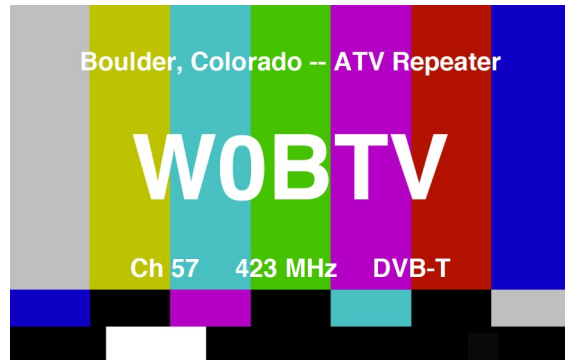


Boulder Amateur Television Club TV Repeater's REPEATER

June, 2023
issue #132

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com



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

Amateur Television at Dayton Hamvention

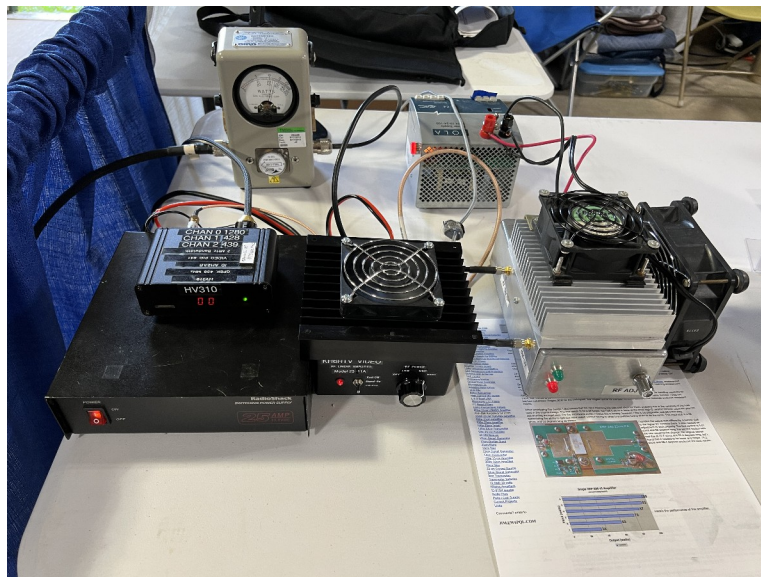
Dave, AH2AR, DARA, Dayton, Ohio



From Left to Right: Art WA8RMC, Rick KK4LW, Pete N8KKY, Live and in Digital Color, on the TV Monitor is Bill W8CWM, William WB8YIF, and the venerable N3BFZ

For the first time in a number of years, nearly perfect weather was experienced at Hamvention 2023. Aside from a night rain shower that dispersed a half hour before the gates opened, very mild temperatures appeared. Maybe moving the Hamvention to Xenia finally broke the Dayton curse! The ATN booth drew in a large number of hams interested in ATV. Like last year, the ATV booth provided a live cross-link ATV demonstration, along with several different ATV-related projects displayed on the table. The crosslink consisted of a DVB-T transmitter (HV-310) transmitting on 1280 MHz, QPSK at 2 MHz bandwidth. A Jim Andrews, KH6HTV 23cm amplifier (Model 23-11A) was being used as the intermediate driver, at reduced output, for the W6PQL model XRF-286 amplifier to provide a final output of 50 watts. This 23 cm transmission was linked to the W8BI ATV repeater in Huber Heights Ohio. The 21 mile path was then crosslinked back to the Hamvention ATV booth via a 70cm DVB-T transmitter at the repeater site on 428 MHz, QPSK, also using 2 MHz bandwidth. At the ATN booth, I was using a KH6HTV, 70cm preamp and a Hi-Des model HV-110 receiver tuned for 428 Mhz. It was in line with a cavity for reception of the W8BI ATV repeater.

Along with the crosslink demo, W8CWM, Bill McCoy, participated at his home QTH in Englewood Ohio, by providing an ATV repeater link demonstration. Bill couldn't attend Hamvention this year, however, his "virtual presence" through the ATV repeater helped showcase digital ATV from 35 miles distance throughout the three days of the show. Of particular note was that on Sunday, a 70cm band opening occurred that appeared on the ATV repeater link. The ATV repeater was re-transmitting W8URI's 70cm analog ATV signal through for all to see at the ATN booth. This constituted an approximate 80 mile link between the DARA repeater site and Bill Heiden's location in Mt Giliad, Ohio.



Crosslink transmitter on 23cm. The demo consisted of a HiDes HV310 transmitter, a Jim Andrews 23-11A amplifier, an XRF-286 Amplifier, a SOLA 28 VDC 10 Amp power supply, a 13.8 VDC power supply and a Bird wattmeter with a 100 watt element. This equipment was used for the live demo that was operating for the three days during Hamvention



Crosslink antennas outside the MAXIM 1 Building's door. That is a Directive Systems loop Yagi growing out of K8FIX's head!

Along with the active crosslink transmitter hardware on display and the W8BI ATV repeater reception, the following projects were also displayed at the ATN booth:

K0PFX, Mel Whitten provided his TX/RX Interface integrated with a 10 watt amplifier for the ATN table top display. During Hamvention 2023's ATV forum, he provided additional information about this project. Mel Whitten has also created helpful, very detailed comprehensive documentation on the construction of this interface. It can be found on his website: <https://slatsatn.net/>



Two separate extremely portable "self-contained" maintenance DVBT receiver-monitors were on display that I (AH2AR) had brought in for the table.



WA8RMC, Art Towslee provided his Versa-Tuner digital receiver prototype that he has been working on. Shortages of Raspberry Pi's and some software work has held up the production start as he had spoken about during the ATV forum. Art's and Mel's ATV discussions during the ATV Forum about these ATV projects can be found on YouTube at the following link:

<https://www.youtube.com/watch?v=aPALay4bqnI>

Please blame me (AH2AR) for recording the ATV forum in Portrait Mode instead of Landscape mode. I must say that the video does look great on smart phones!



Also displayed was an AH2AR project that uses the TC70 series A5 transceivers as a host interface that provides T/R switching, 3 watts of RF power output, and additional DVB-T receiver gain for the HiDes HV series transmitter-receivers. The modification requires only nine components and once the mod is installed, it does not lose functionality of the analog (A5) transceiver. Here is the article:

<https://www.atco.tv/Newsletter/ViewPdf/1135>



Disaster struck when we found out that the ATV dinner was excluded from the Hamvention Program. Since the ATV Dinner was scheduled for Friday and the ATV forum was scheduled for Saturday, we were unable to let everyone know that the ATV Dinner was still on the docket. To make matters even worse, a number of ATV anchors (Bill Brown WB8ELK and Mike Collis WA6SVT) were unable to attend due to granddaughter / work commitments. The only good thing that became of this was that of the eight ATVers who attended, 50 percent walked away with door prizes!

ATV Dinner attendees... This actually looks like a large number of ATVers, however, there is a mirror in the background. In attendance was KE0VR, N3BFZ, KC3AM, WA8RMC, KK4LW, K8FIX, K0PFX, and AH2AR (taking the photo in the background!)

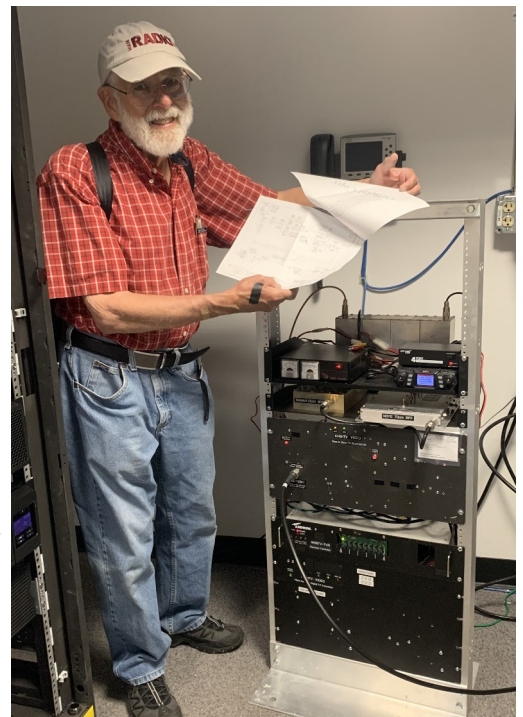


W0BTv - DATV Repeater is Back on the Air ! Finally !

Photo at right is Don, N0YE, assistant trustee for W0BTv proudly proclaiming that the Boulder, Colorado ATV repeater is once again operational. This time, it actually works ! Date: 24 May. Our first attempt on the 19th to reinstall the repeater ended up in failure when the 70 cm transmitter failed while we were on-site. Subsequent bench test showed that the Hi-Des model HV-100EH modulator had failed and was not putting out any RF. It was replaced with another HV-100.

Input Frequencies are: 1243 MHz (6 MHz BW), 441 MHz (6 MHz BW) and 439 MHz (2 MHz BW) - all DVB-T

Output Frequencies are: 423 MHz (6 MHz BW), DVB-T and 5.905 GHz, FM-TV (24/7 beacon)



Signal Reports for W0BTV

With our newly, re-installed and modified DATV repeater, we are now in the performance testing mode. We want to publish everyone's experience (both good and bad) with how well it is performing.

The repeater uses Hi-Des receivers which have a nice feature of On-Screen-Display (OSD) of frequency/bandwidth, incoming call sign, received signal strength in dBm and signal/noise in dB. We have the OSD feature permanently turned on. Thus this data is always displayed on the repeater image. Thus each user can determine how strong a signal he/she is putting into the repeater and also it's s/n quality. Plus for those ATV hams using Hi-Des receiver's at home, they can also use the OSD to determine how well they are receiving W0BTV's signal at their qth.

It should be noted that each of the three Hi-Des receivers at the repeater have a significant offset in their reading that needs to be corrected before reporting the actual signal strength at the repeater's antenna input connector. Not at the antenna, but at the repeater rack in the radio room. For the 1243/6 MHz receiver the offset is +40dB. For the 441/6 MHz receiver the offset is +25dB. For the 439/2 MHz receiver the offset is +9dB. For example, if the 439/2 MHz receiver is displaying an S meter reading of -63 dBm, the real input to the antenna input connector was:

$$-63 \text{ dBm (OSD)} - 9 \text{ dB (offset)} = -72 \text{ dBm}$$

The repeater's sensitivity was measured in closed circuit, bench testing using "normal" digital parameter QPSK signals (8K FFT, 5/6 code rate (i.e. FEC), 1/16 Guard) For 6 MHz BW, the video resolution was set to 1080P and 5.5 Mbps. For 2 MHz BW, the video resolution was set to 480P and 1..5 Mbps. With these settings, on the bench, the minimum S/N was about 8 dB for P5 picture Q5 audio with no freeze framing. The sensitivities measured under these conditions for keying the repeater reliably were: 1243/6 MHz = -91 dBm, 441/6 MHz = -87 dBm & 439/2 MHz = -94 dBm

On the bench, with no antenna connected, the corrected, residual noise level displayed by the S meter was: 1243/6 MHz = -100 dBm, 441/6 MHz = -101 dBm, & 439/2 MHz = -100 dBm

In actual repeater operation with our Diamond X-6000 receive antenna connected we see the following background, no incoming DVB-T signal, S meter readings:

1243/6 MHz = -102 dBm (-62 dBm displayed)

441/6 MHz = -99 dBm (-74 dBm displayed), but with many peaks much stronger as other RFI signals come and go. Strongest noted has been -89 dBm (-64 dBm displayed)

439/2 MHz = -100 dBm (-91 dBm displayed), again with many peaks much stronger as other signals come and go. Strongest noted has been -91 dBm (-82 dBm displayed)

Signal Reports from BATVC Hams:

KH6HTV - Jim From my present, new qth 12 air miles due east of the repeater, I am able to receive both the 70 cm and 5 cm signals. I am able to put a good signal on 23cm into the repeater. I also put strong signals in on 70cm (both 6 & 2 MHz BW) but not sufficient to override the background

RFI. For antennas, I am using Yagis for both 70cm (11dBi) and 23cm (15dBi). Dish (22dBi) for 5cm. DVB-T transmit power is 10 W (70cm) and 3.7 W (23cm).

I receive the 70cm repeater signal at -62 dBm with a perfect 23dB s/n. On 5 cm, I receive the FM-TV signal P5 with no rfi. For transmitting into the repeater, my signals at the repeater are: 1243/6 MHz = -81dBm & 17dB s/n; 441/6 = -68dBm with 16dB s/n (but severe freeze framing with RFI); and 439/2 = -71dBm with 15dB s/n (again not useable due to intermittant freeze framing). Conclusion: 439/2 MHz did not cure the RFI problem, at least for me getting into the repeater on 70cm band.

NOYE - Don I am close to the repeater near Fairview High and 1.2 miles distant and line of sight. I receive very strong signals from both the 70 cm and 5 cm repeater transmitters. My uplink signals are +34 dBm (2.5 Watts) on 70 cm and +22 dBm (160mW) on 23 cm. The repeater receives them at -51 dBm, 23 dB s/n on 70 cm and -75 dBm, 19 dB s/n on 23 cm. No RFI freeze framing on any of my transmissions. *note: running QPSK on DVB-T, a s/n reading of 23dB is the max. possible and indicates a perfect, 100% quality picture.*

Pete, WB2DVS & Debbie, WB2DVT They live near Arapahoe & Foothills parkway, about 3 miles from the repeater site in a suburban area with lots of houses and trees. Their antenna situation is compromised. They use a yagi antenna mounted indoors looking out a west window. They use only the 70 cm band and transmit with 10 watts. They put a good signal into the repeater on 441 MHz measuring -64 dBm with 23 dB s/n. But even with 10 watts, there is an occasional freeze framing due to intermittant RFI.

WA2YUN - Colin Colin lives very close to the repeater. Only 0.6 miles, but his qth is on the same hillside as the repeater's site on the top of the mesa. Thus he is in a shadowed area. Colin uses the 23 cm input with 3 watts of rf. His signal into the repeater is -78 dBm with 18 dB s/n.

K0HEH - Jack Jack lives just to the east of the university in a residential area with lots of trees. His view to the repeater is compromised by a large apartment building nearby. He is 2.3 miles from the repeater. On 23cm with 3 watts he puts a weak -85 dBm signal into the repeater. Sometimes works, sometimes not. If he uses Steve's repeater he is then able to get into W0BTV fine.

WA0TQG - Steve Steve lives a long way from the repeater, up in the mountains on top of Sugar Loaf mtn. He is completely shielded from the W0BTV repeater. As a work around, Steve designed and built his own cross-band 23cm/70cm repeater to enable him to access W0BTV. Steve's repeater is located at Jack, K0HEH's qth in Boulder which is line of sight from Steve. Using 10 watts and a yagi antenna at Jack's qth, Steve's repeater gets into W0BTV quite well. On 441 MHz, his signal at W0BTV is -54 dBm with 23 dB s/n.

K0CJG - Chris Chris lives in the south-east part of the city, near Baseline road and Foothills parkway. He is 2.9 miles from the repeater. Again, like others he lives in a residential neighborhood with lots of houses and trees. He runs 3 watts to a loop yagi antenna on 23 cm. Chris reports -- "Hi Jim -- I made some measurements today for my rig on FULL power (3 watts): Power: -86 to -91 dBm; s/n = 11-15 dB. My signal is weak compared to past observations on MEDIUM power (1 watt) which were - Power: -85 to -82 dBm; s/n of 16 - 23 dB. I also dropped out on low power, which used to give me an OK signal with occasional freeze frames, so my power is low. I see one of the directors on

my loop yagi is turned almost sideways, so maybe the solar installation guys bumped the antenna pointing as well. I'll redo the measurement when I get a chance to get up on the roof to realign the antenna. On low S meter readings -- I also see a small tree has grown quite a bit this year and heavily leafed out right in my line of sight to NCAR. I planned on loping it off at the top anyway since it shades some of my solar panels also. I'm sure a few dB's are lost in it."

AB0MY - Bill Bill lives in north Boulder on a hilltop, but surrounded by other houses and lots of trees. He is 4.5 miles north of the repeater. Bill has full capability, including 70cm, 23cm and 5cm with yagi antennas and max. rf power Bill reports --- "Hi Jim, -- Here are the results of my tests this evening. 5.9 GHz beacon, ignoring the Wi-Fi interference, I'd give it a P4.5, just seeing a faint ghost. OSD for repeater's 423/6 output at my location -68dBm, s/n 22dB
My 1243/6 signal at the repeater -73dBm, s/n 23dB using medium power of 1 watt.
My 441/6 signal at the repeater -69dBm, s/n 20dB using medium power of 1 watt.

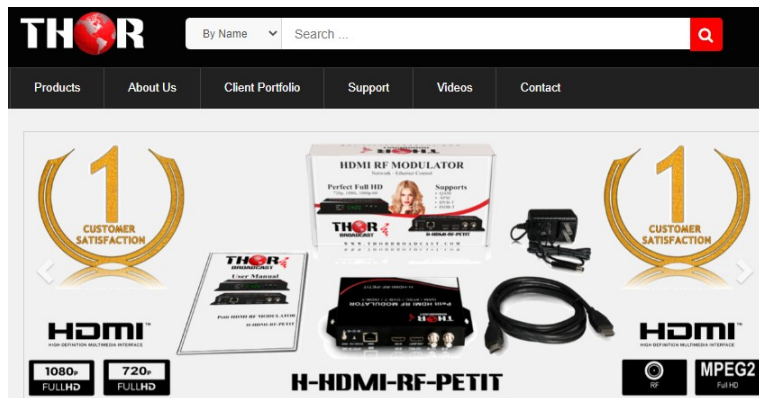
K0JOY - Ed Ed lives in the mountains, north of Boulder on a ridge line with a great 180 degree view out on the eastern Colorado prairie. He has a line of sight path to W0BTV. The distance is about 9 miles due north. Ed runs 3 watts on 23cm to a home-built converted 2.4 GHz BBQ grill dish antenna. Ed says he "sees -79 dBm with s/n of 18 dB into the repeater. With low power (300mW), -88 dBm and s/n of 9 dB. Readings the same as in the past. All seems good."

W0BTV Required Repairs: We recently had several failures in our Boulder ATV repeater, W0BTV. We had to purchase several items to replace failed components. Plus, other items were purchased to modify the repeater to add the 439 MHz / 2 MHz BW receive capability. These are the items purchased: Hi-Des HV-100EH Modulator (\$415), Hi-Des HV-110 Receiver (\$124), RC-832 5.8G FM-TV Receiver (\$18), (3) OREI model UHD-PRO102 1in/2out HDMI Splitters + HDMI cables (\$94), Agptek Mini 1080 Digital Media Player (\$38), and Intuitive Circuits model DTMF-8 DTMF Decoder / Relays pc board (\$134). The total outlay for repair and modification came to \$823.

SDATV Happy 14th !

San Diego, California ATV --- SDATV Society is 14 years old today! Membership continues to be very active {23 members ages 12 to 18 and 50 ages from 19 to 79. Our STEM Program continues to include funding from NASA and the National Science Foundation.

Our Network continues to operate 24/7/365 with no issues in operational status, non interference operations with our neighbors to the North.



THOR Broadcasting, Torrance, California (<https://thorbroadcast.com/>) is a great supporter to our society membership. We thank them for their continued support.

73! Mario, KD6ILO

ATV News from Down-Under

We exchange newsletters with the North East Victoria (Australia) Amateur Radio Club (NEVARC). It often contains a lot of news about their ATV activities. (<https://nevarc.org.au/>) The editor, Mick, VK3CH, is an avid ATVer.

There is a new ATV repeater soon going on the air from Mt. Anakie, near Geelong. Call sign is VK3RGL. Input is 1255 MHz, either DVB-S or DVB-T. Output is 2411 MHz, DVB-T. Robert, VK3EHT is building the repeater. The latest NEVARC newsletter, June, 2023 has several pages in it devoted to the new repeater and also Mick's work on putting together the necessary kit to be able to work it from his qth 78 km to the east in Doncaster, a suburb of Melbourne. VK3RGL has only undergone some preliminary testing. They hope to get it on the air later this year, or possibly early next year.



Mick's home-brew 2.4 GHz down-converter

FEED-BACK on HDMI:

Jim --- Regarding HDMI:

I have worked with it more for home theater but it is a headache there too.

There is a pretty good writeup on Wikipedia about it and shows the many versions that it has gone through so it is important that all devices are compatible with the version used. In addition manufacturers are not required to implement all features of a version so it is anyone's guess if products will be compatible depending on features used. Here is a quote from Wikipedia:

"Products are not required to implement all features of a version to be considered compliant with that version, as most features are optional. For example, displays with HDMI 1.4 ports do not necessarily support the full 340 MHz TMDS clock allowed by HDMI 1.4; they are commonly limited to lower speeds such as 300 MHz (1080p 120 Hz) or even as low as 165 MHz (1080p 60 Hz) at the manufacturer's discretion, but are still considered HDMI 1.4-compliant. Likewise, features like 10 bpc (30 bit/px) color depth may also not be supported, even if the HDMI version allows it and the display supports it over other interfaces such as DisplayPort.[92]

Feature support will therefore vary from device to device, even within the same HDMI version."

So unless a manufacturer has certified that two products are compatible (most don't) you just have to try it and see for yourself as you have found out.

73 de Steve, WA0TQG, Boulder, Colorado

FEED-BACK on ATV DX RECORDS:

It's been 31 years since I approved ATV/DATV distance records on my website <http://www.hb9afo.ch/records/default.htm>

The principle of the classification is as follows: the QSO will be considered as the world record if the distance between the two correspondents is greater than the previous approved record. In addition, at equal distance, the world record will be awarded to those who have used the smallest apparent power to achieve it.

The approval of a record is not an easy task because the record holders do not always announce their records to me. I need at least the distance covered, the date and time of the QSO, the standard used (DVB-T, DVB-S, etc.) and the SR. Then, for each correspondent, I need the callsign, the locator, the transmission power and the type of antenna as well as proof of reception, a screenshot or a video.

To answer to S58RU who made an 8 km QSO in DVB-T on 24GHz in 2022, I specify that I only approve distance records, not the first ones (first DATV QSO on 24GHz for example). I also don't classify the records by standard, SR or other, that would be way too complicated. There is a "DATV" class, all digital modes (DVB-S, DVB-T, etc.) and SR combined, and an "ATV" class, the old analog AM or FM standard.

The DATV 24GHz record is currently held by the duo IW9ARO/9H1GB with 186km.

73 de Michel HB9AFO

[editor's note -- A big Thank You to Michel for all his work in compiling these records.]

CORRESPONDENCE: Jim --- Thanks for adding my name to the distribution list for your ATV newsletter! We moved to the Portland metro area last month and I have restarted Amateur Radio. Really interested in ATV, so delighted to find an ATV repeater group here (currently inactive, and thinking of going digital)

BTW, I authored a few articles for the BATC (back in the day; CQTV edition 190ish, year 2000) - good to see they're still active.

73, Peter J. Stonard, KN6VSL, ex- G8PJD, Portland, Oregon

Editor's Note: BATC in 2000 -- The chairman then was Trevor Brown, G8CJS and the CQ-TV magazine editor was Ian Pawson, G0FCT. Years later, in 2013, they went on to start CQ-DATV. An all electronic, on-line, slick magazine. (<https://cq-datv.ianp.uk/ebooks.php>) It ran for 100 issues. The last appearing in October, 2021.

WOBTV Details: **Inputs:** 23 cm Primary (CCARC co-ordinated) + 70 cm secondary all digital using European Broadcast TV standard, DVB-T 1243 MHz/6 MHz BW (primary), plus 441 MHz/6 MHz BW and 439 MHz/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 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/>*

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