Boulder Amateur Television Club
TV Repeater's REPEATER

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BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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Boulder, Colorado -- ATV Repeater
W0BTV
Ch 57   423 MHz   DVB-T

ATN
The Amateur Television Network

High-Definition, Digital Video transmitted from BARC Field Day -- shown on a receiver in the Betasso shelter house.   Allen, K0ARK, at the mike on the 20 meter SSB station.

BARC FIELD DAY --- ATV Experiment a Success

After a one year intermission due to Covid, BARC once again participated in the ARRL's annual Field Day exercise.   As for the past several years, we held it at the Betasso open space preserve up in the mountains, west of Boulder. Allen was the Field Day chairman along with club president, Michael, KD0FDJ.   The main station was on 20 meters SSB using Allen, K0ARK's trailer mounted, motorized crank-up tower with a big Step-IR yagi antenna and Allen's HF rig.   There was also a digital station on 40 meters running FT-8

with a G5RV antenna.   Heimer, W1ANT, also set up an FT-8 station on 15 meters using his home-brew loop antenna.   Jim, KH6HTV, also furnished a 2 meter, FM rig and a GOTA station with an IC-7300 and mobile whip antenna mounted on the shelter house's metal roof.   The weather was nasty most of Saturday.   We had heavy rains and cold temps and had to shut down ops for a time due to the danger of lightning.   There was a good turn-out of members for field day.   Some came to operate the rigs while others came to just help with set-up and tear-down and also for some great eye-ball QSOs.

Allen gave the ATV group a challenge to get ATV coverage of the Field Day operation out to the rest of the world, via the Boulder ATV repeater and over the internet, via the BATC server in the U.K.   Allen provided a 70cm yagi antenna and rotator mounted on his crank-up tower.   We set up a DVB-T transmitter at the base of the tower.   It consisted of a Hi-Des HV-320E modulator driving a 12 Watt (rms), 70cm, KH6HTV amplifier. Our TV camera was setup in the 20m, SSB tent watching the computer monitor screen and the two operators. We also setup a TV receiver in the Shelter house so others could monitor the action on 20 meters.   We transmitted our signal on 441MHz and beamed it to KH6HTV's QTH south-east of Boulder.   The 14.5 km path was marginal at best.   It was not line-of-sight, but had to diffract around the north flank of Flagstaff mountain.   The *Radio Mobile* program said it would be "iffy" with perhaps a predicted 2.4dB margin.   *Radio Mobile* assigned 33dB of additional loss to the path based upon the Flagstaff mountain obstruction.   At KH6HTV's QTH, the 441 MHz signal was received and then up-linked again to the W0BTV, TV repeater on 1243MHz.   Once at the repeater, it was then re-broadcast over the Denver metro area and north-east Colorado on 423MHz, DVB-T and 5.905GHz, FM-TV.   The repeater's output was also sent over the internet on to the BATC's server in the U.K. ---- IT WORKED ! ! !

Allen's trailer mounted antenna arrives

The bosses - Michael (l) & Allen (center)

Assembling the BIG Step-IR antenna

Attaching it to the mast

Pushing the Sky Hook up in the air

The 70cm Yagi used for TV link

Our source of AC power

The 40 meter, FT-8 tent crew setting up antenna

20 meter, SSB tent

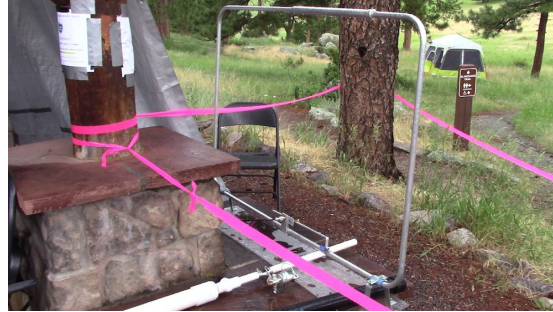20 meter SSB rig operator & logger

Betasso Shelter House - cold rain & wind blowing -- glad we were inside !

Heimar's 15m FT-8 rig & loop antenna

FT-8 demo

Joey's lecture on DMR radio

BARC's Barker -- Will's canine friend

Our permit to use Betasso for the weekend

HDMI EXTENDERS

At the recent BARC Field Day, we were asked to send video to the outside world. I mentioned to Allen, K0ARK, that the camera would need to be near the ATV transmitter as the A/V signal would not travel very far on HDMI cables. Allen said "No Problem, I have the solution".   What Allen had was a pair of HDMI to Ethernet cable boxes which allow you to send HDMI, 1080P video plus audio up to 400 ft. using CAT6/7 cable.   The sender / receiver pair is available from OREI (www.orei.com) for $70.   The model number is EX-400C. They worked !

SSTV From International Space Station
Chris, K0CJG

As reported in the ARRL Space Bulletin ARLS007, from June 21-26, 2021, the ISS planned to host a SSTV special event. Information provided by ARISS (https://ARISS.org) indicated transmissions would be on 145.8 MHz FM using PD120 (2 minutes per image). Twelve different images were to be broadcast more or less continuously during that period. As a relatively new ham (since August 2020), this looked like a fun opportunity to try something new. To get started, I looked up the ISS overpass times for my QTH grid square (DN70JA, at: https://amsat.org/track/) on 6/22, and tuned my rig to 145.8 MHz, just to listen for the signals during a predicted overpass. The first couple minutes after the AOS (acquisition of signal) time given by the tracker yielded only static. Then, faintly, I could hear the unmistakable "diddle" sound of an SSTV transmission preamble followed by the melodic chirp of an image being transmitted (an example can be found at: https://soundcloud.com/spacecomms/pd120-sstv-test-recording). Disappointment instantly turned to excitement, and I resolved to attempt to capture the entire image series, if I could.

My receiving station consisted of a Yaesu FT-991A set to FM mode, with a 16kHz bandwidth, fed by a Diamond X-50 vertical antenna on the roof of my shack, with the audio signal fed via USB to a Windows 7 PC running MMSSTV software (https://hamsoft.ca/pages/mmsstv.php). MMSSTV and the PC provided demodulation and image capture (the MMSSTV AFC should be engaged to compensate for Doppler shifts due to the high relative ISS velocity). Between 6/23/21 1624Z and 6/26/21 1856Z, 21 full or partial images were captured with picture quality P0-P5, and 10 of the 12-image-set were captured with ~P4 quality or better.   Several images were captured multiple times, but not all images in the set were seen. The first image captured exhibited a herringbone interference pattern (see Fig. 1) due to locally generated RF noise.

Figure 1. 6/23/21 1624 Z: Strong S6 SSTV signal, but radiated noise from two HDMI switchers operating in the shack caused copious herringbone interference. Once the sources were located, they were disconnected during all subsequent captures.

Figure 2 shows some examples of captured images judged to be P5 (occasional narrow signal dropouts are ignored for simple picture quality comparison ratings).

In an attempt to understand parameters that most affected image quality, an Excel spread sheet was used to log each image time along with the corresponding ISS maximum line-of-sight (LOS) elevation and maximum elevation azimuth angles. A linear interpolation in time was used to approximate the actual maximum elevation angle from my station to the ISS at the time corresponding to the center of each image. The images were then graded on a quality scale from P0 to P5
(see https://kh6htv.files.wordpress.com/2021/02/an-55a-atv-handbook-1.pdf for details), The latter being a perfect central image and the former being some indication of a transmission but no discernable picture. The quality ratings were plotted against the corresponding elevation and azimuth angles. There was no discernable relationship to the azimuth at maximum elevation, but higher central image ISS LOS path elevation angles largely corresponded to the higher P4 and P5 image quality factors as shown in Figure 3.

Figure 2   Examples of "P5" SSTV image captures from the ISS. Left: 6/26/21 1223 Z ; Right: 6/24/21 1849 Z.
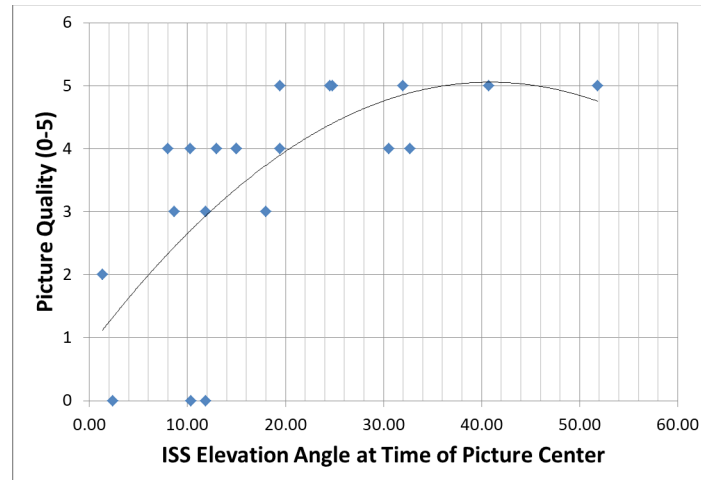
Fig. 3   Picture Quality vs. Elevation Angle

It is not clear why there are short duration dropouts in otherwise strong signals with a clear LOS (as can be seen in Figure 2). My antenna is vertically polarized and omnidirectional, so perhaps polarization variations or multipath reflections from the nearby foothills are involved. In either case, antenna improvements should address the issue. On one occasion, there was a strong signal, but the image was torn as though horizontal sync could not be achieved, and no signals were received at all on 6/25, presumably because none were transmitted during overpasses of my QTH. In any event, this was a toughly enjoyable exercise, and I look forward to future ISS SSTV special events.

Chris Grund, K0CJG, Boulder, Colorado

Update on Chinese DVB-T Modulators

Back in March in our issue # 73 of this newsletter, John, K0ZAK, informed us that he had found a couple of low cost ($80 + shipping) DVB-T modulators in China.   He promised to tell us more later after he had a chance to evaluate them.   Here is a recent e-mail from John.

Hi Jim ---   Sorry to say, that I have not made any more headway on the two Chinese modulators I have purchased. The first one (from Gecen) as I mentioned, has the same ITE modulator chip in it as the Hides UT100, which is capable of 1-8Mhz bandwidth. But it is currently limited to 6-8 Mhz due to the firmware that is loaded on it. It has an onboard processor that controls it via an I2C command bus. User setup is done via a an onboard menu generated from the processor. The bandwidth is set via a dropdown menu which is currently restricted to preset parameters of 6, 7 or 8 Mhz. If the firmware was modified to allow manual entry of the bandwidth, it should be capable of 1-8 Mhz. There is an unpopulated 3pin header location on the board that would allow direct communica-tion to the processor. My plan is to install the pins and attempt to communicate directly with the processor from a pc and see if I can copy the firmware and hack it. However, that is really beyond my current capabilities and I haven't wanted to risk blowing it up while we are testing with the 6Mhz settings.

The second modulator is very similar, but also has an ethernet port on it. It is program-mable either directly from the front via menu's like the first one, or by a menu on a pc when connected to it over the network. It is currenty restricted to 6-8Mhz bandwidth due to the same preset menu parameters. However, this modulator seems to have a different modulator chip than the first one. Unfortunately, there is a heatsink glued firmly to the chip, so I have not discovered who makes it or its native bandwidth range. The current setup menu's are somewhat different from the first unit, so it could be another manufac-turers chip than ITE.

While the first unit has the same chip as the Hides UT100, it is currently controlled via I2C ports while the UT100 uses a USB cable via different pins on the chip. If the chips weren't so small it would be rather simple to just enable the USB pins on the chip and use the Hides software to program it to 2 Mhz.

Both units will transmit at +6 DB output level, but I find that it is best to keep it set to -5 to 0 DB to keep the signal clean. It begins to grow the shoulders above 0Db and running through the amp.

BTW, I also now have built a BATC Knucker board and bought a Adalm-Pluto to play around with 1Mhz and below bandwidth signals. I have only been testing these signals in my house as no one close by is set up for that yet. Using the BATC Portsdowne4 soft-ware to drive the Adalm-Pluto.
It works somewhat but the transmit signals are very unstable right now. I need to do a ground mod and upgrade the oscillator board to get it a bit more stable before running it into an amp.

I also picked up a cheap used Hides UT100 on Ebay. it was the 6-8 Mhz receive version but the transmit will do 1-8 Mhz bandwidth, which is what I wanted it for. But I contact-ed Calvin at Hides about converting it to 2-4 Mhz to see if it could be done with firmware. He logged on to my pc and upgraded the firmware for me. I can now use the internal jumper and switch it between 2-4 mhz and 6-8 Mhz receive modes. Pretty nice especially since they want $100 more for the 2-4 Mhz version. I wouldn't recommend the UT100 to anyone however, The PC2TV software required to use it with live video is marginal. They gave up on making it work correctly and moved on to their newer prod-ucts. They are still selling them however, so someone must be making them work.

I will let you know If I make any progress in hacking the Chinese boxes, but I think I need to find someone that is a bit more software literate than I am to make any further progress. So far I have been unable to get them to send me any firmware files to edit & load on them.

                                        Thanks, John Kozak, K0ZAK/3, Maryland

Are You Confused About Your A/V Cables ?

Recently on the Boulder ATV net there was a discussion about the proper connections on 1/8" A/V plug cables.   Jack, K0HEH, did some research and came up with some answers.   I have added a few entries covering the specific devices we are using.

Device	Sleeve	Ring 2	Ring 1	Tip
Raspberry-Pi	Video	Ground	Right Audio	Left Audio
Apple	Video	Ground	Right Audio	Left Audio
MP3 Players	Ground	Video	Right Audio	Left Audio
Camcorders	Right Audio	Ground	Video	Left Audio
Canon Camcorders	Right Audio	Ground	Video	Left Audio
Media Player	Ground	Video	Left Audio	Right Audio
Hi-Des DVB-T Receivers	Ground	Video	Left Audio	Right Audio
RC-832 5.8GHz, FM-TV Receiver	Ground	Video	Audio	Not Used

Note: For RCA plugs, the standard color code convention is: Yellow = Video, Red = Right Audio Channel, & White = Left Audio Channel
If you have an unknown cable, then use your Ohm-meter to determine which of the above you have.

BARC TAILGATE SWAP-FEST

Plan to bring a trunk load of goodies to the Boulder Airport, terminal building parking lot on Tuesday, July 20th at 6pm.   Once again the Boulder Amateur Radio Club (BARC) will be hosting their tailgate swap-fest.   Plan to bring a trunk load of stuff you no longer want -- but also be prepared to take home a trunk load of NEW stuff, you could pass up buying ! We also will have an ATV demo at the swapfest demoing our W0BTV repeater and also 5.8GHz, FM-TV.

Weekly Boulder Ham Breakfasts Resume

After a long covid induced absence, the Boulder hams are once again getting together for weekly breakfasts and eyeball QSO sessions.   We are now meeting on Tuesday mornings at 8am at Doug's Diner, in Boulder.   Doug's is on the south-east corner of

Arapahoe and Folsum. All interested hams who have been vaccinated are invited to join us. During covid, we were meeting on the internet via Zoom on Friday mornings. There was enough interest to continue the Friday morning Zoom sessions as they included several BARC hams who had moved away from Boulder.   If you want to participate in the Zoom meetings, contact the co-ordinator, Don, N0YE.

BATC Special Issue FEEDBACK: Mario, KD6ILO, of

Oceanside, California writes --- "American Amateur Radio TV enthusiasts wouldn't invest in DVB-S modulators like I did back in 2009 with equipment from Germany because of it's high price and lack of participation in the advancement into digital from US hams. I just set aside a budget for such projects. My start was in February 2009. Yes the DVB-S receivers were cheap at that time also. I never used or had a PC based system as it would have been hard to go portable, less is more and reliable . Like your system in Colorado, we use both DVB-T & S and we have a very reliable network to include our community TV cable channel."

Editor's Note: The equipment, Mario refers to was from S-R Systems in Germany. They used to supply DVB-S gear to hams.   However, Googling them today, you will no longer find them supplying such gear.   The SR gear was standard definition only.

I too never liked the concept of requiring the use of a PC computer to build a TV transmitter or receiver.   The biggest use of ATV in Boulder, Colorado was for ARES.   For ARES operations, it was mandatory that the gear be portable, small, robust and 12Vdc battery powered.   Carrying along a PC computer did not qualify.   Jim, KH6HTV

Wyoming HamCon - 2021: Save the date of October 9th for this up-

coming ARRL section ham convention in Cheyenne, Wyoming.

ATN - Arizona Swap-Meet: The Arizona chapter of ATN will be

holding a Swap-Meet, lunch and meeting on Saturday, July 17th. It will be at the QTH of Rod, WB9KMO.   The address is 8334 E Culver St, Mesa, AZ 85207. Bring friends. Please RSVP to wb9kmo@gmail.com.
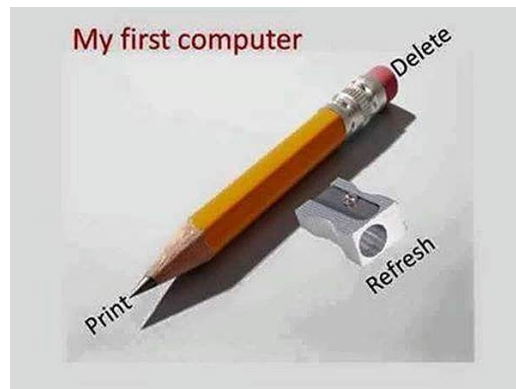
Tnx to Ken, KV5Y for finding and sharing these with us.

W0BTV Details: **Inputs:** 439.25MHz, analog NTSC, VUSB-TV; 441MHz/6MHz BW, DVB-T & 1243MHz/6MHz BW, DVB-T
Outputs: Channel 57 --- 423MHz/6MHz BW, DVB-T, or optional 421.25MHz, analog VUSB-TV.   Also, secondary transmitter, FM-TV output on 5.905 GHz (24/7). Operational details in AN-51a   Technical details in AN-53a.   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. The net typically runs for 1 to 1 1/2 hours.   A DVD ham travelogue is usually played for about one hour before and 1/2 hour after the formal net. ATV nets are streamed live using the British Amateur TV Club's server, via: *https://batc.org.uk/live/kh6htvtvr* or *n0ye.*   We use the Boulder ARES (BCARES) 2 meter FM voice repeater for intercom.   146.760 MHz (-600kHz, 100 Hz PL tone required to access).

Newsletter Details: This is a free newsletter distributed electronically via e-mail to ATV hams.   The distribution list has now grown to over 450.   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.**

NEW ON THE W6ORG SURPLUS WEB PAGE

GO TO http://www.hamtv.com/surplus.html and help me clean out the shack, or at least make a dent in it. Contact me via email if interested in any of the items on the web page - atvinfo at hamtv dot com I will ship USA only via the USPO and accept check or MO made out in my name.
73, Tom W6ORG

Downeast Microwave 7025PA 70cm Linear Amplifier
Great amp to drive from 60 dBmV cable modulators or DVB-T ATV exciters.
10mW to 2W in adjustable / 20W out all mode 420-450 MHz.
Max output 35W, never exceed input to the SAU83L module is 100mW.
Size 5.5x5.5x4.3". Cooling fan on top of heatsink. N jacks. Requires 13.8 Vdc at 10A.
Output detected AM video monitor installed. See app note from 2007.
        $150 + $15 USPO shipping.

Mirage D100-ATVNR ATV Repeater Linear Amp
2W in / >80W out all mode 420-450 MHz.
Higher gain version of the D1010. Max, never exceed input 7W.
Size 19x10x3". Designed to be mounted in a 19" rack for repeater duty, but can be placed on a shelf with the large heatsink up.
Suggest adding a fan for long key down periods. N jacks.
Requires 13.8 Vdc at 20A. See app note from 2009.
        $300 + $15 USPO shipping.

Downeast Microwave 2330PA 23cm Linear Amplifier
50mW in / 30W out all mode 1270-1300 MHz, 25W at 1253 MHz. Max, never exceed input 100mW.
Size 5.5x5.5x4.3". Cooling fan on top of heatsink. N jacks. Requires 13.8 Vdc at 8A.
See app note from 2013.
        $150 + $15 USPO shipping.

4.5 MHz Sound Trap - 18uH slug tuned inductor and 120pf cap used in our
DMTR Detector Video Monitor T/R relay board to reduce detected 4.5 MHz
sound carrier cross hatching with the color subcarrier in the monitor video output.
Custom made for us by Coilcraft using their Slot-10-1 inductors. 120pF cap included.
        $3 each, 5 for $10 - 160 available, *make offer for some or all.*