

# Boulder Amateur Television Club TV Repeater's REPEATER

January, 2022  
issue #95

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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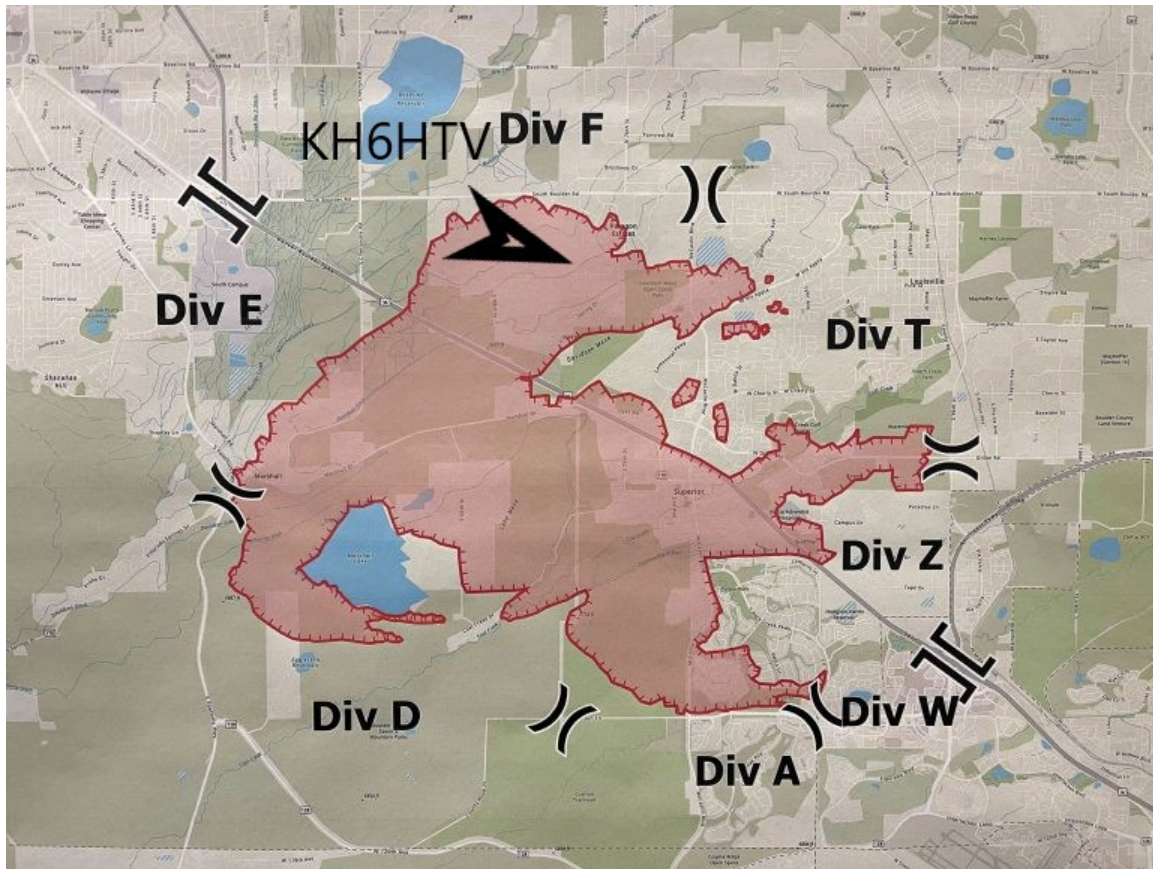
## **FIRE STORM DESTROYS 991 HOMES in BOULDER COUNTY**





On Thursday, December 30<sup>th</sup>, Boulder County was attacked by a severe windstorm with winds exceeding 100mph. A grass fire started near the base of the mountains in Marshall. The winds rapidly created an extraordinary firestorm. It was too big and fierce for firemen to battle. The only battle was evacuation as the towns of Louisville and Superior and northern suburbs of Denver lay in the wind driven path. The only thing that contained the fire was the winds finally stopping during Thursday evening. By that time hundreds of homes had burned down. This was not a typical forest fire, but an urban firestorm.

On Saturday, January 1<sup>st</sup>, Sheriff Joe Pelle announced that a total of 991 homes had been lost. 553 in the town of Louisville and 332 in Superior. Plus 106 more in unincorporated Boulder County. Most of those were in my own neighborhood. The above photos are of my own home burning down. The Thursday evening photo was taken by my son-in-law, Mike. He really should not have been there as the extremely intense wind driven heat waves could have easily killed him. Early the next morning, I walked into the area to check on our home. The second photo is all I found remaining. Our daughter, Susan, Mike and grand-daughter Alexa lived next to us and their home was also destroyed. All of our close neighbor friends lost their homes also. They included Boulder ATVers, Roger, N0IHX, and Naomi, KD0PDZ.



We had no official warning of the coming firestorm. My only warning was from our daughter who saw it happening. We evacuated saving only ourselves, our bulldog Ruby, 2 laptops and our 2 cars. Lost every thing else.

Surprisingly Sheriff Pelle said there were no deaths. If this had occurred during the middle of the night I am sure there would have been many deaths.

So what is the ATV impact? Well for one, KH6HTV Video as a supplier of ATV gear will be out of operation for a very long time to come. I have already had to turn down a couple of orders. I will try to continue, as time permits, this ATV newsletter. But it might come out less often in the future.

Jim, KH6HTV, Boulder, Colorado

*Note: the remainder of this newsletter was written prior to the firestorm.*

## **My Rube Goldberg DVB-T Remote Base**

**John Kozak, K0ZAK**

Since I cannot get into or receive the local ATV repeater from my house due to a large hill near me, I put together this Rube Goldberg Remote Base and installed it at a friends house in order to test the new DVB-T receiver we have recently added to the repeater. Basically, it is a Hi-Des UT-100 transmit dongle on set 434 MHz @ 2 MHz bandwidth which is driving a brick amplifier using a Mitsubishi RA60H3847M1 Power Module for around 5 watts output. There is a Scientific Atlanta 9660 Satellite receiver to receive the 1291 MHz analog repeater output as there is no DVB-T output on the repeater yet. This equipment is controlled by a micro computer with an i5 processor and lots of USB connections. The software is rather involved (a mess). I'll try to describe the system as best as I can.

The Hi-Des UT-100 transmitter is plugged into a USB port on the PC and drives an RF amplifier that outputs from 1 to 5 watts of usable RF. It will produce more power than that, but will begin to distort the RF power above 5 watts. I filter the RF output with one of the 6 MHz Bandpass filters I purchased from Jim, KH6HTV. But I will be replacing that shortly with the new 2 MHz filter I just got from China. The transmitter The UT-100 is controlled by the Hi-Des PC2TV software running on the PC. This program is real picky about the video that is sent to it and crashes quite often. It is the weak link of the system at this point. I think that Hi-Des gave up on trying to get it to behave and hasn't updated it since 2016. But I don't know of another option to control the UT-100 with live video at this point.

I key the amplifier on and off with a USB relay board and another piece of software that controls it. This particular board has 2 relays on it, one applying power to the amp and the other applying bias voltage to the power module when I want to transmit. I just ordered another board with 8 relays to control a few more things, but it is not needed at the moment.

I provide audio & video to the UT-100 using software called OBS Studio, and their OBS virtual camera patch. This allows me to feed a multitude of video sources. Live cameras plugged into the PC locally, pre-recorded video files or still images stored on the PC, and streamed live video coming from my home via Zoom. I can superimpose text over the video as well as a live clock source, then feed everything to the PC2TV software. All these varied video sources are what is causing the PC2TV program to crash however. I will need to work on processing the video output from OBS Studio better to make the transmitter behave better, but it is usable for testing the way it is.

I have a TinySA spectrum analyzer hooked to the PC via USB and its associated software loaded so I can monitor the waveform of the transmitter output in real time. As Jim mentioned in the previous newsletter (issue #94), it isn't really truly representative of the signal but it does make a good reference to show that the transmitter is working as expected. Hopefully his suggestion of using the low frequency port with a LO and mixer

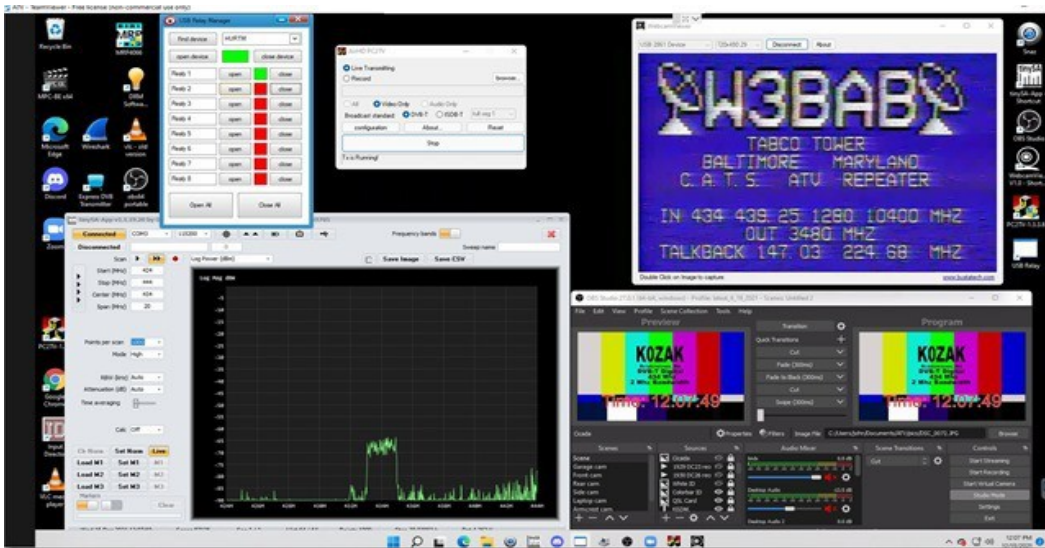
will help. Currently it is just picking up the RF using a spike antenna as I am not too concerned about actual signal levels at this point. But it could be fed by a RF tap and attenuators to monitor the actual power levels.

For receive, I have a Scientific Atlanta 9660 receiver tuned to the repeater output on 1291 MHz. I feed the analog video & audio from this receiver into the PC via a Roxio video to USB converter, which is then displayed in a Windows media player screen open on the PC as well. I can also use the Roxio converter as an input for a Zoom Meeting, which will allow other participants to watch the repeater output directly. This is a good tool for people trying to set up their transmitters and antennas when they can't see the repeater's output well.

I log onto the Remote PC from home using Team Viewer and that gives me full remote control. This seems to work well, even when I am streaming active video in both directions to and from the remote base.

This setup wasn't meant to be permanent. It was just thrown together as a temporary system with what I had available to allow us to run initial testing of the Digital receiver at the repeater with a decent signal. I'm now working on a replacement for the UT-100 and crappy PC2TV App. It is an Adalm-Pluto and I'm controlling that with DATV Express software and OBS Studio. DATV Express was written for bandwidths of 2 MHz and below and recently modified to control the Adalm-Pluto, which is a separate topic. After a bit of tweaking, I've now gotten this combination running very stable on 2MHz, 1MHz, & 500kHz bandwidths. I've had it transmitting locally at 2 MHz bandwidth for 3 or 4 hours without a glitch. I'm lucky to get 5-10 minutes with the UT-100 without the software crashing. By the way, I am using a Knucker receiver from BATC to receive those lower bandwidths and they seem to work fine.

73 de John, K0ZAK, Reisterstown, MD



This picture of the desktop shows the following Apps in operation  
 Top left - USB relay controller for controlling the power amplifier

Top middle – Hi-Des PC2TV for controlling the UT-100 modulator  
Top Right – output of the repeater via Scientific Atlanta receiver  
Bottom left – TinySA application showing the transmit waveform  
Bottom right – OBS Studio controlling the video sources.

**BUON NATALE e  
un FELICE ANNO  
NUOVO 2022  
to all ATVers  
Rudi Pavlic, S58RU  
Koper, Slovenia**

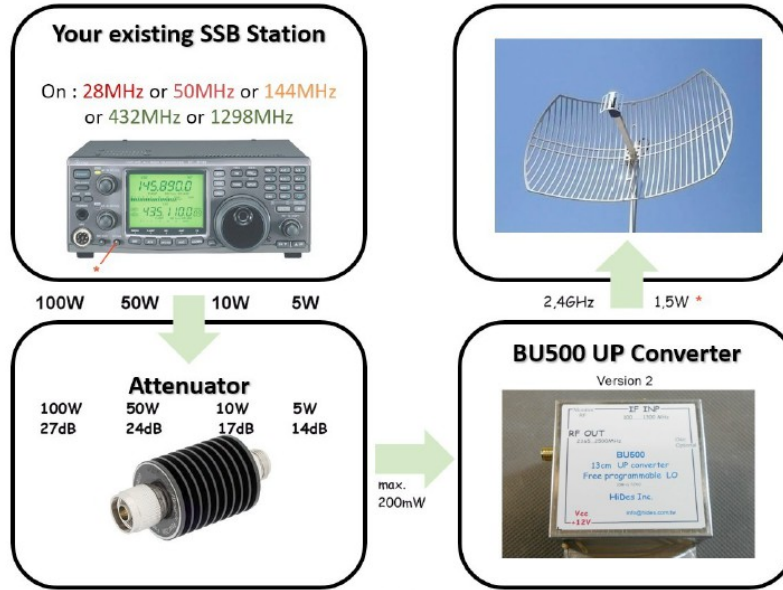


**Rudi, S58RU**, has shared with us the following diagrams on how to transmit to the QO-100 amateur satellite. It is a stationary satellite which supports both narrow-band (CW & SSB) modes and wide-band ATV (DVB-S) mode. It's up-link is in the 2.4 GHz band while the down-link is in the 10 GHz band.



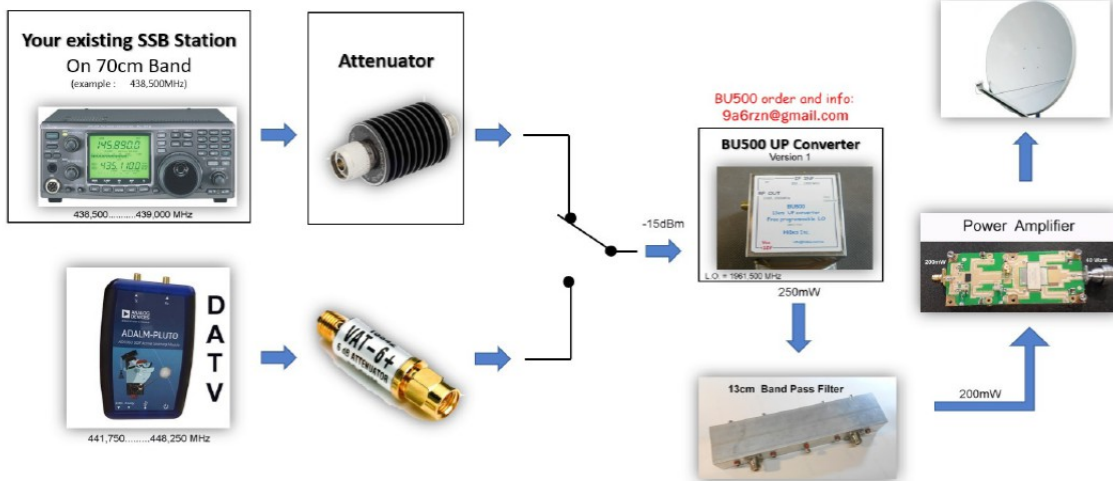
The BATC hosts a receiving station at the Goonhilly Earth Station in Cornwall, U.K.. You can actually watch the live spectrum from QO-100 at: <https://eshail.batc.org.uk/wb/>

## Minimum TX hardware for a successful QO100 connection



\* You can regulate 2.4GHz output power from minimum to full power

## TX hardware for successful SSB and DATV QO-100 connection



## BATC NEWS from the U.K.

The Winter 2021 issue of *CQ-TV*, the British Amateur Television Club (BATC) magazine has just arrived. In it are several interesting articles.

Noel, G8GTZ writes the BATC's report to the Radio Society of Great Britain (RSGB) on the spectrum usage of ATV in the U.K. Noel writes --- "The ATV community has recently developed products enabling the use of narrow band DVB-T based, multi-carrier, OFDM technology with H.265 video encoding to be used in bandwidths as low as 250 kHz. This has enabled contacts on 51, 71 and 146 MHz to be made over paths not previously possible, due to multi-path with single carrier DVB-S. It is planned to carry out mobile transmission tests using narrow band DVB-T where it is hoped this will prove significantly more robust than DVB-S in this challenging environment." He also reports on various band usage for ATV.

**29 MHz** -- "The inclusion of an experimental segment at 29 – 29.51 MHz has encouraged a number of operators to start building narrow band DVB-T OFDM equipment for that band. It is envisaged operation will be 250KHz wide centered on 29.125MHz to avoid interference to the satellite band at 29.3 MHz."

**50, 71 & 146-147MHz** --- Narrow band (500 to 250kHz) DVB-T activity continues on these bands also. 2 meter DATV QSOs over 200km are now happening regularly and the current record stands at 407km (253 miles).

*Editor's note: Here in the USA, we are not allowed to do such wide-band ATV on these HF & VHF bands. The lowest band we can legally use is the UHF, 70cm band. We are only allowed to do voice bandwidth, SSTV on these bands.*

**TV Repeaters** --- There currently are 39 ATV repeaters in the U.K. with a mix of analog and digital. Most are on the 23cm band, 2 on 13cm band, 7 on 9cm band, 2 on 5cm band and 6 on 3cm band.

**FM-TV** --- With the availability of extremely low cost (< £20) FPV, FM-TV transmitters & receivers for drone usage, they are seeing a significant increase in ATV activity on the 5.8GHz (5cm) band.

**Oscar 100** --- With the launch of the geostationary Oscar 100 satellite, they have seen a large increase in activity and interest in ATV. There are now over 150 U.K. stations known to be operational on DATV.

*Editor's note: The Oscar 100 satellite is geostationary over Europe, Asia and Africa. It is not visible in the western hemisphere.*

**Duplexer for 23 & 13cm** -- Chris, PA3CRX, has an interesting article in *CQ-TV* (pp. 12-13) about how to build a duplexer. His design uses an assortment of  $1/4 \lambda$ , open circuited stub lines, appropriately spaced. Every thing is made out of 0.141" semi-rigid coax cable.

**Noise Figure Meter** --- This is also in *CQ-TV* (pp. 14-18, 22-23, & 27-28). Dave, G8GKQ, shows how to use the BATC Portsdown test equipment suite to configure a noise figure meter. It basically requires a LimeSDR receiver, a Raspberry-Pi 4 computer,



a noise source and a switching (on/off) power supply for the noise source. He discusses where to get suitable noise sources and how to build the power supply.

## San Diego, California DATV Update



Greetings --- Just an FYI only, our progress report on the installation of one of the new, *ILO512PA* first unit installations for the upgrade projects for 2022. Four team members and I went to the San Diego site in downtown San Diego to install the new THOR {modified} modulator and one of the

70cm/23cm DVB-T/S HD | ATSC 3.0 2022 Test Program.  
[San Diego/Oceanside/Ramona](#)



Network Station-Oceana MESH-L | IPTV Network  
>SoCal AREDN Hamnet Users Group  
>Hawaii AREDN/IPTV

new power amplifiers onto the rack mount. Also completed the network link up configuration to the NSM - Network Systems Management Console. Also linked to our MESH backbone. ATSC {Ham TV} channel modifications for two channel slots are ongoing on channel slots 14 and 16. We have not voted yet on what two UHF channels to use yet. The Romona site is on private land so we will coordinate with our property agent that we will be on site late January - early February 2022. We plan to install new hardline, PA and the other THOR modulator. Plus place the MESH antenna another 10' higher on the tower. We have two ATSC, UHF channels now working on the bench using 6 MHz BW, 8VSB on 423.25 MHz and 436.25 MHz using modified THOR modulators.

73 de Mario, KD6ILO, Oceanside, California



## Santa, NOP on NPR

In our Dec. 1st, issue #93, ATV newsletter, we reported on the Longmont, Colorado Amateur Radio Club's project of helping kids talk to Santa Claus via ham radio. Well they made it big time today, December 22ed. This morning there was a 5 minute feature story on National Public Radio (NPR) about LARC's Santa project. It included actual sound bites of kids and Santa talking over the radio. Santa was using the call sign, NOP, for his QTH at the North Pole.

**BOULDER HAM BREAKFAST:** --- A group of Boulder, Colorado hams, including several ATVers get together weekly for breakfast on Tuesday mornings. We are presently meeting at the Walnut Cafe - South Side, in the Table Mesa shopping center at 8am.

**W0BTV Details:** **Inputs:** 439.25 MHz, analog NTSC, VUSB-TV; 441MHz/6MHz BW, DVB-T & 1243 MHz/6MHz BW, DVB-T  
**Outputs:** Channel 57 --- 423 MHz/6MHz BW, DVB-T, or optional 421.25 MHz, 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 (22:00 UTC). 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 ( -600 kHz, 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 about 500. 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.**