Boulder Amateur Television Club
TV Repeater's REPEATER

December, 2021
issue #93

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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

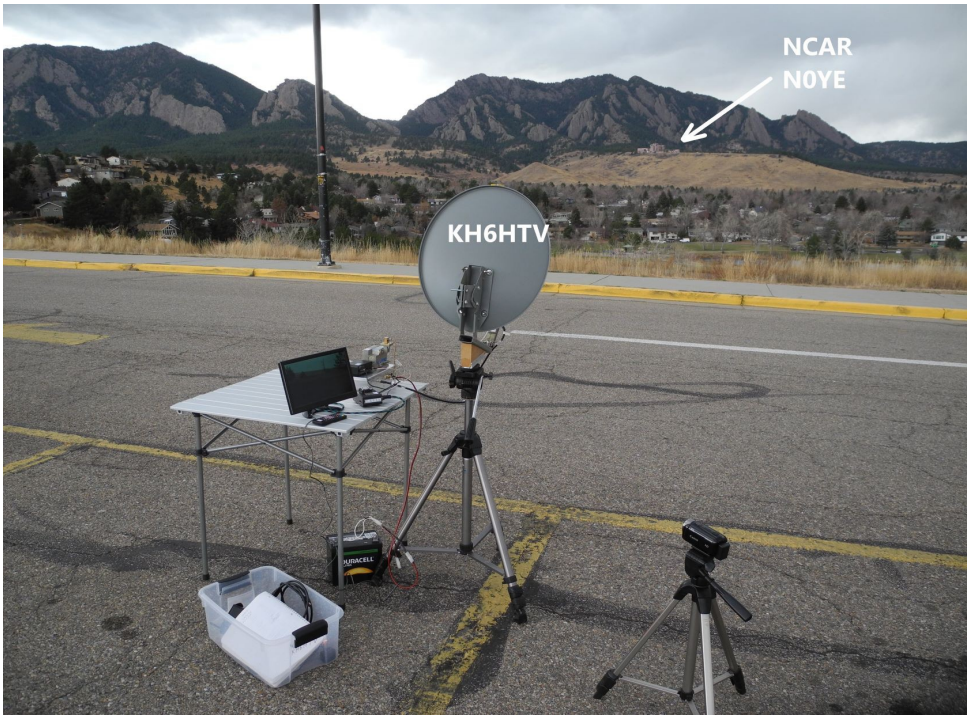
NEW AMPLIFIERs for SAN DIEGO

Mario, KD6ILO, reports that he just returned from a business trip to Madrid, Spain. While there he had a friend in Madrid build a couple of custom RF Power Amplifiers for the San Diego, California ATV repeater group. The new amplifiers are "one of a kind and can be controlled, monitored and software updated remotely." These are very impressive amplifiers with programmable RF output power ratings of 50, 100 or 200 Watts (DTV average). The power out is controllable via the software. Mario did the processor module. Mario plans to use them to upgrade their San Diego and Ramona DATV sites. They hope to get them installed in February. Their coverage area will expand greatly with improved digital reception without impacting other ham spectrum.

Their new THOR modulators will also be integrated into the new system. These THOR Modulators will also generate ATSC in addition to DVB-T. Their engineering team is

experimenting now for possible application upgrade. ATSC is thus available for their future Ham TV Network.

Technical specifications:
- Power Output: 50W, 100W and 200W
- Output connector: N-connector
- Output Impedance: 50 Ohms
- Power Input: 2-10W
- Input Impedance: 50 Ohms
- Input connector: N
- Frequency Range: 420-450 MHz {Custom for Ham DATV-KD6ILO}
- RF output ruggedness: SWR protection with reduced power, over-voltage protection, over-current protection, temp protection
- Spurious/Harmonic rejection: Use of external notch filter for your specific channel use.
- Power Supply: Mains 110V-240V (50/60Hz), works everywhere
- Ultra Stable, Ultra Clean Output
- SWR meter with alarm: LCD display
- RF power meter: LCD display
- 2 TEMP meters with 2 alarms: LCD display
- SWR protection: Reduced power with LCD warning, lights RED led, beeps
- Current consumption meter with alarm: Reduced power with LCD warning, lights RED led, beeps
- RF drive indicator and alarm: Reduced power with LCD warning, lights RED led, beeps
- No Expensive Test Equipment Required to setup, no SWR meter required to setup (although one is always recommended)- Rack size: standard 2H 19 inch rack



BOULDER ATVers light up 10GHz Again !

On Saturday, Nov. 20th, the Boulder, Colorado ATV gang again radiated digital TV signals on the 3cm (10 GHz) band. We had tried the previous weekend, but the Boulder winds were way too strong. Our dish antennas would have ended up way over in Kansas ! This time, we charged our resident weather expert, Chris, K0CJG, to find us a day/time when the winds would not be blowing. Unfortunately, we failed to also ask him for a warm, dry day ! When we started we could see nasty weather moving in. We terminated our outing sooner than we would have when it started to drizzle cold slushy rain. At least the wind was not the issue this time.

The main purpose for this outing was to give several hams a chance to try out their new, home-brew, 10 GHz rigs. They were Bill, AB0MY, Chris, K0CJG, and Jim, KH6HTV. Pete, WB2DVS & Debbie, WB2DVT, and Don, N0YE, were using older, reliable N0YE, home-brew SSB rigs converted for DVB-T service. So we set up on known, good locations with short distances between them. Don, N0YE, our microwave guru, set up on his favorite spot, namely the parking lot at NCAR up on the mesa above town. From there he was able to give us all a known, good signal for testing purposes. Chris, Pete & Debbie, and Jim setup in the Fairview High School parking lot, just down hill from NCAR with a good visual line-of-sight path. Actually Don with his TV camera was able to look at us in the FHS parking lot. The distance between these two sites was 1.5 miles (2.46km). Bill setup on his second story deck at his home QTH in north Boulder. The distance between Bill and NCAR & FHS was 4.5 & 5.25 miles respectively. DVB-T, digital TV signals were easily passed between NCAR and Fairview High. Bill was unable to receive signals from Don, nor was Don able to receive Bill's. The weather got too bad for tests between Bill and Fairview. We were operating on 10.359 GHz with 6 MHz bandwidth, DVB-T, with QPSK.

Don reported that his setup consisted of a 23dBi dish antenna. His feed cable had -4dB loss. His transmitter power was +20dBm. For receive, he was using a DEMI LNA with 10dB of gain and 1dB noise figure. This was followed by a mixer that probably had a conversion loss of 8dB or worse.

Pete and Debbie were using another N0YE transverter. See photo. The dish gain was 27dBi. The power output was +24dBm. The receiver noise figure was 2.6dB

Bill has been building his own 3cm transverter. Bill reports -- "Currently I am working with a Magnum brick at 10.781 GHz and a WM mixer. A 10 GHz DEM LNA kit is under construction. Antenna -modified TVRO offset dish: feed to be determined (Probably similar to Chris's. Control board to be built."

Chris' 3cm transverter is still a work in progress. This was his first time operating in this band using any mode. His antenna was a 23" center-fed dish with a home-brew feed. The feed is a degenerate cassegrain splash plate at the end of a 17" long ¾"circular copper pipe waveguide. The length of the waveguide allowed convenient access for tuning and transceiver connection behind the dish.

Waveguide excitation/pickup were provided near the end by a ¼ wavelength long SMA-connected probe, backed by an adjustable brass tuning disk that fills the inner waveguide diameter. The disk position was tuned several odd ¼wavelength multiples behind the probe to sharpen the system frequency response, effectively doubling as a band pass filter. Assuming an optimistic 50% efficiency factor, and otherwise perfect alignment and focus, this antenna configuration should produce ~33 dBi gain.

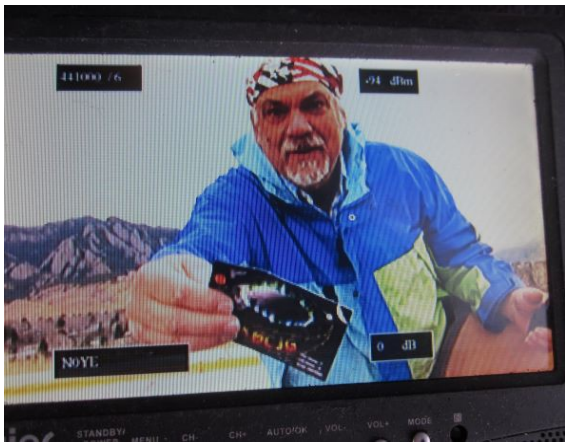
Otherwise, at this point, Chris' setup was the bare minimum consisting of only a Magnum Microwave brick LO producing ~17 dBm at 10523 GHz, with an Anaren 90340 SSB modulator (IL unknown) upconverting the Hi-Des HV-320E DVB-T modulator signal (set to 0 dBm output) for transmit at 10359 GHz. For receive, he used an Anaren 70160mixer (IL ~6dB) down converting to the IF at 164MHz. His IF receiver was the GT Media V7 Plus. Both LO and the antenna feed were switched by 28V Transco SPDT antenna relays operated from 12V using the transient voltage doubling method reported in a recent newsletter. No power amplifier was used for transmit, and no LNA in the receiver so performance was strictly dictated by system losses and conversion loss in the mixers. Assuming up and down conversion mixers have similar losses, perfect antenna tuning, and 2 dB loss in cabling and switching, the estimated transmit power was ~ -8dBm, producing an EIRP of ~ 25 dBm. The GT Media receiver does not provide a useful RSSI measurement, but received signals from Don, N0YE, were solid without freezes once antennas were properly aimed.

Jim's rig was described fully in our previous November ATV newsletter, issue #92. The transmitter output power was +14dBm. The receiver noise figure was 1.06dB. It's sensitivity for a 6MHz BW, QPSK, 5/6 FEC, DVB-T signal was -97dBm. The coax cable was a 30", Andrew 1/4" Heliax with 0.8dB loss. For an antenna, Jim used a converted offset feed, DirecTV, 18"x21" dish with a measured 28.5dBi gain. (details in Aug. 2020 newsletter, issue#53, pp. 2-8)

So how did the various rigs perform?
Jim reported receiving Don's signal with a very strong signal strength of -46dBm and a perfect 23dB s/n. Thus 51dB above his receiver's threshold of -97dBm.
Pete & Debbie reported receiving Don's signal at -58dBm with 20dB s/n.
Bill had technical difficulties and was unable to receive any signals. Better luck next time, Bill !
Don reported Jim's signal to be -70dBm with 20dB s/n. Pete & Debbie were -74dBm with 20dB s/n. Chris was very weak with freeze framing at around 8dB s/n threshold

N0YE as received by KH6HTV
hi-def image recorded on DVR

KH6HTV as received by N0YE



K0CJG as received by N0YE

WB2DVS/T as received by N0YE

note: the resolution in the pictures received by N0YE was limited by the 240 line resolution of Don's old Haier, 7", LCD monitor.

DATV On-Line Group:

The DigitalATV Groups.io group replaced the original Yahoo ATV group a couple years ago when Yahoo discontinued group service. The Membership, Message Log, Files & Links were converted from the Yahoo group to the Groups.io group

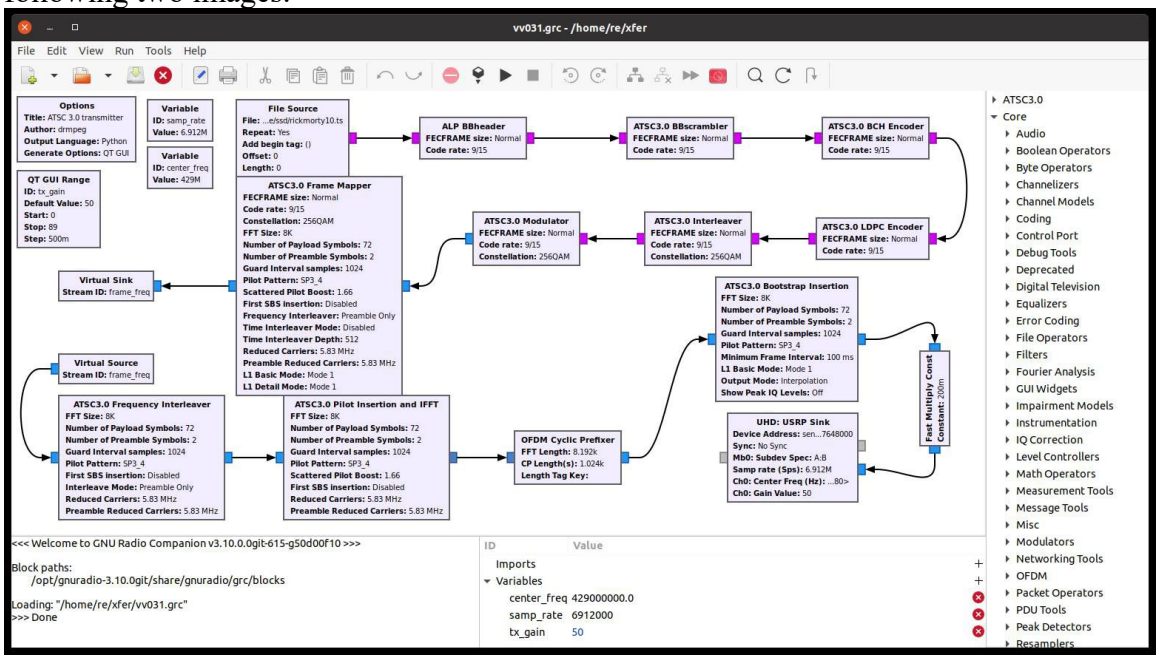
Groups.io

DigitalATV@groups.io

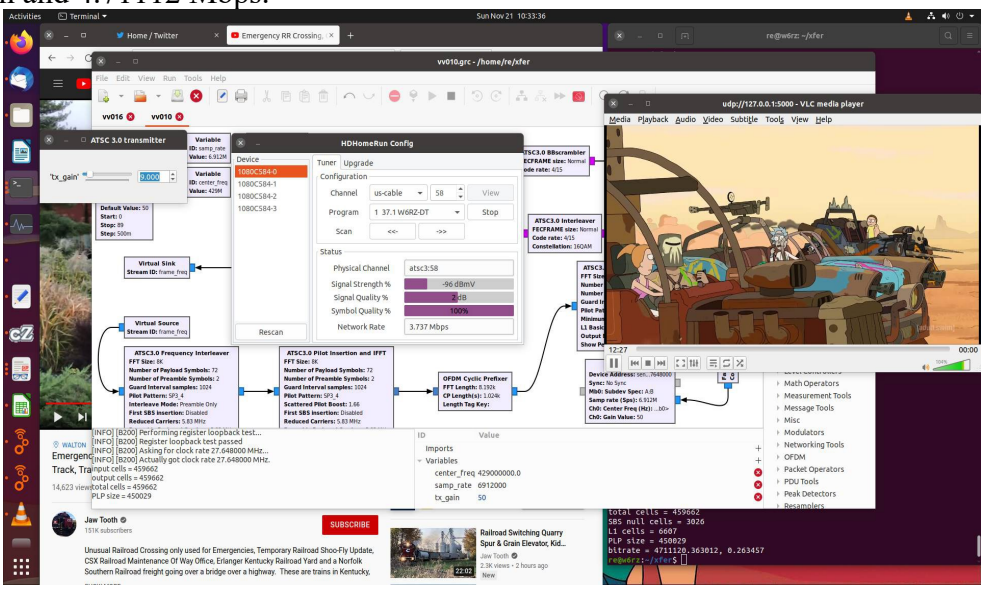
The DigitalATV group has nearly 500 members world-wide including hams with significant experience in all aspects of Digital ATV.
The DigitalATV Groups.io is available at: https://groups.io/g/digitalatv/
73, Mark, WB9QZB, Palatine, Illinois

Amateur ATSC 3.0 On the Air !

Ron, W6RZ, in Mountain View, California reports on Nov. 24th, "The ATSC 3.0 transmitter for the GNU Radio is on the air ! Unfortunately, ATSC 3.0 can only operate at 6 MHz (or higher) bandwidth, so not exactly ham band friendly". He sends us the following two images.



And here it is in action with an HD HomeRun 4K receiver. It's running at 16QAM at 2dB s/n and 4.71112 Mbps.



Is Walmart the Next Radio Shack?

Chris, K0CJG, has alerted us to the on-line offerings from Walmart. Try googling "Walmart electronic components" Then do a search for a specific item, like "RF Mixers" You will be shocked by the number of items they offer. It looks like they are offering usually 3 day shipping. Items don't seem to be stocked in Walmart warehouses, but most are sold and shipped from many different small store fronts, a lot of them in China. Walmart is obviously now trying to beat Amazon, E-Bay, Alibaba, etc. at their own game. However, their search engine will oftentimes come up with some really weird results. And some product descriptions are definitely written in Chinese English.

Hi-Des HV-110 MPEG-2 / H.264 Issue Feed-Back:

In a previous newsletter (issue #89) we had reported that the HV-110 receiver would not decode MPEG-2 transmissions, if it had been originally programmed with H.264. Mike, WB6SVT, in the previous issue #92, then informed us that he had contacted Calvin Yang at Hi-Des about the issue. Calvin then got back to him to say they have now updated the firmware to resolve the problem.

So today (11/23), I received a shipment from Hi-Des which included a new HV-110 receiver. I have programmed it to receive the 70cm ATV channels using H.264. I then switched the signal source (HV-100EH modulator) over to MPEG-2 encoding. Voila ! The new HV-110 receiver automatically tracked the change and kept right on working. Thus, Hi-Des' new firmware has in fact fixed the problem. The firmware installed in this receiver was version 0.01.72.159.000000.

Jim, KH6HTV, Boulder, CO

BATVC will be at the first hamfest in 2022. We will have a display table with a live demo of DATV. We are also scheduled to give a talk at 10am on "Amateur High-Definition Digital Television."

GREAT PUBLICITY for HAM RADIO

The Longmont, Colorado ham club just got great publicity for amateur radio in the November 24th issue of the Boulder Daily Camera newspaper. LARC's president, Chuck, K0ITP, is featured in the newspaper photo. The article is about LARC's Christmas season project to allow kids to talk over a ham radio with Santa Claus.

Longmont Amateur Radio Club

Matthew Jones / Staff Photo

Chuck Poch poses for a portrait near his ham radio setup at his home in Firestone on Monday. The Longmont Amateur Radio Club will bring Santa Claus the air waves to talk with kids about what they want for Christmas after seeing success last year.

Santa Claus returns to airwaves

By Kelsey Hammon
Staff Writer

As the coronavirus pandemic continues for a second holiday season, some local Santa's helpers are assuring that children will still get the chance to tell Old St. Nick what they want for Christmas in a safe-distanced way.

After devising a plan last year to connect Santa Claus with children via ham radio, the Longmont Amateur Radio Club is once again reserving some air time for Kris Kringle. Children will be able to talk with Santa Claus from 5 to 7 p.m. Sunday and 6 to 7 p.m. Monday through Dec. 3.

Chuck Poch, radio club president, said that last year the club was able to connect 34 children with Santa Claus, including one from Ohio and one from Canada. With opportunities to visit with Santa Claus last year lessened because of concerns about the spread of the coronavirus pandemic, the club still wanted to give children the chance to participate in the tradition in a safe distanced way. Poch, of Firestone, said they wanted to extend that opportunity this year.

"I think hopefully it will still give children a little cheer to know that Santa is out there," Poch said. "You may not be able to see him in person and sit on his lap, but get on the air and talk with him and you at least know he's there."

Longmont's Steve Haverstick, the radio club's publicity committee, said he knows how much getting to talk to Santa Claus on the air meant to kids last year when many holiday traditions were nixed because of the pandemic.

"That's what sparked this whole Santa on the Haverstick said. "It wa wait, 'with covid, kids go talk to Santa Cla think it meant a lot esp ly to talk to Santa. Any teurs in the backg tried to coach the ki get good communicat Santa Claus (John son), of course, has a to help the club with it sion.

Poch said he believe

See RAD

El-Cheapo Camcorders:

Chris, K0CJG, has called our attention to a source of very low cost camcorders. It is Amazon. Search their web site for "camcorders". You will get an infinite number of hits (at least 20 pages). Most of them are all very similar models with prices for 1080P in the $40 to $80 range. 4K camcorders are in the $150 range. However, a word of caution. None of these low cost camcorders have an adjustable optical zoom. The zoom they claim is strictly digital, which reduces the resolution at higher zooms. But if you are looking for a basic camcorder for the shack and price is important, then they are worth checking out.

More on the ADF Microwave Synthesizers:

Bob, WB0NRV, has sent us a link for a great talk about the Analog Devices ADF4351 (4.4GHz) and ADF5355 (13.8GHz) synthesizers. It is by Brian, GM9BJF, of the Lothians Radio Society. It is: http://www.lothiansradiosociety.com/meeting-reports-and-presentations/62-2017-2018-meetings/798-25-apr-2018-using-chinese-adf4351-adf5355-pll-boards-as-microwave-aignal-sources-brian-flynn-gm8bjf

Bob's DTV Progress: Bob, WB0NRV, in Johnstown, CO reports that he now has assembled a 70cm RF power amplifier for DVB-T and he is getting 40 Watts output. So far, he has been able to make a one way QSO with Mark, KE6KBM, in Severance, CO. The distance was 12 miles. They used 435MHz / 6MHz BW. There was too much RFI on 441 MHz to make the contact. Bob can receive our Boulder ATV repeater's signal. We hope to see his smiling face on it soon.

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 (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 (-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 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.

Low Noise Pre-Amplifiers for 70cm, 33cm & 23cm Bands

Models 70-LNA (20dB, 0.7dB NF), 33-LNA (16dB, 0.8dB NF) & 23-LNA (14dB, 1dB NF) P(-1dB) = +20dBm, 12Vdc @ 90mA. Price $90. Includes detailed test report with plots of S21, S11 & S22, plus noise figure measured on HP-8970A. Detailed specs. available at www.kh6htv.com