

Boulder Amateur Television Club TV Repeater's REPEATER

April, 2024
issue #158



BATVC web site: www.kh6htv.com

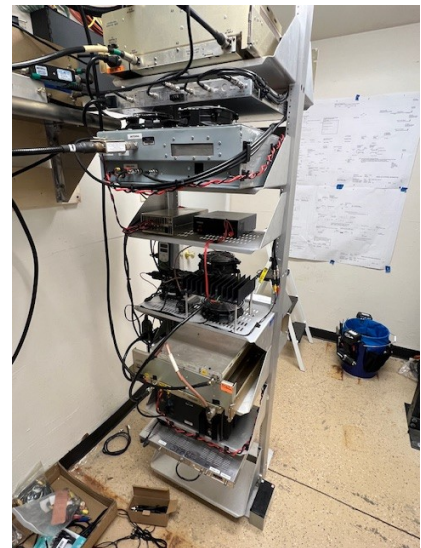
ATN web site: www.atn-tv.com



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Dayton, Ohio ATV Repeater Status Update

March 19th -- Status of DARA ATV Repeater Re-Install: Work continues. K8FIX, Bruce Kobe has been concentrating his effort on all of the Lace-work on the many 12 VDC Buss Connections on the receiver/audio/video rear rack, and he has done a superlative job. Hats off to Bruce! I will provide some photos next week. I still can't estimate when the re-rack will be completed, but work continues to progress and we are hoping to have it complete by the end of the month. I did a checkout of the receiver audio / video distribution and I also checked the newly installed transmitters and amplifiers, and all are operating fine. Below is a photo showing the



finished transmitter/amplifier rack that is placed at the front of the small room. Interestingly enough, After re-installing the DVR in the new open receiver rack, I found a problem with one of the three DTMF decoders that I had built into the DVR several years back for the DARA ATV repeater. This particular decoder controls screen selection on the DVR that conditions and distributes four separate ATV receiver screens into the voter. Its odd how things can break simply sitting in a box waiting for a re-install! I will be swapping out the DVR/DTMF decoder with a spare that I had on the shelf in "standby", and that will give me the opportunity to troubleshoot the decoder function and R&R the unit which will then become our "new spare". We also had a small video gain adjustment box that ended up missing in action. Not sure where it went, but it could have easily gotten lost in the shuffle. I am in the

process of fabricating another one as I wait in earnest for a 100 ohm potentiometer from Amazon to arrive on my doorstep.

March 27th -- STATUS OF DARA ATV Repeater Re-Install: New Installation Working Flawlessly

Bruce K8FIX, and I finished the installation over the weekend. All the systems are working superbly well, with no de-sense. Concerns here locally on whether it was a good idea to go with an open rack design, vice the previous cabinet installation that had served the DARA ATV community well for years, ended up being unfounded. Interestingly enough, The old cabinet RF-tight doors were never closed due to in-the-way cabling and air circulation issues, but still



worked well with no de-sense. With the new open racks now installed, all of the swapped equipment is exactly the same, minus some new cabling and the separation distances between the two racks. Several new installation features may have indirectly contributed to the open racks' success.

The new racks have good physical separation between the receivers and transmitter/amplifier racks. Also, some of the inter-rack RF cabling was switched out as part of this re-rack effort, with the replacement cables being corrugated hardline. As you know, de-sense that could occur within the repeater room likely may have been further reduced since received power decreases in proportion to the square of the distance. This separation went from approximately 2 feet, to about 7 feet, possibly representing an additional 6 to 10 dB isolation between the two racks' candidate RF leakage points. Also, 12 ft runs of audio, video and control lines were placed inside a deep U-channel aluminum beam that served also has stiffening up the two new unsupported racks. The beauty of the open rack design makes it so much easier to work on the equipment!

Bruce's expertise in "making things neat" and his skills at cable lacing in the avionics industry paid off, and we were able to finish this work ahead of schedule for the Hamvention!

AMAZING 70cm BAND OPENING: We had a really excellent band opening on 70 cm ATV Saturday, March 16th. We exchanged both analog (P-5) and digital video (closed circuit quality) at 90 miles+, using only 2 watts. W8URI, AH2AR, W8KHP, WB8YIF, WB9LGA and N8KKY participated in this unusual Saturday morning band opening. 73 de Dave, AH2AR, Dayton, Ohio

SAN DIEGO ATV NEWS: Mario, KD6ILO, has recently sent us several e-mail up-dates on their on-going project to use light transmitters in place of microwave transmitters to link up their several sites. I will try to summarize what they are doing here.

**193,548,387 MHz (1.55µm)
--- DATV Transmission
This should be an ATV World Record !**



The "HERO" picture confirming the new FSOC system really works !



Free Space Optic Communications Transceiver installation San Diego DTV Society members at Carlsbad California Lab.

Mario reports that they are doing over the air tests of their new optical ATV link transmitter over a 3 mile path between a couple of the group's sites in southern California, San Diego area. The laser transmitter is operating on 1.55µm {1550nm}. They are using 600 mW of power. An EDFA laser light amplifier is used as a pre-amp for the optical receiver. Pointing their extremely narrow laser beam is tricky. They use a beacon beam to find its mark, acquiring and keep a lock once established to send test signal.



EDFA Optical Amplifier

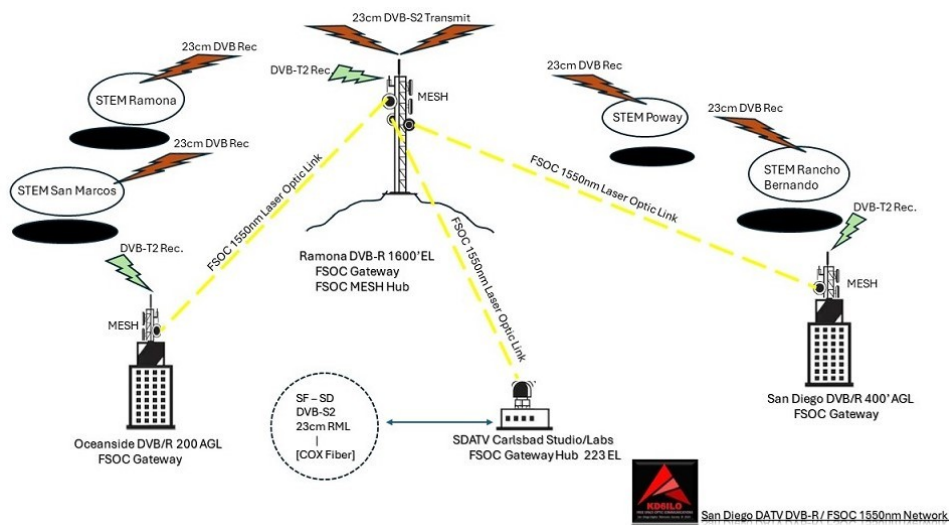
Their plans are that these will be used for back-bone links to replace their current RF links for optimum deployment and handling very high data traffic which RF can't. They are calling their system FSOC, short for Free Space Optical Communications. This project is costing their group \$120,000. EDFA amplifiers do not come cheap ! Sounds like they found some "deep pockets" somewhere !

March 25th -- Still more news from Mario in San Diego about their new system and how it is being put to use.

A few of the team members and I took the time off today to show the STEM activities committees the improvements we did on the network both with the new SDATV Societies addition of our FSOC1550 Laser Optic Network and the 23cm DVB-S2 H265 RF links to Rancho Bernado, San Marcos and Poway

The clarity of the video through our 1550 nm network has amazed us all on the team, society as a whole and the STEM EDU instructors. To help out a little bit the students helped clean the monitors large and small in their classrooms this morning, and WOW! time and \$\$ invested was well spent. We also notice the difference in the RF DVB-S2 transmission from the Ramona site, the image sharpness and clarity since one of the FSOC Transceivers is located on the tower at the 75' level just below the RF stage platform.

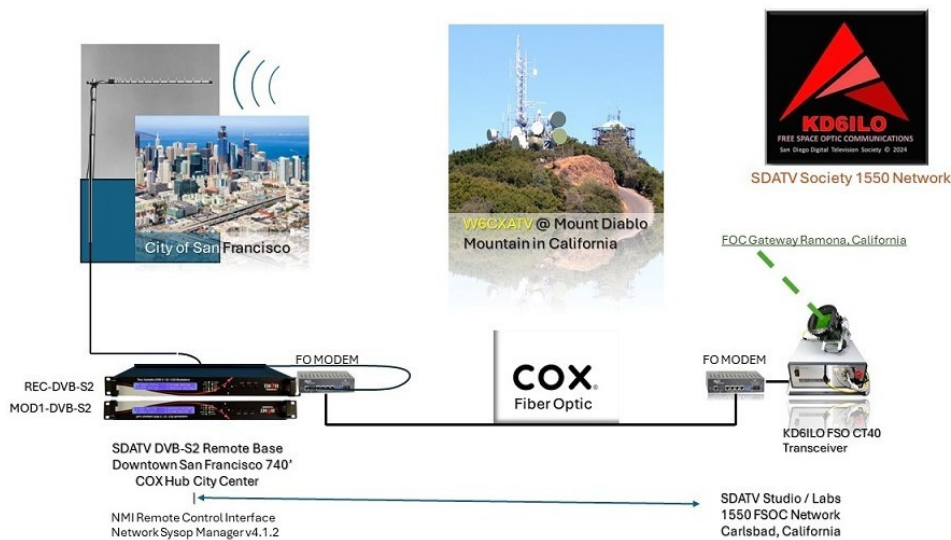
The EDFA optical amplifiers at each site maintain a stable link by providing high gain and low noise, are polarization independent, and can amplify optical signals in the 1.55 μm band {our band} or 1.58 μm band.



29-30 March - additional updates from Mario

A new month is here and April brings us to the SDATV Team's new project as part of our 1550 Network expansion. Part four(4), as most already know, we are not as fortunate to have our own QO-100 transponder like our overseas couzins the east. So what do we do here in San Diego, we transport our signals by-the-speed light! Having our FSO 1550 network has improved our image transport and clarity immensely.

STEM classrooms have grown with the improvements made, investments made in visual aids, laptops, HDTV upgrades and 23cm DVB Receivers at each STEM classroom to augment IPTV for outdoor science activities.



Bay Area Remote Base -- Project Expansion Remote 23cm DVB S2 Receivers

We plan for a RML remote link to San Fansisco using {COX} fiber to downtown San Francisco to a building housing other telecom companies {a hub}. We will be installing two THOR components, one DVB-S2 Receiver, one modulator which will transmit 2 channels under one RF carrier. The receiver to capture {we hope} W6CX ATV Repeater to be seen in San Diego, "LIVE" in real-time with minimal delay and install a 24EL beam toward Mt.Diablo, a Diamond U200 vertical Dual-band 23cm/70cm. We will be using our own Net Management Software to remote manage the remote system.

Thanks to COX and a member of our group who is a COX employee, we are going to upgrade and deploy two remote receivers on a 23 cm DVB-S2 {THOR} with an upgraded model watch includes ASI inputs. This will be integrated with one of our spare fiber optic modem through COX fiber back to our Carlsbad Lab 1550 Network. They have an office hub in downtown San Francisco, building at 740' AGL. This will bring in our San Francisco members on 23 cm DVB-S2 RF back to us. They will receive via IPTV rtsp back no delays in full HD. Second receiver open: standby mode.

HAMTV from the ISS

FEED-BACK --- ISS ATV: Hi Jim --- I see there was a question in this issue (#157) about receiving HamTV from the ISS. - I did an article in CQ-TV last year plus at the request of ARISS USA we have just put up a new page on BATC which we hope will become the go to page for details on how to receive HamTV. https://wiki.batc.org.uk/HAMTV_from_the_ISS



73, Noel Matthews, G8GTZ, BATC Secretary

(reprinted from the BATC web site) --- HAMTV is the name of the Digital Amateur Television (DATV) transmitter on board the Columbus module of the International Space Station (ISS). It transmits Digital video and audio in MPEG-2 format using the DVB-S protocol in the 13 cms band.

The original HamTV unit was installed on the ISS in 2013 and commissioned in April 2014 and was used for a number of ARISS school contacts in 2016 - 2018.

The unit failed in 2019, and was returned to earth for repair. It returned to the ISS on the SpaceX SpX-30 flight on March 21st 2024 and it is hoped that it will be recommissioned by a visiting astronaut within a few weeks of its arrival.

Below is the contents list of all the various topics Noel covers on the BATC web site for receiving the signal from HAMTV on ISS. Definitely, if you are at all interested, it is required reading.

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Multiple 4K programs on Single ATSC 1.0 Channel

We just received an e-mail from Roland, KC6JPG, alerting us to this new DTV experiment. Roland wrote --- "We are having a special guest on the ATN Arizona Net this Sunday (March 24th) at 7:00pm PDT / 8:00pm MDT. Special guest will be Anton Kapela - station owner / manager of K03IM-D, LPTV station. He was able to pack many subchannels into 1 channel spectrum using ATSC 1.0 - including three 4K video streams within the same spectrum."



You can watch a You-Tube video about this including an interview with Anton at:

https://www.youtube.com/watch?v=e_94q9TCCDY

Following up on Roland's lead, it appears that K03IM-D is a low power TV station in Eugene, Oregon. rabbitears.info shows they are broadcasting 14 sub-channels within their 6 MHz, channel 3 TV signal. (8) 720P, (2) 1080P, & (4) 2160P. There is a lot of additional discussion about it on the Satellite Guys web site (<https://www.satelliteguys.us/xen/threads/ko3im-d-in-eugene-or-experimental-codecs-on-atsc-1.407381/>).

Single Ant. 1~8Mhz BW



**Dual Ant. diversity
Narrow Bandwidth
Superior Sensitivity**



UT-120, dual-diversity, DVB-T, USB Dongle

DVB-T

Diversity Ant. 2.5~8Mhz BW

HV-122 Dual-Diversity, DVB-T, Receiver

Hi-Des News: We have wondered why the Hi-Des model HV-122, dual-diversity, DVB-T receiver no longer appeared on their E-Bay web store site. Well here is the answer from Calvin. *"HV-122 was phased out because of the demodulator IC. We don't have the substitute it. We have only the USB dongle solution now."* The UT-120 is currently listed on their E-Bay store for \$115.

A diversity receiver is particularly useful for those hams participating in activities such as high altitude balloon and rocket launches. The TV transmitter from those platforms is constantly moving and the antenna's polarization is all over the place. Thus tracking with an Az-El yagi antenna should be done really with one antenna vertically polarized and the other horizontally polarized. Then use a diversity receiver to select automatically the best picture.

**Chinese RF & Microwave Products' Specs
Don't Believe Them ! --
But There Still Are Some Hidden Treasures**

Here is a typical example. This Bias Tee is found from many Chinese vendors on E-Bay, Ali-Express, etc. Note the specs. printed directly on the side of it. Freq. range 10 MHz to 6 GHz, DC ratings of 50 V and 0.5 Amp. Also included on the E-Bay advertising are a statement that the insertion loss is < 1.2 dB.



Price \$ -- typical of Chinese products. It varies all over the place from a low of about \$12 to about \$30. I recently purchased one from an E- Bay vendor with USA stock for \$17, including postage.

So what did I find ? Well, yes, it is actually a Bias Tee. Did it have a true frequency coverage range with insertion loss < 1.2 dB from 10 MHz to 6 GHz. **NO !** Above 500 MHz, yes, it performed as advertised. But 500 MHz is a really long way from 10 MHz !

-1dB (500 MHz), -0.4dB (33cm), & -0.9dB (23cm) I was only able to test it up to 3 GHz with my NanoVNA.

But below 500 MHz, that was a different story. **Totally False Advertising**

-24dB ! (10 MHz), -12dB (50 MHz), -6dB (100 MHz), -3.8dB (145 MHz), -3dB (200 MHz), & -1.4dB (430 MHz)

Hidden Treasure: Now the Good News ! The package this bias tee comes in would make a great generic SMA enclosure for all sorts of RF and microwave ham projects. It is very nicely machined out of a block of aluminum and comes complete with a set of detachable SMA end launch connectors plus a DC power feed-thru capacitor. All for about \$15. Just try to buy the SMAs and feed-thru cap for that, let alone the high cost of the machined housing. So, if you are a ham experimenter this is just the ticket to build your little projects in. Buy the bias tee, and rip out the internal pc board and install your own. Or, if your new circuit is a simple one, you might be able to install it on the existing pc board. The internal board is simply held in place with the solder tabs of the SMA, the feed-thru cap and (4) screws.

New Bias Tee: I have been building and selling bias tees. I have been simply using the die cast enclosure and pc boards that I use to build my pre-amps. But due to the high cost of those parts, I have had to charge \$50 for my bias tees. I have always felt that was a bit high. So when I got ahold of this cute little enclosure, I thought I could modify it to replace my model BT-UHF bias tee and charge my customers less for it. So, I have come up with my new model BT-UHFa which is an improvement in performance over the Chinese bias tee, but reuses it's SMA package.



With my redesign, I now spec. this Bias Tee for operation from 140 MHz to beyond 1.5 GHz with less than 0.7 dB insertion loss. Thus covering the most popular 2m, 70cm, and 23cm bands. It's low frequency, -3dB cutoff is now 65 MHz vs. 200 MHz for the Chinese unit. I also was able to considerably improve the current handling capability from the Chinese 0.5 A max. up to 2 Amps. I actually tested mine at 3 Amps for several hours, but a comfortable spec. is 2 Amps. Price ? I think with the modification and supplying a test report with each unit, a price tag of \$30 is reasonable.

73 de Jim Andrews, KH6HTV, Boulder, Colorado

More on Local Oscillators for Microwaves

In previous issues of this newsletter we have written about several different, low cost, frequency synthesizers and our problems with their dirty outputs, both phase noise on frequency and spurious outputs elsewhere. On our recent Boulder ATV net, Pete, WB2DVS, called the gang's attention to an interesting article in the latest April issue of QST. See Paul, W1GHZ's article entitled "*Local Oscillators for Transverters*" in his *Microwavelengths* column, pp. 53-54.



Paul mentions an LO which he finds to work better for him at 10 GHz. It is made by Q5 Signal (www.q5signal.com). They seem to now be the source for Down East Microwave products. This photo shows their "**digiLO**" pc board frequency synthesizer which they are selling for \$99.

They also sell it for \$144 with a higher stability, 10 MHz reference crystal oscillator. It uses the Maxim MAX2870 (24 MHz to 6 GHz) frequency synthesizer IC. Unfortunately, it is not designed to allow the user to operate it on any desired, arbitrary frequency. Instead it has an on board PIC microcontroller which is pre-programmed with about 100 various fixed frequencies which the designer felt were most appropriate for ham LO's. You have to hard wire jumpers on the pads shown on the bottom of the photo to select your desired LO frequency. Or install your own mini selector DIP switch.

If any of our readers out there have experience with this particular LO we would love to hear from you with your experiences with it. We would especially like to publish your results of looking at the phase noise and spurious outputs (or lack thereof !).

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FEED-BACK -- ATV Northern MN: Hi Jim -- I was shocked to find my picture in your newsletter. Thanks for the plug..... I appreciate it. I am seriously looking for some ATV hams south of me Brainerd or near Minneapolis. Our weather patterns (SW) come from that direction. I'm interested in what I can do on 430 MHz with a high gain array at 200 ft and some tropo help. Great newsletter, thanks again, Roger, WA0IUJ

WOBTV Details: **Inputs:** 23 cm Primary (CCARC co-ordinated) + 70 cm secondary all digital using European Broadcast TV standard, DVB-T 23cm, 1243 MHz/6 MHz BW (primary), plus 70cm (secondary) on 441 MHz with 2 receivers of 6 & 2 MHz BW
Outputs: 70 cm Primary (CCARC co-ordinated), Channel 57 -- 423 MHz/6 MHz BW, DVB-T Also, secondary analog, NTSC, FM-TV output on 5.905 GHz (24/7 microwave beacon).
Operational details in AN-51c Technical details in AN-53c. Available at:
<https://kh6htv.com/application-notes/>

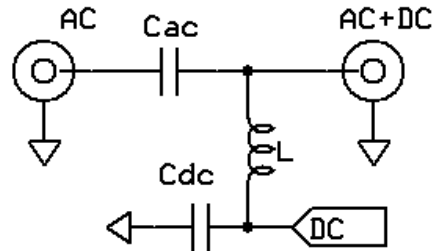
WOBTV ATV Net: We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time (22:00 UTC). The net typically runs for 1 to 1 1/2 hours. A DVD ham travelogue is usually played for about one hour before and 1/2 hour after the formal net. ATV nets are streamed live using the British Amateur TV Club's server, via: <https://batc.org.uk/live/> 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 is a free newsletter distributed electronically via e-mail to ATV hams. The distribution list has now grown to over 700+. 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



Model BT-UHFa BIAS TEE



A Bias Tee is used to either insert or extract DC power to / from a coaxial cable. It can be used to send dc power up a cable to an antenna mounted pre-amp or coax relay. The Model BT-UHFa has a useful frequency response covering from 2m to 23cm bands (144 MHz to 1.3 GHz). It is rated to 50 Vdc and 2 Amps.

Parameter	Value	Notes
S21 Insertion Loss	< 0.7dB	140 MHz - 1.5 GHz
typical IL	0.6dB (2m), 0.5dB (70cm)	0.2dB (33cm) 0.5dB (23cm)
Low Frequency Cut-Off	65 MHz	S21 = -3 dB
1st Resonance	2.6 GHz	
Capacitors	10 nF & 6.8 μF	C _{ac} & C _{dc}
Inductor	62 nH	shunt inductor
DC Ratings	50 Vdc & 2 Amps dc	
RF Connectors	SMA	female, jacks
DC Connector	feed-thru capacitor	solder terminal
Dimensions	1.65" x 1.3" x 0.45"	excluding SMA's & feed-thru cap pin. machined all metal enclosure
	2.4" x 1.7" x 0.45" overall	
Test Report	furnished with plot of S21	sweep 0 to 1.5 GHz