ATCO NEWSLETTER

VOLUME 34 NUMBER 1 **January 2017**

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

ATCO SPOTLIGHT TOPIC

Here's a cartoon that was sent to me some time ago. Source is unknown. Enjoy!

ACTIVITIES ... from my Workbench

Hello again guys. Let's see, what shall I start out with this time? Weather? No, you can just look out the window. Antennas? No, it's too cold to think about that. How about talk about cutting the grass? NO!!!... Now that's getting downright silly. Art, get back down to earth and say something even slightly intelligent. I don't seem to be able do that either but here goes….

Concerning the repeater, the DVB-T digital signal stopped working recently. When I went there to investigate, I found a blown line fuse. That can never be good as chances of fixing it on the spot usually cannot be done. A close inspection of the fuse showed that it blew because of an overload and not a short circuit. How do I know this by inspecting the fuse you ask? Well, a short will vaporize the internal element. An overload will only part the element leaving the internal wire intact. See, I really **can** say something intelligent at times but I digress. Deciding I can't fix it there, I removed it and took it to Dale, WB8CJW, who is our DVB-T/DVB-S expert. His inspection revealed the power supply had overheated because of a failed fan. I took the supply home to inspect it further and (quickly?) determined after replacing most all of the electrolytic capacitors which all had severely reduced capacitance, it was a lost cause. One cap. was completely open. **Switching supplies are very difficult to repair!** Therefore, I purchased a new one from Jameco. I should have done that from the start seeing how much time I spent replacing the caps. but I gave it a shot!

After installing a new supply, I reworked some of the wiring and installed two small fans in the front panel blowing inward. That way the air moves in the front and out the back in a direct stream across the transmitter heat sink with no direct interference. Also, now the fan blades are clearly visible from the front upon site inspection instead of being hidden inside where it can't be seen. A reinstallation proved that everything is back to normal. Power output is about 20 watts (true power) with sideband regrowth down about 30dB from the peak of the haystack signal. That's about as good as can be achieved at this power level with amateur equipment. VSWR is close to 1:1 so I looked for the next thing that needed attention.

The second channel of the DVB-S 1268MHz transmitter hasn't been working for some time now. I fixed it once before by wiggling the ribbon cable connecting the second channel encoder board but that only worked for a few days. I tried it again among other things with no success this time so it looks like a "shop job" again. No time to pull it out and take it home now so I left it as is for the time being. Time was running short because my wife had dinner nearly done and I was anxious to return home. It'll be something to tackle on my next trip.

On the home front, I'm working on some improvements to my Vmix software program to multiplex video sources. That's a real neat free program if you have a reasonably fast PC running at least Windows 7. Check out the article in this Newsletter for details. There is a rather sharp learning curve using the program but if I can do it, anyone can. The free version can accept up to 4 video sources and can output streaming video to the internet as well as USB data to my DATV-Express board. I still need to finish my 1280MHz power amp to mate to the output of the Express so I can export a DVB-S signal to the ATCO repeater during NET nights. I'm working on it but so far, too many projects are getting in the way.

That's all for now, guys. I have to get parts ordered for the next production run of Express boards and work on our next Express board developments. Stay tuned!

73,
…WA8RMC

ATCO DUES PAYMENT CHANGE

I want to personally apologize for the way we have handled the ATCO dues in the past. Money issues are sensitive so I've been quite concerned about our record keeping accuracy. I've always given the benefit of any doubt to the member but it is very clear that it is not enough. Since the beginning, we have collected dues on a January to January basis. While that may seem like a simple way to do it, it has complicating issues. Most important moving forward is the need to automate our process and have a single point of record keeping. So, Bob volunteered to do just that. I now believe we are on the right track…WA8RMC

Bob explains the new system as follows:

In order to make it easier for our members to know when their membership is expiring, a new version of the dues software has been implemented. Forget what you knew about how dues were determined in the past. We won't try to explain that. Here is the way the dues will be handled from now on.

There are still four ways for you to pay your dues:

1. Give cash or check to Art or myself.
2. Mail a check to me (N8NT) at 3569 Oarlock CT, Hilliard OH 43026
3. Pay your dues online using PayPal
4. Pay your dues at one of the ATCO events (cash or check)

In all cases once the dues are posted to the account your dues will be good for one year (365 days) – it will expire one year from the time we post it or the computer posts it to the account.

Here are some possible scenarios:

1. If your membership is expired and you pay your dues on any day after the expiration date your membership will expire 365 days after your dues post to our database.
2. If you choose to pay for more than one year, then your expiration date will be based on 365 days per every $10 you give us. So, if you send me $30 on February 19th 2017 your membership will expire on February 19th 2020.
3. If you paid last year (2016) on May 5th, your expiration date is May 5th 2017. If you pay before your expiration date, then your new expiration date will be the next year on the same month and day your current membership expires. For example, in this case, if you pay another $10 on Feb 10th, then your new expiration date would be May 5th 2018.

The website will now monitor all membership expiration dates and will send out an Email to each member whose membership has one month left – Email will be sent once a week for 4 weeks prior to the expiration date. If you fail to renew by the expiration date your membership will go into a lapsed status. If that happens we'll no longer send Emails but you can renew by sending in your dues at any time.

If you send us dues for more than one year, we'll assume you are paying for dues. If you want to send a donation along with your dues (say, $10 for dues and $10 for donation) please let us know. We can put donations into a separate account area.

You may check the status of your membership at any time by logging onto the website and clicking on the Members tab, then select My Account. A list of all of your payments that we know about will be shown to you. If paying by PayPal, you will see a PayPal ID in the notes.

The Emailing of the membership status is not officially done yet, but will be done by the time you get the next Newsletter (April) or earlier.

If we do not have an Email for you, then Art will get in touch with you. He and I will both get copies of the Email sent to members whose memberships are expiring.

If anyone has questions or concerns about the new system, email Art or myself.
…Bob N8NT

ATCO 2016 FALL EVENT – OCT. 30, 2016

Art, WA8RMC, started off the afternoon by inviting everyone to partake lunch provided by the Club. As usual, thanks to Art for picking up the food (and picking it out!). The food was well received and there was plenty for everyone in attendance.

After lunch, Art continued by thanking all for attending, and recognition of Ken, W8RUT, for use of the facility; Dale, WB8CJW, for taking care of the Bulletin Board and Bob, N8NT, for taking care of the treasury. Members in attendance called for recognition of Art, WA8RMC, for taking care of the repeater. In all, there were 18 in attendance.

Art asked if anyone was interested in becoming an officer. No one offered to run and a motion was made by Roger, WB8DZW, to retain the present officers. This was passed by voice vote of the membership, with no dissentions. Stan, AA8XA, volunteered to be the statutory agent, since the present agent has not been active recently in the club. Bob took care of accepting dues from those who brought them to the meeting. Ken, W8RUT, then spoke to the club, accompanied by a Power Point presentation:

- First part of Ken's presentation spoke of ATCO accomplishments, discussion of need for new officers, bringing in new members, and increased activity. Further discussed was challenges for ATCO, next steps to take, and recommendation to form a small team of club volunteers to stimulate discussion on what the future holds for the club.
- Second area of Ken's presentation, with possible tie-in to parts of the first, was about Ham MESH radio. He discussed a little of the equipment required, a few technical details of mesh (2.4 GHz, IP-based, channelized operation), and what the current level of activity was in the Columbus/Delaware area, and the type of Amateur activities with MESH that they were supporting for government agencies.
- There was some discussion of some of the ideas that Ken had presented.
- Ken took questions with more detail after the meeting with individuals that were interested, as well.

Some discussion that took place after Ken's presentation included having a pizza party sometime. Troy, AC8XP, volunteered to organize one. After discussion ended, it was time for door prizes. Drawing for tickets was made and the winners were able to pick from an assortment of equipment or components up for grabs – thanks to everyone who donated prizes to the club!

73,
Mark Cring, N8COO
ATCO Club secretary.

ILLEGAL DRONE TRANSMITTER INTERFERENCE

From ARRL Headquarters Newington CT January 12, 2017
ARLB003 Illegal Drone Transmitters Could Interfere with Air Traffic Control, ARRL Complaint Asserts.

In what it calls an "extremely urgent complaint" to the FCC, ARRL has targeted the interference potential of a series of audio/video transmitters used on unmanned aircraft and marketed as Amateur Radio equipment. In a January 10 letter to the FCC Spectrum Enforcement Division, ARRL General Counsel Chris Imlay, W3KD, said the transmitters use frequencies intended for navigational aids, air traffic control radar, air route surveillance radars, and global positioning systems.

"This is, in ARRL's view, a potentially very serious interference problem, and it is respectfully requested that the products referenced...be investigated and removed from the marketplace immediately and that the importers be subjected to normal sanctions," ARRL's letter said. Some of the transmitters operate on frequencies between 1010 and 1280 MHz. "These video transmitters are being marketed ostensibly as Amateur Radio equipment," the League said, "but of the listed frequencies on which the devices operate, only one, 1280 MHz, would be within the Amateur Radio allocation at 1240-1300 MHz." Even then, ARRL said, operation there would conflict with a channel used for radio location.

ARRL said the use of 1040 and 1080 MHz, which would directly conflict with air traffic control transponder frequencies, represented the greatest threat to the safety of flight. The use of 1010 MHz, employed for aeronautical guidance, could also be problematic.

ARRL cited the Lawmate transmitter and companion 6 W amplifier as examples of problematic devices being marketed in the US. Each cost less than $100 via the Internet. The device carries no FCC identification number.

"The target market for these devices is the drone hobbyist, not licensed radio amateurs. The device, due to the channel configuration, has no valid Amateur Radio application," ARRL told the FCC. "While these transmitters are marked as appropriate for amateur use, they cannot be used legally for Amateur Radio communications." In the hands of unlicensed individuals, the transmitters could also cause interference to Amateur Radio communication in the 1.2 GHz band, ARRL contended.

The League said it's obvious that the devices at issue lack proper FCC equipment authorization under FCC Part 15 rules, which require such low-power intentional radiators to be certified.

"Of most concern is the capability of the devices to cripple the operation of the [air traffic control] secondary target/transponder systems," ARRL said. "These illegal transmitters represent a significant hazard to public safety in general and the safety of flight specifically."

The surge in sales of drones has been dramatic. The FAA has predicted that combined commercial and hobby sales will increase from 2.5 million in 2016 to 7 million by 2020.

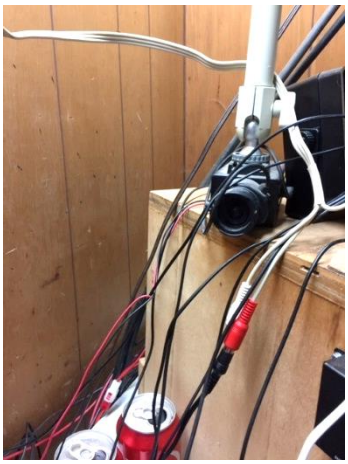
In Exhibit A of the January 10 letter, "Illegal Drones Threaten Public Safety," the League noted that some of the drones and associated equipment it has come across "are blatantly illegal at multiple levels," with some drone TV transmitters described as "particularly alarming."

"Rated at 6 times over the legal power limit, and on critical air navigation transponder frequencies, these devices represent a real and dangerous threat to the safety of flight, especially when operated from a drone platform that can be hundreds of feet in the air," the exhibit narrative asserted.

W8RWR's VIDEO CAMERA COLLECTION

I believe Bob has more cameras than anyone else in ATCO. It seems he is playing with another one each time he displays video on the Tuesday night net. The cameras below represent, what I believe, is only a small collection of the ones he really has. Perhaps the remainder are inoperative but he always seems to come up with another to show us one each time we meet. Good work Bob. There are still a few of us actively playing with their Ham equipment. The 4 cameras below were part of the quad display he showed us recently.

(Bob, you still need to get rid of those pop cans!)




MORE CAMERA PICTURES

In response to my comment on the NET the other night about Bob with all of his cameras, Gary sent me pictures of his prized collection. Thanks Gary. Now, are there any more people out there that would like to share their camera collection with us? How about the oldest operational camera? Who has the oldest one that is still operational? Send the pictures in!
Gary writes,

Hi Art,
On your ATV net the other night you asked that if anyone had a camera collection to send you the pictures for the newsletter.
I thought I'd send you the pictures of my 1979 Sony DXC-1610 camera, still works like a charm but getting heavier as I get older!
I'm not in the group but enjoyed the net.
73,
Gary – KB9VGD
Burlington, WI.

Gary, consider joining us. It only costs $10 per year and you get the Newsletters as a bonus!
…Art



HAMVENTION READY TO DEAL WITH ANTICIPATED TRAFFIC FLOW

Hamvention® is ready to deal with the anticipated heavy traffic flow when the event opens on May 19 at its new location, the Greene County Fairgrounds and Expo Center in Xenia, Ohio. Mike Kalter, W8CI, said the all-volunteer Hamvention organizers have turned to professionals to address this aspect of the event. Kalter, who is treasurer of the sponsoring Dayton Amateur Radio Association (DARA), was interviewed last week by DX Engineering's Tim Duffy, K3LR.

"We recognized that we needed to reach out to a professional engineering firm that does this all over the country to help us to work with the local government officials, so that we can have a good solid plan to keep the people flowing in," Kalter told Duffy.

An aerial view of the Greene County Fairgrounds and Expo Center, the new home of Hamvention. [Greg Ordy, W8WWV, image]

Kalter said arrangements have been made to have staging areas for those needing to either offload or load equipment from the indoor exhibit areas or the flea market.

He also pointed out that on-site parking would be free, and that no one will have to park in the mud. Kalter said areas set aside for parking are well drained, and he doesn't anticipate any problems, even if it rains during Hamvention. That goes for the flea market area as well, he said, noting that the arena infield area is used for events in good and bad weather alike.

Kalter said Hamvention expects to be able to post the plan for flea market spaces on its website soon. The layout for indoor vendor and exhibitor booths is already available on the Hamvention website. Kalter said that if everyone who attended Hamvention 2016 at Hara Arena shows up again this year, they will find plenty of room at the new venue. Maps are available on the website.

Turning to traffic of a different sort, Kalter noted that Greene County has brought in a high-speed Internet "pipe" to the new venue, and that AT&T will drop telephone lines wherever they're needed.

DARA Board member Mike Kalter, W8CI, spoke recently with DX Engineering's Tim Duffy, K3LR.

Kalter said there will be plenty of picnic tables as well as a temporary structure dedicated for socializing. He also promised that Hamvention 2017 will offer "a wide variety of great things to eat." That will include food vendors and food trucks.

Kalter said it takes some 600 volunteers to make Hamvention happen each year, and the leadership team consists of 86 individuals.

Reflecting its new venue, "Hamvention -- Same Friends, New Home" will be the theme for the 2017 event. Last summer's closure of Hara Arena forced the move to the new location more than 20 miles to the southeast.

The price of admission to Hamvention has gone up slightly; tickets will now cost $22 for all 3 days ($27 at the door). Accompanied minors age 12 or younger may attend free. Online ordering is not yet available, but those planning to attend can order tickets by mail. Hamvention, which runs from Friday, May 19, until Sunday, May 21, is expected to attract upward of 25,000 people to the greater Dayton area. Visit the Hamvention website or e-mail for more information.

DATV-EXPRESS PCB PROGRESS

During the month of November, the DATV-Express project team made the decision to build another batch of hardware boards. The project team was flooded with standby orders and as of now have new orders from all over the world totaling about 50 boards.

Art WA8RMC has ordered forty-eight blank PCB boards and has ordered all of the electronic components for delivery scheduled in early December. If events go according to plan, Art will receive the first assembled boards around Dec 17 and begin testing. His goal is to then turn on the PayPal coding to again allow “real ordering” for the standby hams and to be able to ship completed assembled boards by the end of December.

Ken W6HHC continued to do testing of the experimental set of coding for DVBT protocol (2 MHz and 1 MHz channel bandwidths only) that was included in the release of v1.23 software.

It appears that the DVB-T receivers for 2 MHz channel bandwidths are available from HiDes. Ken ordered a HiDes model UT100B Tx/Rx USB unit and after some initial problems installing the BDA Viewer software, he was able to download a newer v2.4.9.2 BDA Viewer plus receiver code from HiDes support that worked on Windows 10.

Charles G4GUO had reported some difficulties testing DVB-T to a UT100B receiver. Only one of his three 64bit computers running Express_ DVB Transmitter software would allow the UT100B to lock on his signal.

Charles believes the DVB-T software is running close to the limit of the USB2 real world throughput limits and the software requires a fast and well-designed PC for the DVB-T transmissions to be received without problems.

After resolving the HiDes issues with the upgraded software, Ken was able to have the BDA_Viewer_plus receiver lock onto the 434.000 MHz DVB-T transmission with BW=2.0 MHz on the very first test. The Windows10 computer Ken was using was a fairly new 64bit DELL i7 CPU notebook. More receiver testing of DVB-T protocol to follow. (img,, alt: update1 src: ../Images/update1.jpg)

The HiDes UT100B receiver immediately locked onto the DATV-Express experimental DVB-T signal on 434.000 MHz using BW=2.0MHz FEC=3/4 SR=2.2MSymb/sec and QPSK modulation. Charles G4GUO has reported that he received a LimeSDR Tx/Rx board, but is having some driver problems installing on Windows10.

His first commitment is to prototype RF Channel simulation functions for testing receivers at microwave frequencies. This will be a difficult first project on LimeSDR board since simulating multiple reflections of the received signals quickly doubles and even x12 the size of the code and data handling needed in the FPGA.

After prototyping the channel simulator project, Charles will turn his attention to porting the DATV-Express software over to the LimeSDR hardware board. Initial alpha testing of this DATV-Express/ LimeSDR software is not expected before maybe June 2017.
… Ken W6HHC

BOB TRAVELS TO W1AW

While Bob, W8RWR, was participating in the safety aspects of the Boston Marathon, he and fellow Hams stopped by at the W1AW headquarters to check out their equipment. It looks like Bob is having fun checking out some rare DX station.

NEW IDEAS FOR HAMTV

The ARISS meeting minutes for August 16, 2016 cover the discussion about using a Raspberry Pi computer board to generate video to feed the ISS Digital ATV transmitter. An idea was proposed by JeanPierre Courjaud F6DZP for using Raspberry Pi at the transmitting ground stations for generating a H264 video stream that modulates a DVBS orDVB52 carrier. His report was distributed to the ARISS team on August 12, 2016.

Discussion: JeanPierre Courjaud had brought this idea to a Ham TV Technical (HTT) meeting for using Raspberry Pi to generate a H264 video stream. Raspberry Pi is used in the United Kingdom for DATV on 2 meters.

Gaston Bertels ON4WF termed this a cost effective solution, probably easy to work on, many people and schools would be able to receive video from the ISS, and he inquired if this idea was proposed for the Paolo Nespoli IZ0JPA flight next year.

JeanPierre Courjaud related that Paolo Nespoli had asked about it, and the team hopes he could use it if the idea is presented for review to the ARISS International Technical Evaluation & Support Committee and approved by ARISS Delegates.

JeanPierre Courjaud explained that Raspberry Pi could be a solution for two things: first, the webcam could be used instead of the onboard ISS camera, and second, signals received by schools could be transmitted back to the crew.

Frank Bauer KA3HDO felt the astronauts would like this.

Dave Taylor W8AAS asked about the type of receiver schools would need and how signals would be uplinked.

JeanPierre Courjaud clarified that schools would have a narrowband ATV receiver that uses a USB dongle; this would bring the signal to the Surface Pro computer that Paolo Nespoli plans to fly on ISS, and modified Minitutioune software would decode the uplink signal received from the Lband antenna.

Dave Taylor inquired what new hardware would have to be tested and certified for flight.

JeanPierre Courjaud said that Nespoli plans to take the Surface Pro, and to be tested and launched would be the USB interface that would work with the Lband antenna and serve as an Lband receiver with the Surface Pro.

During Nespoli's mission the Minitutioune software could be uploaded to his Surface Pro. Oliver Amend DG6BCE planned to share the meeting discussion with Emanuele D'Andria I0ELE and ask him and the committee, because the project originated with AMSAT Italia, to give the plan, including what must be tested and launched, to Mark Steiner K3MS, chair of the ARISS International Technical Evaluation & Support Committee.

Read the full ARISS Meeting Minutes August 16, 2016 at http://www.ariss.org/meetingminutes/ *August2016*

USING vMix SOFTWARE WITH DIGITAL ATV

Reproduced from the Orange County Amateur Radio Club newsletter. www.W6ZE.org
Contact Info – the author may be contacted at W6HHC@ARRL.net

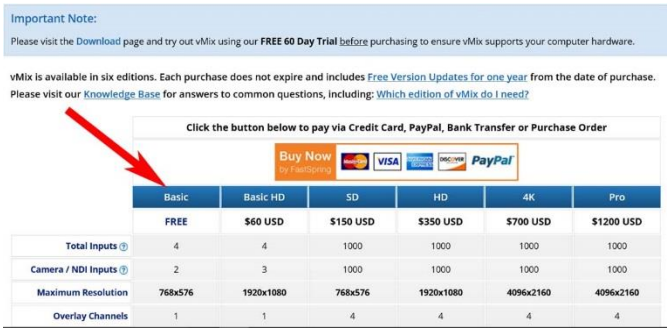
The vMix software is a good companion software application program that allows the user to switch and mix between different cameras/video-files and also do special video-effects, including "green screen". It works well with ham radio Digital-ATV (DATV) activities. Perhaps the best part is that the entry-level software package, called **vMix Basic**, is free to download for SDTV format video (Standard Definition) from vMix.com.

This is NOT a tutorial on how to use vMix (there are tons of tutorial-videos on YouTube to walk you through the steps)…but rather is an overview of the many concepts that vMix brings to the user. This article is written from my experience with the DATV-Express DATV transmitter product, but is also applicable to other ham radio DATV product lines that are compatible with vMix.

Which vMix Product to Get?
vMix Basic is a free video-mixer-editor software package for SDTV format video (Standard Definition) that is available from vMix.com. There are more-professional HDTV products that are available for sale, including the vMix Basic HD for US$60. See **Figure01** for array of vMix products. The download you want is currently called vMix 17

The free video-editing software allows you to:
1) support one or two USB-cameras
2) use a JPEG file as a "Test Pattern" video source
3) switching between the two video sources (see Figure 02)
4) adding a better-looking call-letters-overlay
5) try "green-screen" video tricks.

Figure 01 – The array of vMix products – including free vMix BASIC



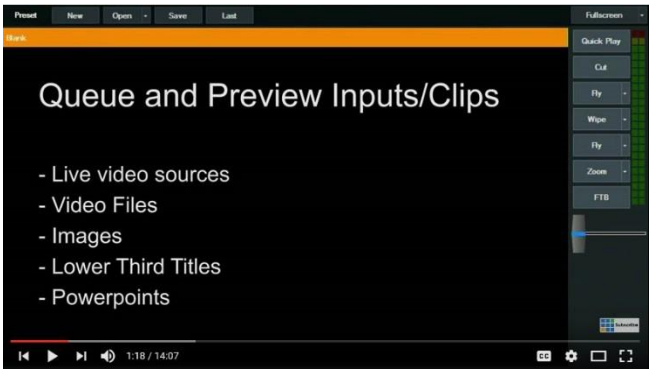
The vMix Main Screen
The screen-capture in **Figure02** shows the normal screen to operate vMix. The large window in the upper left is called the Preview Window. The large window in the upper right is called the Live Video Window.

Figure 02 - An example of vMix Basic video Main Screen with one camera (in Preview) and a "Test Pattern" JPEG (in Live Window)

The two smaller screens in the lower left are where you bring in new cameras and video to look at…and then select for Preview. The free **vMix Basic** only allows four video sources to be viewed in the lower-left. More-professional products available for sale can allow more video sources to be viewed here.

vMix Preview Window
The Preview Window allows you to queue up a number of video sources and have the next selected video ready to become "Live" at the push of a button. What can be selected for display here are cameras, video files, JPEGs, and PowerPoint slides for a slideshow video stream.

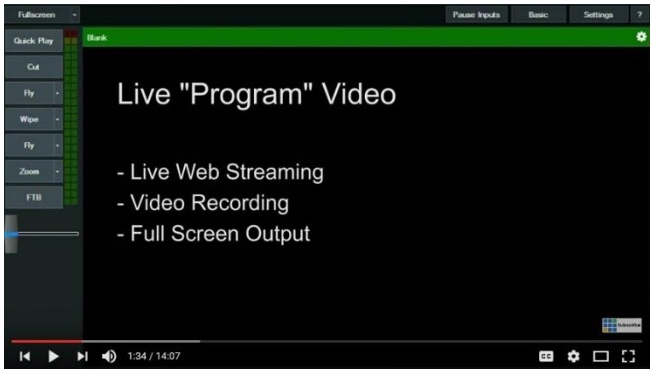
Figure 03 – Main capabilities of the Preview Window



You will be able to switch from "Preview" to "Live" by clicking a single button.

vMix Live Program Video Window
The Live Video Window displays the actual video that you have chosen to transmit or stream out.

Figure 04 – Main capabilities of the Live Program Video Window



vMix Input Selection List
When setting up a Preview Window for the correct camera and microphone, the user just presses the **ADD INPUT** button in the lower left corner of the Main Screen. A long list of choices for video sources and audio sources will appear as shown in Figure 05.

Figure 05 – List of input sources available to be selected by DATV users.

Here is a partial list of inputs to vMix that can be selected:

- Video files
- DVD
- Cameras
- NDI allows Skype as input
- JPEG file (as Test Pattern, etc.)
- A slideshow of JPEG files
- Audio files
- Microphones
- Adding Title overlays
- Your web browser

One important concept about configuring your camera in vMix is selecting the correct frame rate. The selected framerate for vMix is **ALWAYS** set to equal the framerate being output from the camera…NOT what you want to transmit via DATV. The vMix tutorials on YouTube spend a lot of effort to explain:

- PAL = 25p (progressive output fps)
- PAL = 50i (interlaced output fps)
- NTSC = 29.9p (progressive output fps)
- NTSC = 59.9i (interlaced output fps)

vMix Titles
vMix has the ability to allow you add a "title overlay" to your video. I personally do NOT like this feature very much, because it takes up too much room on the screen and is too fancy for my style.

Figure 06 – Using the vMix Titles feature to overlay your transmitted video stream

Green Screen Effects

A neat feature of vMix is to create "green screen" tricks to combine a live camera shot (perhaps a talking presenter in the studio) with a video clip of a faraway place. As shown in Figure 07. There are three parts:

- The studio camera video presenter in front of an actual green sheet (Fig07a)
- Using vMix to make the green sheet become transparent, leaving only the studio presenter remaining (Fig07b)
- Combining the transparent studio video with a video file (Fig07c)

Conclusion

The vMix function makes a good companion software package for Digital-ATV. The cost of the entry level **vMix Basic** product (SDTV) is free. The cost of the **vMix Basic HD** product (HDTV) is reasonable at US$60. vMix is very useful if you have more than one video camera being used for DATV transmissions. Or if you use one camera and want to switch to a Test Pattern sometimes or switch to a slideshow sometimes. vMix is a much better product than an old EMPREX model BMP-001 media box for producing DATV slideshows/test-patterns from JPEGs.

Fig 07a – live camera video of presenter in front of green sheet

Fig 07b – live camera video with green color made transparent

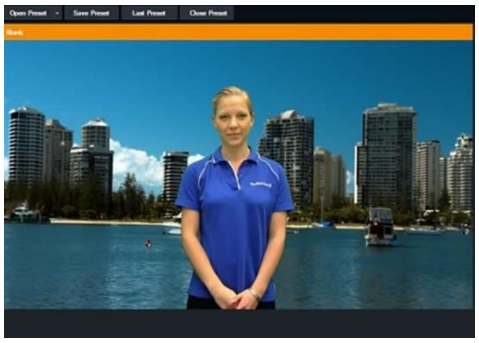


Fig 07c – live camera video with transparency over-laid on a separate video stream

Useful URLS

- vMix Product descriptions, prices and downloads – see **www.vMix.com**
- vMix tutorials (including YouTube) on how to use features
  – see **https://www.youtube.com/watch?v=ESWTcbtWq7U&list=PLrm0RX9U0Mzxg-uJeE5Em3DAsgBHHaY8P**
  – see **http://www.vmix.com/support/training-videos.aspx**
- British ATV Club - Digital Forum – see www.**BATC.org.UK/forum/**
- CQ-DATV online (free monthly) e-magazine – see **www.CQ-DATV.mobi**
- Orange County ARC entire series of newsletter DATV articles and DATV presentations
  – see **www.W6ZE.org/DATV/**

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

CONSTRUCTION ARTICLE INDEX

The following list is an index of all construction related material that has appeared in the ATCO Newsletter since its inception in the early '80's. This is a handy reference for that particular construction article that you knew existed but didn't want to wade through each issue to find it. All Newsletters below are also listed in order in the ATCO homepage under "Newsletters".CTRL Click on www.atco.tv. Once you locate the Newsletter section, the displayed list can then be re-sorted as needed by clicking on the "date" in the header.

…Bob N8OCQ

Issue	Page(s)	Article
Vol 1 I		(Missing Newsletter)
Vol 1 II	5	439 Beam
Vol 2 I	4	439 Beam
Vol 2 II	8,9	439 Parabolic Ant
Vol 2 II	9	Video Modulator
Vol 2 III	7	1296 Ant 45 Ele loop yagi
Vol 2 III	10	RF Power Indicator (in-line) for 1296 MHZ
Vol 2 SE	2,3	Diode Multiplier for 23 CM
Vol 2 SE	4,5	1296 MHZ 10 Watt Solid State Linear Amp
Vol 4 I	3	RF/Video Line Sampler
Vol 4 II	3	P-Unit Meter
Vol 4 II	7,10,11	UHF Gated Noise Source
Vol 4 II	12	420 – 450 Broom Handle Rhombic Ant
Vol 4 III	4,8	25 Element 1.26 Loop Yagi
Vol 4 IIII	6	Video Modulator (Tube Type)
Vol 5 I	3	Video Modulator One Transistor
Vol 5 II	4,7	900 MHZ Yagi Ant
Vol 5 II	6	Video Modulator for 2C39 Final
Vol 5 III	3	440 MHZ Hidden Transmitter Finder
Vol 6 I	3	Video Line Amp
Vol 6 I	8	25 Ele 910 MHz Loop Yagi
Vol 6 II	4,6,7	Microwave Oven ATV Xmiter
Vol 6 II	5	Matching a Quad Driven Ele
Vol 6 II	8	Power Divider for 33CM
Vol 9 IIII	5,7	16 Ele Loop Yagi for 439.25 MHz
Vol 10		No Articles
Vol 11 II	4,5,6	439 48 Ele Collinear Ant
Vol 11 IIII	7	1280 MHZ Cavity Filter
Vol 12 I	6,7,8	439 & 1200 Horz Polarized Mobile Ant
Vol 12 II	5,6,7	ATV Line Sampler
Vol 12 II	10	439 & 1280 Interdigital Filter(s)
Vol 12 III	6,7,8	439 Cheap Attic Ant
Vol 13 I	9, 10	High Level Modulator for ATV
Vol 13 II	5	VGA to NTSC Converter for Computer
Vol 13 III	9, 10	AM Video Modulator
Vol 13 IIII	4	1200 MHZ Transistor Linear Amp
Vol 13 IIII	6	900 & 1200 MHz Loop Yagis
Vol 14 IIII	8	439 31 EleYagi
Vol 14 IIII	12, 13	1250 MHZ FM ATV 3 Watt Xmiter
Vol 15 I	16	427.25 Horz J-Pole Ant
Vol 15 II	14	2400 MHZ Loop Yagi
Vol 15 III	8	Wavecom Modification
Vol 15 III	12,13,14	2.4 Gig Antenna's
Vol 16 II	20	2.4 Gig Helix Ant
Vol 16 IIII	4	1280 MHZ Loop Yagi
Vol 17 I	14, 15	Video Amp (Multi Output)
Vol 18		No Articles
Vol 19 IIII	4	Pwr Supply for 28 Volt Ant Relay
Vol 20 III	9, 10	Video Sampler
Vol 21 I	4	RF Pwr Amp for 900/1200 MHZ
Vol 21 II	14	10-14 Volt Doubler for 28 Volt Ant Relays
Vol 21 III	5	S-Video To Composite Adaptor
Vol 21 IIII	3,4	Video Noise Rejection Amp
Vol 21 IIII	14,15,16,17	"S" Meter For Comtech Boards
Vol 22 I		No Articles
Vol 22 II	10	1260 MHZ Cavity Filter
Vol 22 III		No Articles
Vol 22 IIII		No Articles
Vol 23 I		No Articles
Vol 23 II	5,6	Linear 60 Watt For 70CM
Vol 23 II	8,9	Video Modulator Update
Vol 23 III		No Articles
Vol 23 IIII		No Articles
Vol 24 I	13	RF Sniffer For 2.4 GIG
Vol 24 II		No Articles
Vol 24 III	3	Quantum 1500 Rec Tuner Mod
Vol 24 IIII	9	Battery Recharge Ckt
Vol 25 I		No Articles
Vol 25 II	6,7	Comtech TX Module Improvement
Vol 25 III	11	Comtech TX Module Improvement Correction
Vol 26 I	6	Isolator (Circulator) Mod. 850 To 1260 MHz
Vol 26 II	5,6	Comtech 1200 MHz rec. module improvements
Vol 26 III		No Articles
Vol 26 IIII	9	Remote Touch Tone Decoder For Your Shack
Vol 27 I	10	ATV Low Pass Filter (427 Mhz)
Vol 27 II	15	PictureTel Camera Data Cable Wiring
Vol 27 II	10	ATV Low Pass Filter (427 Mhz)
Vol 27 II	15	PictureTel Camera Data Cable Wiring
Vol 27 III		No articles
Vol 27 IIII		No articles
Vol 28 I	11	Super 1280 MHz amplifier
Vol 28 II		No articles
Vol 28 III		No articles
Vol 28 IIII		WB8LGA Antenna switching system
Vol 29 I		No articles
Vol 29 II		1280 MHz Hi Gain Panel Antenna
Vol 29 III		No articles
Vol 29 IIII		No articles
Vol 30 I		No articles
Vol 30 II		No articles
Vol 30 III		No articles
Vol 30 IIII		No articles
Vol 31 I		No articles
Vol 31 II		No articles
Vol 31 III		No articles
Vol 32 I	12	On screen display generator
Vol 32 II	7	DVB-T power amplifiers
Vol 32 III		No articles
Vol 32 IIII		No articles
Vol 33 I		No articles
Vol 33 II		No articles
Vol 33 III	12	Power strip controller
Vol 33 IIII		No articles
Vol 34 I		No articles

This is the complete list for construction articles shown in past ATCO newsletters. The page numbers listed may not match the actual page in the Newsletter. They are the numbers shown in the PDF file. Some early issues are missing. Art did not have a copy of every year. This list is complete through Volume 34 I.

…Bob N8OCQ

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.

01/29/2017 | TUSCO AMATEUR RADIO CLUB HAMFEST
Location: Strasburg, OH
Type: ARRL Hamfest
Sponsor: Tusco Amateur Radio Club
Website: http://tuscoarc.org

02/19/2017 | Mansfield Mid Winter Hamfest
Location: Mansfield, OH
Type: ARRL Hamfest
Sponsor: Intercity Amateur Radio Club
Website: http://W8WE.ORG

03/18/2017 | MOVARC HAMFEST
Location: Gallipolis, OH
Type: ARRL Hamfest
Sponsor: MOVARC Club
Website: https://sites.google.com/site/midohiovalleyarc/

03/19/17 TMRA Toledo Hamfest
Location: Perrysburg, Ohio
Type: ARRL Hamfest
Sponsor: Toledo Mobile Radio Association
Website: http://www.tmrahamradio.org/hamfest.php

04/01/2017 | Portsmouth Radio Club Hamfest
Location: Portsmouth , OH
Type: ARRL Hamfest
Sponsor: Portsmouth Radio Club

04/08/2017 | CFARC 63rd Annual Hamfest
Location: Cuyahoga Falls, OH
Type: ARRL Hamfest
Sponsor: Cuyahoga Falls Amateur Radio Club
Website: http://www.cfarc.org/hamfest.php

04/29/2017 | Jackson County Amateur Radio Club Hamfest
Location: Jackson, OH
Type: ARRL Hamfest
Sponsor: Jackson County Amateur Radio Club
Website: http://jacksoncountyarc.org/page3.html

04/30/2017 | Athens Hamfest
Location: Athens, OH
Type: ARRL Hamfest
Sponsor: Athens County Amateur Radio Association
Website: http://ac-ara.org/

05/19, 20, 21/2017 | 2017 Dayton Hamvention
Location: Xenia, OH
Type: non-ARRL Hamfest
Sponsor: Dayton Amateur Radio Association
Website: http://www.hamvention.org

06/17/2017 | Milford Hamfest 27th Annual
Location: Milford, OH
Type: ARRL Hamfest
Sponsor: Milford Amateur Radio Club
Website: http://www.w8mrc.com

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 www.BATC.tv then ATV repeaters thenWR8ATV.

ATCO TREASURER'S REPORT - de N8NT

OPENING BALANCE (07/20/16)….	$	1664.64
RECEIPTS(dues)….	$	210.00
Fall Event food……	$	(220.14)
US postage……	$	(13.60)
PayPal fee……	$	(1.18)
CLOSING BALANCE (01/22/17)……	$	1639.72

ATCO REPEATER TECHNICAL DATA SUMMARY

Location: Downtown Columbus, Ohio
Coordinates: 82 degrees 59 minutes 53 seconds (longitude) 39 degrees 57 minutes 45 seconds (latitude)
Elevation: 630 feet above the average street level (1460 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 (Analog TV on 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)
2395 MHz Mesh Net transceiver 600mw output (channel 1 -2). 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 xmitters 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
2395 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni (Used for experimental Mesh Net 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)
438.000 MHz - DVB-T QPSK, 2K 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)
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)
2395.00 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni (Used for experimental Mesh Net operation)
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 439.25analog /438digital 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#	C1* to turn off 438 MHz DVB-T Tx, C1# to enable it (Must be in manual mode to enable this function).
C2* or C2#	C2* to turn off 423 MHz DVB-T Rx, C2# to enable it (Must be in manual mode to enable this function).

Note: The DVB-T Tx and Rx units can lock up when they lose video or see bad video. When this happens, power must be cycled. To do this select C1* or C2* to turn off power. A few seconds later select C1# or C2# whichever appropriate to restore power to selected unit. Wait about 15 to 30 seconds to see restored operation. (Example: To reset the DVB-T receiver enter C2*,wait a few seconds then C2#)

ATCO MEMBERS as of January 2017

Call	Name	Address	City	St	Zip	Phone
KD8ACU	Robert Vieth	3180 North Star Rd	Upper Arlington	OH	43221	614-457-9511
AH2AR	Dave Pelaez	1348 Leaf Tree Lane	Vandalia	OH	45377	937-264-9812
W8ARE	Larry Meredith III	6070 Langton Circle	Westerville	OH	43082-8964	
VK3BFG	Peter Cossins					
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
K8DW	Dave Wagner	2045 Maginnis Rd	Oregon	OH	42616	419-691-1625
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	OH	43026	614-405-1710
KB8EMD	Larry Baker	4330 Chippewa Trail	Jamestown	OH	45335-1210	
KC8EVR	Lester Broadie	108 N Burgess	Columbus	OH	43204	
N8FRT	Tom Flanagan	6156 Jolliff St.	Galloway	OH	43119	
W8FZ	Fred Stutske	8737 Ashford Lane	Pickerington	OH	43147	
WA8HFK,KC8HIP	Frank & Pat Amore	P.O. Box 2252	Helendale	CA	92342	614-777-4621
WA8HNS	Mike Gray	5029 St Rt 41 NW	Washington Ct Hs	OH	43160-8740	740-335-5133
K8KDR,KC8NKB	Matt & Nancy Gilbert	5167 Drumcliff Ct.	Columbus	OH	43221-5207	614-771-7259
W8KHP	Allan Vinegar	2043 Treetop Lane	Hebron	Ky	41048	
WA8KKN	Chuck Wood	5322 Spruce Lane	Westerville	OH	3082-9005	614-523-3494
WA8KQQ	Dale Waymire	225 Riffle Ave	Greenville	OH	45331	937-548-2492
N8LRG	Phillip Humphries	30856 Coshocton Road	Walhonding	OH	43843	614-3543744
W8MA	Phil Morrison	154 Llewellyn Ave	Westerville	OH	43081	
KA8MFD	Ross McCoy	227 S Boundary St PO Box 9	Edison	OH	43320	
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
WU8O	Tom Walter	15704 St Rt 161 West	Plain City	OH	43064	614-733-0722
N0OBG	Jim Conley	33 Meadowbrook 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	
KE8PN	James Easley	1507 Michigan Ave	Columbus	OH	43201	614-421-1492
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	1941 Red Forest Lane	Galloway	OH	43119	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	
KB8SSH	Mike Cotts	3424 Homecroft Dr	Columbus	OH	43224	614-371-7380
WA6SVT	Mike Collis	PO Box 1594	Crestline	CA	92325	
KD8TIZ	Bob Holden	5161 Goose Lane Rd	Alexandria	OH	43001-9730	614-562-8441
K8TPY, K8FRB	Jeff & Dianna Patton	3886 Agler Road	Columbus	OH	43219	
NR8TV	Dave Kibler	243 Dwyer Rd	Greenfield	OH	45123	937-981-1392
W8URI	William Heiden	5898 Township Rd #103	Mount Gilead	OH	43338	419-947-1121
KB8UWI	Milton McFarland	115 N. Walnut St.	New Castle	PA	16101	
WA8UZP	James Reed	818 Northwest Blvd	Columbus	OH	43212	614-297-1328
KC8WRI	Tom Bloomer	PO Box 595	Grove City	OH	43123	
AA8XA	Stan Diggs	2825 Southridge Dr	Columbus	OH	43224-3011	
AC8XP	Troy Bonte	5210 Smothers Road	Westerville	OH	43081	
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
KA8ZNY,N8OOY	Tom & Cheryl Taft	386 Cherry Street	Groveport	OH	43125	614-202-9042
W8ZCF	Ferrel Winder	6686 Hitching Post Ln.	Cincinnati	OH	45230	
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 payable on January 1 of each year. 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.

The membership period is from January 1ST to December 31ST. New members joining before August will receive all ATCO Newsletters published during the current year prior to the date they join ATCO. For example, a new member joining in June will receive the January and April issues in addition to the July and October issues. For those joining after August 1ST, can elect to receive a complementary October issue with the membership commencing the following year or get the previous (3) Newsletters. Your support of ATCO is welcomed and encouraged.

Membership expiration notices will be sent out in January in lieu of Newsletters for those with an expired membership.

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. The actual expiration is on January of the following year to keep the dues clock consistent with the beginning of each year.

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

ATCO Newsletter
c/o Art Towslee -WA8RMC
438 Maplebrooke Dr. W
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 EXPIRED.