **http://www.w8mrc.com**

06/15/2019 | W8DXCC DX Convention
Location: Owensville, OH
Type: ARRL Convention
Sponsor: SouthWest Ohio DX Association
Website: http://www.w8dxcc.com
http://www.w8mrc.com

07/07/2019 | 20/9 Radio Club Hamfest, Computer, & Electronics Show
Location: Austintown, OH
Type: ARRL Hamfest
Sponsor: 20/9 Radio Club, Inc.
Website: http://20over9.org

07/20/2019 | NOARSFEST
Location: Elyria, OH
Type: ARRL Hamfest
Sponsor: Northern Ohio Amateur Radio Society
Website: http://noars.net/hamfests/noarsfest

07/21/2019 | VAN WERT HAMFEST
Location: Van Wert, OH
Type: ARRL Hamfest
Sponsor: Van Wert Amateur Radio Club
Website: http://w8fy.org

TUESDAY NITE NET ON 147.48 MHz SIMPLEX

Every Tuesday night @ 8:00PM WA8RMC hosts a net for the purpose of ATV topic discussion. There is no need to belong to the club to participate, only a genuine interest in ATV. All are invited. For those who check in, the general rules are as follows: Out-of-town and video check-ins have priority. A list of available check-ins is taken first then a roundtable discussion is hosted by WA8RMC. After all participants have been heard, WA8RMC will give status and news if any followed by late check-in requests or comments. We usually chat for about ½ hour so please join us locally or via internet at https://batc.org.uk/live/wr8atv/. Click on WR8ATV.

ATCO TREASURER'S REPORT - de N8NT

OPENING BALANCE (01/14/19)	$ 3799.97
RECEIPTS(dues)	$ 90.00
PayPal fees	$ (3.54)
Web site annual hosting, domain & SSL cert & call sign database fees	$ (219.99)
CLOSING BALANCE (04/20/19)	$ 3666.44

ATCO REPEATER TECHNICAL DATA SUMMARY

Location: Downtown Columbus, Ohio
Coordinates: 82 degrees 59 minutes 58 seconds (longitude) 39 degrees 57 minutes 47 seconds (latitude)
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 contin, 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)
2397 MHz Mesh Net transceiver 600mw output (channel 1 minus2). ID is WR8ATV-2
10.350 GHz: 1 watt continuous analog FM
Link transmitter: 446.350 MHz: 5 watts NBFM 5 kHz audio. This input is used for control signals.

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 6dBd 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 minus2 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 slot 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 and PID'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)
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 digital SR=4.167Msps, FEC=7/8. PIDs: PMT=133, PCR=33, Video=33, Audio=49 (Input here feeds all TV transmitters and also goes directly to 1268 MHz DVB-S digital output channel 2.)
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 of MESH on 2397)
10.450 GHz - Commercial 40 slot waveguide horizontally polarized 16 dBd gain omni

Auto mode Input control:	Touch Tone	Result (if third digit is * function turns ON, if it is # function turns OFF)
	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)**
	003	Select room camera **(Always exit by selecting 001)**
	002	Select roof camera. Select room cam first then 002 for roof cam. (**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 1280 digital receiver
	00* then 3 for Ch. 3	Select 1280 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 April 2019

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
N8CXI	Garry Cotter	2367 Northglen Drive	Columbus	OH	43224	
N3DC	William Thompson	6327 Kilmer St	Cheverly	MD	20785	301-772-7382
K8DMR	Ron Fredricks	8900 Stonepoint Ct	Jennison	MI	49428-8641	
W8DMR	Bill Parker	2738 Florbunda Dr	Columbus	OH	43209	
WA8DNI	John Busic	2700 Bixby Road	Groveport	OH	43125	614-491-8198
N8DUK	Ron Reynolds	2173 Noe Bixby Rd	Columbus	OH	43232-4131	
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	OH	43026	614-405-1710
KB8EMD	Larry Baker	4330 Chippewa Trail	Jamestown	OH	45335-1210	
N8FRT	Tom Flanagan	6156 Jolliff St.	Galloway	OH	43119	
W8FZ	Fred Stutske	8737 Ashford Lane	Pickerington	OH	43147	
WB4IR	Bob Holden	7725 Tressa Circle	Powell	TN	37849	
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	
N0OBG	Jim Conley	33 Meadowbrook C C Est	Ballwin	MO	63011	
W6ORG,WB6YSS	Tom, Maryann O'Hara	2522 Paxson Lane	Arcadia	CA	91007-8537	626-447-4565
N8OCQ	Bob Hodge Sr.	3750 Dort Place	Columbus	OH	43227-2022	
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	David Jenkins	100 Miller Ave Apt 108	Ashville	OH	43103	614-853-0679
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	1163 Cloverknoll Ct	Columbus	OH	43235-4008	
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 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 CLUB OFFICERS

President:	Art Towslee WA8RMC	Repeater trustees:	Art Towslee WA8RMC
V. President:	Ken Morris W8RUT		Ken Morris W8RUT
Treasurer:	Bob Tournoux N8NT		Dale Elshoff WB8CJW
Secretary:	Mark Cring N8COO	Statutory agent:	Stan Diggs AA8XA
Corporate trustees:	Same as officers	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 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.