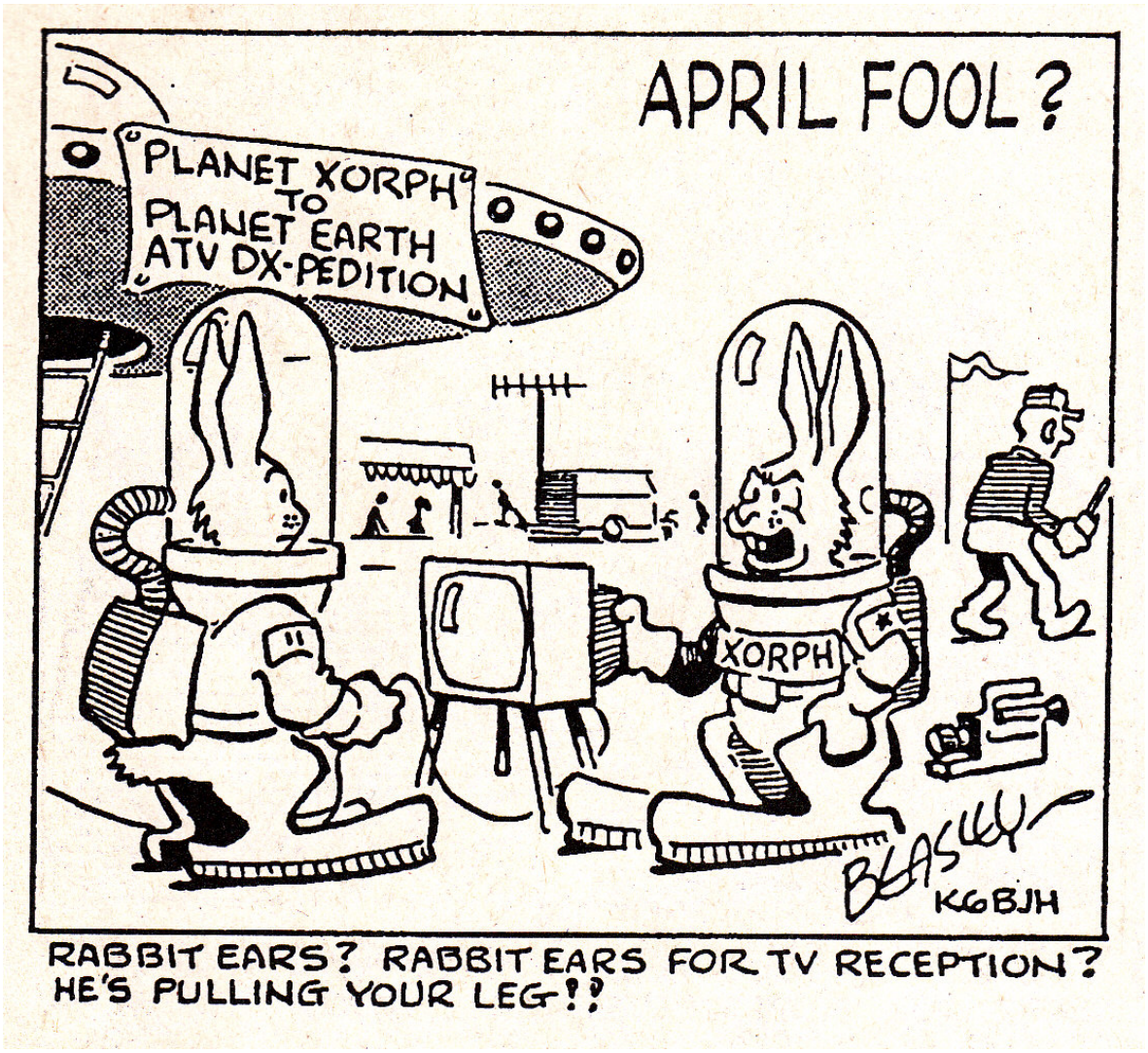
ATCO NEWSLETTER

VOLUME 31 NUMBER 2 **April 2014**

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

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



ACTIVITIES ... from my Workbench

This has been a slow, cold and snowy winter. Many projects have been waiting for warmer weather so NOW IS THE TIME!

The repeater seems to be running fine with a few exceptions. For one, the slide show unit is stuck in a short loop again. It is working but it skips some slides and doesn't fade from slide to slide. Also, it seems to stay on one slide much longer. It has done that before and the only fix needed is to power it down and back up for its restoration. That's strange because it is on a battery back up system so I don't know how it gets stuck in a loop like that. Sandisk is the manufacturer and they are not willing to share the source code even though the product is obsolete with them. Also, the 10GHz transmitter video is low. On the next trip I need to bump up the video gain a bit.

I've noticed that the QAM output we added late last year is not being used. I don't know of anyone other than Ken and I that has seen it. The output is on 423MHz (cable channel 57) and receivable with any modern standard TV but I don't know of anyone else that has tried. The signal is vertically polarized and transmitting 24/7. Maybe if we converted it to horizontal polarization that would help.

That brings up another topic. A number of people are trying their transmission and reception skills with DVB-T. With the availability of inexpensive receive dongles ($80 each) and transmitter dongles for about $250, it's easy to experiment with them. Also, it seems that reliable operation with low power units can achieve Dx contacts. The dongles output only a milliwatt so you will need to build a post amplifier but those are becoming easier to put together. A watt or so seems to be all that is needed. Therefore, that brings me to my next point. We are investigating the possibility of either making the 427 amp switchable to alternately transmit DVB-T or create a diplexer so that 427 analog and 423 digital DVB-T can be transmitted simultaneously. That would then utilize our existing horizontal antenna.

The channel 4 radar signal is back on the air now. I changed the frequency to 1288 from 1280 so we won't interfere with the new 1280 radar transmitting from London, Ohio now. However, I noticed that channel 4 is sending us a fixed channel 4 announcement and not the radar signal lately. I need to call them about this.

That's about it for now except to remind you that the Spring Event is May 4 at ABB in Westerville. Same time as in the past. See the announcement in the following pages.

By the way…….I see our membership list is getting smaller. A number of people that have not paid dues since 2012 have been eliminated so I notice the list dropped by 10 people. They include KC8ASF, NN8B, W6CDR, N8CZO, KB8GZW, WG8I, KA8MID, WU8O, W8RRF and WB8WBK. If you talk to any of these please encourage them to re-consider.

….73, WA8RMC

SILENT KEY…John Shaffer W3SST

It is with great regret that we announce the passing of John Shaffer W3SST. He passed at home with his family at his side on Saturday April 12, 2014 at 12:01 AM. He is survived by his wife Lois and his children Sam, David and Robin.

John lived in both the York, Pennsylvania and Columbus, Ohio areas as an active DXer. He built the York ATV repeater. John was an active member of ATCO and attended most meetings. He was a regular at the Dayton Hamvention. We will miss seeing him there.

Robin, his daughter writes,
"Our father, John Shaffer, W3SST, passed away Saturday, April 12th at12:01AM at home with us and Mom at his side. Many of you are aware he was placed under hospice care just before Christmas due to end-stage heart and kidney failure with expectations of a few weeks at that time. He proved the doctors wrong and was doing well until early last week and, mercifully, his decline was rapid so he did not have an extended confinement in bed. We are following Dad's wishes for final arrangements to be private however if you would like to drop Mom a note we're sure she would love to hear from you. Her address is 6706 Gilette Dr., Reynoldsburg, OH 43068. Thank you for being a part of Dad's legacy and the friendship you shared with him.
Sincerely,
Sam, David, & Robin "

Galileo GPS closes down a 23cm ATV Repeater DB0QI

The new Galileo GPS system that broadcasts across 1260-1300 MHz has resulted in the closure of a German ATV repeater.

The DARC report the Munich ATV repeater DB0QI has been closed down due to it jamming the Galileo Satnav Control Centre. DARC in Google English http://tinyurl.com/GermanyDARC

Munich ATV repeaters DBØQI must take 23-cm-spending out of service

The operators of the Munich ATV repeaters DBØQI have been asked by the Federal Network Agency, the two 23-cm-spending to 1276 MHz (analog) and 1291 MHz (digital) to take out of service. This requirement are the operators on 4 March complied. The 23-cm band is allocated to radio amateurs only on a secondary use basis. With this step, make available to the trouble free operation of the primary user safe: Near Munich operates the German Aerospace Center (DLR) in Oberpfaffenhofen a control station for the satellite navigation system Galileo. Specifically affected the ATV spending the E6-channel of the navigation system to 1278.5 MHz. The entries of the ATV repeaters and the 10 GHz channels are not affected by this step, say the operators of DBØQI on their website db0qi.de . According to the prevailing state of knowledge other relays are not affected.

A 2006 Galileo GPS article by Peter Blair G3LTF highlighted problems this could cause, see http://www.southgatearc.org/articles/galileo.htm

The Amateur Satellite Service has an important allocation at 1260-1270 MHz for Earth-to-Space (Uplink) communications. The Amateur Satellite Service has already seen its allocations at 2.4 and 5 GHz rendered unusable in urban areas due to WiFi and other license exempt devices. The Amateur Satellite Service does not have any other global spectrum allocations in the key 915 MHz to 6 GHz region.

While the German announcement may relate to a single Galileo command station it clearly raises concerns about what will happen when Galileo 1260-1300 MHz GPS units are in widespread use.

See! We are not the only ones being squeezed out of our Amateur Radio Spectrum. It doesn't make me feel any better but it's comforting to here of other groups affected. Ed.

A NEW MODULATION METHOD.... Really?

Introducing a new modulation method.

New modulation schemes don't come along very often. In fact, it has been years…decades really…. since any new modulation method has been invented. Remember there are only three basic ways a carrier can be modulated: by varying the amplitude, frequency or phase or some combination of those. Most of the useful combinations have already been discovered and either ignored or adopted. Whether you know it or not, the most popular modulation scheme in use in the wireless world today is QAM or quadrature amplitude modulation. It is a combination of both amplitude and phase modulation. Digital bit sequences are represented as unique amplitude-phase variants of the carrier. For example, 64QAM uses 64 different amplitude-phase combinations to represent any 6-bit combination. QAM is use everywhere because it is very spectrally efficient meaning that it can transmit more bits per Hz of bandwidth than almost any other modulation method. It is used in HSPA and LTE OFDM cellular systems, Wi-Fi, cable TV, DSL modems and a wide range of microwave backhaul, and satellite systems. It is hard to beat QAM despite the fact that it needs a better than average signal to noise ratio and linear power amplifiers for reliable communications.

Anyway, along comes a new company MagnaCom with a new modulation method called WAve Modulation (WAM). You won't find it in any textbook and the company won't reveal any details on how it works. MagnaCom's goal is to challenge the dominance of QAM and ultimately replace it with WAM. The company claims that it is fully backwards compatible with QAM systems and does not require changing antennas or radio circuitry. WAM is a purely digital modulation method that uses the same analog and RF circuits as QAM. Even after a long briefing with the company, I still don't know how it works. One explanation said that I should view it as a multidimensional QAM. Here is what MagnaCom's release said about WAM: "WAM technology is a pure digital new modulation scheme, using spectral compression that improves spectral efficiency. The spectral compression enables an increase in the signaling rate thereby affording the use of a lower order alphabet, which reduces complexity. It provides inherent diversity of time and frequency domains and uses nonlinear signal shaping. The nonlinearities are handled digitally at the receiver side allowing a lower-cost and lower-power transmitter."

The discussion continues: " WAM is a multi-dimensional signal construction operating in the Euclidean domain. WAM is breaking the orthogonality of signal construction (zero ISI in a single carrier/zero ICI in OFDM) shown for the first time to increase capacity and provide an optimal handling of nonlinear distortion, ultimately resulting in significant improvements versus today's legacy QAM systems…"

That does not exactly explain it for me. I keep wondering what a WAM signal looks like on a spectrum analyzer. Can a constellation diagram be shown like QAM? In any case, I am sure that MagnaCom is just protecting its IP. No doubt the whole thing takes place in a DSP or FPGA with some unique algorithms. I would love to include mention in the 4th edition of my college textbook *Principles of Electronic Communications Systems* (McGraw Hill) as I am updating it. But frankly I do not know what to say.

Despite the discomfort of not really knowing how WAM works, I am amazed at the MagnaCom claims of amazing benefits. These include, up to 10 dB system gain advantage, up to 50% lower power, up to 400% greater distance, up to 50% spectrum savings, better noise tolerance, major increase in speed, lower cost and easier design, and 100% backward compatibility. Wow!

If these claims are real, MagnaCom will have a real success on their hands. The above listed advantages are really needed and wanted especially in the wireless world that never has enough speed or bandwidth. It will be interesting to see who adopts this, who makes chips and so on. I wish MagnaCom great success.

…FROM ELECTRONIC DESIGN MAGAZINE BLOG SECTION 2/24/14

AN ATV REQUEST FROM THE CLEVLAND AREA

The following was Emailed to me 4/8/14 suggesting that interference to Police and Fire departments in northeast Ohio was possibly coming from the Columbus area. It sounds strange to me. I didn't know that Police/Fire radios were authorized in the 420-430 band segments. For that reason, I didn't respond and suspect the information is erroneous. If anyone knows otherwise, please let me or the group know about it. Ed. WA8RMC

"Folks,

Many police and fire departments, as well as other government agencies operating in the 420 to 430 MHz band are often experiencing interference here in Northeast Ohio. The company I work for services many of these departments. If you could, please spread the word that ham operations, including ATV are not allowed north of line A, in this frequency band, for this reason. We believe that the interfering signals are coming from south of Cleveland, possibly as far as Columbus. The signals easily travel up here in decent weather, and are most noticeable during the day from 10 AM till 2 PM - though we have occasionally noticed them in the evening too. We would ask you to spread the word around that this is causing significant problems to dispatch operations, and everyone should be using best operating practices, such as minimum power necessary, not pointing gain antennas northeast, etc.

Any helpful information, questions, etc. please Email me at: WD8PFK@ARRL.NET
Thank you all,
Jim Arcaro WD8PFK

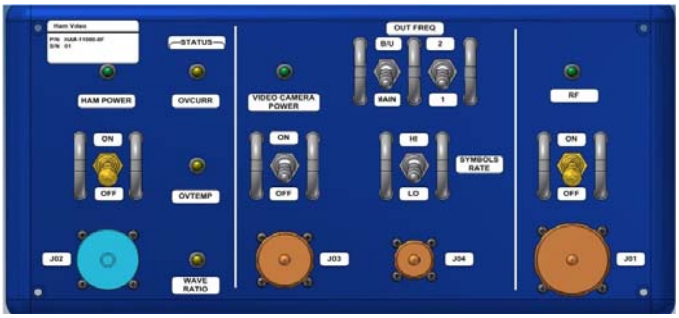
INTERNATIONAL SPACE STATION HamTV IS A SUCCESS!

On Saturday, March 8 initial commissioning test transmissions were made on 2422 MHz using the HamTV equipment on the International Space Station (ISS). This is the first time a DATV signal has been sent from space! The digital video was successfully received and was web streamed to a global audience via the British Amateur Television Club (BATC) server at http://batc.tv/ch_live.php?ch=4. There were four live web streams each from different receivers. The entire commissioning process of testing all possible transmitter combinations involved 4 different frequencies, two different symbol rates and two different antennas on board the ISS. The configurations are as follows:

Ham Video Configurations and Switches

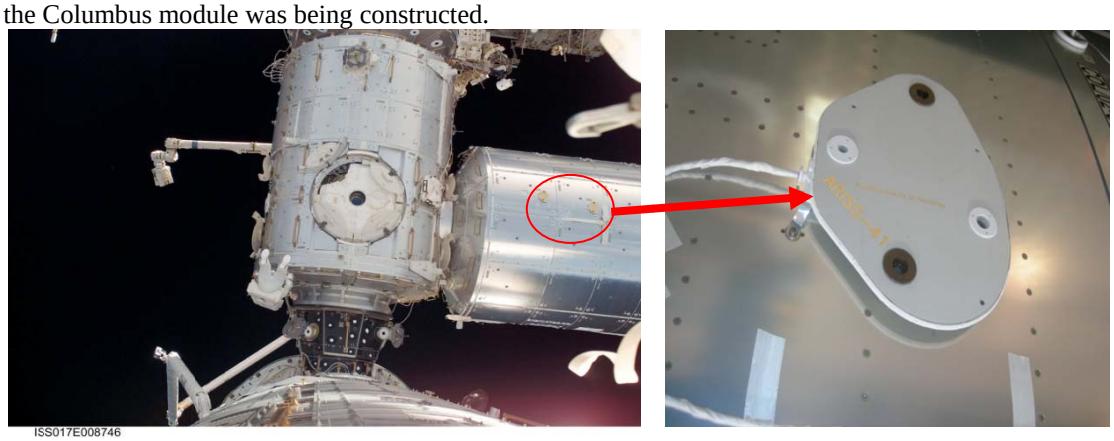
Configuration	Frequency	Symbols rate	OUT FREQ		SYMBOLS RATE
1	2422GHz	1.3	MAIN	1	LO
2	2422GHz	2.0	MAIN	1	HI
3	2395GHz	1.3	backup	1	LO
4	2395GHz	2.0	backup	1	HI
5	2369GHz	1.3	MAIN	2	LO
6	2369GHz	2.0	MAIN	2	HI
7	2437GHz	1.3	backup	2	LO
8	2437GHz	2.0	backup	2	HI

Transmitter front panel L/O



The HamTV transmitter is the culmination of over ten years work by dedicated volunteers to establish an amateur radio TV transmitter on the ISS. It uses patch antennas fixed on the Meteorite Debris Panels (MDP) protecting the hull of the ISS Columbus module. These antennas were installed while the Columbus module was being constructed.

There are two right hand circularly polarized patch antennas installed on the outside of the Columbus module. Both antennas are capable of operating on the 24 and 13cm portions of the Ham band. So far, only 13cm is used.


ISS017E008746

A fund-raising campaign took place during 2005-7 to raise over 65,000 Euros for the antennas. Individual radio amateurs from around the world donated generously as did several organizations including AMSAT-UK and the RSGB.

The main mission of HamTV is to perform contacts between the astronauts on the ISS and school students, not only by voice as now, but also by unidirectional video from the ISS to the ground.

HamVideo is the name of the onboard DATV S-band transmitter. HamTV is the name of the complete system, comprising DATV downlink and VHF voice uplink. Kaiser Italia SRL was the prime-contractor for the design and development of the flight and ground segment http://www.kayser.it/index.php/exploration-2/ham-tv

Read the HamTV overview by Gaston Bertels ON4WF http://tinyurl.com/HamTVoverview
Join the ISS HamTV Yahoo Group http://groups.yahoo.com/group/HamTV
ARISS-EU HamTV Bulletins http://www.ariss-eu.org/
HamTV on Facebook https://www.facebook.com/Hamtvproject
U Tube Video from Italy Casale Monferrato tracking station https://www.youtube.com/watch?v=Xkodq_2TshI

From ARRL Letter March 13, 2014

As one of his final actions during his duty tour aboard the International Space Station, NASA Astronaut Mike Hopkins, KF5LJG, installed and commissioned the Amateur Radio on the International Space Station (ARISS) "Ham Video" system over the March 8-9 weekend. Hopkins returned safely to Earth March 10 aboard a *Soyuz* Lander with crew members, Russian cosmonauts Oleg Kotov and Sergey Ryazansky. The Amateur Radio digital television (DATV) setup can transmit video of the crew and the interior of the *Columbus*

module on the 2.4 GHz band (S-band). The ARISS project, led by ARISS-EU, AMSAT-Italy, and the European Space Agency (ESA), eventually will enhance ARISS school contacts by providing a video and audio downlink plus an audio-only uplink. Operating under the call sign OR4ISS, the S-band transmitter can utilize one of two ARISS patch antennas installed on *Columbus*. Radiated RF power is on the order of 10 W EIRP. The received DATV signal was streamed via the web to a global audience via the British Amateur Television Club (BATC) server.

"Congratulations to the Ham TV team on today's outstanding commissioning success!" said ARISS International Chair Frank Bauer, KA3HDO, who just retired from NASA. "Several stations in Italy were able to receive [the] video and audio downlink." He explained that while the video camera and transmitter aboard the ISS are referred to as "Ham Video," the entire digital TV/audio downlink and FM voice uplink system is being called "Ham TV."

The commissioning process primarily involved making sure that ground stations in Europe would be able to copy the DTV downlink signal, and the results exceeded expectations. A large, high-gain dish at the Matera, Italy ground station worked in concert with smaller-dish stations that are planned as future Ham TV ground relay stations. ARISS had several additional ground stations around the world tuned in and providing reception reports of the so-called "blank transmission" mode, with the transmitter on and the camera turned off. Those blank transmissions will continue until the next commissioning step set for April 13.

Astronaut Mike Hopkins, KF5LJG, is live on the air during commissioning of the Ham Video digital amateur TV system [Image courtesy of Frank Bauer, KA3HDO]

Commissioning of the Ham TV system marks the culmination of more than a decade of planning and preparation within ARISS. Although there are no immediate plans to employ the Ham TV system for educational contacts with schools in North America, Bauer said several US radio amateurs are testing this capability, as are stations in other parts of the world. "If this shows educational value," Bauer said, "it will be employed in the US." Read more. -- *Thanks to ARISS International President Frank Bauer, KA3HDO, AMSAT News Service, and ARISS-EU Chairman Gaston Bertels, ON4WF*

April 4, 2014 Jean Pierre, F6DZP, reports,
"During last night, 4 passes with this new frequency 2369 MHz were well received at Poitiers. Again we can see that ISS has changed its attitude and that we get the TS (*Transport Stream*) OK sooner with the lower SR. AOT was made at 7.7° =1662km.

This new frequency is very clear for me. Absolutely no interference, just a few seconds at the end, under 22° El, were cut by a neighbor house, and I got a signal again until 15.4°(1200km)".

F6DZP

The final Ham Video Commissioning Pass 4 is Planned for Sunday April 13 at 18.23 UTC. Configuration 4 will be used:
• ARISS antenna 43 • Frequency 2395 MHz • Symbol rate 2.0 MS/s

Koichi Wakata will operate OR4ISS. Ground stations F6DZP and IK1SLD will receive the signals and stream the video over the BATC server. The video is expected to be received during 5 minutes.

This will mark the end of the Blank Transmissions. We thank the operators who filed reception reports of blank transmissions. Your participation to the Ham Video testing campaign has been invaluable. No decision has been taken yet on the future use of Ham Video. We will keep you informed on any progress.
73, Gaston Bertels, ON4WF ARISS Europe chairman.

April 14, 2014 - Ham Video Commissioning is completed!
The final Ham Video Commissioning Pass was performed flawlessly Sunday April 13 at 18.23 UTC. ISS Commander Koichi Wakata operated OR4ISS while ground stations G4KLB, F6DZP, IK1SLD and KI (Livorno) received the signals and streamed the video over the BATC server. The DATV signal was received for about 6 minutes. Commander Wakata congratulated ARISS for this achievement and answered a series of questions prepared in the manner of a school contact. He also proceeded to a microgravity experiment.
The recorded video of this historical transmission is available at http://www.vivadatv.org/viewtopic.php?f=66&t=317 and also on YouTube at http://youtu.be/EpFzbKvK1pk. Congratulations to the Ham Video team for this outstanding performance.

The next step should be a video enhanced ARISS school contact. We will keep you informed on any progress. Presently, the goal is to develop the ground segment and to set up the system for ARISS operations. After the pass, Commander Koichi Wakata was very pleased to hear that 4 amateur ground stations captured and streamed his Ham Video transmission. He extended his congratulations to all. This step is an important milestone!
73,
Gaston Bertels, ON4WF ARISS Europe chairman

Here is a picture of the Hams at work in the control room of B.USOC's facility at Matera, Italy. They were the primary reception facility used during commissioning.

This is the main reception dish used at Matera. Since it's 50 feet in diameter, needless to say, the signal was very strong!

B.USOC Daily Operations Report for Ham Video

Overview of 2014-04-13

Today, the crew switched to configuration 4 (2395MHz) and successfully performed Pass 4 with the script. All his demonstrations, questions and closure remarks were recorded and also received on ground by 4 ARISS stations (Poitiers, Bornemouth, Casale Monferrato and Livorno). All together a good 6 minutes of reception with some ground station chaining. The video on the flash card of the XF305 camcorder was transferred to the ESA folder for downlink. Camcorder and Bogen arm were stowed away after de-activation of the Ham-Video transmitter. Many congratulations to all for this final commissioning activity and we are hopeful for a positive outcome towards future utilization.

Pass 1	
GMT067	
08-Mar-14	
Antenna	Config#
41	1
41	3
41	7
41	5
41	6

Pass 2	
GMT068	
09-Mar-14	
Antenna	Config#
43	1
43	3
43	7
43	4
43	8
43	6

Pass 3	
Not needed	
Antenna	Config#

Pass 4	
NET GMT102	
13-Apr-14	
Antenna	Config#
43	4

Blank Transmissions				
GMT067	08-Mar-14	Antenna 41	Config #1	2422 MHz
GMT068	09-Mar-14	Antenna 43	Config #1	2422 MHz
GMT075	16-Mar-14	Antenna 43	Config #3	2395 MHz
GMT082	23-Mar-14	Antenna 43	Config #4	2395 MHz
cancelled	30-Mar-14	Antenna 43		
GMT096	13-Apr-14	Antenna 43	Config #5	2369 MHz

…WA8RMC

DVB APPROVES NEW TRANSMISSION SPECIFICATION

In part from TV Technology March 9, 2014 by Doug Lung. For complete article see, http://www.tvtechnology.com/article/dvb-approves-new-transmission-spec/269248#sthash.ZzwqKWsq.dpuf

DVB-S2X promises spectral efficiency gains the enhanced DVB-S2 specification known at DVB-S2X was approved at the 76th meeting of the DVB Steering Board last week. DVB said it DVB-S2X offers spectral efficiency gains for professional applications by up to 20 to 30 percent and in some instances, gains of up to 50 percent. New operational modes allow channel bonding, combining multiple channels to increase flexibility and bandwidth.

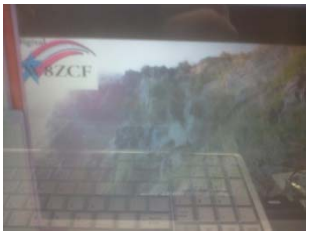
The improvements in DVB-S2X include more choices for roll-of factors, additional modulation and forward error correction options, additional framing and scrambling options for very low SNR applications, and bonding of up to three channels. The optional super-framing structure allows use of advanced interference mitigation techniques for interactive broadband services.

"Throughout the technical activity, I was impressed to see European, U.S. and Far East companies, operating in different business environments such as broadcasting, VSAT or DSNG playing together, as if in a symphonic orchestra, to design a state of the art common system".

DVB's executive director, Peter Siebert, added: "We are delighted that the Steering Board has now approved the new DVB-S2X specification and I would like to congratulate all the Members that have actively contributed to bringing about this step forward in updating the excellent DVB S2 standard. The satellite industry has been anxiously awaiting this standardization which will help it to improve profitability, interoperability and achieve further growth."

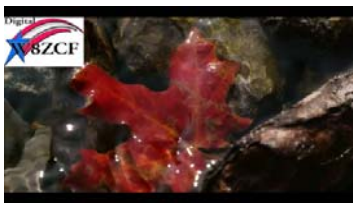
DVB has made the DVB-S2X extensions available online: Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications: Part II: S2-Extensions (DVB-S2X) – (Optional) – DVB Document A83-2.
- See more at: http://www.tvtechnology.com/article/dvb-approves-new-transmission-spec/269248#sthash.ZzwqKWsq.dpuf

DVB-T ATCIVITY IN OUR AREA



From W8URI
Here are more DVB-T videos as received by ah2ar in Vandalia, OH, a distance of about 90 miles. This is a cell phone picture of w8zcf on 3/05/2014 as received at my location on DVB-T. I realize the quality is poor because of the reflection of the screen from my laptop. It was the first DVB-T digital picture that I received from Cincinnati Ohio, a distance of about 135 miles. By the way, distance to ah2ar is about 90 miles. I forgot to mention that in previous e mails.

I use a Toshiba laptop running the UT 100 B for transmit and receive in DVB-T mode. A preamp is used on receive. The transmit side goes to a small amp to get the power level up to the point that will drive the big amp. Gain is adjustable on the transmit program. I am able to go from about 7 watts up to about 300 watts depending on distance and conditions. The picture received from W8ZCF was at about a 150 watt level. Analog reception that morning from him was in the P2 to P3 level. The pictures that AH2AR took of me the one day was at about 180 watts. The other picture that he took of me was at the 280 watt level. On that day, analog reception from him was at about P1 and I believe he was running about 100 watts. I have since worked W8RVH and WB8CJW on digital. All contacts were done using the UT 100 B running DVB-T format. I have also been able to work W8RUT on DVB-T. Distance to AH2AR is about 90 miles. Distance to W8ZCF is about 135 miles. Thanks for your interest and let me know if you have any questions.
…Bill W8URI



HERE WE GO AGAIN! ... Will we loose our 10GHz band?

In part from the TV Technology Magazine Doug Lung / RF Report. See http://www.tvtechnology.com/article/the---ghz-spectrum-battle-heats-up-/270021 for the complete article.

The 10.0-10.5 GHz Spectrum Battle Heats Up

The FCC, in its Proceeding RM-11715 is considering a Petition for Rulemaking from Mimosa Networks to create a new frequency allocation for wireless networks. If granted, this that would allow the licensing of high-power fixed microwave links in the 10.0-10.5 GHz band under Part 90, Subpart Z, using rules similar to those adopted for the 3650-3700 MHz band. As of April 18, the FCC Electronic Comment Filing System shows 241 filings, including the original Petition and FCC releases and the deadline for reply comments has now been extended to April 25, 2014.

In the United States, the 10.0-10.5 GHz band is allocated on a primary basis to the government radiolocation service, and on a secondary basis for non-government radiolocation services and the amateur radio service. As a result, it comes as no surprise that the New America Foundation, Qualcomm and other wireless broadband interests support a new wireless allocation in that portion of the spectrum and the incumbent users, amateur radio operators, are strongly opposed to this.

From what I've read and heard from amateur radio operators, with the possible exception of the 2.4 GHz ham radio spectrum, the 10.0-10.5 GHz band is the most popular amateur radio microwave band. The ARRL distance records show communications at distances more than 1,000 km using tropo propagation, and reports many examples of rain scatter propagation greater than 700 km. The band is also allocated, on a secondary basis, to the amateur satellite service and it is likely to see more use as the cost of launching small satellites ("CubeSats") drops.

In its Petition for Rulemaking, Mimosa states: "In order to guard against interference with both U.S. Government and civilian radar operations, Mimosa proposes the application of Dynamic Frequency Selection restrictions to wireless broadband operations in the band, Further, the application of coordination procedures and requirements provided in Subpart Z will ensure amateur radio operations in the band will not be disrupted. In addition, as a further safeguard, Mimosa proposes a band plan for the 10.0-10.5 GHz band that would protect frequencies in the band that are most often used by amateur radio operators." However, Mimosa does acknowledge that use of the 10-10.5 GHz band by radio amateurs has become increasingly popular during recent years.

Mimosa's proposed rules don't include the band plan. Their proposal would divide the band into 20 MHz wide channels with a guard band at 10.0-10.01 GHz and provide an amateur calling band at 10.35-10.37 GHz. The amateur satellite allocation at 10.45-10.5 GHz would also be reserved in the band plan. Under the proposed rules, Part 90 users would be limited to a maximum EIRP of 55 dBW, although there are no minimum antenna gain or pattern performance requirements.

Qualcomm's proposal continues: "First and foremost, the FCC should determine the extent to which this band can be cleared of incumbents. If the band can be completely cleared in a reasonable time frame, particularly in those areas of the country that are experiencing high demand for mobile broadband data, the FCC should clear the band."

If incumbents can't be cleared from the band Qualcomm says "Authorized Shared Access (ASA)" should be considered. While this approach may work for government users of the band, I can't see how this would work to protect amateur radio operations, which are intermittent and often driven by enhanced propagation, which itself can be difficult to predict.

The Open Technology Institute (OTI) and Public Knowledge (PK) at the New America Foundation offered these comments about protection of amateur radio operations in the band: "

Although OTI and PK have no view at this time about the efficacy of Mimosa's proposed interference-avoidance mechanisms--or even whether they are necessary--we commend Mimosa for advancing protections that have proven effective in other bands and that could potentially meet the legitimate concerns of band incumbents."

The comments also: "urge the Commission to consider whether small cell and unlicensed use of the band under Part 15 of the Commission's rules would be a compatible and additional use case for this band."

The Wireless Internet Service Providers Association (WISPA) comments give more attention to protection of amateur radio operations than the Qualcomm and OTI/PK comments.

Regarding technical and operating rules, WISPA inquired about minimum antenna performance standards, requirement for features to minimize radiated power to the minimum needed, standards for device certification, power limits and out-of-band emission limits, and the most effective band plan. The organization asked: "Should guard bands and a 'notch' be required to protect amateur radio operations? Do the guard bands proposed by Mimosa provide sufficient interference protection?"

The American Radio Relay League (ARRL), the national association for amateur radio, filed extensive comments opposing the Mimosa Network's Petition. The ARRL argued that the FCC is without authority to make the allocation proposed in the Petition and it therefore

must be dismissed. The ARRL noted that in ITU Region 2, 10.0 to 10.5 GHz is allocated on a primary basis to the radiolocation service and on a secondary basis to the Amateur Service. The 10.45 to 10.5 GHz segment is also allocated to the Amateur-Satellite service. International footnote 5.479 also allocates 9975-10025 MHz to the meteorological satellite service on a secondary basis for use by weather radars. The ARRL stated: "There is no mobile for fixed allocation in ITU Region 2."

The ARRL's comments continued:"Directly relevant to Mimosa's proposal, Footnote US128 very clearly and without equivocation prohibits all non-Federal services in the band 10-10.5 GHz except for the amateur service, the amateur-satellite service, and the non-Federal radiolocation service. [ARRL emphasis]. This United States footnote makes it impossible to grant the relief sought by Mimosa."

The ARRL argued there is no compatibility between wireless broadband operation and Amateur Radio operations at 10 to 10.5 GHz. The organization noted that this would limit amateur radio use to two small segments of the band and stated: "Those exclusions, however, are not in Mimosa's proposal, mandatory."

In the comments, the ARRL noted: "The 'band plan' proposed by Mimosa indicates a presupposition that the bulk of the terrestrial use of the 10.0-10.5 GHz band by radio Amateurs occurs in what it misleadingly identifies as the 'weak-signal sub-band 10.350-10.370 GHz.' It also urges wireless broadband users to avoid the Amateur Satellite Service segment above 10.45 GHz. The assumption, however, that those two segments are the only ones used actively by radio amateurs or that they are the only segments that require protection from interference is mistaken." Several examples are cited to show there are amateur operations throughout the 10.0-10.5 GHz band--including amateur television repeaters in southern California with inputs near 10.4 GHz--use 27 MHz-wide NTSC FM emissions.
See more at: http://www.tvtechnology.com/article/the---ghz-spectrum-battle-heats-up-/270021#sthash.FX2eo9MA.dpuf

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The Comments of David Weinreich, WA2VUJ below provide a brief, but excellent, technical argument for denying Mimosa's petition.

Comments of David Weinreich, WA2VUJ

Pursuant to FCC Rules given in CFR 47, I am filing the following comments in opposition to the Petition for Rulemaking of Mimosa Networks, Inc, captioned RM-11715.

The petition from Mimosa Networks is unwarranted for the following reasons:

1) the petition does not take into account the 100 MHz of spectrum recently harmonized with adjacent spectrum to allow Wi-Fi channels of greater bandwidth;
2) the petition underplays the significance of rain attenuation in the 10 GHz frequency range;
3) the petition, in its proposed band plan, suggests depriving the Amateur Service of the use of 86% of the spectrum to which it currently has access;
4) the petition suggests that compatibility can be assured with interference mitigation techniques that may not be suitable for the protection of the Amateur Service;
5) allocation of the 10.0-10.5 GHz band would deprive the USA of a valuable educational resource for the development of the next generation of radio engineers.

Rain Attenuation

On page 17 of the instant petition, Mimosa Networks states that the specific attenuation in the 10 GHz range is 0.7 dB/kilometer for a rain rate of 25 millimeters per hour (mm/hr). This is the 0.01% of time rain rate. This rain rate is applicable in the southwestern part of the USA but approximately 50% of the USA enjoys a 0.01% rain rate of 40 mm/hr. According to the ITU-R Recommendation referenced by Mimosa Networks, the specific attenuation for this rain rate is 1.3 dB/kilometer, almost twice as great as for the 25 mm/hr rain rate.

Later on page 17, Mimosa Networks mentions that high reliability links, which Mimosa Networks would hopefully attempt to provide, have 99.999% availability. It is good to note that the specific attenuation for 0.001% of the time is on the order or 3.5 dB/kilometer, a factor of 5 greater than the quoted specific attenuation for the 0.01% rain rate.

Interference Mitigation

Radio amateurs operating on the microwave bands, including the 10.0-10.5 GHz band, strive for as low as noise figure as can be achieved. On the 10 GHz band, these achieved noise figures often approach 1 dB. Taking a conservative approach and assuming that an amateur station is operating with a 10 dB noise figure and employing FM in a 200 kHz bandwidth, the noise level in this channel, without interference, would be -111 dBm. Mimosa Networks proposes to avoid interfering with the incumbent services using the 10.0-10.5 GHz range through the use of contention based protocols and dynamic frequency selection (DFS).

DFS is mainly used for the protection of radar systems, where the wireless receiver would detect a radar signal and refrain from transmitting on that frequency. Amateur service signals are most often much weaker than radar transmissions and, as opposed to radar signals, would usually occur on an irregular basis. Both the small signal level and the irregularity of transmissions make DFS an ineffective interference mitigation technique. Further, amateur service stations spend a great deal of time "listening" for other stations and do not transmit during these periods. Use of DFS in this situation would lead to interference to the amateur service receiving station because the DFS could not detect the distant amateur service station that was transmitting.

Contention based protocols are meant to allow the sharing of a common resource among communications devices that have similar characteristics e.g. data networks. Given the difference between amateur service signals and broadband wireless signals, interference mitigation relying on contention based protocols would be ineffective.

Educational Resource

In the past few years, there has been resurgence in electronic experimentation as evidenced by so-called "maker fairs" (see http://en.wikipedia.org/wiki/Maker_Faire). These gatherings encourage do-it-yourself activities in many areas including science and engineering. The Institute of Electrical and Electronic Engineers (IEEE) has indicated that there is a critical shortage of electronic engineers including those experienced in radio frequency (RF) engineering, especially in the microwave frequency range. The Amateur Service allocation at 10 GHz offers an opportunity to try out and participate in RF engineering. The availability of used commercial equipment and the possibility of constructing one's own equipment permits the ready fabrication of a station operating in the 10 GHz band at a reasonable expense and with a manageable size. Since this band is the most popular amateur band above 3 GHz, contacts with other amateurs can be made with a minimum of difficulty. Curtailing amateur activity in any portion of this band by adopting a band plan similar to that proposed by Mimosa Networks would dissipate this resource by imposing restrictions that would make do-it-yourself construction more difficult and expensive due to increased technical requirements. Throughout my career, I have met many engineers who have gotten their start as a radio amateur.

In closing, the Amateur Service has been a "good neighbor" to the US Government operations in the 10.0-10.5 GHz band. It has not been demonstrated that wireless broadband activity in this band would be as "friendly."

For the reasons given above, the petition of Mimosa Networks should be dismissed. Regarding qualifications, I have a Masters Degree in Electrical Engineering. Since 1972, I have been involved in the evaluation of the performance of communications satellite systems, the determination of the effects of interference on satellite communication performance and the management of electromagnetic spectrum for satellite systems. I have participated in the activities of the International Telecommunications Union since 1981 and have served as a Private Sector Advisor at every World Radio Conference since 1995. I have been a licensed radio amateur with the call sign WA2VUJ for more than 50 years and currently have Amateur Extra Class privileges. Respectfully submitted,
David Weinreich
WA2VUJ
04/10/2014
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What a 91-Year-Old Man Has Been Keeping in His Basement Got Him a Visit From the FBI

http://www.theblaze.com/stories/2014/04/03/what-a-91-year-old-man-has-been-keeping-in-his-basement-got-him-a-visit-from-the-fbi/

Don, N9NTP, is a great guy and means no harm. He was the owner and creator of Wyman Research that made and sold the 439 MHz Triton ATV transmitter for many years. He is an active participant of SSTV in this area and moderator of the Hamvention SSTV forum. Last year he joined us at the Hamvention Friday night dinner and gave an hour long presentation of his past life experiences including his involvement with the Manhattan project to produce the first atomic bomb. He now lives alone at his residence outside Indianapolis, Indiana. It's too bad he is being subjected to the interrogation as described below. Ed, WA8RMC

When Andi Essex got an eyeful of Don Miller's gigantic basement collection of artifacts he's acquired from his travels around the world, she was enthralled. "It's unreal," Essex told WISH-TV in Indianapolis, adding that the "full skeleton is what blew my mind" and that her "favorite" was Miller's piece of Hitler's bunker.

The 91-year-old is a veteran, former teacher, and was part of the Manhattan Project which created the atomic bomb — and over eight decades has traveled to more than 200 countries, collecting and bartering for artifacts along the way.

"He's just a very interesting, interesting guy," Essex told WISH. Apparently the FBI agrees.

Federal agents took over Miller's home in Waldron, Ind.; about 35 miles southeast of Indianapolis, on Wednesday because they believe some of his artifacts may violate several treaties and could have been "acquired improperly."

"Over the last several months, an FBI investigation has determined that Mr. Miller may have knowingly and unknowingly collected artifacts, relics and objects of cultural patrimony in violation of several treaties federal and state statutes," FBI Special Agent in Charge Robert Jones told WISH.

Jones said some statutes and laws from the last several decades may not have been in effect when Miller collected some of the items, adding that it's "our duty to ensure they are properly identified, safeguarded, collected and stored in a manner that allow us to eventually to return them to those Native American and other nations and cultural groups who have legitimate rights to ownership."

While Miller invited the agents inside his home and told WISH that everything is rightfully his, officials are making sure in a big way. A command station, trucks, and huge tents surround Miller's house, along with crime scene tape, as they comb through his artifacts.

"He is being cooperative and so far everything is going well," Paul Bresson, FBI spokesperson, told WISH.

The FBI added all artifacts Miller possesses legitimately will be returned to him; the agency wouldn't confirm or deny if criminal charges are being filed.

Jones said the FBI will turn over its findings to the U.S. Attorney's office once the investigation is complete.

"I have never seen a collection like this in my entire life except in some of the largest museums," IUPUI Professor of Anthropology Larry Zimmerman told WISH.

The FBI noted that no one is in danger and that they want to return artifacts to their rightful owners and places of origin if necessary — which would be a disappointment to neighbors who've viewed Miller's collection with a sense of awe.

"I had even asked him, 'Can I bring my Grandpa? Can I?'" Essex recounted WISH after her tour. "He was like 'Oh, sure! Just call me. Yeah, we'd love to show him through here.' Because you know, anybody who interested who's a history buff would love to see some of the stuff he has."

"He was just one of those guys that you meet once in your life, and he has a huge impact on you, and you just never forget him," Melissa Kleiman told WISH.

"He was just one of the most interesting guys I've ever met. Loves to tell stories of his travels, and he's been all over the world." Among the countries he's visited are Haiti, New Zealand, China, and Greece. When she heard that the FBI was conducting an investigation of his collection, Kleiman told WISH she was "flabbergasted."

"I'm just thinking about this wonderful man that I had met three years ago, and I'll never forget him and all the stories he told us. I just can't imagine him doing anything wrong on purpose."

But while people all over the internet complained, not one is taking up arms and rushing to his defense. And so it goes.
…WA8RMC

DigitalATV – Understanding DVB-S Protocol

by Ken Konechy W6HHC and Bandwidth Updates by Hans Hass DC8UE

Reproduced from the Orange County Amateur Radio Club newsletter. **www.W6ZE.org**

There are about four protocols being tried by hams for Digital-ATV (DATV) today. These DATV protocols are:

- DATV-S (originally used for commercial Standard Definition [SD] satellite transmissions)
- DATV-T (originally used for commercial SD terrestrial transmissions…over-the-air to your TV)
- DATV-S2 (originally used for commercial HDTV satellite transmissions)
- ITU-T_J.83-B (originally used for US/Canada cable-TV-industry transmissions)

Ken plans to cover each of these protocols in future articles. But, today we start with the DVB-S protocol.
This month, DATVtalk will explain a few Digital-ATV concepts that are typically not understood by most hams and even analog ATVers. Using the DVB-S standard to transmit a digital ATV signal involves:

- MPEG-2 compression data rates for video
- Video bit-rate needed
- Net Data bit-rate available
- Symbol-Rates
- FEC (Forward Error Correction) algorithms
- QPSK (Quadrature Phase Shift Keying) digital modulation
- RF Bandwidth

This article will now walk through these various DATV factors and arrive at determining the resulting RF bandwidth for DVB-S.

Video Data-Rate and Compression

DATV needs to compress the video data rate from a camera to a manageable value using video compression technology such as MPEG-2 or MPEG-4. Today, most hams use Standard Definition digital TV (SDTV) using MPEG-2. For DATV, the analog camera output (NTSC or PAL) is first digitized by the MPEG-2 Encoder board shown in **Fig 1**, and then compressed by the MPEG-2 algorithm. The reason the compressed video data rate varies in **Table 1** is that the low value means little motion (a "talking head" QSO) in the video scene and the higher value means a lot of motion (like a soccer game). In the near future, digital cameras will find their way into mainstream ham DATV.

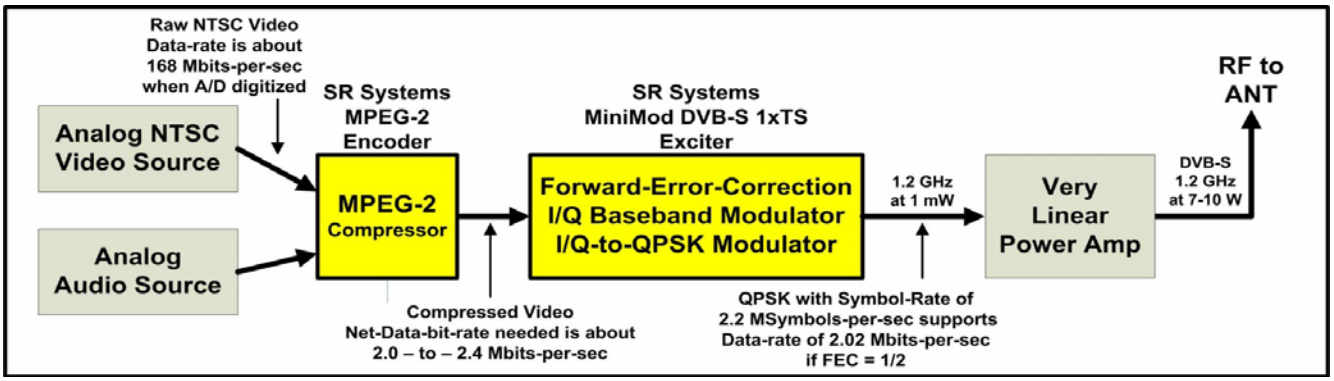


Figure 1 DATV Block Diagram Showing Various Data-Rates and Symbol-Rates for DVB-S QPSK (for 2.2 MSymbols-per-sec, the Bandwidth is 3 MHz)

Table 1 – Camera Video Data Streams and MPEG-2 Data Streams

Video Data Stream	Data-Rate	Notes
Analog NTSC camera	168 Mbits/sec	A/D digitized, uncompressed
NTSC MPEG-2	2-3 Mbits/sec	compressed
VHS MPEG-2	1-2 Mbits/sec	compressed
Analog PAL camera	216 Mbits/sec	A/D digitized, uncompressed
PAL MPEG-2	2.5-6 Mbits/sec	compressed
HDTV camera	1-1.5 Gbits/sec	uncompressed
HDTV MPEG-2	15-60 Mbits/sec	compressed
HDTV MPEG-4	12-20 Mbits/sec	compressed

Stefan-DG8FAC of SR-Systems (located in Germany...see links at the end) has explained to me that in Europe many hams set the MPEG-2 output data-rate to be 2.5 Mbits/sec for PAL. Stephan further suggests that the MPEG-2 output data-rate for NTSC would be about the same. I suspect that for NTSC there should be about a 22% reduction in MPEG-2 output data-rate from PAL, to about 2.0 Mbits/sec. I originally planned for a 2.5 Mbits/sec video stream. But when I finally tested my station DVB-S transmitters, I measured that the NTSC MPEG-2 output (including audio) displayed reasonable quality all the way down to a data-bit-rate reduced to about 1.9 Mbits/sec stream. For comparison, I also added a row to show MPEG-4 compression with HDTV.

FEC Inflation of Video Stream Data-Rate

Forward Error Correction (FEC) is a technology that not only can detect an error on the received signal, but adds enough redundancy of the data so that it can correct the wrong bit. It can even correct two wrong bits. Since redundancy increases the data-rate of the video stream, there is a trade-off between more redundancy and the required video data-rate becoming too large. As we will see a little later in this article, the larger the video stream data-bit-rate, the higher the required RF bandwidth. So at some point the FEC algorithm will not have enough redundancy to correct too many errors and the DATV screen will go blank.

The DVB-S commercial television standard uses two different Forward-Error-Correction (FEC) algorithms together in order to provide protection against noise errors and multi-path errors. The first FEC algorithm is called Viterbi. The second FEC algorithm is called Reed-Solomon.

The Viterbi FEC algorithm can be configured for different levels of error correction. These different Viterbi configuration/redundancy settings are usually called: 1/2, 2/3, 3/4, 5/6 and 7/8. The first number ("1" in the case of configuration 1/2) is the number of input bits. The second number ("2" in the case of configuration 1/2) is the number of output bits from the $FEC_{viterbi}$ algorithm. So the MPEG-2 output data stream is "inflated" 100% by this FEC algorithm configured for 1/2. That is...for every bit going into the FEC engine, two bits come out. A $FEC_{viterbi}$ algorithm configured for 3/4, for example, would inflate the MPEG-2 output data stream by 33%. So FEC levels can really inflate the data-bit-rate going to the RF modulator; the MPEG-2 algorithm compresses the video stream, but the FEC algorithms start to expand the required data-bit-rates again.

The Reed-Solomon FEC algorithm has a fixed configuration. Its data stream "inflation rate" is 188/204. So for every 188 bits going into the $FEC_{reed\text{-}solomon}$ algorithm, 204 bits come out...an additional FEC inflation of 8.5%.

Digital Modulation Symbols and Symbol-Rates

Digital modulation technology like BPSK (for example PSK-31), QPSK (Quad Phase Shift Keying – like DVB-S) and QAM256 (Quadrature Amplitude Modulation with 256 "constellation points") have the ability to put more information into a narrow frequency spectrum than analog modulation. The complexity of the digital modulation scheme, allows us to pack more "data bits" into each SYMBOL. **Table 2** lists out how many data bits can be packed into a symbol for several well-known digital modulation technologies.

Table 2 – Symbol Bit-Packing for Various Digital Modulation Technologies

Modulation Scheme	Data Bits per Symbol (Me)
BPSK	1
QPSK	2
8-VSB	3
QAM16	4
QAM256	8

Table 2 means that QPSK will pack two data bits into each symbol being modulated. If we know the final output data-bit-rate (I will call this inflated data rate the "Gross Data-Bit-Rate") we need for the television signal, then the "symbol-rate" we need is exactly one-half of that data-bit-rate. For example:

Gross Data-Bit-Rate = 4.5 Mbits/sec
Symbol-Rate Needed = 2.25 MSymbols/sec

The formula to calculate the Symbol-Rate setting that I need for my DVB-S transmitter is:

Symbol-Rate Needed = NDBR / (Me x CRv x CRrs)

Where:

NDBR = Net Data Bit Rate (aka the information rate)
Same as MPEG-2 output stream data rate in Table 1
Me = Modulation Efficiency (2 for QPSK in Table 2)
CRv = Correction Rate setting for Viterbi (1/2, 3/4, etc)
CRrs = Correction Rate value for Reed-Solomon is 188/204

I will now calculate an example for QPSK where the output of MPEG-2 is 2.4 Mbits/sec and FECviterbi is configured to a value of 1/2.

$$\text{Symbol-Rate Needed} = \frac{2.4\ \text{Mbit/sec}}{2\ \text{bits/symb} * (1/2) * (188/204)}$$

$$\text{Symbol-Rate Needed} = \frac{2.4\ \text{Mbit/sec}}{0.921\ \text{bits/symbol}}$$

Symbol-Rate Needed = 2.65 MSymbol/sec

If I change the FECviterbi setting to 3/4, then the CRv value becomes 3/4 and the results are:

Symbol-Rate Needed = 1.73 MSymbol/sec

The Symbol-Rate that is needed was reduced because the "inflated data-rate" caused by a lot of FEC redundancy was reduced. The values inside **Table 3**, shows the Net Data Bit Rate that can be supported by a particular Symbol-Rate using several FEC settings. The FEC setting needs to result in a number of Net Data Bit Rate that is at least 2.4 Mbits/sec. The red values in the table show FEC settings or Symbol-Rates that result in a Net Data Rate of less than 2.4 Mbits/sec that I set as my goal for MPEG-2 video stream output.

Table 3 – Symbol Bit-Packing for Various Digital Modulation Technologies

Modulation	FEC Coderate	DVB-S RF BANDWIDTH for DATV (RF BWallocation = SymbolRate x 1.33)					
		2.0 MHz (SR = 1.5 MS/sec)	2.5 MHz (SR = 1.88 MS/sec)	3.0 MHz (SR = 2.25 MS/sec)	4.0 MHz (SR = 3.0 MS/sec)	5.0 MHz (SR = 3.75 MS/sec)	6.0 MHz (SR = 4.50 MS/sec)
QPSK	1/2	~~1.38~~	~~1.73~~	2.07	2.76	3.46	4.15
	2/3	~~1.84~~	2.30	2.76	3.69	4.61	5.53
	3/4	2.07	2.59	3.11	4.15	5.18	6.22
	5/6	2.30	2.88	3.46	4.61	5.76	6.91
	7/8	2.42	3.02	3.63	4.84	6.05	7.26
		NOTE-1: NTSC Analog Camera produces about 2.0 Mbits-per-sec MPEG-2 output for Ham Radio type broadcasts					
		NOTE-2: The Net Data Bit-Rate values inside the Table need to be at 2.05 Mbps or larger to support the expected camera and audio data rates coming from MPEG-2 encoder					
		Note-3: The Net Data Bit-Rate values inside the table shown in RED (with strikethrough) are Net Data BitRates that are too small to support the payload data stream.					

Confusion about the word "Bandwidth"

Note – Hans DC8UE, who has many years of experience as a satellite communications engineer for commercial television, was very kind to spend a lot of time to help me understand RF bandwidth for DATV. While talking to hams in Europe about DVB-S DATV repeater designs, Ken noticed that sometimes he was given unexpected values of RF bandwidths being used by the European repeaters. The Symbol-Rates (S/R) being reported by the repeaters were always accurate (Symbol-Rate is always a setting in the transmitter, so it is well known), but the RF bandwidth reported by repeater owners sometimes had an unexpected relationship to Symbol-rate. A little searching on the internet (love the Google and Bing search engines) showed that there are at least three popular ways methods of defining RF Bandwidth for DVB-S.

-
- **"minus 3 dB" bandwidth method**
- **"occupied" bandwidth method**
- **"allocation" bandwidth method**

So if you were to ask three different hams "what DATV bandwidth are you using?"...you may get three different answers when talking about the same DATV DVB-S repeater!!

The authors agree that the most important purpose of describing bandwidth for DATV hams...is to provide a value that can be used for band-plan spacing and frequency coordination to avoid adjacent interference. Now we will look at these three methods of describing RF Bandwidth for DVB-S (QPSK modulation).

"minus 3 dB" bandwidth method

With this method, the bandwidth is measured at the points that are down 3 dB. This is a typical method for measuring an analog filter bandwidth and represents the "half-power point" if you are looking at voltage on a spectrum-analyzer.

Mathematically, BW-3dB ≈ S/R for this definition of bandwidth

While the **BW-3dB** method is very familiar to analog engineers and analog ATVers, it is not very useful for DATV to define the bandwidth of a digital signal transmission link for two reasons.

First, creating a digital-(pulse-) modulation signal produces a non-Gaussian signal-flank (shape).

Second, you would not want to space the frequencies of several DATV stations "shoulder-to-shoulder" on their 1/2–power points, since significant power would overlap neighboring frequencies. This approach to spacing of stations would create potential receiving interference. Especially, if several DATV repeaters are located together on the same hill-top or tower so that receiving antennas are pointing in the same direction toward adjacent DATV repeaters.

As a note: The bandwidth of the DVB-S carrier at the minus 3.8 dB points is approximately the same as the symbol rate (S/R).

"occupied" bandwidth method

As defined by the commercial satellite standard, **3GPP TS 34.121, section 5.8**, the Occupied Band-Width (OBW) is the bandwidth containing 99% of the total integrated power of the transmitted spectrum, centered on the assigned channel frequency.

Mathematically for hams: BWoccupied = 1.19 x S/R

How is the occupied bandwidth measurement determined? During this measurement, a Gaussian filter with a bandwidth greater than 10MHz and a resolution bandwidth (RBW) of 30 kHz or less is used to measure the distribution of the power spectrum.

First, the total power found in the measured frequency range is calculated.

Then, starting at the lowest frequency in the range and moving upward, the power distributed in each frequency is summed until this sum is 0.5% of the total power. This gives the lower frequency value for measuring the bandwidth.

Next, starting at the highest frequency in the range and moving downward, the power distributed in each frequency is summed until 0.5% of the total power is reached. This gives the upper frequency value. The bandwidth between the 0.5% power frequency points is called the “occupied bandwidth”.

While the "occupied" bandwidth spacing of repeater frequencies is better at preventing adjacent interference than “minus 3 dB” bandwidth spacing, it still lacks one feature. The spacing should have a little guard-band to allow for unplanned obstacles ...like signal-path nonlinearity, etc.

"allocation" bandwidth method

This method for describing bandwidth provides a little guard-band between adjacent DATV signals. The allocation bandwidth for DVB-S is calculated as

BWallocation = (1 + Roll-off-Factor) x Symbol-rate

BWallocation = 1.35 x S/R

When using a 0.35 Roll-off-factor. The Roll-off-factor (as shown in **Fig 2**) controls the grade of the slope of a DVB-S signal-edge.

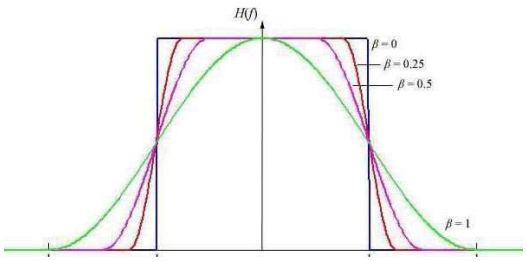


Figure 2 – Different roll-off slopes for different Roll-off-factors

The “allocation bandwidth” is determined by the big commercial satellite-providers (like inside the **Intelsat Earth Station Standard 420: (IESS420e.pdf)** as an area, inside that the power-level will be not be lower than –26dB. There will be a filtering necessary on the signal borders (mostly performed by software), which takes care, that the borders rolls out weakly. The grade (slope) of this roll off will be described by the Rolloff-factor. It shows the relationship between half of the roll off area to half of the wanted channel-bandwidth.
The DVB-S standard specifies the Roll-off-factor at 0.35. A raised cosine filtering at the edge region for the transmission path is required. The used filter generates in a first step only a root raised cosine shape. Only in combination with the same filtering inside the receiver you will get the wanted raised cosine form of the filter shape.

Choosing an RF Bandwidth for DVB-S DATV

It turns out, one of the advantages of digital-ATV is it can be more bandwidth-efficient than analog-ATV. With DVB-S and QSPK modulation you actually have the ability to easily make the DATV RF bandwidth as narrow as 2 MHz or 3 MHz without giving up any noticeable quality. This is because the commercial DTV standards planned to transmit several Television streams inside one normal (old) RF TV bandwidth.

Fig 3 shows a D-ATV DVB-S QPSK signal using a 1.5 MSymbols/sec symbol-rate of (generated by a MiniMod). It shows clearly 2.025 MHz of used bandwidth.

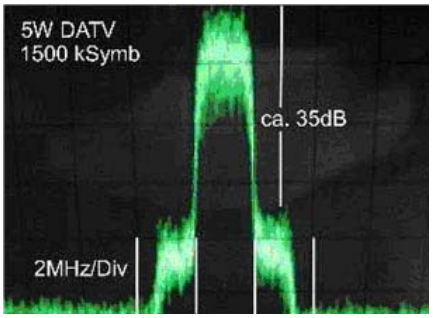


Figure 3 – DATV QPSK signal at 1.5 M Symbol/sec produces 2.025 MHz of bandwidth

Below 35dB you can see the additional shoulders, generated by distortion on the non-linear characteristic curves of the RF amplifiers being used. There is more on non-linearity, later in this article. The “allocation bandwidth” is in practice really very useful to describe the real used bandwidth for spacing DATV repeater frequencies. However, for ham radio, Ken W6HHC prefers to “adjust” the bandwidth allocation formula slightly to

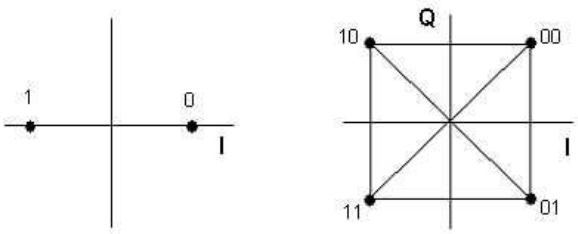
BWallocation ~= 1.33 x S/R

Ken explains that this "adjusted value" is less than a 2% error and is much easier to calculate in his head. The authors both agree that hams should only use the term **BWallocation** when they talk about DVB-S RF bandwidths for DVB-S. As **Table 3** displays, a 3 MHz RF bandwidth can be achieved with plenty of error correction capacity (FEC = 1/2) by selecting a Symbol-Rate of 2.25 M Symbols/sec.

Non-Linearity effects on QPSK bandwidth

Digital modulation using phase shifting (PSK) like BPSK or QPSK transitions from one state to another state. For QPSK, you are always in one of four states...and your next transition can be to any of those four states, as shown in **Fig 4**.

Figure 4 – Theoretical transitions in the I-Q plane made by BPSK (on the left) with two states and by QPSK modulation with four states.



However, non-linearity in the RF amplifiers can cause the received values of I and Q to contain errors from the theoretical. It is extremely important, to avoid compression in the power amplifier and to operate the signal path and PA in a linear mode. **Figures 5** and **6** shows the effects of increasing non-linearity on the transition of states for QPSK modulation. You can see in **Fig 7**, that the power levels of the shoulders (aka spectral regrowth) have grown to 20 dB below the carrier. This will splatter power into adjacent frequencies outside of the allocated bandwidth.

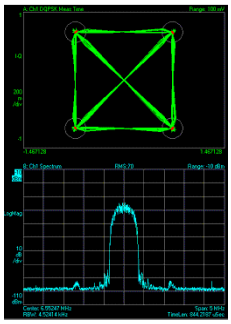


Figure 5 – Real-world QPSK state transitions closely match theoretical with good linearity. (Photo courtesy of PE1JOK and PE1OBW)

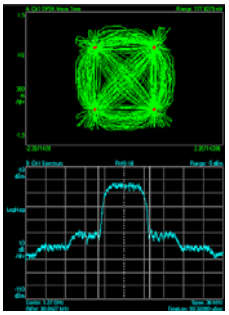


Figure 6 – More amplifier non-linearity increases errors as power increases (Photo courtesy of PE1JOK and PE1OBW)

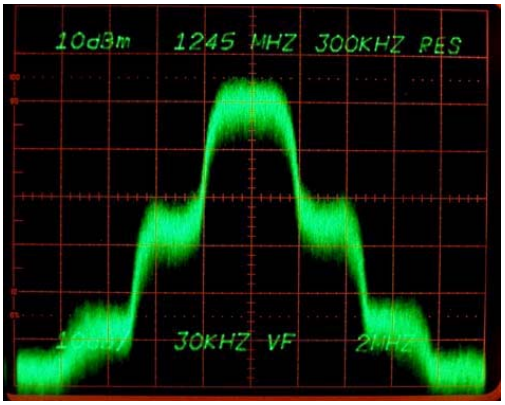


Figure 7 – Spectral regrowth after amplification with shoulders now only 20 dB below the carrier (Photo courtesy of Art-WA8RMC)

So while the average power level may seem low, the peaks can be going into compression (or even flat-topping in saturation), hence nonlinearity and hence stronger shoulder power levels. Commercial satellite-uplink operators adjust their shoulders to be more than 26 dB below the main carrier. Likewise, it should be the duty of hams that operate DVB-S repeaters and transmitters to not allow the shoulders to get within 26 dB of their main carrier in order to avoid interference to nearby frequencies.

Conclusion

The authors are impressed that the DVB-S protocol brings ATV to a whole new level of performance for hams compared to the old analog technology. The Forward Error Correction and QPSK modulation are very robust…and it allows a savings in RF bandwidth for ATV. My own field tests show that DVB-S overcome snow (weak signals) and ghosts (multi-path propagation) that had plagued analog-ATV transmissions in the same locations. It is no wonder that today; DVB-S is the most widely-used protocol for DATV.

Contact Info

The authors may be contacted at **W6HHC@ARRL.net** and HansHass@WEB.de

Useful URLs

- British ATV Club – Digital/DigiLite/DTX1 forums – see www.BATC.org.UK/forum/
- BATC info site for DTX1 DVB-S exciter – see www.DTX1.info
- DATV-Express Project web site (SDR-based exciter) – see www.DATV-Express.com
- DigiLite Project for DATV (derivative of the "Poor Man's DATV") – see **www.G8AJN.tv/dlindex.html**
- Orange County ARC entire series of newsletter DATV articles – see www.W6ZE.org/DATV/
- PE1JOK and PE1OBW on "The Ultimate Resource for Digital Amateur Television" – see www.D-ATV.com
- SR-Systems D-ATV components (Boards) – see **www.SR-systems.de**
- Yahoo Group for Digital ATV - see groups.yahoo.com/group/DigitalATV/

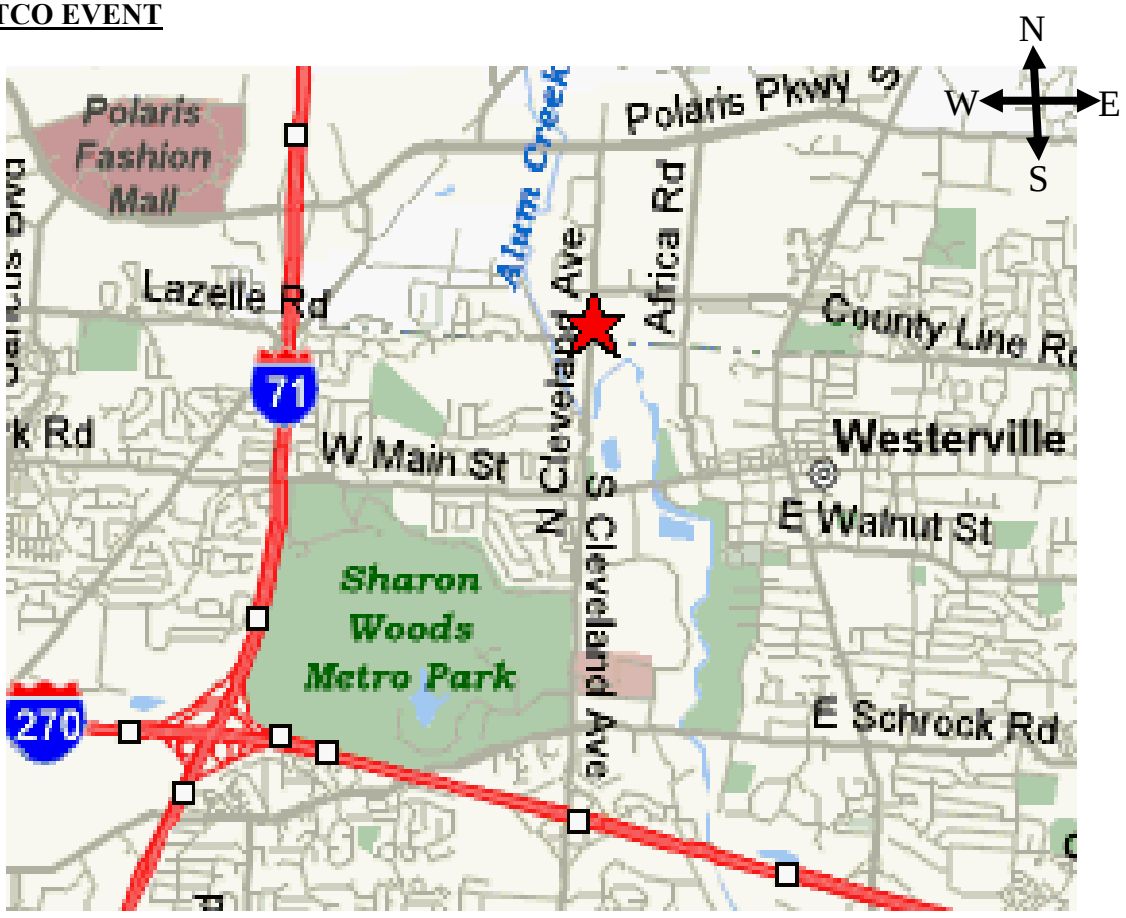
A T C O
2014 SPRING EVENT

12 Noon – SUNDAY (For hamfest)
(Lunch starts about 12:30 PM)
May 4, 2014
ABB PROCESS AUTOMATION CAFETERIA
579 EXECUTIVE CAMPUS DRIVE, WESTERVILLE
FOR MORE DETAILS, CONTACT
ART – WA8RMC - 891-9273
FREE LUNCH PROVIDED – DOOR PRIZES
BRING A FRIEND AND SEE OLD BUDDIES
MINI HAMFEST – SHOW AND TELL

DIRECTIONS TO THE ATCO EVENT

From I-70 WEST Bound:
Take I-270 Northbound around and turning to the west to Cleveland Ave. Exit north onto Cleveland Ave and travel north about 2 miles to Executive Campus drive. (It's the next street past Westar Crossing Street). Turn left (west) to the ABB building at the end of the street.

From I-70 EAST Bound:
Take I-270 Northbound around and turning to the east past SR 315 and past I-71. Get off on the Cleveland Ave second exit and travel north (to Westerville). Continue north on Cleveland past Schrock road and then past Main Street. Continue north about ½ mile past Main Street to Executive Campus Drive. (It's the next street past Westar Crossing Street) Turn left (west) to the ABB building at the end of the street



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

From I-71 traveling SOUTH bound toward Columbus (North of I-270):
Exit the Polaris Ave exit and travel East about 1 mile to Cleveland Ave. Turn right on Cleveland Ave to Executive Campus Drive. Turn right again on Executive Campus Drive. ABB is on the right side of the street about half way around the semi-circle.

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 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 II	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

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 30 IIII.
…Bob N8OCQ

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.

K9BIF Charlie Short, Goshen, Indiana
N8ASB Daun Yeagley, Wilmington, Ohio
…WA8RMC

LOCAL HAMFEST SCHEDULE

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

04/26/2014 | Jackson County ARC Hamfest
Location: Jackson, OH
Type: ARRL Hamfest
Sponsor: Jackson County Amateur Radio Club
Website: http://jacksoncountyarc.org/page3.html

04/27/2014 | Athens Hamfest
Location: Athens, OH
Type: ARRL Hamfest
Sponsor: Athens County Amateur Radio Association
Website: http://ac-ara.org/

05/16/2014 | Dayton Hamvention
Location: Trotwood, OH
Type: ARRL Hamfest
Sponsor: Dayton Amateur Radio Association
Website: http://hamvention.org

06/07/2014 | Fulton County ARC Hamfest
Location: Tedrow, OH
Type: ARRL Hamfest
Sponsor: Fulton County Amateur Radio Club
Website: http://k8bxq.org

06/21/2014 | MILFORD HAMFEST
Location: Milford, OH
Type: ARRL Hamfest
Sponsor: Milford Amateur Radio Club
Website: http://www.w8mrc.com

07/12/2014 | 20/9 ARC Tailgate and Hamfest 2014
Location: Austintown, OH
Type: ARRL Hamfest
Sponsor: 20/9 Amateur Radio Club
Website: http://www.20over9.org

07/19/2014 | NOARSFEST
Location: Elyria, OH
Type: ARRL Hamfest
Sponsor: Northern Ohio Amateur Radio Society
Website: http://NOARS.net

07/20/2014 | 27th Annual Van Wert Hamfest
Location: Van Wert, OH
Type: ARRL Hamfest
Sponsor: Van Wert Amateur Radio Club
Website: http://w8fy.org

07/27/2014 | Portage Hamfair '14
Location: Randolph, OH
Type: ARRL Hamfest
Sponsor: Portage Amateur Radio Club
Website: http://Hamfair.com

08/02/2014 | Columbus Hamfest/Ohio Section Conference
Location: Columbus, OH
Type: ARRL Hamfest
Sponsor: Voice of Aladdin Amateur Radio Club (W8FEZ)
Website: http://www.columbushamfest.com

08/17/2014 | Warren ARA's Annual Hamfest & Computer Show
Location: Cortland, OH
Type: ARRL Hamfest
Sponsor: Warren Amateur Radio Association
Website: http://www.w8vtd.org

09/07/2014 | Findlay Hamfest
Location: Findlay, OH
Type: ARRL Hamfest
Sponsor: Findlay Radio Club
Website: http://www.w8ft.org

INTERNET ATV HOME PAGES (list verified 01/21/12)

Domestic homepages

http://www.atco.tv	Ohio, Columbus, homepage (ATCO)
http://www.w8bi.org/atv/atvresources.html	Ohio, Dayton ATV group (DARA)
http://www.citynight.com/atv	California, San Francisco ATV
http://atn-tv.org/ATN.htm	California, Amateur Television Network in Central / Southern
http://members.tripod.com/silatvg	Illinois, Southern, Amateur Television group
http://www.ussc.com/~uarc/utah_atv/id_atv1.html	Idaho ATV
www.bratsatv.org.	Maryland, Baltimore Radio Amateur Television Soc. (BRATS)
www.qsl.net/k7atv/	Salem, Oregon Amateur Television Associations-Salem
http://www.qsl.net/kd2bd/atv.html	New Jersey, Brookdale ARC N2SMT/R repeater
http://www.ipass.net/~teara/menu3.html	North Carolina, Triangle Radio Club (TEARA)
http://www.oregonatv.org	Oregon, Portland OATVA ATV Association W7AMQ/R repeater
http://members.bellatlantic.net/~theojkat/	Pennsylvania, Phila. Area ATV W3PHL repeater
http://www.hotarc.org/atv.html	Texas, WACO Amateur TV Society (WATS)
www.qsl.net/ww7ats	Washington, Western Washington Television Soc. (WWATS)
http://www.shopstop.net/bats/	Wisconsin, Badgerland Amateur Television Society (BATS)
http://www.kcatvg.org	Kansas, Kansas City ATV Group WR0ATV repeater (KCATVG)

Foreign homepages

http://www.batc.tv.	British ATV club (BATC)
http://www.**batc.org.uk/cq-tv**	British ATV Club and CQ-TV Magazine

Misc other ATV related sites

http://www.atv-tv.org	The Amateur Television Directory
http://www.atn-tv.org	Amateur Television Network
http://www.atvquarterly.com	Amateur Television Quarterly Magazine
http://gb3lo.camstreams.com	"GB3LO" Repeater Camstream westoft, UK
http://www.ham-radio.com/sbms	"SBMS" San Bernardino Microwave Society
http://www.qsl.net/kc6ccc/	"METS" Microwave Experimenters Television System
http://www.icircuits.com/store/index.html	Intuitive Circuits ATV products
http://www.atvresearch.com/	ATV Research Co, cameras & related security products
http://www.downeastmicrowave.com/	Down East Microwave, UHF/Microwave parts
http://www.directivesystems.com/	Directive Systems, UHF/VHF/Microwave antennas
http://www.m2inc.com/	M2 Antenna Systems
http://www.hamtv.com/	PC Electronics, ATV equipment

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 has 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 if you can.

ATCO TREASURER'S REPORT - de N8NT

OPENING BALANCE (01/20/14)....$2162.36
RECEIPTS(dues)....$ 230.00
Flowers for W3SST....$ (64.44)
PayPal fees....$ (3.82)
Winter Pizza Party food.... $(205.80)
CLOSING BALANCE (04/22/14).... $ 2118.30

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 average street level (1460 feet above sea level)

TV Transmitters: 423 MHz QAM digital, 427.25 MHz VSB AM, 1258 MHz FM, 1268 MHz QPSK digital, 2433 MHz FM, 10.35 GHz FM
(multipole filters in output lines of all transmitters)
Output Power - 423.00 MHz : 5 watts continuous (Digital QAM ATV on cable channel 57)
427.25 MHz: 50 watts average 100 watts sync tip (Analog ATV on cable channel 58)
1258 MHz: 40 watts continuous (Analog ATV)
1268 MHz 20 watts continuous DVB-S (QPSK) DATV SR=3.125Msps, FEC=3/4 , 2 video channels.
(PMT PID:32, Video PID:162, Teletext PID:304, PCR PID:133, Audio PID:88, Service ID:5004)
2433 MHz: 15 watts continuous
10.350 GHz: 1 watt continuous
Link transmitter - 446.350 MHz: 5 watts NBFM 5 kHz audio

Identification: 423, 427, 1258, 1268, 2433, 10.350 GHz transmitters video identify every 15 min. with ATCO & WR8ATV on 6 different screens.
1268 MHz digital & 10.350 GHz analog - Continuous transmission of ATCO & WR8ATV with no input signal present.

Transmit antennas: 427.25 MHz - Dual slot horizontally polarized "omni" 7 dBd gain major lobe east/west, 5dBd gain north/south
423.00 MHz – Diamond U200 vertically polarized 9dBd gain omni (digital QAM ATV)
1258 MHz - Diamond vertically polarized 12 dBd gain omni (Analog ATV)
1268 MHz - Diamond vertically polarized 12 dBd gain omni (Digital DVB-S ATV)
2433 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni
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)
439.250 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, PCR PID:33, Video PID:33, Audio PID:49
This input feeds all transmitters and also directly to 1268 MHz digital output channel 2. Therefore, 1280 DATV input and 439 or 2398 can be ON at the same time. (Input here = output on all TV transmitters)
2398.00 MHz - F5 video analog NTSC. (Input here = output on all TV transmitters)
10.450 GHz - F5 video analog NTSC

Receive antennas: 147.480 MHz - Vert. polar. Diamond 6dBd dual band (also used for 446.350 MHz link output)
439.250 MHz - Horizontally polarized dual slot 7 dBd gain major lobe west
1288.00 MHz - Diamond vertically polarized 12 dBd gain omni
2398.00 MHz - Comet Model GP24 vertically polarized 12 dBd gain omni
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 up for 5 minutes) Select # to shut down before timeout.
697	Select Time Warner radar. (Stays up till turned off). Select # to shut down.
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 for auto scan to continue

Manual mode Functions:

00* then 1 for Ch. 1	Select 439.25 receiver
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 (6 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 1280 MHz digital receiver scan enable
03* or 03#	Channel 3 1280 MHz analog receiver scan enable
04* or 04#	Channel 4 2398 MHz scan enable
A1* or A1#	Manual mode select of 439.25 receiver audio
A2* or A2#	Manual mode select of 1280 digital receiver audio
A3* or A3#	Manual mode select of 1280 analog receiver audio
A4* or A4#	Manual mode select of 2398 receiver audio
C0* or C0#	Beacon mode – transmit ID for twenty seconds every ten minutes
C1* or C1#	C1* to disable 427 MHz transmitter, C1# to enable it
C2* or C2#	C2* to disable 1268 MHz digital transmitter, C2# to enable it

ATCO MEMBERS as of April 2014

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	
W8ARE	Larry Meredith III	6070 Langton Circle	Westerville	OH	43082-8964	
N8ASB	Daun Yeagley	1353 Gurneyville Road	Willmington	OH	45177	
K9BIF	Charlie Short	PO Box 554	Goshen	IN	46527-0554	
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
WB8CXO	Mike Young	289 Gayloard Dr	Munroe Falls	OH	44262	
N3DC	William Thompson	6327 Kilmer St	Cheverly	MD	20785	301-772-7382
WA8DNI	John Busic	2700 Bixby Road	Groveport	OH	43125	614-491-8198
K8DMR	Ron Fredricks	8900 Stonepoint Ct	Jennison	MI	49428-8641	
K8DW	Dave Wagner	2045 Maginnis Rd	Oregon	OH	42616	419-691-1625
WB8DZW	Roger McEldowney	5420 Madison St	Hilliard	OH	43026	614-405-1710
KC8EVR	Lester Broadie	108 N Burgess	Columbus	OH	43204	
WA8FLY	Rod Shaner	16012 London Rd.	Orient	OH	43146	740-279-3614
N8FRT	Tom Flanagan	6156 Jolliff St.	Galloway	OH	43119	
W8FTX	George Biundo	3675 Inverary Drive	Columbus	OH	43228	614-274-7261
WB2FVE	Craig Blaine	1195 Hooverview Drive	Westerville	OH	43082	614-891-5378
W8FZ	Fred Stutske	8737 Ashford Lane	Pickerington	OH	43147	
WA8HFK,KC8HIP	Frank & Pat Amore	3630 Dayspring Dr	Hilliard	OH	43026	614-777-4621
WA8HNS	Mike Gray	5029 St Rt 41 NW	Washington Ct Hs	OH	43160-8740	740-335-5133
W4HTB	Henry Cantrell	905 Wrenwood Dr.	Bowling Green	KY	42103	270-781-9624
WB2IIR	Michael Anthony	370 Georgia Drive	Brick	NJ	08723	
N8IJ	Dick Knowles	1799 Homeward Ave	Lima	OH	45805	419-231-7277
W8KHP	Allan Vinegar	2043 Treetop Lane	Hebron	Ky	41048	
WA8KQQ	Dale Waymire	225 Riffle Ave	Greenville	OH	45331	937-548-2492
N8LRG	Phillip Humphries	30856 Coshocton Road	Walhonding	OH	43843	614-3543744
WB8LGA	Charles Beener	2540 State Route 61	Marengo	OH	43334	
KD8KDM	Mike Bowlus	127 W. Plum St. PO box 221	Saint Paris	OH	43072	
W8MA	Phil Morrison	154 Llewellyn Ave	Westerville	OH	43081	
KA8MFD	Ross McCoy	227 S Boundary St PO Box 9	Edison	OH	43320	
N8NT	Bob Tournoux	3569 Oarlock Ct	Hilliard	OH	43026	614-876-2127
N0OBG	Jim Conley	33 Meadowbrook C C Est	Ballwin	MO	63011	
N8OCQ	Bob Hodge Sr.	3750 Dort Place	Columbus	OH	43227-2022	
W6ORG,WB6YSS	Tom, Maryann O'Hara	2522 Paxson Lane	Arcadia	CA	91007-8537	626-447-4565
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
W8RRJ,W8WTB	John Hull	580 E. Walnut St.	Westerville	OH	43081	614-882-6527
W8RUT,N8KCB	Ken & Chris Morris	2895 Sunbury Rd	Galina	OH	43021	
W8RVH	Richard Goode	9 Master Street Apt A	Springfield	OH	45504	937-478-6488
W8RQI	Ray Zeh	2263 Heysler Rd	Toledo	OH	43617	
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	
W8SJV, KA8LTG	John & Linda Beal	5001 State Rt. 37 East	Delaware	OH	43015	740-369-5856
KB8SSH	Mike Cotts	3424 Homecroft Dr	Columbus	OH	43224	614-371-7380
W3SST	John Shaffer	6706 Gilette Dr	Reynoldsburg	OH	43068	614-751-0029
WA6SVT	Mike Collis	PO Box 1594	Crestline	CA	92325	
W8TIP	Gene Hawkins	1720 Liberty Street	Toledo	OH	43605	
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 R. 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	
KB8YMQ	Jay Caldwell	4740 Timmons Dr	Plain City	OH	43064	
KC8YPD	Joe Ebright	3497 Ontario St	Columbus	OH	43224	
N8YZ	DaveTkach	2063 Torchwood Loop S	Columbus	OH	43229	614-882-0771
W8ZCF	Ferrel Winder	6686 Hitching Post Ln.	Cincinnati	OH	45230	
K3ZKO	Ron Cohen	915 Rowland Ave	Cheltenham	PA	19012	215-828-1263
N8ZM	Tom Holmes	1055 Wilderness Bluff	Tipp City	OH	45371	
KA8ZNY,N8OOY	Tom & Cheryl Taft	386 Cherry Street	Groveport	OH	43125	614-202-9042

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, they 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 so we can keep the dues clock consistent with the beginning of each year.

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: Tom Bloomer KC8WRI
Newsletter editor: Art Towslee WA8RMC

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. 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.