

Boulder Amateur Television Club TV Repeater's REPEATER

June, 2022
2ed edition, issue #103

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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



FEEDBACK on Analog vs. Digital ATV Contests, etc.

Dave, G8GKQ writes ----- Dear Editor ----- Whilst I accept that the majority of TV activity in Slovenia near S58RU might be on analog ATV, in the UK the situation is the opposite with the majority of activity using DVB-S and DVB-S2.

Most of the UK ATV repeaters have only Digital ATV outputs, enabling them to relay 720p or 1080p signals in a few MHz of bandwidth. Some retain analog inputs, but the digital inputs perform so much better that these are rarely used.

For contest operation, again the majority of activity is digital. In last year's IARU Region 1 Contest, the winning station was a single-operator portable station using Digital ATV on all bands from 432 MHz to 76 GHz. I placed second in the contest operating Digital ATV on all bands from 432 MHz to 24 GHz from a regular estate car (photo attached).



The Italians have recently set new distance records using Digital ATV: The IARU Region 1 Distance record was set by a team consisting of IT9HZM and IZ5TEP at Monte Beigua and IW9GUR, IT9GAJ and IW9ARO at Monte Pelotani on 15 May 2022 over a distance of 904 km (561 miles). They achieved 2-way contacts on 432 MHz, 2400 MHz and 10 GHz using 333 kS DVB-S2 transmissions.

Digital ATV is here to stay, and the benefits we have seen in the UK outweigh the disadvantages.
73, Dave, G8GKQ, Salisbury, England

Editor's Note: I agree with Dave. Here in Boulder, Colorado, while we have retained analog capability on our ATV repeater, W0BTV, for both input and output, the analog portion is no longer used by any of our members. Plus, I have tried to locate older NTSC, analog gear to replace what I lost in the fire which destroyed my home. I find it is very hard to find these days. So, even if one wants to do analog, you will have issues finding suitable equipment. The sole exception seems to be the ready availability of very low cost, FM-TV transmitters and receivers for the 5.8 GHz band. As a matter of fact, we have one of them on our ATV repeater as a secondary transmitter. We run it on the air continuously 24/7 to serve as a "Beacon" for anyone wanting to experiment with microwave ATV.

FEEDBACK -- SatLink DVB-T Modulator:

In the May issue (#101) of this newsletter, we ran an article evaluating the SatLink WS-6990, DVB-T Modulator from China. It was evaluated as a potentially lower cost alternative to the modulators we have been buying from Hi-Des in Taiwan.

So I guess the old adage "you get what you pay for" still holds true. The particular SatLink unit that was evaluated back in May is no longer functioning. Its failure is it still puts out RF, but with no A/V modulation. Just a black screen with no audio. So am writing off SatLink as a supplier. ----- Jim, KH6HTV

4.4 GHz Signal Generator

Analog Devices has come up with some great frequency synthesizer chips which go out well into the microwave region. As a result several Chinese manufacturers are now offering low cost signal generators using these A-D devices. The basic output from the A-D synthesizers is a square wave of the order of 0 dBm output power.



I recently found on E-Bay a Chinese box which now includes an RF power amplifier, plus a programmable rf attenuator in addition to the A-D synthesizer. The price is in the \$150 range. So, I ordered one as a much less desirable replacement for the HP signal generator I lost in the recent fire. It has been my experience in the past that you can never trust the Chinese specs. (if any) to be truthful. So I always am scared as to what I will really get for my money. The following is what I found in terms of performance.



The unit comes with no manufacturer's name, nor model number. It has a paper label only saying ADF-4351. The advertised frequency range is 35 MHz to 4.4 GHz. The unit is powered with a +9Vdc wall wart. There are five push-button controls. From left to right, they are Left, Up, Enter, Down, & Right. They move the cursor around on the two line LCD display.

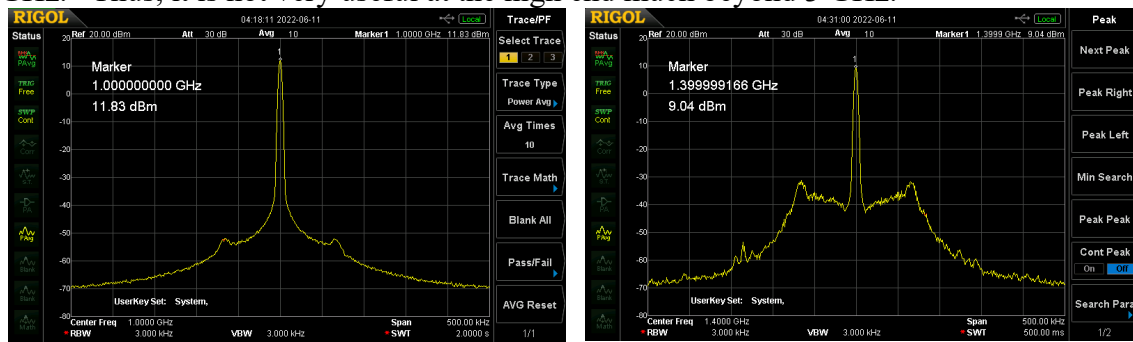
The unit I received would not tune below 137.5 MHz, contrary to the advertisement. According to the Analog Devices data sheet, the ADF-4351 should in fact work from 35 MHz to 4.4 GHz. So, although it was labeled as ADF-4351, it probably instead had the ADF-4350 IC installed. I was able to test the unit up to 1.5 GHz using my Rigol DSA-815-TG spectrum analyzer. Above 1.5 GHz, I tested it strictly with my replacement, HP 432A RF power meter.

Contrary to some of the lower cost, bare pc board ADF4351s offered for sale, this generator actually put out rf immediately upon power up, plus it retained in memory the

previous settings. With it's +10dBm output power it could be used to directly drive +7dBm double balanced mixers.

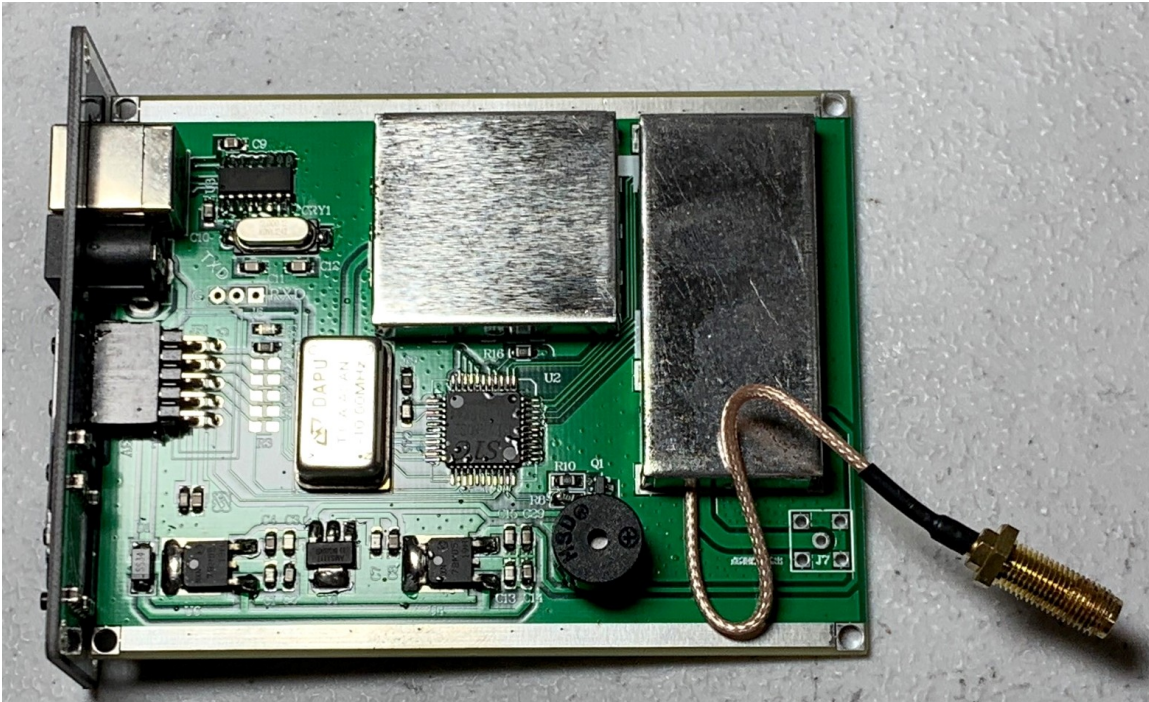
I did find the frequency to be quite accurate. It can be set in 1 kHz increments. The output waveform is not a sine wave, but is a square wave. As a result it has very strong harmonics. Being a square wave the even harmonics are quite low, being > 42dB down from the fundamental. At 150 MHz, the odd harmonics were measured to be -6dBc (2ed), -12dBc (5th), -15dBc (7th) & -18dBc (9th).

The RF power level was adjustable over a range from +10dBm to -40dBm in 0.5 dB increments. I set the RF level to the max. of +10dBm. Up to 1.5 GHz, it varied from a max. of +11.9dBm to a min. of +9.2dBm. Above 1.5 GHz, using the HP power meter, I found the level was still relatively flat at +10dBm up to 2.6 GHz. Beyond there the power dropped like a rock. It was -3dB down at 2.9 GHz and down to -16dBm at 4 GHz. Thus, it is not very useful at the high end much beyond 3 GHz.



The phase noise was found to vary considerably depending upon the frequency setting. The photo on the left was at 1.0 GHz while the photo on the right was at 1.4 GHz showing far worse phase noise. The RF level was set to +10dBm for both. The plots are at 10dB/div & 50kHz/div. The resolution bandwidth was set to 3 kHz with signal averaging.

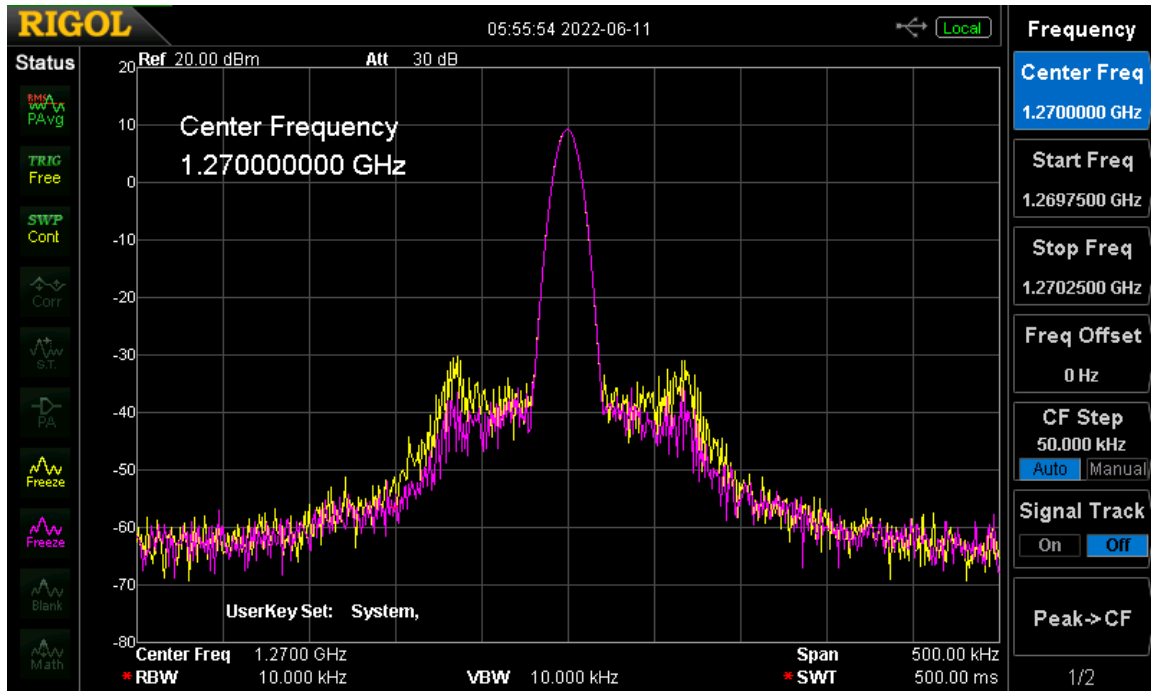
I was not satisfied with the phase noise performance, so I opened the box to see if I could make any improvements. I have been able to do that in the past with similar ADF synthesizers by adding large capacitors on the various DC voltage regulators.



This is the inside view of the generator. I found three voltage regulators. They are all on the lower left side of the photo. U4 & U6 were 78M05, +5V regulators. U1 was an AMS1117, 3.3V regulator. I thus added four, 100uF, 16V electrolytic capacitors. One on the +9V input line and the others on the +5V & +3.3V outputs.



There was some improvement, but not major in the phase noise as a result. Even larger value caps would have probably be beneficial. This photo shows the before and after results.



The yellow trace is the phase noise before modification and the magenta trace is after adding the 100µF caps. center freq = 1270 MHz, 10dB/div & 50kHz/div, 10kHz RBW

More Nails in Analog TV's Coffin

Some ATV hams will be hauled kicking and screaming from analog, NTSC, ATV into DATV. But analog's days are numbered, if for no other reason than the



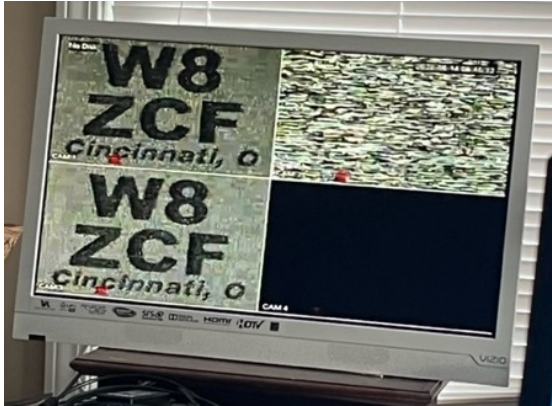
analog gear is becoming scarce and very difficult to find. In the "good ole days" my favorite way to generate pure, VUSB-TV signals was to use the modulators designed for use in CATV head-ends and private closed-circuit systems, such as in hotels, etc. I then used the CATV modulator to drive my rf linear power amplifier.

So, in my attempt to resupply the ham shack with gear that I lost in the 30 Dec. fire storm, I recently decided to again get a CATV, VUSB-TV modulator and demodulator. I first google searched for them on the internet at E-Bay, etc. Not much luck there. The sole exception were several fixed channel modulators, but none for cable TV channels 57-60. Always in the past, I had purchased them from ATV Research in Nebraska. So checking their web site (www.atvresearch.com), I did still find some listed. I thus placed an on-line order with ATV Research. Right away, Mel, W0KYQ, called me back to say, they could no longer fill my order with what they advertised, but he had located

elsewhere a pair which he could get for me. He said because of the move to digital, these items are now out of production and are increasingly rare and hard to find.

I have also heard it reported that hams wishing to purchase a new TV receiver are finding many of them no longer include an NTSC, analog receiver. We could still easily build our own AM-TV transmitter, simply using a power video amplifier to AM modulate the finals in a CW/FM transmitter. But to build from scratch a complete analog TV receiver would be a much more difficult task.

Jim, KH6HTV, Boulder, CO



(left photo) DX-ATV from Farrell, W8ZCF received by KY4ATV, ATV repeater in Bowling Green, Kentucky (182 mile path). (right photo) DX-ATV from Charles, WB8LGA, in Morrow County, Ohio as received by Hank, W4HTB, in Bowling Green, Kentucky (311 mile path)

Mid-West ATV Band Opening !

On June 14th and 15th a group of ATVers experienced a very rare opening which we've only experienced two or three times in the past twenty years. The magnitude of these openings are frequently found along the gulf coast into Texas and western states.

Our Midwest DX-ATV group has existed for over thirty years meeting each morning 24/7 around 11:30 UTC for an hour or so. Our purpose is to test and improve our systems by checking propagation between each station. Presently there are ten or so that gather on Zoom (*same ID and password as weekly nets from ATCO and DARA*) These

stations range from northern OH to Southern KY and PA. Zoom provides us with a medium whereby we can see our own video signal at all the receiving stations.

On the morning of June 14th I really got excited when experiencing one of these openings, especially this one as we've had our local ATV repeater copy W8ZCF, Farrell from Cincinnati some 182 miles. This was a first time for an out of state contact. On June 15th great propagation still existed as I was able to copy Charles, WB8LGA Marengo, Ohio, live video some 362 miles. With openings like this power levels doesn't make much difference as we ran from 2 watts to 150-200 watts with P4-P5+ pictures

Hopefully we will have frequent openings and will pique the activity of other ATVers in the Midwest. Presently we're running A5 (analog ATV) on 439.25 MHz but in past openings Digital has worked well for us. But this opening caught us off guard and none were setup for digital.

73 & Great ATV-DX de Hank, W4HTB, Bowling Green, Kentucky

(Hank's bio from www.qrz.com --- First licensed as a novice WN4HTB in 1954. Have worked as an electronic engineer until retirement in 1998. Presently doing consulting as a Professional Engineer. Primarily interested in Amateur Fast Scan Television and Digital Slow Scan. Most interesting project in amateur was the design and construction of the controller used on the MIR space craft which sent SSTV pictures via 2 meters.)

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.



COMPLETE DVB-T STATION --- For Sale

Are you new to digital ham TV ? -- Or do you have some ham friends who would like to get started in high-definition, digital ATV ? Well KH6HTV Video has a "KISS", "Turn-Key" offer to make it easy to get started. If you buy our Model 70-9B Amplifier (\$400), we offer to purchase for you and then resell it to you at cost an appropriate DVB-T modulator and DVB-T receiver. Plus we will program both the modulator and receiver to work properly on the amateur 70 cm band. So when you receive the package, you can be assured it will work with no additional programming set-up required. You will need to provide a source of HDMI video, an HDMI monitor, 12Vdc power supply, 70cm antenna and coax feedline. The video source can be a camcorder, your PC computer, a DVD player, etc. Your conventional home TV receiver can be your HDMI monitor.

The DVB-T modulator we recommend is the Hi-Des model HV-320E (\$370 + E-Bay Sales Tax). If your local ATV standard is using 6 MHz band-width channels, then the receiver we would furnish is a "combo" DVB-S & DVB-T for \$60. Thus the total package cost would be \$830 plus sales tax and shipping. If your local ATV group is using DATV channel bandwidths less than 6 MHz, we would furnish the Hi-Des model HV-110 receiver. (\$100 + E-Bay Sales Tax).

Interested ? --- Questions, etc. contact Jim, KH6HTV, at kh6htv@arrl.net
 web site = www.kh6htv.com