

Amateur Television Journal

February, 2025
issue #182

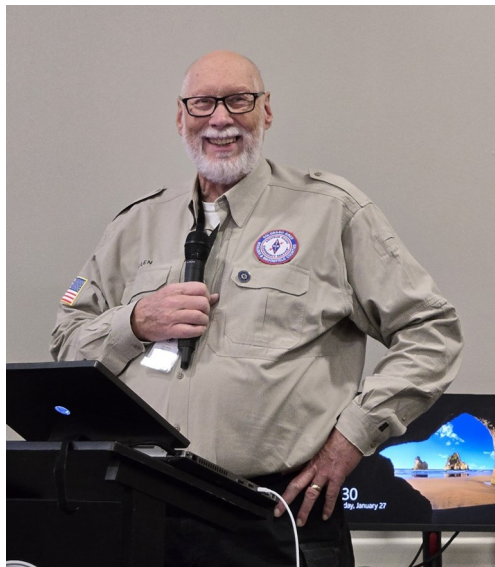
BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com



Jim Andrews, KH6HTV, editor - kh6htv@arrl.net www.kh6htv.com

BCARES Annual Meeting



Allen, K0ARK -- EC



Doshia, WB0NAS



Rob, KM2SHL

We held the **Boulder County - ARES (BCARES)** annual meeting on January 27th 2025. The meeting was held in the Boulder County, Colorado Sheriff's Office meeting room. There were 15 members present, plus a representative from the Sheriff's dept. along with three from the Office of Disaster Management (ODM).

Chairman & E.C., Allen Bishop, K0ARK, gave a great introduction talking about the major operations that BCARES has been involved with in the past including the big flood of 2013 and the Marshall Fire of 2021. We did not have any call outs in 2024, but that's actually a good thing from a community perspective.



70cm DVB-T Transmitters



70cm DVB-T portable Repeater



Microwave Extender

There were demos of our 70 cm ATV equipment with conventional camera and drone camera inputs and our portable, 70 cm DATV repeater was on display as well. A useful addition that was on display was a microwave HDMI extender. This can extend an HDMI connection over 10 miles.

Allen talked about the training events that were held in 2024 including for ATV, Winlink, WebEOC and a session on how to operate the BCARES station at the EOC. He also talked about the grant that BCARES received from the county to help us improve our operations. Allen discussed future cross-band ATV repeaters that could expand our ATV coverage throughout the county.



Drone ATV

Bill Eberle, ABOMY, treasurer gave a report. The bank balance as of Dec. 31st was \$33,460.75. The bulk of this is from the large grant BCARES recently received from Boulder County. Members were reminded to pay their annual dues of \$20.

Doshia Kretke, KB0NAS, is our hospital liaison and discussed upcoming mass casualty exercises that could simulate large events caused by terrorism, accidents or natural disasters.

Peter Goldman, WB2DVS, talked about the microwave IP network project that has a goal of connecting several EOCs in the area using microwave links via the Rocky Mountain Ham microwave backbone network that stretches the length of Colorado along the front range. Each EOC would have a digital Voice over IP (VOIP) phone and a laptop to provide basic telephone and email connections between those EOCs.

Eric Richards, KB0YDN, Loveland, talked about how his rural community near Pinewood Reservoir west of Carter Lake, is working on emergency preparedness by connecting non-ham community members with hams using GMRS radios. Then hams can connect to the local ARES group through ham radio for wider communications.

Bob Smith, N0ZFY, urged us to contact our local congressmen to push for legislation that would require HOA exemptions for reasonable amateur radio antennas to allow hams to provide communication during disasters including "black sky events" where all commercial communications infrastructure would be out of commission.

Rob Fauls, KM4SHL, continues his work on our official website to make it more useful and is also collecting data to see how often members view the website and respond to email requests. This is a way to measure how members are paying attention to communications from our leadership.

Report & Photos courtesy of Pete, WB2DVS

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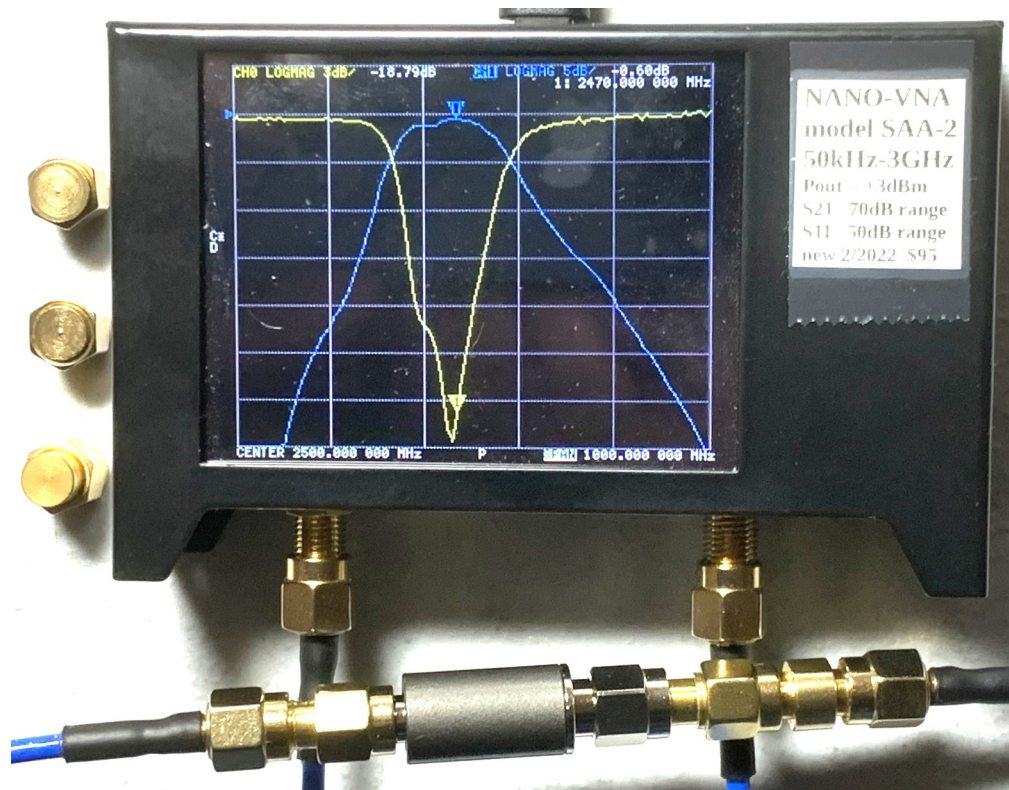
2.4 GHz Band-Pass Filter

Jim, KH6HTV

In the previous issue #181, I informed our readers about a very inexpensive (\$14), very low noise pre-amp from Amazon. It was extremely broad-band covering from the HF bands out to the 13 cm (2.4 GHz) band. It is my recommendation that it always be used with a band-pass filter to minimize the chances of overloading your receiver.

For the 13 cm band, I recommend this filter from Taoglas. It is their model BPF.24.01. It is available from DigiKey for \$26. They also offer a similar one for the 9 cm (5.8 GHz) band. The Taoglas specs. are: Ceramic filter, Freq. Range & pass band width 2.4 to 2.5 GHz, Insertion Loss in pass band < 1.3dB, Pass-Band Ripple 0.8dB, 50 Ohm, Pass-Band Return Loss 9.6dB min, 10 Watts max., Connectors SMA-RP plug & jack (caution note: reverse polarity !)

I measured the performance of one on my Nano-VNA. See the attached photo of S11 & S21. I measured the min. S21 at 0.6dB at 2.46 GHz with S11 of -21dB. At our Boulder DVB-T frequency of 2.393 GHz, S21 was -1.3dB with S11 of -13dB. The -3dB BW was 230 MHz (2.34 - 2.57GHz). Other band-widths measured were: -6dB (280MHz), -10dB (360MHz), -20dB (580MHz) & -30dB (800MHz).



Nano-VNA Measurement of Taoglas 2.4 GHz Band-Pass Filter. Blue trace is S21 (5dB/div). Yellow trace is S11 (3dB/div). Sweep from 2 GHz to 3 GHz. 200MHz/div.

TQP3M9037-LNA Feed-Back:

Hi Jim --- Last year I bought one of those preamps (mine was more expensive and had no battery...), but I didn't check it above 23 cm. So your review on the journal was very welcome! And I now understand the purpose of that diode on the output line! ---- I also watched your presentation about the LNA during last week's W0BTV - ATV weekly net. (*editor's note: The Boulder, Colorado weekly ATV net is held on Thursday afternoons starting at 3 pm (Mountain time zone). It is streamed over the BATC internet server in the U.K. <https://batc.org.uk/live/> click on ABOMY for our stream.*)

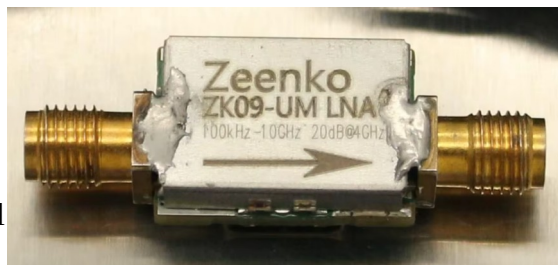
By the way, if you want to spend a little more money...you might want to consider one of these preamps: <https://vi.aliexpress.com/item/1005007657027549.html>
 In particular the ZK06_UM. I haven't bought one yet as I cannot do proper tests. But the guys behind these preamps are the same (<https://www.zeenko.tech/>) who engineered the nanoVNA-H4, LiteVNA and the Tiny SA-Ultra (I have them all!!!). They make also a better boxed version (with battery included):

<https://vi.aliexpress.com/item/1005007657180668.html>

Check out users reviews for more pictures.

3.4 GHz: If you guys can use 3.4 GHz, check this post Gareth, G4XAT, of BATC published on the UK Microwave.io group: <https://groups.io/g/UKMicrowaves/topic/110808373>
 In particular this amplifier <https://vi.aliexpress.com/item/32961940564.html> which is very cheap!
 Unfortunately here in Italy we cannot use that band... :-((
 Best 73 de I2NDT, Claudio, Dalmine, Italia

ZEENKO model ZK09 10 GHz Amplifier



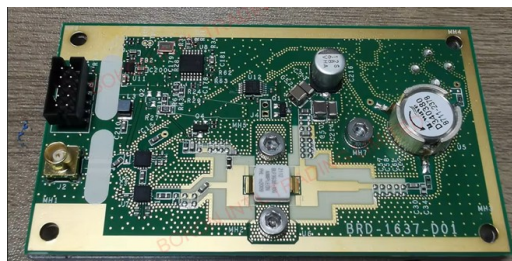
Following up on Claudio's suggestion, we find several different, but similar model preamps listed on the web site.

They have models going out to either 4, 6 or even to 10 GHz ! The ZK04 has 25dB gain at 100kHz and drops to 9dB at 4 GHz. It has 0.7 to 1dB noise figure from 100 MHz to 4 GHz. The ZK06 has 27dB gain at 10 MHz and drops to 22dB at 6 GHz. It has similar noise figure performance, but goes out to 6 GHz with 1dB NF. The ZK09 is flat at 21dB from 100 kHz to 3 GHz then rolls down slowly to 13dB at 10 GHz. The 10 GHz amp is a bit noisier with about 2 to 3 dB NF from 100 MHz to 8 GHz and 3.9dB at 10 GHz. Rated at +13dBm (-1dB).

Amazon is listing this particular version on their web site for sale at \$41 with 2 day prime delivery. The "BM" version contains a built-in battery. It appears to be essentially the same package as the \$14 TQP3M9037 which we reviewed in our previous issue. Claudio's link on it to AliExpress shows it being sold in China for the astonishing low price of only \$12 + \$4 shipping. Are there any readers out there who have evaluated it ? If so, please share your observations with your fellow hams.



Now here is Claudio's other find on AliExpress. An interesting 10 watt rf power amplifier pc board for the 3.4 GHz band. Almost zero info given on the web site except for:
 3.4GHz 10W 28V BLF9G38-10G with PCB RF MOSFET
 Power LDMOS transistor BLF9G38-10GU GJ
 price is \$15 plus \$10 shipping



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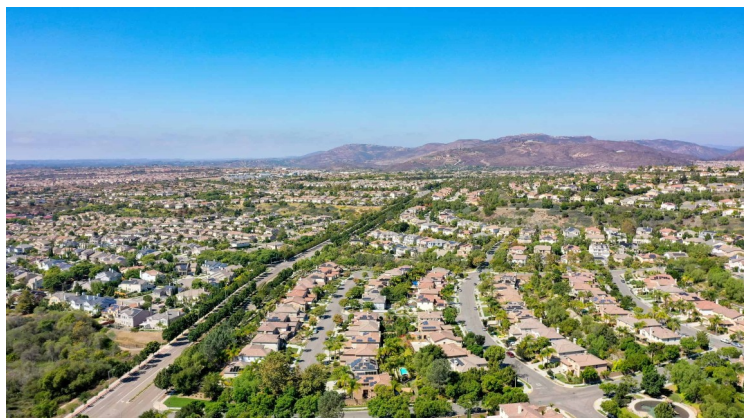
SAN DIEGO DVB SOCIETY -- members -- 2025



Thank you from the San Diego DVB Society

To: W0BTV Colorado --- We want to thank you and your team for providing programming content for our viewers about the latest activities on your system, equipment reviews, experimentation, field & remote operations and support to your surrounding communities. Thank you from all of us.

Editor's note: The San Diego group picks up the BATVC's weekly ATV net from our internet stream from the BATC server in the U.K. and then rebroadcasts it over their network. <https://batc.org.uk/live/Bill,ABOMY>, streams our nets and other significant BCARES activities to the BATC. Our weekly nets are held on Thursday afternoons starting at 3 pm local time (22:00 UTC). The nets typically run for about one hour.



QST: KD6ILO UAV Ground Control Station Project: SAR Image Communication Support Unit

KD6ILO
UAV PMGS-705G
DVB T2 DnLink 2k 6M HD Video
5.8 GHz UAV [on-site control]
5G-GSM2 Transceiver - Up[DnLink VoIP/Data/SRT VID [UAV Remote Control]
GSMU NVIDIA Jetson Nano
13.8 VDC 20A/ 110 VAC 60Hz

We tested this today(1/26) for the first time. The DVB-T2 reception was received well over 1.8 km at 300 feet AGL. Also via SRT VIA 5G to my SRT server. We have to test the remote function via the 5G Verizon {remote pilot} connection feature using the NMU so if the local pilot needs a break. We did a video downlink to the SRT feed to our public safety video server and our network server. Yes, the smoke in the background is from the southern California fires. That's why this unit was put together so our newest UAV could be supporting the damage assessment and recovery tasks {loaner package}. The 46K\$ system took me 5 weeks to finally complete.

San Diego DATV UAV 705G --- It is a programmable UAV with large lift capability for private or public safety use. , It was engineered to provide a stable foundation for machine learning applications, precision aerial video, data capture, and developer-configurable autonomy. It has a integrated Nvidia Orin GPU, offering unprecedented processing power of 157 Trillion Operations Per Second (TOPS), making it great choice in providing accessible computational power. With its 1024-core NVIDIA GPU, 32 Tensor Cores, 16 GB RAM, and upgradable onboard SSD storage ranging from 500 GB to 2 TB, the UAV is the definitive platform for aerial machine learning applications. Its design supports 5 lb payload capacity and features versatile interface ports including USB 3.0, Ethernet, and Flight Controller Telemetry, all within a weather- and thermal-resistant airframe.

73 de Mario, KD6ILO, Oceanside, California

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ATSC 3.0 on 13 cm: Ron, W6RZ, Mountain View, California has posted a note saying he has a demo You-Tube video showing the results of his ATSC 3.0 transmitter on 2304 MHz running at 2 to 3 dB SNR. ATSC 3.0 being transmitted from a Beagleboard X15 and decoded on a SiliconDust HDHomeRun 4K receiver. QPSK at 9/15 code rate (5.335885 Mbps)

<https://www.youtube.com/watch?v=cmIGM0I3NE0>

editor's note: ATSC 3.0 must have lots of different encoding layers. Joel, KD6W, sent this inquiry to Ron.

Joel: I think you are the only person in the world using ATSC 3.0 in your lab and made me wonder how you were managing the DASH or MMT layer, the ALP layer, and so on. Were you using FFMEG to make HEVC?

Ron's reply: It's using the legacy Transport Stream mode. The ALP layer for that is very simple. Unfortunately, there's no way to signal legacy Transport Stream mode to a regular TV, so it only works with the HDHomeRun. The bitstream is H.264 video (and AC3 audio) that I captured from my cable TV box with Firewire. It's not transcoded, just re-multiplexed to the correct TS bitrate. The HDHomeRun doesn't care what's in the TS. I can send MPEG-2 video also. I did correspond with someone who was able to transmit an STL (Studio to Transmitter Link) file, but most folks won't have access to that.

Doug Lung from NBC/Universal wrote a nice article in IEEE Broadcast Technology magazine (starting on page 20). It is entitled "Building an ATSC 3.0 Transmitter in GNU Radio".

https://bts.ieee.org/images/files/newsletters/BTS-4thQtr2022-web_1.pdf

Ron, W6RZ

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Cable QAM for ATV ? Joel Wilhite, KD6W, reports -- "I was out at Quartzfest doing my talk on Amateur TV and was leading the folks to play with QAM on cable frequencies in the UHF spectrum so that they can leverage the built in tuners you get from a store bought TV. "

Editor's Note: I strongly discourage the use of Cable TV QAM for over the air ATV. I refer reader's to my old 2014, KH6HTV Video application note, AN-14. I am here reprinting the portions of it dealing with QAM.

CATV 64-QAM: My first experiences [1] with amateur radio, high-definition, digital television (DTV) was in 2011. At that time, I experimented with the system used in North American cable TV (CATV) systems. It is Quadrature Amplitude Modulation (QAM) of either 64QAM or 256QAM, as specified by the standard ITU-T/J.83B, Annex B. I used a QAM modulator produced by R.L. Drake, their model DSE24 (\$1,200, 2011 price).

In the fall of 2011, a set of field trial experiments were run in Boulder, Colorado to compare the propagation characteristics of VUSB-TV, FM-TV, DVB-S, and CATV 64-QAM analog and digital TV systems. The results were documented in KH6HTV Video application note, AN-3, [2]. CATV 64-QAM worked, but it was judged that it was not going to be particularly useful for any emergency, field portable, ARES situations. The major use for ham TV in Boulder, Colorado is for ARES support of the local sheriff, police and fire agencies [3]. The CATV 64-QAM issues discovered included:

(1) Receiver Sensitivity --- the 64-QAM digital threshold sensitivity of typical commercial analog/digital TV receivers was -78dBm. 256-QAM was 8dB worse at -70dBm. The sensitivity of the other systems were 10 to 20 dB better than 64-QAM.

(2) Multi-Path --- multi-path distortions of the rf spectrum exceeding 10 dB caused the receiver to stop decoding the signal. In many situations when we had a true, visual, line-of-sight path between the transmit and receive antennas, we were still unable to receive the DTV signal due to multi-path.

(3) Mobile --- in general, except in extremely strong signal areas, mobile operation simply did not work at all. The DTV receiver seemed to take one to two seconds to achieve lock. With mobile "flutter" of varying signal strengths and multi-paths, the receiver simply could not keep up and thus -- no picture.

Additional Comments by KH6HTV on CATV-QAM --- The technical design for digital TV signals is dramatically different for the various propagation channels as they possess totally different characteristics.

Cable TV (DVB-C): A coax cable is essentially a perfect propagation environment. The signal strength levels can be kept quite high for excellent signal to noise ratios. This allows the use of highly complex, high levels of QAM of 64 or even 256. Plus, efforts are made by the cable companies to keep the VSWR low for all system components. With low vswr, there are essentially no "echos" propagating on the cable. In free space, we would call these echos multi-path.

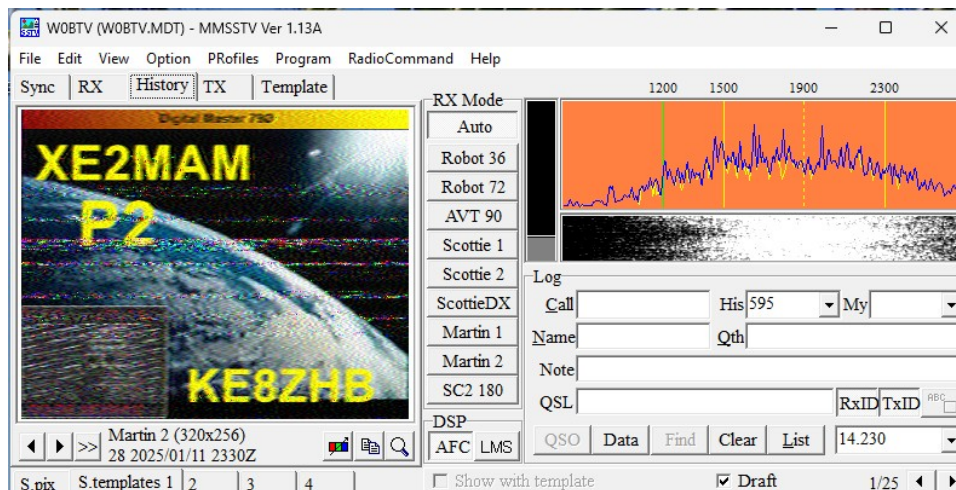
Satellite TV (DVB-S): Here we are dealing with signals coming down from outer space. The signals are inherently weak due to limited power budgets at the relay satellites. Thus the receivers must deal with very low S/N ratios. With highly directional, high gain, dish antennas pointed skyward, they are only dealing with the direct path signal from the satellite. Multi-path reflections (i.e. echos) are not a consideration.

Terrestrial TV (DVB-T): This is what we hams must deal with. Terrestrial means TV signal propagating horizontally over the surface of the earth. This is the worst possible signal environment of the three. Signal strengths might be very strong near the transmitter, or they might be extremely weak in fringe areas. There might be a lot of other stray rf signals also floating around in the TV channel causing RFI. Finally, there will almost always be multi-path signals present. In the old days of analog TV, we saw this immediately on our TV screens as "Ghosts". Multi-path is due to signals bouncing off of other reflecting surfaces, buildings, mountains, automobiles, etc. Multi-path can be either stationary or moving with doppler shifts. The engineers designing DVB-T had to contend with all of these effects in the required signal processing, both at the transmit and receive ends. The end result required a huge amount of computer processing at both ends. But the end result of their research was a very robust, excellent product.

Practical On-the-Air Experience: In the time period 2010-2013, several of us Boulder ATV hams tried using the Drake QAM modulator and linear amplifiers for sending DATV signals around town. Sometimes it worked, but usually the results were negative. So, when we discovered the Hi-Des gear for DVB-T in 2014 and how well it worked, we all immediately dumped our QAM Drakes.

If you are a new ham wanting to get into DATV, learn from our experience and **Do NOT use CATV-QAM!**

73 de Jim Andrews, KH6HTV, Boulder, Colorado



SSTV: Have you tuned across the 20 meter band and heard some funny, musical warbling tones ? Chances are the frequency was 14.230 MHz. What you were hearing was a transmission of Slow-Scan Television (SSTV). Still another aspect of our ATV, but on HF. Rather than sending moving live images, SSTV is the transmission of a single image, more like a slide show.

The most recent Jan/Feb 2025 issue of the ARRL's **On The Air** electronic magazine has a couple of useful articles about SSTV. On page 10, Wayne Greene, KB4DSF, article "Slow-Scan TV: Communicate Over the Airwaves with Pictures" On page 12, Steve Ford, WB8IMY, has an article "SSTV: When a Picture is Worth a Thousand Words"

WOBTV Details: **Inputs:** 23 cm Primary (CCARC co-ordinated) + 70 cm & 3 cm secondary all digital using European Broadcast TV standard, DVB-T with standard 6 MHz wide TV channels. Frequencies listed are the center frequency of the TV channel. 23 cm = 1243 MHz (primary), 70 cm = 441 MHz & 3 cm = 10.380 GHz
Outputs: 70 cm Primary (CCARC co-ordinated), Channel 57 -- 423 MHz with 6 MHz BW, DVB-T Also, secondary analog, NTSC, FM-TV output on 5.905 GHz (24/7 microwave beacon).
 Operational details in AN-51d Technical details in AN-53d. Available at: <https://kh6htv.com/application-notes/>

WOBTV ATV Net: We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time (22:00 UTC). The net typically runs for 1 to 1 1/2 hours. ATV nets are streamed live using the British Amateur TV Club's server, via: <https://batc.org.uk/live/> Select **ab0my or n0ye**. We use the Boulder ARES (BCARES) 2 meter FM voice repeater for intercom. 146.760 MHz (-600 kHz, 100 Hz PL tone required to access).

Newsletter Details: This newsletter was started in 2018 and originally published under the title "*Boulder Amateur Television Club - TV Repeater's REPEATER*" Starting with issue #166, July, 2024, we have changed the title to "*Amateur Television Journal.*" This reflects the fact that it has grown from being simply a local club's newsletter to become the "de-facto" ATV newsletter for the USA and overseas hams. This is a free ATV newsletter distributed electronically via e-mail to ATV hams. The distribution list has now grown to over 800+, both in the USA and overseas. News and articles from other ATV groups are welcomed. Permission is granted to re-distribute it and also to re-print articles, as long as you acknowledge the source. All past issues are archived at: <https://kh6htv.com/newsletter/>

ATV HAM ADS -- *Free advertising space is offered here to ATV hams, ham clubs or ARES groups. List here amateur radio & TV gear*

For Sale - or - Want to Buy

ITEMS FOR SALE OR GIVE AWAY:



ICOM 706 Mk2G RECEIVER



FLEX 2000 RADIO



ALINCO DR06 6 METER FM
MOBILE TRANSCEIVER



FLEX 6700 SDR RADIO



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