Amateur Television Journal

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BATVC web site: www.kh6htv.com
ATN web site: www.atn-tv.com

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10 GHz Circular Horn Antenna

Recently on the Boulder ATV Net, the question came up -- "What is the antenna gain of a Bulls Eye LNB ?"

Steve, WA0TQG, had the answer -- It is

14.6 dBi

Fig. 1 Bulls Eye LNB

Steve then proceeded to explain how he came up with the answer. As part of Steve's recent project to get on both 5 and 10 GHz with DVB-T, he needed to come up with a 3cm, high gain dish antenna. He decided to re-purpose an old DirectTV dish antenna. He needed to come up with a suitable feed antenna which he could use for both receive and transmit. He reasoned these dishes were designed to accept a standard LNB, so what not use a suitably modified LNB.

Fig. 2 Circular Horn

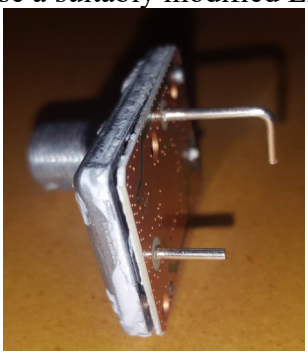

Fig. 3 Ant Probes

Fig. 4 modified LNB with SMA

Steve purchased for a very low price, a generic LNB and disassembled it. Fig. 2 shows the business end of the circular waveguide horn LNB antenna. Fig. 3 shows the removed p.c. board which contained all the LNB electronics, plus two antenna probes which protruded into the circular waveguide. Fig. 4 is Steve's re-assembled LNB now with an SMA connector serving as a probe into the waveguide.

Figs. 5 & 6 show the modified LNB feed antenna mounted on the satellite dish.

Steve had set up at his QTH an antenna test range to evaluate and tune up his various new microwave 5 & 10 GHz antennas. While doing this, he also measured the gain of the modified LNB. The result was 14.6 dBi.

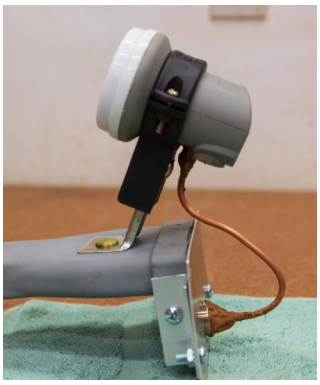

Fig. 5 Feed Ant mount

Fig. 6 Steve's Dish Antenna

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I have heard from a few hams still interested in using the older, analog, NTSC, amateur TV. As shown in the recently up-dated ATV Repeater Directory, there are still a few ATV repeaters here in the USA using it. So, to be able in encourage new ATV hams to use these older, analog repeaters, we need to be able to show them where they can find suitable equipment to get on those repeaters. For this reason, I have recently done some research and come up with some equipment that is still available here in 2026. This is all documented in my latest application note, AN-75. It is available in .pdf format to be down-loaded from my web site: ***www.kh6htv.com***

Here are some of the items I have found which are still available. I have three suggestions for AM-TV (or VUSB-TV) modulators. They all put out low milli-watt level rf power and will require a linear rf power amplifier to boost them up to the Watt level. I also have two suggestions for an NTSC receiver.

CATV MODULATORS

These must still be considered absolutely the first choice if wanting to build an NTSC analog TV transmitter. These CATV modulators most all came in what was called the mini-mod format to be plugged into a special rack side-by-side. Many units racked up side by side at the CATV head-end might create 100 or more simultaneous, adjacent TV channels for the cable TV system. They required +5V and +12Vdc power. There were two versions available. The lowest cost was a fixed frequency unit and had to be ordered by the desired CATV channel number. Also available were frequency synthesized units which covered all CATV channels, plus broadcast TV channels.
They were previously made by several companies, including; MACOM, Drake, Holland, Pico-Macom, Blonder-Tongue, etc. Unfortunately, now in 2026 with the transition to digital TV, these analog CATV modulators are now considered obsolete. They can still be found, but only occasionally on E-Bay. I have found however (2026), one company left still offering them for sale. It is the Toner Cable Equipment company. Their web site is: www.tonercable.com
They are still offering their single channel modulators (model TMM-45+) for $105 and the frequency agile modulator (model TAMM-860) for $145.

Toner Model TAMM-860: 2026 tests were run on this particular CATV modulator. It was found to cover 54 to 860 MHz (ch 2 - 135) and included the amateur 70cm band with cable channels 57-61. The max. PEP rf power output was -2dBm measured on the sync tips. It was adjustable over a 25dB range. The 2ed harmonic was well suppressed at -62dBc. The 4.5 MHz SSC level is selectable at either -15dBc or -20dBc. I calibrated it to set the deviation at 25 kHz. On the lower side-band, the SCC was suppressed at -55dBc. . The video and audio levels are adjustable. The upper side-band video frequency response was measured and found to be very flat up to +4.2 MHz. It then had a smooth sharp roll-off -3dB down at +4.9 MHz, -10dB at +5.4 MHz, -20dB at +5.7 MHz. On the lower side-band the vestigal filter worked well. -2dB down at -0.5 MHz, -10dB at -1.1 MHz and -20dB at -1.3 MHz. The audio frequency response was measured using as a standard receiver a Blonder-Tongue model MIDM-806C CATV demodulator. The audio response was found to be quite flat with -3dB band-width extending from 60 Hz to 18 kHz. Requires +5Vdc and +12Vdc power.

AM-TV Modulators

OK, so what other options do we have in 2026 if we can't find CATV modulators ? Fortunately, China is addressing the forgotten analog TV market with a few offerings. As is the case with most things these days from China, they come from totally unknown manufacturers, with no brand names on their products. Plus, they might be here today and gone tomorrow ? Also, they either come with no advertised specs and in many case mis-leading or false specs. Best to rely upon the advice of other hams before purchasing. I have made numerous Google searches of the internet and have found a few suitable products, which I or other hams have evaluated.

HLLY TVX-50:

In 2020, Burt, N7CS, discovered AM-TV transmitters from China under the brand HLLY. It was reported on in our ATV Journal newsletter, issue #45. The model TVX-50 was evaluated and found to be suitable for use as a 70cm or 33cm AM-TV modulator. A google search shows that it is still available on E-Bay in 2026. Current price is about $110 plus shipping. HLLY also offers on E-Bay their model TVX-02S which they claim puts out **2 Watts**. This has not been evaluated, but might be quite useful as a stand alone ATV transmitter. It's current (2026) price is $220.

China Model HDM65:

A 2026 google search turns up this analog modulator offered by several different distributors, including Amazon. No brand name, simply the model # HDM65. Currently selling in the $30-$50 price range. I did purchase one recently for evaluation. I did find that it is suitable for use as a 70cm, ATV modulator. Here are the results of my evaluation.

Packaging: It is an all metal enclosure of X"xXxX" with additional blue plastic mounting brackets. It is powered via a 115Vac power cord. 2 digit LED display. Adjustable gain controls for RF level, Video and Audio. Four programming push buttons. Loop-thru, type F rf connectors. Dual A/V inputs of HDMI (digital) and RCA composite video and stereo audio.

Frequency Range: Sound sub carrier frequency adjustable to 4.5, 5.5, 6.0 & 6.5 MHz. The sound sub-carrier can not be disabled. Video frequency range is 47 to 888 MHz. The video frequency can only be set to standard NTSC or PAL broadcast frequencies. Thus for amateur use it is only useable on cable channels 57, 58, 59, 60 & 61 in the 70cm band. It can not be set to non-standard frequencies such as 426.25 nor 434 MHz.

RF Output: The max. rf output power was measured to be -10dBm, pep, peak sync. It is adjustable over a 25dB range. The 2ed harmonic of the video carrier was suppressed by -55 dB. The 4.5 MHz SSC level was fixed at -18dBc and was present equally on both the upper and lower side-band. I calibrated it by setting the deviation at 25 kHz.

Frequency Response: The video and audio levels are adjustable. The upper/lower side-band video frequency response was measured and found to have a smooth roll-off over the standard 4.2 MHz video pass-band. It was -1dB down at 2.5 MHz, -2dB at 3.2 MHz and -3dB at 4.6 MHz. It then dipped to -

20dB down at 7 MHz, but then fully recovered again beyond 10 MHz. The audio frequency response was measured using as a standard receiver a Blonder-Tongue model MIDM-806C CATV demodulator. The audio response was found to not be flat, but peaked at 100 Hz with -3dB band-width extending from 33 Hz to only 3 kHz. It was -6dB down at 8 kHz.

HDM65 CONCLUSIONS: The HDM65 is a good, low cost choice for a 70cm AM-TV modulator.

ANALOG TV RECEIVERS

The first choice is obviously your home TV receiver. However, most modern TVs now only include a digital tuner and will not tune the older NTSC analog TV signals. The FCC requirement to include an analog tuner expired in 2017. Otherwise, you will need to purchase a separate set-top box receiver to use with your flat screen video monitor.

CATV De-Modulators:

If you no longer own a suitable home TV receiver, then the ideal tuner (or De-Modulator) would be those used by the cable TV industry for their head-ends. These were made by the same companies mentioned earlier for the modulators. It is in the mini-mod package and is identical in appearance to the modulators. A current (2026) search of the internet shows that most of these are now obsolete and no longer available. One exception found is the Toner company's model TAMD-860. It currently sells for $171.

NTSC Analog TV Tuner:

Fortunately, there are available, low cost, set-top box receivers for NTSC. These function in the same manner as the set-top boxes supplied by the cable TV companies, satellite TV, etc. Simply connect the suitable antenna to the antenna port. The A/V output is then HDMI and / or RCA composite video plus stereo audio. The A/V output is then connected to a separate video monitor.

This photo shows one such NTSC analog TV tuner (or de-modulator). A google search of the internet will find several possibilities. I recently purchased the one shown here for evaluation from Amazon for $65. The only ID on it was a model number of RFDM3. No brand name. Made in China.

The tuner is quite small at 4"x2.5"x1" in a plastic case. Actually smaller than it's remote control. RF antenna input is a PAL connector, but a PAL to F adapter was included. A/V outputs are RCA for composite video, plus line level stereo audio. It is powered by a +5Vdc included wall wart. The included remote control is required for programming and all operations. It is a universal tv tuner design which supports rf frequencies for all NTSC and PAL systems.

One of these was purchased (2026) for evaluation. It was found to work to receive NTSC, AM-TV or VUSB-TV signals on the amateur 70cm band on cable channels 57-61. No controls on the unit. It is controled completely via the supplied remote control. I found it difficult to use. Even though there are numeric buttons on the remote control, it is not direct access. i.e. you can not simply enter either a channel number, nor a frequency by the remote control for channel selection. It has to be "scanned", like modern digital tv receivers. Once scanned it stores memorized channels. Not easy to use !

I measured it's rf sensitivity and compared it to the B-T demodulator. It was not as sensitive because it had a built-in video squelch. It stopped working at a P3 level of -88dBm. I tried adding a low noise preamp to it. With a pre-amp, I got a P3 picture at -91dBm, 3dB improvement.

I used the Toner VUSB-TV modulator as my "standard" for testing. It's SSC deviation was set to the industry standard of 25 kHz. I tested the video output of the receiver. It was quite "hot" with the 1.7 V ptp video into 75 Ω, vs. the standard of 1 Vptp. The level is not adjustable. In the absence of a valid input rf tv signal, the video output is a tv signal with a black screen and a white memory number displayed. I also tested it's audio performance. Using an 800 mV ptp, 1 kHz test tone, the test tuner put out a max. of 400 mV ptp. The volume level was adjustable via the remote control. The frequency response was quite flat with -3dB band-width extending from 63 Hz to 16 kHz.

73 & happy NTSC ATVing de Jim Andrews, KH6HTV, Boulder, Colorado

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Another Excellent ATV Newsletter

The down-under Aussies are quite active with ATV, in particular Digital ATV. Want to find out more ? Contact Mick Ampt, VK3CH, editor and ask to be put on their mail list ***magazine@nevarc.org.au***

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PLUTO HAS BETTER PERFORMANCE WITH DVB-S2 MODE - WHAT IS S2 COMPARED TO S ?

DVB-S and DVB-S2 Technology Explained

Mick Ampt, VK3CH

DVB-S utilizes Quadrature Phase Shift Keying (QPSK) modulation technique to transmit digital signals over satellite. QPSK allows for efficient utilization of bandwidth by encoding multiple bits per symbol. The modulation scheme is combined with Forward Error Correction (FEC) techniques, such as Reed-Solomon coding, which adds redundancy to the transmitted signal, enabling error detection and correction. In terms of compression, DVB-S employs MPEG-2 video and audio compression standards. These compression techniques significantly reduce the size of the broadcasted content, enabling efficient use of satellite bandwidth while maintaining acceptable video quality.

Advancements and improvements in DVB-S2 --- DVB-S2 represents a significant advancement over its predecessor, introducing several improvements to enhance the efficiency and performance of satellite television broadcasting.

1. Advanced Modulation Schemes: DVB-S2 incorporates more advanced modulation schemes, including 8PSK (8-Phase Shift Keying) and 16APSK (16-Amplitude and Phase Shift Keying). These modulation schemes allow for higher data throughput compared to QPSK, enabling the transmission of more channels or higher-resolution content within the available bandwidth.

2. LDPC Coding: DVB-S2 introduced Low-Density Parity Check (LDPC) coding, a powerful error correction technique that outperforms Reed-Solomon coding used in DVB-S. LDPC coding offers better error correction capabilities, resulting in improved reception quality, especially in challenging transmission conditions.

3. Adaptive Coding and Modulation (ACM): DVB-S2 incorporates ACM, which dynamically adjusts the modulation and coding parameters based on the link conditions. ACM optimizes the transmission parameters to accommodate varying signal quality, maximizing the efficiency and robustness of the satellite link.

4. Higher Efficiency with Multiple Streams: DVB-S2 introduced the concept of Multiple Input Multiple Output (MIMO), allowing the transmission of multiple independent streams simultaneously. This technique improves the spectral efficiency, increasing the capacity in terms of the number of channels or the amount of data that can be transmitted over the satellite link.

Increased efficiency and higher capacity in DVB-S2 --- DVB-S2's advancements result in increased efficiency and higher capacity in satellite television broadcasting. The combination of advanced modulation schemes, LDPC coding, ACM, and MIMO technology allows for improved bandwidth utilization and spectral efficiency. This means that broadcasters can transmit more channels, higher-resolution content, or additional services within the same satellite bandwidth.

Comparison of DVB-S and DVB-S2 --- One of the key differences between DVB-S and DVB-S2 lies in their modulation and error correction techniques. DVB-S utilizes Quadrature Phase Shift Keying (QPSK) modulation, which allows for the encoding of two bits per symbol. On the other hand, DVB-S2 introduces more advanced modulation schemes, including 8PSK and 16APSK, which encode three and four bits per symbol, respectively. These advanced modulation schemes provide higher data throughput and spectral efficiency compared to QPSK used in DVB-S.

In terms of error correction, DVB-S employs Reed-Solomon coding, which adds redundancy to the transmitted signal, allowing for error detection and correction. DVB-S2, however, incorporates Low-Density Parity Check (LDPC) coding, a more powerful and efficient error correction technique. LDPC coding offers superior error correction capabilities, resulting in improved reception quality and reduced transmission errors. DVB-S2 represents a significant advancement over DVB-S, offering enhanced performance and efficiency in satellite television broadcasting.

Feature	DVB-S	DVB-S2
Modulation Scheme	QPSK	QPSK, 8PSK, 16APSK
Error Correction	Reed-Solomon Coding	LDPC Coding
Spectral Efficiency	Lower	Higher
Throughput	Lower	Higher
Channel Capacity	Limited	Increased
Adaptive Coding & Modulation (ACM)	Not supported	Supported
Multiple Input Multiple Output (MIMO)	Not supported	Supported
Compression	MPEG-2	MPEG-2, MPEG-4, HEVC
Applications	Direct-to-Home (DTH), Broadcasting to remote areas	DTH, Broadcasting, Contribution & Distribution, Datacasting
Scalability	Limited	Highly scalable

Explanation of other DVB standards

DVB-C (Digital Video Broadcasting - Cable) is used for digital cable television broadcasting. It is employed by cable operators to deliver television channels through coaxial or fiber-optic cable networks directly to subscribers' homes.

DVB-T (Digital Video Broadcasting - Terrestrial) is used for digital terrestrial television broadcasting, where signals are transmitted over the airwaves using terrestrial antennas. It has been widely adopted for over-the-air television broadcasting, providing viewers with access to free-to-air channels through

terrestrial receivers.

DVB-T2 (Digital Video Broadcasting - Second Generation Terrestrial) is an advanced version of DVB-T. It offers improvements in efficiency, robustness, and capacity over its predecessor. DVB-T2 utilizes more advanced modulation schemes, such as Quadrature Amplitude Modulation (QAM) and Orthogonal Frequency Division Multiplexing (OFDM), to deliver higher data rates and accommodate a greater number of channels. It provides enhanced reception in challenging environments and supports features like UHD (Ultra-High Definition) broadcasting and HEVC (High-Efficiency Video Coding) compression.

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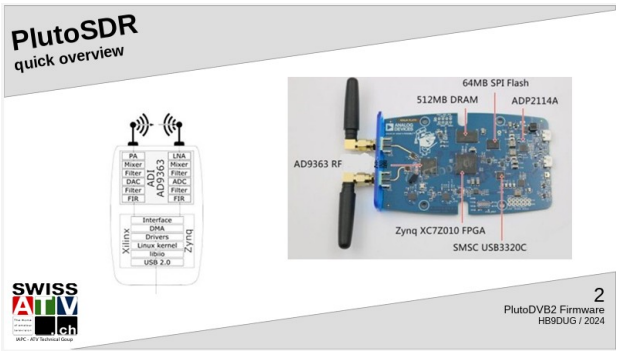
DVB-S with Pluto



Mick, VK3CH, writes about his recent experiences getting started with DVB-S2 using a Pluto SDR. For other hams interested in doing the same, his article is recommended reading. It is found in the latest issue # 14-03, May-June 2026, of the NEVARC NEWS. It is entitled "*ADALM-PLUTO Digital Television Generation -- Another Rabbit Hole to fall into*", see pages 18-29.

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ATV NEWS from Michigan

Hi Jim --- So sorry I didn't reply sooner for your updated ATV repeater directory. The Jackson ATV repeater is still on the air. Jackson is on lower VSB, 439.25 MHz input, AM-TV. Horizontal polarization using a rib cage antenna for receive and a vertical commercial 900 MHz stick for transmit. It has a Hi-Des, DVB-T receiver set to 439.000MHz and a 2 way splitter and preamp (angle linear) There is a VSB filter and 2 additional cavities in the receive line to get rid of an adjacent 442.500 ham repeater that is in the same rack. The 900 MHz output is currently only AM mode using a TX33-1, 1 watt exciter padded down and a Glenayre paging PA about 250 watts out. I have a newer IP video streaming device/server I was going to install in the input but life changed and put a lot on hold.

There is no local activity. I tried giving away equipment to get some users but they all want to play FM and be on DMR and other voice modes. I have not spoken to Ron, K8DMR, in a long time. Hoping he is doing ok. I should call him and check in. I didn't know Hank passed away. I actually built the rib cage for 421.250 for their repeater there in Bowling Green. He was always willing to try working us up here. We were close to 400 miles I think and I did work him once or twice on morning openings on UHF.

I have also worked on the Flint,MI ATV repeater a few times. It is currently in a box in my shed! It's last problem was a bad power connector on the DEMI amp. I rewired it with power poles and it was

fixed. It used to work very well from about 200 feet on a hospital rooftop. The home QTH was about 53 miles so could not work it every day but most mornings it didn't take much to get in and see it well. The same issue up there, no activity. There were 2 or 3 guys with equipment but were not on much and think they got bored with it. It has a ATVR-4 receiver, xtal controlled. We modified it for lower VSB years ago and retuned the DCI filter due to many UHF FM repeaters in the 442 range wiping their input out.

I will try to keep in touch but unfortunately not much new and exciting here. ---- 73, Bryan KC8LMI

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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

Model 23-12B
23 cm, 50 dB, 15/10/2 Watt
RF LINEAR
POWER AMPLIFIER

The KH6HTV-VIDEO Model 23-12B, RF Power Amplifier is for use in the amateur radio 23 cm band. It is a Class A-B amplifier designed for linear service. It can produce a 2 Watt, high-definition (1080P), digital TV (DTV) signal.

It can also be used to produce an 10 Watt (pep), analog TV or SSB signal, or 15 Watts for FM/CW service. For DTV service with it's low DC current draw of only 0.9 Amp at 13.8 Vdc, it is ideal for in the field battery operations, such as for ARES emergency operations. With it's optional heat sink and fan it is rated for 100% duty cycle at full 15 W CW. The heat sink and fan are not needed if the amp is only to be used in 2 W, DATV service. An optional PTT circuit for a 2 W, DATV repeater is also available.

for more details -- www.kh6htv.com

KH6HTV Video, Boulder, Colorado