Amateur Television Journal

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AH2AR 70cm-23cm Cross-Band DVB-T Repeater

Dave, AH2AR & Dave, KC3AM

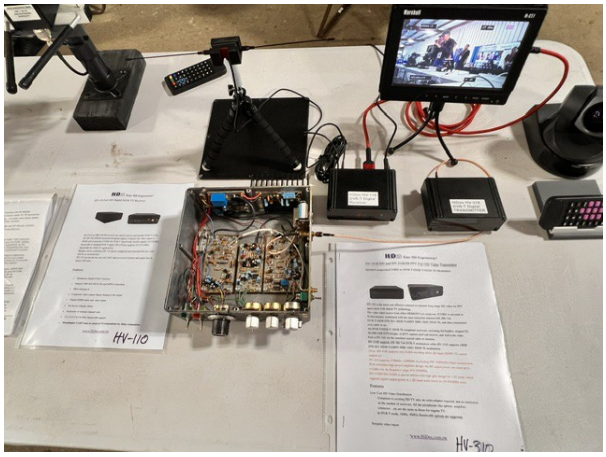
ATV at Dayton Hamvention a Success !

Dave Pelaez, AH2AR

Mike, WA6SVT, Bruce, K8FIX, & Darko, OE7DBH

(l to r) KK4LW,OE7DBH,KE8DOC,AH2AR,KC3AM,K8FIX

This year's Dayton Hamvention - 2026 was a resounding success, featuring ATV Activities at the ATN, DARA, and ATCO Exhibits. Plus culminating with one of our ATV booth exhibitors winning Hamvention's Major prize, an ICOM C-7610 v.32 (See adjoining article). The exhibit included a number of ATV items of interest. The ATV group provided a continuing demo of the Dayton Amateur Radio Association's ATV repeater and a number of various displays featuring 70cm and 23cm ATV DVB-T modes. ATV hams, WA8RMC, WA6SVT, OE7DBH, K8FIX, KK4LW, KC3AM, KE8DOC, and AH2AR assisted with answering numerous questions from interested Hamvention attendees.



AH2AR brought in a working cross-band ATV repeater as a live demo that was one of the items featured at the exhibit. Other exhibit display items included Hi-Des receivers and transmitters with several table-top links running.

Art, WA8RMC, answered inquiries about preliminary progress he has made regarding a project with a U.S. manufacturer for possible modification and use of the current “HomeRun” digital receiver box that will be able to serve “double-duty” for ATV. Early measurements indicated that it will provide a 5 dB gain improvement over an HV110 at 2 MHz bandwidth. Other technical specifications will be provided elsewhere within the newsletters. Through WA8RMC’s involvement in the DATV-Express Project, he helped develop affordable hardware and software defined radio (SDR) applications that made digital video transmission accessible to everyday operators.

At the booth, Mike, WA6SVT, answered numerous inquiries regarding his move to Pitcairn Island as VP6MC, along with providing a wealth of knowledge regarding a deep dive into Amateur Television. He built and designed infrastructure for the Amateur Television Network in California. This massive fast-scan and digital DATV repeater system is recognized as the largest network of its kind in the United States. He served as a long-time commercial broadcast engineer and transmitter supervisor, working for major television network operations including CBS Los Angeles. He is the former co-publisher and technical editor of Amateur Television Quarterly.

Darko, OE7DBH, was able to fly in from Austria, and was introduced at the ATV Forum by WA8RMC on Saturday.

Darko works closely with Hi-Des to test and optimize their hardware for amateur radio use. He publishes technical evaluation reports, such as benchmark performance and sensitivity testing for equipment like the Hi-Des HV-110 DVB-T receiver.

Darko has posted a 4 min. slide show on YouTube *https://www.youtube.com/watch?v=zE4qjmSSiHw*

Because Hi-Des standalone transmitters typically output a very low signal (often around 1 mW to 100 mW), Darko designs and builds custom, high-quality Class A power amplifiers (ranging from 4W to 10W) tailored to boost these specific DVB-T signals. He has been heavily involved in modifying and adapting DVB-T equipment to operate on amateur radio bands, specifically the 70cm (434 MHz), 23cm (1.2 GHz), and 13cm (2.4 GHz) bands.

Art, Darko and Mike spoke at the ATV Forum. You can see the Forum on **YouTube** if you type in the YouTube Search Window "*ATV Forum 2026*". (*https://www.youtube.com/watch?v=2RN0NI_AvE0*)

The ATV dinner was also a resounding success. Prizes that were drawn by six of the 24 attendees were two triband HT's, a Sony PTZ desktop HDMI camera, and two multimeters. If you attended the ATV Dinner, you had a 1 in 4 chance of winning! There were 24 ATVers in attendance at the ATV Dinner on Friday night.

ATVer Wins Big at Dayton !

Pictured is **Bruce Kobe, K8FIX**, ATVer from Tipp City, Ohio, who won a major Hamvention Prize at the end of the Dayton Hamvention - 2026. To his surprise, he stayed for the closing of the Hamvention Sunday Afternoon hoping that he would win one of the minor prizes, but was flabbergasted when the event organizers called his name to pick up his new rig, a new Icom HF transceiver. Bruce re-wired his desk cablingin order to find a spot to place the transceiver into its new operating position. His Yaesu FTDX-101MP is now playing "second fiddle" to its closest competitor, the major Hamvention prize, an **ICOM IC-7610 v.32!**

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How to do FM-TV on 1.2, 2.4, & 3.4 GHz Bands

Jim, KH6HTV

Back in the "Good Ole Days" of analog (antique) ham TV, we mainly used FM-TV on the higher microwave bands above 70 cm. Some ATV repeater groups still support FM-TV.

But the current issue for newer hams wanting to also do FM-TV is where to find the gear to do so ? ? ?

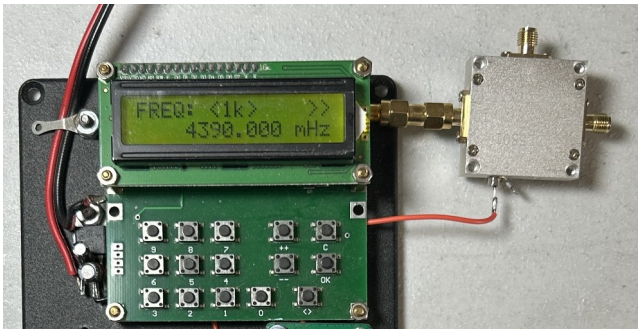
5.8 GHz: Well, essentially the only FM-TV gear presently commercially available is on the 5.8 GHz band. We have written about it a lot in previous issues of this ATV Journal. It is intended for the mass consumer market to provide video from drones. The key buzz word for Google searches is **FPV** or First Person View.

For example, go to Amazon and type in "5.8 GHz FPV Video Transmitter". You will find a large selection of products to chose from. One in particular which is my personal favorite is a transmitter / receiver pair with the model numbers of TS832 & RC832. In years past, they sold for the ridiculously low price of only $30. Current Amazon price is about $55 for the pair. Still a great bargain for what you get. For anyone wanting to get into ATV on the cheap, this is the way to go.

Both units are frequency synthesized and are pre-programmed for 40 channels. They range from a low of 5658 MHz up to 5945 MHz. Our 5 cm ham band is 5650 to 5925 MHz. A portion of it is shared with unlicensed Wi-Fi, etc. users. Here in Boulder, we have picked Channel 3-2, 5.685 GHz, to use for simplex operations and have found it to be clear of Wi-Fi RFI. Also, for our W0BTV-TV repeater's 5 cm FM-TV, 24/7, beacon transmitter, we are using Channel 3-6, 5.905 GHz.

The transmitter puts out a robust 600 mW of rf power. The receiver we have found to be extremely sensitive. With line of sight rf paths, we have made 2 way, 5.8 GHz, contacts over long distances up to 50 miles. We have even received signals from our TV repeater up to 70 miles away.

OK so what about the lower microwave bands ? In the previous issue (#210), I wrote about making a 23 cm, FM-TV contact with Don, N0YE. When Bill, AB0MY, heard us doing it on 2 meters, he made the suggestion -- ***"Why don't you try using the 5.8 GHz gear along with mixers to work the lower bands ?"*** Bingo ! Why Not ? -- thus this article.



I have used this simple arrangement in previous issues of our ATV Journal as a mixer. The local oscillator (LO) consists of a low cost frequency synthesizer using an Analog Devices, ADF-4351. It covers from 35 MHz to 4.4 GHz. The mixer is an Analog Devices ADL-5801. It is an active mixer covering from 10 MHz to 6 GHz. It can be used for either up or down conversion. It's LO port can be driven directly with 0 dBm from the ADF-4351 as shown in the photo.

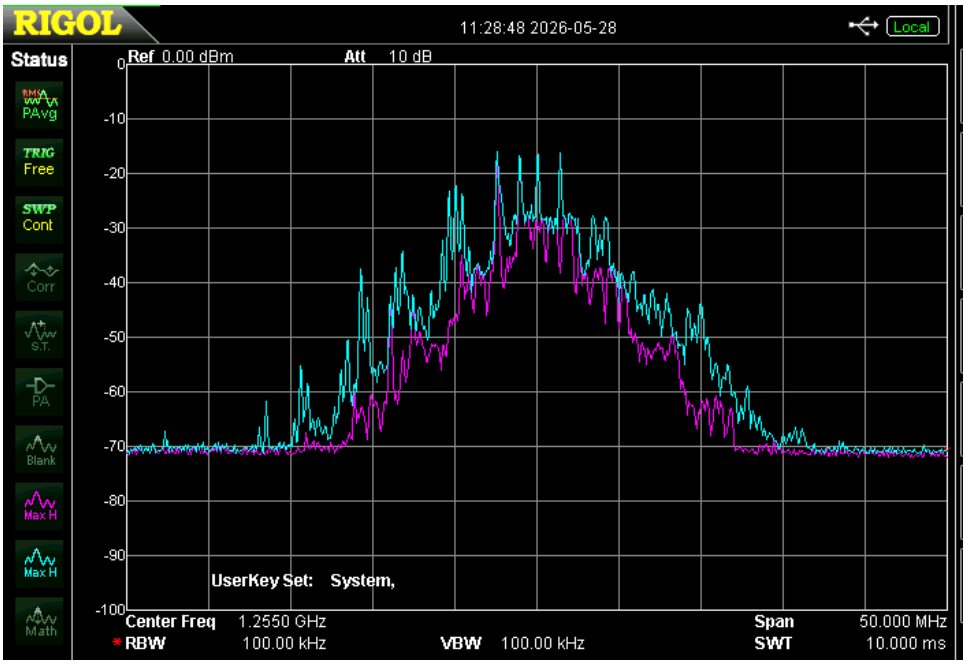
So using this simple LO/mixer I was able to down-convert to the 23cm band the rf signal from the 5.8 GHz TS-832 transmitter and receive it successfully using my 23-7 /23-5 23cm FM-TV receiver. Likewise, I was able to easily up convert a 23 cm FM-TV signal from my model 23-8 modulator up to the 5.8 GHz band and receive it successfully on the RC-832 receiver. The ADL-5801 mixer had -12 dB down conversion loss and -20 dB up conversion loss.

Standards for TS832 & RC832 ? Hams have asked what are the technical standards for these 5.8 GHz items ? There are no complete specifications given with them. So, now having the ability to compare them against some known gear, I was able to now give some answers.

Pre-Emphasis: Most FM-TV gear used pre-emphasis to enhance the receiver's sensitivity. There were however different, non-compatible standards used for NTSC vs. PAL systems. I found that the 5.8 GHz gear does NOT use pre-emphasis / de-emphasis. Instead it has a flat frequency response. It will thus work with either NTSC or PAL video signals.

Sound Sub-Carrier: For broadcast, AM (VUSB) TV, the standard sound sub-carrier (SSC) was 4.5 MHz with 25 kHz deviation. For FM-TV, the SSC used was not totally standardized, but was typically a bit higher in frequency. I found the 5.8 GHz gear used 6.5 MHz for it's SSC. The SSC level was set at -25 dBc.

Video Deviation: Most USA ATV repeaters used 4 MHz deviation for FM-TV. This was a more complex measurement to find out the deviation of the 5.8 GHz gear. My first test was to observe the spectrum of the TS832 and compare it to that of my model 23-8 which was calibrated to be 4 MHz deviation. This test was performed at 1255 MHz with the TS832 signal being down-converted from 5645 MHz. I used a 1 V, standard color bar test pattern video signal as input to the transmitters. I adjusted the rf levels to be the same at -17 dBm. On the spectrum analyzer, I set the displays to be in the peak hold mode. The results are shown in the below photo. The cyan trace was from the 23-8 modulator running 4 MHz deviation. The magenta trace was from the TS832 transmitter. It is seen that the TS832 deviation is less than 4 MHz. But how much less ?



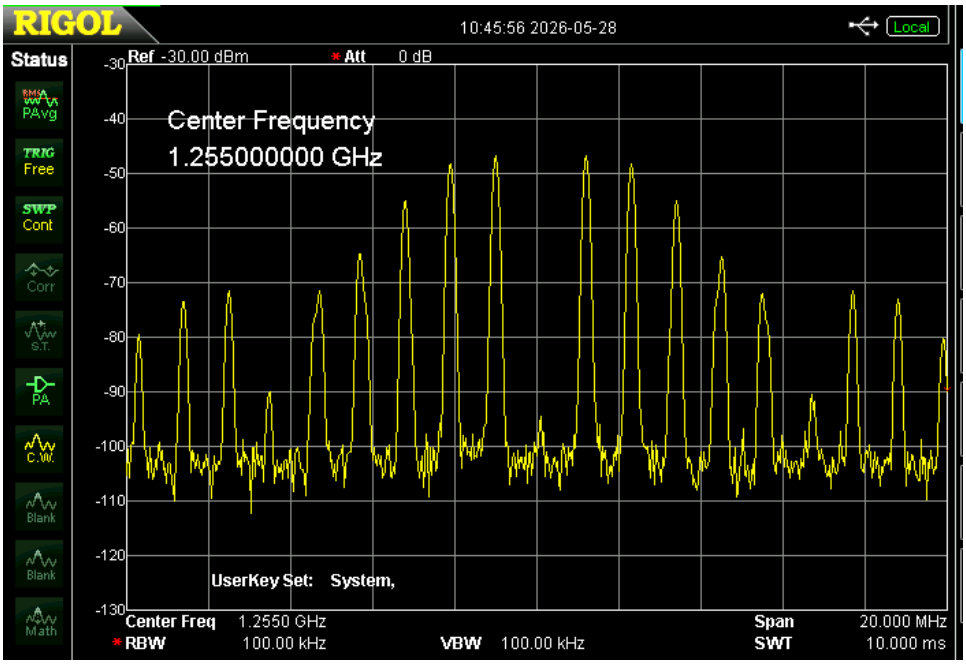
Spectrum Comparison of 23-8 (cyan) and TS832 (magenta) transmitters

The standard method for determining FM deviation is called the "Bessel Null" For details on this measurement, I refer readers to my application note, AN-14, *"FM Transmitter Deviation Adjustment & Calibration*". To perform this test, I modulated the TS832 with a 1.0 Vptp sine wave and monitored the spectrum. I slowly increased the sine wave from low frequencies and watched carefully the center frequency until it disappeared. I then noted the frequency. It was 1.1035 MHz. See the below spectrum photo

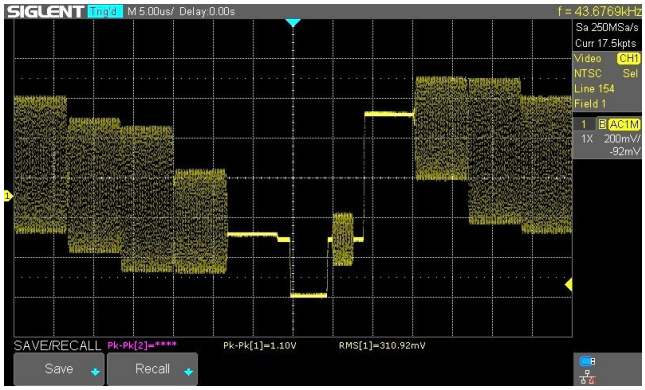
The modulation index, χ is given by this equation: $\chi = D / m$ where **D** is the peak deviation and **m** is the modulation frequency. The first Bessel Null occurs at an χ value of 2.405.

Thus from this measurement, we can calculate the deviation **D**

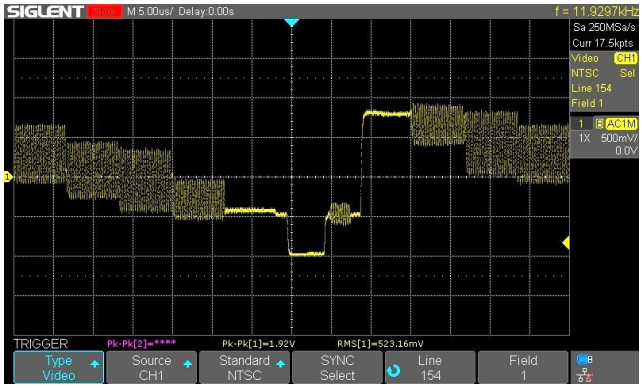
$$D = m \times \chi = 1.1035 \text{ MHz} \times 2.405 = \mathbf{2.65 \text{ MHz}}$$



Bessel Null measurement of TS832 transmitter



Color Bar Video Test Signal



23-1 xmitter to RC-832 receiver

Video Gain Measurements: Composite analog video signals are standardized at 1.0 V ptp into 75 Ohms. In an ideal TV system, they always stay at 1.0 V. Now if we try to pass video signals thru FM systems with differing deviations, we should expect to see some differences. To keep things standard, we will thus need to provide additional video amplifiers with adjustable gains.

The first test was of the TS832 transmitter being received by the 23-5 receiver which was calibrated for 4 MHz deviation. A 1 V color bar test pattern input resulted in 1/2 V output due to the lower deviation of the TS832. The second test was using a 4 MHz deviation model 23-8 transmitter being received by the RC832 receiver. A 1 V color bar test pattern this time resulted in a larger 2 V output. In all cases my 7" flat screen video monitor was able to display a satisfactory picture.

Observing the amplitudes of the color signals showed that the two different systems showed flat frequency responses for the transmitter/receiver pairs. But when the two were mixed, the system frequency response was somewhat limited.

CONCLUSION: With a knowledge of the standards used for the 5.8 GHz FM-TV gear, hams should now be able to also use them along with LOs & mixers to generate and receive FM-TV signals on our other microwave ham bands.

73 de Jim Andrews, KH6HTV, Boulder, Colorado

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QST: W0BTV/R Member Stations

Satellite S-Band Transceiver/Controller/TT&C Project
1)We have completed the assembly of our S-Band 2.0/4.0 GHz Transceiver/Controller.
a) This ground transceiver is a comprehensive solution integrating a modem, an antenna controller for various positioners and a mission scheduler. This powerful combination allows for efficient management of communication tasks and antenna positioning, ensuring optimal performance.

b) The team and I will conduct an in-house evaluation, testing, calibration and integration with multiple other ground system components to assure that the S-Band transceiver controller hand-shaking algorithms are accomplished for proper operations. Small fiber optic transceivers were added to this unit for our (DOG-1) Digital Optical Ground Station One. Updates to follow.

73 de Mario, KD6ILO, Oceanside, California

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Colorado ARES -- ATV Training: The success of the Boulder, Colorado ARES group (BCARES) in providing ATV coverage of major events for the Boulder public safety agencies of Sheriff, Police and Fire has not gone unnoticed. The state ARES coordinator, Perry Lundquist, W6AUN, has asked BCARES to share it's experiences and technology with the other ARES groups in Colorado.

On Saturday, July 18th, Perry will be hosting a 2 hour Zoom training session for all Colorado ARES groups. The topic will be ATV and ARES. The presenters will be Allen Bishop, K0ARK, BCARES E.C. and Jim Andrews, KH6HTV.

Letters from Readers: (We *just got this very nice letter from Canada*)

Hi, Jim ... I was in touch a couple of years back looking for some guidance on HiDes' DVB-T transmitters. I've finally put it all together, it's all working great, and it was a lot fun doing it. There's a learning curve with this stuff that I'm still in the middle of, but I would never have gotten this far without your great resources, which I consulted endlessly and for which I am very grateful. So thanks, please keep up the great work!

73 de Scott Tremblay, Hamilton, ON, VE3GHN

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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*

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