Boulder Amateur Television Club
TV Repeater's REPEATER

November, 2020
2ed edition

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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

FAREWELL to 9 cm BAND:

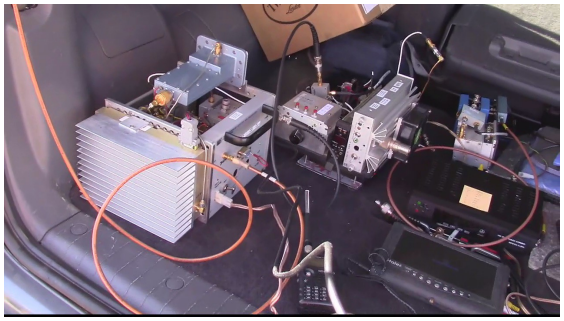
Don, N0YE, and Jim, KH6HTV, made a recent decision to make a last effort to work with DATV an unworked, microwave band before we lose it. With the recent FCC announcement that radio amateurs are sun-setting on the 9cm (3.5GHz) band, they lashed together some gear to make a DVB-T, two way QSO on the band. They also set the goal to do a "Worked All Bands with DVB-T" this fall. They will be 70cm, 33cm, 23cm, 13cm, 9cm, 5cm & 3cm.

Don furnished most of the equipment from his well stocked closet of microwave gear. He used his SSB, 10 Watt, 3.4 GHz transverter which he has used in years past for microwave SSB contests. For DVB-T, it put out a whopping 1 watt (+30dBm) rms. He

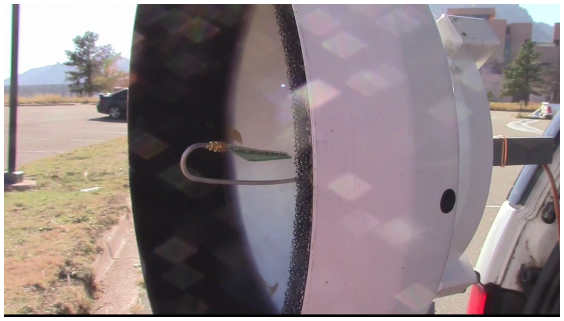
also loaned to Jim, a California Microwave, brick local oscillator, a band-pass filter and a dish antenna. Jim then dug into his meager supply of microwave components and lashed together a temporary 9cm transverter. The block diagram of Jim's rig is shown on the following page.

On Oct. 30th, when the Boulder weather turned nice again after a recent snow storm, Don set up his gear at his favorite microwave location, NCAR, on the mesa south-west of the city of Boulder. Jim set up his gear in his backyard, south-east of Boulder. The distance between the two sites was 7.9km (4.9 miles). With dish antennas visually aligned, contact was established immediately upon turning on transmitters. We operated on 3.395 GHz with 6 MHz bandwidth, DVB-T, using QPSK and normal digital parameters. Perfect P5 / Q5 video and audio was received at both locations. Jim used a calibrated Hi-Des HV-110 receiver and reported that Don's signal strength was -61dBm with a perfect 23dB s/n. Jim used a 3dB noise figure preamp and his transceiver had a -93dBm sensitivity. Don was transmitting +30dBm (rms) of DVB-T rf power, while Jim was transmitting +13dBm. Both were using identical 13" dish antennas fitted out with WA5VJB log-periodic antennas as the feed. Don estimates their gain at perhaps +14dBi.

View from N0YE site at NCAR out onto the prairie towards KH6HTV, 5 miles away



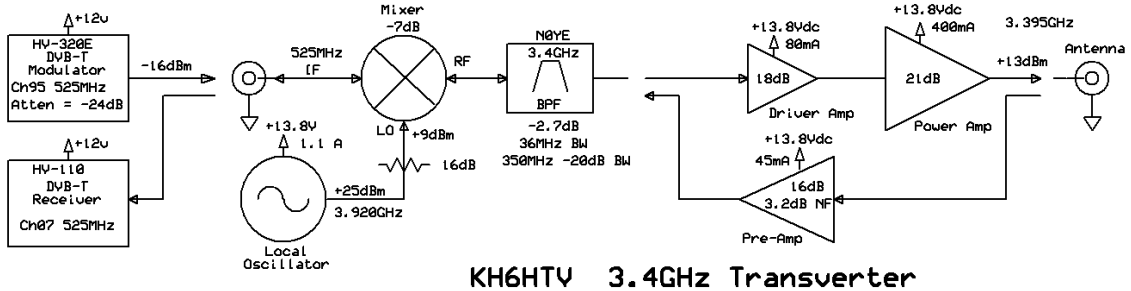
Don's SSB / DVB-T, 9cm transverter



& dish antenna with log-periodic feed

Jim's picture as received by Don

Jim's lashed together 9cm rig



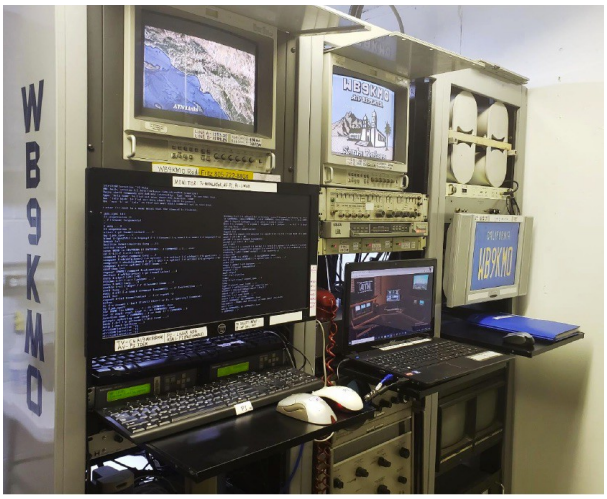
KH6HTV 3.4GHz Transverter

LO	Mixer	Driver Amp	Power Amp	Pre-Amp	
California Microwave	Anzac MDC-171 RF/LO 4 - 18GHz IF DC - 4GHz LO drive +7dBm	KH6HTV UWBA-103 20dB gain BW 250kHz - 3GHz P(sat) 22dBm P(-1dB) 20dBm +12V 80mA	Amplica 6535CSL 24dB 4-8GHz BW 3.2-8.4GHz P(sat) +25dBm P(-1dB) +23dBm +13.8V 400ma	KH6HTV WB-LNA-2 specs at 3.4GHz 16dB gain 3.2dB NF P(-1dB) 12dBm +12V 45mA	Frequency = 3.395GHz Transmit Gain = 29dB DVB-T Pout = +13dBm rms Spec Shoulders -30dB Receive Gain = 6dB Receive Sensitivity = -93dBm

FCC License Fee - an Editorial: The ARRL recently sent out a special newsletter to all members soliciting support to oppose the introduction of licensing fees by the FCC. My position to the ARRL is "Pick Your Battles". This is not one to be fought. I feel paying $50 for the privilege of using a huge spectrum for amateur radio communications for ten years is well worth the money. ARRL you should instead put all your efforts with the FCC into preserving our bands. ARRL in return for accepting a $50 license fee, you should be encouraging the FCC to put some tiger in their regulations and enforce them better.

Jim, KH6HTV

Santa Barbara - ATN Repeater



The WB9KMO-ATN repeater site is at 2500 feet elevation, a few miles north of Santa Barbara, California.

With help from Mike and several others, we just did a significant overhaul of the repeater site, which has been in operation for 40 years. Our first ATV repeater contact there was to a station in San Diego in 1980. This photo shows our repeater equipment in the KTYD transmitter building on the site at 3130 Gibraltar Road. The site is known as Rattlesnake Pass. We installed a 5 GHz data link to a Cox Business account at Santa Barbara Hackerspace in Goleta that gives us a 30 Mbps down and up data throughput. I have Grandstream GXV3500s installed on site that gives me full-duplex video between Santa Barbara to my other ATV repeater site in Mesa Arizona. I'm fine tuning the installation on the Mesa end. Soon, we'll have Santa Barbara integrated in with our Arizona ATN network. At the same time, we enhanced our two-way ATV and FM RF links from Santa Barbara to Santiago Peak in southern California. That makes Santa Barbara a redundant link between all of the ATN-CA repeaters and ATN-AZ repeaters. I'm already enjoying the Santa Barbara audio and video in Mesa. Soon, I'll be sharing it with the rest of the world.

73 de Rod, WB9KMO, WB9KMO-ATN Repeater Trustee rod@sbatv.org

(tnx to ATCO Newsletter, Oct. 2020)

LabGuy's World: KJ6RNL Amateur Television in San Jose, California

Labguy, KJ6RNL testing his early ATV transmission December 28, 2011

www.labguysworld.com

Check out Richard, KJ6RNL's great web site. He has a tremendous amount of TV material there, especially for vintage Video Tape Recorders (VTRs) and TV cameras. From his contact page, he writes --- " Labguy is an avid collector of vintage video recording technology and related historical information. He specializes in all aspects of

video tape recorders and video cameras that predate the accepted arrival of "home video". Mildly obsessive and manic, he runs the site in "cackling mad man" mode. His collections of almost antique video tape recorders and cameras is legendary. If it is electronic and makes pictures of any kind, he knows something useful about it." The site includes links to over 200 of Richard's You-Tube videos on TV, mostly VTRs and cameras.

In e-mail correspondence with Rich, he has shared with me some of his background in TV and ATV.

I worked in professional video as a video technician, studio engineer and eventually a broadcast equipment design engineer at Prime Image. I have worked for several companies over the years designing mixers, switchers, editors, VTR mods, digital video products and too many other products to recall. Clearly, I am obsessed with video tape recorders in particular. I was a kid when I read an article about the VTR. It blew my mind that you could record TV on tape! I was never the same after that.

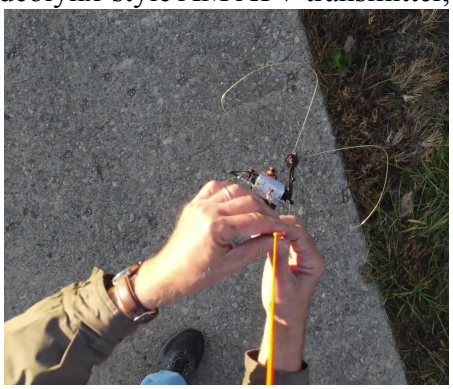
Back in 2011, I got my ham license JUST to run ATV. I have no burning interest in any other aspect of ham radio. Back in 1977, I joined an obscure amateur television club in Arlington, Virginia called Metrovision. This was the famous WR4AAG, the first in-band ATV repeater in the nation. I was considered an associate member because I had no ham license. Though I was an avid ATV watcher who owned the only VTR in the club. I was also the most distant member living in Brandywine Maryland some 45 miles from the repeater. I had USAF antennas at my disposal and was encouraged to use them by my superiors who were delighted that they had a tech who actually liked to... tech! I would lug the hundred pounds of video gear to the monthly pot luck dinners so the other members could see their own pictures for the first time. They could see everyone else, but never themselves. Alas all those recordings are long gone, taken by tape rot. What I wouldn't give to have them today.

Ain't this the greatest hobby ever? --- 73 de Rich, KJ6RNL

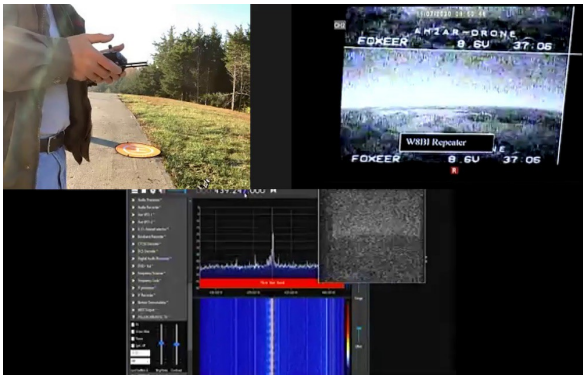
"Television? The word is half Latin and half Greek. No good can come of it." - C.P. Scott

AH2AR Drone Propagation Experiment on 70 cm, A5, ATV Forthcoming

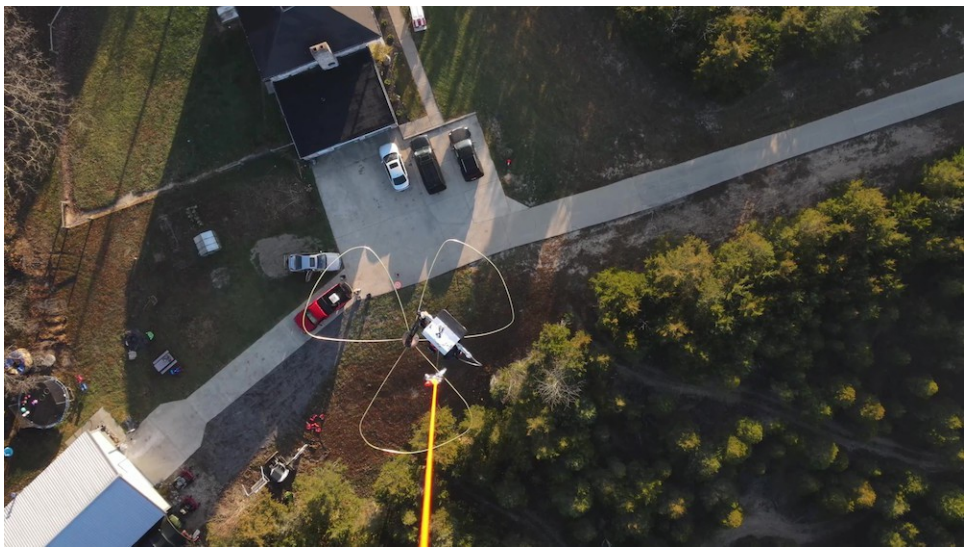
Here is a photo of the completed 70cm, A5 ATV transmitter package that I will be suspending from a DJI drone. My goal is simply to fly the transmitter package at 400 ft AGL from a hilltop in Germantown Ohio and provide an ATV signal for the Midwest ATVers that will coincide with one of the daily early-morning ATV DX Nets that meet on Zoom. This propagation experiment will tentatively be scheduled for November 14th at around 8:30 a.m., Dayton Time, dependent upon that morning's weather conditions (less rain or winds). The AM analog transmitter, amplifier, batteries and antenna weigh in at a skinny 15 ounces, and will be transmitting an analog horizontally polarized ATV signal on 439.250 MHz. Average output power of the transmitter measures at 2 watts, and fight time will be approximately 20 minutes. The launch activity will be streamed live on Zoom, and we will also be using the same Zoom call-in number we use for our weekly ATV nets. Also, I will have a second live Zoom view that will be occurring that will be re-broadcasting the W8BI Dayton Amateur Radio ATV repeater located 22 miles from the Germantown Ohio drone launch site. The transmitter package contains a color camera, an on-screen-display for the call sign, uses three, 18650 Lithium batteries, a Videolynx-style AM ATV transmitter, and a Chinese 70cm RF amplifier.



Attaching the payload



Zoom multi-image display



Test Flight -- view from on-board camera looking down from 130 ft.

One of the lessons learned in this "test flight" surfaced an issue with herringbone interference getting into the transmitted video, as the slight interference source was due to the little wheel antenna's close proximity to the transmitter. This was only noticed during the "fresh battery" time period. I was able to duplicate this issue later after the flight on the test bench. Consequently, placement of copper shielding tape on the camera and transmitter has eliminated this issue.

73 de Dave, AH2AR

Blackmagicdesign ATEM Mini Pro HDMI Switcher

Recently, I purchased a Blackmagicdesign ATEM Mini Pro HDMI switcher. It has 4 HDMI input ports with “instant” live switching between ports. In configuring this Mini Pro into my station, I connected my old and “slow to sync” HDMI switch to Port 4 on

the Mini Pro. After making this connection, the switching latency between all ports went from up to 5 seconds to less than a second. This is great! I now have a port "extension" of my Mini in my old HDMI switch.

I did try two different model HDMI switches with the Mini. One made by Kinivo (3 port) and Monoprice (4 port) with similar results.

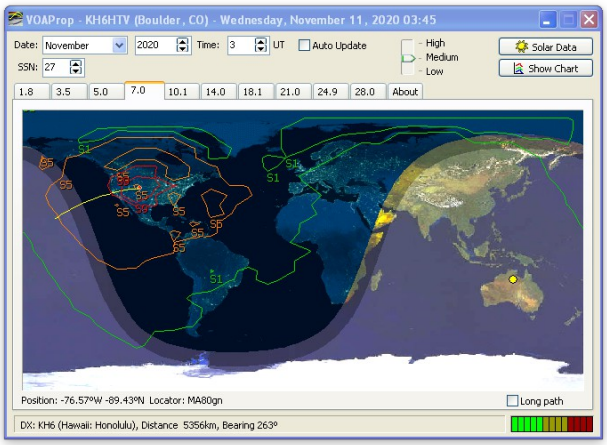
The Mini may be controlled remotely with IP so it could be used at a repeater site which I believe Mike WA6SVT is planning to do. The Mini Pro's single HDMI output may be connected to a splitter for input to both the DATV modulator/transmitter and Mini's display monitor. Other applications of the Mini Pro may be found in G4NRT, Gary's BATC Oct 24 presentation available on You-Tube.

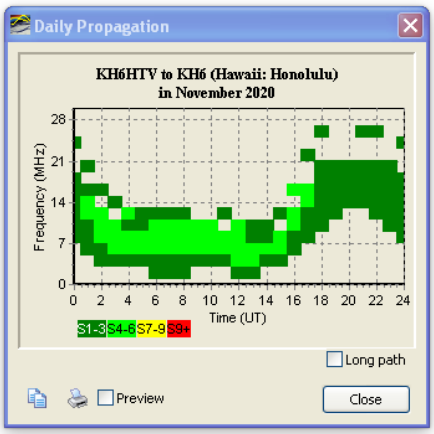
The Mini Pro is much more than just an HDMI port switcher. It is like a TV show production controller. The learning curve for anyone short of being a "Producer" may find it a bit steep if all of the features are to be realized. Tutorials on You-Tube are helpful but be prepared to hit the pause and replay button. I first learned about the "Mini" from Bob Heil, K9EID over a year ago. And recently Gary, W6KVC bought his to my shack to show me. Sorry now I waited so long to get one. But sure glad I finally did. Thanks Bob and Gary!

The photo shows I have assigned the Mini Pro's ports to the shack's main camera, PC, DVR and the old HDMI Switch. Sound can be from any embedded HDMI source or two analog Mic inputs. Sound from any source can follow to what ever HDMI port is selected. Size/location for PIP can be adjusted. Live streaming is available at the "push of a button" – No PC required. A SS Disk is on the right for recording and playback.
Chroma keying (green screen) for layering video images can be done using the Mini's control software. …and yes, I have both ends of all those cables identified !

73 de Mel, K0PFX

Analog Devices Frequency Synthesizers: We have reported in previous issues on low cost frequency synthesizers from China based upon several ICs from Analog Devices. The have included the 4.4 GHz, ADF-4351 and the 13.6 GHz, ADF-5355. They are available from China both as assembled pc boards and also packaged in an enclosure. A major issue with their use at high microwave frequencies as a local oscillator has been the issue of excessive phase noise. Pete, WB2DVS, has discovered a paper by Matthias Bopp, DD1US, in which he resolved the phase noise issue by greatly improving the regulated voltages used on an Chinese, 13.5GHz, ADF5355 pc board. Here is the link to Matthias' paper: https://www.dd1us.de/Downloads/A%20low%20cost%20signal%20generator%202018-06-09%201v0.pdf
Also of interest in Matthias' paper was the mention at the end, that Analog Devices now has upped the ante even farther with a new IC that reaches 32 GHz. It is their ADF4371. Checking the Digi-Key web site, it is available now, but at a stiff price of $236.





PROPAGATION PREDICTIONS: My favorite tool for predicting VHF/UHF/Microwave rf path propagation is ***Radio Mobile***. It is a free, on-line, calculator. The web site is: http://www.ve2dbe.com/english1.html My application note, AN-33a, "TV Propagation" shows how to use it and provides examples.

For HF, my personal favorite, and one used by many hams, is ***VOAProp***. It was written by Julian, G4ILO (now SK). His program uses ***VOACAP*** which was originally developed for the Voice of America. G4ILO just made it much more user friendly. It can be downloaded from his web site: http://www.g4ilo.com/voaprop.html

Our own Prof. Ed, K0JOY, has found some more interesting web sites with HF prediction programs. One in particular, that Ed calls our attention to is the Australian Bureau of Metrology, Space Weather Services site: www.sws.bom.gov.au Click on their HF Prediction Tools.

FEEDBACK:

Ref. ARRL Handbook: As always, thank you Jim. ---- Our EME group has had a similar experience with the Handbook. We had an active EMEer who was asked to update the EME section- this goes back maybe 10-12 years ago. I saw his submission and thought it was excellent. But alas, it never got included in the new addition- and this was before the day of prevalent .PDF website links.
I guess we are seen as 'fringe' groups. To be honest however, those amateurs that purchase the Handbook are pretty much all fringe amateurs- builders and designers.
73, Dale, W4OP

AB0MY in SARC Communicator: The Surrey, British Columbia ham club puts out a great bi-monthly newsletter. It typically is over 100 pages in length with a wealth of material. You can find it at: https://ve7sar.blogspot.com/ In the most recent Nov/Dec. issue, check out page 108. It features a photo of our own Bill, AB0MY, in a write-up about his 53 mile, 5.8GHz, ATV contact with Gary, WB5PJB, this past summer.

W0BTV Repeater Details: Inputs: 439.25MHz, analog NTSC, VUSB-TV; 441MHz/6MHz BW, DVB-T & 1243MHz/6MHz BW, DVB-T Output: 423MHz/6MHz BW, DVB-T, or optional 421.25MHz, analog VUSB-TV. Operational details in AN-51a Technical details in AN-53a. Available at: https://kh6htv.com/application-notes/ We hold an ATV net on Thursday afternoon at 3 pm local Mountain time. ATV nets are streamed live using the British Amateur TV Club's server, via: https://batc.org.uk/live/kh6htvtvr or n0ye.

Newsletter Details: This is a free newsletter distributed electronically via e-mail to ATV hams. The distribution list has now grown to over 400. 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/

This newsletter is published at least monthly. When sufficient news items are available, it is published more frequently. It is the editor's intent to keep the length of the newsletter to normally about a dozen pages.

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.**

The St. Louis Amateur TV Society (SLATS) is trying something new with a **"Sell, Swap, Give-Away, and Looking For"** page on their website. Being local (no shipping) is nice. However, to expand their outreach, they asked us to post a link to their page in this ATV newsletter.
Here's the link: http://www.slatsatn.net/?page_id=713

Items currently listed there include: Hi-Des UT-120 USB DVB-T Receiver ($50), Hi-Des HL-100R Rx LCD Control Module ($50), Tektronix 1710J NTSC Waveform Monitor (free !) & Tektronix 1420 NTSC Vectorscope (free !), B&K 1249A NTSC Generator ($10) For more details and photos, check out their web site.

70cm Low Noise Pre-Amp

Model 70-LNA: 0.5 dB Noise Figure, 21 dB Gain, -3dB BW 80 MHz, Pout(-1dB) +21 dBm, DC power required +12Vdc at 100mA. Optional DC feed via RF out connector. Includes test report with NF measurements.
Price $100 KH6HTV Video -- kh6htv@arrl.net