Boulder Amateur Television Club
TV Repeater's REPEATER

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BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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News from Japan --
358 km, 5.7 GHz, DATV Success !

Fumio Sekizaki, JA0RUZ

On July 29th and 30th, I started the Nihonkai Duct DX Challenge with the JA0GPO station in Nagano at 7 o'clock and went to the vicinity of Meotoiwa Rock in Shika Town on the Noto Peninsula and Mt. Houdatsuyama.

The communication partner station is a JA4JKE station moving near Takohana, Matsue City, Shimane Prefecture, near Tenku no Misaki, and the main purpose is 5.7GHz and 10.2GHz FM and FHD-ATV (ISDB-T) communication.

According to the forecast for the Sea of Japan duct on this day, the conditions were not very good, but the schedules of both sides matched, so we decided to go ahead with this day.

On the 29th, try the approximately 366km between Takohana, Matsue City, Shimane Prefecture and Shika Town, Ishikawa Prefecture! In FM, he receives a strong signal of about 59 + 60dB (reading the S meter of IC-1275 with TRV connection), but it is impossible to make a video with such a thing. He can't see the ISDB-T image unless it's 30-40dB stronger! ! We tried for several hours, but could not reach full high-definition image communication.

After that, he joined the JA9BPH station at the nearby "Ganmon Cliff Park" from the morning, and after joining the JA9BPH station, he was advised by a certain local government official that "a good point with a good view for wireless operation".

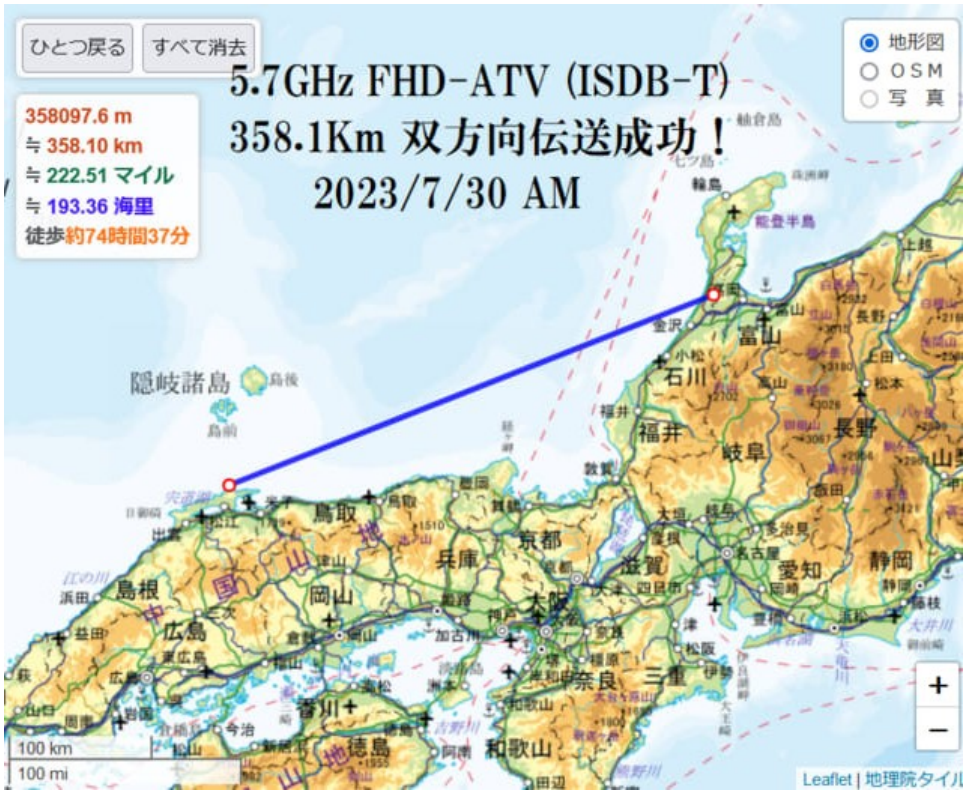
Disbanded after previewing. (However, the direction of the opening is bad!) When you are doing something unfamiliar to you near the coastline, you will see most of the civil servants.
I got it!

This kind of thing happens quite often, so I will use Novolibata to make it visible even from a distance, saying, "Amateur radio station radio wave propagation experiments in progress"!

On the next day, the 30th, we changed our schedule and headed to Mt. Houdatsu, this time about 358km, and tried again. The difference in distance has almost no effect, but I thought that the heat would be different because it would be a little higher. Mt. Houdatsu was under construction in various places, so I set it up at the entrance of Mt. A signal came in, so I hurriedly replaced the FHD-ATV, and surprisingly the video signal could be decoded. After a while and fine-tuning the beam, a full high-definition image was projected! ! !

This was a distance that I had never tried before, but the JA0GPO station was also able to succeed in "two-way communication with 5.7GHz FHD-ATV with a span of 358km" at the same time.

See "evidence video" on You-Tube. ***https://youtu.be/bZENy5cv14M***



I think this is probably the first time in the world that this full high-definition ATV has successfully communicated over a 358 km non-line-of-sight span ! !

We 64QAM RF output at 5.7GHz was about 0.3W~0.6W, and he used a 60cm~100cm parabola and was able to communicate in two-way.

This is the longest distance even in Japan, but I'm curious about the world record for Full-HD ATV (1920 x 1080 30fps) ?

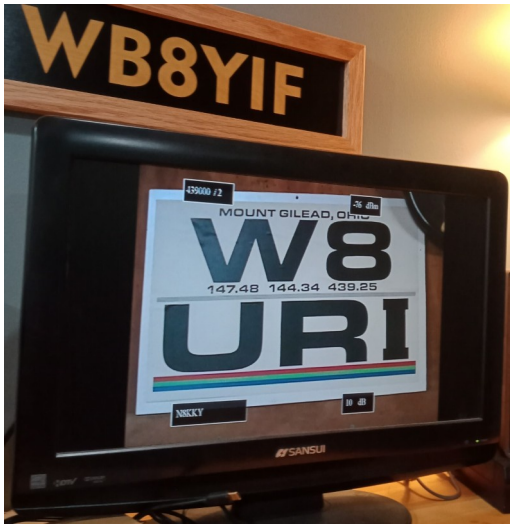
In addition, we communicated with a 430 MHz, 20 Watt, 10-element Yagi antenna, but this time it was not FS with 430 M, and it was operated under conditions that could not be said to be a strong duct, but 5.7 GHz is very strong. It has been successful at times.

In other words, the propagation of V/U in the Sea of Japan duct can only be used as a reference, and we have come to understand that "microwave propagation cannot be understood unless you try it!" However , it would be a waste to not use such a wonderful propagation band because of "wrong subconsciousness" . After all, the mobile operation this time was a “fight against the heat wave”, and it was operated in a situation where both people and equipment were considerably down during the preparation stage, and even smartphones could not work properly . FHD-ATV video transmission and reception equipment and other troubles have come out many times! ! In addition, 10.2GHz did not improve the duct condition, so I gave up with only FS of FM this time.

However, the Sea of Japan Duct is addictive! ! !

73 de Fumio, JA0RUZ, Email: ***ruz@cap.ocn.ne.jp***

Another 70 cm Mid-West Band Opening for DATV



Another ATV band 70cm opening this morning (5 August 2023). Pictured is William’s (WB8YIF) DVBT receiver monitor located in Little Hocking, Ohio, during reception of (W8URI) Bill’s ATV signal. W8URI is located in Mt Gilead Ohio, a 109 mile path.

Cheers, Dave, AH2AR

Boulder, Colorado BATVC & W0BTV-ATV Repeater News

We have still been struggling with the issue of poor sensitivity of the 70cm receivers on the W0BTV, DATV repeater. This is after our exciting report in the recent July 16th newsletter (issue #136) that our RFI had disappeared. Unforutnately, we now need to report it has returned. Plus, now another serious issue has arisen. Something has failed in our remote control, radio circuit. We use a 2 meter FM radio with touch-tones (DTMF) to control various functions, plus the FCC requirement to remotely disable the repeater in the event of a mal-function. Also, the 5.9 GHz, FM-TV beacon had again failed.

So, trustees, Don, N0YE, & Jim, KH6HTV, once again made a trip to the repeater site. As always, we needed to call in advance and make an appointment for access. This time, we asked for a 2 hour time slot to make a bunch of spectrum analyzer measurements on the 70 cm band, plus do other trouble shooting and climb on the roof to remove the 5.9 GHz transmitter. As it turned out, 2 hours was not nearly enough time, we stretched it to 3 hours, pushing the limits of our welcome. Even then we didn't finish all the experiments and measurements we wanted to do. We did find that the DTMF decoder was receiving the proper tones, but was not responding to them. The DC power to the remote, roof top mounted, 5.9 GHz transmitter was not working. At the end of the session, we removed both the main repeater rack and the 5.9 GHz transmitter box and they are now resting in Jim's ham shack for repairs.

We did learn quite a bit more about our poor 70cm receiver sensitivity problem using our Rigol DSA-815 spectrum analyzer. We measured signals directly from the repeater's Diamond, X-6000, tri-band (2m/70cm/23cm) antenna. We also measured the signals later internal to the repeater's receiver at the output of the 3dB signal splitter, just before it went to the Hi-Des DVB-T receivers. At this point the antenna signals had gone through the input circuits of the triplexer, 70cm - 6 MHz band-pass filter, low noise pre-amp and 3dB power splitter. We captured lots of various screen images on a USB memory stick for later study. The most relevant are shown here as Figs 1-3 on the following pages. The same settings were used for all three figures. They were the same as recommended by ITU for measuring DVB-T signals. Center Freq = 439 MHz, Span = 20MHz (i.e. 2 MHz/div). Vertical settings were: 10dB/div, 0dB input attenuation, LNA turned on, RMS detector, IF resolution bandwidth = 30kHz, video bandwidth = 300kHz, sweep scan time = 2 seconds.

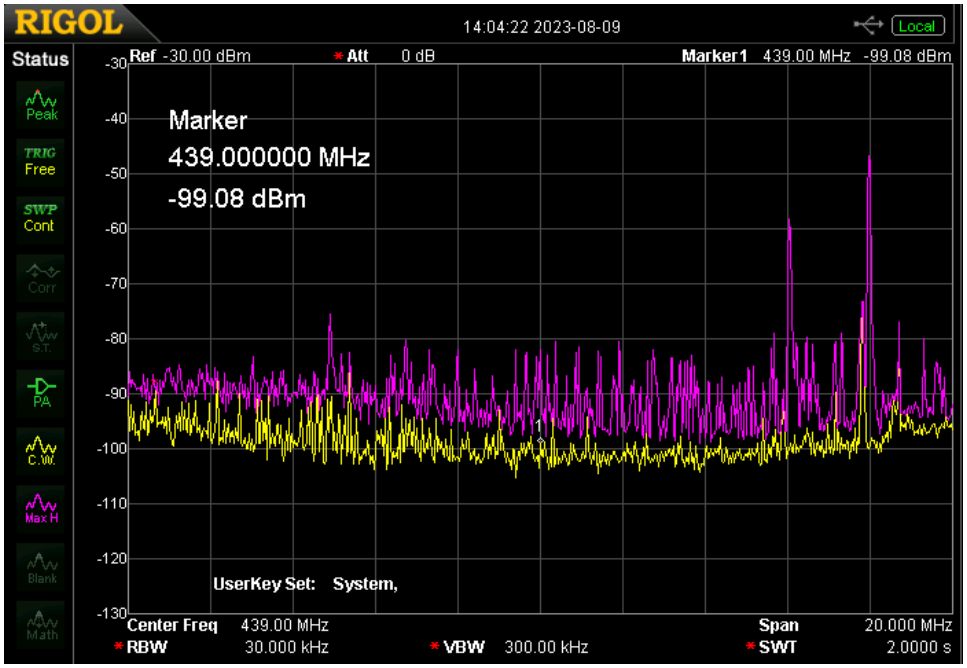


Fig. 1 Baseline Noise from Receive Antenna - with no DATV signal present at 439 MHz. Yellow trace = "live" single sweep. Magenta trace = peak hold after 1 minute of sweeping. Other ham signals were seen above 444MHz.

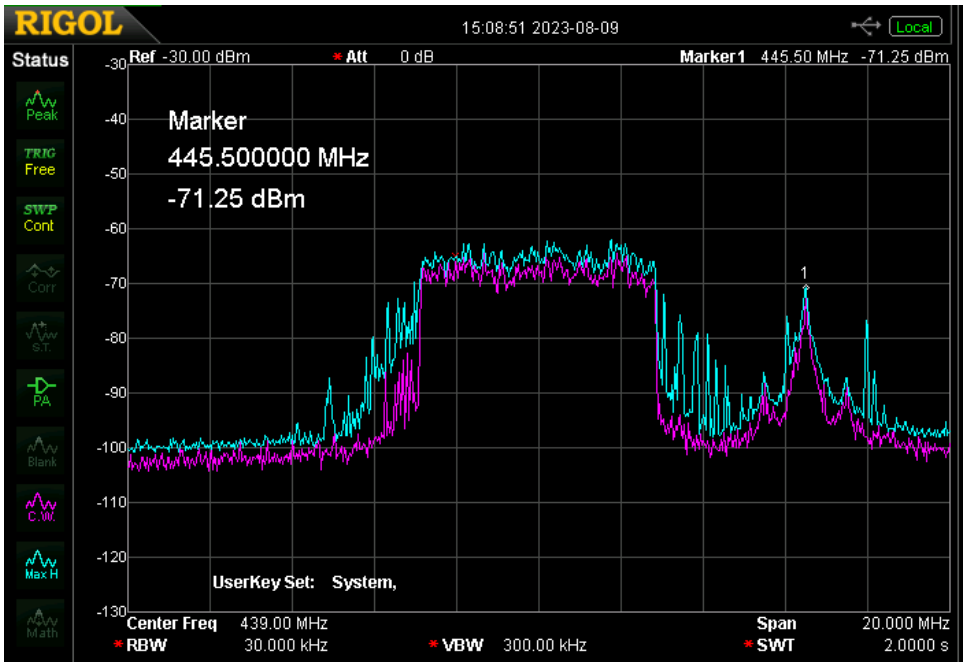


Fig. 2 A DVB-T, 439 MHz, 6 MHz BW signal from Jack, K0HEH --- marginal. Decoded signal did have live motion with audio - But also suffered from intermittant freeze frames. Signal measured inside the repeater at the output of the 70cm 3dB power splitter. Signal had passed through

the input circuits of triplexer, 6 MHz band-pass filter, low noise pre-amp and then the 3dB splitter. Magenta (purple) trace is "live" single sweep taken at a time with RFI was minimum. Cyan (blue) trace is peak hold after 2 minutes of sweeping. It captures both TV signal and the max. amount of RFI

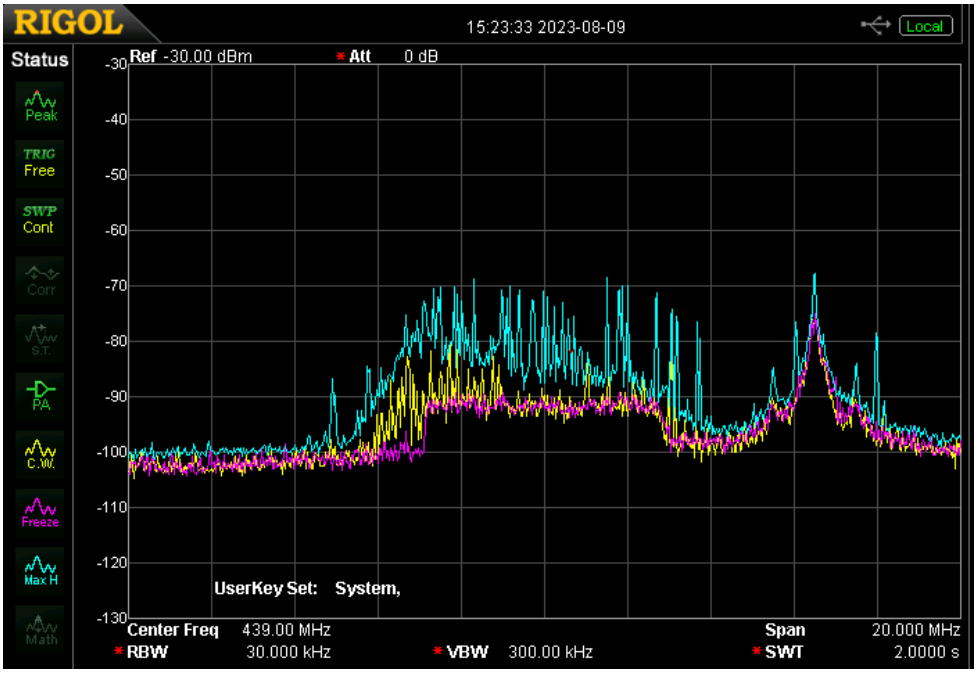


Fig. 3 Same set-up as Fig. 2. Receive antenna is connected. This time no external DTV signal present. But our own locally generated, weak DVB-T test signal is inserted via directional coupler.

For Fig. 3, the test signal was set at digital threshold of the repeater's receiver. Magenta (purple) trace was just the test DVB-T signal without the receive antenna attached. A 50Ω termination was substitued for the antenna. This trace was then "frozen". Then the antenna was attached to the directional coupler and the repeater receiver for the remaining two traces. The test signal was still being injected. There were no other DTV signals on the air at this same test time. The yellow trace is a "live" single sweep. The cyan (blue) trace is the same, but in the peak hold mode for about 2 minutes of sweeps. The spikes seen at 445.5MHz in both Figs. 2 & 3 was some other ham's signals or voice repeaters.

So What Do These Tests Tell Us ?

#1 Our repeater is in a very noisy environment with way too much very broad band, RFI, noise present.

#2 The noise is always there, but bursts sometimes 15dB higher and recurs quite often, every few seconds.

#3 Nothing we can do with further band-pass filtering, etc. will cure the problem. Our problem is the external EM environment at our repeater site.

Let's analyze Fig. 1 further. First the spectrum analyzer background noise level is much less than shown here. With the same identical setup at KH6HTV's QTH in a residental area and an outdoor yagi antenna attached to the analyzer, the baseline noise seen is of the order of -112dBm. The yellow trace in Fig. 1 is showing a min. level of about -100dBm. Easily 10-12dB worse. If you look carefully on the yellow trace at 433-434MHz, you will see some higher level RFI moving across the sweep with peaks up to almost -90dBm. Now look at the magenta trace for the peak hold of anything which occured over a minute time frame. We now see RFI peaks reaching as high as about -82dBm. Easily 20dB higher than seen in a quiet RFI environment.

Figs. 2 & 3 taken inside the repeater vividly demonstrate that our band-pass filter and preamp are working and working quite well. They have wiped out most everything else out which is outside of the BPF's passband, plus amplified the in-band signals properly.

Fig. 3 demonstrates the impact of external RFI upon our ability to receive weak DVB-T, 70cm signals. When the antenna was removed and replaced with a 50Ω termination, the level of the DVB-T test signal was then adjusted with a step attenuator. More and more attenuation was cranked in until the digital threshold was reached. This was at the point where the received picture was still P5 with Q5 audio. Adding 1 more dB beyond this point caused freeze framing. The attenuator settings were then recorded. This then showed the basic sensitivity of the repeater's 439/6 MHz receiver was approxiamately -89dBm. That spectrum level was then "frozen" on the Rigol's screen as the magenta trace seen in Fig. 3. The 50Ω termination was then removed and the repeater's outside antenna was once again connected to the repeater. The yellow and cyan traces now show the effects of adding the outside world RFI. The yellow trace is a "live" single sweep, while the cyan trace was the peak hold. Now the receiver would no longer decode the test DVB-T signal. We then proceeded to reduce the step attenuator settings and note what happened to our decoded TV picture. With stronger test signals, we started to get some motion and audio but with intermittant freeze framing. When the test signal was finally about -63dBm, we were finally able to get above the level of the RFI and once again see perfect P5 pictures with Q5 audio. This -63dBm number correlated quite well with in the field measurements we had preformed during previous ATV nets. They too had showed that a very strong signal into the repeater was required for good performance, free from freeze-framing.

So, now what do we do ? --- This is a discussion --- to be continued.

73 de Jim, KH6HTV, & Don, N0YE, --- W0BTV Trustees

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 439 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/**

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Disclaimer: This just came in the mail. I do not know anything about this company. But if you have a ham radio estate to dispose of, it would be worth checking out. - kh6htv

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