**Boulder Amateur
Television Club
TV Repeater's
REPEATER**
December, 2023
2ed edition, issue #149

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

Boulder, Colorado -- ATV Repeater

W0BTV

Ch 57   423 MHz   DVB-T

ATN
The Amateur Television Network

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A NEW ATV NEWSLETTER !

SLATS

EAT BEEF!!

St. Louis Amateur Television Society

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The following article on A/V sync is reprinted with permission from SLATS

We have all experienced the video lagging the audio and find it can be quite frustrating when a speaker's lips are not in sync with their voice. What causes this? Can it be avoided in DATV transmissions? Let's take a look at this problem.

SYNC AUDIO AND VIDEO SOURCES

First of all, we are not alone with this "sync" problem. As you may

have noticed while watching commercial broadcasting TV. It happens often. Poor synchronization is experienced by just about everyone in the industry. In the recording industry a sync difference of more

than 20ms is a problem for them. Very poor "lip sync" can be really annoying. It doesn't take much delay to notice it. A couple hundred ms (milliseconds) lag in the video is noticeable. Longer delays may make you want to look the other way while someone is talking. Broadcasters have soft-ware and hardware tools that delay the audio in an effort to keep the audio in sync with the vid-eo. In hardware you will find what are called "Audio Delay" boxes and "Lip Sync correctors." Any delay must avoid affecting the pitch of the audio too.

So, what does this all mean for us as ATV amateurs? Is there something we can do to improve the A/V sync in our ATV signal? Maybe. HIDes has "Low Latency" firmware for some of their receiver/ transmitters. This might help with the lip sync but it is really for reducing overall A/V latency. To use this firmware everyone must have the same model of transmitter and receiver. Currently, we all don't. I have not tried the firmware with the repeater's HV-110 receiver. The repeater transmitter is a HV-200 which does not have any receiver low latency compatibility. Changing to a HV-320 would be possible but the repeater really needs the HV-200's loop through HDMI port. I don't believe it would be worth the effort and cost to consider this right now.

What else could be explored? --- The video requires a lot of processing for MPEG/H.264 compression and FEC. This causes overall latency and video delay longer than the audio. First, at your transmitter the video must be pro-cessed, then sent out OTA to the repeater's receiver where it is processed and on to the repeat-er's transmitter where it must be processed again. Finally, at your receiver the video must be processed yet again! And wow, what happens when we convert the transmitter's HDMI output to IP (internet protocol) streaming? Oh, now we can have at best 6-7 seconds of delay and up to 10 seconds or more depending on the network not to even mention the lip sync problem. The internet delay is not as bad as it may appear unless you are on 2 meters Talk-Back with zero delay audio talking about a video that is being transmitted over the repeater. However, there is a way to get around some of this problem. You could watch the IP streaming with VLC and then you'll see when to sync your 2m audio with the video.

The delay will seem long but it helps to avoid frustrating the viewer! Your internet latency may be different than others, but anything to minimize the viewer's frustration is worth the effort. This really isn't a fix for the A/V sync problem but rather something you should be aware anytime you are running a video and talking about it on 2 meters. I failed to do this recently with a PowerPoint presentation and was kindly reminded by a viewer of the latency!

Some TV sets (LG, SONY, Samsung) have a lip sync delay setting. It may be configured as Auto or have a manual adjustment. If you are using a TV (vs a PC monitor), check to see if it has lip sync delay correction. Maybe it could make a difference for DATV. Is there PC software that works with a sound card to delay the audio for our application? Probably. This might be worth a few Google searches to find out. Let me know if you find this as a possible solution. There is a lot of info about lip sync and latency on the internet.

From our friends at B&H Photo and Video in NYC you will find an "A/V Lip-Sync Corrector" made by SESCOM that adjusts the delay of the audio up to 300ms. Adding a delay in-line with the repeat-er's HDMI audio might help the lip sync problem. Would this be would be enough delay? I don't know. The SESCOM lip sync corrector is not an HDMI device. Rather, it is an analog one with RCA I/O jacks. A quick Google search did not find a lip sync corrector for embedded HDMI audio. There

probably is one, but the cost could be prohibitive. What could be tried is a HDMI audio "Extractor" and pass the output of it's audio into the SESCOM and then into HDMI "Inserter." Any audio passing from the receiver (your input into the repeater) to the repeater transmitter would then be delayed. Caution must be given here too. An HDMI signal can be degraded causing loss of sync due to the overall cable length, cable bandwidth /adapters and any device added in-line. Keep this in mind too when adding HDMI cables/switches/a DVR in your ATV station. General rule-of-the-thumb for HDMI cables is "the larger the diameter the less loss."

As you can see, I am looking for some way to add a delay into the audio line in an effort to reduce the lip sync problem. Maybe there is an easy fix for this that I have missed. Perhaps, you may have an idea I can try. If so, please let me know.

73 de Mel, K0PFX, St. Louis, MO

Mel at Pacificon-2023

Mel's Ham Shack

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Velcro… The Solution to Everything! Simple Off-the-Shelf Build of a Portable A5 Receive configuration using a 5 Inch Monitor/Demodulator, Preamp and Power Supply
Dave, AH2AR

Provided below are four photos that shows the "Velcro method" for configuring a handy self-contained A5 (analog NTSC, ATV) demodulator/battery pack/ Marshall monitor/pre-amp/power supply/ and a Lucite radio stand. Believe it or not, the configuration went together using Velco cut-outs that allows for a clean and extremely secure approach that actually works great and this solution ensures a nice form, fit and function. I have used this approach for other portable equipment builds for DVB-T with surprisingly good results. The trick to this approach is to cut the Velcro out to conform to the mating surfaces, because the more surface area employed, the more secure the hold will be.

AH2AR's new "To Go" analog, NTSC, ATV receiver and monitor

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STEM students working on CubeSat

Bench Testing

Update: SDATV Project 2023 CubeSat

Greetings to all,

1-Our 2023 CubeSat project that had been planned in early spring of 2022 is coming along very well as announced by its project manager Brian Copeland and his team including our STEM helpers. Funded by the National Science Foundation and the support of the component supplier https://www.aac-clyde.space/.

2-My part is systems integration and testing, it's a 3U structure with a PC/104 form factor and a system bus allowing modules to easily be stacked and routed.

3- It will be using the S-Band for tracking, telemetry and control {Module 2} out of six. I will be working on Module 6 {camera/tranmitter}.

-- More updates to follow --

73 de Mario, KD6ILO, San Diego DATV Society

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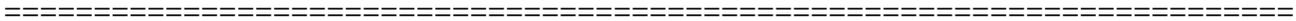
ATV from High Altitude Balloons - contd.

We recently got this inquiry via the DATV users group from a ham in British Columbia, Canada. -----

I just joined the group in hope some members might have some ideas for our project. We are launching our second hydrogen balloon with cross-band repeater, and APRS on it in the new year. It goes to 100,000 feet before descending by parachute... total time of flight around 3 hours.   We are thinking to add a camera and possibly would like to send a photo to the ground every x seconds (much determined by battery power available). Is there anything in the amateur tv world that might help without breaking the bank?   If not, any other ideas from the consumer market?   Here is the URL link to our balloon group: *https://www.ve7nfr.com/pico-balloons.html*

<div align="right">Thx, 73, Adrian VE7NZ</div>

There were several replies for others in the users group.   We felt they were worth while passing on.

Roger - VK5YYY replied -- "Have a look at this Adrian https://www.areg.org.au/archives/category/horus-datv "

Jim - G7NTG replied -- "Why not use a drone camera at 5665 MHz ?"

Dave - G8GKQ replied -- "Hi Adrian -- We have been unable to do fast-scan ATV from a balloon in the UK due to licence restrictions, but it sounds like you are thinking of what we know of as SSDV (Slow Scan Digital Video).   There is lots of info here: https://ukhas.org.uk/doku.php?id=guides:ssdv . I'm sure that you will find the rest of the Wiki useful as well.   There is a group in the Netherlands that does an annual launch of a balloon with fast scan digital ATV, but you probably would want to get some experience with SSDV first."

Noel- G8GTZ also replied -- "The UK High Altitude Ballooning (HAB) community has been doing this for some time using a system called SSDV.   https://ukhas.org.uk/doku.php?id=guides:ssdv

Your editor, KH6HTV, also sent Adrian a lengthy email reply including references to all of the articles we published here in this newsletter last spring on the subject.   They included issues #s 124, 125, 126, 127, 128 & 135.

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The above URL link to *www.areg.org.au* is very interesting.   It is very good documentation of a balloon flight in 2021 which included live video using DVB-S on the 70 cm band.

Here are a few key details.   We recommend you look at the complete web site for full details.
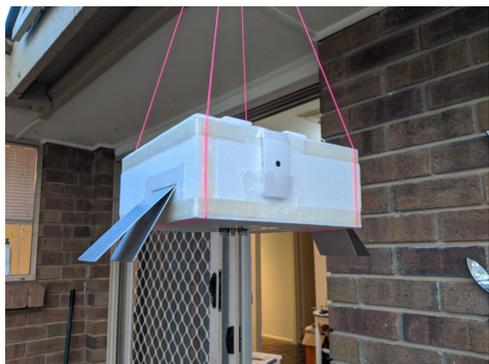
Balloon Payload

Payload Interior Guts

70cm Tracking Antennas

The DVB-S payload was the primary experiment on this flight, and developed by Mark, VK5QI, and Peter, VK5KX. The payload utilised a Raspberry Pi Zero W to capture and compress video (using F5OEO's DVB-S encoder and natsfr's LimeSDR Gateware – this project would not have been possible without their work – thanks!).   This was then modulated as a 70cm (445MHz) DVB-S transmission using a LimeSDR Mini. The signal was further amplified to ~800mW using a LDMOS-based power amplifier. The overall power dissipation in the payload was ~6 watts, so a heat-spreading and heat-sinking system was built by Peter, including custom-milled interface plates for the LimeSDR.   The final DVB-S parameters used for the flight were: Frequency = 445.0 MHz, Mode = DVB-S, Modulation = QPSK at 1 Msps, Forward Error Correction = 1/2 and Video Resolution = 720 x 404.

Last video image from space before balloon burst

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Mid-West ATV Nets: **DARA/ATCO/ATN ATV NET** Meeting time is 8 pm on Wednesday evenings.   the **MidWest ATV DX** group meets daily both weekdays and weekends at 7:30 am in the morning.   Times are Eastern Standard Time.   Both nets meet on the Zoom website with a common conference log-in number of   *https://www.zoom.us/j/9670918666*   For further info on these nets, contact Dave, AH2AR.

BCARES ATV Equipment Update

Allen, K0ARK, reports that he has just finished re-packaging all four of the BCARES portable ATV pac-sets in new hard cases.   Each pac-set is a complete 70cm, DVB-T, 3 Watt transmitter.   It contains a Hi-Des HV-100 Modulator, a KH6HTV model 70-9B rf power amplifier, a Sony hi-def Camcorder, a 12 Amp-hr LiFePO4 battery, battery monitor and 70cm whip antenna.   It is all internally pre-wired and ready to go as a "Plug-n-Play"   Allen then reused the old, orange hard cases previously used for the camcorders to carry some other accessories.   They include: camera tripod mounting plate for both camcorder & antenna, HDMI cable, camera power cable, antenna coax cable, extra camera battery & charger.

With four complete pac-sets, BCARES is capable of putting on the air simultaneously, four seperate camera images.   For this we use all four available, 70 cm, 6 MHz, ATV channels 57, 58, 59 & 60 (423, 429, 435 & 441 MHz).   There have been some BCARES emergency operations in the past when all four were required.   With DVB-T, we have found it possible to work well without co-channel RFI interference using all four adjacent channels.   In the old days of NTSC, analog ATV co-channel operation was always a challenge, even using very good inter-digital band-pass filters.   Many times then our received video images included bleed-over of TV signals from adjacent channels.   These new DATV pac-sets are stored in the BCARES equipment cache for 24/7 access in the Boulder County 911 Communications Center & EOC.   Also see previous Oct. 2023 issue #143, p. 7

Allen has already had some inquires from other local hams asking if he would consider building an ATV pac-set for them.   Allen says "Yes".   So, if you are interested, contact Allen directly.   His contact info is on www.qrz.com
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Ham Radio Trivia: Did you know that one of the world's largest electronic component distruibutors started out simply as a ham radio hobby business ?   The company **DigiKey** started 50 years ago simply selling a kit of parts to build a digital electronic Morse code keyer for radio amateurs.

Hence the name DigiKey.   It was founded in 1972 by Ron Stordahl, AE5E in Thief River Falls, Minnesota.   The company is still headquartered there.   The company now has over 3 million sq.ft. of facilities, 5000 employees, 15 million products and $5 billion in annual sales.
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NEW Antenna & Pre-Amp Supplier Found !

Antennas-Amplifiers

Our super inter-net sleuth, Colin, WA2YUN, has made yet another find of relevance to us ATV hams. He has discovered the company "Antennas-Amplifiers" in Serbia. (*www.antennas-amplifiers.com*) We suggest you check out their very interesting product offerings on their web site.

Colin was particularly interested in a dual-band, 70 cm/23 cm, Yagi antenna he found on their web site. He was so interested that he ordered one for evaluation.   It is their model 70cm23WB11 and sells for 159 € + shipping.   Colin said it cost him overall about $250.   Colin brought the antenna to the weekly Boulder, CO ham breakfast as a "show-n-tell" recently.   We all found it to be an extremely well built, very rugged antenna.   Key specs. are: Gain = 8.1dBi (70cm) & 11.4dBi (23cm),   4 elements on 70cm and 11 elements on 23cm, boom length = 49 cm. The web site shows very complete
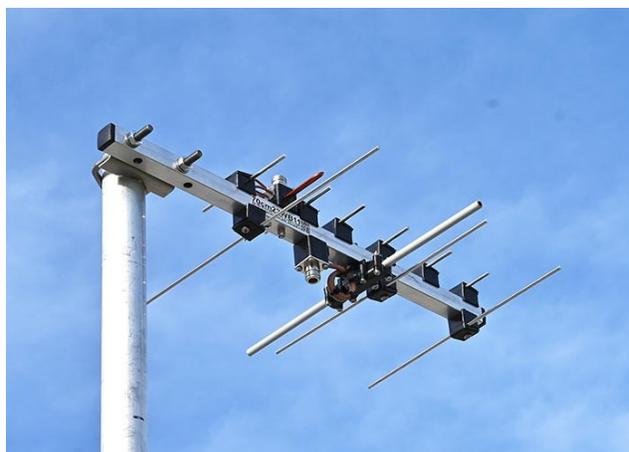
documentation with measurements perfomed on lab grade, quality test instrumentation.   We will be anxiously awaiting to hear the results of Colin's technical evaluation of the antenna.
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Dayton, Ohio - ATV News

The DARA ATV Repeater will be down while NEW equipmen racks are installed
Bruce K8FIX, Doc, KE8DOC, and Dave, AH2AR, worked last Sunday to remove all of the equipment from the DARA ATV Repeater cabinets.   The job took about four hours, and I am guessing that the system will likely be down for six to eight weeks or so. Taking this equipment removal job on during the holidays makes for a busy month! The new racks will be installed and the real job starts once the hardline and other electricals are configured for the new installation.

Digital Parameters FEED-BACK:

Mike, WA6SVT -- "Thank you Jim for a wonderful newsletter! I learned a few new things from your DVB-T school of how it all works. Of importance for me was the DHCP in the Hi-Des media programming."

Chris, K0CJG -- "Thanks Jim.   I now understand better how the various parameters affect performance against different types of interference.   Nothing in the standard encoding seems to specifically tackle the QRM we see frequently on 70cm due to narrow band coherent signals."

Larry, N8GGG -- "I agree with Chris- though I've known some of this for quite some time, there's a LOT I didn't know, and I'd never before seen it put together and explained so well. Lots of things are much more clear now. Beautiful job! Thanks Jim"

Don, N0YE -- "Jim - Thank for these details. It will take time to digest all of the data."

Pete, WB2DVS -- "Jim - Thanks for putting all of this information in one place. Great issue!"

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W0BTV 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/*

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.   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 500+.   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.

Hi --- It took a lot of work but in the end I'm happy to have saved at least part of the OE7forum pages for you.   Let's keep blogging *https://oe7dbh.blogspot.com*   I will continue to try to describe and test all of HiDes' innovations that are important for amateur radio here, as well as my own projects.

I would also like to take this opportunity to wish you a happy Holiday, a Merry Christmas and a healthy successful New 2024.

<div align="right">Vy 73 de OE7DBH, Darko</div>

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Plus lots of other goodies - for sale & to give away !

ICOM ID-1 data, D-Star & FM, 1.2GHz Transceiver

Marconi 6970 RF Power Meter

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KH6HTV Video annouces the introduction of a **NEW product, the model 23-12, 23cm RF Linear Power Amplifier**.   Up until now, there has really only been one choice for most ATV hams of an RF power amplifier for the 23cm band. It has been the model 23-11A, or other similar amps.   It's key DATV specs. were:

RF Power Out = 4.5 Watts (DTV service)
DC power required = 6.9 Amps at 13.8Vdc = 95 Watts,   i.e. 5% efficiency

The new model 23-12 offers lower RF power, but is considerably more efficient. It's key specs. are:

RF Power Out = 2.0 Watts (DTV service)
DC power required = 1.1 Amps at 13.8Vdc = 15 Watts, i.e. 13% efficiency

Thus, the new 23-12 now makes it possible to go portable out in the field with a reasonable size battery.   As such, it should be an ideal solution for ARES groups wanting to do DATV on the 23 cm band.   It is similar in performance to the KH6HTV model 70-7B, 70 cm amplifier which is packaged in the same enclosure.

Model 23-12
23 cm, 43 dB, 13/7/2 Watt
RF LINEAR
POWER AMPLIFIER

The KH6HTV-VIDEO Model 23-12, RF Power Amplifier is for use in the amateur radio 23 cm band. It is a Class A-B amplifier designed for linear service. It can be used to produce an 8 Watt (pep), analog TV or SSB signal. It can also produce a 2 Watt, high-definition (1080P), digital TV (DTV) signal. With it's low DC current draw of only 1.1 Amps at 13.8 Vdc, it is ideal for in the field battery operations, such as for ARES emergency operations.

PARAMETER	Typical Performance	Notes
Output Power (Digital TV)	2 Watts, +33dBm	average power
Output Power (analog TVor SSB)	7 Watts PEP, +38 dBm	peak power on sync tips
Output Power (FM, CW)	13 Watts, +41dBm	saturated ouput
Output Power (-1dB comp)	9 Watts, +39.5dBm	
RF Power Amplifier Gain	43 dB, nominal	
Amplifier Gain Flatness	± 1 dB	1240 - 1300 MHz
Amplifier Max Input Power	20 mW, +13 dBm	
Spectrum Regrowth (Digital TV)	-30 dB at +33dBm (2 Watts)	-35dB at 1W, -40dB at 1/2W
LSB Rejection (analog VUSB)	better than -20dB	at 7 W peak sync
Duty Cycle	100 %	heat sink & cooling fan included
DC Supply Voltage	13.8 Vdc	10 to 15 Vdc
DC Current	1.1 Amps (2W DTV), 0.5A idle	@ 13.8Vdc
RF Connectors	SMA input & N output	
Dimensions & Weight	4.2" x 3.5" x 7.4"	1.5 lbs
Accessories Included	instruction manual, test report, DC power cable & 12" SMA cable	

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