Amateur Television Journal

May, 2025
issue #186

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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

San Diego ATV Group's Low Earth Orbit Optical Communications Relay Experiments

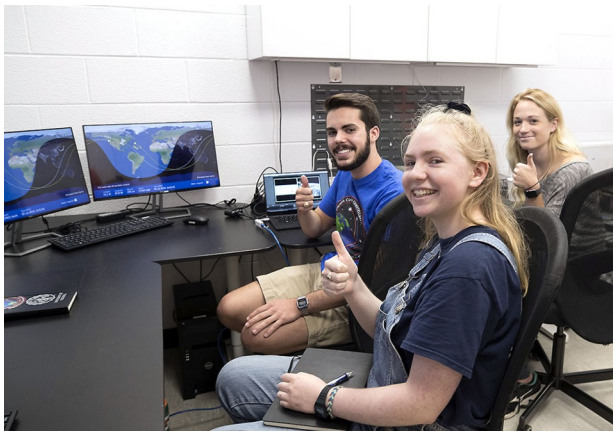
Mario, KD6ILO, has kept us up-dated on their recent progress with their Low Earth Orbit (LEO) Cube-Sat satellite project. Here are some of his progress reports.

Our Optical Terminal Transceiver Module (OCT) was a rebuilt unit that took 19 months to complete for a custom base as it was a surplus piece. Jerry C {a.k.a. Jimbo} works for SCAN as a service technician and volunteered his time to help us. All paid from an NSF grant funding from 2022 budget.

Left: Observatory Enclosure Assemble on ITG lab's roof top Right: Optical Terminal Transceiver module

"Jimbo"Testing with power up, calibration & alignment -- in the FSOC Terminal Control Cell

We have now successfully installed, powered tested, along with control network management systems and calibration aiming targeting alignment coordinates for our first cubesat in LEO and it was successful four times. As for the past few days we have pulled six hour shifts of four members {I did two shifts} so I could log procedures for operational manuals.



LEO Control Room

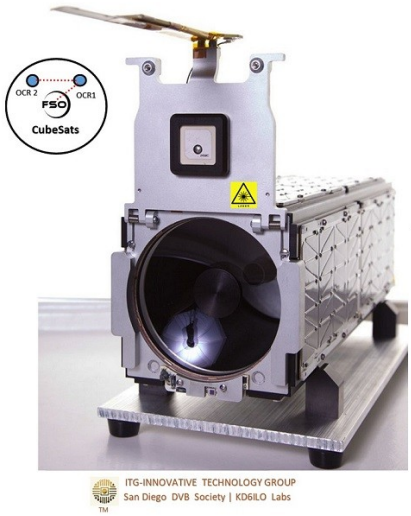
We have a terminal control area linked to the ground station tracking room, a small area where we track, monitor uplink/downlink signals and much more. We will start training senior members on safety protocols and operations. I'm one of six instructors, Jerry at the terminal cell will be the primary lead on that station. More to come.

We will be testing a second optical channel [T2 1532nm] uplink to OCR-1(2000km). we will do two passes, send a 1.25 GB video to the cubesat on the first pass. Then on the second pass 90 minutes later it will be sent back to us. When OCR-2 is placed in orbit and is placed in proper alignment/altitude {as this will take a few hour} it will relay the GS signal to OCR-1, than OCR-2 finally downlink data to its ground target.

*Just a reminder our cubesats are NOT amatuer radio satellites , but these are experimental [FSO] Free-Space-Optical relay communication platforms. Sending voice, data and video on IR optical channels (THz).

(4/21 update) --- We did a short test downink feed yesterday morning and it was successful. Uploaded to OCR1 it only took less than two(2) seconds. On the next pass 91 minutes later at 11:01:03 am, Sunday, it downloaded the data video to the media server library for storage, logging and record keeping. Also health telemetry data..good to go! We (6) six of us are leaving for Florida tonight to view the launch of our second CubeSat OCR2. We'll be back on, May 1st. If successful it will take two to three days for OCR2 to be in proper orbit.

Photo at right is FSO 2OCR ExCubeSat ITG2



ATV at DAYTON HAMVENTON

Attention ATV Hams ! Are you going to Dayton this year. If so, definitely put on your "Must Do" list stopping by the ATV booth, the ATV seminar and also attending the ATV dinner. Here are the details from Art, WA8RMC.

HAMVENTION DARA / ATCO ATV BOOTH ACTIVITIES: Are you planning to go to Hamvention this year? If so, be sure to stop by booths 1004 and 1005. They are the second and third tables on the left as you enter building 1. That building is the first building as you enter from gate 3. I will be demonstrating the VersaTune receiver and Joel Wilhite, KD6W will show his QAM transmit setup with actual signals from The DARA repeater location. There will always be an empty chair available to sit for a spell and discuss ATV.

HAMVENTION AMATEUR TELEVISION FRIDAY NIGHT DINNER: The ATV Friday Night Dinner will be on May 16 at 6:30 PM at the China Garden Buffet Restaurant (937-781-9999), 112 Woodman Drive in Dayton, Ohio 45431 (Airway Shopping Center). The all you can eat Buffet Dinner is $11.99. We will have dinner and then ATV presentations concluding at 9 PM. All are invited. Door prizes will be awarded.

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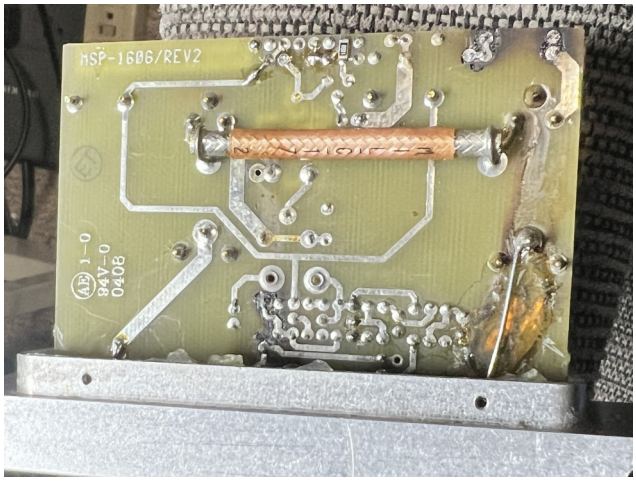
Advanced Receiver Research 70 cm Mast Preamplifier Rebuild -- A story that can't be made up!

Dave Pelaez AH2AR

Stage 1: **LETS SWAP PREAMPS!** Vince N3BFZ contacted me regarding an ARR MSP432VDG-160, that he had and he mentioned it was not working up to par… He received it from Hank W4HTB who had picked it up at an estate sale. When Vince tried using it he noticed that at times it was going into oscillation. Vince wanted to use it as as a receive only preamp and I mentioned to him that I would go ahead and fix it if he was willing to trade it for a working Down East Microwave preamp. I knew that W8CWM was looking for a preamp to mount on his homebuilt fold over tower. Vince volunteered to press on with the trade, so we swapped amplifiers and everyone was happy.

Stage 2: **DON'T LET THE SMOKE OUT!** Once I received it in the mail from Vince, I put it on the bench and was unable to get it to go into oscillation. I tried varying the voltage and it held steady at 18 dB gain. After running it for a few days, it continued to amplify with no hitches, so I took it over to Bill's house and mounted it to Bill's fold-over antenna tower. Using the DARA ATV repeater as a beaconing signal source, the preamplifier made a marked difference in ATV receive sensitivity at Baez QTH. But then things went south! He tried transmitting and it immediately disabled the preamplification. Consequently, I went ahead and took it back home for another bench check, but this time I went ahead to attempt to inspect the internal circuitboard for the first time, and I was unable to get into the case. It appeared that it was sealed tight enough where the cover could not be removed from the base without possibly destroying the steel case. It somewhat reminded me of an armored sardine can.

Stage 3: **USE A BIGGER HAMMER!** Not wanting to damage the steel case to get to the circuit-board I decided to call the manufacturer to get some advice on how to disassemble the preamp without destroying it. Jay from Advanced Receiver Research answered the phone on the first ring, and hewas very helpful but I was a littlesurprised with his suggestion. He mentioned that since the case was sealed with RTV Silicon cement, it would be best to put the case in a vice and smack the ledges with a rubber mallet. Reluctantly, I carefully locked it in my workbench vice and a few hits with the rubber mallet did the trick! It finally came apart. What is that acrid smell?!?!?



Stage 4: **THE LINGERING SMOKE INSIDE THE HERMETICALLY SEALED CASE ESCAPED!** Once apart, I was somewhat amazed at the damage. I immediately noticed that it reeked of burnt phenolic PCB, and I noticed an old "repair" that someone accomplished and indeed, someone modified the preamp to be a "receive only" unit as they removed and then bypassed the stripline printed circuit tracings that took out the conducting path to the RF sensing circuit from the unit. A closer look indicated that the RF sensing transistor was inoperative. PC Board was "modified" by persons unknown years back (as shown in the lower right corner.

Stage 5: **THE DAMAGE WAS WORSE!**

My further electronics "forensics" autopsy indicated that the RF sensing transistor must have failed years back, and somebody decided to turn the preamp into a receive only unit. Doing so would set someone up for an instant disaster if the next owner decided to put it into transmit/receive service, and that was us! When we tried transmitting 160 watts into the receiver section (with no RF sensing relay to switch it to pass around the active preamplifier circuit), it ended up (literally) smoking three resistors, a diode, an SMD capacitor and the MFG1302 transistor. Could it be saved?

Stage 6: **ITS ALIVE!** After running down the needed parts, I installed the components and also replaced the RF sensing transistor that had obviously failed years back. I also fixed the circuitboard where the "modification" removed the printed circuitboard tracings to the RF sensing circuit. It was now working as it should, at 18 dB gain… Back to normal! And it was ready for installation.

Stage 7: **MEANWHILE BACK AT THE RANCH...**W8CWM acquired another 70cm preamp during all of this restoration and repair activity. I decided to adopt the unit as I had admittedly developed a liking to this preamp, who just like the flight of the Phoenix, has arisen from the ashes unscathed.

73 de Dave Pelaez, AH2AR, DARA, Vandalia, Ohio

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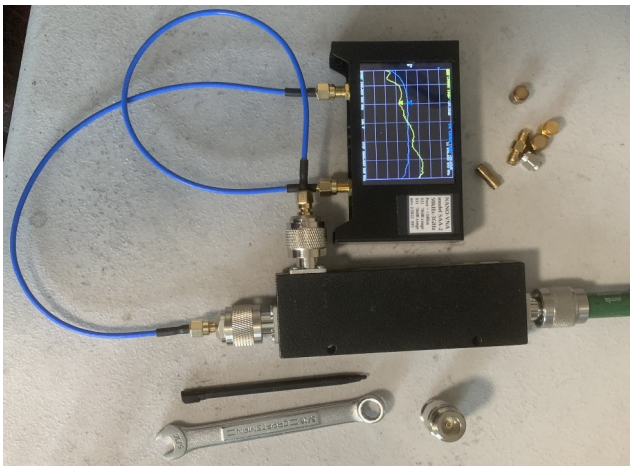
TEST EQUIPMENT --- NEW PRODUCT REVIEW

Jim, KH6HTV

Sometimes we hit upon a new piece of ham gear or test equipment with a price too good to believe. This item is one of those treasure finds.

It is a coaxial directional coupler with type N connectors and covers the important ham bands from 70cm thru 13cm (450MHz - 2.4 GHz). Now the really good news, the Amazon price was only an extremely low **$16 !** You heard that correct - $16 ! (*April 6th price, who knows what it will be soon with Trumps tariff trade war ?*) The advertised specs. are: 800-2500MHz, 200 Watts, with a wide selection of coupling values. They are: 5, 6, 7, 10, 15, 20, 30 & 40dB. I ordered the 30dB coupler.

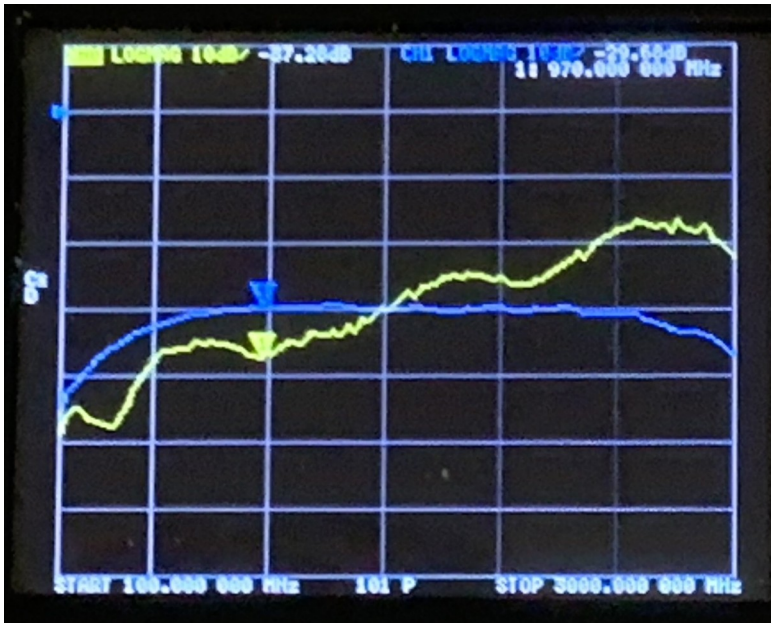
The coupler arrived today (4/18) and I have promptly tested it with my 3 GHz, Nano-VNA, model SAA-2. Photo shows the test setup. I set-up to sweep from 100 MHz to 3 GHz. I labeled the ports as: #1 in input, #2 = output & #3 = side-arm coupled output. The table & photo below show the results for S31 (blue trace) & S11 (yellow trace) The scales are: 10dB/div vertical and 500MHz/div horizontal. I found the coupler to meet specs. and was useful from 2 meters (-46dB), 70cm (-33.6dB) and flat at about -30dB on out to beyond 2.4 GHz



Dongzhou Model DZ-R530925-50, 30dB Directional Coupler

S parameters (in dB) vs. Frequency (in MHz)

Freq	150	450	915	1270	2000	2400	3000
S31	-42	-33.6	-30.0	-29.3	-29.9	-31	-36.6
S11	-46	-41	-37	-34	-25	-20	-21
S13	-42	-33.5	-29.9	-29.6	-29.9	-30.7	-36.3
S33	-35	-25	-18	-19	-11.4	-12.6	-9



-30dB Directional Coupler: S31 (blue) & S11 (yellow) sweep from 100MHz to 3 GHz
10dB/div vertical (ref. line is 1 div down from top) 500MHz/div horizontal

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Broadcast TV Pre-Amp Feedback: In our last issue, Mark, KB9VKE, was asking for advice on what commercial TV pre-amps worked best. Mikes, WA6SVT, has sent this recommendation.

"Thanks Jim for another great newsletter. For the station asking for a source of DTV preamps: Winegard is the brand to go by. Most of their preamps have input TV band filters and low noise high IP3 circuits. They are a little bit more money but work well. I have used them for my over the air TV at my QTH and my ham radio transmitters do not QRM the preamp due to their filtered TV bands input. There are UHF, VHF and combo VHF and UHF models. They come with a bias tee. Connectors are "F" some of the models are made to direct plugin to Winegard yagis and some have 300 balanced inputs. I just checked their web site and the current best performer looks to be their Model LNA-200. Check it out pretty impressive specs." --- 73, Mike, WA6SVT

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More Feed-Back on Using CATV-QAM for DATV: Art, WA8RMC, ATCO, Columbus, Ohio writes in the latest issue of their ATCO newsletter the following article, reprinted with permission:

DATV OPERATION using QAM
(Quadrature Amplitude Modulation)

Joel Wilhite will use QAM at Hamvention this year. Great! It seems like a good fit for the application. Then ask, “why not use it for more DATV applications”? Well, it depends! Let’s briefly discuss the

pros and cons and let you decide if you want to try it elsewhere. However, QAM was designed primarily for cable operation in the USA where the signal is contained and not subject to multipath interference. To receive a QAM signal, all you need is an unmodified TV receiver. That's a powerful asset. However, when you subject it to over the air conditions, the ground rules change. Back in 2002 we tried to use it for our ATCO repeater in downtown Columbus, Ohio and were very disappointed. We gave up trying to make it work. We had enough height (650 ft above street) but the tall buildings around it and other transmit sources in the area made success impossible.

The main issue is the fact that the QAM format contains very little multipath error correction, so the software simply rejects any signal that is out of phase with the incident signal. There may be some areas that will be "quiet enough" to allow good reception using QAM but it may be a challenge. I encourage anyone to try it and report their experiences to me. Ham Radio/TV is open to experimentation so "go for it"!!! The main factors to consider are:

- Perfect if you want to use a standard unmodified TV for reception.
- There are many manufacturers of QAM modulators that are very inexpensive.
- There is very little (none) built-in error correction so multipath is an issue.
- To minimize reflections, good cable practices are necessary. A cable SWR can produce issues.
- Highly directive antennas may be necessary to minimize non incident signal reception.
- Receiver sensitivity may be insufficient because most TV's require higher level signals.
- Adding a preamp at the receiver may prove ineffective because of the increased signal distortion.
- To cope with the above variables, it may be necessary to increase transmit power to compensate.
- A shorter overall reception range could result but try it and see if it is successful for your application.

73 de Art Townslee, WA8RMC, ATCO, Columbus, Ohio

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More Feed-Back on NBTV on HF:

Mel, K0PFX, of SLATS, St. Louis, MO writes --- "HI Jim, ---- Did you see this article from KE9V's site?

https://ke9v.net/2025/04/23/video-hf.html

And its happening right here in St Louis. I'll have to find out if there are any hams working there. And if they are aware of EU hams using NBATV? Not much "technical" info released, however when defined as streaming, I "assume" a rather high bit rate would be needed to call it by that name. So would be interesting know the frame rate and resolution. It is in the trial stage so we'll have to see how it plays out. They maybe achieving this with machine learning AI with very high compression. FreeDV's RADE (Radio Auto Encoder) is now using AI to vastly improve voice quality and robustness over an HF channel."

So here is what Mel found: -------- Reticulate Micro, Inc., a software products company specializing in advanced video compression and streaming solutions, announced Reticulate Micro's VAST Video Platform achieved a breakthrough in military communications by successfully streaming video over a High Frequency (HF) radio link from Tucson to San Diego at ultra-low bandwidths of 10kbps to 100kbps. This breakthrough enables live video transmission in bandwidth-constrained and remote environments where such capabilities were previously unattainable.

HF radio refers to radio waves in the frequency range of 3 to 30 MHz. HF radio is known for its ability to provide long-distance communication by bouncing signals off the ionosphere (a process called skywave propagation). This makes it valuable for military, maritime, aviation, and emergency communication, especially in remote areas where satellite or internet-based communication may be unavailable.
(*Editor's Comment --- Not surprising that the Military would be interested in sending video (even at low resolution and frame rates) over HF*)

Grant, VE3XTV, also writes --- "Hi all --- "DXing when compared to the old analog?" There a lot is happening in the area of DATV/ATV DXing with the work I have been doing for the last three years with HF ATV for the 10m band. This is new way to look at ATV for long distances, I started this project because there was next to no interest here in Canada for doing any type of DATV/ATV, so I needed to find a new way to get back into ATV without having any local contacts to work on UHF.

Therefore I like to get in contact with anyone who like to try something new in DATV/ATV? such doing tests of NBTV on the 10m band, as the software is now avalible to try out on GitHub and I can provide the SDR modulator / demodulator for GNURadio to tryout."
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VERSATUNE PROGRESS

Art, WA8RMC

As many of you know, we are working on the design of a completely self-contained DVB-T / DVB-S receiver for DATV use. It’s taking much longer than expected but understandable given the circumstances. I’m doing the hardware which is pretty much complete because I’m retired and can devote much of my time to it. Bob Tournoux , N8NT, on the other hand has a full-time job so it’s an “after work” commitment. Besides, the software is an unknown part of the equation so as expected, we ran into many obstacles and had to start over a few times when we realized we were taking the wrong approach. (writing software for the Raspberry Pi computer board is not straight forward when you have minimal experience with it). Now, the hard part is behind us, so we hope the “light at the end of the tunnel” is not a train this time. We ARE making progress with some software “tricks” and compromises to be able to get to where we are now.

I will have a working prototype at Dayton Hamvention booth 1004 and 1005 to display, same as last year, but actually working this time.

OPERATIONAL DESCRIPTION:
This receiver is designed primarily for digital Amateur Television reception operation as a stand-alone scanning receiver / DATV repeater controller. It can be used as a simple self-contained receiver for individual use or as the receive portion of an Amateur Television repeater. It can be programmed to scan up to 7 separate stored frequency selections from up to 5 selected RF sources.
An “auto scan” mode will be included. If selected, all enabled inputs will be sampled one at a time for a selected duration, then go through the enabled slide show selection before repeating the sequence.
It will receive DVB-S/S2/S2X (250-2150 MHz) and DVB-T/T2 (52-900 MHz) digital television signals from one onboard tuner with 2 separate RF input connections. (An expanded frequency range will be available as soon as the tuner module manufacturer sends me a new tuner chip for it). It will also have PCB pads for the addition of one available optional tuner. The received signal is processed to output composite or HDMI video / audio output signals. When an active signal is not received, it can output up to 7 separate sequential “slide show” identification screens from jpeg, mov or internet sources using internal stored registers or selected Ethernet internet or USB sources.

Setup is accessed using a Windows PC computer interface or Smartphone menu and transferred to the receiver via Bluetooth, WiFi or Ethernet data ports in real time. Ethernet access allows internet parameter selection from a remote repeater installation. All setup parameters are stored and transferred in real time to the VersaTune receiver when the setup screen is exited. VersaTune will use this for all operational parameters.
DiSEqC 1.0 operation is included which allows LNB / preamp voltage of 13V or 18v and 22KHz selection control. It has an active internal current limit circuit to prevent circuit failure due to shorted or overloaded external RF cable circuitry.

HARDWARE:

Enclosure: Enclosure is black ABS plastic approx. 6” deep x 6” wide x 2” high from Hammond. One side is modified to access the Raspberry Pi micro-HDMI ports and composite video/audio jack. Front and rear panels are aluminum. Front panel has power on/off push-push switch, “power on” LED, “Signal Lock” LED and (3) LEDs to represent the binary value of the received channel. Rear panel has a DC connector for +12VDC power from an included separate “wall wart” power supply, (3) available USB ports (port #3 is reserved for internal communication), TTL level I/O via a DB9 connector and (2) RF “F” input connectors for the DVB-S and DVB-T inputs. Circuit pads exist for an optional added tuner.

(reprinted with permission from ATCO Newsletter, Vol 42, number 2, 1st Qtr, 2025)

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NEW DATV REPEATER --- COMING SOON !

Jim Shepherd, W6US, Sparks, Nevada reports that he is in the process of putting together a new DATV repeater for the Reno/Sparks, Nevada area. Jim says he is planning on a cross-band repeater with a 23cm input and output on 70cm. Jim says "Planned on using the 70cm frequency due to letting lots of other hams get the bug with inexpensive gear like some used set top boxes or even the SDR dongles... Then they can pick up modulators to uplink on 23 cm..."
Jim writes further --- "I've got Mel Whitten's PTT mod board coming so that will be the next step... An amp from Q5 is also on the way.... I've got a 2m radio that I will set up as a control receiver to be able to shut the repeater off if someone tries to show a XXX video...LOL ! (will be turning off the PTT line, and will have the ability to power cycle everything). have a couple of LNAs and will be using a low insertion loss high pass filter just ahead of the LNA on the 23cm receiver of the repeater." Jim will be using Hi-Des, DVB-T gear including the HV-120 receiver and HV-320 modulator.

Jim promises to keep our readers updated on the repeater's progress.

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NEAR DISASTER at K0CJG's QTH !

Chris, K0CJG, really scared all of us on the BATVC's recent weekly ATV net with his video images of his close call with losing his garage ham shack / lab. Here is his report.

"I walked out to my garage/lab and opened the door and was engulfed in a cloud of dense black smoke. I had a meltdown of a lithium polymer battery pack for an electric drill (unknown brand Chinese import, purchased ~2 years ago). Apparently, the charge management circuit failed and charger

continued charging the pack until it self-destructed. No apparent problems before this incident. Luckily, the pack was isolated on a particle board bench top and didn't case a larger fire, but it did fill my lab with acrid smoke and everything nearby was covered with fine black particles."

Fortunately, Chris was goint to the garage when this happened. If he hadn't been, he would have lost his garage, and maybe his house. Another Boulder ATVer, Allen, K0ARK, had a similar situation about four-five years ago when his house fire alarms started screaming in the middle of the night. He was also charging a lithium battery overnight on his ham shack desk. Alan's damage to his ham shack and house was more severe, but fortunately with his alarms he was able to contain it.

As Chris says -- "From now on all battery charging will be done outdoors away from any flammable material. We all need to learn from Chris & Allen's experiences.

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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:

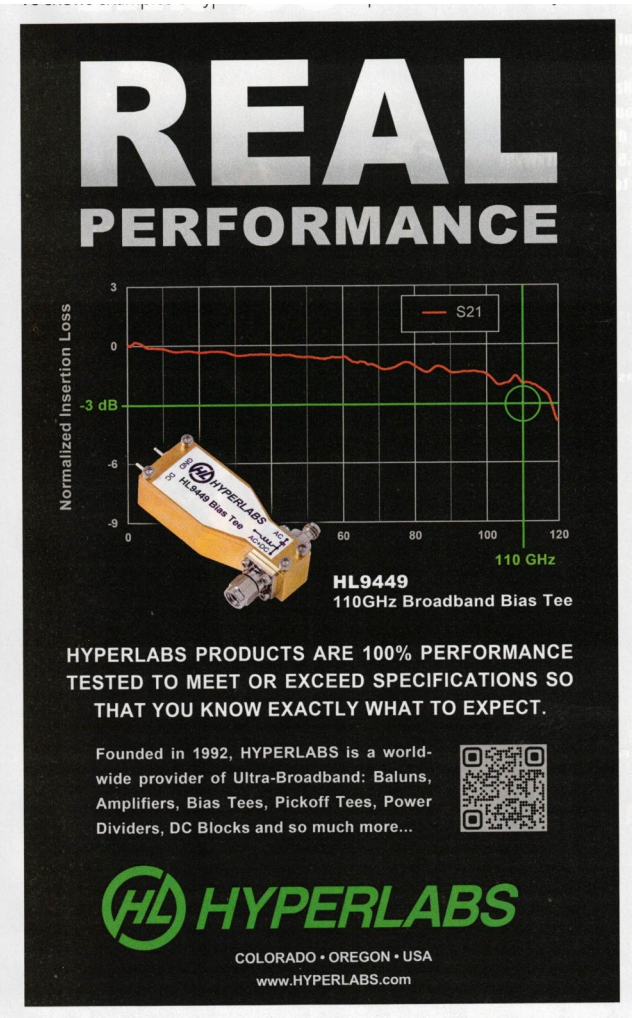
We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time (22:00 UTC). The net typically runs for 1 to 1 1/2 hours. ATV nets are streamed live using the British Amateur TV Club's server, via: ***https://batc.org.uk/live/*** Select ***ab0my or n0ye***. We use the Boulder ARES (BCARES) 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



Readers might be questioning why I am including this particular advertisement here in our ATV newsletter. Well, in a sense it is your editor's way of bragging. The ad appeared in the latest April issue of the Microwave Journal.

1n 1980, after leaving NBS (now NIST), I started my own electronics test instrument manufacturing company called Picosecond Pulse Labs (**PSPL**). I made ultra-fast risetime pulse generators. A critical component I needed to build even faster pulsers was an ultra-broadband BIAS TEE to supply bias/power to semiconductors I imbedded into coaxial lines. The ultra-broadband requirement stretched from kHz to GHz to enable me to pass undistorted picosecond risetime pulses but with microsecond flat tops. In that era, no mfgr. made commercially such Bias Tees. They were all strictly limited, typically to an octave band-width. So I proceeded to develop my own bias tees. My first one, model 5550, worked quite well with -3dB bandwidth extending from 100 kHz to 18 GHz using SMA connectors. It would handle 50V and up to 1/2 Amp.

My bias tees worked so well, I decided there was probably a market for them besides simply using them in my own products. I was right. They were an immediate hit in the market place. They right away found a market in the very high data rate (then 1 Gb/s and later 10 Gb/s) long haul, fiber-optic telecommunications market. Over the years PSPL continued making and selling even better Bias Tees and they became the "bread & butter" of own broadband microwave component line. We also built ultra-broadband amplifiers with similar performances. Key in designing our amplifiers was our ability to build suitable bias tees.

So, fast forward to 2014. PSPL was acquired by TEKTRONIX, Beaverton, Oregon. They closed down production in Boulder, Colorado and moved it all to Oregon. Unfortunately, TEK didn't seem to

know how to build PSPL products and five years later totally discontinued the PSPL product line. Today, the only place you find PSPL products is on E-Bay as used items.

But like the rise of the Phoenix bird, PSPL is alive again. But now under the name HyperLabs in Louisville, Colorado. (near Boulder). It was reborn by three of PSPL's most talented engineers and our best technician. At present they are concentrating on the ultra-broadband coaxial components, but are also developing a new line of very high Gigabit test instruments also. Their coax components work up to 110 GHz as evidenced by their new Bias Tee in the advertisement. (***www.hyperlabs.com***)

73 de Jim, KH6HTV, Boulder, Colorado
Founder & former President of PSPL