Boulder Amateur Television Club
TV Repeater's REPEATER

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BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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23cm Band Under Attack at WRC

I think it would be good if you started "softening up" your readers to the major changes that will probably happen to 23cms at the World Radio Conference (WRC) next year. The IARU published their latest update last Friday and I have linked to it on this forum post: https://forum.batc.org.uk/viewtopic.php?f=91&t=7939#p30844
There will still be a ATV allocation but likely to be 4 MHz so fine for DATV but not for FM. As I said in my forum post, I wouldn't be spending money on 23cms wideband TV equipment right now.

73, Noel Matthews, G8GTZ, Basingstoke, England
British Amateur TV Club - Secretary

Comments about Narrow Band-Width DATV & other related topics

Two hams from Akron, Ohio, Brett - KD8MEE & Kevin - KE8DLH, recently attended the ATV Forum at the Dayton Hamvention. They were intrigued by Mel's (K0PFX) talk on DATV. They followed up Mel's suggestion they contact your editor for more info. I in turn put them in touch with the two Midwest, Big Gun, ATV Gurus -- Dave, AH8AR, Dayton ham club and Art, WA8RMC, ATCO, Columbus, Ohio. What followed was a long string of emails with advice, and observations, in particular relating the the pros and cons of using narrower bandwidths for DVB-T. This soon pulled in Mike, WA6SVT, of ATN-California. Mike's observations are of particular interest, so we are sharing them here in our newsletter. --- Jim, KH6HTV, editor

Hello to the ATVers in this email thread.
I would like to throw my comments into the mix. Hi Bret, I am Mike WA6SVT, trustee of W6ATN. We have seven linked ATV repeater that have 2 MHz bandwidth DVB-T receivers on 434 MHz as the digital ATV input used on our repeaters, we also have analog 434 MHz too. I am a broadcast transmitter engineer for KCBS & KCAL in the Los Angeles market.

1. The data rate has to remain about 15 to 20% less as headroom is needed for housekeeping data such as PSIP etc.

2. There is a difference between sensitivity on the bench and in the real world environment so you will likely not achieve the same sensitivity due to other signals that are lurking on the band.

3. The most robust signaling for DX is using MPEG2 encoding and QPSK constellation. Having said that, the HV-100 and 102 series modulator-exciters allow you to select encoding while the HV-310 1nd 329 only allow h.264 encoding. You get about 30 to 45% more data throughput using h.264 but take a larger hit when QRM or radar or spread spectrum pulses are co-channel.

4. On the bench you take a 5 db hit to sensitivity but get twice the data throughput using QAM 16 constellation. In the real world over the air use of QAM 16 vs QPSK is much less than the 5 dB on the bench hit due to weak other signals on the band. Military uses spread spectrum communications radios as well as some weak signal from Canada (Line A) in the background in your area. In our area it is spread spectrum, occasional RADAR and DRM hot spots.

5. HiDes receivers do have the narrow bandwidth however the minimum IF bandwidth is 5 MHz thus less effect of a lower noise floor at 2 MHz as the receiver is still dealing with 5 MHz noise floor and any signals within the 5 MHz window. The way to fix this is run a 2.2 MHz minimum bandwidth filter after the LNA, this will give you maximum sensitivity and the filter will cut off white noise outside the filter bandwidth. We have done this with two of our repeaters and noticed a difference. We have a six MHz wide filter ahead of the LNA and a splitter so we can also feed the analog receiver. Look at Jim's notes on his KH6HTV.com site. He shows the gain in receiver sensitivity as bandwidth is reduced and you will see the 6 MHz vs 5 MHz and the percentage of improvement. 5 to 4 MHz and lower bandwidths the sensitivity improvement is not as intense.

6. The speed of the data per MHz of bandwidth is the same whether you are using 2 MHz or 6 MHz, the data throughput does change (size of the pipe), this is assuming the same constellation and enconcoding (MPEG2 or h.264) is used for both bandwidths. As in FM video or digital video the signal is spread out across the bandwidth so there is a sort of transmitter gain. One of our repeaters is Oat Mountain and currently has a 919.25

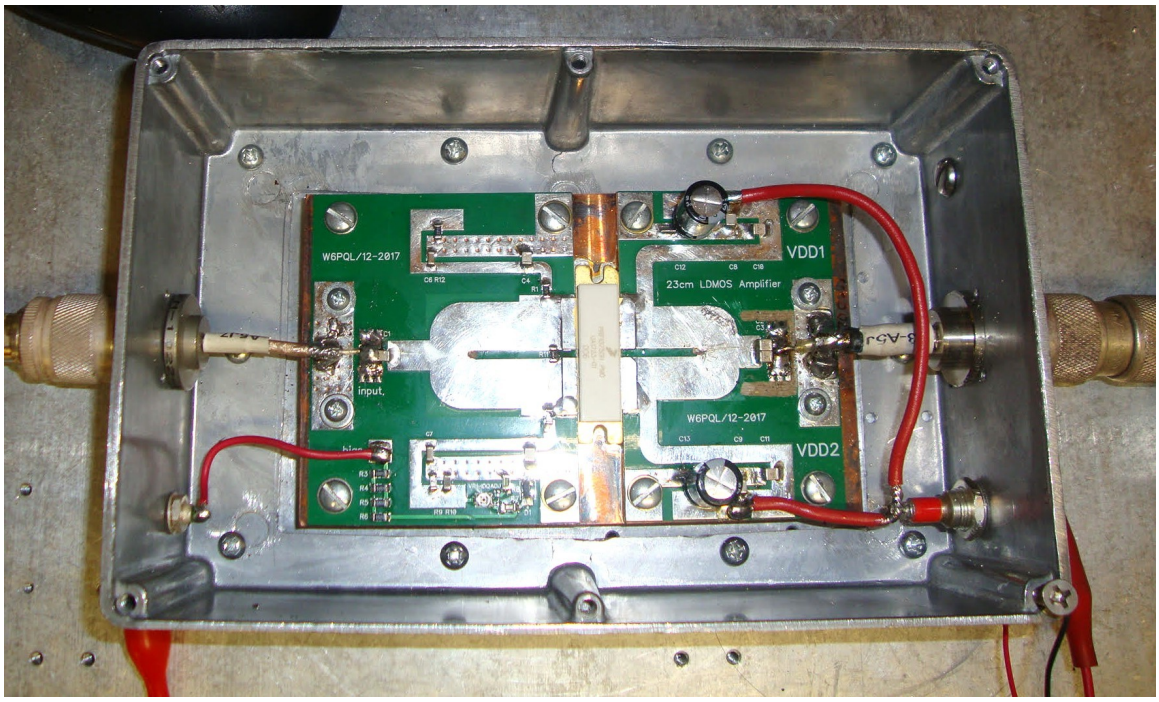
MHz analog output and for two months we tried both 6 MHz and 2 MHz DVB-T, 2 MHz worked better in the high level of part 15 spread spectrum signals. The receivers did show a higher RSL at 2 MHz as compared to 6 MHz. I find this odd as the wattmeter showed the same average power output at the repeater site.

7. ATV at the band edge, for simplex the guys are correct, stay away from the edge. Hams need to have spurious signal (spectrum regrowth in the case of digital ATV) down a minimum of -38dBc. -30 dBc as in driving your amplifier harder or using a typical ham amplifier used for SSB and FM (the 12 volt ones) or using the HV-310 may be an issue if you follow the letter of the law. If you run a bandpass filter, the filter should greatly reduce adjacent channel spectrum regrowth and spurious signals. If you use the 439-441 MHz area, this is not as much of an issue. One of our repeaters at Snow peak runs 4 MHz bandwidth on 1242 MHz due to an FAA radar station 95 miles away at 1247 MHz (3 MHz bandwidth radar receiver). Our 10 pole ATV filter cuts off regrowth below 1240 MHz. We are using an HV-320 as well due to much cleaner spectrum than the 310. We also do not drive the amplifier too hard and it is a LDMOS medium voltage transistor that is very clean.

Having said so much, lets keep it simple and if you stay away from the band edges, use low loss feedlines such as LMR-400, N connectors (stay away from PL-259 as they are not 50 ohms by the way at UHF), get your antenna above the roofline and even better if above the treeline, you will enjoy ATV digital simplex even with a lower gain antenna. buildings and trees are a sponge to UHF signals and I would take a six element ATV beam in the clear any day over a stacked set of long boom Yagis 5 ft off the roof. But I do enjoy having both for maximizing ATV DX.

You will most likely need a good digital rated ATV amplifier and Jim Andrews has a good one ready to go and I would suggest a purchase of his highest level power amplifier. If you want to make your own, Mini Circuits has PHA-1+ MMIC that makes a great predriver that will get you up to about 15 milliwatts (digital average). They have also have a PHA-101+ that is nearly 10 dB higher output than the PHA-1+. I use a PHA-1 driving a PHA -101+ as my post HV-320 amplifier then drive a two or four RF module amplifier or broadcast TV used broadband RF pallet for high power ATV. As you can tell, I like to build a lot of ATV gear. The Photo Below is an LDMOS 600 watt amplifier I built for several of our ATV repeaters output on the 23 cm band. It runs on 50 volts, 20.5 dB gain, saturates at nearly 700 watts and we run it in analog mode at 400 watts peak sync and at 100 watts average DVB-T . These pallets as well as complete ready to plug and play amplifiers HF through 23 cm band.

73, Mike, WA6SVT, Crestline, California



Mike, WA6SVT's, High Power 23cm Amplifier

MORE FEEDBACK on DEMISE of ANALOG TV

Re info on p.4 concerning FCC requirement for television sets to include an analog NTSC tuner: that requirement sunset five years ago, on Aug. 31, 2017. See paragraph 44 in FCC Order 15-175 and 15.117(b). (Only a subset of television receivers, those marketed as "cable ready", must include an analog NTSC tuner for cable channels, 15.118(b). Since streaming and web-access have for the most part replaced "cable-ready", the cable analog requirement today does not apply to most new TVs.

73, Dave K3ZJ, Romney, West Virginia

(*note: Dave serves as the ARRL's Washington Counsel*)

Feedback on Italian DATV Extreme DX:

Hi Jim, and thanks for another edition. UHF DX is interesting. One of my early jobs was designing microwave digital radios for telecom. We had installed the first digital O'ahu to Molokai links at 2 GHz and discovered the problem with multipath reflections off the ocean. That was about 1980 and no one had much experience with QPR modulation. The Italians must have had similar problems and then some.

73 de Alan, AD6E, & KH6TU, Maui, Hawaii

908 km DVB-T contacts - GREAT ! ! ! DO NOTE that it was over water which is a challenge for we here in land locked Colorado. And it was over the horizon suggesting ducting was part of the success.

73 de Don, N0YE, Boulder, Colorado

Thank you Jim. Not so important, but actual WW locator of Sicily operations was JM78SF. 73 de IW9ARO -Johnny-

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Jim --- Just a friendly comment.. we have really very active folks here in the Midwest who prefer in keeping the A5 activity alive. This is likely because the Midwest is currently the only place in the world that there is a lot of point-to-point Analog DX ATV activity that is occurring every single day. Most of the ATV DXers in Columbus and Dayton rarely use the ATV repeaters as "repeaters". The DARA ATV repeater and the ATCO repeater are currently used far more as a beacon for 70cm ATV propagation than for ATV repeater QSOs.

Analog interest is still solid due to the draw from the daily ATV DX activity going on. So let's try not to discourage them…

I appreciate the fact that there will be folks in other regions that don't understand how these ATVers can ever get excited about receiving a P-1 DX ATV signal…but we should not discourage those who still enjoy weak signal A5 viewing. There will be days where ATV propagation may allow for detection of "sync bars" only on a black and white TV raster. A lot of folks don't get it, but that's ok.

Cheers ! Dave, AH8AR

VIDEO STUDIO SOFTWARE REVIEW:

I suggest you download the latest newsletter (9-7, July, 2022) from the North East Victoria Amateur Radio Club.
https://nevarc.org.au/wp-content/uploads/2022/06/NEVARC-NEWS-Vol-09-Issue-07-2022.pdf
There is a great article in it by Mick, VK3CH, entitled "*New Amateur Television Studio*". At 15 pages, it is too long to reprint here in our ATV newsletter.

Filtering is Important on Receive as Well !

Ian Parker, G8XZD

My local repeater GB3ZZ has just returned to service after losing its original site at Filton, north Bristol. Although it has only moved across the car park to a nearby building, the aerials are lower and it is closer to nearby houses, so possibly no longer clearing the ridge in my direction.

Previously I could receive it at D22, it returned briefly for tests and it was D2 and some 6dB less sensitive on receive. GB3ZZ uses two aerials on 23 cms with the receive Alford Slot at the top of mast, and it has always been spectacularly sensitive on receive.

Recently, although nothing had changed at either end, I couldn't see anything other than the odd lock confirming that it was GB3ZZ. Initial tests confirmed that my Ryde receiver was working fine and the aerial checked out OK. Still nothing though.

Other locals confirmed it was on air though one distant station near Taunton confirmed he had lost the signal but could still get in if he ran about 6dB more power - which tallied with my observations.

I would point out I've been lucky to have a signal strong enough to receive without any preamps or filters, connecting straight to the Serit tuner – though the BATC always recommend the use of a preamp ahead of the tuner.

Inspired by what Justin, G8YTZ, had written in the previous CQ-TV I thought I'd look at improving the selectivity of my receiver. Justin had noted poor performance on the 70cm input of JV which has traced to his Ryde being swamped with enormous DVB-T/T2 signals from Crystal Palace transmitter which dwarfed the incoming signals on 437MHz.

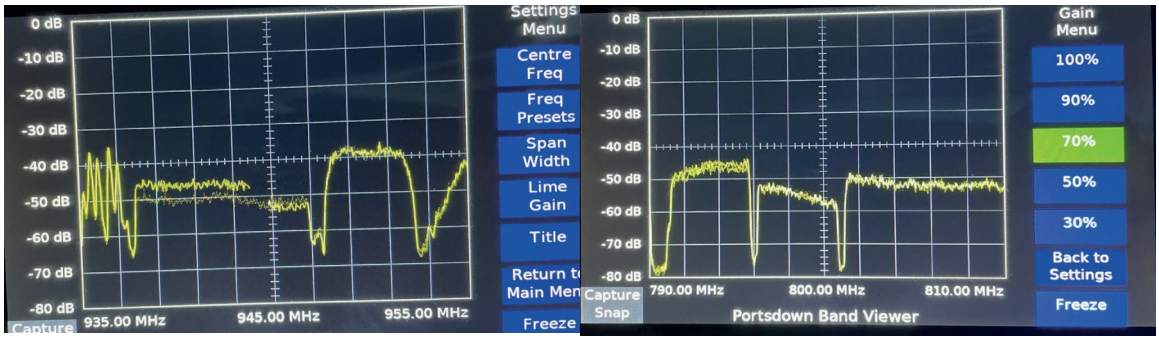
The JV group looked at several solutions involving commercial filters but none could knock out the mighty Crystal Palace. Eventually he managed to solve the problem with a SAW band pass filter from eBay - yes it is lossy - but using the filter after the preamp it cleaned the incoming 70cm and all was well with non-local stations able to get back in again.

I wondered if there were any strong signals near to me but couldn't see anything significant on a spectrum analyzer. Then the penny dropped. We've had a new 15m-tall mobile phone mast installed about 1/2 mile from home – on the same bearing as the repeater. It's a lot higher than the one it replaced and bristling with aerials.

Was this it, I wondered ?

At this stage it's worth pointing out that there is no suggestion that anything is wrong with the phone mast and the companies are legitimately using frequencies and power levels they've paid millions for the privilege.

Using the excellent band viewer software on my Portsdown-Lime combo I could see massive signals centered on cellular frequencies between 700 and 1000MHz - within the passband of the Serit. Again these were some 20dB higher than GB3ZZ on 1316MHz.



I guessed there was probably activity between 1900 and 2300MHz as well.

The Serit has little filtering on the front end and I believe it was getting swamped by the strong cellular signals so I then tuned up an old five-pole interdigital filter for 1316MHz (ZZ output)and this restored my reception.

Lesson learned: good filtering is just as important on receive as on transmit. Not just on remote hilltops but also within the RF smog of a big city.

Experiments like this are all part of the hobby and help to justify the amateur license and the valuable spectrum we are allowed to use for free.

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Editor's Note: *This is a lesson we too have learned here in Colorado. When Paul, WA2YZT, expressed an interest in obtaining a DVB-T receiver to watch the Boulder ATV repeater, W0BTV, we suspected immediately that he would need a really good band-pass filter in front of it. This was due to Paul' QTH location on the top of Lookout Mountain in Golden. The home of Denver's high power TV broadcast stations. Paul is actually a broadcast engineer in one of them. Sure enough a very high quality, 70cm, 6 MHz BPF allowed him to view the much weaker (6 Watt) signal coming from Boulder.*

Jeff, KD0TLB, had the same experience. Jeff lives within Denver with a clear view to Lookout Mtn. plus has nearby mobile telephone towers. A spectrum analyzer examination of his site showed lots of very strong signals, not just TV and cell, but 450 MHz business band, plus some broadband noise covering the whole 70cm band and beyond. Again, the same inter-digital BPF as was used for WA2YZT cured the problem and allowed Jeff to see the Boulder repeater's DATV signal.

Sometimes adding a good pre-amp helps, but only those built with integral band-pass filters that only cover the ham band of interest. In some cases, that might be enough filtering. It wasn't in Jeff's case. He needed the inter-digital BPF in front of the pre-amp.

BOULDER HAM & EGGS BREAKFAST: A large group of hams, both HF and ATV oriented, gather every Tuesday morning at 8am for eye-ball QSOs and breakfast. We recently changed locations. The new location is Doug's Diner in the BaseMar shopping center (Broadway & Baseline). All hams are invited to join us.

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/*

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