Boulder Amateur Television Club
TV Repeater's REPEATER

October, 2022
2ed edition, issue #113

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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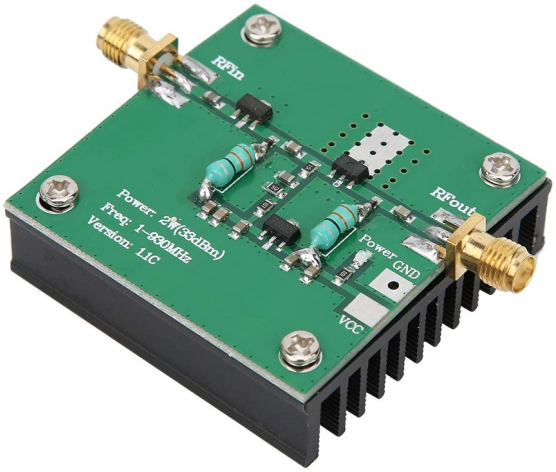
Apollo TV From the Moon

I follow this guy's YouTube channel. He's captivated by space communications, particularly Apollo era stuff. He has reconstructed an entire Apollo RF chain with gear on loan from a private museum. Very impressive guy with some smart friends and a great home lab. Marc Verdiell is also a Ham, AJ6JV, and has many other very cool videos. He goes by the handle "CuriousMarc" (www.curiousMarc.com)
Thought your ATV newsletter readers might enjoy watching this one.
https://www.youtube.com/watch?v=msWnY2zKS9o
part 22 - "*NASA's Daring Moon TV Upgrade: Live Color for 1970*" The video runs for 23minutes. Another one on YouTube is "Apollo TV From the Moon" - part 21 (26 mins)

73 de Dave, K7DMK, Mesa, Arizona

Editor's Note: *Our very own Boulder ATVer, Joe Woods, AD0I, fresh out of college, worked for NASA-Houston in the TV section. He helped develop NASA's bandwidth reduction scheme for the Apollo moon TV. He was also the TV tech expert in mission control during the lunar landing. He has shared his NASA experiences with us on our weekly ATV net.*



A New, Cheap, Low Power RF Amplifier

Recently while surfing the Amazon web site, I stumbled upon a cheap ($12) RF amplifier which caught my eye. It had very minimal specs. given, as normal for Amazon, E-Bay, etc. Basic specs. are the same as printed on the above pc board, i.e. 2 Watts, 1-930MHz and 12Vdc. It is made in China by Ladieshow with a part# of k9g5r4qms2. Well for only $12, it was worth buying and seeing what it would really do.

Here is what I found. As seen in the above photo, it is a two stage amplifier of U1 and U2 in cascade. The third IC is a +5V regulator which provides Vcc of 5V to U1 and +1.7V dc bias to the input of U2. Vcc for U2 is +12V. The amp pulls 200mA when idling.

I tested the amp with my Rigol DSA-815 spectrum analyzer with built-in tracking generator. I first did a swept frequency response test up to 1.5 GHz to determine gain with Pin = -26dBm. Yes it has gain, lots of it at low frequency, 54dB at 1 MHz. Below 1 MHz the gain rolls off. The gain is definitely not flat with frequency. But all the way up to our 23cm band, it still has gain of 25dB.

My next test was max. power output, again as a swept frequency test with the DSA-815 tracking generator set to 0 dBm output. I didn't quite get the spec. 2 Watts (+33dBm),

but close up to our 70cm band. Still considerable power, about +29dBm, at 33cm. In a CW max. power out test, the amp pulls about 400 mA at +12Vdc.

Because most of us are interested in digital ATV, I then tested the amplifier for DVB-T service. I tested it at 435, 915 and 1270 MHz with 6 MHz band-width, QPSK signal. I adjusted the rf drive level up until the spectrum shoulder break-points rose to about -30dB. The results are in the table below. +20dBm = 100 mW at 70cm. Thus about -12 dB below the max. saturated output power. This amplifier could thus be used as a moderate "After-Burner" on the output of a DVB-T modulator for a tiny QRP-DATV rig.

Parameter	**1 MHz**	**10 MHz**	**100 MHz**	**150 MHz**	**450 MHz**	**900 MHz**	**1300 MHz**
S21 Gain	54 dB	52 dB	47 dB	45 dB	39 dB	33 dB	25 dB
Pout (sat)	32.1 dBm	32.4 dBm	32.5 dBm	32.6 dBm	31.7 dBm	28.6 dBm	21.2 dBm

Pout (DATV)

(*-30dB shoulders*)

430 MHz (70cm)	**915 MHz (33cm)**	**1270 MHz (23cm)**
+20 dBm	+16 dBm	+11 dBm

73 de Jim, KH6HTV, Boulder, Colorado

Canon > $225 Camcorder

Amazon < $100 Camcorder

LOW COST VIDEO CAMERAS for ATV

A key item to have for any ATV operation is a video camera. They certainly come in all sizes, shapes, features, and capabilities, not to mention a wide range of prices from a few dollars to many 1000s of $$$.

For folks using PC based ATV systems, web cams are ideal and they can be quite good and inexpensive.

For most of the Boulder, Colorado ATV hams, we have chosen to use Camcorders. They gave us all the features we wanted of a built-in view finder monitor screen, optical zoom capability, high definition (1080P) digital video, compact, battery operated for portable use, plus both HDMI and analog composite video outputs. The HDMI is ideal for use with our Hi-Des DVB-T gear and the NTSC composite analog is ideal for our 5.8 GHz, FM-TV gear.

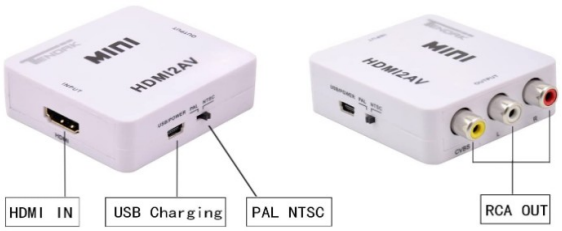
In particular most of us are using Canon camcorders which have typically cost us about $225 to $250 in the past. But at present Canon only lists their Vixia HF R800 on their

web site at $250, but for past 1/2 year or longer it also says "Out of Stock". We used to use Sony camcorders, until Matt, K0DVB, discovered more recent models would not put out audio when in the camera mode, only in the play-back mode. Not acceptable !

So for folks wanting to get into ATV and DATV in particular what to buy ? Well surfing the web, we do now find some really low cost (meaning < $100) camcorders, such as the one shown above on the right. Just looking at Amazon.com comes up with a bewildering selection of camcorders with one selling as low as $40 ! One needs to very carefully read the fine print to determine what some of the other specs. are however. Some had really high resolution up to 2.7K and 4K. Most did 1080P, but some only at lower frame rates of 15fps. All use an SC card as memory. All of those found had a USB output for web-cam usage. Many also had an HDMI output, usually with a mini-HDMI connector. One was found that had NTSC/PAL composite video plus line level mono audio output. Several also included IR night vision capability. What all of these low cost camcorders had in common was a fixed optical lens. They all claimed zoom capability of 8X up to 18X. But it was digital zoom. Caution, digital zoom is done by simply picking only the pixels in the center of the image and rapidly throwing away resolution as a result.

Disclaimer: *I have not purchased, nor evaluated any of these low cost Amazon camcorders. My only camera is a Canon HF R800. If any reader owns one of these low cost camcorders that you like and find useful for ATV and would like to write a review article on it, we would like to publish your review.*

For ATV hams requiring an analog, composite video signal for their analog ATV transmitter, but only having a camera with an HDMI output, there is a low cost ($10) solution. These little MINI boxes labeled as HDMI2AV work well. They do require

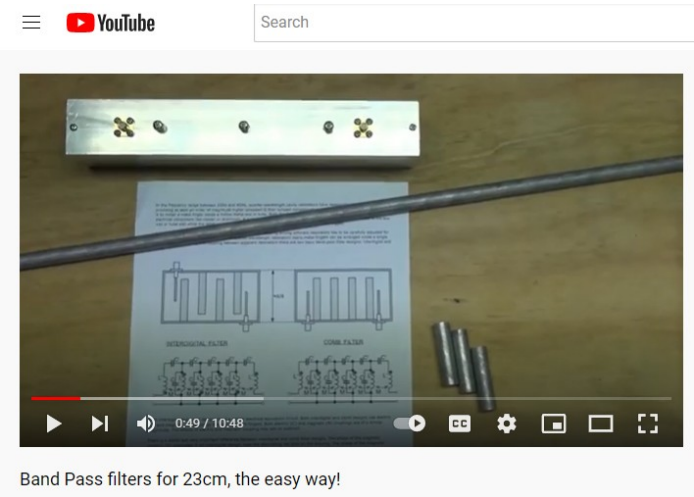


+5Vdc power. I did luck out with one I purchased in the past. It got it's DC power from the HDMI source. But others didn't. Also some I had purchased actually put out an NTSC color bar signal when there was no input HDMI signal. But then again some didn't. Obviously they are not all made identical internally.

73 de Jim, KH6HTV, Boulder, Colorado

VU METERS

While we are all interested in sending great quality video as our goal as ATVers. We also need to be concerned about the quality of our audio. One of the tools for measuring our audio levels is the VU meter. Mick, VK3CH, has a great article covering all aspects of VU meters and measuring audio signals. It is found in the latest October, 2022 issue of the NEVARC-NEWS. Available in .pdf format to be down-loaded from: www.nevarc.org.au



23cm Band-Pass Filter: Mario, KD6ILO, has alerted us to a You-Tube video of interest to ATVers. It is an 11 minute on how to build an inter-digital Band-Pass Filter for 23cm band.
The URL link is: www.youtube.com/watch?v=62H6pLJzFVQ

left to right: Tony (KD5CRC), Greg (AF5SP), Bret (ND5P), Steve, Kirk, Ken (KD5HEH), & Eric

Amateur Rockets & Amateur TV

We have several hams in Albuquerque, New Mexico, who are deeply involved in amateur rocket projects on a big time basis. Because they also want to see the earth from space, they also incorporate amateur TV into their rocket designs. They are Ken, KD5HEH, Tony, KD5CRC, Bret, ND5P, and Greg, AF5SP. Their earlier rockets carried analog, ATV transmitters. Ken wrote an article for our newsletter previously. See our Aug. 2020, issue #54, pages 11-13. Since then they have purchased Hi-Des DVB-T gear to move to high-definition, digital ATV for future rocket flights. Greg has just sent us this report and photos on their most recent rocket flight experiment.

Had a good trip to the Black Rock Desert, NV (late September) for the yearly Tripoli Rocketry Association (TRA) Research Launch. This is a closed venue due to the significance of the vehicles that are launched. Weather at BR was the best anyone could ever remember; no wind at all....and clear skies.

Our Group had the biggest motor this year, a "Q" Class; pretty serious. We produced it ourselves. Such a motor develops an average thrust of over 3,000 lbs. Ship was 17' feet tall, 6" OD, 225 lbs on the Pad, and single stage.

Took a whole crew to deal with it. You can't believe the effort it takes to put something like this together. Some of us have been in this Advanced Group since 2016. I was one of the original 4.

We were also the only ones at the Launch site with a Hot Tub; and camp Cook; we go first class all the way !! Thanks to our Launch Pad Lead.

I'm involved with motor casting/testing, 1280 MHz ATV & Ground Stations, 70cm ATV & Ground Stations, and assigned as Launch Pad Checklist Manager. Also, developing 2-stage experience with my own smaller ship at local launches.

Unfortunately, when we cast the motor earlier in the year, a vacuum line plugged (at least to some extent we suspect), likely causing a void in the lower fuel column. This caused a burn-out through the lower air frame a few seconds after launch. Because of this, the ship went less than 10,000 ft. The Rocket was expected to attain about 124,000 ft altitude if no anomalies occurred

Radio, Tracking, and Recovery systems worked fine; this was part of the flight purpose...to test these systems. [The ATV (Amateur Television System) wasn't ready for this launch, so will be tested at a later date].

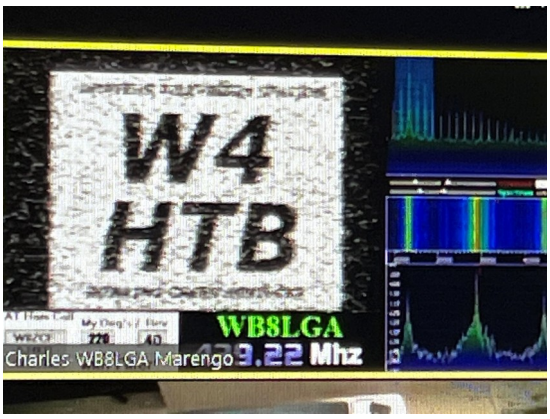
We had to dig the motor section out of the desert floor.....after it cooled off a bit. BLM mandates that our activities leave the Playa untouched, so even smaller pieces were retrieved.

Our Space Launch Attempt will probably be delayed until September 2024 since we had a motor problem this time around.

As with the Pros.....not every launch is guaranteed 100% successful. Thus.....the Challenge.....and the Charm.

73 de Greg, AF5SP, Sandia Park, New Mexico

Yet another 311 mile A5 70cm band opening between Kentucky and Ohio



Dave, AH2AR, reports --- Analog ATV is far from dead in this region. Several other folks had success during this opening, including a two way contact between W8URI and W4HTB, a 320 mile path.

Pictured above: Here is a screenshot from WB8LGA's station as he was receiving W4HTB, in Bowling Green Kentucky (311 miles) on Saturday, 1 October 2022.

QUICK POLARIZATION FLIP: Bob, WB0NRV, has just shared with us his solution for easily working both horizontal and vertical polarization. Here are two photos of his 5.8 GHz BBQ grill dish antenna mount. He fabricated a mounting plate to go on a camera tripod for the dish. But he also included a hinge to be able to rotate the dish 90º Looks like he also included a bubble level.

FEEDBACK:

Jim -- I am amazed at the wealth of information you are sending my way. The international events astounded me. Ham TV is much more mature than I thought. I am super amazed at how inexpensive it is to get started. I am ramping up on preparation for my first broadcast. You and other pioneers have blazed a beautiful path for I, and others, to follow. This portion of our hobby has an explosive growth on the horizon. Thank you for your contagious enthusiasm.

73 de Rex Holt, KI5CAI, Higginson, Arkansas

What has digital modulation brought us in ATV?

(letters to the editor from Rudi, S58RU, Koper, Slovenia and Jim, KA6YHO, Scottsdale, Arizona)

The radio amateur's ATV field is closely linked to manufacturers. Companies Yaesu and Icom have tried a little to touch this amateur radio area, but to no avail. Amateur radio is an expensive hobby. The ATV also has the disadvantage of having to make the devices yourself or ask a builder friend.

In 2004 Mijo, S51KQ, at the ATVS meeting in Koper, showed the first attempts at DVB-S. I tried various RXs and showed its DVB-S TX. All I remember from the meeting were the TX and RX prices. The ATVS meeting in Koper 2004 was the last meeting under the leadership of ATV managers ZRS - S51KQ.

After the meeting, we hooked up the analogue ATV nostalgics. We also tried to connect with the radio amateurs of the nearby Italian region. We have also offered a hand to radio amateurs from the north of Slovenia. Central Slovenia had hardly any radio amateur ATVers. We also tried to participate in the IARU, ATV competition. Our operation was successful. The radio amateur ATV population has increased significantly. We also managed to participate in the IARU ATV competitions. The radio amateur ATVs from this region have climbed to the top of the rankings in IARU ATV competitions.

After 2014/2015 we decided to try also DVB-T, not DVB-S, as was probably the world trend. We made the first connections, organized the repeater, we also showed up at the ATV competitions and here we are today. The digital ATV has greatly expanded the possibilities of operation, but at the same time has "diluted" the number of RA ATVs.

We now know DVB-S, DVB-S2, DVB-T, DVB-T2. Each of the modulations has a lot of parameters. The frequency range dropped to 50 MHz ...

If the radio amateur opts, for example, for DVB-S, it can abandon all other modulations. Also, if you get excited about DVB-S, you probably won't be able to work on one frequency at all signal widths. In every decision, he must know if he will have a correspondent. In short, digitization has created a lot of confusion for us.

As the icing on the cake, the Oscar 100 satellite appeared. A very interesting innovation, but like all repeaters, it cannot affect the ATV.

What has digital modulation brought us in ATV? I don't see anything positive. I might be wrong.

73 de Rudi, S58RU, Slovenia

Hi Jim --- This newsletter prompted several questions.
First, the DVB-S format seems like a great choice for Amateur TV. There is both modulation software and low cost receivers available. In addition it can be used at narrow bandwidths and it requires less power output to achieve greater transmission distance.

Second, the use of SDR Angel to demod the signal seems less expensive than the fixed receivers and is more available to all Ham operators.

Here in Arizona we have a 2 MHz bandwidth and have only one choice of modulators and receivers. They are super expensive, and prevent all but a few from getting on the air, myself included.

You are probably the only one who could suggest a "standard" that could enable all ATV amateurs in the U.S. to be able to communicate with each other, and even to allow some mobile operation or interconnections between cities.

If the BATC can bring a standard across Europe and Australia, and its cheap and uses Raspberry Pi, allows for narrow bandwidths, why are most clubs, Arizona included, locked into DAB-T that requires expensive gear and lots more transmitter power to operate?

It seems like with a standard, there could be simple set-up, training videos, club projects, and help for new hams to get onboard. This would allow for far greater growth and participation.

What am I missing here? ----- 73 de Jim Williams, KA6YHO, Scottsdale, Arizona
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San Diego ATV Status Report: SDATV Society upgraded systems are holding up well with no issues to report. We now hold 62 members strong ages range from 12 to 79 years old. A very large young adult STEM Ham Group which is very, very active. Hope everyone has a great fall season. Mario KD6ILO

AM-TV Gear Disappearing: In response to recent letters, I have just checked on the availability of what was one of the last AM-TV, 70cm transmitters on the market. It was the MFJ-8709 5 watt transmitter. It was also previously called the VideoLynx. MFJ has dropped it from their web site. The only ATV transmitters MFJ now offers are tiny, 100mW modules intended for use in a drone. They are their models 8704 ($180) and 8708 ($240). Not inexpensive items. The

Chinese HLLY brand TVX-50M, 50mW AM-TV modulator is still listed on E-Bay at $108. Also listed on E-Bay is the model TVX-02S, 2 watt transmitter for $280. The TVX-50M was reviewed back in 2020 in our ATV newsletters, issues #44 and #45. It thus appears that the HLLY units may in fact be the last man standing for NTSC AM-TV.

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 or ab0my*. 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.

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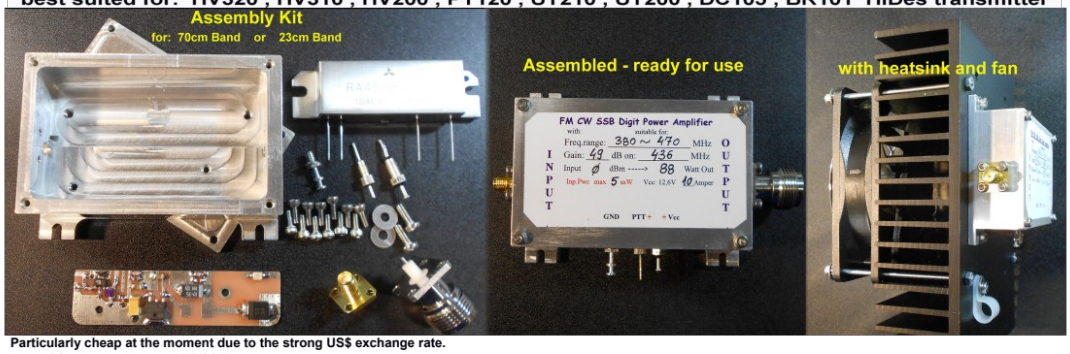
Items like: Microwave Test Equipment, Flex Radio 3000 , Antenna Bridge, Hi Freq Probe, Marconi Power Meter, 23cm Trnsvrtr, NTSC TEST EQUIP!

70cm or 23cm Power Amplifier for your transmitter

best suited for: HV320 , HV310 , HV200 , PT120 , UT210 , UT200 , DC105 , BR101 HiDes transmitter



Particularly cheap at the moment due to the strong US$ exchange rate.

Assembly Kit…. Price: 150,00 Euro **~147,00 US$**

70cm Output Digital: 10 W	70cm Analog Output > 60 W
23cm Output Digital: 5 W	23cm Analog Output > 25 W
Gain: > 48 dB	Gain: > 48 dB
Vcc: 13,2 V	Vcc: 13,2 V

Assembled – tested , ready for use module 70cm Band	190,00 Euro	~186,00$
Assembled – tested , ready for use module 23cm Band	190,00 Euro	~186,00$
Assembled – tested , with heatsink and fan , ready for use module 70cm Band	230,00 Euro	~225,00$
Assembled – tested , with heatsink and fan , ready for use module 23cm Band	230,00 Euro	~225,00$

https://www.oe7forum.at/viewtopic.php?f=7&t=410&sid=cf6266cbaffaedb91b5e0a12b13521bc#p1005

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