Amateur Television Journal

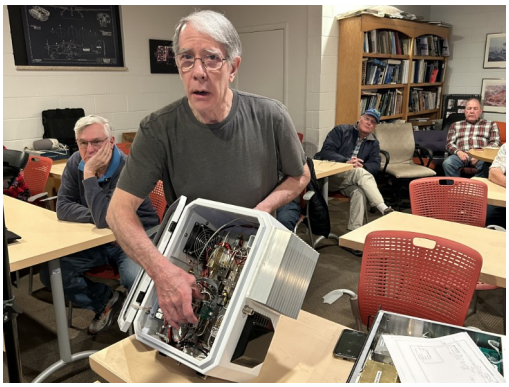
December, 2025
2ed edition, issue #199

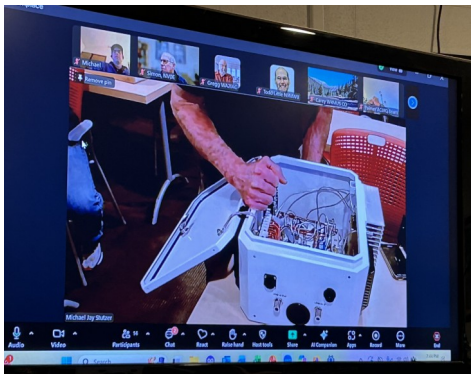
BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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

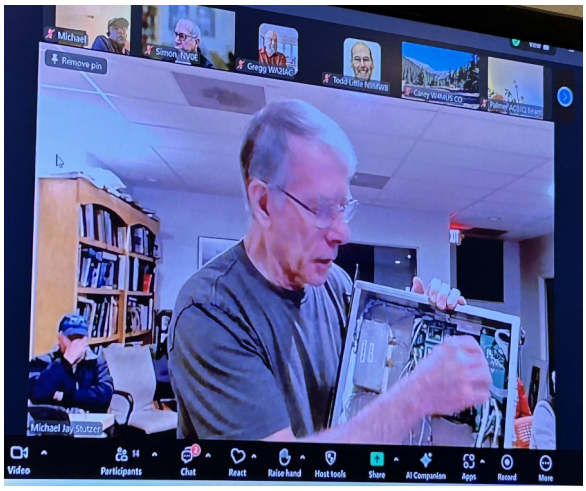
BARC "Home-Brew" Night Features ATV

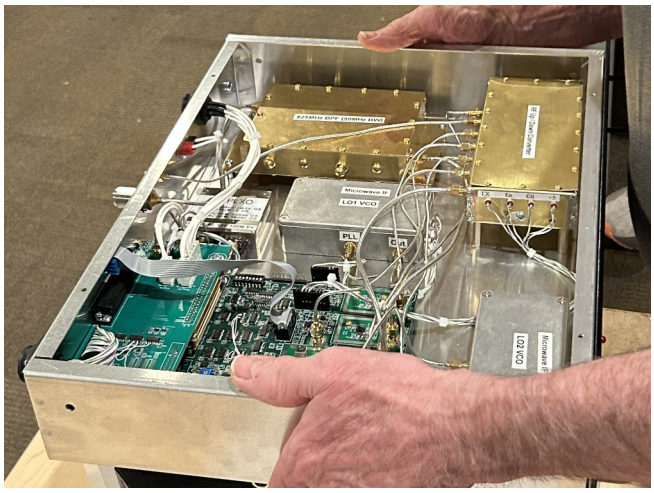




The December meeting of the Boulder, Colorado Amateur Radio Club was their annual "Home-Brew Night" where members were encouraged to bring their latest and greatest home projects to the club meeting for a great "Show-N-Tell". Some of the projects shown were: a collection of old 40's vintage ARRL handbooks, collection of low cost Chinese QRP rigs and apartment dweller antenna woes, a QRP antenna tuner for balanced feed-lines, a 40m/20m, CW transceiver with direct conversion receiver and class E transmitter, new operating software for remote operation of Flex Radio, etc. Ever since the covid pandemic, BARC has been doing meetings via Zoom over the internet. So some members elected to stay at home and participate, but show their projects from home.

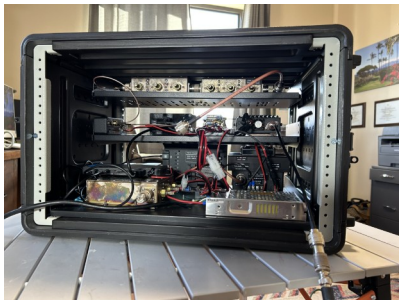
The most impressive and ambitious home-brew project was that of our own **ATVer, Steve, WA0TQG**. Steve has been working on home-brew designing and building an integrated system of all mode (including DATV), all-band (up to 3cm) transceivers featuring a common controller. His latest addition is to add the 5 cm (5 GHz) and 3 cm (10 GHz) bands. To eliminate the very long run of waveguide required to get 3 & 5 cm signals up and down to his antennas on the top of his tall 50 ft. tower, he has chosen to mount all of the microwave electronics in a water proof enclosure at the top of the tower adjacent to his dish antennas. He will then run coax with 800 MHz IF signals, plus control cables up the tower from the ham shack. The above photos are of Steve showing off the completed 3 & 5 cm microwave box.





These two photos are Steve showing off his controller box which resides in his ham shack

Jim, KH6HTV, brought to the meeting one of the two, new, 70 cm, DVB-T Repeaters, he had recently built for BCARES. He discussed the design principles involved in building a repeater.



Ham ATV Repeaters On the Inter-Net

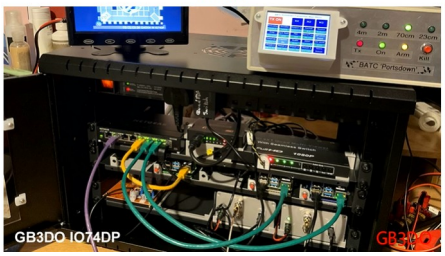
Want to see what other ATV hams are doing ? Then go to your computer and check out ***https://batc.org.uk/live/*** There are always about 25 ATV repeaters, plus about 1/2 dozen individual hams streaming live video to the BATC server in the U.K. Plus a whole lot more other ATV hams, including our own BATVC, stream occasionally. For BATVC / W0BTV video steaming, click on either AB0MY or N0YE. BATVC streams our weekly ATV nets, plus any BCARES emergency operations. Granted many of the 24/7 streams are just transmitter site local cameras, test patterns, or repeating slide shows, but sometimes you will be lucky and find real live video QSOs in progress, or ham club meetings. Here are a random selection of some the videos found recently on the BATC. When I snapped these images, only GB3JT, was an actual live presentation with a lecture on GPS, and a live QSO on W3BAB. Plus AB0MY showed a live ARES operation.

DB0OZ Bremen

F5ZBC

GB3CT

GB3DO



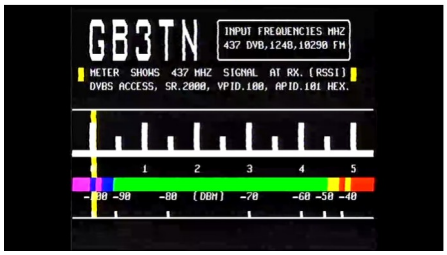
GB3EY

GB3GV

GB3HV

GB3JT

GB3TN



GB3YT

GB3ZZ

ON0TVO stream by ON5KR

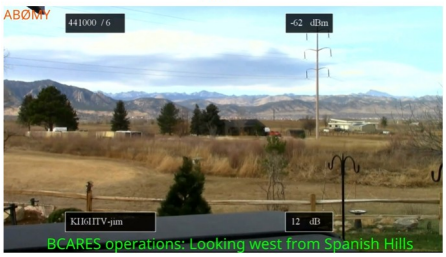
PA3FBX

W3BAB - Chesapeake ATV Society

W6CXATV

W6SVA

AB0MY



10 meter DATV Feed-Back:

Jim --- I saw the article by ON4VVV on 29 MHz DATV in the November ATV Journal. He suggests the use of 29.4 MHz for this activity. DATV transmissions on that frequency will cause significant interference to amateur satellite down-links. The UK's BATC suggests the use of 29.250 MHz to protect the weak-signal satellite down-links, see: ***https://wiki.batc.org.uk/29_MHz***

73 de Trevor, G3AKA, Dorset, England

(*editor's note: The BATC wiki article on 29MHz gives a good summary of the current state of experiments, equipment, etc. for live video on 10 meter band.*)

BATC Wiki - 29 MHz

(reprinted here with permission from BATC)

British Amateur Television Club

Page Discussion

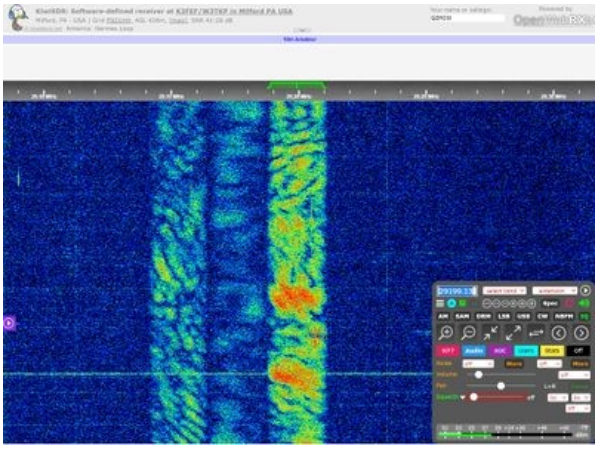
29 MHz

Introduction: The 2022 RSGB band plan *http://rsgb.org/main/files/2022/02/220126_2022-Band-Plans_RadCom-web.pdf* identifies 29000 - 29510 kHz segment as available for experimental wide bandwidth operation on a non-interference

basis to other stations, including the amateur satellite service segment at 29300 - 29510 kHz. It is recommended that stations use a center frequency of 29.250 MHz to avoid causing interference to the weak-signal satellite down-links of OSCAR 7 and CAMSAT satellites. In practice, this means we can experiment with reduced bandwidth DATV on 10 m. The 10 m band opens for worldwide DX around solar maximum, so theoretically and now in practice it is possible to transmit video worldwide.

These pages are intended cover the experiments, noting they are experiments, that may require significant effort in construction of equipment, development of software and quite a but patience in order to participate. So far, signals have been sent across the Atlantic by several amateurs using very low symbol rates. There is much still to do to improve performance and reliability. If that interests you, you are in the right place.

Propagation Effects and Multi-Path:



The F2 and E skip that provides good DX on 10m usually comes at the cost of multipath distortion. In practice this means our usual phase modulated signals (e.g. Quadrature Phase Shift keying (QPSK)) of above a few kHz bandwidth can't be decoded. Success so far has used relatively low bandwidth 18 ks/s QPSK in a bandwidth of ~20 kHz but even this is too wide-band and does not deliver particularly good video. Here are three narrow band signals received by a networked radio in Pennsylvania. They are Gareth G4XAT, Rob M0DTS and Mike G0MJW. All were about 100W, with Mike and Rob using beams and Gareth a vertical. The multi-path distortion is very apparent, as is the difference in propagation paths. Despite the good signal strengths, none of these signals were decodable except very briefly whenever a single path became sufficiently dominant.

The solution to multi-path for digital audio broadcasting at HF and VHF and terrestrial television at VHF/UHF is to use a modulation mode, called Orthogonal Frequency Division Multiplexing (OFDM) where many narrow bandwidth signals are stacked next to each other. ***Wikipedia - OFDM*** Each narrow bandwidth carrier is less impacted by multi-path and clever algorithms can be used to compensate and even take advantage of the multiple paths to either increase data throughput (as in MIMO) or improve the signal to noise ratio. Some form of OFDM is likely to be the best technique, but requires software development to enable it.

Equipment for 29MHz DATV

Generally, we can generate DATV signals in the same way we do for higher frequencies using software defined radios (SDR). The popular SDRs that are used to transmit DATV at higher frequencies are the Adlam-pluto and Lime Mini. The pluto does not work below 70 MHz and while the Lime Mini does cover 29 MHz natively, in practice the spectrum it generates in this region is not sufficiently clean to use on the air. Consequently, to use either device for transmitting it is best to down-convert from a higher frequency, for example with a 2 m to 10 m transmit down-converter. Similarly on receive, the popular Minitiouner used at higher frequencies does not tune down to 29 MHz. An up-converter is

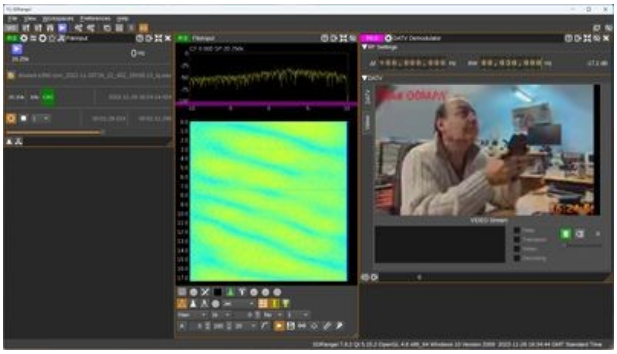
needed to translate the signal to an IF within the range of the tuner. A better option for receive may be to use an HF SDR, e.g. an Airspy, RFSpace SDRIQ/CloudSDR or an RTL dongle and decode the signal in a software package like GnuRadio or SDRAngel. Both of these software packages can also be used to transmit.

Software for 29MHz DATV
ffmpeg - for generating the encoded video stream SDRAngel - for receiving

Generating a Low Rate Transport Stream
There isn't much bandwidth available on 10m which means relatively low symbol rates are needed, probably occupying no more than 100 kHz of bandwidth, ideally less. This means we need to use the most efficient video compression readily available to us, at the time of writing this is H265 which can produce good video in 100 kb/s and fair video in less. The ffmpeg software package can encode video and generate low data rates mpeg transport streams. Using ffmpeg requires a complex set of command line options that must be tuned to get the best quality. For example the following developed by Rob, M0DTS, takes input from OBS and uses an Nvidia graphics card to generate a transport stream for a Pluto running Evariste F5OEO's firmware:

ffmpeg -f dshow -i video="OBS-Camera" -vcodec hevc_nvenc -g 8 -s 213x120 -bf 0 -pix_fmt yuv420p -b:v 10k -bufsize 30k -r 2 -preset fast -profile:v main -rc cbr_hq -rc-lookahead 5 -an -f mpegts -streamid 0:256 -metadata service_provider="YourCall" -metadata service_name="YourName" -max_delay 2500000 -pcr_period 80 -pat_period 0.4 "udp://192.168.2.1:8282?pkt_size=1316"

This is pretty complex and breaking this down is out of scope and might reveal many liberties being taken but it did actually work. Here is an example received trans-Atlantic using SDRAngel.

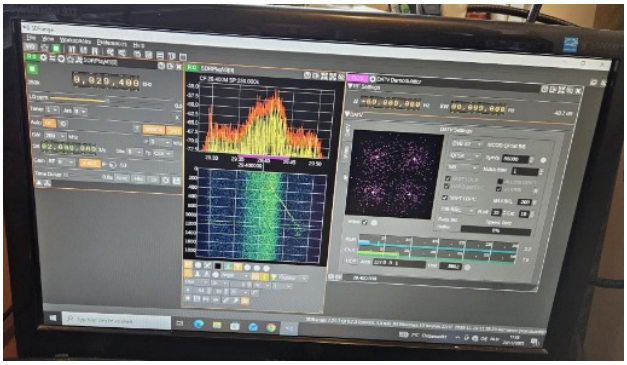


The above parameters need to be tweaked for each required but rate, which will depend on the transmissions bandwidth, modulation and forward error correction.

D-ATV Activities on 10 meters between BELGIUM & GREECE:

Dear Jim --- After the successful attempt mentioned in your newsletter of November a second test was done one week later. This time the conditions were slightly better and again a tens of minutes long communication was performed in DVB-S2 with 125 ks/s and also 250 ks/s where the picture quality was very good. Note that for the voice communication an ATV channel of “ZELLO” was used in order to keep all available data reserved for the video. You can see it in the YouTube film made by Stavros SV1EBS here: ***www.youtube.com/watch?v=t0PKCOGkYCg***

This time an attempt was made in direction Greece > Belgium too with a transmit power of around 50 Watts connected to the wire dipole. This signal was received in Belgium with sufficient signal strength but badly distorted by so far unknown reasons, maybe the PA, the antenna, the polarisation alternation in the ionosphere, making the demodulation into video not possible at that time. Picture of the received signal here.



A new schedule was made for the first days of December and the connection with Stavros SV1EBS succeeded again, on 5 attempts, 3 times success, not bad. We followed the classical procedure again, first to see if a CW carrier could be detected strong enough on a normal SSB receiver, because Stavros does not have a Spectrum Analyser or SDR ANGEL, and first with an SR of 33ks/s and then 66, 125 and finally 250ks/s. Each of these transmissions was crowned with received images, and that with a simple wire dipole without a preamplifier or bandpass filter on the receiving side.
You can see the excellent quality of the video for 250ks/s in the following YouTube film made by Stavros himself: ***www.youtube.com/watch?v=0RsGRJWGPog&t=109s***
I should add that before making the tests, in advance the real-time conditions for 10 meters were evaluated each time on: ***https://hf.dxview.org/perspective/JO10wx***

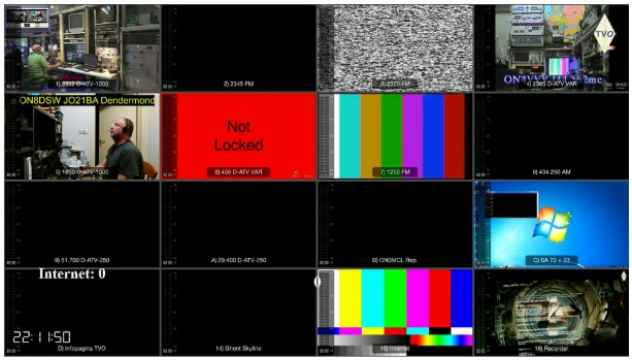
10 m DATV to Russia ! Our successful exploits on 10m also received attention on the "blog" of John Desmond EI7GL: ***https://ei7gl.blogspot.com/2025/11/digital-amateur-tv-experiment-between.html*** which also ended up on the ear of a Russian listening amateur a few hundred km beyond the Crimea. Since he was not at home on Saturday morning, he decided to register the entire spectrum around 29 MHz and then during his free time intended to make an attempt to demodulate the stored material by means of SDR CONSOLE and SDR TELEVISION. And yes that all worked out too, the direction from me to this OM differs by 30 degrees, but no problem as my 4 element yagi has a total horizontal opening angle of 60º at -3dB. You can see the result of his efforts here, and that in QRA locator KN95BG at a distance of 2594 km.
The Russian in turn published replies on the blog and a YouTube film on the Russian YT site:
https://rutube.ru/video/private/02c17478e0d3bde7127eb843829fdbab/p=LRxhTDEASKOmdNtk6mQLjg

I am still searching to make a transatlantic connection with the USA or Canada, anyone interested?
Contact me at ***ON4VVV@UBA.BE*** please.

73 de Frans, ON4VVV, Massemen-Wetteren, Belgium

ON0TVO

East Flemish ATV Repeater



A few months ago, a new output was added on 3cm. For now, the transmitter is operating as a test on approximately 10280MHz with an SR of 4000ks and in 8PSK, i.e., full HD. The frequency will be adjusted a second time very soon, and you may need to retune the receiver due to a five MHz difference. This new output is much stronger than the previous, and now defective, analog output on 10180 MHz. The new mosaic looks like this.

You can watch the stream 24/7 with VLC player: ***srt: srt.on0tvo.be:10000 10000*** . Note that the old stream via the BATC, including the chat mode, still works and will continue to work; for now, the old mosaic is still there.

The 2385 and 436 MHz inputs are equipped with a variable SR: 250, 500, 1000, and 4000 ks for 2385, and 250, 333, 500, and 1000 ks for 436 MHz. The receivers work with DVB-S, S2, H262, 264, and 265 compression, and with QPSK, 8PSK, 16, or 32APSK. The display also allows you to see the signal strength for various experiments. This means you can use an older SR-SYSTEMS transmitter, Portsdown TX, or other systems to conduct D-ATV or ATV. A similar variable SR is also available for the 1250 MHz input, should we manage to acquire a Minituner. In addition, there are D-ATV inputs at 1250 and 2332 MHz for an SR of 1000ks in both DVB-S and S2. NOT LOCKED only means that the RX does not see any signal coming in, in which case you will need to be patient during a TX test (max 30 sec), as the receiver is busy scanning the various preset SR's.

The classic FM inputs will also remain in service, one on 1250 MHz and one on 2370 plus 2345 MHz, although the latter is not yet operational. There is also access via the internet which is currently running on a trial basis. As soon as it is "finished" the access options will be announced, see box 15. The indication “Internet: 0” which you can see at the bottom left indicates the number of viewers at that moment via the internet.

Operation is still on 144.5625 MHz, but now via short DTMF tones of approximately 200 to 300 milliseconds. These DTMF codes are displayed at the bottom of the screen for each input. When an entered DTMF code is received and recognized, it appears as confirmation at the bottom center of the screen. To see the list of available DTMF codes overlaid on the screen, enter an (*), and enter (*) again to clear the list.

Note that the 6 cm D-ATV will soon be switching from DVB-S to S2 and from H262 to H264, so you may need a different receiver to receive these. The 1275 MHz output, however, will remain unchanged in DVB-S and SR 2000 ks and will soon also display the new mosaic.

73 de Frans, ON4VVV, Massemen-Wetteren, Belgium

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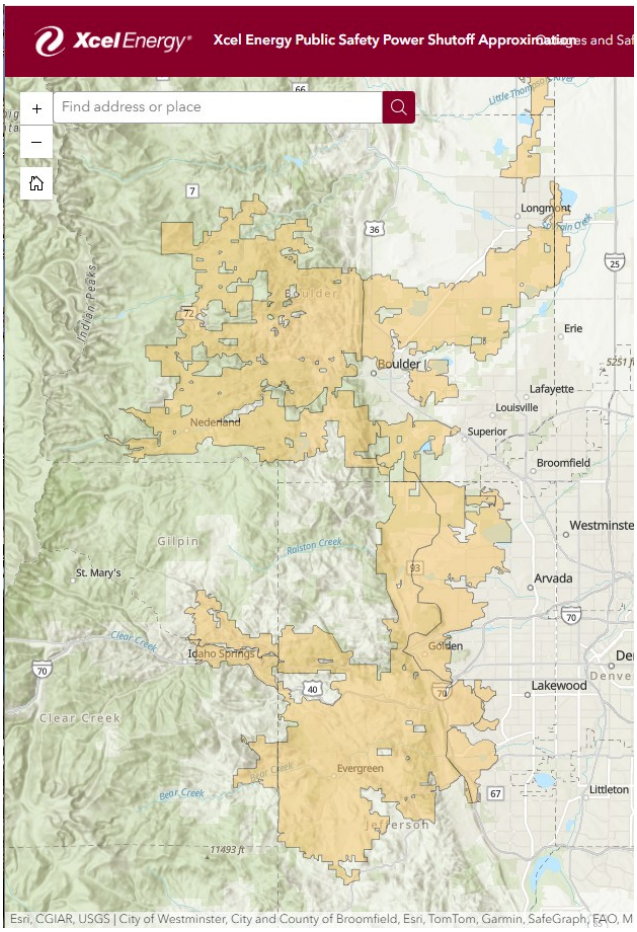
BCARES Activated for Wind Storms

The Boulder County Colorado, Amateur Radio Emergency Services group (**BCARES**) was recently activated for three days, December 17-19th, during severe wind storms. Winds with gusts exceeding 100 mph stuck the Front Range of Colorado, including the Denver-Boulder metro area with winds especially severe in and near the foothills.



The electric power company, Xcel Energy, turned off electricity service to a large area due to the winds. It then took the power company several days to restore power because they needed to physically examine all of their lines. This power shut-down was a preventative measure taken by them because they had been sued for causing the disastrous Marshall/Boulder fire storm on December 30th, 2021 when over 1000+ homes were burned down. They recently settled the law suit for over $500 million.

BCARES was activated by the EOC (Emergency Operations Center). They have a office (ham shack) at the EOC immediately adjacent to the large situation room. They were on stand-by if the need arose to open evacuation shelters. They had two main functions for this storm.

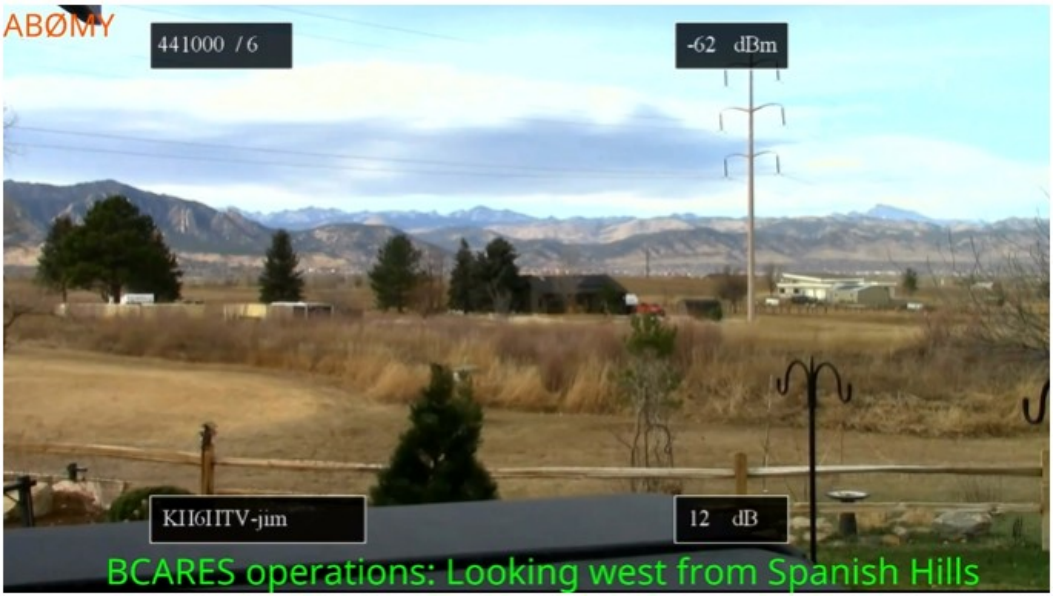
The first task was to monitor the 2 meter Mountain Emergency Radio Network (MERN) and act as a back-up 911 call center for the mountain communities. The second task was to provide video images of the Front Range mountains for spotting possible forest and/or grass fires. One video crew was dispatched to set up a TV camera on Panorama Point on Flagstaff mountain with a great view of the plains to the eastern part of Boulder County. The second camera was set up in the Spanish Hills area south-east of the city of Boulder at KH6HTV's QTH with an excellent view of the Front Range mountains in the western half of Boulder County. These video images were then displayed on a large

screen monitor in the EOC situation room. Fortunately, there were no fires in this wind storm ! We lucked out this time. There was wind damage from uprooted trees, etc., but no fires.

ATVers are quite active in BCARES. Allen Bishop, K0ARK, is the E.C. and chairman of BCARES. Bill Eberle, AB0MY, is the treasurer. Pete Goldman, WB2DVS, is the equipment officer.

BCARES ATV video from Flagstaff mountain looking over the city of Boulder

AB0MY



BCARES ATV video from Spanish Hills relayed via W0BTV ATV repeater.
Then streamed to BATC by AB0MY.

W0BTV 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/*

W0BTV 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