ATCO NEWSLETTER

VOLUME 37 NUMBER 2 **April 2020**

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)
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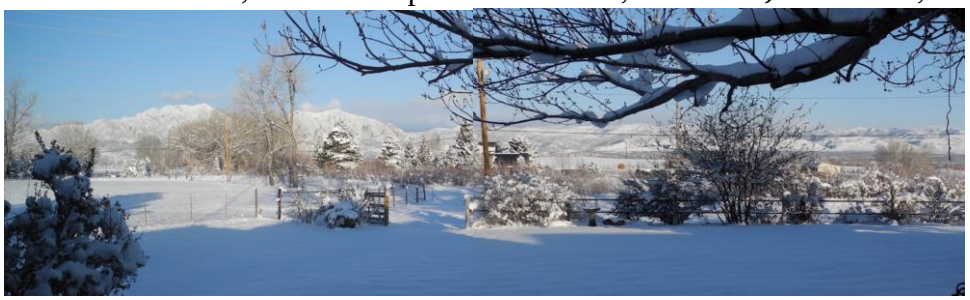
ATCO SPOTLIGHT TOPIC

ACTIVITIES ... from my Workbench

Before I get started with the ATV stuff, look at this picture from Jim, KH6HTV**,** in Boulder, Colo. He said, *"On Saturday I mowed my lawn for the first time with the temp. in the mid-60s. Sunday, it dropped 50 degrees and snowed for two days. I have over a foot of snow on the ground now"*. Does that make you feel better guys? Good! Let's move on to warmer topics.



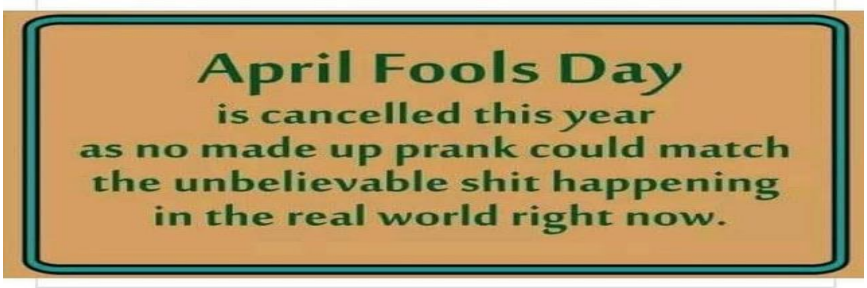
Besides the Coronavirus, there's not much happening right now. You've most certainly heard enough about COVID-19 so I won't go there. Even the needed work at the repeater is on hold for the time being. I have my 439.25 MHz signal source there trying to drown out the interference on 439 but I found that my signal is too strong for the other ham repeater inputs in the same vicinity causing their receivers to de-sense so I shut it down. I also need that signal source to test the new rib cage antenna I built for the Jones Road location but I can't get permission to retrieve it because of the virus quarantine. So, activity there is on hold also. When I finally get access, the first thing I need to do is verify whether or not the external interference is still there. If it is, I'll call the FCC again to find out if they will do something about it. I was told that they were in the area a few weeks back but didn't contact me about it.

Looking around for something else I can do while staying in compliance with our quarantine, I noticed activity on the local Channel 34 PBS TV tower close to me. I figured as long as I stay the required distance away from the workers, I figured it was OK to watch them remove their antenna and install a new one on top of their 1065 foot tower. BOY!!! I just found something else I definitely **do not** want to do. Those guys are crazy swinging around there at the top. In addition to the antenna they had to remove the top tower section and replace it with a stronger one to support the new antenna. The old antenna is about 2 feet in diameter and 30 feet long. The new one is almost 3 feet in diameter, 55 feet long and weighs 8800 pounds. Looking at the old antenna I noticed spikes going up the antenna about 2 feet apart. I was told those are the climbing spikes needed to get to the beacon on top. In addition, he said they can't use their safety harness while climbing those. They must do it without any safety protection… and was told they **did it once** at 3AM in the winter. It gave me chills just listening to that.

The workers are hoisted to the top with a free hanging cable held away from the tower about 10 feet. Looking at that, it seemed they were actually flying there without any help. I watched 4 of them go up each hooked to the higher person's safety harness. It looked like a single line of people "floating" to the top. See photo on next page.

All is well now. Channel 34 is back with 1MW high power using their new antenna. WOW! See pictures on following page. That's all for now. More later, Stay tuned!
...73 WA8RMC

As a public service announcement, the following message is issued here just in case you didn't remember…



To the far right is the tower with the gin pole at the top. It's the yellow item clamped to the 1065' tower side ready for the new antenna.

The middle photo shows the 4 workers being hoisted to the top with the winch cable. Not my idea of a fun thing to do.

Below is the winch used to hoist the antenna and workers up and down the tower. It holds 5000' of ¾" cable.

Directly below is the removed old antenna. Notice the climbing spikes. Above is a closeup of the feedline feed point for the 6" coax hardline. Too big for my QTH!

Above is the new 55-foot-long multiple slot antenna. It's 32" in diameter and weighs 8800 pounds. Check out the ladder improvement over the old antenna. It's a standard Werner fiberglass ladder bolted to the antenna intermediate steel flanges.

WHAT'S HAPPENING AT OTHER ATV CLUBS???

WILMINGTON DELAWARE ATV REPEATER : The KC3AM ATV repeater has 439.25MHz AM input and transmits on 423MHz with DVB-T, 2 MHz bandwidth. The repeater site is the highest point in Delaware at 440 ft. above sea level. The metro area of Philadelphia is visible from the repeater's antennas. The repeater is now affiliated with the Amateur Television Network (ATN). For more info about this repeater, contact Dave, KC3AM, at KC3AM@verizon.net

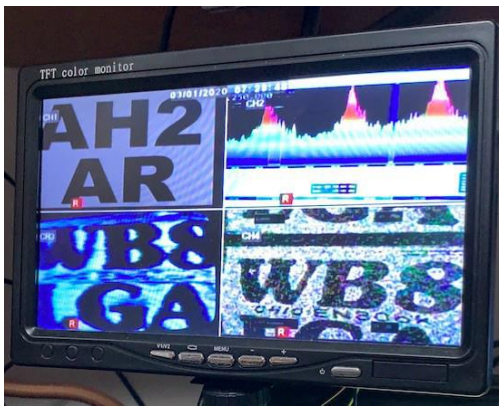
ATV at ARRL WINTERFEST: Note from Mel, K0PFX --- "Hi Jim -- Thanks to your AN-54 and help from Dave and Dale, I have the Hi-Des model BR101E "Gap-Filler" DVB-T repeater up and running. Not sure what I am going to do with it, but I will use it for something. The upper left LED is valid RX signal and could be used for control. I see that this Gap Filler is on holiday sale now for $203.

ATV at ARRL South-West Division Convention: Mike, WA6SVT, is the CTO of the Amateur Television Network (ATN) (http://myhamcallsign.com/atn-tv.org/). Mike will be giving a talk on ***Digital ATV*** at the upcoming ARRL South-Western Division ham convention. The convention this year will be in Yuma, Arizona on Feb. 14-15th. Mike's talk will be on Saturday at 3:40pm. Other speakers at the convention include Riley Hollingsworth, K4ZDH, and Gordon West, WB6NOA.

ATV in BAY AREA - CALIFORNIA: "Jim, -- Thank you for sending me your digital TV newsletter. Please keep me on your list. I have been doing amateur TV since before I was licensed in 1991. Presently I am the keeper of the ATV repeater up on Mount Diablo with the call W6CX. We have both inputs and outputs on DVB-S 1.2 GHz. Some of the details are on the club's website: http://www.mdarc.org/activities/repeaters/atv

ATV in ARIZONA: The Arizona chapter of the Amateur Television Network (ATN) holds a monthly meeting at a Denny's restaurant in Tempe. For their January meeting they have several items planned including: Next Generation TV, 2020 plans, ATV "Show-N-Tell", etc. They also have a brand new ATV repeater to expand their coverage in the East Valley. It is on 421.25 MHz.
Watch their ATV Nets on YouTube.com Sunday, Tuesday and Wednesday evenings between 7 and 9 PM Arizona Time. On YouTube, search for W6ATN Live and W7ATN-MESA Live.

Dayton ATV News: A marginal East-West, 70cm band enhancement occurred on Sunday (3/1). Pictured below is the received signal coming from WB8LGA in Morrow County, Ohio, received by AH2AR in Vandalia Ohio (an approximate 90 mile separation path). To better explain the QUAD screen display, The upper left portion of the screen is an AH2AR ID video screen in standby, the upper right-hand portion of the screen is the 439.250 MHz Analog received signal from WB8LGA directly received on an AirSpy SDR receiver in Vandalia , the lower right hand portion is WB8LGA's analog signal being re-transmitted by the Huber Heights DARA ATV repeater though its digital output to Vandalia, and the lower left hand screen is WB8LGA's direct-received analog video, being received in Vandalia. Note that analog video continues to be alive and well in this region. We tried to complete the link on 70cm DVB-T during this enhancement but the band was not fully cooperating... probably due to QSB.



…Dave, AH2AR

ATV QSO Party FOR 2020 ???

Follow the discussion between VK3BFG and KC6JPG about a possible ATV QSO party this Fall. It was discontinued a few years ago because Peter lost their repeater location. Now, it's back so activity is revived. WA8RMC Roland starts,

Hi Peter!

I hope you are doing well my friend. It's been a long while since we've "seen" each other during the ATV QSO Party in the past. As ATV continues to advance into DATV in the states, our Amateur Television Network system has been deploying DVB-T technology, starting with our receivers on all of our ATN repeaters in the southwest part of the United States (and will be deploying DVB-T transmissions this year at 2 of our repeaters). ATV'ers are certainly looking great using DVB-T digital transmitters.

Say, I would like to get your thoughts about resurrecting the ATV QSO Party for 2020. This event was so AWESOME in the past as it was a fabulous platform to have our ATV'ers from around the world getting together during the 24-hour run to check in, say HI, show off their shack, and have a wonderful QSO via video. We have been utilizing Whereby.com, Zoom video conferencing and BATC to link up other ATV systems during our nets with the ATN. With this technology, we can certainly link up repeaters and ATV'ers from around the world as we are streaming in HD on our ATN channel on YouTube. Let me know your thoughts as I am more than willing to assist you if you decide to have a "GO" with hosting the ATV QSO Party again. The last weekend in August would be perfect.

Take care Peter and I do look forward to your reply and your thoughts my friend. 73,
…Roland Hoffman - KC6JPG

Hi Roland. Great to hear from you ……

As you may know VK3RTV lost its site a couple of years ago as it was de-commissioned and the tower removed. Since then I have been looking for a site. There were sites available but they wanted thousands of dollars rental.

Amateur Radio Victoria fortunately acquired a site on one of the very high points around Melbourne. It is located in the eastern metropolitan area right beside a large water storage reservoir. It has a tower with plenty of feeders available and has a great outlook. We have had to accommodate a 360-degree service area which required a re—think/re-design of antennas.

We are intending to install new antennas late February or early March. I would hope that VK3RTV will become active again not too long afterwards. I certainly had it in mind to run the QSO party again as I had a prompt from both Don KE6BXT and also Art WA8RMC recently. Late August for the party will also work for us as well.

I have been reading the mail generally and have seen a number of new digital repeaters on the air in the USA. With your help we should be able to bring more systems to the party, starting in the eastern US and working across.

I understand as you comment, that a number of USA Repeaters use DVB-T which, of course is our commercial standard in Australia. Early adopters of digital were DVB-S in and DVB-T out. We will still have a multiplexed output running two channels of DVB-T in a 7 MHz bandwidth. (VK3RTV1 and VK3RTV2).

I have already loaded Zoom and briefly tried it out with Art during his net night. I am fortunate that I have a really great connection to our new national network. I have relatively short cable to a local node and then fiber after that.

I will be concentrating on installation tasks for the next little while, but after that I will be ready to have a chat about a DATV QSO Party 2020
…Best Regards, Peter

IS OUR 3 GHZ HAM SPECTRUM IN JEOPERTY?

Mike Collis, WA6SVT, is representing the USA Ham community to petition the FCC for our existence against continual pressure to relinquish spectrum to the broadband groups for 5G needs. It's complicated and confusing but bear with me and read a partial transcript of the Docket 19-348 correspondence from Mike. The final decision is yet to be announced but it looks like we may retain at least a small part of the space in question. WA8RMC Mike's address to the FCC follows:

I. Introduction and Summary:

1. Amateur Television Network (ATN) is the nation's largest Amateur Radio-TV group with several chapters across the country. Our chapters build, install and operate Amateur Television (ATV) repeaters. Many areas have linked repeaters covering multiple states using the microwave spectrum in the part 97 Amateur Radio Service. ATN club members and other Amateur Radio operators have home based, mobile and portable ATV stations to operate through the repeaters or operate simplex.

ATN has been a good sharing service with Federal Government Radiolocation in the microwave bands over several decades. ATV is used as a public service tool to local, state and federal governments during disasters to provide video of disaster scenes upon request allowing those in authority at Incident Command Centers to see the extent of the disaster(s) while remaining at the ICC.

2. ATN strongly opposes removal of the Amateur Radio Service in the 3.3-3.5 GHz part of the 3.1-3.55 GHz band. This action would sever many of our microwave ATV links and in some cases losing an ATV repeater output channel. At minimum replacement spectrum elsewhere within the 3.1-3.55 GHz band could be an solution for us although at great cost to Amateurs to modify or change equipment.

Although there are other microwave bands in the part 97 allocation, several of those bands have been greatly reduce in size and have new or reactivated RADARS we have to protect. Many of the bands also have part 15 Wi-Fi systems overlaid on them. Amateur radio MESH nodes and access points have taken up most of the white space. reducing the number of channels for ATV use. This has reduced channels for ATV use.

II. Discussion:

3. In the docket under section III, Discussion, subsection A (9): "Removal of Non-Federal Allocations", it is discussed about the commercial interest in the band as well as extensive uses by STA's and experimental licenses operating in the 3.1-3.55 GHz band. Nowhere is there any mention of amateur radio part 97 interest or our use of the band although our use is in the public view. Amateur radio uses in the band that actually exist (hundreds of stations) but not limited to are:

1. Amateur Television repeaters.
2. Point to point microwave links for Amateur Television, several systems.
3. Point to point and point multipoint Mesh data links and access points.
4. Point to point voice repeater links.
5. Weak signal terrestrial communications using CW, SSB and narrowband data.
6. Weak signal Earth Moon Earth (EME) allowing world-wide communication by reflecting signals off of the moon. This mode of communications is an international allocation.
7. Amateur Satellites are an international allocation at 3.4 to 3.41 GHz.

4. In the docket under section III, Discussion, subsection B (11): "Future of Incumbent Non-Federal Operations", The question of where to relocate incumbent non-federal users is asked. Although ATN and the other amateur radio mode users would prefer to stay in our existing allocation in the 3.3-3.5 GHz band allocation or perhaps half of that allocation as is the case being negotiated in the 3.7-4.2 GHz band between satellite operators and proponents seeking to reallocate the band for 5G and unlicensed broadband in another NPRM docket. Replacement spectrum in the 3.1-3.3 GHz band may work for ATV and weak signal modes but may be an issue internationally using Earth Moon Earth to communicate with amateurs in other countries. Existing MESH equipment will not work below 3.35 GHz, this would be a major issue for that mode users as they use commercial 3.4-3.6 GHz equipment with new firmware installed. This new mode has explosive growth with hundreds of nodes in the 3.3-3.5 GHz band just in the state of California alone.

5. In the docket under section III Discussion, subsection B (12): "Future of Incumbent Non-Federal Operations", The question, is there sufficient spectrum existing amateur spectrum in other bands that can support operations currently conducted in the 3.3-3.5 GHz band? **The short answer is no.** Other than the narrowband weak signal operations, most existing amateur operations is broadband, ATN and Mesh are the two largest users in the microwave bands currently available for part 97 use. We will review band by band to support our claim for needed space for existing wide band modes and anticipated growth.

420-450 MHz - 70 cm band:

This band has federal Radiolocation and radio navigation we have to protect. Per CFR 97.303, no amateur transmissions between 420-430 MHz above line "A" in the north of the county and within 80.5 km of the cities of Cleveland, Buffalo and Detroit. 440-450 MHz is mostly FM and DMR mode voice repeater and simplex. 420-430 MHz in the non-line "A" restricted areas have point to point links and in some less populated areas ATV in a with a 6 MHz channel for analog or digital ATV. In the 430-450 MHz part of the band we have the 431-433 MHz weak signal sub band and amateur satellite sub band at 435-438 MHz that do not allow repeater operation. ATV operations are on 434 or 439.25 MHz depending on regional basis. This band is not suitable for ATV links or broadband MESH modes.

902-928 MHz - 33 cm band:

This band has government Radiolocation we have to protect as well as part 90 commercial licensed stations. On top of this, the band is overlaid with part 15 and part 15 Wi-Fi devises. The bottom of the band is weak signal mode operations and above that are repeater inputs, the top of the band is voice and DMR repeater outputs. The middle of the band has one 6 MHz wide ATV repeater output channel and one simplex ATV channel or MESH operation. This part of the band is very noisy and full of part 15 interference. Communication range is very limited for wide band modes. Some improvement with ATV communication by running high power on the repeater output. This band is not suitable for ATV links, limited use for ATV repeater outputs and limited use for MESH operations.

1240-1300 MHz - 23 cm band:

Back 30 years ago when amateurs had the full 1215-1300 MHz band, this band supported several ATV links running FM modulation and repeater inputs and outputs. There was lots of room at the time for all modes including weak signal, EME and voice repeaters. Many years ago 1215-1240 was cleared of amateur operations. Our ATV links were moved to the higher microwave bands including 3.3-3.5 GHz.

2300-2310 MHz & 2390-2450 MHz - 13 cm band:

Back over 25 years ago when amateurs had the full 2300-2450 MHz band, this band supported several ATV repeater and ATV links running FM modulation and repeater input and outputs. There was room for all mode users. This band also had been reduced in size to 2300-2310 MHz and 2390-2450 MHz. Amateurs are appreciative of the elevated status to primary at 2300-2305 MHz and 2390-2417 MHz, we would appreciate where possible to have portions of our other UHF and microwave bands elevated to primary status. This band has federal Radiolocation although that use seems to be minimal.

2300-2310 MHz is not suitable for links because the bandwidth is too narrow and weak signal activity is centered around 2304 MHz. 2390-2450 MHz is wide enough to support part of our ATV repeater and link needs. 2417.5 MHz is used for one-way links and 2441.5 for repeater inputs using FM modulation. Amateur satellite has 2400-2410 MHz and Mesh has one channel at 2397 MHz with some overlap of the amateur satellite segment. This band is also overlaid with part 15 Wi-Fi above 2400 MHz causing reduced range due to co-channel interference for ATV use. When we lost the center of the band one side of the ATV links had to move up to the higher frequency microwave bands.

3300-3500 MHz - 9 cm band:

This band currently is our best performing band for long haul point to point ATV links and ATV repeater FM inputs and outputs. This band also has room for several Mesh channels and is their best performing band. Weak signal and EME operations also take place and enjoy interference free communications. ATV uses 3380 and 3400 MHz and FM modulation. There are several ATV station active in this band and hundreds of Mesh nodes and access points are active.

5650-5925 MHz - 5 cm band:

This band used to be a good band for ATV links and repeater inputs and outputs. That has changed for the worse once the part 15 Wi-Fi operations were overlaid over most of the band. 5850-5925 MHz is nearly interference free but that is about to change with the NPRM docket ET 19-138 that proposes to overlay Wi-Fi operations and add C-V2X to the 5.9 GHz part of the band. This will greatly affect our range for FM repeater outputs at 5910 MHz. Most of our point to point ATV links below 5850 MHz are experiencing harmful interference, it is nearly a full time job tracking down the part 15 Wi-Fi stations to resolve interference. Mesh operations enjoy the 5850-5890 MHz part of the band where there is less interference but this gives then only a few channels.

10-10.5 GHz - 3 cm band:

This band works well for ATV for short haul links and repeater inputs and outputs. Heavy fog, rain and snow reduce range usefulness to about 25 to 30 miles. During clear weather, range is similar the lower microwave bands when running enough power. Weak signal operations and EME are popular modes. There is no Mesh operations that I now of as equipment is not yet available. The higher microwave band are not suitable for reliable ATV links or repeater inputs or outputs due to fog, rain and snow cause so much attenuation communications range drops back to a few miles at best.

III. Conclusion:

6. ATN opposes complete removal of the amateur radio service part 97 allocation from the 3.3-3.5 GHz part of the 3.1-3.55 GHz band, we need at least two 20 MHz wide channels to support ATV operations, 5 MHz for weak signal operations and room for Mesh operations. For weak signal and ATV replacement spectrum in the 3.1-3.33 GHz would allow us to continue to operate and use our ATV repeaters to support public service operations in support of local, state and federal agencies during drills and emergencies.

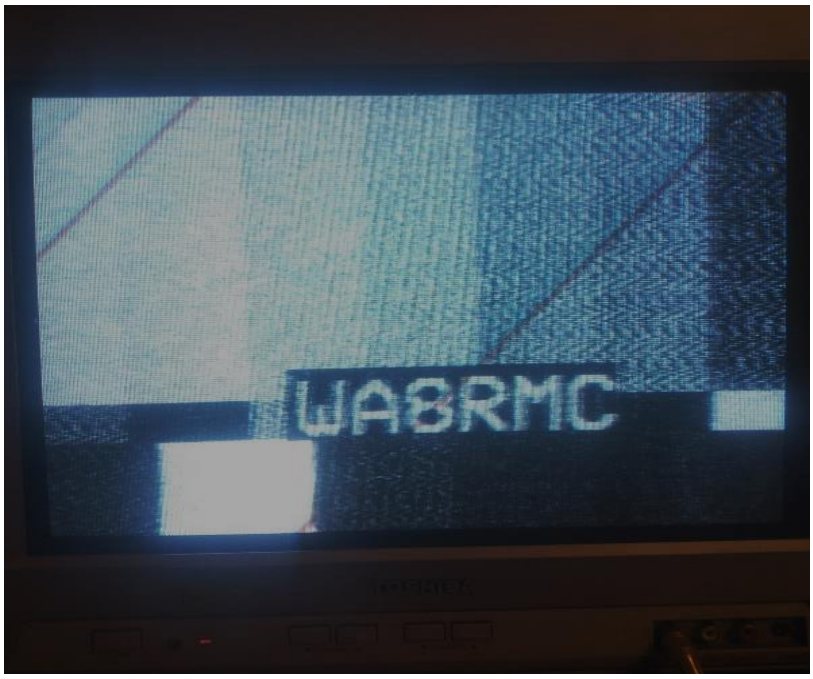
Respectfully submitted by,
Michael Collis WA6SVT, on behalf of Amateur Television Network P.O. Box 1594, Crestline, CA 92325

ATCO REPEATER SIGNAL SEEN IN JACKSON MICHIGAN!

04/06/20

Hi Art,

Saw you this morning just before 9AM and watched you for a bit up here. You were about P2 into the Jackson, Mich. repeater. The attached pic was you direct. I hollered on 144.34 but realized you were probably on 147.48. I came up a few times on 439.25. Tried to get into Columbus but nothing, also nothing from GR towards Ron. We are still around, just working more now to keep everyone's internet going! A lot are trying to work from home and they want faster but between 900 equipment which is canopy 1 Meg and trees it's not great. Some customers have really good signals and can get 5GHz or the 3.65 LTE which works well. Will try to catch you on next opening. 73 for now,
…Bryan.



Well, the picture he saw was not from me direct. It was my "test" signal at the repeater but I've had an interference issue so I shut it down. However, every Monday morning the SOT does an AC generator test and removes all AC power for about 20 minutes. My remote-controlled AC power strip is programmed to turn on all AC receptacles at power up. Therefore, when the main AC came back on the signal source came on with it. (*Yes, I know the power strip logic board should latch the outputs).* About 9AM that morning I noticed it was on and turned it off again but just before I did that, Bryan saw it and took the above picture…and now you know the rest of the story!
…WA8RMC

ARISS CELEBRATES LAUNCH OF RADIO SYSTEM TO ISS

ARISS Celebrating Successful Launch Carrying Interoperable Radio System to ISS.

Amateur Radio on the International Space Station (ARISS) is celebrating the successful launch and docking of the SpaceX-20 commercial resupply mission to the International Space Station (ISS). One payload on the flight is the ARISS Interoperable Radio System (IORS), which ARISS calls "the foundational element of the ARISS next-generation radio system" on the space station. Amateur radio has been an integral component of ISS missions since 2000. The Dragon cargo capsule docked successfully with the space station on March 9. ARISS-US Delegate for ARRL Rosalie White, K1STO, said hundreds of ARRL members contributed to make the IORS project happen, and ARISS is celebrating the 4-year-long IORS project.

"ARISS is truly grateful to ARRL and AMSAT for their co-sponsorship and support of ARISS since day one," White said. "ARISS greatly appreciates the hundreds of ham radio operators who have stood by ARISS, sending financial support and encouragement. A robust ham station is on its way to replace the broken radio on the ISS, and tens of thousands of hams will enjoy strong ARISS packet and ARISS SSTV signals as a result. In addition, thousands of students will discover and use ham radio to talk with a ham-astronaut. We hope to see the trend continue where more ARISS teachers and local clubs set up school ham clubs." The new system includes a higher-power radio, an enhanced voice repeater, updated digital packet radio (APRS), and slow-scan television (SSTV) capabilities for both the US and Russian space station segments.

White called the March 7 launch, "beautiful, flawless." ARRL President Rick Roderick, K5UR, told ARISS that he had his fingers crossed for a successful launch.

According to NASA Mission Control, it will take the three ISS crew members up to a month to unload and stow the 4,300 pounds of cargo on board the Dragon capsule, and the IORS is not a priority. The actual ham equipment will be installed in the ISS Columbus module. Another IORS unit is in line to be launched and installed in the Russian segment of the ISS later this year.

The IORS consists of a custom-modified JVC Kenwood TM-D710GA transceiver, a multi-voltage power supply, and interconnecting cables. The ARISS hardware team will assemble four flight units - and 10 IORS units in all â€” to support onboard flight operations, training, operations planning, and hardware testing.

ARISS-International Chair Frank Bauer, KA3HDO, said earlier this year that future upgrades and enhancements to the next-generation system are in various stages of design and development. These include a repaired Ham Video system - currently planned for launch in mid-to-late 2020, an L-band (uplink) repeater, a microwave "Ham Communicator," and Lunar Gateway prototype experiment.

DSN2596 DC/DC SWITCHING REGULATOR

It is built around an LM2596 IC switching regulator. The LM2596 is a 150kHz switcher rated at up to +40V input and 3 Amp output current. It is made by both TI and ON Semi. At Mouser, the IC alone sells for about $2.25 and up. But the complete DSN2596 stuffed pc board can be purchased for much less. However, shop carefully on the internet. I found prices all over the place ranging from as low as $1.25 to $11. These are very useful items to have a lot of in the ham shack. They work nicely and I have used them in many projects.

… **Jim Andrews, KH6HTV**

CRYSTAL REPLACEMENT FOR PC ELECTRONICS EQUIPMENT

Ever since International Crystal closed shop, hams have had grief finding crystals for their old rigs. Dave, AH2AR, has found a suitable replacement for 100MHz crystals for old P.C. Electronics ATV rigs. Here is what Dave has written: "I have finished up a small project that provides a solution for the unobtainable crystals for PC Electronics ATV transceivers. This specifically resolved an issue for Ken, KC8EAT, since the transceiver he will be using did not have a 109.8125 MHz crystal installed. I'm surprised it works so well. No visible artifacts while transmitting and it's right on frequency.

The active component to the circuit is what WB8LGA recommended, obtained from DigiKey. It is a **TTL, programmable crystal oscillator model SGR-8002DC-PTC**. When ordering, you have to specify the desired frequency as DigiKey programs them. The photo shows the board standing on end, inside the transceiver, right where the crystals normally plug in. It's getting its power source from an on-board 5volt regulator that's energized only when power is supplied to the exciter. Cost is a low $6 including a 5 V regulator, capacitor and a trimmer cap. I am very surprised it works so well. As a test, I installed one of these on the TC-70's second channel where the first channel had the original crystal on 109.8125 MHz.

Switching quickly back and forth by flipping the frequency switch shows nearly no spectral differences (on the spectrum analyzer) when comparing the oscillator to the crystal, and unbelievably, the oscillator seems to provide better looking video by examination of the video coming out of a line sampler. It is also spot-on frequency with no perceptible signs of jitter or other artifacts, either on the spectrum analyzer or the received video. I put a 10-30 pF trimmer across the oscillator's output and ground, and a single 0.001 µF disc cap across the regulated 5Vdc that runs the oscillator, and that was all that was needed to get these results. — four parts total — TTL oscillator, 78L05 regulator, capacitor and trimmer. I built two, and both provided the same results. Quite remarkable..."
73 de Dave, AH2AR

ATCO AND DARA NET NIGHTS HAVE CHANGED

A couple of months ago Charles, WB8LGA, suggested there is a better way to get together besides Ham radio/ TV. He and the 75 meter 7:30 AM gang decided to use the ZOOM internet teleconferencing system for general discussions and switch to radio when conditions permit. That's proved to be very successful.

ATCO and DARA decided to follow suit. We've had great success too. Participate every Tuesday for ATCO (9PM) and Wednesday for DARA (8PM). Join us for both teleconferences if you can. We usually have 15 to 20 check-ins from all over the world on various topics. We had a check-in from Australia and Japan last week.

I know ZOOM is not the "Ham Radio" that so many of you cherish with noise, interference and atmospheric challenges, but it's a great 2-way communication system available to all beyond the normal reach of ATV. It doesn't "replace" Ham Radio but serves as an introduction to the hobby so those without radio equipment can enjoy the conversation too.

To join for the first time, simply type **https://zoom.us/join** then download, install the .exe program on your computer and run it. ZOOM will start. Click on join, enter the **967-091-8666** meeting ID then the **191593** password and you're in. Those numbers are valid for both ATCO and DARA. Join with video or just audio if you don't have a camera.
…WA8RMC

BIQUAD ANTENNA (With radome)

The following are details on how to build your own BiQuad antenna from web article in 2014 (author unknown) followed by details by Dennis Belles, WA7DRO, See the following URL's for the complete antenna details:

https://buildyourownantenna.blogspot.com/2014/07/double-biquad-antenna-calculator.html
https://buildyourownantenna.blogspot.com/2014/07/welcome.html

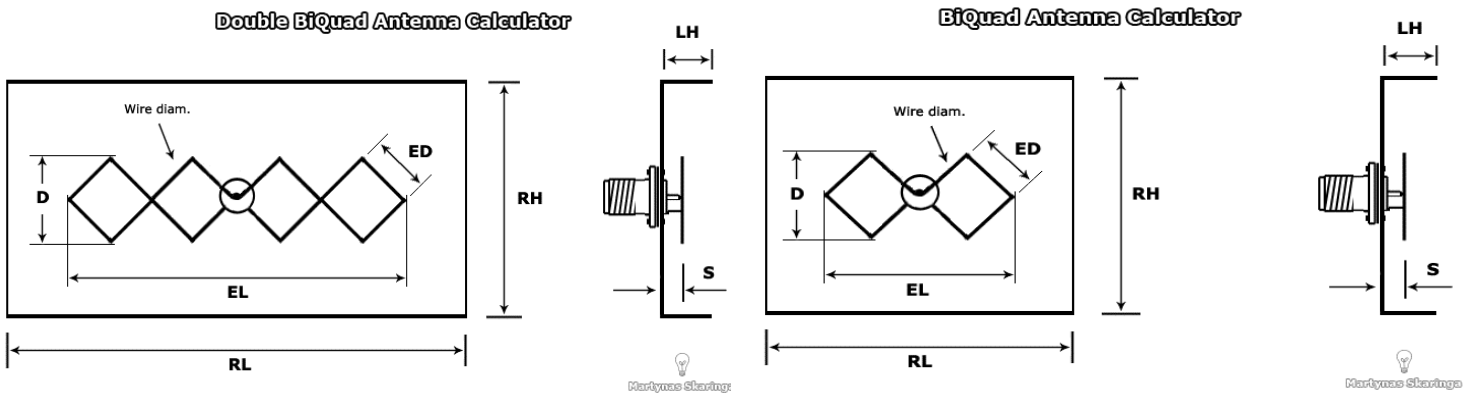
Various Construction Methods
https://buildyourownantenna.blogspot.com/2014/07/double-biquad-sector-antenna-for-2450-mhz-wifi.html
https://vk1nam.wordpress.com/2017/12/27/construction-of-a-23cm-1296-mhz-bi-quad-antenna/
http://www.iw0urg.it/index.php?option=com_content&view=article&id=155:antenna-biquad&catid=52:wi-fi&Itemid=174

The BiQuad antenna is easy to build, provides reliable gain and it has a very forgiving design. You can make quite a big margin of error in the construction and still get 10-11dBi gain.

Everyone seems to have their favorite construction methods and I am no exception. I use an aluminum plate with a N-connector in the center. For the section of transmission line between the N-connector and the driven element, I strip the braid from RG-8 coax and substitute a length of hobby brass tubing. One end of the tubing is flared with a tubing flaring tool for soldering to the N-Connector and at the other end I cut an 1/8" notch out, half way through the tubing so that the hot side of the driven element does not short out on the tubing. Next the RG-8 center conductor with insulation is soldered to the N-Connector center pin, then the flared end of the tubing is slid down to the connector body and soldered.

Unless you have three hands, soldering the driven element to the transmission line is a two-person job. Bend a couple of feet of #12 solid wire for 1270 MHz to the dimensions recommended in the Bi-Quad calculator. The common point of the two loops is soldered to the center conductor, with the two loose ends soldered on the back side of the brass tube. Surprisingly the driven element is rather stiff even without mechanical support on the ends. I contemplated adding some extra length to the two loose ends with an extra 90 degree bend and clamping them in place with a micro size hose clamp for ease of soldering. Finally, I put a coat of paint or epoxy over the driven element to protect it from tarnishing.

There are various construction methods. Some like to use a PCB for the back plane with .141 hard line soldered in place. Others solder a copper tube in place and slide a length of coax through that. Because copper and brass are pricey, a smaller square of copper or brass could be screwed into an aluminum plate. There are Bi-Quads, Double Bi-Quads, and several Bi-Quads with phasing harnesses. As long as the basic dimensions are adhered to, the result is a really nice broadband, directional antenna with roughly a 60 degree pattern.



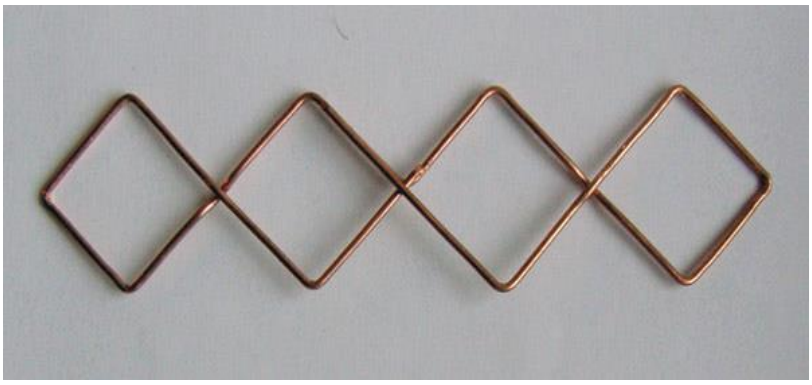
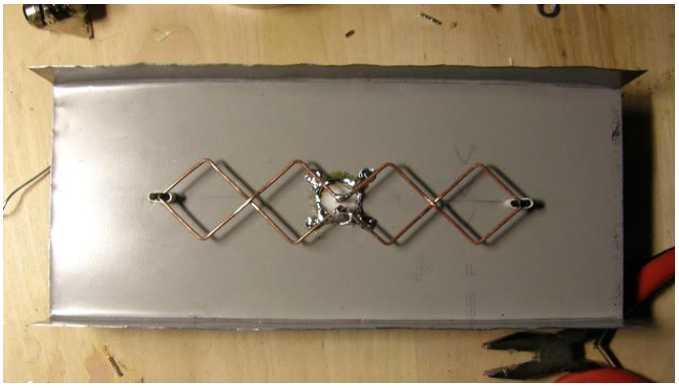
Parts Required

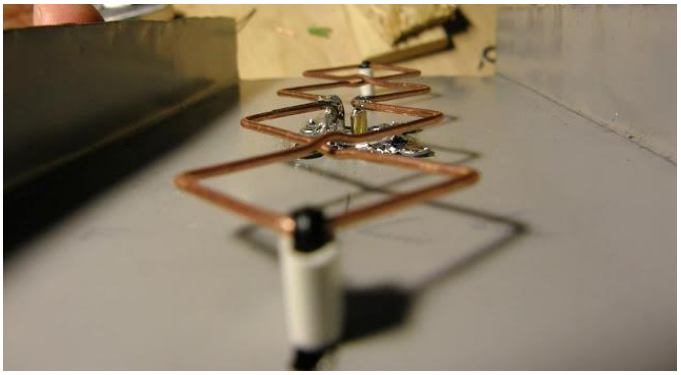
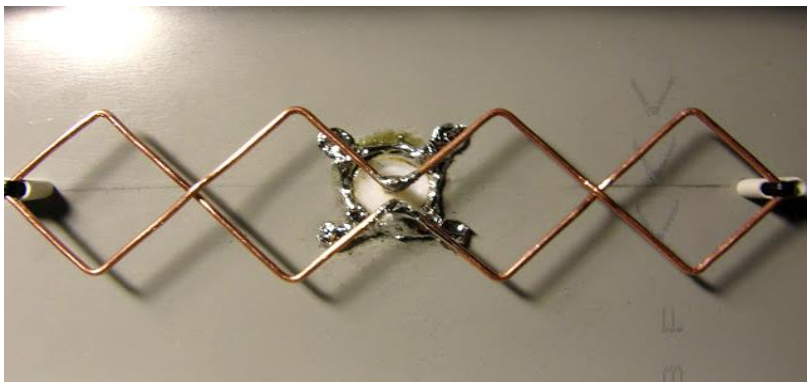
N-Type (female) panel mount connector
Reflector - Any metallic sheet like copper or Copper Plated Blank Circuit Board 1.6mm thickness
Cable - read this guide before doing anything else: Guide to Antenna Cables & Connectors
(Very important to choose proper cable! the longer the cable length, the more signal loss you'll have through the cable. Long cable will defeat the purpose of the antenna. Read the guide for more info.)
Copper wire for the element.
Spacers in each end of the element to hold its position and spacing correct height between the radiator and reflector. Spacers must be from any non-metallic material.

Building the antenna

I will not show you picture after the picture how to drill the hole in center of reflector. How to use ruler. How to do proper soldering. What kits to use and etc. There are plenty of tutorials for these steps: http://www.ziva-vatra.com/index.php?aid=16&id=SGFyZHdhcmU=, http://martybugs.net/wireless/biquad/ or http://martybugs.net/wireless/biquad/double.cgi
(Note: all calculations in links are for 2.4 GHz WiFi antenna. Use calculator calculated data and measurements for your antenna.)

Element Details ***Note: Pictures not to scale***


...Dennis Belles, WA7DRO

BUILDING FIBERGLASS RADOME FOR THE BiQUAD

Amateur radio operators build antennas, that's what we do, that's who we are. But what we don't do well is build weather covers for our engineering works of art. Most commercial antennas have a fiberglass or plastic cover protecting it from the elements and physical abuse.
Fiberglass has got to be one of the easiest and most fool proof mediums ever invented by man. It can be molded into any shape, is inexpensive, lasts for decades in open sunlight, is an insulator, transparent to RF and it's pretty close to impossible to do anything wrong. The only real limitation is the lack of imagination, and the only rules are...there are no rules. Whatever works!

Recently I built a couple of 23 cm Bi-Quad antennas for my new digital television modulator. Previously, watching my DIY 43 element copper Loop Yagi disintegrate over a couple of decades in the weather, I didn't want to repeat that with my new antennas. Wanting something a little nicer in appearance than Tupperware to protect my antennas, fiberglass came to mind.

For a quick and dirty fiberglass mold, I bought a white Melamine shelf from the local hardware store. I then sawed it up, screwed it together and radiused the seams with oil-based modeling clay. At first I rolled the clay into a 3/4" snake to radius the joints. For my second fiberglass weather cover I rolled the clay into a 1/4" snake for the joint radius. I finally concluded that simply stuffing the joints with mold release wax to keep the resin from seeping into the joints and bonding would produce the nicest corners for my radome. I chose 11-degree sides for appearance; this also makes removing the finished part from the mold easy. A small hole was drilled in the center of the mold and filled with clay so that the part could be blown out with compressed air but this was found to be unnecessary. The mold was waxed with solid automotive paste wax, so that the fiberglass wouldn't stick to the mold. Fiberglass thickness of 1/8" was more than ample and could be thinner. I simply took my mold to a high volume fiberglass shop and had them slip it into their production line. Our company manufactures fiberglass drift boats.

As I mentioned there are no rules. Instead of wood, the mold could have been made from foam or cardboard reinforced with sticks and hot glue, radiused with shipping tape rather than clay. Wax paper from the kitchen drawer could be laid in the mold as a parting agent. Bondo and waxed paper are a best mold making friends.

The aluminum Bi-Quad antenna reflector plate was seated in the radome leaving a ¼" fiberglass lip. I glued the aluminum plate in place using outdoor house caulk. For instant gratification one might tack the pieces together with hot glue then caulk over the hot glue for long term sunlight protection. Don't use any caulk the smells like vinegar, it will corrode everything inside of the radome. Drill a small vent hole in the bottom of the weather cover. Water gets into places that it can't get out of. With temperature and barometric pressure changes the fiberglass would otherwise puff out or suck in.

There are basically two types of fiberglass resin Epoxy and Polyester (boat resin), both work well. Epoxy is more expensive, stronger, smells less, and is mixed part A and part B. Polyester is cheaper, available at any hardware store, the odor is strong, and catalyst is purchased in a squirt bottle with about 2% being added to the Polyester resin. Both types work best between 40 degrees and 85 degrees Fahrenheit. On colder days a little more catalyst in the Polyester boat resin will help it cure faster. It's rather forgiving if you put in a bit too much, you just have to work faster to stay ahead of the resin.

There are a number of fiberglass cloth styles. There is 1-1/2 oz Mat which is a bunch of short fibers pressed together to form a cloth that can easily be torn by hand. This makes a good first layer called a "skin out", it also conforms to a tight radius and complex shapes. There is 6 oz woven boat cloth which is stronger than mat and also conforms to a tight radius. This is sufficient for the second and successive multiple layers in our application. However, if 6 oz boat cloth is all you can find... just go with that! Using mat by itself also works.

Fiberglass is messy to work with, a pair of thin disposable gloves come in handy. Use a throw away paint brush and small disposable paint roller. Saturate small convenient size pieces of fiberglass Mat cloth with liquid resin on a piece of cardboard. Next lift the saturated Mat from the cardboard into the mold, rolling and dabbing out the bubbles, making the seams lay down. About ten to twenty minutes later there is a small window of rubbery “trim time”. Somewhere between gooey and rock hard, the fiberglass can be trimmed with a sharp Xacto knife around the top edges of the mold. This is the first layer known as a “skin coat” or “skin out”. After the first layer is hard, hit it with sand paper to knock off the sharp points sticking up. For the second and successive layers put a piece of Mat on the cardboard (for a good bond to the hard first “skin out” layer) and a few layers of boat cloth over that. After rolling in the resin to your fiberglass sandwich, lift the multiple layers from the cardboard into the mold. Get all of the air bubbles out with the paint brush or roller. You can quit at any time and continue another day. To avoid grinding hard spiny cloth edges tomorrow, rip a narrow strip of mat, laying it on the seams to hold them down, then dab the mat strip with your paint brush. One eighth inch, or thinner is about right for your finished part. Instead of mixing a large batch of resin and having it get hard on you, mix a series of small batches working at a leisurely pace. Rather than trying to wrestle with a large piece of cloth, work with small convenient cloth sizes overlapping them. After removing the part from the mold, it can be used with its natural finish or the wax can be ground off for painting.

If you need a flat fiberglass plate for a fabrication project, you can wet out the appropriate numbers of cloth layers on glass, glazed tile, or wax paper. The next day the fiberglass plate will easily peel off. If one needs a fiberglass putty it is commercially available or made by mixing resin and powder... even sawdust results in a course putty.

On slippery Melamine, solid automotive paste wax is sufficient, but on other more porous surfaces a thin layer of water soluble, Poly Vinyl Alcohol (PVA) is sprayed into the mold over the mold release wax for additional anti-sticking protection. YouTube is an excellent source for learning cheap and dirty shortcuts for working with fiberglass and fiberglass mold making.
Wear safety goggles. Work in a well-ventilated space, preferably outside. I put my dish of extra, unused, catalyzed resin out in the driveway to smoke away from the chemical heat generated. Waste acetone solvent if left outside in an open container will evaporate in a few days.
…Dennis Belles WA7DRO

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.

06/06/2020 | FCARC Summer Hamfest

Location: Wauseon, OH
Type: ARRL Hamfest
Sponsor: Fulton County Amateur Radio Club
Website: http://k8bxq.org/hamfest

07/19/2020 | Van Wert Hamfest

Location: Van Wert, OH
Type: ARRL Hamfest
Sponsor: Van wert Amateur Radio Club
Website: http://w8fy.org

08/01/2020 | 2020 Columbus, Oh Hamfest

Location: Grove City, OH
Type: ARRL Hamfest
Sponsor: Voice of Aladdin/ Audio Unit of Aladdin Shrine
Website: http://columbushamfest.com

12/07/2019 | Fulton County ARC Winterfest

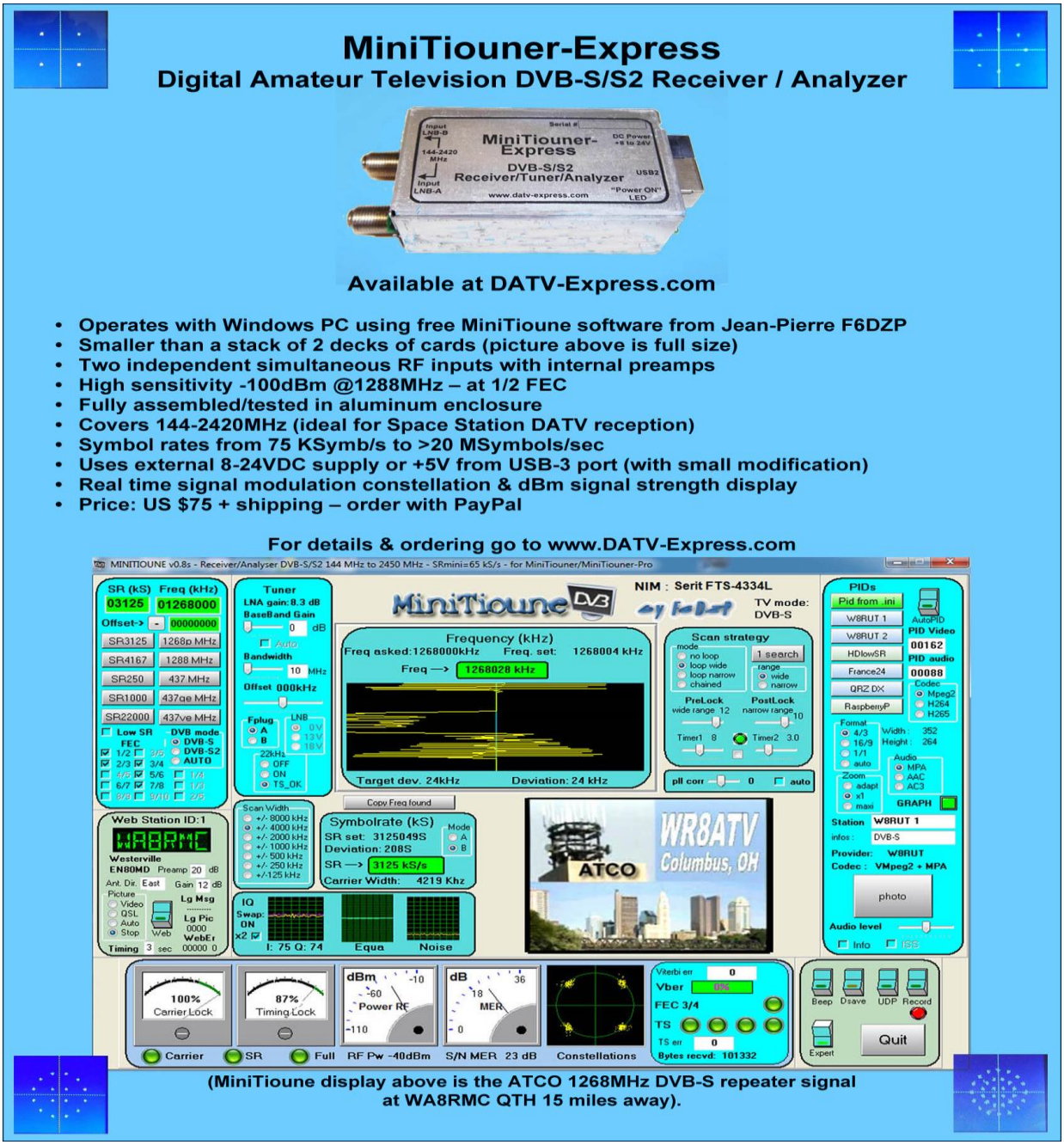
Location: Delta, OH
Type: ARRL Hamfest
Sponsor: Fulton County Amateur Radio Club
Website: http://k8bxq.org/hamfest

TUESDAY NITE NET ON 147.48 MHz SIMPLEX

Every Tuesday night @ 9:00PM 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 (01/20/20)	$ 3779.66
Receipts (dues)	$ 20.00
Bank fee	$ (12.00)
PayPal fees	$ (1.18)
CLOSING BALANCE (05/20/20)	$ 3786.48



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 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 inputs..

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 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)**
	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 April 2020

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	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	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.