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BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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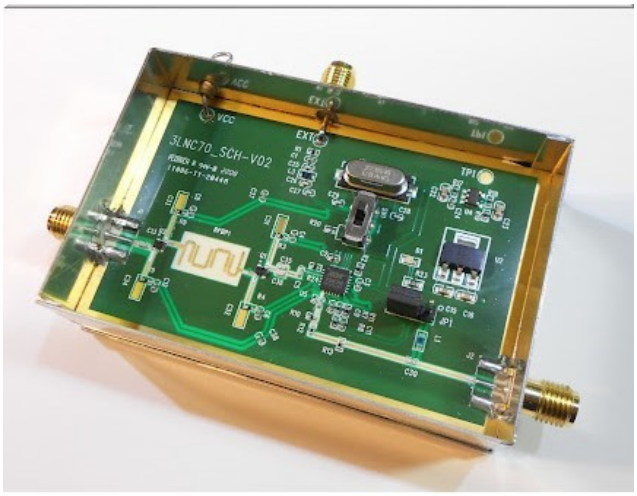


NEW 3 cm Down-Converter for W0BTV-DTV Repeater

Jim, KH6HTV

We announced plans earlier this summer to add receive capability for the 3 cm (10 GHz) band to W0BTV repeater. From Don, N0YE's, infinitely deep microwave junk box he pulled out a WR-90 waveguide, Alford slot antenna. Ideal for our application. The output via the WR-90/coax adapter

was SMA. Our design then called for mounting a good pre-amp and xtal controlled down converter directly at the antenna. Because of the antenna configuration, a typical LNB with integral horn antenna was not suitable, instead we needed a pre-amp/down converter with an SMA input. With these criteria, it appeared that a relatively new product from Hi-Des in Taiwan would be ideal. Their web site (***www.hides.com.tw***) advertises their model 3LNC70 down-converter, shown in the photo. The info on the label gives the key specs. of RF input 9.8 to 10.7 GHz (i.e. our 3 cm ham band). LO = 10.0575 GHz. Other key specs. include: 28 dB gain, 1.2 dB noise figure. The price is $186. So we ordered one to evaluate in hopes it would fill the bill for our needs. It took a while to get here as it was tied up in US Customs for quite awhile. It finally arrived recently, so we have made some preliminary tests on it before installing it in the repeater.
We plan to use 10.380 GHz as the new third input to our repeater. We will be using DVB-T with 6 MHz band-width. So our evaluations were all done at 10.380. With an LO of 10.0575, then the nominal IF should be 322.5 MHz. It should be noted that the unit we received had a hand written label on it saying the actual LO was 10.05746 GHz, i.e. about 40 kHz low.

Our first test was using an Analog Devices ADF5355 signal generator set to 10.380 GHz. Previous frequency counter calibrations by Bill, K0RZ, had shown this generator to be extremely accurate, being only 2 kHz too high at that frequency. We trust Bill's measurements. Bill says "The reference oscillator is an HP-107 and is better than 2 parts in 10^{10} I use a disciplined GPS receiver about every three month and get it set to 5 parts in 10^{11} "

We measured the nominal 322.5 IF output on a Rigol DSA-815 spectrum analyzer. The results showed a conversion gain of 28 dB (right on spec.) with an LO frequency offset error of about 150 kHz too low. Quite poor for SSB service. Still for DVB-T service, good enough. However, for our repeater, we will train the IF receiver to receive exactly the correct IF frequency, so it is truly receiving exactly 10.380 GHz. It should be noted that provision is made in the down-converter to use an external frequency standard rather than the supplied internal crystal oscillator. There is an internal slide switch to select the desired reference source.

The dc current draw measured was 160 mA and the unit was insensitive to running the dc voltage over the full specified range of 8 - 14Vdc. We did find a nice internal feature. There is a jumper labeled J1 (lower right side of pc board near IF output SMA) that routes the dc power input from either the IF output coax or the dc power feed-thru capacitor. Thus, if desired, the unit can be powered by sending DC voltage up the IF coax cable. This is the way we intend to use it in our repeater.

The last test was to determine it's rf sensitivity. For "Normal" digital parameters (6 MHz BW, QPSK, 1080P resolution, 5.5 Mbps, 5/6 Code Rate (FEC), and 1/16 Guard Interval), we found the digital threshold sensitivity was -93 dBm with a s/n of 9 dB. For higher levels of rf input, we did note that the unit did start to overload and distort the signal for signal levels any stronger than about -60 dBm. For rf levels stronger than that we noted a dramatic degradation in the out of channel spectrum shoulders with a resultant degradation of s/n.

The documentation supplied with the down-converter is very minimal. However, it does refer you to OE7DBH, Darko Banko's web site.
https://oe7dbh.blogspot.com/2023/12/10ghz-input-down-converter-432mhz.html

There you will find a lot more details about the unit. It includes a fuzzy, out of focus, schematic diagram. Details that can be made out include: The RF amplifier consists of two NEC NE3503M04 FETs with a pc printed band-pass filter between the 1st and 2ed stage.

Stay Tuned ! We hope to be reporting in the near future the first Boulder 10 GHz, DVB-T QSOs made via the W0BTV repeater.

assortment of antennas to be tested

left to right K0CJG, N0YE & AB0MY

BATVC Tests 10 GHz ANTENNAS

On Monday, August 19th, four members of the Boulder ATV gang got together to test an assortment of 3 cm (10 GHz) antennas. The key motification was to do very complete testing of the new antenna for W0BTV repeater prior to installation. The antenna test range was setup at Jim, KH6HTV's, 2 1/4 acre property south-east of town.

test antennas at transmit site

receive dish antenna with LNB

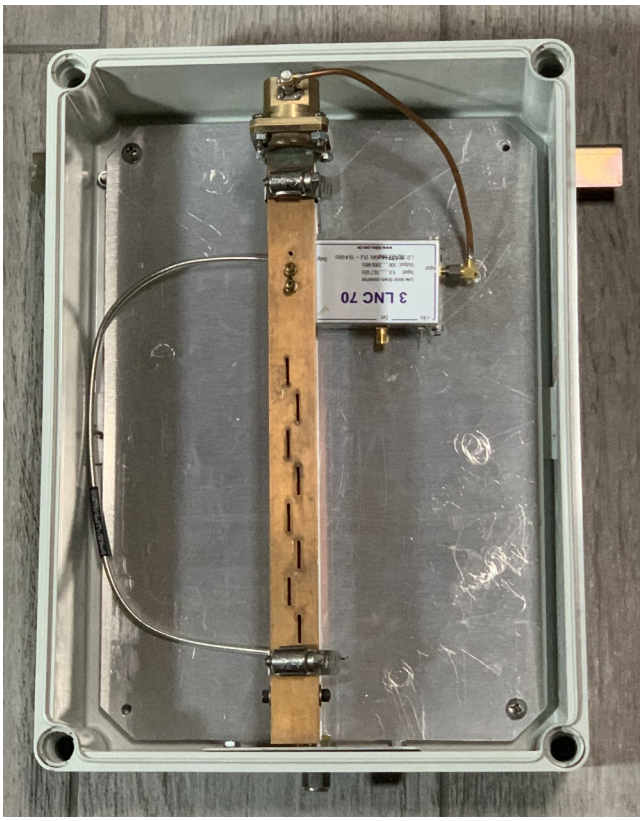
The tests were all performed at 10.380 GHz with CW and horizontal polarization. The test site and receive site were separated by about 100 yards with a totally clear, unobstructed rf path. At the receive end, a high gain dish antenna was used to descriminate against spurious rf paths from other reflecting surfaces. A BullsEye LNB was used with a collapasble offset dish reflector. The 630 MHz IF output from the LNB was measured using a Tiny SA-Ultra spectrum analyzer.

Bill, AB0MY, recording measured data from the TinySA.

At the transmit end of the test site, Chris, K0CJG, and Don, N0YE, set up the various antennas to be tested on tripod mounts. Most of the antennas were all supplied by Don, N0YE. Chris, K0CJG, also brought his MaxRad dish with home-brew feed. Every antenna was tested from exactly the same location and height of about 5 ft. The test CW source was an Analog Devices ADF-5355 frequency synthesizer set to 10.380 GHz. The RF output test power was about -10 dBm. The first antenna to be measured was our Reference Standard Gain Horn. It was a Narda Microline model 640 with a specified +16.5 dBi gain. All other antennas measured were referenced to the TinySA reading we got from this reference horn. The IF signal from this reference at about -40 dBm was well within the linear range for both the LNB and the SA. We used 2 meter FM HTs to coordinate sites and do the necessary fine tweaks to antenna pointing. The following table lists the various antennas tested and the results.

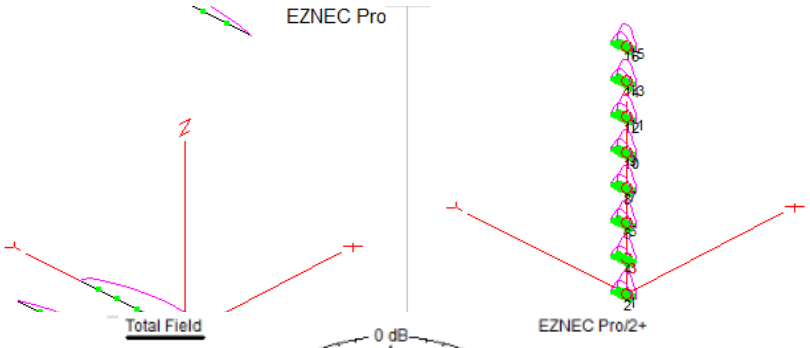
Antenna	**Gain**	**Antenna**	**Gain**
MDL model 90AC136-1E, Waveguide Open End Flange, SMA to WR-90 adapter	+5.1 dBi	Generic, no label, Waveguide Open End Flange, N to WR-90 adapter	+5.6 dBi
Mystery X-Band Unsymettrical Horn Antenna, 1.5"x5.6" aperature	+16.6 dBi	Generic, no label, WR-90 Horn Antenna, 2.63"x3.25" aperature	+16.6 dBi
RCA Satellite Dish with RCA feed	+32.1 dBi	RCA Satellite Dish with W1GHZ feed	+32.5 dBi
Generic, no label, 1 ft. Dish with integral WR-90 waveguide feed with dipole and reflector rods at end of waveguide	+24.5 dBi	MAXRAD 23" Dish with home-brew feed of 3/4" waveguide to 3.5" dia. splash-plate	+27.1 dBi
Alford Slot - WR-90 Waveguide 8 slots on one side	+14.1 dBi	Chinese no brand, Log-Periodic spec. 6dBi, 1.4-9.5GHz, SMA, $8	-7.2 dBi

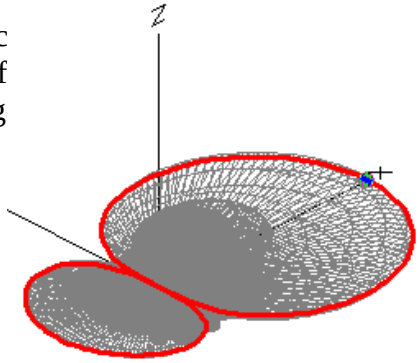
NEW ALFORD Slot Antenna for W0BTV

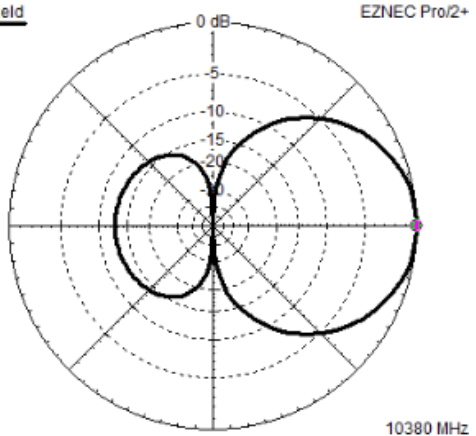


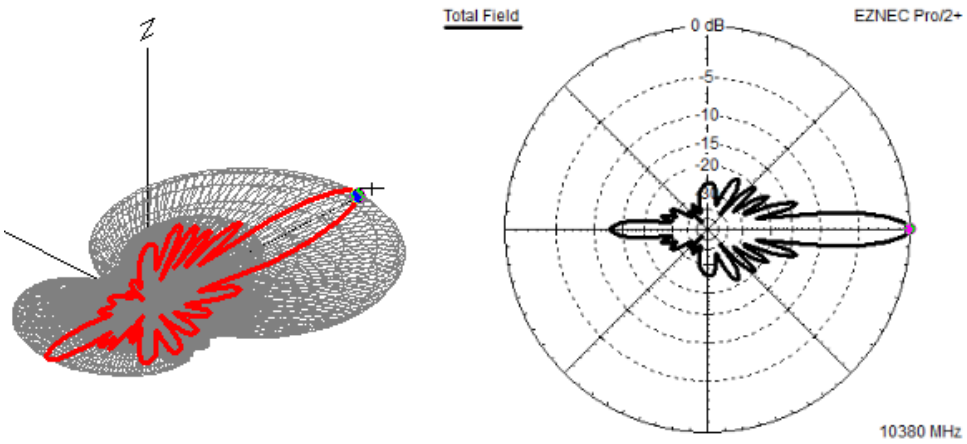
The main reason for the antenna test session was to really evaluate the performance of this antenna. The antenna is a length of WR-90, X-band, wave-guide. It has a total of 16 slots machined in it. 8 on the front and 8 on the rear. As built, it was intended for use as an omni-directional antenna. We wanted instead an antenna with preferably only a 180 degree radiation pattern. We have the very steep Flatiron mountains on the west side of our W0BTV repeater. We want to discriminate against reflections coming off of the Flatirons. So to that end, Don, N0YE, covered up the 8 slots on the back side of the wave-guide with copper tape. Don, then mounted the antenna in this weather-tight, tough plastic enclosure. As mounted, the antenna radiates with horizontal polarization. There is a WR-90 to SMA adapter mounted on the top of the antenna. A type N feed-thru coax connector is on the bottom of the enclosure. Also shown in the box is the newly purchased Hi-Des model 3LNC70 down-converter. In normal service, a weather-proof cover is then installed over the antenna.

EZNEC Model: Prior to any testing, we have tried to do some EZNEC modeling of the antenna to guess-timate what to expect. Our local antenna expert, Prof. Ed Joy, K0JOY, suggested we simply model it as a vertical stack of 2 element wire yagis. i.e. simple driven element with reflector. Th same as the ac not with the of the predicted g but the pattern









Elevation Pattern of Alford Slot Antenna

Our simple EZNEC model predicted a max. gain of 16.7dBi (Ed said it would be too high). Front to Back ratio of -13dB. Azimuth -3 dB BW of 70° -6 dB BW of 100° Elevation -3 dB BW of 10°

Real World Antenna Test: Our first test session on the 19th, we measured the gain with the cover attached at about +14 dBi. We found that attaching the cover enhanced the bore-sight gain by +1 dB due to dielectric focusing. There was 2 to 3 dB ripple noticed in the pattern for just a few degrees variation in the bore-sight beam heading. The -6 dB azimuth beam-width was approximately 80 degrees (±40 degrees). The -10 dB azimuth beam-width was approximately 100 degrees. The front to back F/B ratio was about -30 dB. We also measured the -3 dB elevation beam-width and found it to be approximately 15 degrees.

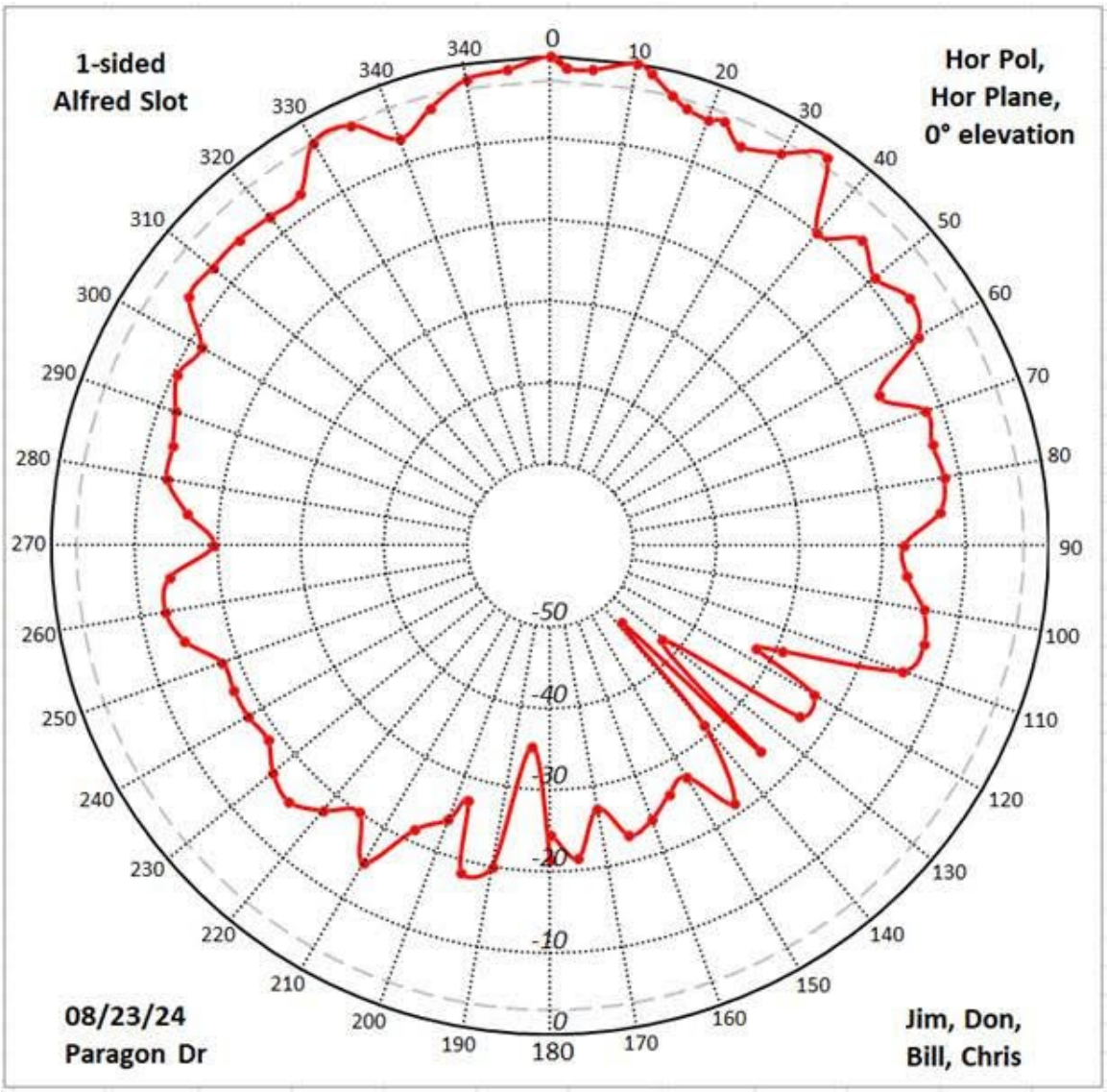
Because of the somewhat irregular pattern measured on the 19th, we elected to return to the test site and repeat the measurements, but with a different test arrangement. We did this on Friday, August 23ed. For this second test, we were only concerned with the antenna pattern, not the max. gain. We felt comfortable with the +14 dBi gain figure we measured in the first test session. For this test, we reversed the arrangement. The antenna under test became the receive antenna. We installed the new 3LNC70 down-converter in the slot antenna enclosure and used it along with a TinySA-Ultra spectrum analyzer plus bias tee as the receiver. For the transmitter, we again used the Analog Devices ADF-5355 synthesizer with a 1 ft. dish antenna (24.5dBi gain). We again adjusted the rf transmitter power to put the received signal in the linear range of the receiver, but with lots of head-room above the noise floor. We set the transmitter power to -30 dBm.

We were once again setup in a large open field at KH6HTV's QTH. We set up as far as possible from any reflecting surfaces. We parked our automobiles a long way away from the test site. This time, we used Chris' antenna angle test set to more precisely measure the antenna angle. See the photo on the right. Chris mounted a long PVC pipe to the antenna tripod mast. At the far end of the pvc pipe he attached his mobile phone. He set the phone to work as a compass. Chris then rotated the antenna, made an angle reading and then stepped far away from the antenna. The other fellas

then used the TinySA spectrum analzyer to measure the received signal strength and record the data. Afterwards, Chris then processed the data and plotted it on a circular chart. See the results on the next page.

Conclusions: Max. Antenna Gain = +14 dBi F/B = -35 dB
-3 dB Beam Width = 30 deg, but then recovers to 65 deg after ripple to -6 dB
-6 dB Beam Width = 40 deg, again recovers with ripple to 70 deg
-10 dB Beam Width = 120 deg
Back Side Rejection of reflections from the Flatirons will be > -15 dB

73 de Jim, KH6HTV, Don, N0YE, Chris, K0CJG, & Bill, AB0MY



A Correction and an Update to the ATV Mode of the IC-905 from Germany

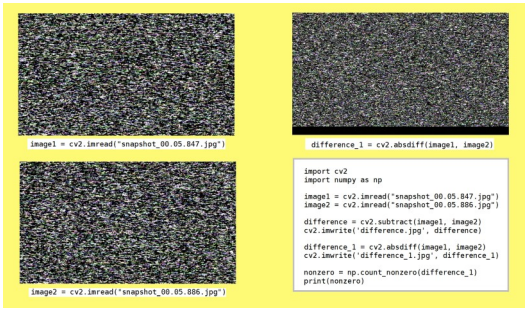
In July 2024 - TV Rptrs Rptr-165 I wrote that from a certain threshold a blue screen is displayed on the AV output of the IC-905. That is not quite correct. Below a certain threshold the video on the AV output is switched off. The blue screen is then generated by the AV to HDMI converter. You can see this in the video by Richard VK3VRS too. In the video you can also see that the blue screen behaves erratically.

https://www.youtube.com/watch?v=3JcsH6lP448

Sometimes Snow --- Occasionally the A/V output turns on even when no video signal is present. Snow will then also appear on the monitor. This behavior is random and can sometimes be reproduced by switching around, see the image "AV-output".

A Part of the Image Freezes --- When snow was displayed on the external monitor, I noticed that the image at the bottom of the video froze briefly. This is only visible in moving videos and especially with noise / snow. I documented it with my HDMI monitor, which can also record videos, see the image "AV-output".

This effect can be observed particularly well with my motion detection program, which is part of my ATV software. The software subtracts two frames from each other, see below. The difference can then be used to determine whether the operator has made a hand movement in front of the camera, for example. If the image freezes at the bottom, a black bar appears.



Difference of two Frames

To show this effect here, I extracted two frames from a saved video and subtracted them from each other using the small Python program, see the second image "Difference-of-two-frames". Two different approaches to subtracting images are shown. The variable "nonzero" provides a more or less large value depending on the movement, which is then used to control the ATV software and later the ATV repeater from remote. If anyone would like to have the two original images for their own tests, I would be happy to send them to you.

The Test-Image --- The last image "Testimage-with-PIP" shows an update of my test image. I turned on the test image by moving my coffee cup in front of the camera. The main image is now displayed "picture in picture" at the top left. The small image at the top center shows the difference between two frames for motion detection. A histogram is shown on the right.

Summary --- In summary, there are the following errors: (IC-905 Firmware is 1.15) In the May 2024 newsletter, 3ed edition TV Rptrs Rptr-163 pages 9 and 10 it was already shown that only a black and white video is sent with the PAL format and that the set bandwidths do not match the actual bandwidths. The July 2024 newsletter, TV Rptrs Rptr-165 pages 1 to 4 also deals with the blue screen.

This article explains that turning off the A/V signal is the cause of the blue screen. By the way, it takes up to 3 seconds for the output to turn on after there is a good A/V signal. This article also shows that a part of the A/V signal freezes at the A/V output.

Best regards from Germany -- Wilhelm, DG2YK

Is DVB-T Sideband Sensitive ?

Jim Andrews, KH6HTV

Note: This is a revised KH6HTV Video application note, AN-50b, August, 2024

Application Note, AN-36, in 2017, has previously discussed the basics of what is required to operate at microwave frequencies with DVB-T. We can purchase from Hi-Des in Taiwan, both modulators and receivers that will work up to the 13cm (2.4 GHz) band. Above there in frequency, we need to then start using mixers and local oscillators to up/down convert. So, one question arises right away -- *"What happens when sidebands are inverted ?"*

When using a mixer and LO, the resultant output contains two mixing product signals,

$$f_{usb} = f_{lo} + f_{if} \quad \& \quad f_{lsb} = f_{lo} - f_{if}$$

The polarity of the RF sidebands remains the same as the IF for the plus (+) mixer product. But the polarity of the sidebands is reversed for the minus (-) mixer product. When running single sideband voice, this makes a big difference. Inverting the sidebands results in un-intelligible speech. *What does it do to a DVB-T, digital TV signal ? ? ?*

The Quick Answer is ---- YES ! DVB-T is sensitive to inverted sideband. *

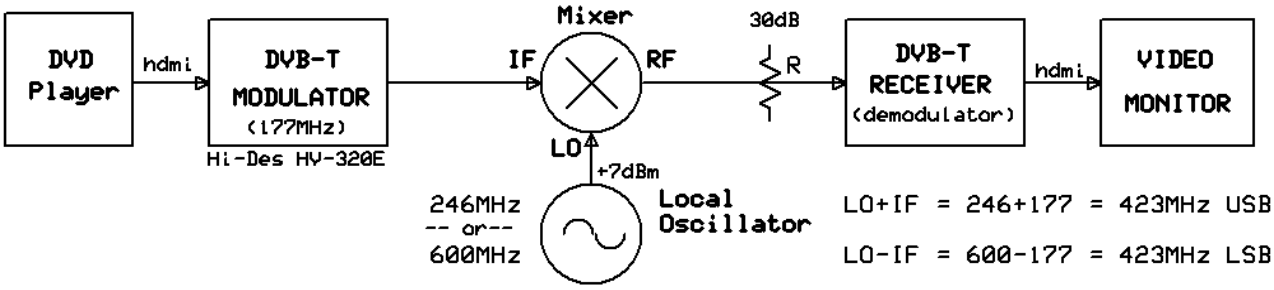


Fig. 1 Test set for mixer/LO tests of DVB-T sidebands

** note - This conclusion is contrary to what I originally published in the first version of this AN-50 in Sept. 2019.*

To experimentally determine this, I set up a controlled experiment. See above Fig. 1. I started with a DVB-T receiver which had already been trained to receive normally 423 MHz on the 70 cm band. I then programmed the HV-320E modulator to put out a normal DVB-T signal on hi-band VHF, Channel

7, 177 MHz. With a local oscillator set to 246 MHz, the USB product was 423 MHz. Then switching the LO to 600 MHz, again put a signal on 423 MHz, but this time with an inverted sideband.

I then used these signals to test several different DVB-T receivers. They receivers tested were Hi-Des models HV-110, HV-120A & HV-122; GT-Media model V7-Pro, and Pantesat model HD-99-T2. Also tested were USB TV tuner dongles. The HV-110, HV-120, V7-Pro and HD-99 all worked perfectly with either sideband.

But the HV-122 and USB dongles refused to decode the inverted sideband.

Thus the conclusion is: Yes, DVB-T is Sideband Sensitive.

Pete, WB2DVS, had purchased the HV-122, which I tested, for use with a 10 GHz transverter which in fact used an LO which inverted the polarity of the received DVB-T signal and he found that he was unable to receive any of the other Boulder ATV ham's 10 GHz, DVB-T signals. Pete contacted customer support at Hi-Des and they confirmed for him that *"Yes, in fact, the HV-122 will not decode inverted sideband signals."*

Further research on the subject by Bill, AB0MY, looked into using USB TV Tuner dongles as potential receivers for microwave, DVB-T, experiments. He also found the dongles would not decode inverted sideband signals. They were using the free computer program, VLC, to run their dongles. He did find in the Advanced Options menu of VLC a line labeled "Spectrum Inversion" which should handle this situation. However changing this setting, it still refused to work with their dongles.

DVB-T SENSITIVITY to Frequency Error and Phase Noise:

Frequency Offset: With this same LO/mixer test set, it was then a simple matter to determine the sensitivity of a DVB-T receiver to having a signal with the center frequency offset from the correct frequency. Adjusting the LO frequency I found that I could move the LO up or down about ± 550 kHz and the receiver would retain lock. Thus, a DVB-T signal with Doppler shift up to this amount should still work.

Phase Noise: The next test was also simple to perform. What happens with phase noise? I was able to simulate this by turning on the FM modulation of the HP signal generator. What I found was the DVB-T receiver was very sensitive to small amounts of FM deviation of the center frequency. With a 1 kHz test tone, the receiver worked only up to about 600 Hz deviation. With a lower 400 Hz test tone, it was worse. 200 Hz deviation caused pixelization and anything higher, the receiver failed.

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Another Low Cost LNB for the 10 GHz Band

Chris Grund, K0CJG

In a recent ATV Newsletter (July, 2024, #166), Jim, KH6HTV, reported on the low cost ($30) “BullsEye” universal satellite TV LNB that is suitable for use as a receiver downconverter for the 10 –

10.5 GHz ham band. Jim pointed out that this LNB had a very stable and accurate LO at 9.75GHz and that down conversion worked well with input RF signals far below the 10.489 GHz spec. Encouraged by his report, I investigated what other "Universal" LNB's might be available and found and ordered the Edision SL-2 ($18, Amazon). This device, shown in Fig. 1, does not have the electrically selectable polarization feature of the BullsEye, but is easy to rotate for desired polarization, and even has degree markings on the housing to facilitate this. It also does not have the 25MHz reference output. The SL-2 specs are similar to the BullEye: RF Input 10.7-12.75 GHz; IF Out: 950-2150MHz; LO: 9.75/10.6 GHz; NF: 0.1dB (!). As with the BullsEye, there is an F-connector that serves as both the IF output and as the power input port, so a bias tee is needed for operation. I made my own using a ceramic capacitor to separate the IF from the DC, and a choke to inject the DC, as shown in Fig. 2. Seems to work OK.

Fig. 1 Edision SL-2 Universal Single Digital LNB

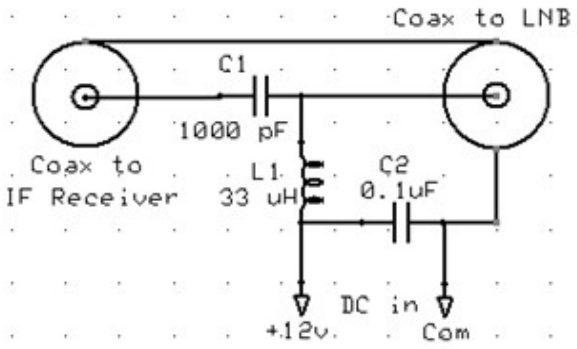


Fig. 2 Homebrew bias tee to inject LNB power

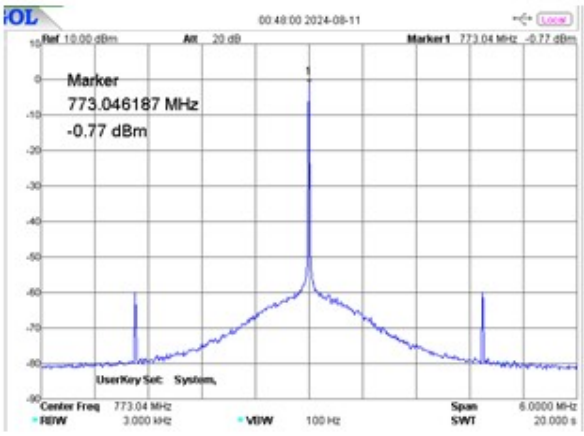


Fig. 3 LNB output spectrum near saturation RF.

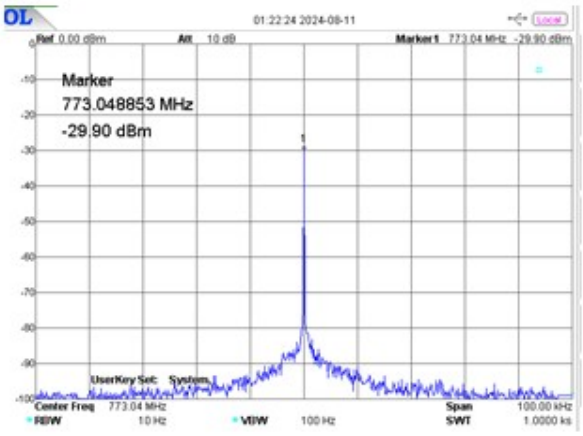


Fig. 4 LNB response with signal reduced 30 dB.

Figures 3 and 4 show test results using a highly attenuated low noise "brick" microwave oscillator as an RF source and a Rigol DSA-815 spectrum analyzer at the IF port of the bias tee. Fig. 3 shows the IF output of the LNB in 3 kHz resolution with the RF input signals level set near output saturation (~0 dBm into 50). While all signal related noise components appear to be at least -60dBc, there are 2 symmetric birdies ~1.7 MHz either side of the carrier and there is also an apparent phase noise pedestal

that falls away rapidly. With the RF input reduced by 30dB, and the SA bandwidth reduced to 100Hz to lower the noise floor, Fig. 4 shows that the birdies are strong signal artifacts that disappear with reduced excitation. However, the phase nose pedestal approximately scales with the carrier, so it is unclear how much is produced by the test source and how much is due to the LO in the LNB. In any event, it is too small to matter for most ham applications. Test sources at 10.523 and 10.368 GHz were also tried, with similar results. The IF frequencies observed for all test sources were within 1 kHz of expectations based on previously measured frequencies of the sources, indicating good LO accuracy, given uncertainties in the test source frequencies that are of this order.
To test thermal stability, the LNB was placed in a box and heated with a hair dryer for ~10 minutes. An IR thermometer indicated a temperature rise from 66F to 130F. The observed IF frequency drifted from 733.040 MHz to 733.048 MHz, or ~8kHz over 64F, adequate for all modes of amateur TV (and even for SSB voice with an occasional tweak). The IF signal strength only varied by a few tenths of a dB over this temperature test. I also noted this LNB was extremely sensitive. So much so that it was difficult to attenuate the signals enough for this test.

All in all, the SL-2 seems like another good low cost choice for a 10 GHz downconverter. It is amazing what a couple of saw bucks can buy these days.

73 de Chris Grund, K0CJG, Boulder, Colorado

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 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*

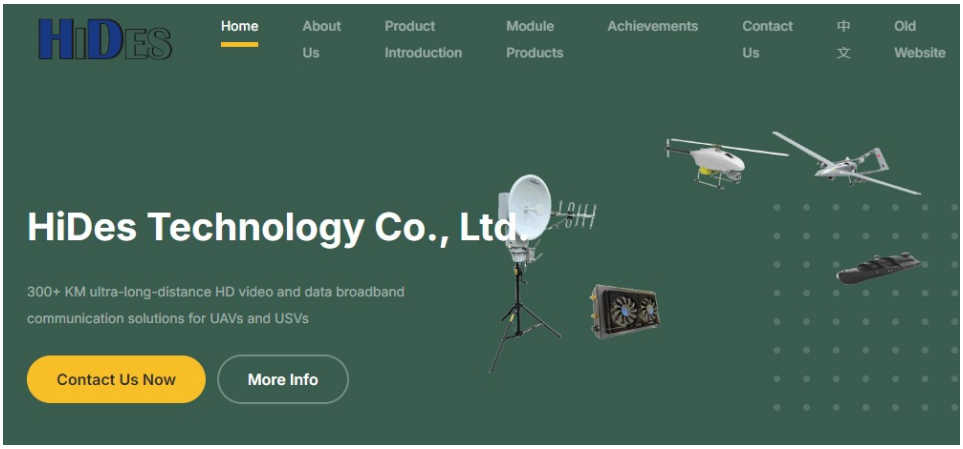
For Sale - or - Want to Buy

23 cm FM-TV Receivers -- FREE I am in the process of selling my house and moving. Thus, cleaning out some unwanted stuff from the ham shack. I have three old, NTSC analog FM-TV receivers for the 23 cm band. I am offering to give them away Free to the first taker. If you are not local and unable to pick them up at my QTH, then I request you send me $10 to cover the cost of postage to mail them to you. So what are they ? These were all pulled out of service with BCARES about ten years ago, prior to our transition over to digital ATV. They are probably about 25 years old. They all used the USA FM-TV standard of 4 MHz deviation.

One of them is a commercial receiver purchased from P.C. Electronics under the COP Security brand. It is frequency synthesized on four channels. They are: 1247, 1262, 1277 & 1292 MHz. It does have a label on it saying "Sync Buzz in Audio". 12Vdc at 350mA.

The other two receivers were home built from kits from North Country Radio. They contain two pc boards. The first is a 23cm pre-amp, voltage tuned VFO and mixer. The second board is a 70 MHz IF amplifier and FM-TV demodulator. Both are housed in all metal cabinets. SMA antenna input. RCA A/V outputs, run on 12Vdc. VFO tunes full 23cm band, but does drift. They have sensitivity calibration charts on them. Shows P1 is -101dBm, P4 is -92dBm, P5 is -85dBm.

Interested ? First One to call me gets all three. Jim, KH6HTV, 303-594-2547, kh6htv@yahoo.com



Check out Hi-Des' new web site ! www.hides.com.tw They have some new products aimed at the long distance, high data rate, military, secure communications market.

For Serious Micro-Wavers:

We have discovered by surfing the internet another interesting ham radio supplier. This time it is **RF HamDesign** in the Netherlands. Check out their web site at: ***www.rfhamdesign.com*** Their home pages says "RF HAMDESIGN is an engineering oriented organization specializing in the design and manufacture of high performance parabolic antennas, computer controlled Antenna Rotators, 3dB high power RF couplers, RF High Power Antenna power splitters, directional RF couplers and more items for RF transmission from HF through Microwave frequencies."

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ITEMS FOR SALE OR GIVE AWAY:

HiDes DVB-T UT-120 Dual Diversity Receiver

ICOM HM-133V MICROPHONE

Dongles use "MCX" connectors. Cables available with BNC, N, UHF, etc. on one end and MCX on the other end are available on eBay and called "pigtails". The male end snaps into the mating connector on the dongles. The Dongles can be a direct replacement for the TX and RX but requires a PC and software found on the HIDES website.

HIDES DVB-T TX/RX Dongles

New Tubes and Tube Tester Package

Highest Bid Takes the whole package. Bidding ENDS August 24 at 10pm. Location is in St. Peters, MO. To place a Bid by email, husser01@yahoo.com. Please put "Bid for TUBES" in the subject line. Thanks!