Amateur Television Journal

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BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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WORKED ALL BANDS - DTV

Here is a challenge to our readers. Let us know how many of our UHF and microwave bands you have made simplex (no repeaters) digital TV contacts on. Especially we would like to know what is your longest distance DX-DTV contact.

For myself, KH6HTV, I have finally reached my goal of ***Worked All Bands*** from 70 cm thru 3 cm. On 1 November, I was finally able to add the 9 cm (3.4 GHz) band to my log book working Don, N0YE. I used the transmitter and receiver combo described in the previous newsletter, issue # 197. Transmitter power was 40 mW (+16 dBm) to a 15 dBi patch antenna. Receiver sensitivity was -91dBm. Don was using a simple LO/ double balanced diode mixer with an ADF-4351 synthesizer as his LO. His rf output direct from the mixer was ultra-low QRP to a 13" dish antenna.

My best long distance KH6HTV DX was on the 3 cm, 10 GHz, band June 11th, 2025. It was an BATVC organized DX-pedition with members scattered around Boulder County exchanging simplex contacts. My longest distance contact that day was with Bill, AB0MY. I was on Flagstaff mountain, west of Boulder and Bill was on Rabbit mountain, east of Lyons. The distance was 27.3 km. I was running 50mW, +17dBm, to a 17dBi X band waveguide horn antenna. I used a BullsEye LNA directly as the antenna and down-converter, with no dish reflector. I have worked much longer distances, but either thru our ATV repeater, or just one way simplex.

Bill - KORZ: For simplex, two way DATV QSOs, I can claim only 10 GHz with Don, N0YE, at his home QTH in Boulder. Distance was 7.3 km.

Steve, WA0TQG: Steve reports making 2 way DATV simplex contacts on 70, 33, 23, & 13cm bands. Longest distance was 30 km on 13 cm band. All from his home QTH. He is presently building more equipment for his home station to add 5 cm and 3 cm band capability for DVB-T.

Chris, K0CJG: For DTV simplex (i.e. not including FM analog) I have worked 5 cm (8.2km) and 3 cm (8.7km)

Pete, WB2DVS & Debbie, WB2DVT: We have made DTV contacts on 70cm, 5cm and 3cm. Pete recalls that the longest distance of 37 km was a 2 way QSO on 3 cm between the NREL windmills and Rabbit mountain.

Bill, AB0MY: I have made contacts on 70cm, 5cm and 3cm bands. My longest distance DX was from Broomfield to Pike's Peak on 70cm. Distance of about 120 km.

Don, N0YE: I have been on these following frequency bands with DVB-T digital TV: 441MHz, 921 MHz, 1243 MHz, 2395 MHz, 3370 MHz, 5685 MHz and 10380 MHz. Some bands have used once or a few times largely to claim using that band. These bands are used weekly during a weekly ATV net: 441 MHz, 1243 MHz and 10300 MHz.

The 10 GHz band has been used three times to activate a summit from which I have, with others, operated. These summits are Pikes Peak, Mt Evans (now called Mt Blue Sky), and Eldorado Mt. These summits were activated to do a SOTA (Summit on the Air). Doing a SOTA with DVB-T has been novel because CW and side band are usually used for those contacts.

The longest distance for one of these 10 GHz contacts includes Pikes Peak north to Boulder (≈ 130 km). Another similar distance would be from the Boulder area north to the Wyoming state line (≈ 122 km).

Editor's Note: Don, N0YE, is hereby proclaimed as the **"Grand Champion"** for **"DATV Worked All Bands"** for our local BATVC club. Plus he is capable from his home QTH of accessing our W0BTV repeater on all 3 bands. He is our local Microwave Guru and has been the great pusher for us all to get active on microwaves. He along with Bill, K0RZ, have been doing microwaves, originally with CW and SSB, for many decades. He has built several rigs for the various bands. More recently he modified some of them to also work with DVB-T. He has given loaner rigs

to others to encourage them. He has even experimented in the past with even higher bands of 24 and 47 GHz Add to this, Don is our reliable ATV Net Control every week.

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Another ATVer Joins the W0BTV Gang

Welcome to Bob, WB0NRV, of Firestone, CO. On Nov. 13th, he was able to put a DVB-T signal into our W0BTV Boulder repeater on 23cm. He was working a portable TV set-up as a POTA from St. Vrain State Park. The photo on the right confirms his excellent signal into the repeater. The distance from the repeater was 20 miles.

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MPEG-2 vs H.264

The two main video encoding schemes used for our DVB-T ham TV are the original MPEG-2 and the more recent H.264. Are they inter-changable ? The answer seems to be both Yes and No. It all depends upon your individual receiver. I just ran a simple test using my old Hi-Des HV-100 modulator which gives me a choice of either MPEG-2 or H.264 which I program from my windows PC using the program AV-Sender.

I first tried our W0BTV ATV repeater and transmitted a signal into it on 23cm band. The repeater uses a Hi-Des model HV-120 (now obsolete) receiver for 23cm signals. Switching from H.264 to MPEG-2 confused the receiver and it simply gave me back a black screen. So, no go.

I next tried a bench test with some DVD-T receivers I have here in the ham shack. I had a Hi-Des HV-110, a GT-Media V7 Pro and a Chinese generic, no brand, $20 DVB-T receiver. They all worked after a fashion switching back and forth between MPEG-2 and H.264. Both the HV-110 and V7 switched automatically from one encoding format to the other after a few seconds to resync. The No Brand receiver would work with either, but only after switching to another channel and then returning to the desired channel. Nothing is ever simple ! Go figure.

73 de Jim Andrews, KH6HTV

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Low Cost Digital Amateur Radio Television Low Cost Receivers for W6CX ATV Repeater

Spotted in the November / December issue of Mount Diablo Amateur Radio Club's newsletter ***The Carrier*** (*https://www.mdarc.org/carrier-newsletter*) (not available online at the time of publication):

Low Cost, pre-programmed to W6CX ATV Repeater. Most with Remotes. $25 each with remote (or $20 without remote). No shipping, as these are for local pick- up. These are used units in good / great

shape. These are DVB-S2 receivers pre-programmed for our club's 1.2 GHz W6CX, DATV repeater frequencies. Connect a 1.2 GHZ directional antenna, aim it at Mount Diablo's North Peak and watch the over the air repeater signal on your video monitor (available from Will Roberts, KA3VDT, Ham 66, *https://laser66.com/ham/*)

This is a generous offer from Will Roberts KA3VDT for those in the San Francisco, California area. Imagine the impact being able to watch the activity on an Amateur Radio Television with a low-cost receiver like this to cultivate interest in Amateur Radio, seeing techie individuals having fun with actual over-the-air (digital) television.

I think every big Amateur Radio club in a metro area should be thinking seriously about putting up a Digital Amateur Radio Television repeater. This is a video era - TikTok, YouTube, etc. Thus DATV is one very relevant way to show off Amateur Radio's technological capabilities. Not Internet video watching or chatting… anyone (literally) can do that. But only Amateur Radio5 allows individuals to transmit video over the air.

73 de Steve, NGNJ, Zero Retries issue #228

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Mount Diablo, California - DATV Repeater - W6CX

Digital Output: 1244.500 MHz Digital Inputs: 1292.500, 1273.0, 917.0 & 430.0 MHz
Analog Input: 1270.0 MHz FM (192.8 PL)
DATV Internet Stream: http://w6cxatv.mdarc.org YouTube Channel: Media MDARC
Thursday 8:00 pm Digital Amateur Television Net 147.060+
W6CX web site: https://www.mdarc.org/home

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ATV Repeater Design -

Control Receiver Antenna Considerations

Jim, KH6HTV

Remote, unattended amateur repeaters need to have a means of control to be able to disable them in the event of failure or illegal useage. This could be either via a direct wire-line, internet, or radio control. For our Boulder, W0BTV, ATV repeater neither a wire line, nor internet was available. We opted to go with a separate 2 meter FM voice receiver control using touch-tones (DTMF) signaling. The control receiver is on our 2m, TV voice inter-com, simplex channel.

Our repeater transmits on the 70cm and 5cm bands and receives video on the 70cm, 23cm and 3cm bands. We thus have multiple antennas for all these various bands on the roof top of our host site. But we were limited to only two, pre-existing coaxial cables coming from the rooftop down to the radio room. This meant we absolutely needed to use a complex network of passive duplexers and triplexers.

The resultant repeater's 70cm receive sensitivity was somewhat disappointing. The sensitivity measured at the front panel receive antenna port was about -88 to -89dBm. The basic sensitivity of the Hi-Des HV-110 receiver came in at about -94-95dBm and with the pre-amp in front of it was about -98dBm. The accounting for the loss in the 70cm input band-pass filter, etc. it should have been about -95dBm. Why did we measure only -89dBm ? A 6 dB difference. What made the difference ? Was it due to the triplexer ? But the measured insertion loss of the Diamond MX-3000 triplexer was less than 1dB. What gives ?

More recently, I have been building more DVB-T repeaters. I again have encountered this same discrepancy. Additional measurements for the 70cm receive sensitivity with and without the 2m/70cm/23cm triplexer or a 2m/70cm duplexer confirmed that having them in the receive path severely compromised the sensitivity beyond their expected low insertion loss. Why ? I don't have a good explanation.

Our ATV repeaters require two separate antennas. One for ATV receive and one for ATV transmitt. We really don't want to add still another antenna for the 2 meter control receiver. We want to be able to use a dual band 2m / 70cm antenna, but using it for receive ends up needlessly compromising the receive sensitivity while using a 2m/70cm duplexer to split out the 2m control signal. So, maybe can we use instead a 2m/70cm antenna plus a duplexer on the transmitter side ?

To answer this question, we need to determine what level of filtering is required to avoid desensing our 2 m control receiver when the 70cm ATV transmitter is on. I thus set up on the test bench a 2m FM transceiver plus an HP signal generator for 2 m FM and a DVB-T modulator for a 70cm DVB-T test signal along with step attenuator. I used a 3dB power splitter to combine the weak 2m FM signal and the interfering 70cm DVB-T signal. The 2m rig was a QYT model KT-8900D.

With no DVB-T RFI, the 2m receiver opened squelch with a usable s/n audio signal at -120dBm. I then set the 2m FM signal level up 3dB to -117dBm (about 0.3 μV). I then added in RFI from the DVB-T modulator. When the RFI exceeded -24dBm, it blocked the 2m signal from opening squelch. If the 2m signal was -107dBm (about 1 μV), the RFI needed to exceed -13dBm.

Now assuming our 70cm DVB-T transmiiter is putting out 10 Watts (+40dBm) and we do not want to have any noticeable desensing of our 2 meter control receiver, how much filtering rejection do we need ? Filter Rejection = +40dBm - 27dBm = -67 dB

What can we expect from a typical 2m/70cm duplexer ? The Diamond model MX-72A is a good example. The manufacturer's spec. is greater than -60dB. On mine, I measured the isolation between the 70cm port and the 2m port to be -69dB when the antenna port was terminated in a a 50 Ω dummy load -- or -- -62dB when the antenna port was left open circuited. Thus, this duplexer should work in this situation.

Conclusion: To use 2m/70cm Duplexer for a control receiver antenna pick-off in a DVB-T repeater, always put it in the transmiter antenna circuit --- not the receive antenna circuit.

Note: For a lot more details about the Diamond MX-72 and MX-3000, I refer readers to our TV Repeater's Repeater, ATV newsletter of April, 2024, issue #159, pages 10 & 11. (all back issues are archived at www.kh6htv.com)

73 de Jim Andrews, KH6HTV, Boulder, Colorado

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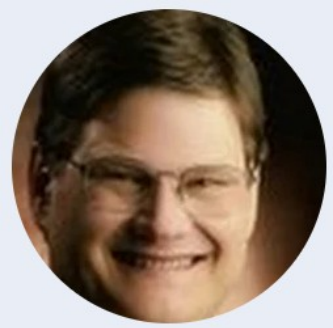
3 GHz Band Feed-Back:



Steve, N8GNJ

As for the former Amateur Radio allocation in 3.x GHz…

Back in the mid 1990s and early 2000s I was an observer of the emerging use of wireless for broadband Internet access. 3.x GHz rapidly became the allocated as the primary spectrum for Fixed Wireless Internet distribution systems everywhere else in the world but the US. Standardization driven by radio chipsets drove worldwide spectrum usage harmonization to the point that every mobile phone eventually included 3.x GHz. Thus there was steadily increasing pressure (demand) from US wireless carriers for access to 3.x. In comparison, Amateur Radio was irrelevant

Thus I concluded early on that it was absolutely inevitable that any 3.x GHz spectrum would be reallocated from Amateur Radio use, and attempts to "defend" Amateur Radio's use was wasted effort. Candidly… Amateur Radio looked a bit foolish for trying. Amateur Radio didn't then… and really couldn't… offer a compelling case for Amateur Radio retaining the use of 3.x GHz at the expense of the greater good of the rest of society.

I think that Amateur Radio's "spectrum defense" efforts should focus on the bands we CAN make a credible case for, such as 5.x and 10.x GHz for space operations and (slowly… increasing…) terrestrial use.

I think the recent development of open.space - https://open.space and its phased array open source technology for 5 GHz makes for some exciting possibilities, including an announced AMSAT LEO cubesat that will have a 5 GHz uplink.

73 de Steve, N8GNJ, Bellingham, WA -- editor of Zero Retries

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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

W1BTR Big Time Radio

Why buy expensive software and programming cables? We can program radios for you at a flat cost: $5/channel or $40 (per radio), whichever is higher. We can also add custom startup messages, settings, setup MDCIDs, and more!

https://bigtimeradio.us/radio-programming/

Programming software is expensive, especially for commercial radios, and that's assuming you can even find a copy! **Motorola, Johnson, Kenwood, ICOM,** etc. etc.

Tnx to Steve, N8GNJ, and his newsletter "ZERO RETRIES" for calling our attention to this useful service to hams by W1BTR. Especially for hard to program Motorolas.

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