Amateur Television Journal

May, 2026
issue #208
BATVC web site: www.kh6htv.com
ATN web site: www.atn-tv.com

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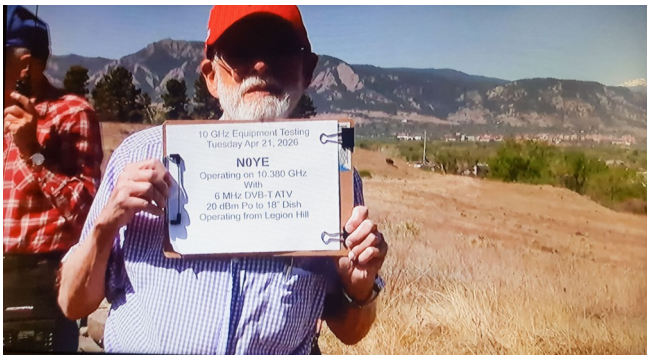


NOYE "Hero" photo

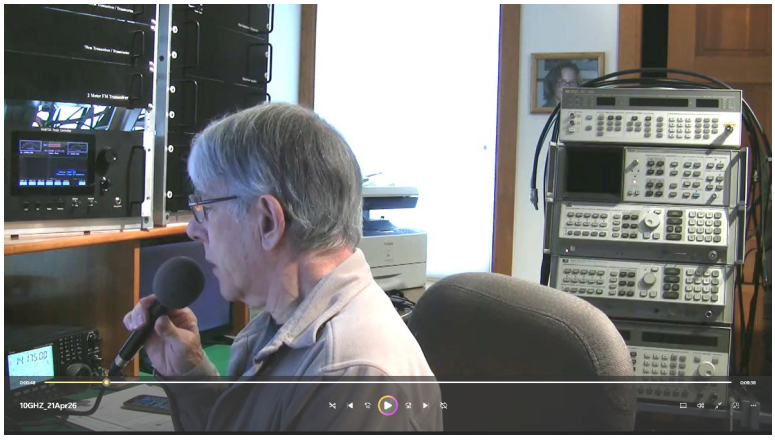
The 3 cm ATV gang

Steve, WA0TQG, declares

" 10 GHz SUCCESS ! "

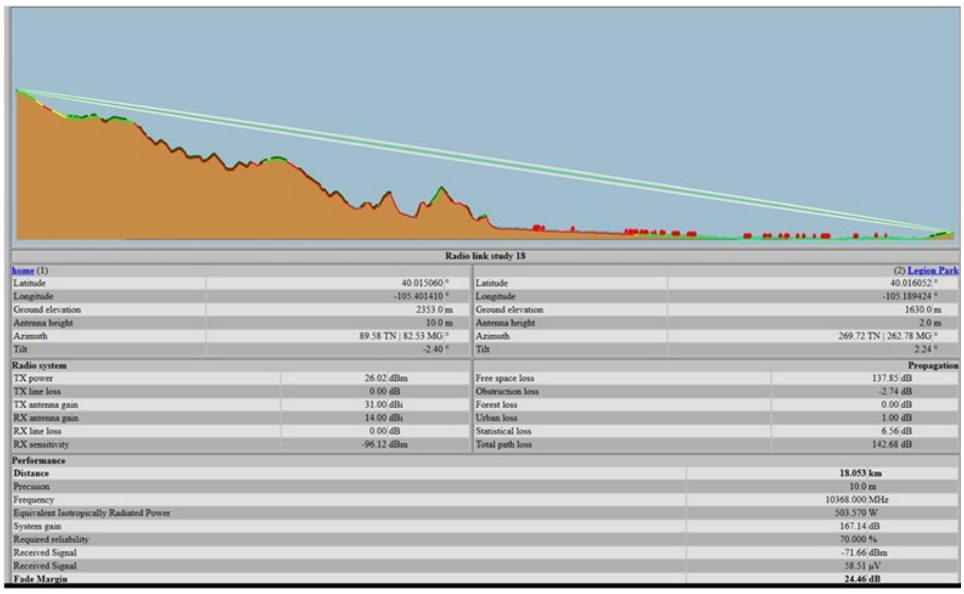
On Tuesday, April 21st, the Boulder, Colorado ATV gang gathered on Legionaire's hill east of the city of Boulder. The purpose was to give Steve, WA0TQG, on Sugar Loaf mountain a chance to try out his brand new all-mode, 3 cm, 10 GHz, transceiver. We have reported in some of the ***ATV Journals*** this past winter Steve's progress in designing, building and installing his elaborate new microwave gear. The above photos Steve took of the live video he received from Don, N0YE, (left), and Jim, KH6HTV, (right). The ATV gang in the right photo from left to right are: Chris, K0CJG, Larry, N8GGG, Jim, KH6HTV, Don, N0YE, Bill, AB0MY and Joe, K2EVK.

We had three 10 GHz rigs set up on Legion Hill. They belonged to Chris, Don and Jim. We started the event with Steve transmitting over the 18 km (11.2 miles) path to us. All three of us received perfect P5 pictures from Steve. Next Chris tried to transmit back to Steve, but was unsuccessful. Why ? We were able to receive Chris locally. Then Don took the air waves and was successful as shown in the above photo. Finally Jim also was able to get a P5 picture thru to Steve. The P5, high-definition, 1080P images were live with motion and no freeze framing plus CD quality audio.



Steve, WA0TQG, as received by K0CJG, N0YE & KH6HTV

Steve and Chris were using large converted Ku band satellite dish antennas. Don had a 1 ft. dish antenna. Jim had a small X band horn for transmit and bare-foot Bulls Eye LNB for receive. How did folks stack up as far as ERP ? Steve comes in at #1 position with 500 Watts (+26dBm & +31dBi ant. gain), Don is #2 with 40 Watts (+23dBm & 23dBi 1 ft. dish) Chris at #3 with 5 Watts (+10dBm & 27dBi). Jim was the tail-ender with 2.3 Watts (+17dBm & 16.6dBi)



Radio link study 18

home (1)		(2) Legion Park	
Latitude	40.015060 °	Latitude	40.016052 °
Longitude	-105.401410 °	Longitude	-105.189424 °
Ground elevation	2353.0 m	Ground elevation	1630.0 m
Antenna height	10.0 m	Antenna height	2.0 m
Azimuth	89.58 TN | 82.53 MG °	Azimuth	269.72 TN | 262.78 MG °
Tilt	-2.40 °	Tilt	2.24 °
Radio system			**Propagation**
TX power	26.02 dBm	Free space loss	137.85 dB
TX line loss	0.00 dB	Obstruction loss	-2.74 dB
TX antenna gain	31.00 dBi	Forest loss	0.00 dB
RX antenna gain	14.00 dBi	Urban loss	1.00 dB
RX line loss	0.00 dB	Statistical loss	6.56 dB
RX sensitivity	-96.12 dBm	Total path loss	142.68 dB
Performance			
Distance			**18.053 km**
Precision			10.0 m
Frequency			10368.000 MHz
Equivalent Isotropically Radiated Power			503.570 W
System gain			167.14 dB
Required reliability			70.000 %
Received Signal			-71.66 dBm
Received Signal			58.51 µV
Fade Margin			**24.46 dB**

Radio Mobile RF Path Prediction Sugar Loaf to Legion Hill

Prior to the event, Steve had run a *Radio Mobile* RF path prediction program to predict whether the path would work or not and also to predict the received signal strength at Legion Hill. For his prediction he entered into the program the known rf system parameters. They were:

W0TQG Transmitter: +26dBm (400 mW), 31dBi antenna gain (dish antenna), 0dB feedline loss

KH6HTV Receiver: +14dBi antenna gain (Bulls Eye LNB, barefoot), 0dB feedline loss

Radio Mobile thus predicted the received signal strength would be -71.7dBm

In our actual test, Jim, using a Bulls Eye LNB (14.6dBi ant. gain) along with a Hi-Des HV-110 receiver. It's S meter (in dBm) reported a displayed S meter reading of -29 dBm with perfect 22 dB s/n. Which was +33 dB above the noise floor. Jim had calibrated the down conversion gain of the LNB at 42 dB. Thus Jim's actual received signal strength was -71 dBm

Whow ! Talk about being close. -71 dBm vs. -71.7 dBm

We really hit the nail squarely on the head that time !

Now Steve is anxious for us to push the ATV DX distance out much further onto the plains of eastern Colorado. Obviously Radio Mobile is a valid tool for us to predict where we might have success.

(below photos courtesy of Chris, K0CJG, and Larry, N8GGG)

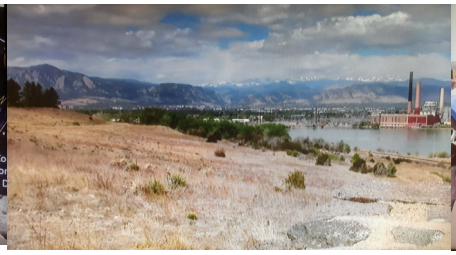
Sat, 25 April - 10 GHz Follow On: Based upon the success of the previous Tuesday, we decided to try pushing the DX distance envelope. Jim & Joe traveled out onto the prairies of eastern Colorado, north-east of Brighton on Weld County road #4. They set up their gear on the high ground out there with a line of sight view back to Steve's QTH on Sugar Loaf mountain. The distance between them was 54 km (33.6 miles). Radio Mobile

WA0TQG at 54 km

had predicted it would be a good site with a signal from Steve putting in a -78dBm signal to Jim's tiny Bulls Eye LNB antenna. Success ! Jim & Joe did in fact receive a great P5 / Q5 video/audio signal from Steve exactly as predicted at a measured -78dBm. Unfortunately, going the other direction did not work Radio Mobile predicted Jim's signal from his X band waveguide horn antenna at Steve would be -85dBm, about +10dB above the noise level. But no success going that direction.

Jim & Joe 54km from Steve

K0CJG confirmation photo



K0CJG camera view of
Sugar Loaf mtn in far distance

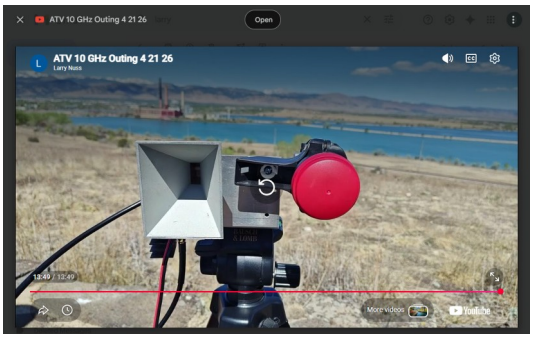
WB2DVS & WB2DVT
confirmation Hero photo

Back to Legion Hill: Also on Saturday, others elected to return to the Legion Hill site and work Steve on Sugar Loaf. Chris, K0CJG, had problems on Tuesday, but this time he was able to exchange 2 way DVB-T signals with Steve, WA0TQG. Also showing up on Saturday were Pete and Debbie WB2DVT & WB2DVS with their 10 GHz rig. They two were able to exchange two way signals with Steve. Don, N0YE, also was again at Legion Hill.

You Tube Video:

Larry, N8GGG, has put together a great 14 minute, edited video of the first 10 GHz outing. He has made it available on You Tube at the URL of:

https://youtu.be/ts4zHnXSk8A



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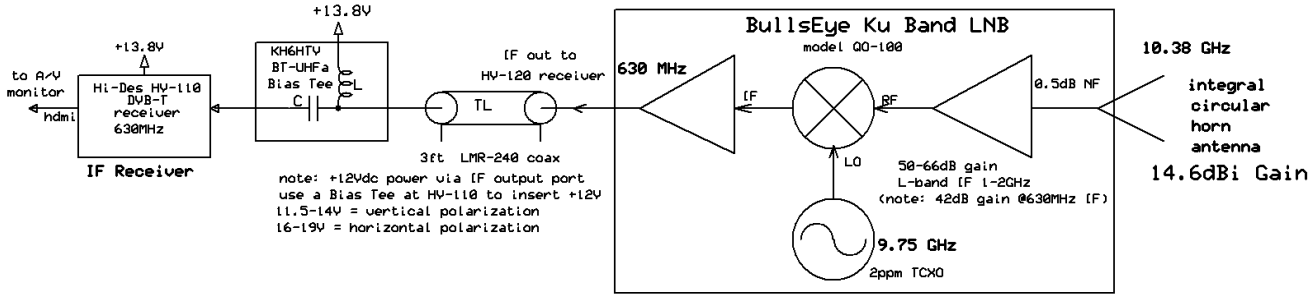

A Simple 10 GHz Transmitter Monitor

When we go out in the field for our 10 GHz DX-peditions, we sometimes wonder if we are really putting out a good signal when the fella at the other end can't see anything. It would be nice to have an inexpensive RF monitor along with us.

A Ku band LNB (Low Noise Block Down-Converter) is just what you need. The best one we (and other hams) have found is the Bulls Eye LNB. It has been found to be the most accurate and frequency stable LNB. A quick search on E-Bay shows they are currently selling for $30 + $10 shipping from China. But unfortunately, they are currently out of stock. Other lower cost Ku LNBs would also work. They all share essentially the same common design.

The above block diagram gives the basic details for these LNBs. Steve, WA0TQG, has measured the gain of their integral circular waveguide horn antenna to be 14.6 dBi. For their design IF output in L band (1-2 GHz) the specs. say the down conversion gain is 50 to 66 dB. The normal LO frequency is 9.750 GHz. Using a lower IF of 630 MHz with an input ham 3cm frequency of 10.380 GHz, I measured the gain to be 42 dB. The Bulls Eye is specified to have a low 0.5 dB noise figure.

To use the LNB simply means providing +12Vdc power up the IF output coax cable. This is accomplished by inserting a Bias Tee in the coax line at your receiver. Note: the LNB polarization is selectable depending upon the applied dc voltage. ---- KH6HTV

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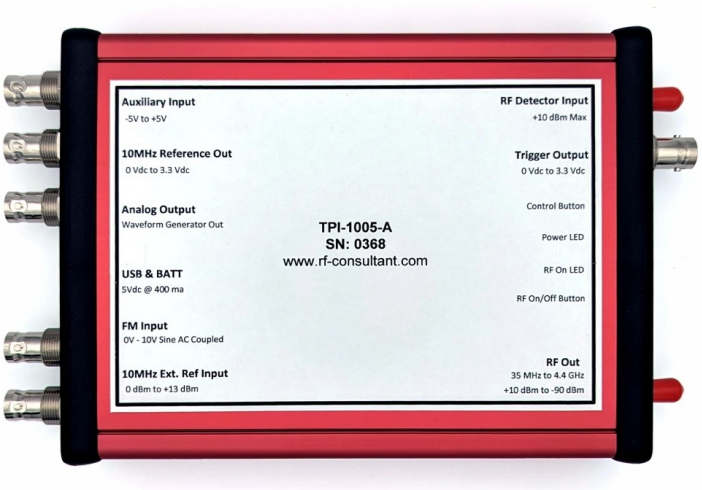
Low Phase Noise Frequency Synthesizer



At our weekly Boulder "Ham & Eggs" breakfast recently we were chatting with Dave Howe, AD0MR, about frequency synthesizers. Dave asked if we were familiar with the TPI synthesizers ?

Dave is an engineer with NIST and works in the Time & Frequency division. He said he recently tested one of them for phase noise and was really impressed. He also said that the Air Force likewise likes them and uses a lot of them.

OK, a quick google search turned up with the info on them. The web site is: ***www.rf-consultant.com*** It is Robert Yarbrough's site. (*unknown if he is a ham ? from qrz.com he is probably KI5TVF*) He offers several variations of his basic design with model numbers of -1001, -1002, -1005 & -1006 with various features. Prices range from $290 to $445. They all feature a USB programmable frequency range from 35 MHz to 4.4 GHz. They all also have programmable rf output power levels over a wide range.

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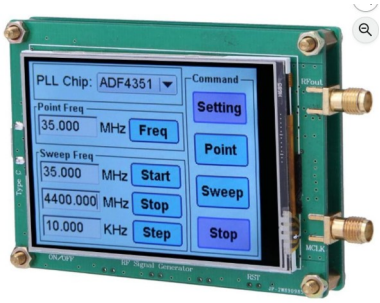

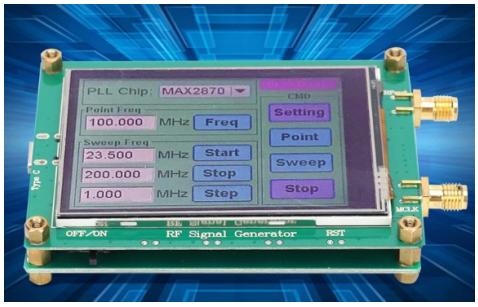

Caution Note: **In the previous issue #207 of this ATV Journal,** we discussed how to build an **"Inexpensive, All-Band, Down-Converter"**. It involved using a low cost frequency synthesizer similar to these shown above. What we failed to mention is a basic engineering design defect which makes these unsuitable for use in a remote, unattended location, such as a repeater site. We have found that none of these retain the programmed frequency when they lose DC power. Every time they are powered up, you need to re-enter the desired frequency. --- kh6htv

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ATV Repeater Design - Contd.

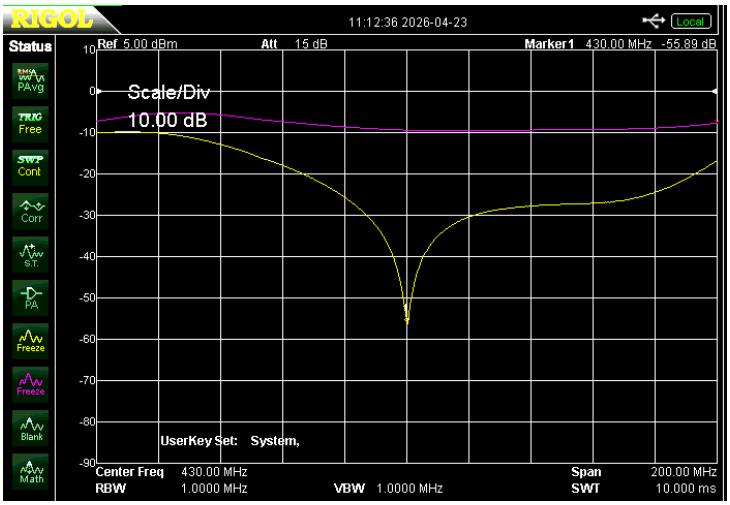
The normal configuration for our ATV repeaters (either analog or digital) uses two separate antennas. One for receive and one for transmit. Plus separate, sharp brickwall cutoff, TV channel band-pass filters.

Sometimes, however, a particular tower situation might restrict us to having only one single antenna. One solution is a very expensive TV channel duplexer.

Another solution which sometimes works is to use a CIRCULATOR. See the photo for an example. So what is a circulator ? --- A circulator is a unique ferrite device allowing RF power to flow in only one direction. RF power entering the input port will go to the output port with small loss (typically 0.4dB) Power entering the output port with go to the load port providing isolation back to the input port (typically 20-25dB). Thus for our ATV repeater we would attach our transmitter to the input port #1, the antenna to output port #2 and our receiver to load port #3.

For the particular circulator shown, I measured 0.2dB insertion loss for both S21 and S32 in the 70cm band. This plot shows the isolation S31. The yellow trace shows the good isolation when the output port is terminated in 50 Ω. The max is -56 dB at 430 MHz. It is better than -30dB across the 70 cm band.

The magenta trace however shows the very poor isolation when the output port has a poor VSWR termination. It is only about -9 dB, when the VSWR = 2 : 1



S31 vs. Freq. 430MHz center, 200MHz span, 10dB/div

This illustrates the fact that a circulator will only work for your ATV repeater if you have a perfectly matched antenna with an almost 1:1 VSWR. Our very first Boulder, Colorado ATV repeater built in the late 1970s actually used a circulator with a well matched antenna and it did work for us. ----- 73 de Jim, KH6HTV

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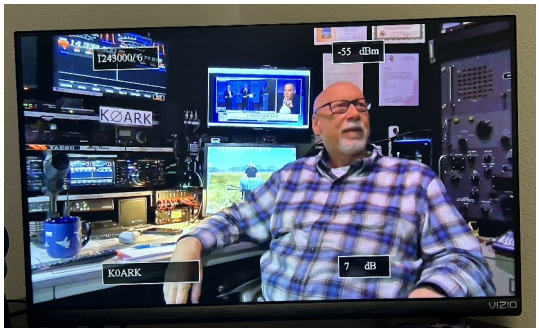
Allen now on 23 cm



K0ARK

Allen, K0ARK, has been struggling to find a good antenna solution at his QTH in Lafayette to get into our Boulder W0BTV ATV repeater. He just added to his collection of TV gear a 23cm DVB-T transmitter, plus a 12dBi gain patch antenna. On the Thursday, April 23ed ATV net he was finally able to show his smiling face via 23 cm.

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DAYTON 2026 HAMVENTION

Coming Real Soon !
May 15 - 17

Amateur TV display booths #1003 & 1004 & ATV Forum

Great Door Prices at ATV Dinner

Plus ATV Dinner for all ATV enthusiasts.

Great chance for eyeball to eyeball QSOs to compare notes on our fantastic part of ham radio.

Dave, AH2AR, and the Dayton Ham Club have been working hard to make the convention a success for ATV. Dave encourages all ATV hams to definitely plan to attend the Friday evening, 6:30pm, ATV Dinner. He has arranged for some fantastic door prizes also. They will include a Sony PTZ HDMI camera and tri-band HTs, etc. All hams are invited to attend.

The **ATV Friday Night Dinner** will be on Friday May 15 at 6:30 PM at the China Garden Buffet Restaurant (937-781-9999), 112 Woodman Drive in Dayton, Ohio 45431 (Airway Shopping Center). The all you can eat Buffet Dinner is $18. We will have dinner and then ATV presentations concluding at 9 PM. All are invited. Door prizes will be awarded.

There will also be an **ATV FORUM** held on Saturday in conference room #4, 11 - 12am. Here is the write-up for it. ----- "Join Art Towslee (WA8RMC), Darco Banko (OE7DBH), Joel Wilhite, (KD6W), Mike Collis (WA6SVT/VP6MC), and Dave Pelaez (AH2AR), for a discussion on Ham digital TV equipment and DATV transmitters. There will be a followup on last years discussion of digital ATV and information about DATV repeater concepts. The speakers will cover a range of

different DATV coding/modulation techniques and repeater concepts, DVB-T2 installation on Pitcairn Island, as well as some interesting activities on the island. EXCELLENT DX will also be discussed."

For more info about the ATV activities, contact Dave Pelaez, AH2AR, at ***tpelaez@woh.rr.com***
For general info about the convention itself, go to their web site: ***https://hamvention.org/***
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Correspondence from our Readers:

ATV Silent Key -- "FYI -- Dr. Ronald Fredricks; **K8DMR** of Grand Rapids, MI. passed away one week ago. His funeral is today (4/25). Ron was very much involved in ATV. -- Best Regards Tom Hansen; N8DGD

Jim -- FYI, Ron Fredricks, K8DMR, owner of the K8DMR analog 70 cm ATV repeater in Grand Rapids, MI has become a silent key as of April 17, 2026. I'll catalogue the station and send you a for sale ad after his family gives me the go ahead. 73, Richard Corey, W8IMA

Ron was an avid ATV operator and the owner of the K8DMR ATV repeater in Grand Rapids, Michigan.

W0BTV 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/*

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. 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

Darko Banko, OE7DBH, (*9a6rzn@gmail.com*) of Pians, Austria writes to inform readers with more details of his new 10 GHz amplifier, which he markets through Hi-Des.


OE7DBH

The 10 GHz amplifier was introduced in the previous issue #207 of the ATV Journal. Also available are multipliers/amplifiers to 10 GHz from 1.2 or 2.4 GHz. They are all available on Hi-Des' E-Bay page ***https://www.ebay.com/str/HiDes168***

Darko says -- "If interested, write a direct email to Calvin at Hi-Des ***calvin@higdes.com.tw*** Include your amateur radio call sign and you will receive the desired part at a **significantly lower** ham purchase price."

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KH6HTV Basement Clearance Sale:

70cm, 3 Watt, DTV Amplifier $150 + $10 shipping

This is a rebuilt older model 70-9B amplifier which was removed from our Boulder, Colorado ATV repeater service. The failed final amplifier was replaced with a lower power model 70-7 amplifier. It meets all of the model 70-7B specs. except it is in a larger 70-9B enclosure with larger heat sink and cooling fan. kh6htv @ gmail.com

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