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BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

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UT-100 - Feedback !

Well in the previous issue, we asked for comments from our readers about the Hi-Des UT-100 series of DVB-T, USB dongles.   We really got it !

Hi Jim ---   Just some quick comments on the UT-100A. A number of folks in this region had purchased the UT-100B around the 2014 time-frame. Since we run 2 MHz bandwidth in the Midwest region, the UT-100B was the dongle of choice: the "B" model operates on 2/3/4 MHz bandwidth, whereas the UT-100A operates on 5/6/7 MHz bandwidth. Yes, it does require a laptop or computer to operate. Software required to run it on the laptop is needed and is provided on a CD with the dongle: Two necessary executables are the the "BDA Viewer" for receiving, and the "TS-player" for transmitting. Interestingly enough, once everything is set up, you can transmit and receive simultaneously (full duplex), so its possible to check your transmit parameters by receiving the DVB-T signal on the same computer that is running the UT-100B. Years back, a number of hams in this region had set up the UT-100B using an intermediate amplifier to boost 0 dBm power output enough to drive a larger amplifier. Transmit coverage is 50 - 950 MHz and 1200-1350 Mhz, while the receive coverage is 50 to 950 MHz.

Th vast majority of hams in this area only transmitted MPEG video files with the UT100B. At the time, some of the hams found the software a little buggy, but for the most part, my UT-100B worked very well. As you also have indicated, I much prefer not having to depend upon a computer to receive and transmit DVB-T.

Cheers, Dave Pelaez AH2AR, Dayton, Ohio

Hi David --- Nice to hear from you in the journal topic concerning the Hi-Des product and integration applications . The UT-100A does 2Mhz.   I [we] work with our STEM students with multiple electrics projects to include small RF transceiver applications, one using the single board computer the famous Raspberry Pi-5, dongle transceiver module {not Hi-Des} and all this running under control of Linux to run the Pi-5, transceiver module and controller board[Tx<>Rec, Band selection and configuration]. To Tx and Rec. We programmed it to work with Bluetooth and a simple small remote to access the PTT [1]to transmit and [2] disengage to receive, [3] change frequency and turn [on/off] 12V power sources all in a 6"X 6" X 2" enclosure to include the 2w PA. Just add an HDMI device, duplexer, 70cm/23cm antenna, coax. Great backpack/portable.

Mario, KD6ILO, San Diego, California

I don't want to give out bad info but the ut100a that we have used in the past did not work on 2 MHz receive, but would work on 2 MHz transmit. Maybe there has been a change to the firmware to allow the receiver to work on the narrower bandwidth? The Hides site also reflects what I am mentioning here. Someone needs to be aware of this before purchasing, maybe an email to Calvin before making the purchase can clear this issue up.

Cheers,Dave AH2AR

I will confirm, that as purchased the UT100A Will NOT receive 2 MHz bandwidth, But will Transmit it. All the UT100 dongles use the same ITI modulator chip that will modulate 1-8 Mhz bandwidth out of the box. But the receive bandwidth is dependent on the firmware loaded.

I purchased a UT100A some time ago when I first started playing with DVB-T at 6 Mhz but decided we would need to start using 2 Mhz bandwidth here in the Baltimore area. I had Calvin load the UT100B firmware on the dongle and it then received 2 Mhz bandwidth. So if you have any UT-100A dongles in your parts bin, it can be converted to a UT100B

I have been using this dongle on a remote base for several years now in Transmit only mode using their TS-Player software on a windows micropc. While it has done the job for the most part, the included TS-Player software is very unstable and can't handle errors in the video stream very well. While it works OK with a simple talking head camera shot, if switching between multiple videos (Using OBS) it will shut down at random times and need to be restarted. HiDes has unfortunately given up on that software and moved on without a solution. Calvin suggested using Linux and alternate software, but I am stuck in the Windows world. I'm interested to find out if anyone else has found a solution the the TS-Player software issue.

BTW, I have several older Chinese Desktop modulators in my parts bin that are set up to use 6-8 mhz bandwidth (with a dropdown menu), but they use the same ITI modulator chip as the UT100 series.

Therefore, if told to transmit 2 Mhz bandwidth, they should do it. Unfortunately I am not versed enough in modifying the firmware to accomplish this. Any suggestions?

<div align="right">John Kozak, K0ZAK, Reisterstown, MD</div>

BR-101EH Used For Sale: -- We have also received a couple of email offers of used BR-101EH USB dongles.   If any ATV repeater group should need one, contact the editor, and I will put you in touch with the owners.

Hello ---   I always enjoy reading the ATV Journal, which keeps me up to date with developments and trends in the USA. In the issue #178, I read the article on the Hi-Des USB dongle BR-101EH used for DVB-T repeaters and no longer available.   The HB9TV team has implemented a new **LINEAR TRANSPONDER** module on the HB9TV-1 relay.

For more information, visit *https://home.swissatv.ch/2024/12/une-premiere-mondiale/*

Perhaps a technology to be tested to replace the Hi-Des USB dongle!

<div align="right">Vy 73 de Michel, HB9DUG, Vich, Switzerland</div>

*(**Editor's Note:**   Michel is presenting a novel new approach to repeaters.   I contacted him for more info and he assured me that his is truly a "linear repeater" capable of relaying any type of signal, be it AM, FM, SSB voice, analog of digital video, etc.   He also offered to provide me with English translations of his papers which I am reproducing here for our ATV Journal readers.)*

All-In-One -
A DATV Linear Transponder

<div align="center">

(presented at HAMRADIO-2022, 24 June 2022)
Michel Burnand, HB9DUG, Vich, Switzerland

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Exploring new technologies and approaches for DATV Repeaters:

The HB9TV Team who manages, operates and develops the HB9TV Network (*www.hb9tv.ch*) has started thinking about a new generation of repeaters for its network.

The current network is mainly based on DVB-S modules from SR-Systems, which have been working well in our 4 repeaters for over 10 years. Unfortunately, the hardware is no longer available and spare parts are becoming difficult to source. In addition, the modules used only support the DVB-S standard with a minimum Symbol Rate (SR) of 1 Ms/s with MPEG2 video encoding, thus closing repeater access to stations using the DVB-S2 standard with SRs lower than 1Ms/s with H.264, H.265 video codec and AAC or AC3 audio codec in their DATV transmitter.

Finally, it should be mentioned that during the migration of our FM relays to DVB-S technology, in order to allow the coexistence of access with FM or DVB-S TXs, the repeater at the center of the

network was equipped with FAGOR IFL6000 (transponder) and IFA600 (amplifier) modules designed for processing Analogue and Digital TV.

In view of the above, it seemed interesting to investigate in the technology of a linear transponder for our future repeaters.

A prototype was made with an ADALM-PLUTO module from Analog Devices.   By carefully reading the documentation for the AD936x RF Agile Transceiver used in this module, you can see that a RF RX to RF TX loop-back function is available. The loop-back happens in the ADI provided HDL core. The transmitter will transmit anything that the receiver receives. The entire RF chain is active (Sample rates, RF bandwidth and FIR settings will all effect the transmission).   We will use this function to create our linear transponder prototype. To make programming the AD936x of the Pluto easier, Analog Devices provides pyadi-iio, the Pluto's Python API.
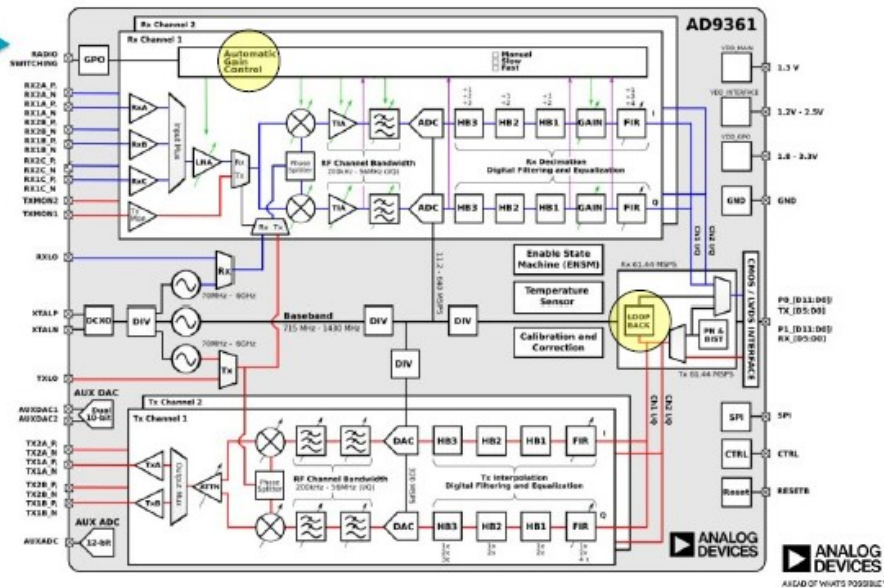

Project hardware
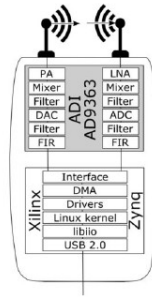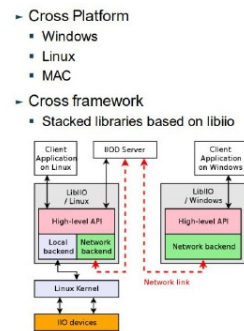
Project hardware

- AD9361: 2 Rx + 2 Tx
- AD9364: 1 Rx + 1 Tx
- AD9363: 2 Rx + 2 Tx
- Major sections:
  - RF input/output paths
  - RF PLL/LO
  - Clock generation
  - ADC/DAC
  - Digital filters
  - Digital interface
  - Enable state machine
  - RX Gain (AGC)
  - TX Attenuation
  - Aux DAC/ADC and GPOs
  - Analog and Digital Correction/Calibration

Before you can use the API, you need to install the libiio and libad9361-iio libraries and after pyadi-iio. The installation of these libraries is OS dependent. For non-geeks like me, PySDR:A Guide to SDR and DSP using Python (https://pysdr.org/index.html) and Analog Devices Hardware Python Interfaces (https://analogdevicesinc.github.io/pyadi-iio/) will give you a starting point for a linux installation.

Project software

IIO
Linux kernel Industrial Input / Output frame framework

IIO - libiio
System library
Provides high-level C, C++, C# or Python programming interface to IIO
Cross Platform (Linux, Windows, MacOS X, BSD)
https://github.com/analogdevicesinc/libiio

IIO – libiio – Command line tools
iio_info, iio_attr, iio_readdev, iio_writedev et iio_reg
included with the libiio

pyadi-iio
Analog Devices python interfaces for hardware with IIO drivers
https://analogdevicesinc.github.io/pyadi-iio/guides/quick.html

PyADI-IIO
PYTHON FOR ADI INDUSTRIAL I/O DEVICES

PySDR: A Guide to SDR and DSP using Python
https://pysdr.org/

The very basic python program below configures the Pluto in "linear transponder" mode with the following parameters:

    Pluto connected via Ethernet interface at 172.22.22.150
    Sample rate at 8.192 Ms/s
    Rx Lo at 437 MHz with a bandwidth at 2 MHz
    AGC automatic in slow attack
    Tx Lo at 1280 MHz with a bandwidth at 2 MHz
    Tx hardware gain at -10 dB

Project software (Python)

```
Python program:

#
#  version 1.0   2021-12-20,  HB9DUG Michel
#
#  proto transponder DATV
#  input = 437 MHz
#  output = 1280 MHz
#  rf bandwidth = 2 MHz

import adi

# setup interface
sdr = adi.Pluto('ip:172.22.22.150')
sdr.sample_rate = 8.192e6

# Configure RX channel
sdr.rx_enabled_channels = [0]
sdr.rx_lo = 437000000
sdr.rx_rf_bandwidth = 2000000

# configure TX channel
sdr.tx_enabled_channels = [0]
sdr.tx_lo = 1280000000
sdr.tx_rf_bandwidth = 2000000
sdr.tx_cyclic_buffer = True

# Mute TX on power up
sdr.tx_hardwaregain_chan0 = -60

# Use RF loop back mode
sdr.loopback = 2

# AGC
sdr.gain_control_mode = 'slow_attack'

# TX on  (-60 to 0 dB)
sdr.tx_hardwaregain_chan0 = -10

while True:
    print(' ')
    stop = input('Return to Exit')
    sdr.tx_hardwaregain_chan0 = -60
    break
```

This simple prototype has been tested with success on the bench and in real conditions in the Lake Geneva area with DVB-S, DVB-S2 and DVB-T transmissions.   Its use is not only limited to a DATV transponder. It can also be useful as an up and down converter in front of a DVB-S/S2, DVB-T tuner or a spectrum analyzer.

We are sure that this demonstrator will foster interest in these new technologies and approaches for our DATV repeaters.   Please share your experiences with us and the ATV community !

References:
   1. PySDR: A Guide to SDR and DSP using Python
https://pysdr.org/
   2. Analog Devices Hardware Python Interfaces
https://analogdevicesinc.github.io/pyadi-iio/
   3. AD9363 RF Agile Transceiver
https://www.analog.com/media/en/technical-documentation/data-sheets/AD9363.pdf
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DATV Linear Transponder on HB9TV-1 Relay A World Premiere?

Michel Burnand, HB9DUG, Vich, Switzerland

Following the linear transponder prototype built and tested in early 2022 (*see article in BATC's CQ-TV 275*), the HB9TV team decided to install this technology on the HB9TV-1 DATV relay.

A linear transponder module was built, integrating an Adalm-Pluto with a USB/Ethernet hub interface and an SD card for storing files (test cards, programs, etc.). The Ethernet connection via the HamNet enables remote management of the Pluto. The module also incorporates a 400 MHz amplifier and a filter on its transmit output.

Thanks to the modular design of the existing HB9TV-1 relay, the receive chain (filter + 1'280 MHz pre-amp) and transmit chain (400MHz/10GHz converter + 10 GHz amplifier) are used as they are. On the input side, a 3dB splitter supplies the signal to the "standard" relay and to the transponder; on the output side, a relay switches the transmit signal from either the "standard" relay or the transponder.

Switching between "standard" relay and transponder operation is controlled by the HB9TV-1 management module equipped with a LAN Controller from Tinycontrol.
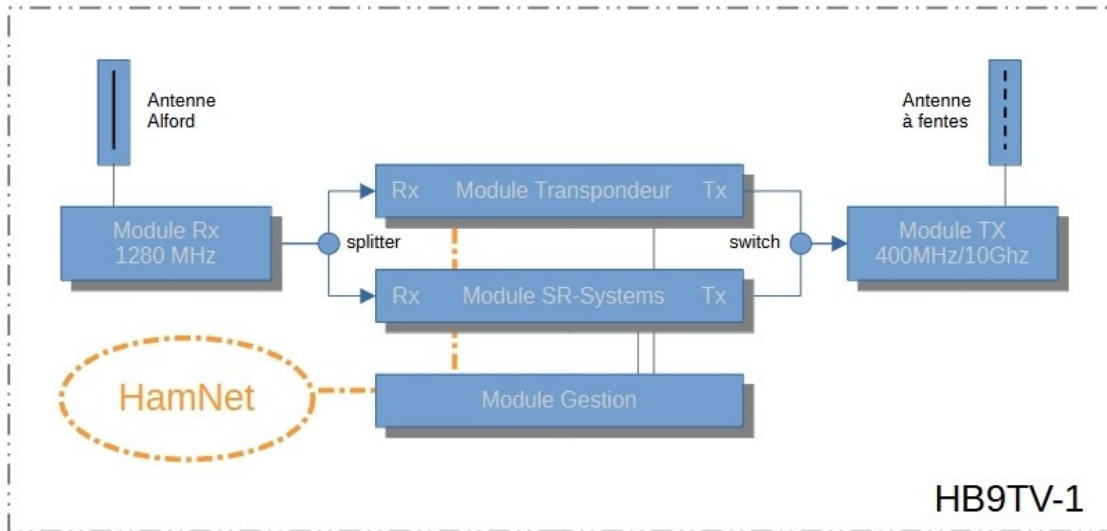
HB9TV-1   Linear Transponder

The transponder software resides entirely in the Pluto and runs smoothly with its original firmware, but Evariste's Pluto-DVB2 firmware, developed in the meantime, adds interesting features such as MQTT and the ability to run TS files locally. The latter feature enabled us to integrate a Test Card without additional hardware.

The HB9TV-1 relay is currently being tested in linear transponder mode. Its bandwidth is ± 2 MHz, centred on 1'280 MHz input and 10'390 MHz output.

In idle mode, the relay transmits a DVB-S2 QPSK SR 250 ks/s FEC 2/3 Test Card. When an input signal is detected, the relay switches to transponder mode.

The initial tests with different DVB-S, DVB-S2 and DVB-T transmission modes were very impressive, even the reception of HB9TV-3, which itself transits via a FAGOR IFL6000 transponder at HB9TV-2's site!

There remains the problem of visualizing the transponder's bandwidth occupation...
To do this, the OpenWebRX+ receiver (http://sdr10ghz-fro.iapc.ch:2173) located at HB9TV-2's site was reconfigured with an additional profile to monitor the 4 MHz of bandwidth centred on the transponder's 10,390 MHz output.

<div align="right">For the HB9TV Team ---   Michel, HB9DU</div>

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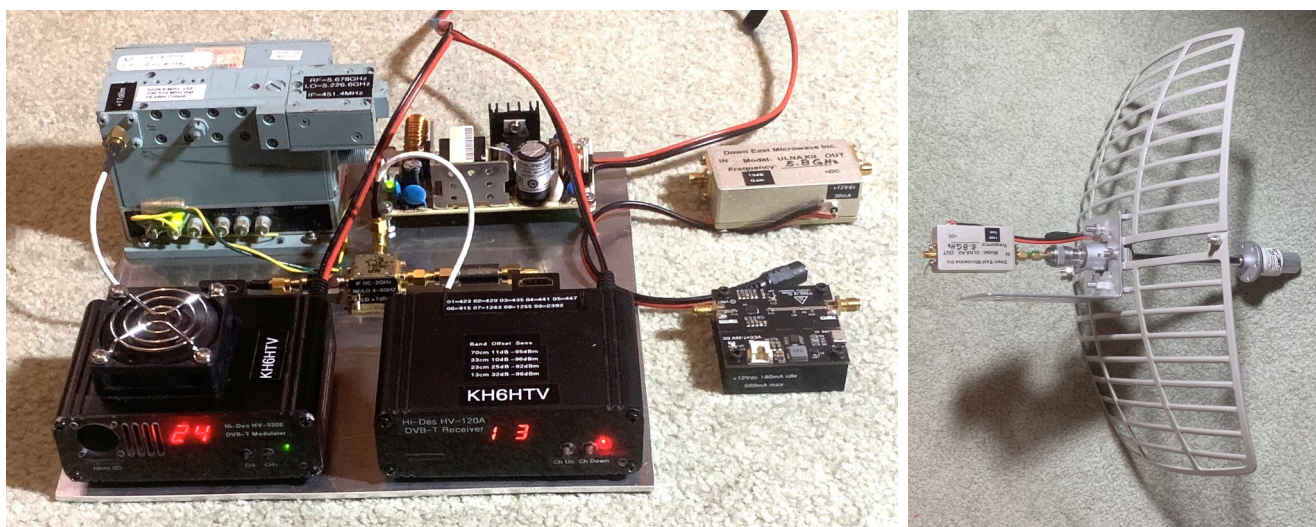

A 5.8GHz, DVB-T Transceiver

In our previous issue (#178), we showed a photo of an All Band, 70 thru 3cm, DVB-T, Transceiver. The weak link in it was the use of an Analog Devices ADF-5355 frequency synthesizer as the LO for the 5 and 10 GHz bands.   The ADF-5355 is fine for use as an LO when used as a transmitter.   It is not really suitable for use in a receiving down-converter. Why ?   The quick answer is "Phase Noise".   The

excessive phase noise generated by the synthesizer (and many other low cost synthesizers) considerably degrades the noise floor and thus the receiver sensitivity.   However, the rig shown previously was mainly intended for use as a 10 GHz transmitter to access the Boulder, ATV repeater, W0BTV.   Thus the ADF-5355 made sense as an economical LO.   For receiving 10 GHz, I use the Bulls Eye LNB (not shown), but discussed in previous issues of this newsletter.

The above photo shows a similar microwave DVB-T Transceiver, but one built strictly for the 5 cm (5.8 GHz) band.   The heart of it is a much quieter Local Oscillator (LO)).   This one uses a very old, surplus, California Microwave brick oscillator as the LO.   We have discussed such brick LOs in previous issues of this newsletter.   The brick starts with a precision 100 MHz crystal oscillator and then a chain of frequency multipliers and band-pass filters.   This particular brick put out +17dBm of RF power on 5226.6 MHz.   For our desired 5 cm operating frequency of 5.678 GHz, the resultant IF frequency was 451.4 MHz.   The brick requires -20 Vdc operating voltage.   This was provided by a Meanwell switcher boost voltage regulator, seen in the upper right corner mounted on the metal plate. The whole rig was designed to be powered off of a +12Vdc battery.

There are several other components mounted on the metal plate.   On the lower left is a Hi-Des model HV-320E DVB-T modulator.   On the lower right is a Hi-Des model HV-120 DVB-T receiver.   Behind them is mounted a double balanced diode mixer, SMA attenuator and a 5.8 GHz band-pass filter.   The modules on the far right are intended to be mounted directly on the 5 GHz dish antenna.   They are a Down East Microwave, 5 GHz pre-amp and a 1 Watt linear RF power amplifier module mounted on a heat sink.
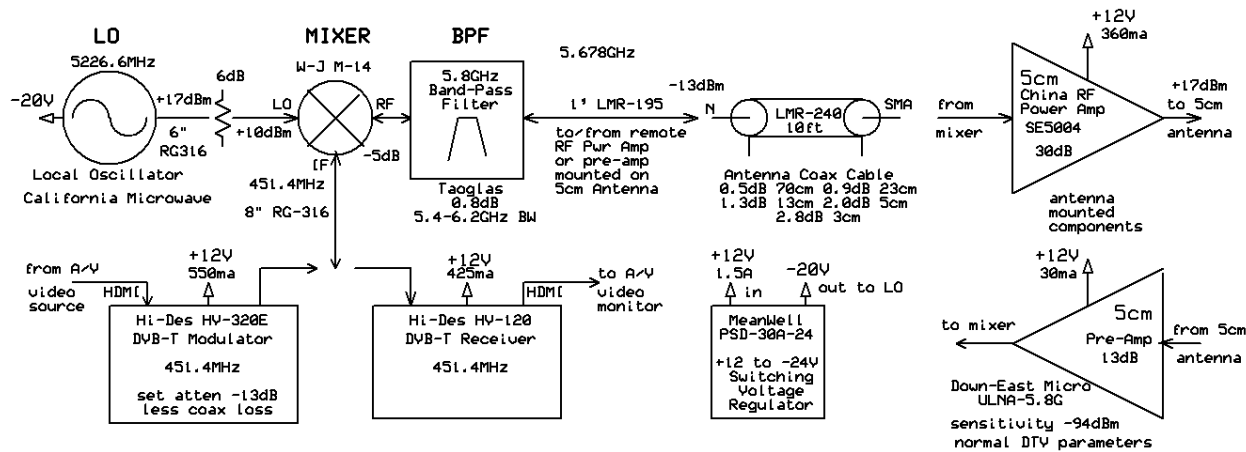

The mixer is an old microwave surplus item from the old line company, Watkins-Johnson. It is a model M-14 (RF/LO 4-8 GHz, IF 0-2 GHz, +7dBm LO, 6dB conv. loss),   The SMA attenuator drops the LO power to the appropriate level to drive the mixer.   The 5.8 GHz, SAW BPF is made by Taoglas.   It has 1dB IL and 5.4-6.2 GHz BW.   The DEM preamp has 13dB gain.   The measured sensitivity of the receiver was -94dBm. The RF power amplifier uses an SE5004 rf power MMIC.   It has 30dB of gain, P(sat) of +27dBm and puts out up to +17dBm of DVB-T rf power.   The BBQ grill dish antenna is made by L-Com and has +22dBi of gain.

73 de Jim Andrews, KH6HTV, Boulder, Colorado

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The Ultimate Aussie Ham Microwave Station !

The latest Dec. 2024 issue of the IEEE Spectrum magazine has a feature article entitled "This Apollo-Era Antenna Still Talks With Voyager 2".   Just the antenna every aspiring microwave ham dreams of having in their back yard !   It is called the DSS-43 and is located in Canberra, Australia.   It was originally built in 1964 as a 26 meter dish.   In 1969 it was enlarged to be a 64 meter dish. Then again in 1987, it became a 70 meter dish.   The DSS-43 has a 400 kilowatt transmitter and a 0.0038 degree beam-width. (Obviously for legal ham use, we would need to turn the power level down a bit.)   DSS-43 transmits on the S (2-4) and X (8-12 GHz) bands.   It has receivers for L, S, X & K bands.
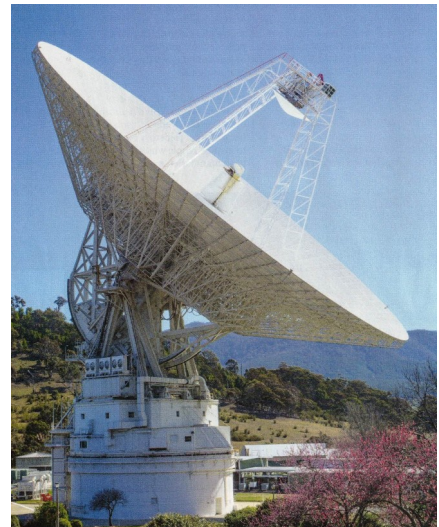
NEW PRODUCT REVIEW:
13 cm RF Power Amplifier Module

In the past year, the Chinese have started marketing a set of very impressive rf power amplifier modules covering from the 33 cm to 13 cm bands.   They are all in the package shown in this photo.

As with most stuff coming out of China these days, their quality

control is lacking.   Some work, some don't.   The first 2.4 GHz module I purchased last summer was DOA ! (Dead on Arrival).   Well when I started out putting together my total DATV package recently, I decided that I still really wanted to have some rf power on the 13cm (2.4 GHz) band, so I went ahead with a gamble and ordered another of the the amps.   It just arrived in the mail and I promptly tested it. This one actually worked.   And surprising for a lot of stuff from China, it really worked according to their advertised specs.

So what are the Chinese specs. ?   Not a whole lot of them.   Mfgr. & Model # = none given.   Freq. range 2.4-2.5 GHz,   40 dB gain, Output Power = 10 Watts for +6dBm input,   DC power 24-28Vdc at 1.7 Amps, 76x40x16.5mm, SMA connectors. External heat sink required.   That's it.

OK, so what did I measure in my lab ?   I mounted the amplifier on a large metal plate as the heat sink.   I powered it with +24Vdc from a well regulated Siglent power supply.   The no signal, idle current draw was 390 mA.   I then ran a CW Pin vs. Pout test at 2.4 GHz.   Yes, it had lots of gain, well in excess of 40 dB and Yes, it did put out a max. of 10 Watts rf power.   For power measurement, I used my HP-432 power meter with a thermistor head.   I used a 50 Watt, 30dB attenuator in front of the power sensor.   I measured the P(-1dB) point to be +40dBm (i.e. 10 Watts, per spec.)   The max.

saturated power, P(sat) was +40.6dBm (i.e. 11.5 Watts).   At 10 Watts CW output, the amp. pulled 1.3 Amps of current.   At 3 Watts out, the current draw was about 0.8 A.

My next test was the small signal, S21, gain vs. frequency.   For this I used my Nano-VNA model SAA-2 (50kHz-3GHz).   I set it up to sweep from 2 to 3 GHz.   The test configuration was to place 50dB of SMA pads on the input to the amplifier under test.   Thus the 0dB reference line indicated by the arrow is 50dB.   There was obviously a calibration "kink" on the VNA at 2.5GHz, but still the results showed that the Chinese amp had a whole lot of gain.   The marker says, the gain at 2.4 GHz was 51.5dB.   The -3dB band-width was about 450 MHz.
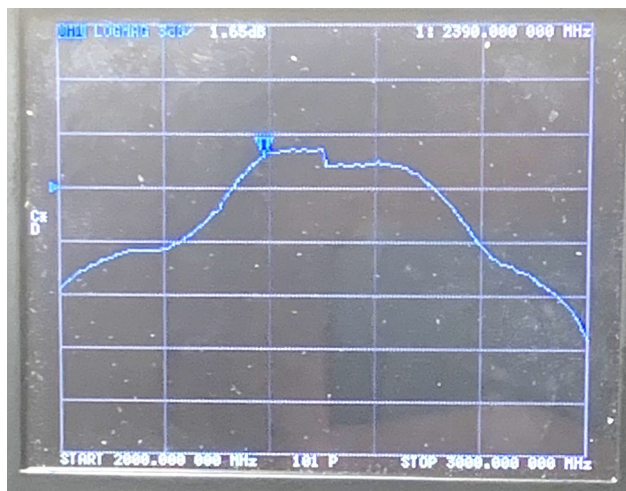
sweep from 2 to 3 GHz, 3dB/div.

My last test was then using DVB-T.   I used my Hi-Des model HV-320 modulator.   I set it to our 13cm ATV frequency of 2.393 GHz.   I monitored the quality of the resultant output spectrum from the Chinese amplifier with my Tiny-SA-Ultra spectrum analyzer.   I increased the rf drive level until the break-point on the spectrum shoulders grew up to the -30dB level. This it the typical level at which we run all of our DVB-T transmitters.   At this level, I used the HP-432 power meter to determine the rf output power.   I found it to be +33 dBm, i.e. 2 Watts.   At this rf output level, the dc current draw from the +24Vdc supply was 670 mA.

CONCLUSION: This amplifier is a winner. Also quite inexpensive. It cost me about $70 on E-Bay. Definitely a good addition to any well equipted ATV ham station.

73 de Jim Andrews, KH6HTV, Boulder, Colorado

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MERRY CHRISTMAS

to all our ATV Journal Readers

This will be the last issue of the ATV Journal for 2024.   The next issue in 2025 may be a bit delayed. Christmas 2024 will be a very different, memorable Christmas for Janet & I.   Instead of the normal family Xmas gathering, etc. -- we will actually be moving into and getting settled in our NEW home !

KH6HTV's QTH burning in the BIG Boulder Fire Storm!

The Xmas season three years ago was ruined by the devastating Fire Storm in Boulder, Colorado which destroyed over 1000 homes.   It included those of several hams.   Janet & I after the fire, didn't want to rebuild at our advanced ages, so we immediately purchased a replacement house in a 55+ retirement community east of Lafayette.   Fast forward one year to Xmas, 2022.   By then our son, Scott, had finally wrung out of State Farm insurance all the money we thought we were really insured for. (State Farm only wanted to give us about 1/2 to 2/3eds).   At our Xmas, 2022, family dinner, son-in-law, Mike, who is a custom home builder, convinced us that with our insurance proceeds, he could build us a smaller house.   Mike, daughter Susan and grand-daughter Alexa, lived next door to us and also lost their house in the fire.   Mike was working to rebuild for them, plus other neighbors.

I then proceeded to design a new house, but based upon the floor plan of the lovely house we previously owned on the island of Maui, Hawaii.   By November, 2023, Mike finally got the building permit and started digging the foundation for the new house.   A year later, now Mike and his partner Patrick have almost finished the new house.   Mike told us to schedule a move-in date for Monday, Dec. 23ed !   Great Xmas present for his Mother-in-Law Janet !   She is thrilled.   So here is a photo of the NEW QTH and TV Broadcast Station for KH6HTV-TV.

New QTH of KH6HTV-TV

To celebrate our rising from the ashes, Janet has created a new family crest for the Andrews home using the symbol of the Phoenix bird.   We will now be known as the "Rising Double J" mini-ranch.

Still will be a lot of work remaining to be in and truly settled. Definitely this spring will be occupied with a lot of landscaping. Antennas ?   Lost the old 50 ft. ham antenna tower *(visible with a hex beam in the above fire photo)*.   Will not be replacing it.   But do look for a mini antenna farm to grow on the roof top of the new house.

So, we from the Andrews family, wish you all ---

Merry Christmas and a *Happy New Year !*

W0BTV Details: **Inputs:** 23 cm Primary (CCARC co-ordinated) + 70 cm & 3 cm secondary   all digital using European Broadcast TV standard, DVB-T with standard 6 MHz wide TV channels.   Frequencies listed are the center frequency of the TV channel.
23 cm = 1243 MHz (primary), 70 cm = 441 MHz   & 3 cm = 10.380 GHz
Outputs: 70 cm Primary (CCARC co-ordinated), Channel 57 -- 423 MHz with 6 MHz BW, DVB-T
Also, secondary analog, NTSC, FM-TV output on 5.905 GHz (24/7 microwave beacon).
Operational   details   in   AN-51d   Technical   details   in   AN-53d.   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.   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

Items for Sale or Give Away: The St. Louis Amateur Television Society (**SLATS**) has on their web site (*www.slatsatn.net*)   a Want Ads section offering various pieces of ham radio equiptment for sale or to be given away. They say to check their site weekly as new items are always being added.   This week, they added a Pull Down GREEN screen (75"x79") and a Brady BMP 21+ Plus Label Machine.