Amateur Television Journal

Boulder, Colorado -- ATV Repeater

W0BTV

Ch 57   423 MHz   DVB-T

November, 2024
3ed edition, issue #176

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

ATN
The Amateur Television Network

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

Ham TV from Space - Not ISS !
But Our Own Rockets !   (part 2)

Editor's Note: After the interest shown in this article in the previous issue #175, I asked Mike for more details about the ATV equipment he designed and operated in the 1990s rocket.   Here is Mike's reply.

The rocket ATV was 2.4 GHz using an FCC part 90 transmitter/receiver system I designed in the mid-90s for licensed video links; the output fed a one-watt amplifier into a circularly polarized patch antenna. A solid three-foot dish with a patch antenna feed was used on the receive side. The camera was a 500-line Sony XC777 CCD with a 6mm lens. I still have it! Antenna tracking was by hand and not too difficult, as most of the flight was straight up with the rocket antenna looking straight down. The recorder was Hi8 with aux video input.
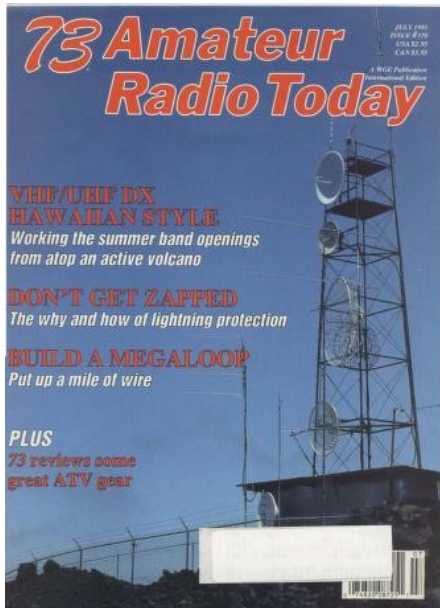
The first few Tomahawk flights used AM video transmission on 370 MHz; the exciter was an ATVM-70. I originally designed it for ham use (see the attached 73 mag article); Tom O'Hara sold hundreds of them through his PC Electronics company. It was modified to operate just below the 70 cm ham band, driving a Mitsubishi five-watt brick amplifier that I modified to operate on 370 MHz. The amplifier output fed a conformal dipole antenna made from copper tape on the leading edge of the lower fin. A PC Electronics receiver was used for reception in conjunction with high-gain M-squared antennas. The majority of follow-on flights were at 2210 MHz using a custom TX/RX system that Hughes contracted

me to design specific to the application. A grid dish antenna was used for ground-based reception; the P3 Orion chase plane used its own airframe-integrated antenna. I still have one of the receivers.

The 73 magazine article I referenced was too large to attach. Here is an archive link: 73 Magazine (July 1991) : Free Download, Borrow, and Streaming : Internet Archive
https://archive.org/details/73-magazine-1991-07/page/8/mode/2up

The more recent 2210 MHZ flights were FM modulation, the difference in resolution can be seen in the video. The photo attachments are of the production ATVM-70 that Tom marketed and the original fin cam prototype using that product.

73 de Mike, KM7MH, Athol, Idaho

The 370 MHz Transmitter Board
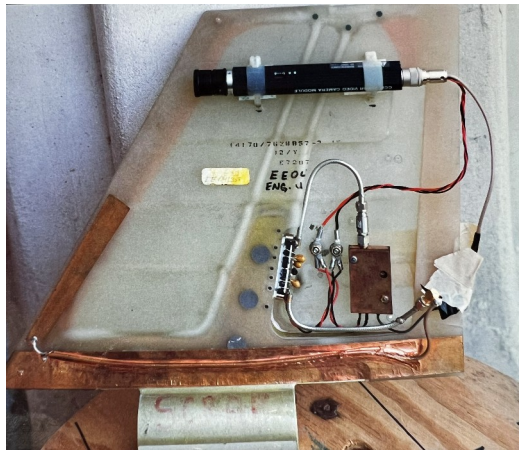
Fin with Sony TV camera and copper foil tape dipole antenna.

Do the USB TV Tuner
Dongles Work on Windows ?
Jim, KH6HTV

In our previous issue #175, we had an article from Wade, W7ITL, entitled "*Cheap RTL Dongle to Receive 23cm DVB-T*". In Wades' article, he showed how to use them with a Linex computer. So, the obvious question is "Will they also work on a Windows Computer ?" Searching thru our ATV newsletter archives, back in 2021, we had a couple of issues devoted to this question. In the January, 2021 issue #66, Jim, KH6HTV, had an article entitled *"USB TV Tuners -- Now Work on Windows 10 !"*. It was followed in the next issue #67, by an article from Daniel, VE7LCG, entitled *"Software Drivers for RTL8232 Based SDR Dongles"*. The key takeaway for those articles was to make these dongles work on Windows required installing a different driver from the one normally used for most ham SDR applications.

I recently purchased an RTL-SDR-V4 dongle prior to seeing Wade's article. I wanted to use it to receive our ATV, DVB-T signals on my HP Windows 11 laptop PC. Much to my disappointment, I was totally unable to get it to work. So, I went to the RTL-SDR.com web site and actually sent an email to their customer support. Much to my surprise, I actually got a useful reply back within 2 hours. This was their reply ---

Hi Jim,--- Unfortunately the V4 will not work for DVB-T. The architecture has changed too much towards enhancing SDR operation, and the old DVB-T drivers don't support the changes. Only the V3 will work with the old DVB-T drivers.

<div align="right">Regards, Carl Laufer   RTL-SDR.com & krakenrf.com</div>

OK, that didn't work. I wondered if any of the three dongles Wade endorsed would work on Windows 11? So I ordered from Amazon the Nooelec model NESDR Smart, V.5 ($34). I dug out my old 2021 article and followed the procedure outlined in it. I was pleased to find that the key web site in Germany which had the correct, 2012 Windows, DVB-T driver was still functional. So I was able to down-load the Treiber2 driver package and installed it in my PC per my old instructions. Guess What ? It actually worked ! So, if you want to use your USB dongle for DVB-T reception check out issue #66. All 175 back issues of the ATV newsletter/journal are archived on the web site: *www.kh6htv.com*

I should however comment that with the old 2012 Windows driver, the full frequency range of the dongle (100kHz to 1.7GHz) is not possible for DVB-T reception.   I tested mine on the 70cm, 33cm and 23cm bands using VLC as the media player.   The dongle only worked on the 70cm band.

73 de Jim, KH6HTV, Boulder, Colorado

==

A Small Contribution From Germany: I bought some slot antennas for ATV and other GHz applications.   Thanks Bert.   One of the slot antennas is for 10 GHz. It has 24 slots on both sides.   I was wondering if I could receive QO-100 with it ?   To do this, the antenna must be aligned horizontally, as QO-100 transmits vertically polarized at 10 GHz. I am amazed at how well this works, see picture. The FT8 range is shown.   With QO-100 as the signal source, I can now test the properties.

Best regards,   Wilhelm, DG2YK, Gescher, Germany

==

NEW APPLICATION NOTES: KH6HTV Video has just posted an up-dated version of it's 2015 application note, AN-23, **"DVB-T Television Repeater"**.   The revised app. note contains new material.   It tells how to build a basic DATV repeater.   It is available as a free .pdf download from the web site: *www.kh6htv.com*

========================

FEED-BACK --- ATV on Rockets:

I don't know if you watched the Tomahawk fin video but they used one of my transmitters - P.C. Electronics is listed in the credit crawl at the end. (*www.hamtv.com*)

Tom O'Hara, W6ORG

Want to read more about the New Mexico rocket folks and ATV.   Check out our old issue #54, from August, 2020.   See Ken, KD5HEH's article on "Amateur Rocket ATV Transmitter".

FEED-BACK --- ATV Journal:

Jim ---   I have but one humble page to write a month and your newsletter is always an inspiration in quality of content!   Thanks for all you do.

Very 73, David, NA2AA, ARRL CEO

David is right, Jim. Great newsletter.   I have found useful tidbits for the World Above 50 MHz column, even in areas not directly involving ATV.

Jon, N0JK, ARRL QST WA50 editor

IC-905 -- QST:

The Dec. 2024 issue of QST has just come out.   In the product review section of this issue, they review the new Icom IC-905 Microwave Transceiver.   (see pages 36-41).   It was tested and reviewed by Dave Halliday, K2DH.
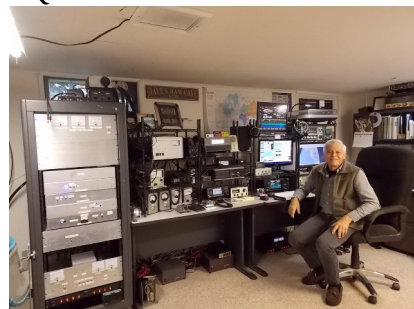
Dave has a lot of ham microwave experience working up as high as 122 GHz as part of the weak signal crowd.   However, Dave's QST review did not include the ATV capability (or limitations) of the IC-905.   He only mentioned that it was included as one of the available modes of operation.   Likewise in the table of tests run by the ARRL lab, there is no mention at all of testing the FM-ATV mode.

Old Time - ATV !

The Dec. 2024 issue of QST looks back to 1975.   The cover of that issue featured ATV.   The main article for that issue was written by own old man of ATV, Tom O'Hara, W6ORG.   His article was entitled "Practical Ideas for the ATV Enthusiast. part 1 Receivers and Antennas".

caption;   ATV need not be all test patterns and tweaking.   Here WB6MEU focuses on some choice DX QSLs from stations worked on the hf bands.
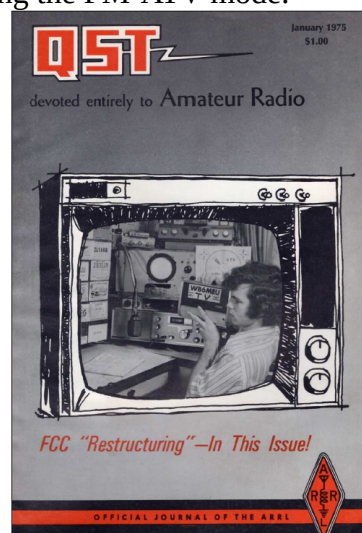
ALL-Star for ATV: Mario, KD6ILO, writes

--- "There are many of us using ALLStar as a back channel [intercom] for a LIVE talk channel {batc uk/us-san diego ca} including me and it works well along with the chat. You might consider asking your repeater's membership about not using Echolink as a backhaul channel for the net. Instead go forward with AllStar as it can be integrated into the repeater as many have for [d]ATV, it has remote management.

So just what is AllStar ?   This is directly from their web site at: *www.allstarlink.org*
AllStarLink is a network of Amateur Radio repeaters, remote base stations and hot spots accessible to each other via Voice over Internet Protocol. AllStarLink runs on a dedicated computer (including the Rasperry Pi) that you host at your home, radio site or computer center. It is based on the open source Asterisk PBX running our app_rpt application. App_rpt makes Asterisk a powerful system capable of controlling one or more radios. It provides linking of these radio "nodes" to other systems of similar construction anywhere in the world via VoIP. AllStarLink's primary use is as a dedicated computer node wired to your repeater or radio. Connections from Echolink, other VoIP clients and telephone calls are supported.   73 de Mario, KD6ILO
==

SAN DIEGEO DVB SOCIETY: Our society has a weekly

net each Sunday 7pm PDT, but it's an administration network meeting for members. Throughout the week the network supports STEM Program classes for our school districts in San Diego as an agreement we have with our grant funding supporters {i.e. NASA and NSF-National Science Foundation}. We also have a net for our local first responders as we support them with image communication support.   We have members as young as 11 years old {Hams}, as old as 75. Total 76 very active members {students , grad-students, employed, retired}.   73 de Mario, KD6ILO
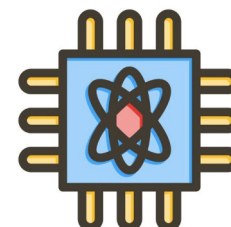
Check out what is happening on the other side of the globe with amateur televison signals from space via the **QO-100** ATV satellite. You can watch their World-Wide ATV Net on their YouTube.
https://www.youtube.com/watch?v=OO8-1zVmkrA
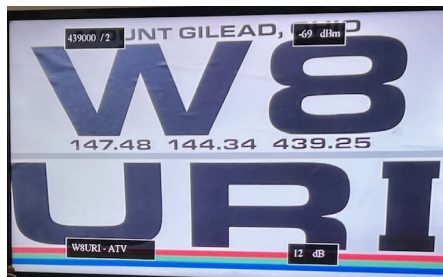
90+ miles !

Excellent Occurrences During DARA/ATCO ATV Zoom Net!
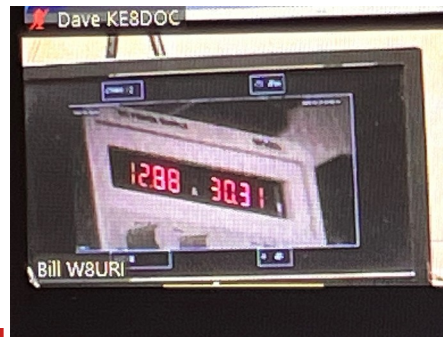
W8CWM -->W8URI 90+ miles

On 13 November 2024, several unexpected ATV-related events aligned during the 8:00 PM DARA/ATCO/ATN Zoom Net. The ATV net started at 8:00 pm and W8URI (Bill Heiden) checked in to try to see if there might possibly be a 70cm band opening. His hopes were granted with a 90 mile path that allowed a two-way link between Bill (Mt Gilead, Ohio) and W8CWM , Bill McCoy located in Englewood, Ohio. Their two-way contacts were highly successful on separate DVB-T and A5 ATV modes.   Fifteen minutes later, Doc Schwab, KE8DOC, mentioned there was going to be an International Space Station pass as the ISS was celebrating 40 years of amateur radio in Space and would be transmitting some commemorative frames via SSTV on 2 meters. Fifteen net participants were treated to three frames of video from the ISS received by KE8DOC in Tipp City, Ohio. Unfortunately,   Bruce Kobe, K8FIX, forgot to buy the Wednesday Night Lottery tickets for everybody!!!   (Dave, AH2AR Reports).

SSTV Commemorative ISS frames that the space station was transmitting as it made a pass over the Continental U.S. on 2 meters FM.   Thanks to Doc Schwab for his impeccable timing!
==

IC-905 FM-TV ISSUES contd.   Darko Banko, OE7DBH, has sent us notice, that some
limited progress is being made on work arounds for the poor frequency response and low deviation for microwave FM-TV in the Icom IC905, microwave transceiver.   He has sent us this forum link at the BATC.

https://forum.batc.org.uk/viewtopic.php?f=2&t=8337&p=36884#p36880
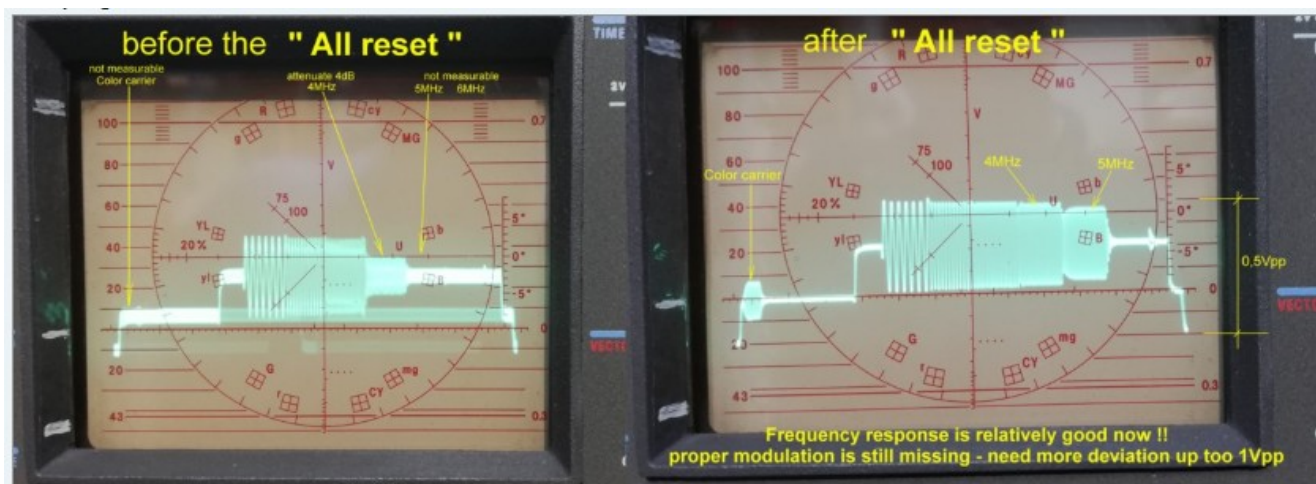
Reset Ergebniss x.jpg (137.15 KiB) Viewed 235 times

That is only 50% of the expected-necessary modulation according to the CCIR standard !!

ICOM still has to do something if he wants to have satisfied customers in Europe or the PAL region.

IC-905 Improvement

===

Comparison of 70 cm Low Noise, Pre-Amplifiers
Jim Andrews, KH6THV

The Advanced Receiver Research, model P432VDG, preamp has been the "go to" workhorse for hams for at least 30+ years. The Boulder hams used them in our ATV repeater going way back to the 1990s. Their web site (*www.advancedreceiver.com*) doesn't give a whole lot of info about it. The total specs. listed there are: 0.5 dB noise figure, 18 dB gain, +12dBm (-1dB gain compression), 30 MHz BW, GaAsFET, BNC std., $120. A Google search for this amplifier reveals an excellent review of it

by Matthias Bopp, DD1US.   See his web site (*www.dd1us.de*)   There he shows photos of the inside, the detailed manual with schematic and his test results.

While wondering what to put into this newsletter, I decided perhaps a comparison of the older discrete FET transistor preamps such as the ARR, P432VDG with the newer MMIC integrated IC preamps might be in order.

I had kicking around the ham shack one of those ARR preamps which we had used in years past, so I tested in on Don, N0YE's, Hewlett-Packard HP-8970A Noise Figure Meter with a NoiseCom NC-346N Noise Source head.   I ran all my tests in the center of the 70 cm band at 435 MHz.   I was quite disappointed in the noise figure I measured.   It was in excess of 2 dB !   So I proceeded to try retuning it on the HP NF meter.   I first retuned it for max. gain at 435 MHz, this still resulted in a 2.0 dB NF. I then carefully tweaked the only trimmer cap in the preamp for minimum noise figure.   The best I was able to achieve was 1.14 dB.   This was a far cry from the ARR spec. of 0.5 dB, but more consistant with what Matthias measured on his ARR preamp.   I then left the tuning at the best NF setting for the remaining tests.
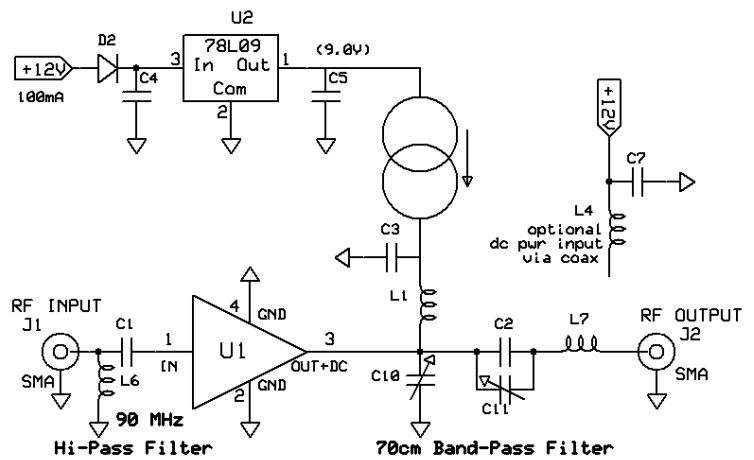
Here is the schematic diagram for the ARR P432VDG preamp.   Available from Matthia's article.   It is a single FET transistor amplifier using an MGF-1302.   It only has a single tuned circuit on the input consisting of the trimmer cap, C1 and L1. The output is an un-tuned transformer.   So obviously only one degree of freedom for tuning and optimization of noise figure.
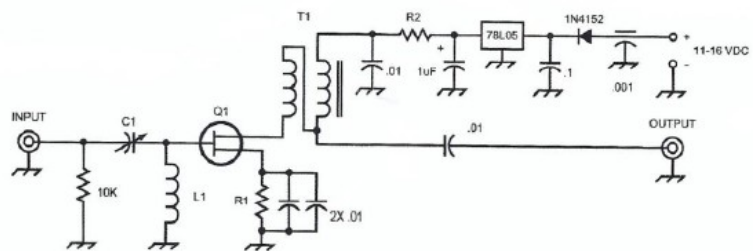
P432VDG schematic diagram

For the KH6HTV   70-LNA, this is the generic circuit diagram.   Rather than just a simple FET transistor amplifier, it instead uses a more modern MMIC gain block module.   The MMIC is extremely broad-band, has low noise figure, and good input/output Z match.

The 70-LNA has about the same pass-band, band-width as the P432VDG, but it has much better out of band skirt selectivity due to the additional filters included in the design.   Because the MMIC works well at

70-LNA schematic diagram

low frequencies, to avoid overload by those signals, a 90 MHz high-pass filter is on it's front end.   On the output side, is a two pole, 70cm band-pass filter consisting of a parallel tuned and series tuned L-C filter.

Measured Performance of 70 cm Pre-Amplifiers

(*) measured at 435 MHz unless noted

PARAMETER (*)	Advanced Receiver Research P432VDG s/n 1711	KH6HTV Video 70-LNA s/n 121
Noise Figure	1.14 dB	0.80 dB
S21 Forward Gain	19.7 dB	20.0 dB
S21 -3dB Band-Width	89 MHz	100 MHz
P(-1dB gain compression)	+12 dBm	+20 dBm
S21 isolation (150 MHz)	-9 dB	-25 dB
S21 isolation (915 MHz)	+5 dB	-35 dB
S21 isolation (1270 MHz)	+1 dB	-44 dB
S11 Input Return Loss	-6 dB	-8 dB
S22 Output Return Loss	-4 dB	-7 dB
S12 Reverse Gain	-30 dB	-30 dB
DC Power Requirement	30 mA @ 12Vdc	100 mA @ 12Vdc
Connectors	BNC	SMA
Price	$120	$90
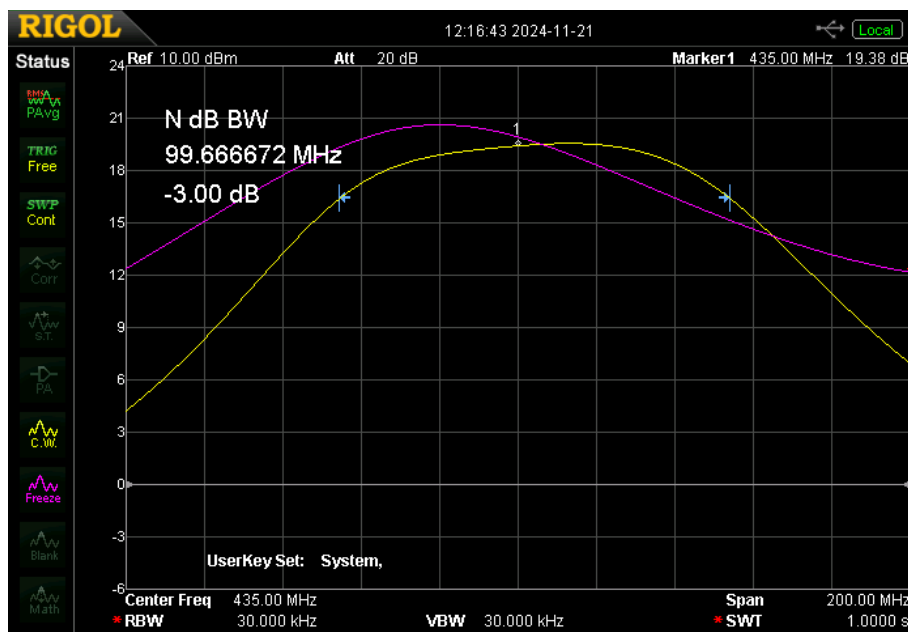
S21 Gain in 70cm Pass-Band. 435MHz center frequency, 200 MHz span, 3dB/div & 20MHz/div.
Yellow trace is 70-LNA.   Magenta trace is P423VDG.
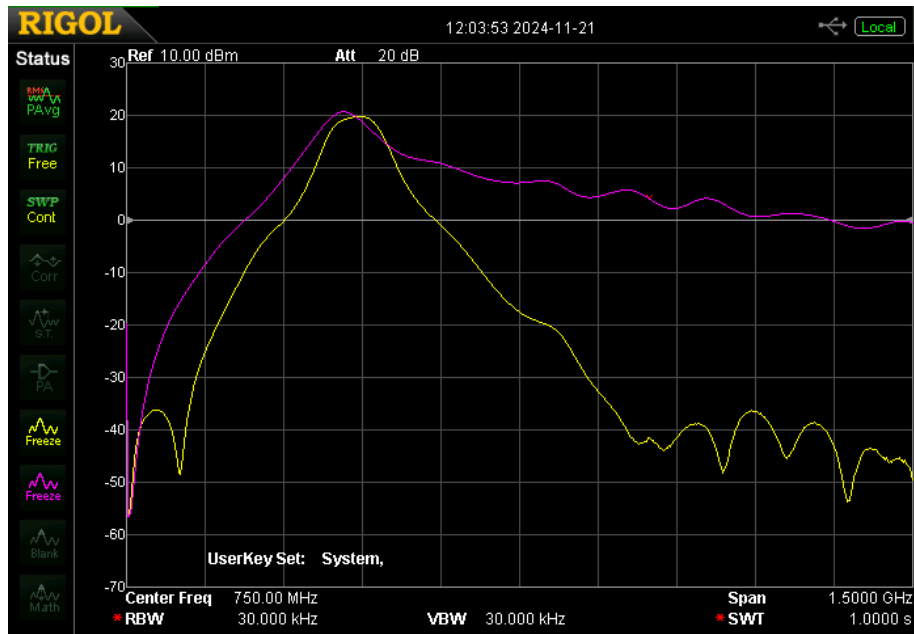
S21 Gain   750 MHz center frequency, 1500 MHz span, 10dB/div & 150MHz/div.
Yellow trace is 70-LNA.   Magenta trace is P423VDG.
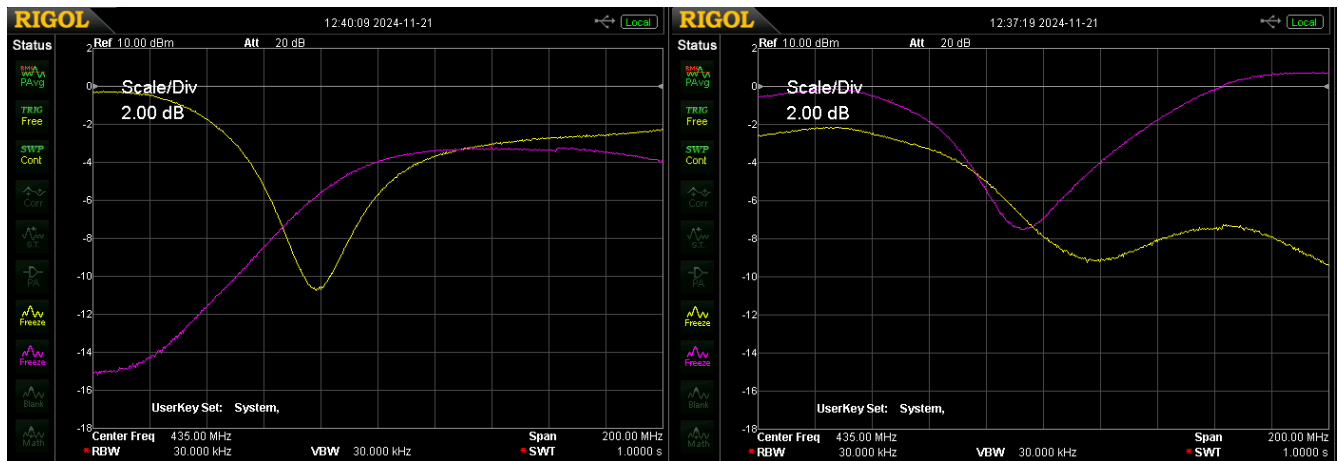
P432VDG   *70-LNA*

Return Loss Measurement in 70cm band: Yellow trace is S11, input RL.   Magenta trace is S22, output RL.   435 MHz center frequency, 100 MHz span, 2dB/div & 10MHz/div

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

FREE -- P.C. Electronics model TXA5-70S (but hand-written label on board of "33"). This was a $1 mystery box Don, N0YE, picked up at the local BARC swap-fest. Nice hand made metal enclosure with two SMAs labeled as Video In & RF Out.   Removing cover disclosed the pc board inside.   Testing on Rigol spectrum analyzer revealed it to not be a 70 cm, but actually a 33cm transmitter board.   Frequency synthesized on (4) channels: 910.25, 911.25, 913.25 & 923.25 MHz. Don is giving it away free to an interested ATV ham who is willing to give us $15 cash for the $11 priority mail postage and hassle of going to the post office during Xmas season.   Interested ? -- send email to *kh6htv@arrl.net*

SLATS

ST. LOUIS AMATEUR TELEVISION SOCIETY

Buy - Sell - Trade - Giveaway

(web site: http://www.slatsatn.net/?page_id=713)
Check it out. New items listed every week

WWW.SLATSATN.NET

**Items for Sale
or Give-Away
Lots more -- check out
our web site.**

ICOM HM-133V MICROPHONE

8" MITUTOYO DIAL CALIPER