

# Amateur Television Journal

**December, 2024**  
**2ed edition, issue #178**

**BATVC web site: [www.kh6htv.com](http://www.kh6htv.com)**

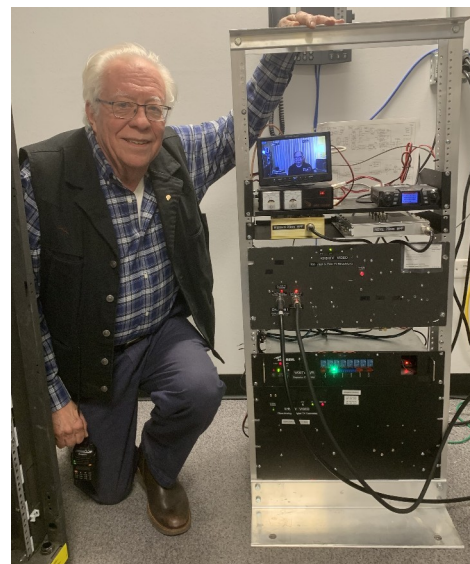
**ATN web site: [www.atn-tv.com](http://www.atn-tv.com)**



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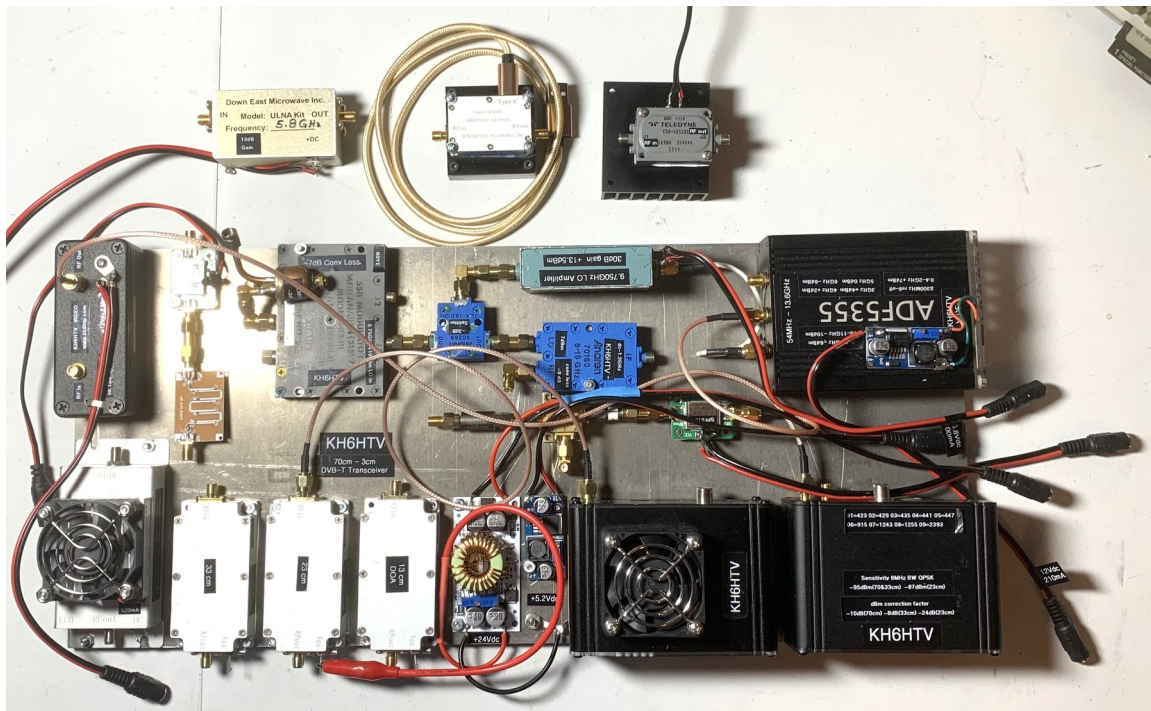
## **W0BTV, Boulder ATV Repeater Repaired -- Again !**

W0BTV is once again back on the air. Earlier in November, the Intuitive Circuits, DTMF-8 touch-tone decoder had failed (again !). Just before Thanksgiving, we were able to make a trip up the hill and pull the controller box out of the rack. This time, Jim, KH6HTV, said "I give up on the old Intuitive Circuits boards". So with some mechanical rework, he proceeded this time to install the new Arduino based DTMF decoder / relay board Bill, AB0MY, had designed. He then turned the controller box over the Bill as he wanted to make still another "mod" to his Arduino controller design and install new firmware for it.



*Bill, AB0MY & W0BTV-R*

On Tuesday, Dec. 3ed, Bill and Jim made another quick trip (in & out in 15 mins.) to the repeater site. All seemed to work flawlessly. Colin, WA2YUN, gave us a test signal on 23cm, while Bill, K0RZ, provided a 3cm signal. This photo shows both Bills and the repeater rack. It is K0RZ's smiling face on the video monitor with his 10.368 GHz, DVB-T input signal.



## All-Band, 70cm thru 3cm, DVB-T Transceiver

Jim, KH6HTV's latest creation. He got tired of having all sorts of bits-n-pieces of microwave gear being lashed together at the last minute for out in the field ATV-DX excursions. He mounded an aluminum plate from Don's, N0YE, scrap pile and proceeded to mount it all on the plate as shown in the above photo. The result is a DVB-T transceiver for 70, 33, 23, 13, 5 & 3cm bands. The separate modules in the top of photo are final power amps and pre-amps which will be mounted instead directly on the appropriate antenna and fed with a low-loss coax cable. In the lower right corner are the Hi-Des HV-320 modulator and HV-120 receiver. They cover directly the 70 thru 13cm bands. RF power amplifiers for these bands are on the lower left. Preamps for 23 & 13cm are in the upper left. For the 5 and 3cm bands, an LO and mixer are required. They are in the upper right. An ADF5355 frequency synthesizer is used as their LO.

## Hi-Des BR-101 vs. UT-100A Don't Make the Same Mistake I Did !!!



Back in 2019, Dave, AH2AR, and I evaluated the Hi-Des USB dongle model BR-101EH for possible use as the heart of a DVB-T repeater.

Hi-Des had managed to package in one small USB dongle a complete receiver and also a modulator for DVB-T. Plus they included the ability for it to function as an automatic repeater. When it detected a valid incoming DVB-T signal, it would then automatically turn on the modulator to rebroadcast the signal on a different frequency. It also included the ability to attach an ID trailer on the turn-off of the modulator. Great! Perfect for use in a repeater. Dave and I published our results in a KH6HTV Video application note, AN-54. Subsequently the DARA & ATCO folks used one for an intermediate relay repeater to tie their two DATV repeaters together.

Fast forward to 2024. The local Boulder, Colorado ARES group BCARES recently received a large grant of money from Boulder County to enhance their communications network, including ATV. BCARES was planning on a new DATV repeater and perhaps some remote receive sites. It looked like the BR-101 was just the gadget we needed for these. Well, the BR-101 was no longer advertised on the Hi-Des E-Bay web site. Instead, I found the UT-100A. On the surface, it's specs. seemed to be similar to the BR-101, so I ordered one at \$199 from Hi-Des.

The UT-100A recently arrived in the mail from Taiwan. I proceeded to hook it up to my HP-PC and try to program it, like I had done in 2019 with the BR-101. Nope, not the same dongle. It came with different software. With the software provided by Hi-Des on a data CD I was able to get it to receive a DVB-T signal and display it on the PC's monitor screen. I was also able to get it's modulator to put out a DVB-T signal. But nowhere could I find to make it work as a repeater. With the BR-101, the instructions said to open the enclosure and move a jumper to the programming mode. Well, opening the UT-100A revealed it to be a totally different pc board from the BR-101.

What to do? Always in issues with Hi-Des, it means sending an email to their service rep, Calvin Yang. Calvin replied "Hi Jim --- I am sorry BR-101 was phased out and we no longer have similar products now. We are forced to stop BR-101 because the main chip of BR-101 was phased out. Hopefully, we can find an alternate for a new digital no-loss repeater. UT-100A can't be used as a BR-101 repeater. It's for the small head-end application. It can't transmit the signal received from the tuner."

So, there you have the answer. No BR-101 DVB-T repeater anymore. The UT-100 series of USB dongles are strictly for receive and/or transmit.

I did not go any further checking out the UT-100A as it didn't do what I needed -- plus I have absolutely no desire to have an ATV station which requires me to use a PC computer permanently connected to my receiver or transmitter. Other hams feel differently and love to use their PCs as an intimate part of the station. If any of you ATVers out their own any of the UT-100 USB dongles and would like to share your experiences with our readers, I welcome your contribution of articles on the subject. In the meantime, because the BR-101 is no longer available, I will be pulling AN-54 off of my web site.

73 de Jim, KH6HTV, Boulder, Colorado

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# W0BTV - Boulder, Colorado DATV Repeater - Updates

The Boulder ATV repeater has seen several enhancements in this past year, 2024. As a result, the documentation has now also been recently updated to reflect all of these changes. These are all now posted on the repeater's web site: [www.kh6htv.com](http://www.kh6htv.com) There are three revised application notes:

**AN-51e, "W0BTV Boulder, Colorado - Digital Television Repeater"**

**AN-52b, "Boulder, Colorado ATV Repeater - History"**

**AN-53e, "W0BTV, Boulder, Colorado Digital ATV Repeater Current Technical Details & Tech History"**



AN-52 recounts the history of ATV in Boulder, Colorado starting in the mid 70s. By the late 70s, we had our first ATV repeater on the air from the Lee Hill radio site. It was sponsored by the Rocky Mtn VHF Society and operated under the club's call sign, W0IA. In 1990, the repeater was installed at the Chautauqua Park radio site overlooking the city of Boulder. It was then sponsored by BCARES and the Boulder Sheriff. It operated under Jim Andrews' call sign, WA0NHD and then later the BCARES call sign of W0BCR. By 2017, we needed to move from the Chautauqua site. The Boulder Police dept. by then needed the space we were occupying in the radio shack and on the tower. After an interval searching for a new site, we finally found the current home at NCAR. It is now sponsored by a sub-set of members of the Boulder Amateur Radio Club (BARC) with an informal group calling ourselves the Boulder Amateur Television Club (BATVC) and using our own call sign, W0BTV. The repeater is still available to support the ATV operations of BCARES and the Sheriff's dept. The above photos are of the Chautauqua Park radio site as it looks today. The photo on the left is looking west towards the Flatiron Mtns. The photo on the right is looking east out onto the prairies of eastern Boulder County.



AN-51 gives the operating details of our ATV repeater. It lists frequencies, modes, power levels, receiver sensitivities, and details of various special features. It describes the various antennas and their tech. details. A table is provided with the various touch-tone control functions. RF coverage maps are included at the end of the app. note.

AN-53 describes the technical details of the actual design and construction of the ATV repeater. It also recounts the past tech history of the repeater as it evolved over the years starting with a 70cm, B&W, NTSC repeater in the 1970s up to it's current configuration of being a hi-def, digital TV repeater covering 70cm up to 3cm bands. Details are given for the receivers, transmitters, antennas, and controller. At the end of the app. note is an overall block diagram followed by detailed circuit schematics for all of the various components.

## My Recommendations for Portable / Mobile 70cm/23cm, DVB-T Station Jim, KH6HTV

I have often been asked -- "What equipment should I buy if I want to get started in DATV, but I can't operate from my home base due to poor location to access the repeater?" This means one needs to be able to instead operate mobile, or set up a portable station out in the field somewhere. This thus also applies to ARES groups thinking about getting into adding ATV as part of their "bag of tricks" to offer to their local public safety agencies of police, fire, etc. So, I am offering here my suggestions of the key elements required to assemble just such a DATV station.

HV-320



DVB-T/ ISDB-T/ ISDB-Tb      100~2500Mhz

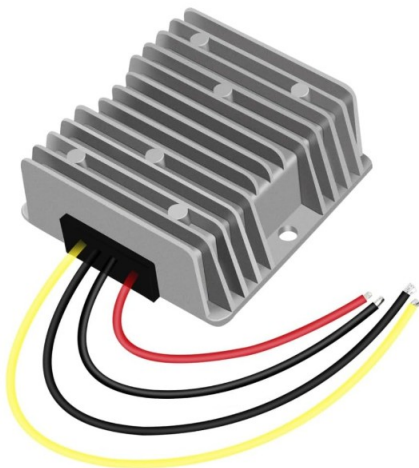
Hi-Des model HV-320, DVB-T Modulator

Hi-Des model HV-120, DVB-T Receiver



70cm RF Linear Power Amplifier,  $P(\text{dtv}) = 0.9 \text{ W}$

23cm RF Linear Power Amplifier,  $P(\text{dtv}) = 2 \text{ W}$



12 to 24Vdc Boost Switcher



70cm & 23cm Low Noise Pre-Amplifiers



tri-band 2m/70cm/2cm Antennas & Accessories



Video Camcorder + Camera Tripod



Small 12Vdc, Video Monitor



12Vdc high capacity Battery & Smart Charger



The above photos have shown the key components required. So what are the costs involved ?

Hi-Des Modulator = \$400; Hi-Des Receiver = \$250; RF Power Amplifier Modules, available on E-Bay, typically about \$60-70 ea.; +12 to +24Vdc boost converter, typically about \$15-20; Pre-Amps = \$90 ea.; Diamond NR2000N mobile antenna = \$85; Diamond DPK-4MN-N antenna mag. mount = \$55; Diamond SRH-999 whip antenna = \$55; Video Camcorder Price = ??, varies dramatically depending upon your requirements, video camera tripod = \$50; small 12Vdc color Video Monitor, many choices available on Amazon for \$50-100; LiFePO4 battery & smart charger, prices are all over the place, available from Amazon, E-Bay, etc. but count on at least \$100.

Hope you find this helpful. Aloha, Merry Xmas & 73 de Jim, KH6HTV, Boulder, Colorado

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## **TECH NEWS from San Diego:**

Thanks for the recent ATV Journal. I'm only now putting my own PA together between other projects I have waiting for me on the bench. PCB came in last week after using a design program from EasyEDA <https://easyeda.com/>. Waiting for the Preamp board to come in. On the bench also a THOR ATSC/DVB-T Modulator for my Subaru Outback and a T2/S2 receiver unit. The dongle unit is waiting for programing UART and rf band spectrum; it will be a transceiver with a separate PA sub-module.

Some of the BATC members in the U.K. and I are testing [a] SRT [server on a Pi3B+] to link our stations together because the latency is quite short. The pros like NFL, NASA and the major networks use it from remote locations to send feeds directly to the main studios [one-way] control room for a LIVE feed. We have had success without using the BATC streaming...moving forward the AllStar DATV talkback is working well with having more joining in. I [we] are the only U.S. station on the DATV Hub; others are UK & Europe based.

[a]SRT Server: P1-<https://www.youtube.com/watch?v=mT8uJlbb2e8>  
What is: P2-[https://www.youtube.com/watch?v=gh\\_Yk4ZZjeg](https://www.youtube.com/watch?v=gh_Yk4ZZjeg)

SRT + OBS or vMix and VLC 24/7 Link between systems.  
73 de Mario, KD6ILO, Oceanside, California

*(editor's note: If readers would like more details on what Mario is up to, you can contact him directly at " accesstv57 at gmail com ")*

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**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).

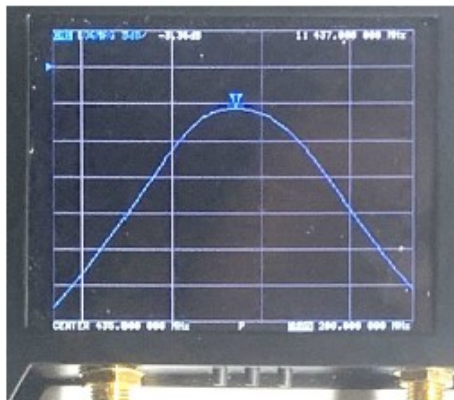
**Newsletter Details:** This newsletter was started in 2018 and originally published under the title "*Boulder Amateur Television Club - TV Repeater's REPEATER*" Starting with issue #166, July, 2024, we have changed the title to "*Amateur Television Journal*." This reflects the fact that it has grown 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***

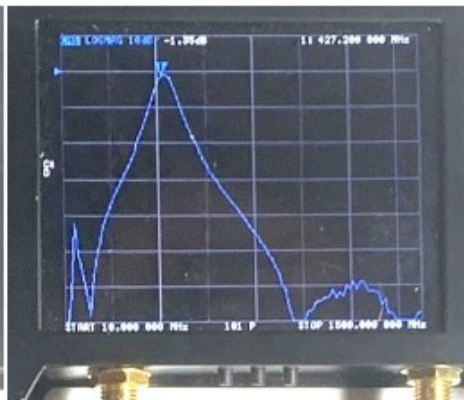


The KH6HTV VIDEO Model 70-LNA is a low noise Pre-Amplifier for the 70 cm (420-450 MHz) amateur radio band. The noise figure is a 0.8 dB with a gain of 18 dB. It's steep pass-band/rejection, provides excellent protection against out of band high power signals. -1dB gain compression of a high +19 dBm.

### Model 70-LNA 70 cm, 0.8 dB NF Pre-Amplifier



S21 70cm Gain 335-555MHz, 3dB/div



S21 Gain sweep from 0 to 1.5GHz, 10dB/div



PARAMETER	Typical Performance	Notes
Frequency Range	420-450 MHz	70 cm amateur radio band
Noise Figure	0.8 dB	measured on HP-8970A
Gain, S21	18 dB	
Bandwidth	90 MHz	-3 dB BW
Out of Band Rejection	-50dB (2m), -60dB (33 & 23cm)	relative to 70cm gain
Max. Output Power	+19 dBm	at -1 dB gain compression
DC Supply Voltage	+12 Vdc, nominal at 100 mA	11-15 Vdc range
RF Connectors	SMA (f)	
DC Power Connector	Feed-Thru, Bv-Pass Capacitor	Optional -- DC feed via RF output
Dimensions	1.5" x 3.6" x 1.25"	fully shielded, die-cast enclosure
Test Report	included	includes S21, BW & NF

**KH6HTV-VIDEO** [www.kh6htv.com](http://www.kh6htv.com) e-mail: [kh6htv@arrl.net](mailto:kh6htv@arrl.net) Boulder, Colorado, USA

**Price is \$90 + shipping**