

Boulder Amateur Television Club TV Repeater's REPEATER

July, 2020

BATVC web site: www.kh6htv.com

ATN web site:
www.amateurtelevisionnetwork.org

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W0BTV Details: Inputs: 439.25MHz, analog NTSC; 441MHz/6MHz BW, DVB-T & 1243MHz/6MHz BW, DVB-T Output: 423MHz/6MHz BW, DVB-T
Operational details in AN-51a Technical details in AN-53a. Available at:
<https://kh6htv.com/application-notes/> ATV nets on Thursday and Sunday afternoons at 3 pm MDT. ATV nets are streamed via: <https://batc.org.uk/live/kh6htvtvr>

Your ATV NEWSLETTER: We first started this newsletter two years ago, in July, 2018. It originally was for just the local 20 or so, ATV hams in Boulder, Colorado. Since then, the distribution has expanded to about 320 ATV hams and it is starting to become a free, USA national, ATV newsletter with contributions from ATV hams in other parts of the country. If you have other ATV ham friends that would also like to receive this newsletter, simply send their name, call sign and e-mail address to the editor. Also, we welcome ATV articles and news from other ATV clubs for the newsletter. We publish at least once a month and usually more often. When we get enough material for a newsletter of about a dozen pages, we release it and e-mail it out. In the past two years, we have now published 48 newsletters. All past issues are archived on the web site: <https://kh6htv.com/newsletter/>



Hi-Definition, Digital TV in Japan on 5, 10 & 24 GHz --- 113 km !

We have just received a report from Fumio, JA0RUZ, of more impressive microwave DATV DX activity in Japan. They are using the Japanese digital broadcast standard ISDB-T which is closely related to DVB-T. On June 20th, they successfully transmitted ISDB-T pictures and audio on 5, 10 and 24 GHz over a very long distance of 113km (70 miles).

Fumio reports the following: "We have recently succeeded in ISDB-T full high-definition 3 band relay communication up to 24 GHz over a span of approximately 113 km, so we will report this.

The configuration was as follows.

JA0RUZ: 10GHz full high-definition transmission =>

JA0RGP: 10GHz reception/recording =>

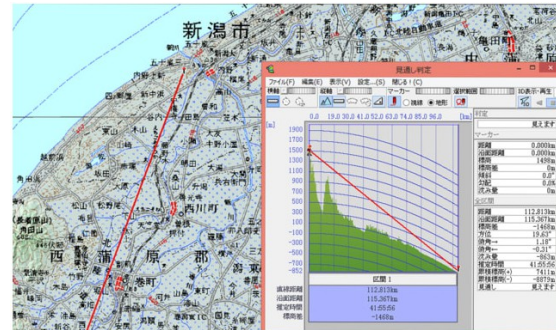
JA0RGP playback video transmitted at 24GHz =>

JA0RUZ 24GHz reception =>

Retransmission of that video at 5GHz =>

JA0RGP 5GHz reception --- "Retransmission successful!"

"FHD-ATV was operated between Nozawa Onsen Ski Resort and Niigata City . "Mutual distance of about 113km". It was sunny up to Nozawa Onsen Muranaka on the day, but it started to rain when I started climbing the Okushiga Forest Road for a while , and it seemed that I was on top of a rain cloud from an altitude of about 1200 m, and I could operate without problems until the end of the rain .This time, it is possible to receive almost stable FHD video from 5G to 24G, and it is thought that the effect of the antenna







The recorded video can be watched on You-Tube at the following link:

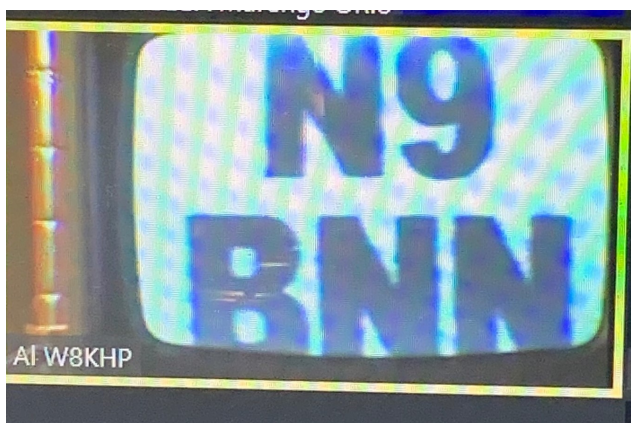
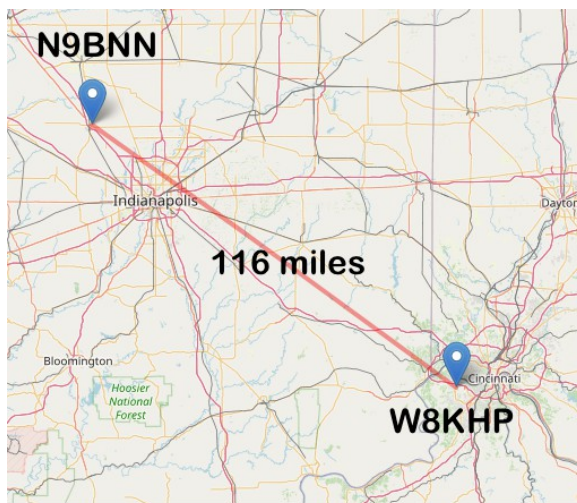
https://www.youtube.com/watch?v=d6Z6Y_XWITY&feature=youtu.be

Fumio's blog web site also gives details of this and other microwave dx-peditions.

<https://blog.goo.ne.jp/ja0ruz>

TROPO ATV BAND OPENING - 210 miles !

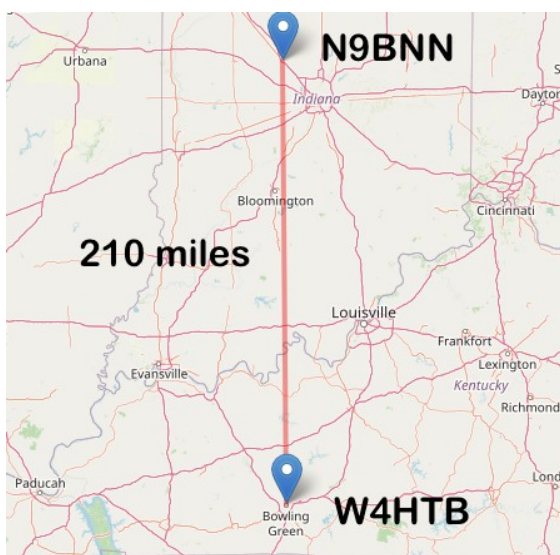
Late Breaking News ! --- Dave, AH2AR, reports a great 70cm, ATV band opening on Tuesday morning, June 30th. ---- "The 70 cm band was open for excellent propagation between Indiana, Kentucky and Ohio this morning. I took a few snapshots of the ATV DX activity that was being streamed through the Midwest ATV DX Group's Zoom. Looks like I somehow missed getting a snapshot of Charles, WB8LGA (Marengo, OH) receiving N9BNN...sorry Charles! Interestingly, the Hebron Kentucky station (Allen, W8KHP) was transmitting only 20 watts and was able to be received by Michael, N9BNN, in Indiana with a P3 Signal. N9BNN has been working on experimenting with a commercial TV amplifier (800 watts) and its still a work in progress. He is currently running about 300 watts.



N9BNN received by K8KHP



W8KHP received by N0BNN



Michael, N9BNN, Lebanon, IN, as received by Hank, W4HTB, Bowling Green, KY

ATV Old-Timers: We recently added some ATV old-timers to our newsletter distribution list. We welcome Henry, AA9XW, Gerald, K4NHN, Greg, KC3MN, and Peter, VK3BFG. Their involvement with ATV goes way back. We hope to have tales from the good old days of ATV from them to share with readers in the future.

Check out the www.qrz.com listing for AA9XW. It is mind-boggling all that Henry has been involved with over the years. This man never sits still ! Among his many other activities, he was the publisher of A5 Amateur TV magazine (1975-1982) and ATVQ magazine (1988-1997). The following is an e-mail from Henry after I sent him a complimentary copy of our latest newsletter.

AA9XW: "Thank you very much.. I welcome the regular post of info and activity and such that has been a hallmark of ATV publications going all the way back to Mel Shadbolts ATV Experimenter (published by 73) MS is ATV Research, Dakota City, NE. His son has taken over the biz. I've spent a small fortune with them for cameras, digital video recorder and other stuff. Yeah, QRZ is the tip of the iceberg about me. I've been in every ham mag, every broadcast mag, had columns in 5 publications, did the WARC 75-80 FCC advice, and lots more. Ran code and ham radio chat on my radio station WOVR FM, etc. Do a goggle on Henry Ruh and Henry Ruhwiedel, and under my ham calls. Went to England for the CQ-TV ham fest and talked about US ATV, lots of other stuff."
73 de Henry, AA9XW

K4NHN: "Jim, Please keep me on the list to receive the mail. I'm not active at the present time, 83 and just went thru triple bypass. But I was real active for a number of years. I was Manager of Transmitter Operation for many years at South Carolina Education Television Network. I had 10 UHF & 1 VHF transmitters, and 8 FM transmitters to look after. I'm the one that built the "Rib Cage Antenna". There was a lot of pro and cons about the slot antenna, but I've had a lot of people over the years to tell me that it did a great job for them. I still get a few call about it and they want to tell me about their use and some had questions. I still have one of the Harris UHF exciter with the 10 watt booster amp. That was a beautiful exciter that put out a text book waveform. I used a 6155 transmitter that I got about 200 watts peak of sync out of.

I just finished looking over the June issue and I see that Dave AH2AR had a couple of articles in it. Dave and I go back many years from when he was stationed in Shaw AFB in Sumter, SC. When I would go to the Dayton Fest I'd always run into Dave and get to catch up with what was going on in that area and we'd talk about the slot and his work with it. I was honored that the Dayton fest gave me the technical excellence award about the third year that they gave it out. I think that they changed the name of it now, but I still see my name every year in the booklet they give out. My 15 minutes of fame. That was a big screw up on their part. I forgot to say that most of us around here, when we were active used the K2RIW antenna that was cut to 439.25. That antenna really did a great job."

73 de Gerald, K4NHN

KC3MN: Very nice newsletter. I will have to go and read all the past issue. 46 wow I have some reading LOL. Once more thank you. I am like the lone wolf here now. Four other hams that I use to ATV with have passed and are now silent keys. I am the all alone and really miss it. Have a lot of equipment for ATV and a repeater now sitting in my living room looking to go back on the mountain, if I can get a someone else interested in ATV in the area. Thank you once more.

73 Greg, KC3MN

Peter, VK3BFG shares this news of their ATV repeater in Melbourne, Australia

VK3BFG: "Hi Jim ... Have been around ATV since about 1975 or so and a long time member of the BATC. I have built and re-built the Melbourne ATV Repeater and most of its Antennas for over 40 years now. Unfortunately three years ago we lost our prime location but have just about re-installed in another. VK3RTV has been digital since 2009 with Analogue FM and DVB-S inputs and two channel multiplexed DVB-T output. (VK3RTV1 and VK3RTV2) Inputs have been on 23 cm and 10G and output on 70cm. In the new location inputs will be 1246, 1255 and 1278 MHz DVB-S (no analogue) and the output on 445.5 MHz DVB-T."



I have attached a picture of the new tower and the current rack. Down from the top of the rack are Humax Satellite Receivers with Pre-amps, VK3RTV1 and VK3RTV2 monitors, VK3RTV2 Controller, Video Machine, VK3RTV2 Controller, VK3RTV DVB-T Exciter, PA Controller, 500 watt PA (run @100 watts), Tangential Fan System, Power Supplies

and Pen-Ultimate PA Driver. The Satellite Receivers and the Video Machine are controlled by IR LEDS with commands derived from a microcontroller synthesizing a Remote. Tracks are selected on the Video Machine and also users can access the internal signal report from the receivers by DTMF Command. Other facilities such as 0 dB sound levels can also be selected. Back in the analogue days, signal reports were video tracks recorded by my daughter. She would come up after a DTMF command and personally advise users of their signal strength. As you can see on the photograph, the rack is not yet fired up, but this will happen soon as we were missing some cables to complete the installation.

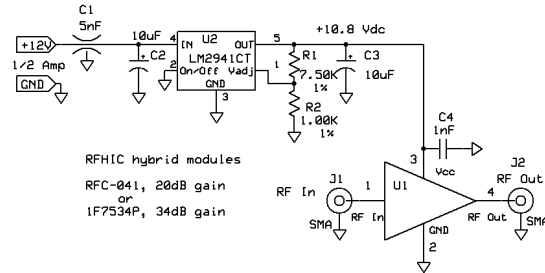
(editor's note: The VK3RTV rack of equipment looks much more professional than our home-brew, W0BTV repeater !!! I am envious of not just the appearance, but the rf output power also.)



Linear Class A, CATV Trunk Amplifiers for 70 cm Driver Amps Jim, KH6HTV

Recently while looking through my electronic parts cabinet, I stumbled on some CATV amplifiers I had purchased ten years ago. I used one of them (RFC-041) in my very first 10 watt (pep), VUSB-TV transmitter. I called it my model 70-1. (see the next article) The parts were hybrid modules from RFHIC in Korea. They were the RFC-041 and the 1F7534P. Unfortunately, they are no longer available from RFHIC. However, the concept of using CATV trunk amplifiers as very linear drivers should be kept in mind when designing your next 70cm or 33cm, ATV transmitter. Thus, I am showing you what can be accomplished with them.

The RFHIC specs. for these amplifiers were: 12Vdc at 1/2 Amp, Gain 19dB (RFC-041) & 34dB (1F7534P). The 1F7534P was specified for CATV service from 50 to 750 MHz with outputs of 44dBmV. The RFC-041 was specified for mobile data radio service in 800 MHz band with very low distortion at 20dBm output.



I decided to build up a couple of amplifiers in the Hammond die-cast enclosures (1590ABK) and see how well they would work for DVB-T service. The RFHIC specs. were very specific about not exceeding +12Vdc. Thus to be able to operate them from +13.8Vdc, I also installed a low drop-out voltage regulator, LM-2941CT and set it for 10.8Vdc. This allowed me to operate the modules from +11 to +15Vdc without fear of damage.

So, how well did they work ? A 1.5 GHz swept frequency, S₂₁, test showed they actually were very wide band with about 1 GHz bandwidths and very flat responses. The gains were about 20dB & 34dB respectively. The low frequency corners were about 20 MHz. The return losses, S₁₁ & S₂₂ were quite good over the extended range also, being of the order of -15 dB. I tested the output power vs. input power at 430 MHz. It was very linear for both units with a very sharp knee at the -1dB gain compression point and very rapidly saturating there after. For the RFC-041, P(-1dB) = +33dBm = 2 Watts. For the 1F7534P, P(-1dB) = +30.4dBm = 1.1 Watts.

I next tested the amplifiers for DVB-T service. The RFC-041 worked well up to +20 dBm (rms) output at 441 MHz. At that point, the shoulder break-point was -32dB. Driving it any harder, even by 1dB, compression started occurring. Backing off the drive by only -3dB, lowered the output to +17dBm (rms), but improved the shoulder breakpoint dramatically to -41dB. The RFC-041 could also be used on the 33cm band (915MHz), but with lower max. output of +15dBm (rms) with a -34dB shoulder break-point.

The CATV Trunk Amplifier, 1F7534P put out even more rf power. It worked well up to +23.8dBm (rms) output at 441 MHz with a shoulder break-point of -31dB. Dropping the drive by -3dB, improved the shoulder to -39dB with an output of +20.8dBm. It was also tested on 915 MHz. The max. output was +18.7dBm with a -35dB shoulder break-point.

REMEMBER WHEN ? --- The following was published in the Boulder Amateur Radio Club, BARC's BARK, newsletter, Nov. 2010, pp. 2-3.

HOME-BREW TV TRANSMITTER PRODUCTION LINE

Jim Andrews, KH6HTV

My contribution for the November BARC meeting home-brew program is my 10 Watt, TV Transmitter. I previously described it three years ago in the Dec. 2007 issue of BARC's Bark. During the recent Four Mile Canyon forest fire, TV was used a lot by BCARES to provide live video feeds from mountain tops to the 911-EOC. This sparked additional interest for more ham TV transmitters. I thus got requests from BCARES and some other hams to build more of my transmitters. Thus, the recent "production line" in the KH6HTV basement cranking out more transmitters.

My latest version of the TV transmitter is similar to the 2007 design, except that I omitted the 1 watt option and packaged it in a smaller enclosure. See Fig. 1. The key features are that it produces true NTSC, Vestigial Upper Sideband (VUSB), TV with 10 Watts output and is fully synthesized to cover all 70 cm (420-450 MHz) ham band channels of 57, 58, 59, 60 and 61.



Fig. 1 KH6HTV TV Transmitter

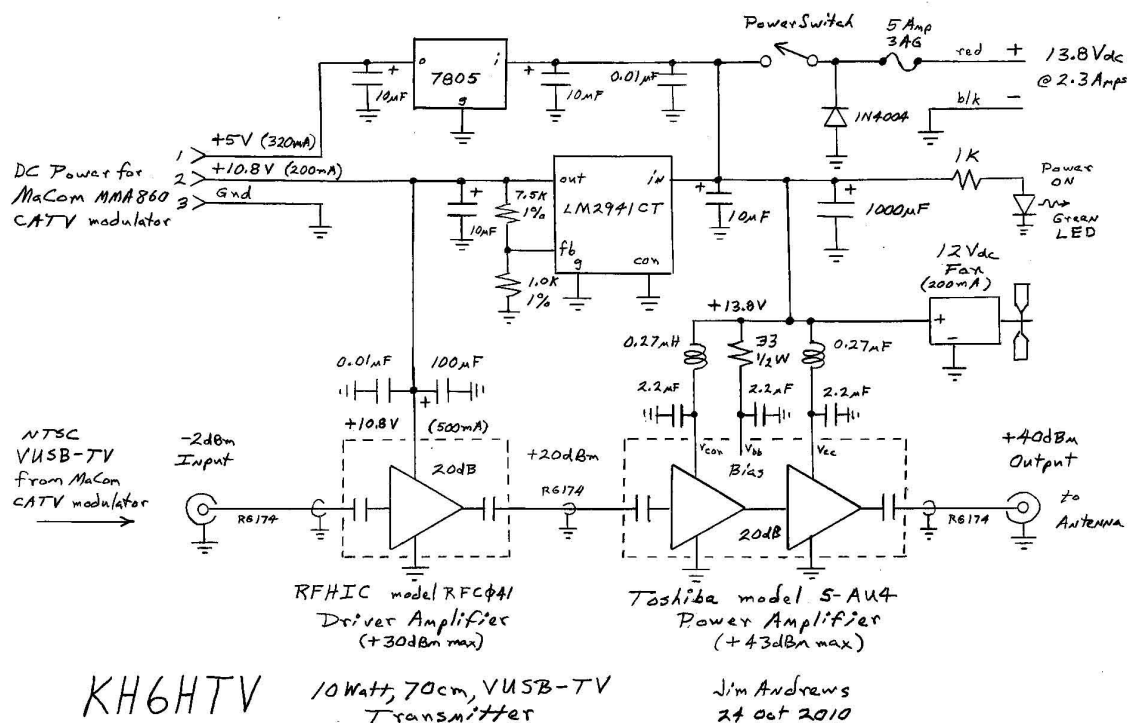


Fig. 2 Schematic Diagram

Fig. 2 is the schematic diagram of the transmitter. A commercial, cable TV, head-end modulator is used to generate the synthesized, VUSB TV signal. It is the black, vertical module seen on the left in Fig. 1. This is a MACOM model MMA860. It's max. output power is adjustable from -17 dBm to +6 dBm. Two linear amplifier "brick" modules are used to boost the power up to +40 dBm. The driver amplifier is a 1 W (+30 dBm), 20 dB gain brick from RFHIC in Korea. It is the model RFC041. The power amplifier is a 20 W (+43 dBm), 20 dB gain brick from Toshiba. It is the model S-AU4. Fig. 3 is a photo showing the interior of the amplifier.

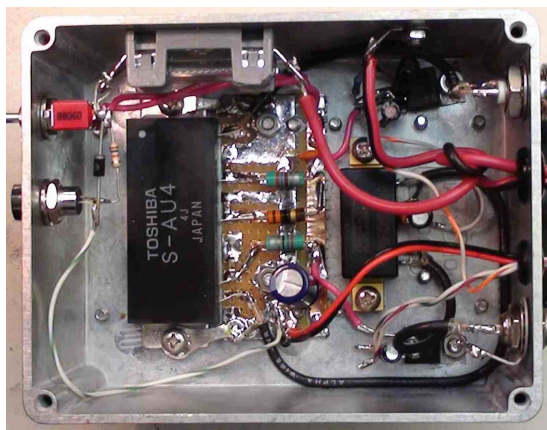


Fig. 3 Interior of Power Amplifier

To maintain the spectral purity of the VUSB signal, it is mandatory that all of the amplifiers be operated in their linear region and not driven to saturation. Thus, the exciter drive level is adjusted to give +20 dBm output from the RFC041 and in turn +40 dBm (10 W) peak on the TV sync pulses from the S-AU4.

Figure 4 shows the measured spectral output when the transmitter is modulated with a typical "live" video picture. The tallest spike in the center is the video carrier reaching up to a peak power of +40 dBm (10 W). The next tallest spike to the right is the Sound Sub-Carrier (SSC), which was set at -20 dBc. Filling in between these two spikes is the desired upper sideband containing all of the video information. The lower sideband is seen to be rejected by -20 dB relative to the upper sideband. The output from the Macom CATV exciter is much better with -50 dB rejection of the lower sideband.

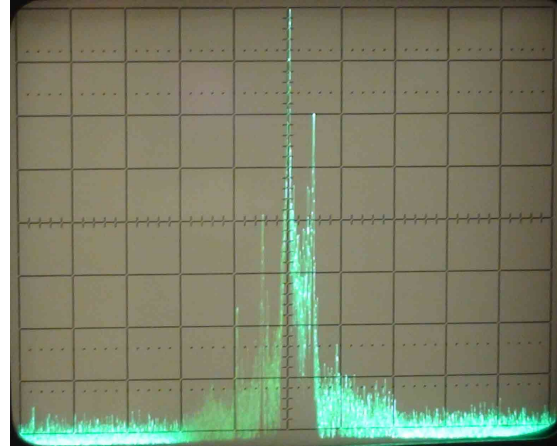


Fig. 4 VUSB-TV spectrum of typical live video. Top reference level is +40 dBm
10 dB/div & 10 MHz / div.

The +20 dBm output from the class A, RFC041, driver amplifier has -40 dB rejection. The S-AU4, final amplifier's linearity is the main cause of the degradation of the VUSB lower sideband. This amplifier runs class AB. Spurious rf noise emissions are seen to be >70 dB down. The transmitter's second and third harmonics are -58 dBc and -55 dBc respectively.

The total cost for parts is \$375. The major cost items are the CATV modulator (\$155), 1 W amp (\$40) and the 20 W amp (\$50). I have built these transmitters at cost, with no charge for any labor. If there are other BARC or BCARES hams that would also like to have one of these transmitters, I can supply them with a complete parts lists and assembly instructions -- or -- I am also willing to build additional transmitters, at cost.

KH6HTV note: *My offer in the fall of 2010 was so popular with Boulder hams, that I ended up building eleven of these transmitters, all at cost. Thus, I realized there was a market for ATV gear. So, in 2011, I decided to start my small, hobby business of designing, building and selling ATV transmitters and other ATV gear. The key parts used in the model 70-1 transmitter, namely the RFC-041 and the S-AU4 soon became obsolete. Thus my next project was to develop a whole new line of RF linear power amplifiers, which I am still selling today.*

EDITORIAL: Please Support Our Local Law Enforcement Officers

Our police and sheriff officers are here to protect us, not harm us. Granted there have been a few rogue officers' deplorable actions in the national news recently, which has caused a backlash against all police officers and departments. But 99.9% of all police are dedicated people who put their lives on the line every day to protect us from the evils in this world. My friend, commander Vinnie Montez, of the Boulder Sheriff's department has expressed this in a very emotional You-Tube video which I recommend that everyone should watch.

<https://www.facebook.com/foxsanantonio/videos/549064515895454/>

I have known Vinnie since he was a young teenager in the Sheriff's Explorer post. He has been a Sheriff's deputy for his whole career. I served with him on the Sheriff's SWAT team, as a BCARES volunteer providing video coverage of SWAT operations. Vinnie is a very competent and dedicated deputy and is now a Commander in the Sheriff's department.

Jim, KH6HTV

ATV HAM ADS

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