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DATV on 2m

What is thought to be the first Digital ATV transmission in the 146 MHz band took place on Dec. 30, 2014 between Arthur Turner G4CPE andDon Saunders G0WFT

Arthur transmitted a 4 watt MPEG-2 signal on 146.500 MHz using a symbol rate of 543 KS/sec to Don over a 3.7 km path.

You could be prosecuted if your broadband interferes with radio signals

Ofcom proposes that people with "power line" networking equipment could face prosecution if it interferes with radio signals.

"Thousands of homeowners could face prosecution if their broadband persistently interferes with radio signals", this is of course Power Line Technology and under Ofcom's latest proposals published after alleged lobbying by intelligence agency GCHQ". I think as radio amateurs we have all suffered from this technology to the point where the RSGB went banging on the door of Ofcom with little or no effect, but when snoopers at GCHQ started to experience problems and they went banging on Ofcom's door the response was a little different.

Ofcom's new proposals are not in response to any requests from any organisation, merely devised to take account of developments in technology and they hope that as a result police, ambulance, and air traffic control, services are able to communicate more clearly. Let's all breathe a sigh of relief and remember next time we come across an annoying device that causes interference , just hope GCHQ are suffering the same, as they clearly carry more weight than the RSGB.

DVB-T2 tests with HEVC

Media Broadcast started a pilot project for DVB-T2 tests in Berlin in September 2014. As a "first" in Germany there are four sets of parameters tested together with the new HEVC/H.265 codec. This allows to expand the data rate of one UHF TV channel from 13 Mbit/s (DVB-T, MPEG-2) to max. 26,5 Mbit/s. That would enclose up to 7 HD- or 16 SD programmes in one multiplex. Private TV channels will be encrypted, while public service broadcasting programmes are free. Presently there are "DasErste", ZDF and Arte in 720p on test, later on Pro7 and RTL together with a VPRT demo channel in 1080i will follow. Modern UHD TV sets with DVB-T2 tuner and HEVC (i.e. Samsung) are able to receive the DVB-T2 test transmissions, as well as DVB-T2 USB sticks plugged into UHD TV sets like TX55AXW904 (Panasonic) and 55UB850V (LG). A PCTV 292e USB stick plugged into a modern Windows PC will show the test transmissions on the

monitor, if HEVC capable receiving software (like DVBViewerPro) is used. From autumn 2015 on (IFA Berlin exhibition) several HDTV sets as well as set-top boxes are expected to show up for DVB-T2 trailblazers.
From August 2015 another DVB-T2 testing region will be the area around Bonn and Cologne. With 20 kW each from the Venusberg TV station (WDR Bonn) and the Colonius tower (Media Broadcast Cologne) the WDR (public broadcast service) will show free TV programmes in one multiplex, a second one is planned for encrypted private TV channels. Final configurations from 2019 on will inhibit 3 public TV multiplexes and 3 encrypted private TV multiplexes.

First free UHD TV live concert

On 19.11.2014 SES Astra demonstrated the rapid 4k TV developments with a live transmission in UHD from the "LinkinPark" concert in Berlin. The 2 Astra UHD demo channels on 19 degr. east can be received by any DVB-S2 satellite tv receivers with HEVC codec. In Berlin 12 UHD TV cameras (11 Sony F55 and a new Toshiba) gave their video signals over 4 SDI cables (4x1080/50p) each into a Sony RAID complex in the OB unit, where the director produced live a final UHD mixing signal. This was coded in HEVC/H.265 as 2160/50p video and was sent via fiber optic cable from Berlin to the Astra satellite uplink station in Munic. There the data rate was reduced from original 12 Gbit/s to 35 Mbit/s for distribution on the UHD satellite transponder.

Sky Germany experience with UHD

"It is possible that we are going to set our main focus on sport in a future UHD programme. Our first official 4k production is the "Fanta4" concert on 20.12.2014 in Stuttgart", said the Head of of Innovations&Standards / Product&Operations-Technology at Sky Germany, Stephan Heimbecher. (Sky produced the live concert of "Fanta4" in UHD, but only 4 testing domestic homes and a 4k cinema were able to receive the encrypted signal from Astra satellite. In parallel an HD version was distributed to Sky pay TV subscribers.)
"Streaming hosts (like Netflix) are distributing first fictional UHD content - that is technically feasible, but the question is, if that gives a real excess value to the viewers. For us, in addition to good sport programming in UHD, that is imaginable", Heimbecher said.
Will Stereo 3D TV die with the introduction of UHD programmes? Heimbecher says no and believes in more power for 3D TV through UHD transmissions, because the higher resolution will enable a better 3D quality (DL4KCK: especially for passive 3D displays with polarizing 3D glasses). Furthermore developments of glasses free 3D displays would benefit from that. He notes an early market presence of UHD for customers, which had a negative impact on a sound development of 4k technologies. "Display makers produced expectations that were too high for the present UHD quality (DL4KCK: the same applies to 3D-TV ads where animals are jumping out of the screen...). Normally the TV viewer is sitting too far away from the display and cannot realize the UHD resolution. We want to avoid that disappointment now."

Philips-TPVision

Recent TV sets rating below 2000 Euro are displaying more and more pixels while overall picture quality is declining because of bad background lighting. The new UHD TV line 9809 by Philips-TPVision is making an exclamation point using a real Direct-LED BL with Local Dimming. This is able to produce nearly double brightness against the usual Edge-LED-LCD screens, and the special Philips video processing enacts the brightness only when it benefits the contrast ratio.

As chief developer Danny Tack (Philips-TPVision Gent, Belgium) stated, the present TV and cinema productions are still using the old video signal specification (Rec.709 with 8-bit color) devised for CRT displays, so usual video sources are not able to provide such extreme contrast ratios.
Right hand display: 9809 with Direct-LED, left hand improved Edge-LED-LCD, middle display usual Edge-LED-LCD.
Also on the OLED display development segment Philips-TPVision is trying to push brightness levels, but Danny Track emphasised that OLED is showing its potency only in dark rooms. More and more manufacturers are presenting improved LED-LCD displays with double or more peak brightness, HDR video processing (and min. 10-bit color), expanded color gamut and native 200-Hz-panels ready for the next step of UHD TV.

Latest news from CES 2015: SUHD

Samsung's flagship television was on display showing off short clips of "Life of Pi" and Ridley Scott's "Exodus", both of which had been specially mastered in 4K UHD with 10-bit colour and in High Dynamic Range (HDR). Both 10-bit color and High Dynamic Range are reportedly part of the new 4K UHD Blu-ray spec, as designated by the newly-formed UHD alliance. High Dynamic Range allows for brighter images with even greater contrast between dark and light.
(DL4KCK: citing Wikipedia "For consumer video standards, such as High Efficiency Video Coding (H.265), the bit depth specifies the number of bits used for each color component. 8-bits per sample allows for 256 shades per primary color (HDTV and Blu-ray standard) while 10-bits per sample allows for 1024 shades per primary color (UHD Blu-ray standard). HEVC defines the Main 10 profile which allows for a bit depth of 8-bits to 10-bits per sample with 4:2:0 chroma subsampling.")
Sources offering 10-bit color and HDR are not available yet, but when 4K UHD Blu-ray discs arrive, we'll get both and from what we've seen so far, it is going to be spectacular in the literal sense of the term. http://www.digitaltrends.com

Translations: K**laus, DL4KCK** www.agaf.de

BATC subscriptions to be increased

The BATC has incurred a small financial loss in the last two years and the current year will also see a loss, mainly due to subsidising the DTX1 sales and increases in the cost of CQ-TV postage

The reversal in the online shop trading and expensive paper magazines, seems to be the problem and will be covered by a 50% hike in the cost of cyber membership.

The paper membership which is listed as part of the problem will see a much smaller percentage increase.

We had hoped that the fairer system of every member paying the £4 membership and cyber subscription, then people who require a paper magazine being able
to purchase an advanced subscription as an additional item at cost via the online shop would have won the day.

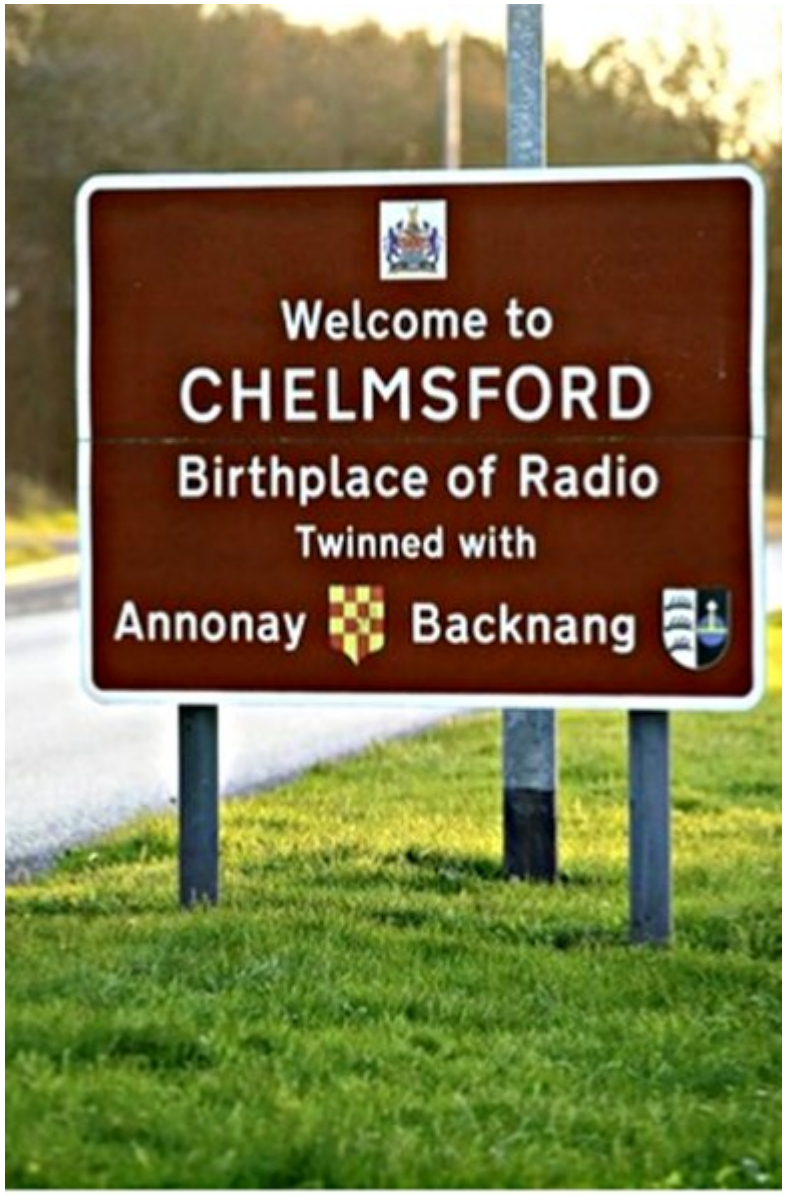
The new rates are :-

For the UK
Full Membership + cyber CQ-TV
1 year =£6 2 years = £11 3 years = £15
Full Membership + paper & cyber CQ-TV
1 year = £20 2 years = £39
For Europe (air mail service)
Full Membership + cyber CQ-TV
1 year =£6 2 years = £11 3 years = £15
Full Membership + paper & cyber CQ-TV
1 year = £30 2 years = £59
For Rest of World (air mail service)
Full Membership + cyber CQ-TV
1 year =£6 2 years = £11 3 years = £15
Full Membership + paper & cyber CQ-TV
1 year = £35 2 years = £69

Birthplace of Radio signs to be removed

The Essex Chronicle newspaper reports the Highways Agency wishes to remove 'Birthplace of Radio' signs from Chelmsford roads

There are ten roadsigns bearing the words "Welcome to Chelmsford – Birthplace of Radio" on roads leading into the



City. They were unveiled by Guglielmo Marconi's daughter Princess Elettra on December 8, 2001. Apparently the Highways Agency says the sentence distracts drivers.

"It's disgraceful because what now remains of our industrial heritage?" said Marconi Veterans Association chairman Peter Turrall, MBE.

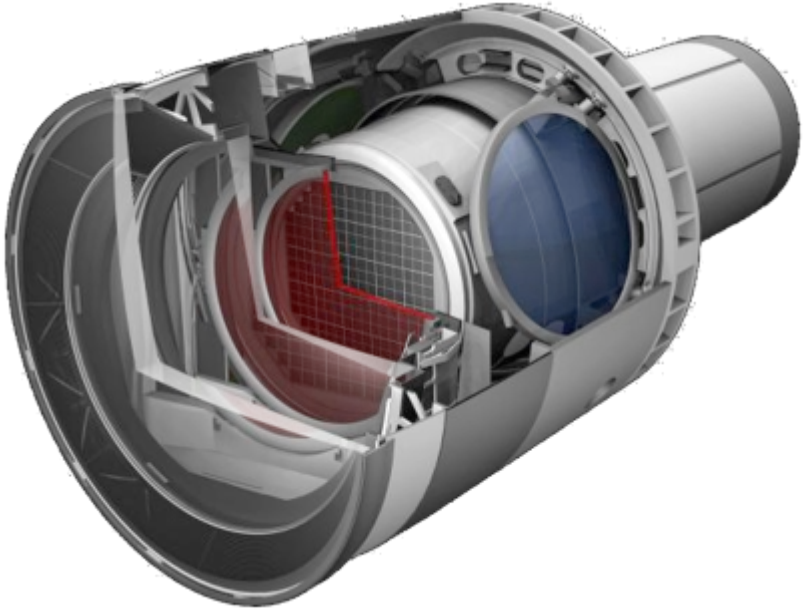
http://www.essexchronicle.co.uk/Uproar-plans-erase-Marconi-legacy-welcome-signs/story-25788407-detail/story.html

Marconi transatlantic signal centenary Dec 8, 2001
http://www.g0mwt.org.uk/events/marfold/marconi.htm

Chelmsford Amateur Radio Foundation training course started Jan 15
http://www.southgatearc.org/news/2014/december/31st_chelmsford_amateur_radio_foundation_course.htm

Source - Southgate news

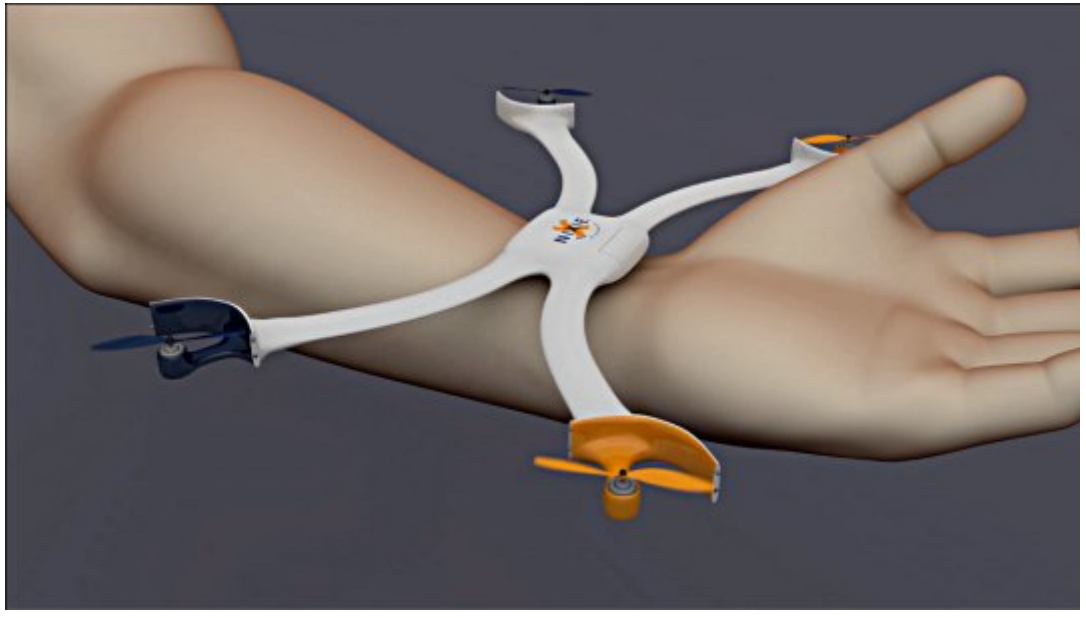
32,000 megapixel camera



Funding has been secured to construct the world's most powerful digital camera. Weighing in at more than three tonnes -- around the same size as a small car. The Large Synoptic Survey Telescope camera, or LSST for short, will be constructed at the Department of Energy's SLAC National Accelerator Laboratory, with operations set to begin in 2022. The goal is to take digital images of the entire visible southern sky from atop Cerro Pachon mountain in Chile.

Nixie - Flyable & Wearable Camera

For the older readers the word Nixie was associated with Nixie tubes, for the younger readers they were the equivalent of 7 segment displays, but predated LED technology and used cut out number in Neon discharge tubes, it was a huge relief when LED technology appeared.



Now the name has reappeared, but as wearable technology, but not the tubes, it's the name for a wearable drone or quad copter equipped with a tiny recording camera.

So you can now produce the ultimate selfie, without being limited by the length of your arm.

The camera looks like a wrist watch, but the strap unfolds and is equipped with the four props, which propel the camera around you filming as it goes, after which it returns to you. Sound too good to be true well it has just won a wearable technology competition, scooping a prize of $500,000 (£313,000) at a ceremony held in San Francisco, follow the links to see it in action and to meet the developer.

http://flynixie.com/

https://makeit.intel.com/finalists

http://www.engadget.com/2014/09/29/nixie-wearable-drone/

Known DATV DX Records - 2015

Rob MØDTS and Terry G1LPS successfully completed their first 2-way DATV QSO on 146.5 MHz on Sunday.
This 28 KM distance is the longest 2M DATV QSO that I am aware of.

Experimental-DATV-Express and Tutioune receivers at both ends.

I have added this 2M QSO at very bottom of the updated table.

Ken - W6HHC

Please note: articles in this magazine are provided with absolutely no warranty whatsoever; neither the contributors nor CQ-DATV accept any responsibility or liability for loss or damage resulting from readers choosing to apply this content to theirs or others computers and equipment.

Known Digital-ATV DX Records

updated 2015-01-15

by Ken W6HHC

24 GHz		
124 KM	JA6DME & JA6EES	2011-11-12
Locations Mont Ten-Zan and Mont Ge-Zan		
10 GHz		
450 KM	HB9JBC & F4CXQ	2005-06-21
Locations JN40CT (Sardinia) and JN12OH (Spain)		
5.7 GHz		
341 KM	JL1BLF & JH1GED	2011-08-06
Locations Mont Chokai-san and Mont Kashimayari-gatake)		
2.4 GHz		
252 KM	JA6SPI & JA5MFY	2009-11-03
Locations ??		
1.2 GHz		
440 KM	G4KLB to G1LPS	2010-10-11
Locations IO90BR and IO94EQ		
(tropospheric ducting - one-way DATV)		
419 KM	G4KLB & MØDTS	2010-10-11
Locations Bournemouth, England and Yarm, England		
(tropospheric ducting)		
379 KM	VK3RTV(RPTR) & VK7EM	2011-02-23
Locations Mount Dandenong, Victoria and Penguin, Tasmania		
(operators VK3BFG, VK3DQ , VK3WWW and VK3TRX)		
252 KM	JA5GYU & JA6JNR	2009-11-03
(1 Watt)		
70 CM		
696 KM	F1FY to G8GTZ	2013-09-24
(DVB-S 2MS/sec FEC=1/2 - - one way reception)		
696 KM	G8GTZ to F1FY	2013-09-25
(DVB-S 2MS/sec FEC=1/2 - - one way reception reported by FM)		
Locations IO91KH (near Basingstoke) and JN16VB (near Roanne, France)		
528 KM	G3PYB & F5AGO	2013-09-24
(DVB-S 2MS/sec)		
Locations near W YORKSHIRE and JN06DP (near Poitiers, France)		
501 KM	W4HTB & WB8LGA	2014-07-26
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting		
Locations Bowling Green, KY and Marengo, OH		
373 KM	G8GTZ & F3YX	2013-09-25
(DVB-S 2MS/sec FEC=1/2)		
Locations IO91KH (near Basingstoke) and JN18AP (near Limours, France)		
290 KM	W4HTB & W8ZCF	2014-04-12
(DVB-T QPSK FEC=1/2 2 MHz Bandwidth) - Tropospheric ducting		
Locations Bowling Green, KY and Cincinnati, OH		
121 KM	KH6HTV to KØRZ	2011-11-21
(video resolution HDTV 1080i - protocol ITU-T/J.83B QAM-64 - one-way DATV)		
Locations Cheyenne, Wyoming and Boulder, Colorado		
144 MHz		
237 KM	F3YX to F9ZG	2011-11-09
DVB-S protocol at 1000 KSymb/s using modified SR-Sys MiniMOD (one-way)		
on 145.0 MHz experimental license 5-Minute max		
Locations JN18AP (near Limours, France) to IN99KC		
28 KM	MØDTS & G1LPS	2015-01-11
H.264 video - protocol DVB-S at 333 KSymb/s using experimental DATV-Express		
on 146.5 MHz - UK temporary band allocation		
Locations Yarm, England and Spennymoor (County Durham), England		

See more details at **www.von-info.ch/hb9afo/records/recordse.htm**

Welcome to CQ-DATV issue 20

When we first published CQ-DATV 1 it was difficult to imagine our future, could we produce the articles you would like to read and well 65,000 downloads later, we must have got something right. The first issue of CQ-DATV started a series of articles that covered the construction and implementation of GB3FY, the 10 GHz FM ATV repeater near Fleetwood. This has been designed and constructed by John G3RFL. This repeater has enthused and grown an entire ATV community. So perhaps to read that BATC are now operating a policy of digital only outputs for any new ATV repeater was a little disappointing

A self imposed policy of digital only for any newly licensed repeater outputs has been adopted and the use of 2 and 4 Msymbol DVB-S is now accepted as the UK standard for all bands from 437 MHz - 10 GHz.

We all understand the need to keep ATV bandwidth to a minimum and that digital is the only way to do this, but as yet we do not have a common digital standard and when we do, this sort of policy needs to be phased in, and perhaps be part of a world where the significant cost of digital technology has reduced from where it is today.

Looking back on FM ATV and its introduction, the migration was from AM, where power amplifiers were down rated in order to produce the required linearity (sound familiar) and the move to higher frequencies where solid state PA's were starting to appear, but at a significant cost, that increased with power. So the need to get the maximum power out of these expensive devices was paramount, (I think more bangs per buck is how it is defined across the pond) a world where down rating was not a popular expression.

FM removed the requirement for down rating and tune for maximum smoke, became the watch word. FM also delivered simple ATV sound systems, in an AM world two transmitters were often used one for sound and one for pictures.

The new FM world delivered and coupled with surplus satellite receivers, proved to deliver improvements and cost savings, two things that rarely go together. this may be the last time that happens in ATV and we might reflect on Edwin Armstrong the inventor of FM

Edwin Howard Armstrong was one of great engineers of the 20th century, he was born in 1890, in New York City, and died in 1954, also in New York City. Edwin Armstrong was only eleven when Marconi made the first trans-Atlantic radio transmission. Enthralled, the young Armstrong began studying radio and building homemade wireless equipment, including a 125 foot antenna in his parent's backyard.

On the brighter side digital will we hope take us into the world of reducing bandwidth that will deliver ATV on the lower frequency bands, starting with 2m.

CQ-DATV will keep you up to speed on these developments as they unfold, I expect we will get to see picture movement and quality degradations as we make this move and lets all hope that we are not going to become the architects of our own downfall, as once we produce RB ATV (Reduced Bandwidth ATV) that this may become the norm for all future spectrum planners, with a never mind the quality, look at the bandwidth approach.

CQ-DATV 20 has one or two departs from the norm first of all the tri band dish feed which does need specialised tools and mechanical engineering input, but is a very useful piece of kit for those who know how or know a man that can.

SSB with a 10GHz PLL LNB, yes SSB is not ATV but a look at an LNB that can be used on the 10GHz band is always useful and the author himself says it has ATV applications

Finally Ugly DATV you may have seen this in other publications, it was part of CQ-DATV 19, but was moved at the authors request to allow him to revise the schematics, so if you have seen an earlier version elsewhere..we hope this is the definitive version. Let's not be hard on any other publication at CQ-DATV we know just how hard it is to put a magazine together and to get proof copies out to the authors and get all the links working, we have a brilliant team, they all know who they are and what is involved in producing DATV, they are indeed the unsung heroes of ATV, that have made CQ-DATV what it is today

Enough of us, please enjoy CQ-DATV 20

CQ-DATV
Editorial Team

Manufacturing a Tri-Band Dish Feed

Steve Noll WA6EJO

This article was first published in the Fall 2014 edition of the ATVQ magazine and is reproduced here with their kind permission.

Background

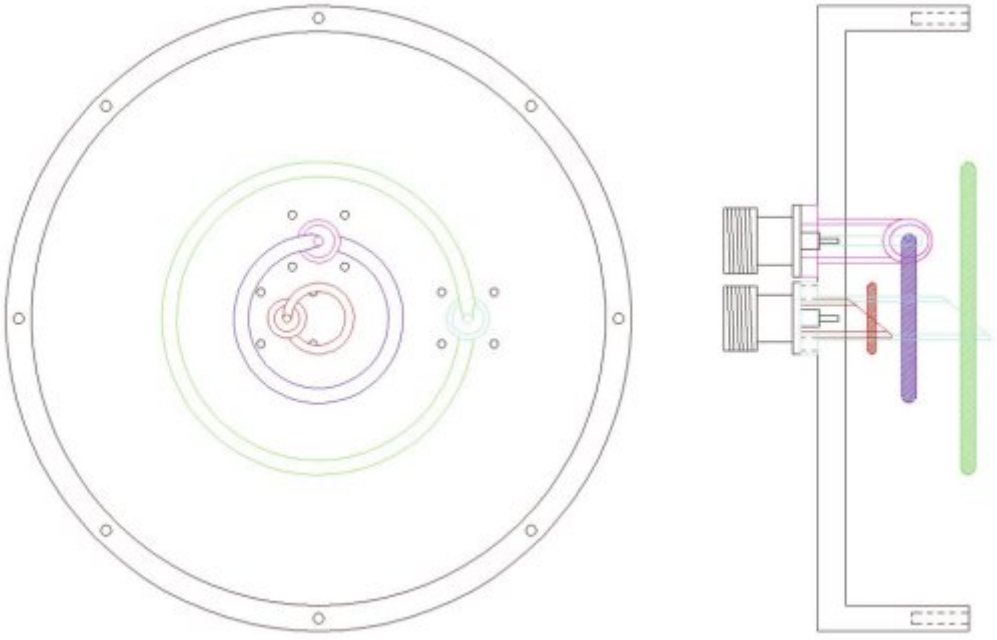
In an effort to upgrade the W6ATN ATV link between Oat Mountain and Santiago Peak, a new feed horn was constructed. This feed was patterned after the dual band feed described by Galuscak and Hazdra in their DUBUS 2/2008 article, "Loop Feed With Enhanced Performance" http://www.om6aa.eu/Loop_Feed_with_enhanced_performance.pdf.

However, in this case a three band feed was needed adding a 5 cm (5.91 GHz) feed to the 13 cm and 23 cm design.

To start, the needed loop diameter and height dimensions were scaled from those used in the original design. The feed was redrawn in AutoCAD to check the 5 cm loop fit.

This additional band complicates the design due to the closeness of the 5 cm N connector to the 13 cm N connector. Standard N connector one inch square flanges would hit so special o-ring sealed 0.69 inch flange N connectors were procured (Amphenol 172117.) The original loop support design was modified to accommodate the smaller connectors.

Nevertheless, this resulted in less than 0.01 inch clearance between the 5 cm and 13 cm N connector male shells so just in case, a low loss N 90 degree adaptor was modified to reduce its outer diameter if there were clearance issues at final installation time.

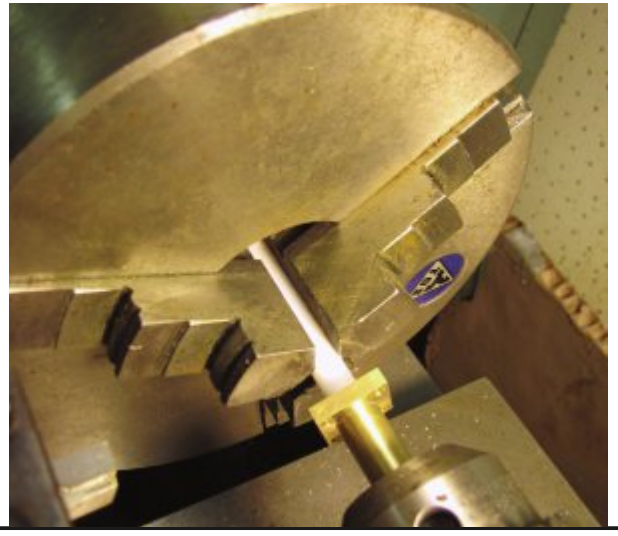


Construction

The feed reflector was machined from a 6 inch diameter 3 inch thick 6061 T6 aluminum disk (McMaster 1610T56.) This will make two feeds as the design is a bit under 1.5 inch thick.

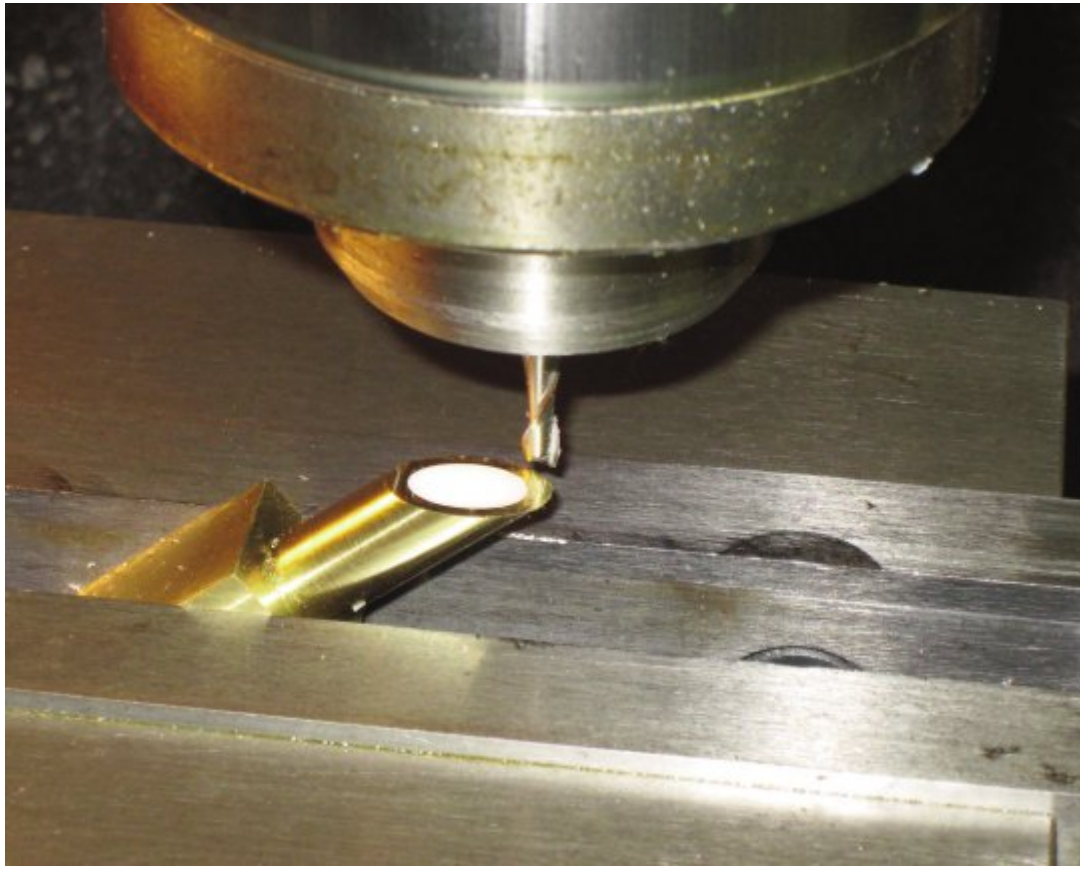
A lathe was used to smooth the faces of the reflector blank.

The bowl was formed and the rest of the machining was done with a milling machine and a rotary table.



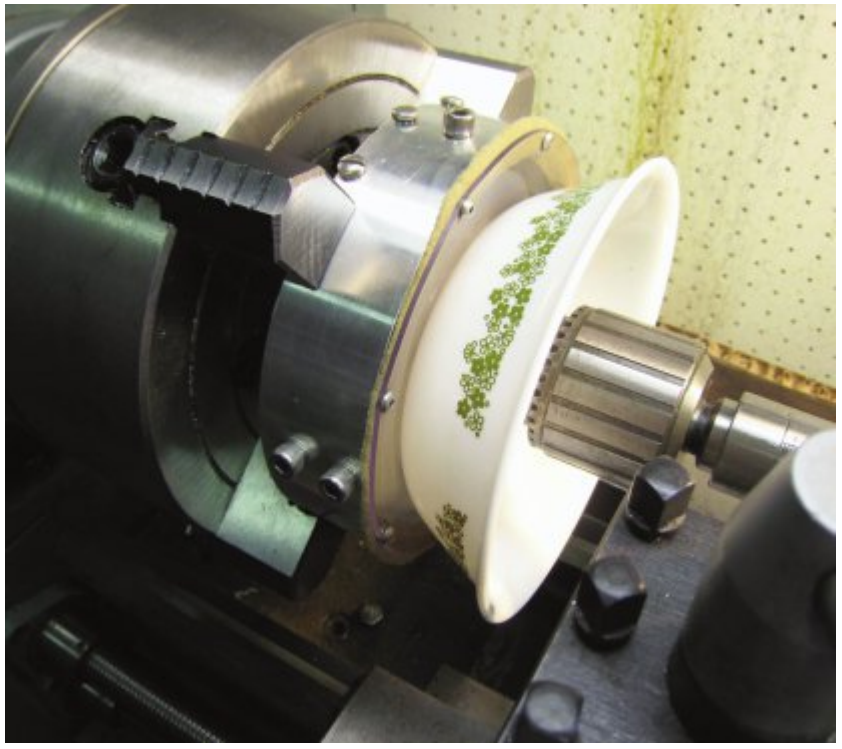
The Teflon insulation in the brass loop support is pressfit in. The center conductor is pressfit in the Teflon later.

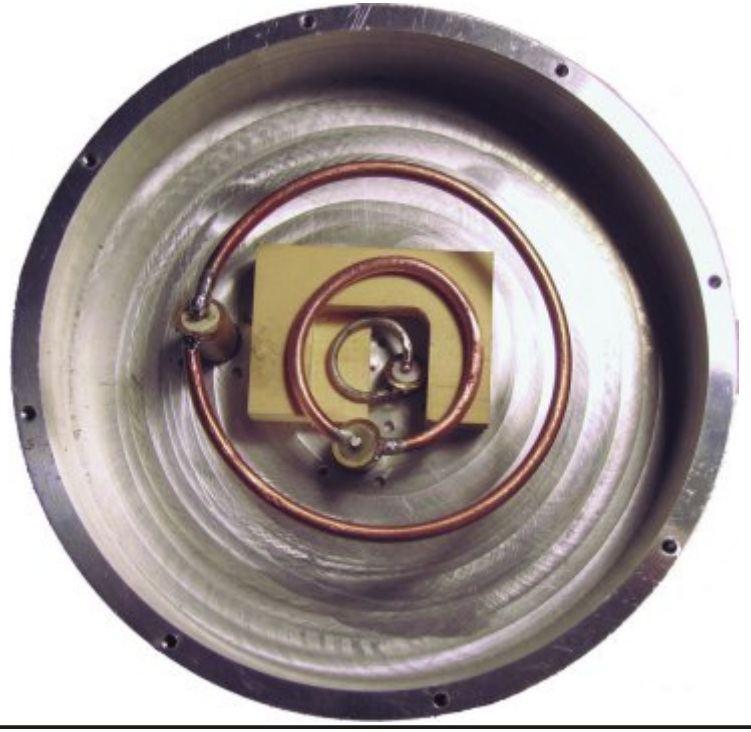
The loop support bodies and center pins are sized to maintain 50 ohm impedance.



A radome is thermoformed from a 1/16 inch polycarbonate disk (McMaster 8508K92.) Before the loop supports are installed, a polycarbonate disk is drilled and mounted on the reflector. Between the reflector and the disk is a felt washer kept moistened with water to keep the polycarbonate cool so its edges won't deform while the disk is being stretched.

While the assembly is rotated on the lathe a ceramic bowl is used to apply pressure while the disk is heated with a heat gun. The resulting bowed disk is flipped 180 degrees when installed. It took three tries to get a good radome.

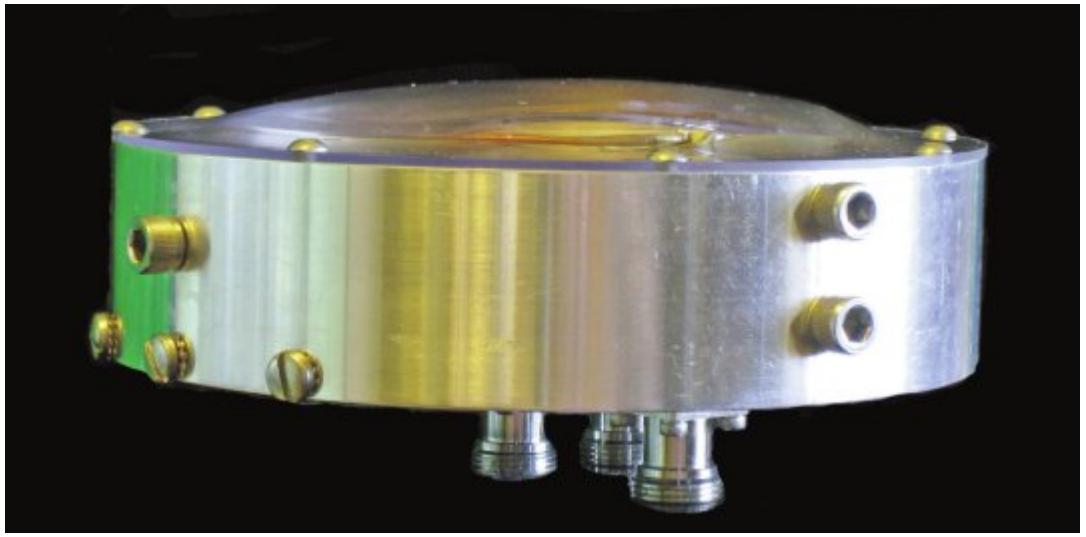




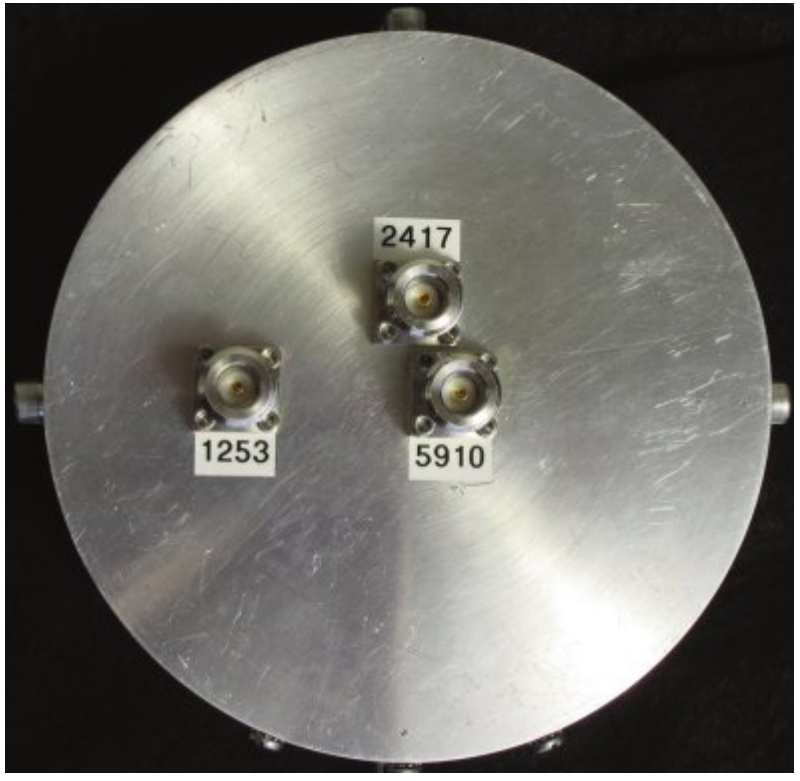
A machined wood block helped to hold the loops for soldering.

Tuning is tedious as loops need to be unsoldered, trimmed, reinstalled and tested over and over again to reach resonance, plus, there is interaction between the loops. To complicate things, the loop to reflector distance also needed adjustment which was not indicated in the original design. The 13 cm and 23 cm loops are fashioned from 0.141 semirigid while 0.085 semirigid was used for the 5 cm loop.

The finished feed has a number of ¼ inch tapped holes around it for mounting and smaller tapped holes for cable clamps.



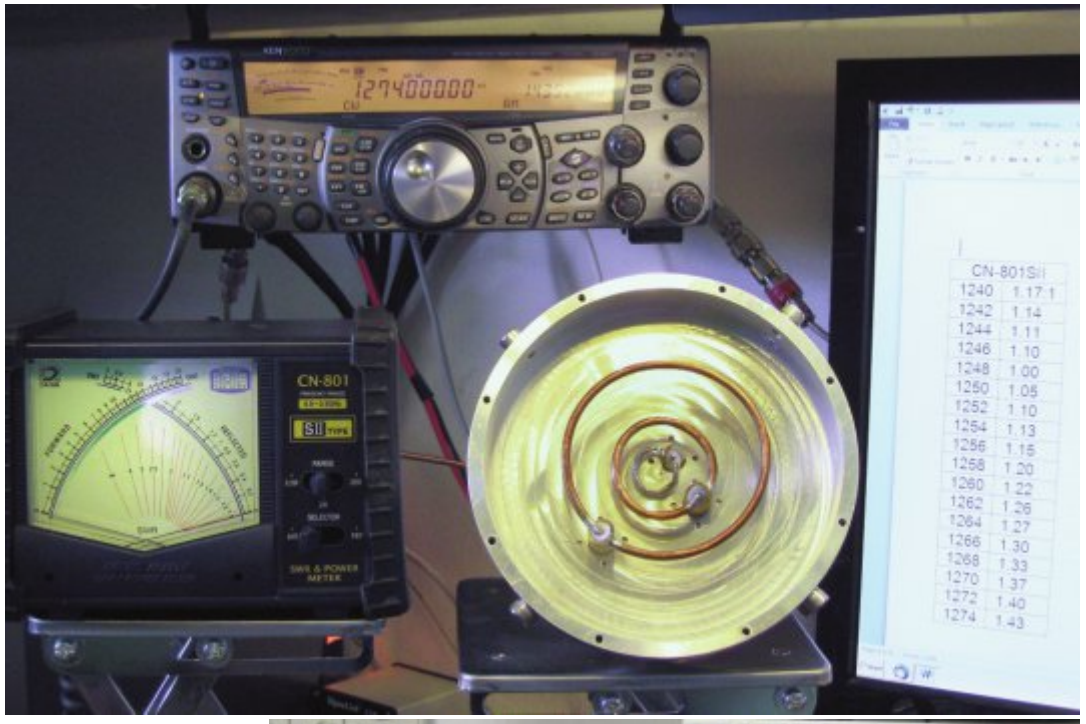
The radome had to be bowed as the 23 cm loop and loop support extends above the rim of the reflector.



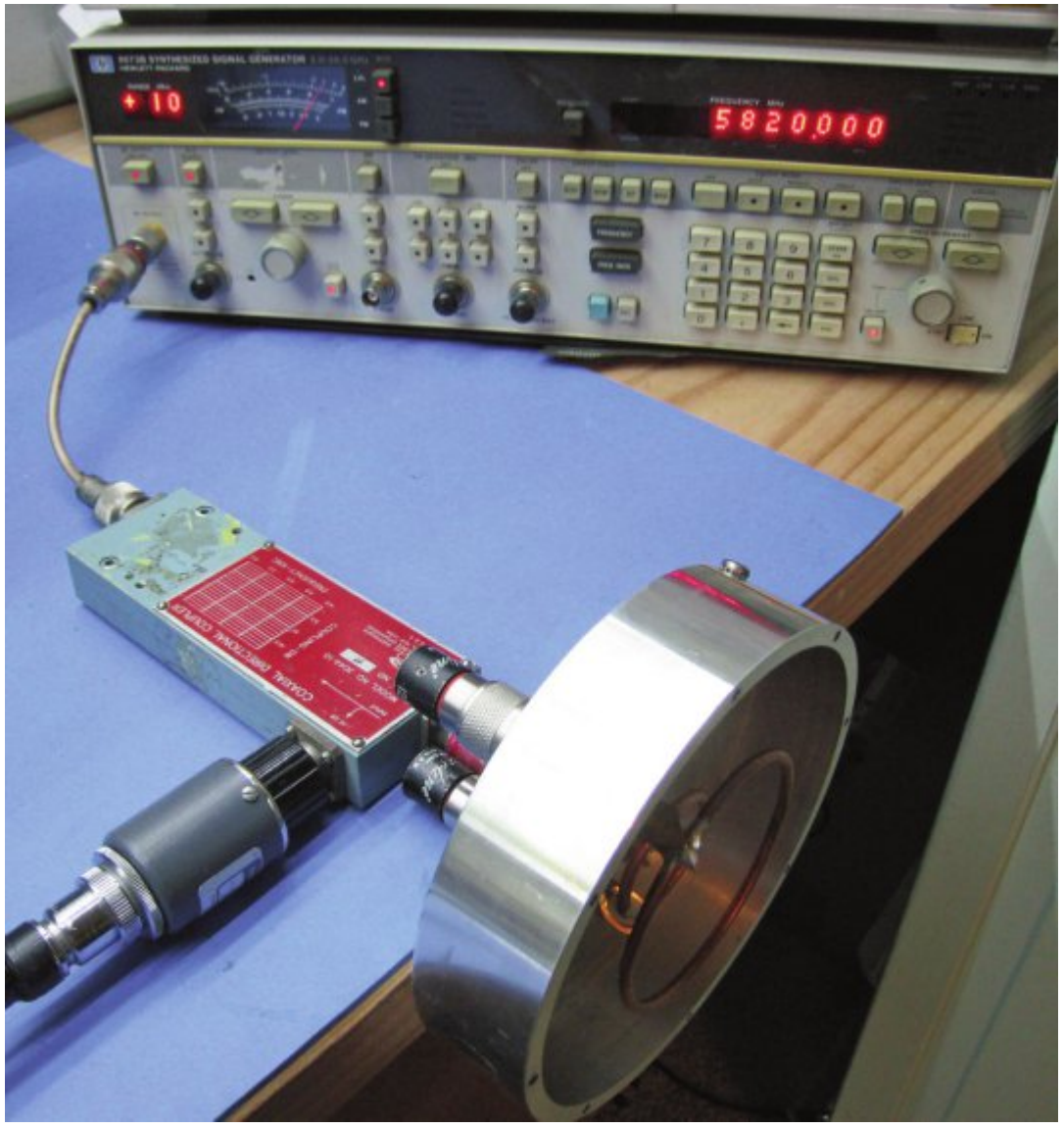
Back view of the feed with the three N connectors.

Tune up

23 cm tune-up used a TS 2000X as a signal source.



For the 13 cm tune-up, the signal generator is assisted by a 1 Watt WiFi power amp.



5 cm tune-up is done with a directional coupler. The final result was SWR under 1.2:1 and a return loss of 23 dB or better on all three bands. 10 dB beamwidths were measured to be 115 to 140 degrees for 23 cm, 110 to 140 for 13 cm, and 90 to 100 degrees for 5 cm.

Last August Allan W6IST, Mike WA6SVT and I drove up to Oat Mountain to remove the old feed and install the new feedhorn. We had to modify the old Sheppard's hook to attach the feed.

Feed in place. Mike WA6SVT, who had the difficult job of installation, is hidden by the eight foot dish. The new feed doubled the 23 cm signal strength. The other bands remain to be tested.

73, Steve WA6EJO

By Michel Vonlanthen HB9AFO

...continued from Issue 19

Replacing the PLL LNB Crystal with a DDS

Experimet by F1CHeF and F1CJN

DDS-60 at Midnight Design Solutions

An Arduino based DDS-60 controller Other

W5DOR DDS

DDS-60 Direct digital synthesizer

To order:

AD9851 DDS Signal Generator Module + Circuit Diagram + Code For Arduino MCU 2560: 21 Dollars on E-bay

2013.01.31 News from Spain (Luis EA5DOM)

I saw Michel F6HTJ sent you photos of the 3 cm beacon under construction. I just want to clarify that we do not use brick multiplier MACOM that we see in the photo. The reason is the large consumption of this circuit. The site on the mountain is powered by solar panels and we have only one panel, which forces us to save energy.

Fortunately, kronotek (a Spanish manufacturer transverter) has already released a very nice 10GHz transverter. We use the multiplier (x96) this transverter because it consumes very little and delivers 10 dBm.

http://www.transverters.net/84298697

To keep you informed about our improvements, we are working on a microwave SDR using an affordable LNB.

We added a slot antenna constructed of square aluminum tube 20 x 20mm. A Sharp LNB has been modified and connected to this antenna.

We use the original antenna pin of the LNB.

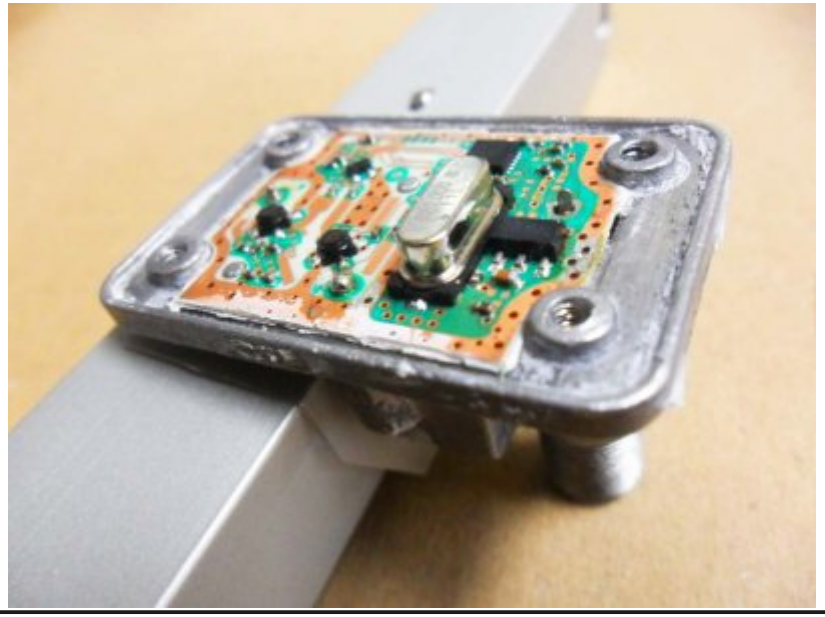
To improve the stability of the PLL, we added a temperature control that heats only the quartz PLL and keeps it at 60 degrees.

Photos LNB

The antenna that is used with the SMA and pin antenna LNB modified Sharp:

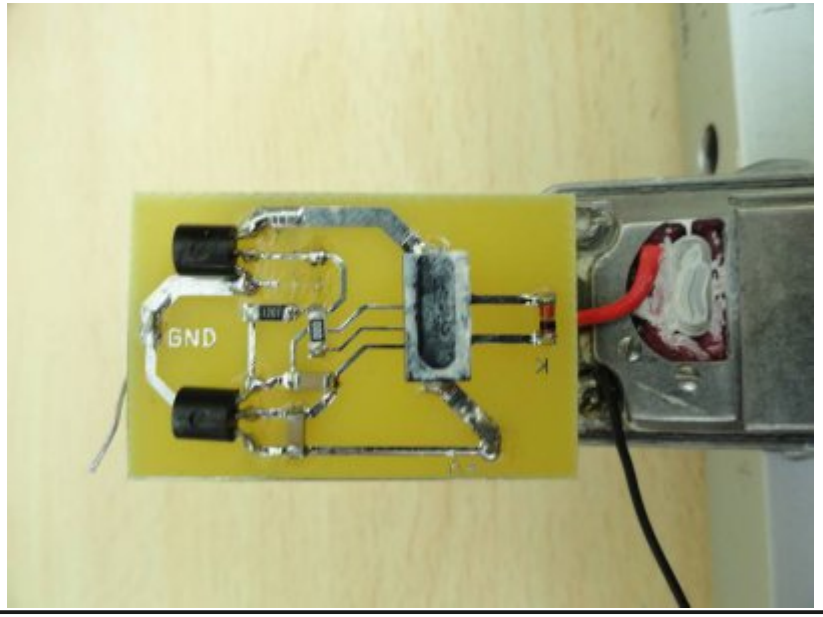
Here changing the LNB which allows it to integrate with the antenna. The LNB is a metal screen and you can see the cone:

The LNB coupled to the slot antenna:



The top cover of the LNB was drilled to access Quartz PLL:

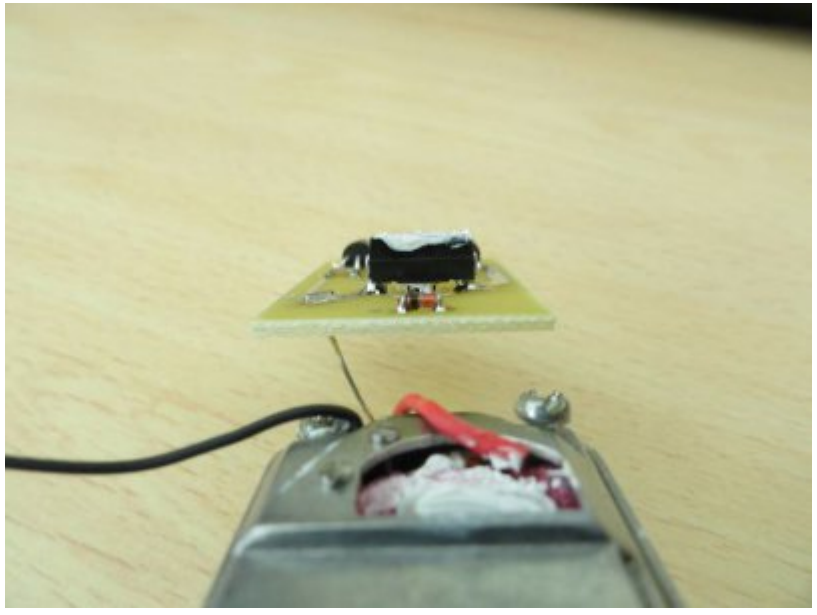
This thermal stabilizer. It is based on a Microchip circuit which contains the temperature sensor and the comparator with a hysteresis of 2 degrees:



The heater is a 68Ohms 3W SMD resistor that dissipates within 120 mA at 12 V.

http://es.farnell.com/te-connectivity-cgs/smw347rjt/resistencia-3w-5-47r/dp/1086392?Ntt=1086392

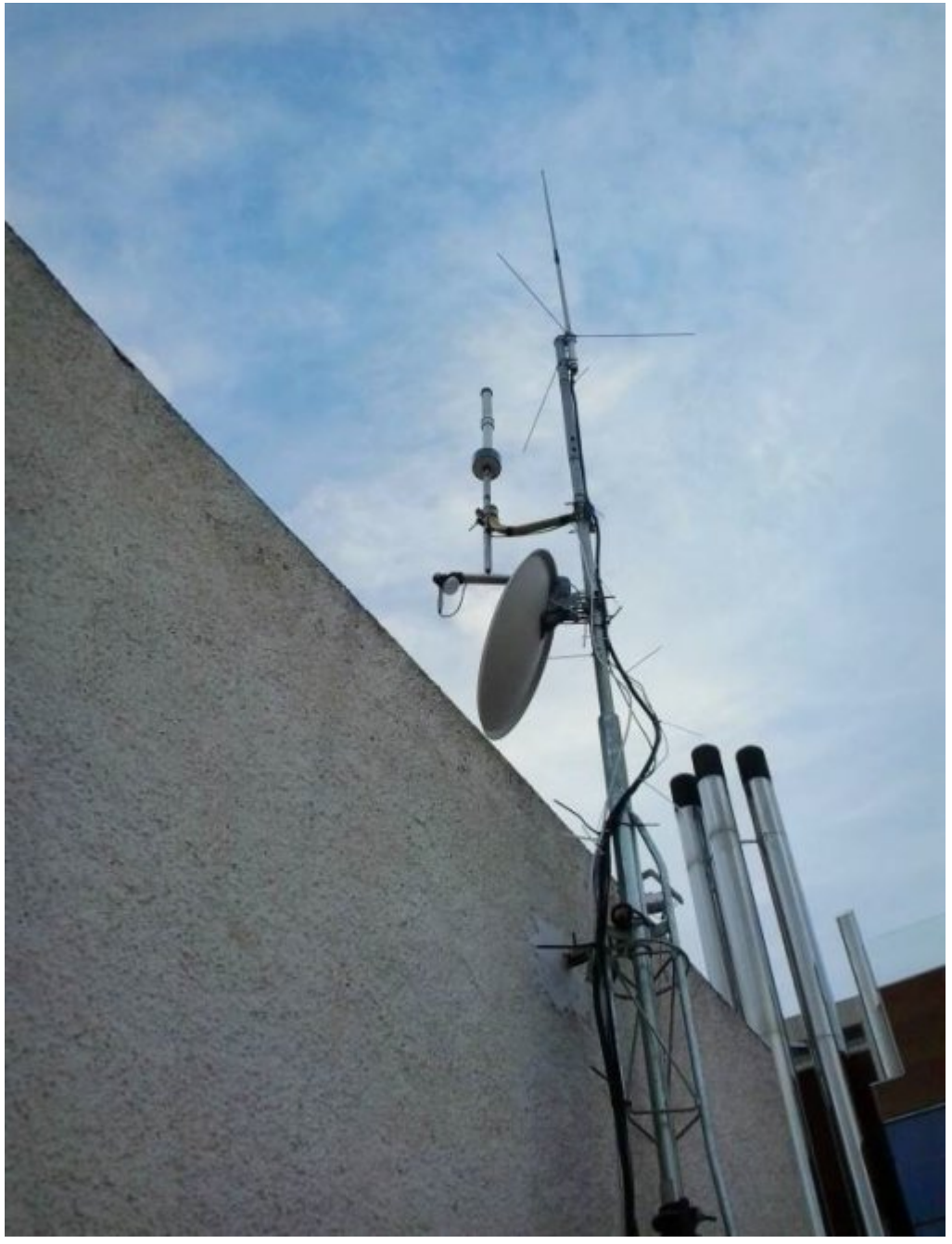
Everything is small enough to fit on the PLL LNB crystal so as to heat only the component and not all the LNB and the antenna. Microchip sensor is located under the resistance, in a closed circuit.



The printed circuit is fixed against the LNB xtal so that the resistance heats only the quartz.

I have determined that a hysteresis of 2 degrees was enough to raise and lower the frequency of the LNB. So I used a plastic plate 1mm thick as a temperature stabilizer. And it works! The frequency is very stable and there is no variation of more than 2 degrees centigrade. A different approach with a linear temperature controller (not digital) could be even more precise.

The radome of the slot antenna is PVC.
And that's what happens on the same lap as the offset satellite dish:



As the frequency difference between the 2 LNB, that of the satellite dish and that of the slot antenna, is about 150kHz, we can not use the same FUNcube to play both signals. We therefore replaced by the LNB 2.3GHz to 10GHz of the slot antenna. This was very convenient and it's easy to see the difference between the signals and changes in frequency of 2 LNB.

Javier EA1BHK, the slot antenna manufacturer and integration of the LNB, recorded a video of the waterfall of the received signal 320images / second for about 90 minutes and then condensed into 30 seconds video .dropoff window The frequency of change of unstabilized LNB compared to stabilized is surprising.

http://youtu.be/rnailMxoo6U

The vertical line on the left is the PLL LNB temperature stabilized and coupled to a slot antenna.
The vertical line on the right, the PLL LNB mounted on a dish.
Both receive the same Ibiza beacon.

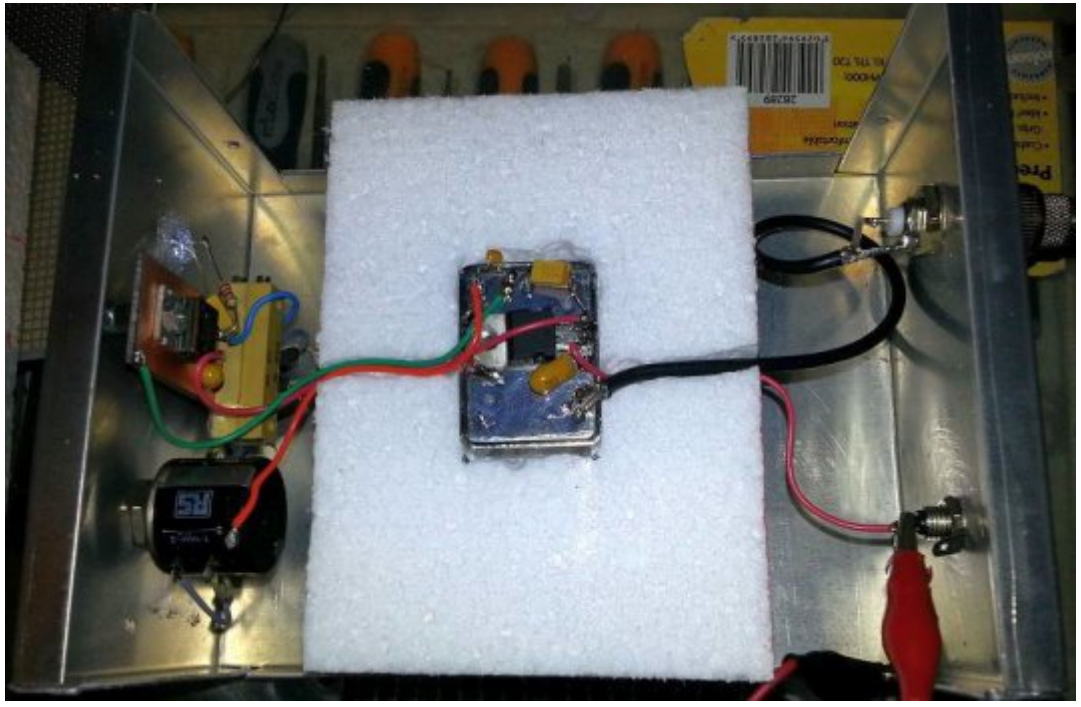
The next work will also stabilize the Avenger LNB . And we have some SDR receiver Softrocks 10,7MHz that will be connected to the IF of a receiver and a third IC2500 SDR can be used to receive any-how often requested. Using Softrocks 10,7MHz turns-any scanner / walkie-talkie in excellent FM receiver 618 MHz, and all for one low price, lower than that of a FUNcube.

73 Luis EA5DOM

2013.01.31 News of Great Britain (Paul M0EYT)

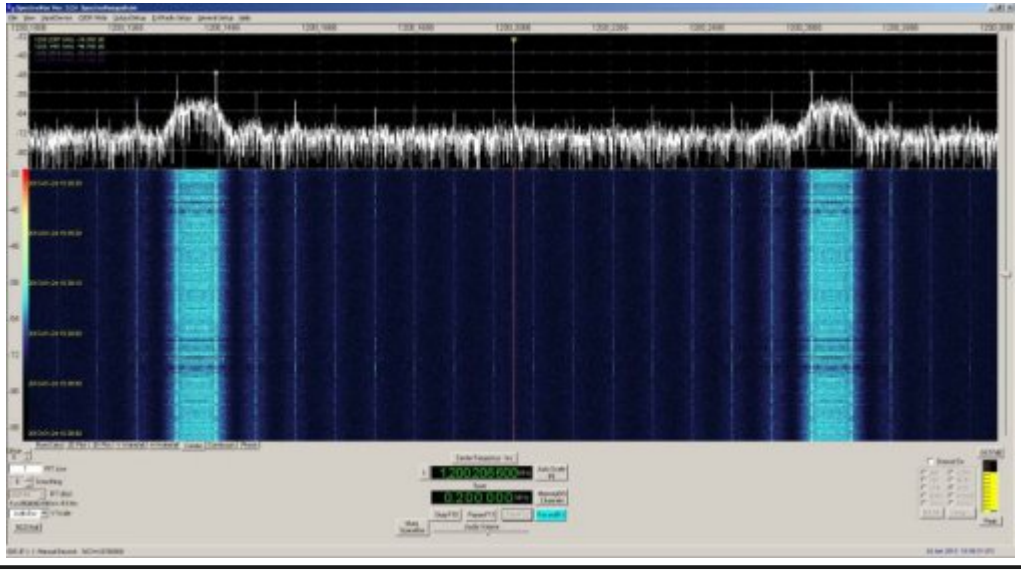
Michel nice article! I am also working on the same LNB, Octagon OTLSO eBay.

A temperature-controlled oscillator with an electronic frequency control for fine adjustment:



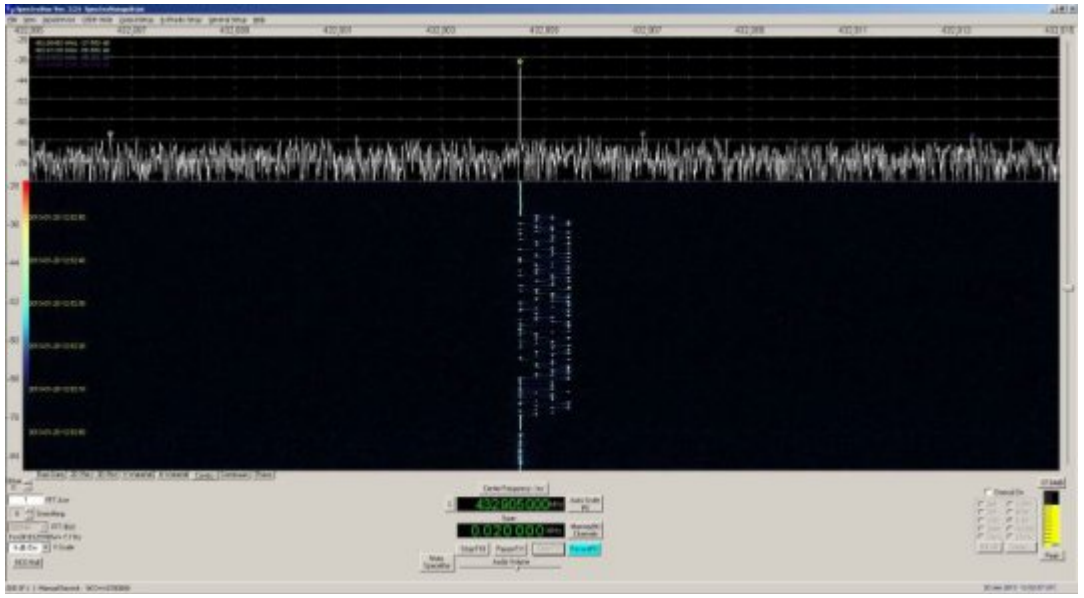
The LNB has two IF outputs, and 2 conversion circuits, that's what the photo shows, the top of the circuit:

And finally the 36E satellite telemetry received using the external 27MHz reference oscillator:



The 2 outputs FI and the input of 27 MHz reference with small coax:

With LO moved from 27 MHz to 27.515, the FI to 70 cm is OK:



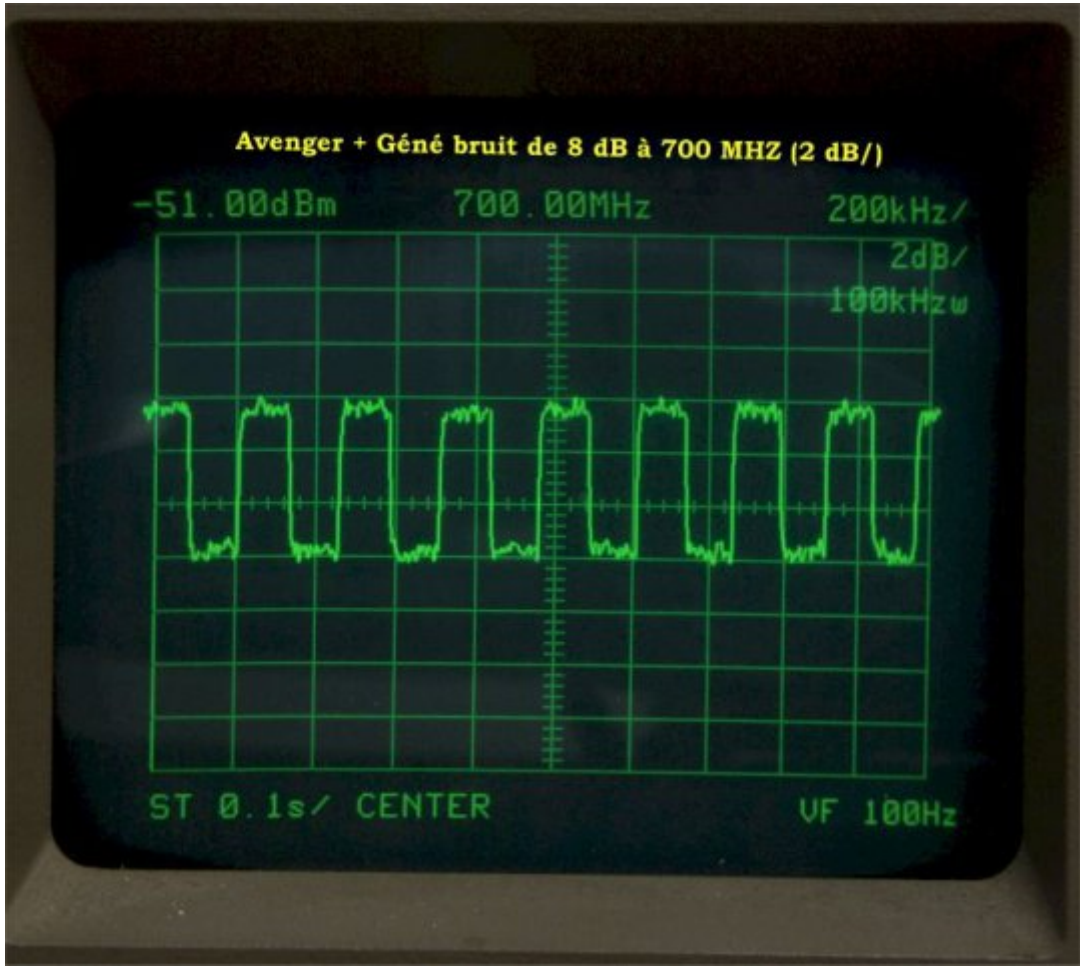
73 Paul M0EY

2013.02.06 From Marc F3YX

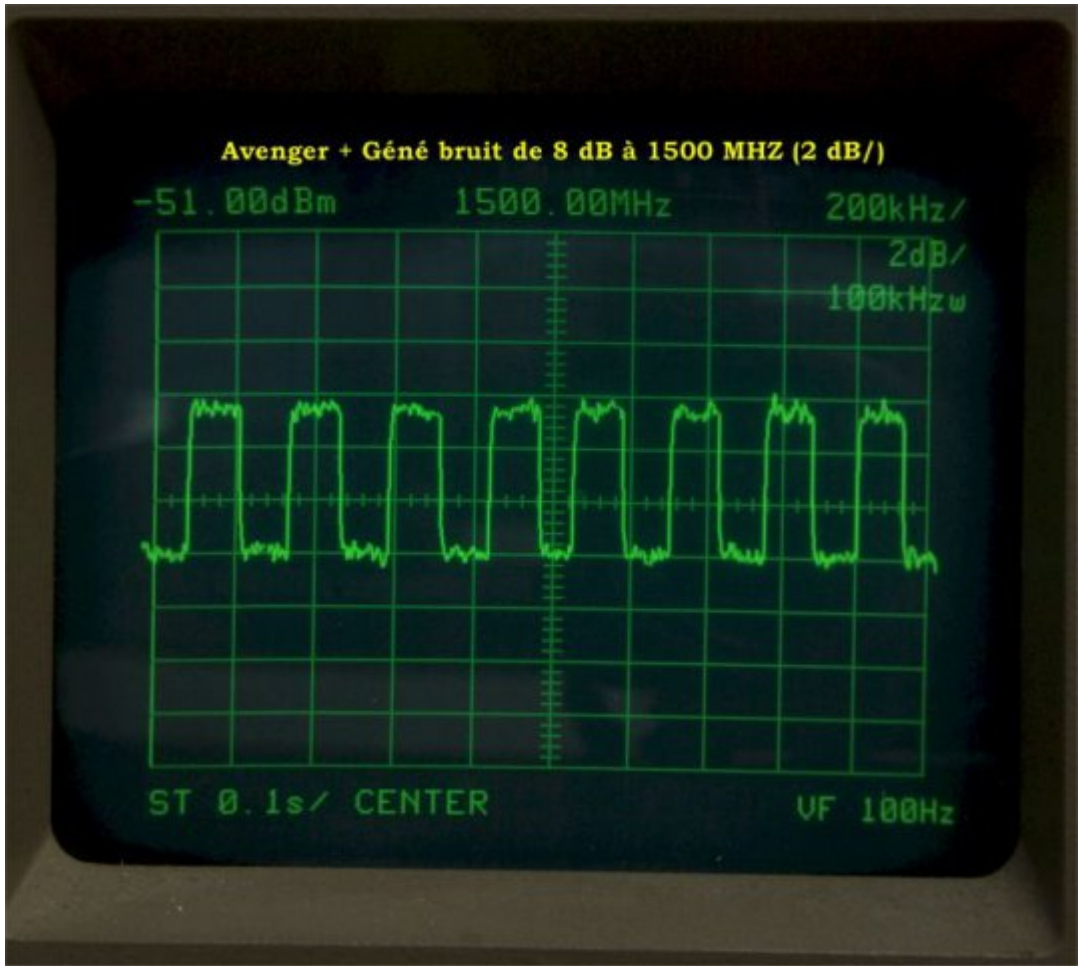
I just made some interesting tests:

1) with two transitions WR75 / Sma one against the other is lost between 0.6 and 0.8 dB according to the models.

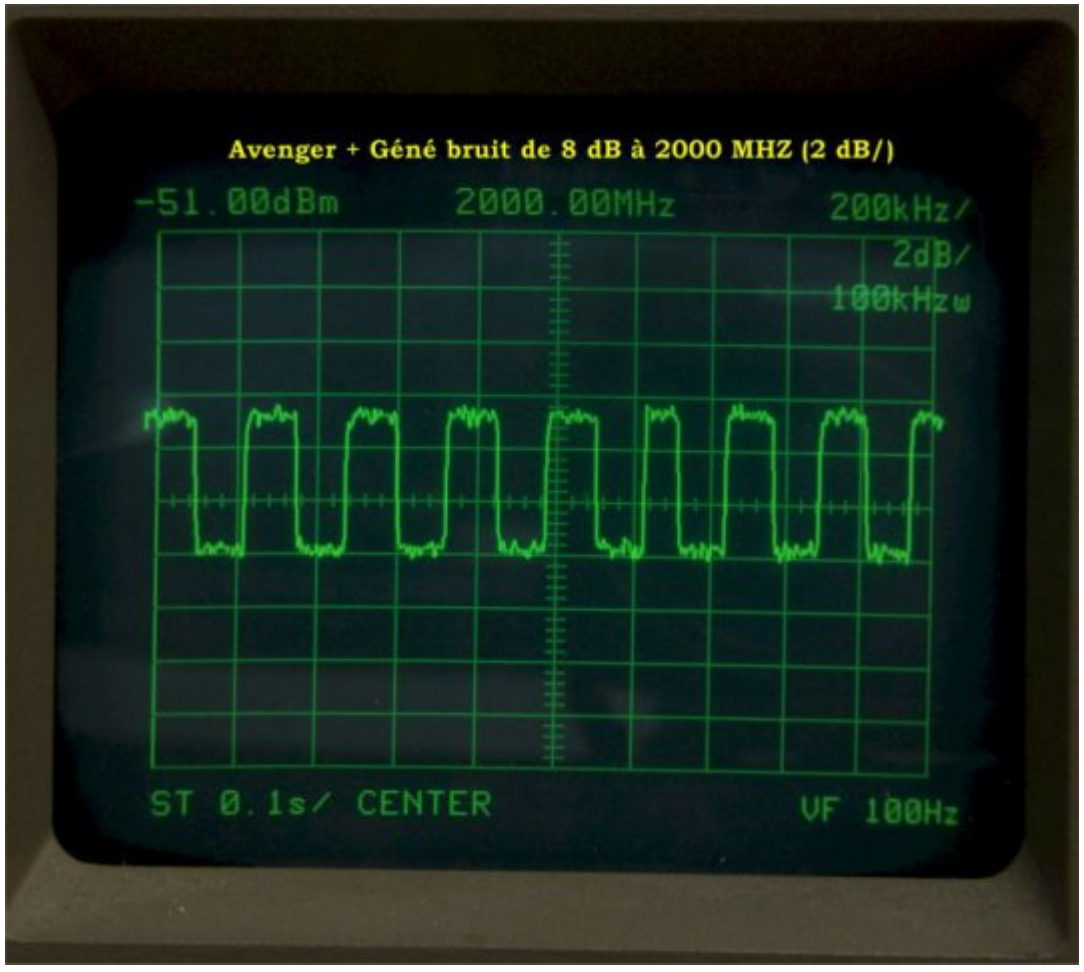
2) I Saw most of pll head cornet, and have set a transition above. The noise generator indicates between 2 and 3 dB, but it lacks a cone inside to extend the cylindrical guide until the transition which should improve performance. Will have to ask BHY to turn a small cone ....! And perhaps that removing the polar H be gained slightly. Try it. The noise factor is almost constant on the output of the head between 500 and 2300 MHZ. The difference is of the order of 2 to 3 tenths of dB. See pictures Sanders noise generator noise 8dB value analyzer.



Avenger and Transition 700 MHz



Avenger and Transition 1500 MHz



Avenger and Transition 2000 MHz

3) I have a SatboxMini USB receiver that is supposed to cover as any Rx sat for 950 to 2150 MHz. (Mygica or Geniatech)

The dimension is that of a box of household matches. Out of curiosity I sent him the DVB-S with my Minimod to see how far it really went down, and surprisingly, it works up to 520 MHZ.

This means that with a pll head and LO in 9750, one can directly receive 9750 + 520 = 10270 MHz minimum.

No additional converter, and without modification of the head. SR 1000 to 8000 Ok and similar sensitivity to SL65.

So no problem DATV 10 GHz for about 40 Euros (30 + 10).

What consider links or simply receiving a qso unbeatable.

Also it works in both SD and HD.

2013.02.15 Another PLL LNB
A copy data sheet with diagram and all the honky-tonk:

http://www.nxp.com/documents/application_note/AN11144.pdf

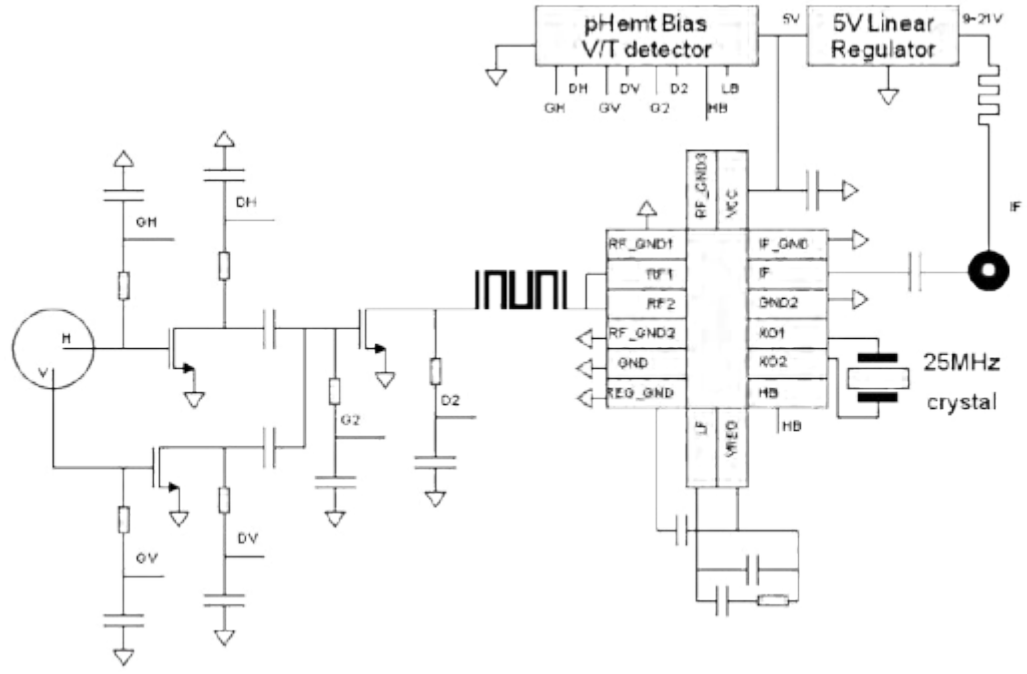
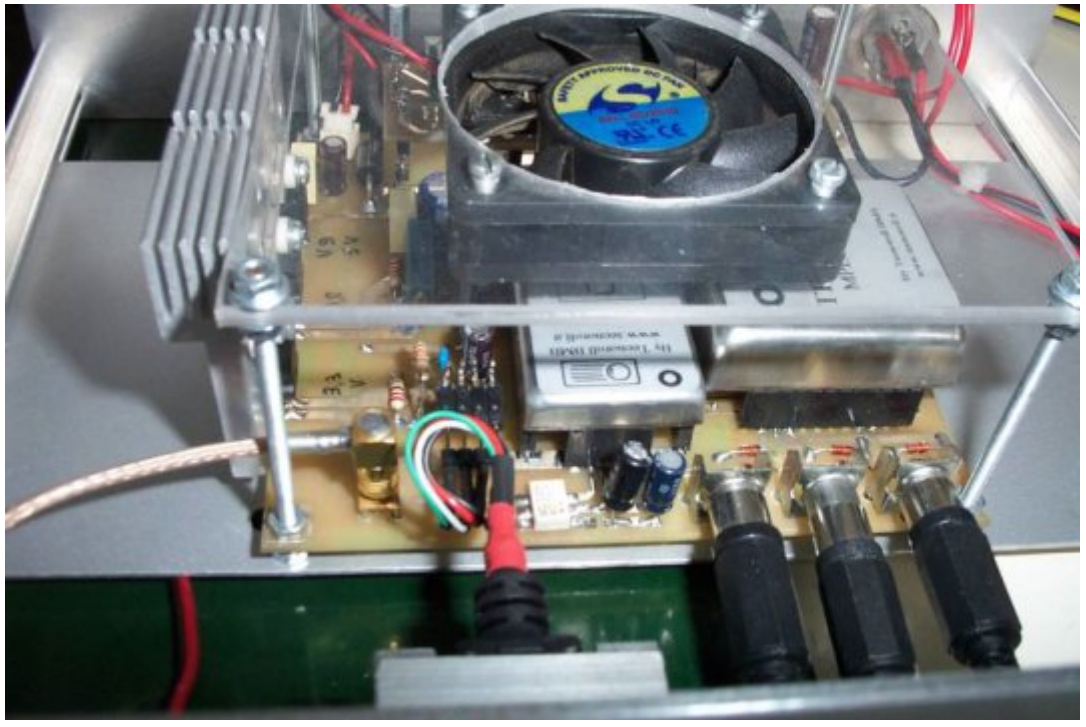


Fig 1. Typical US LNB diagram using the FIMOD IC (TFF101x)

2013.02.15 Tests were digital TV LNB for 10GHz narrowband Andy Talbot G4JNT

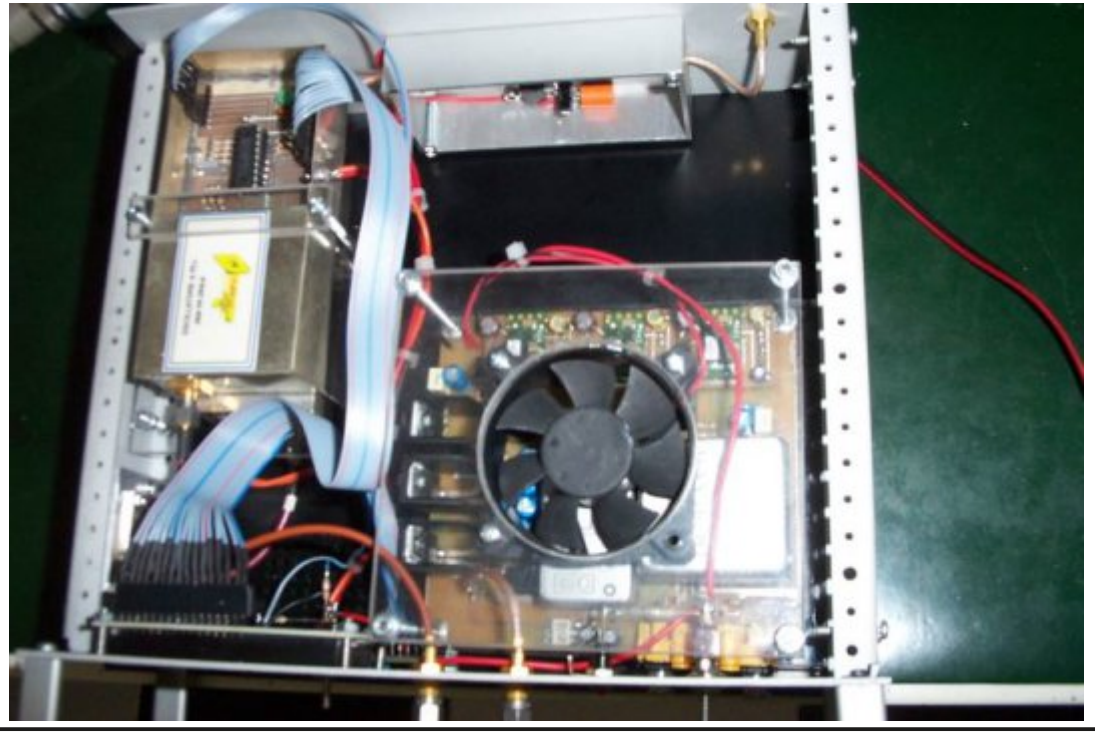
http://www.g4jnt.com/PLL_LNB_Tests.pdf

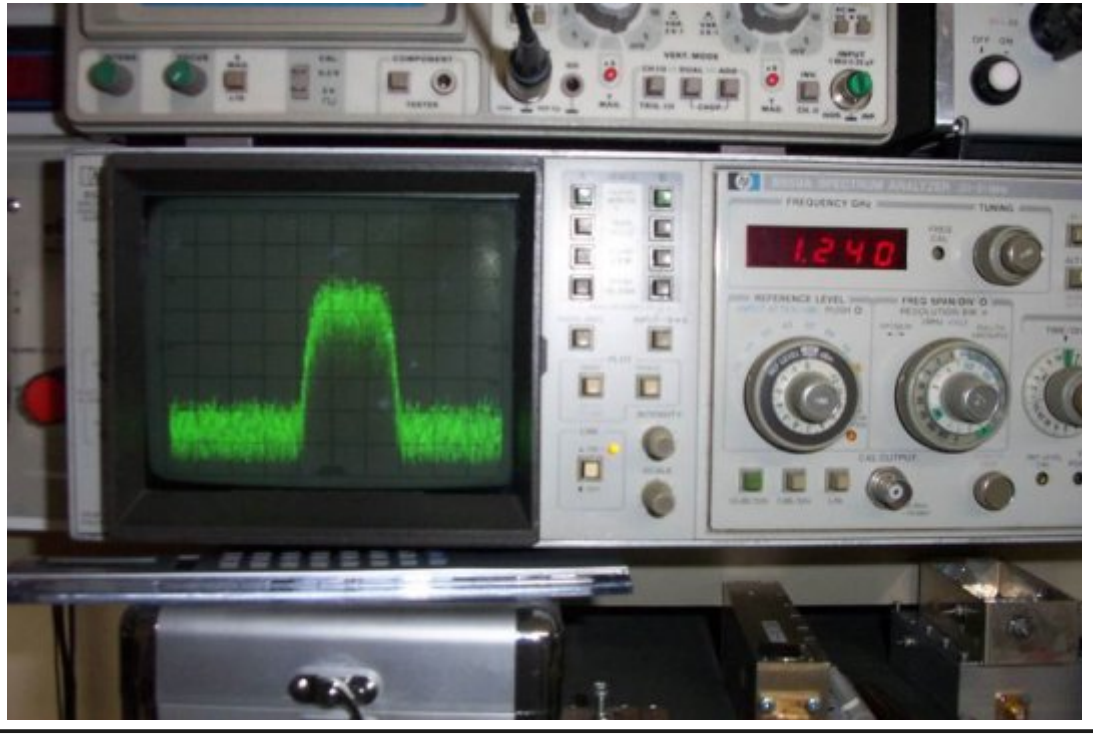
Excellent article Andy Talbot G4JNT with measures analyzer and photos. "This LNB Belgium Bosnia an extraordinarily Good performance as a low cost, low noise monitoring 10GHz narrowband receiver. If Placed at the focus of a suitable dish, It Will make for a very potent receiving send 10GHz system." We reach the same conclusion.



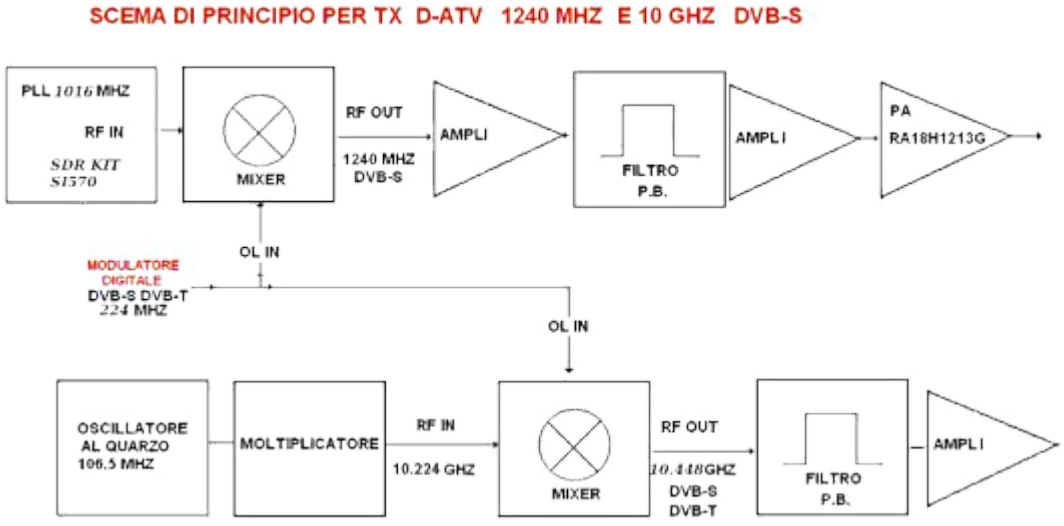
2013.02.21 News of Italy (Franco IW4APQ)

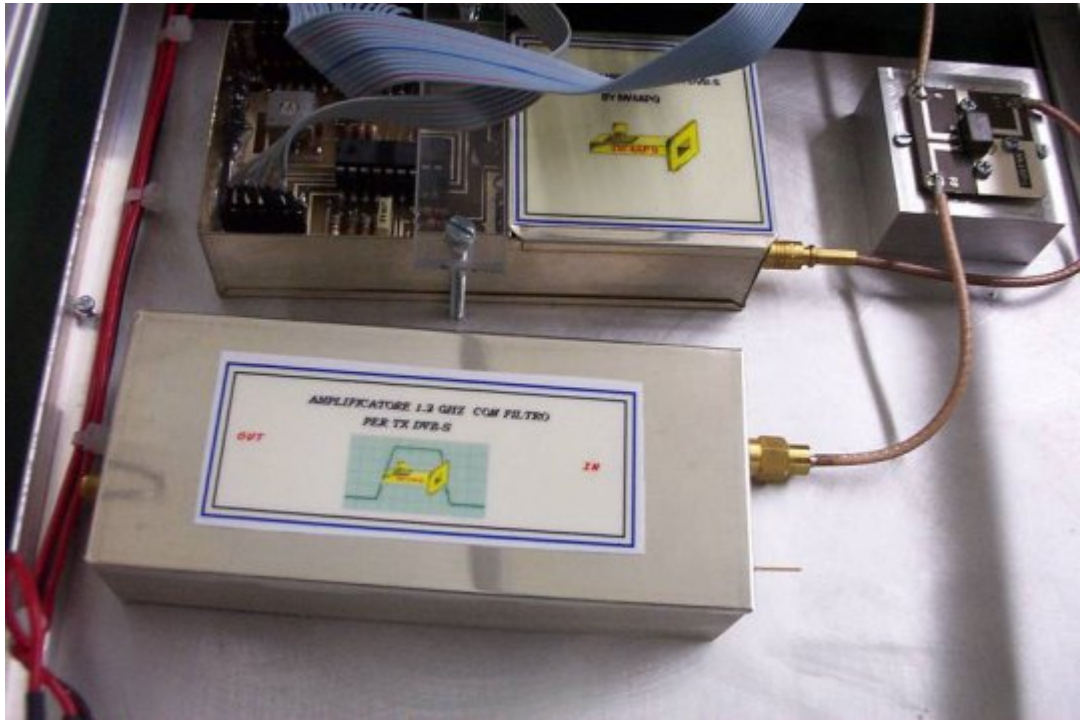
Franco uses a PLL LNB for receiving DATV 10 GHz without intermediate converter. In this case, the 10'448 MHz 698 MHz is found on the input of the receiver which follows. The idea of Franco is to receive DVB-T DATV, so to terrestrial Freeview TV directly with a standard TV with a digital tuner, which is the case with all modern TVs. 698 MHz is channel 49. And it works perfectly.

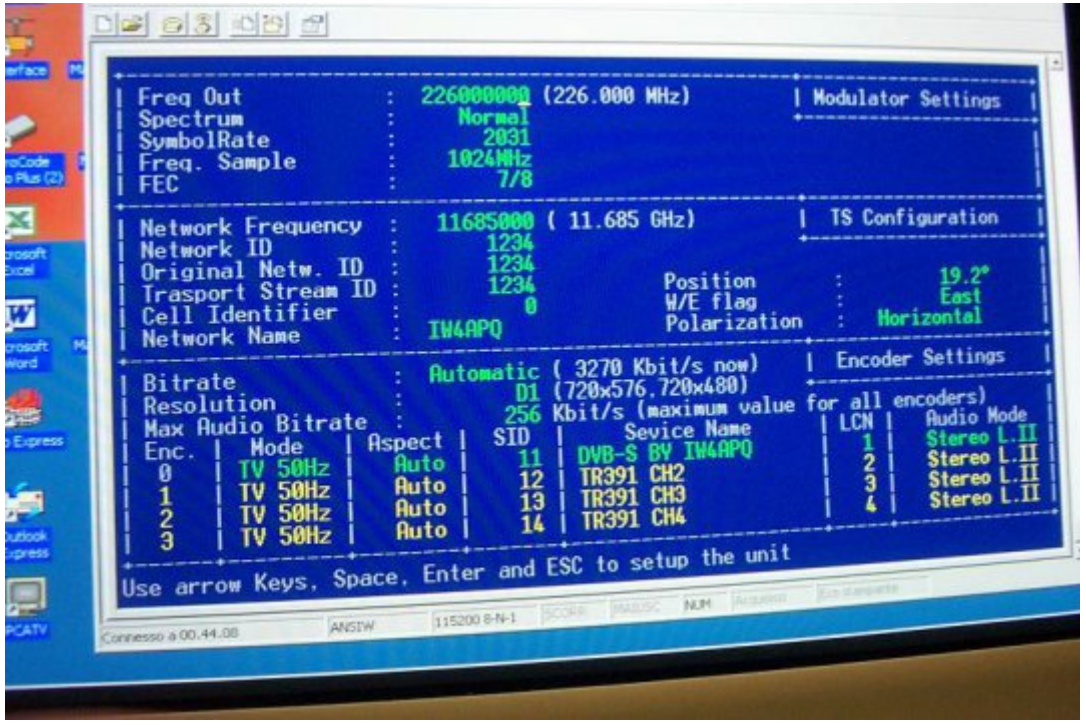


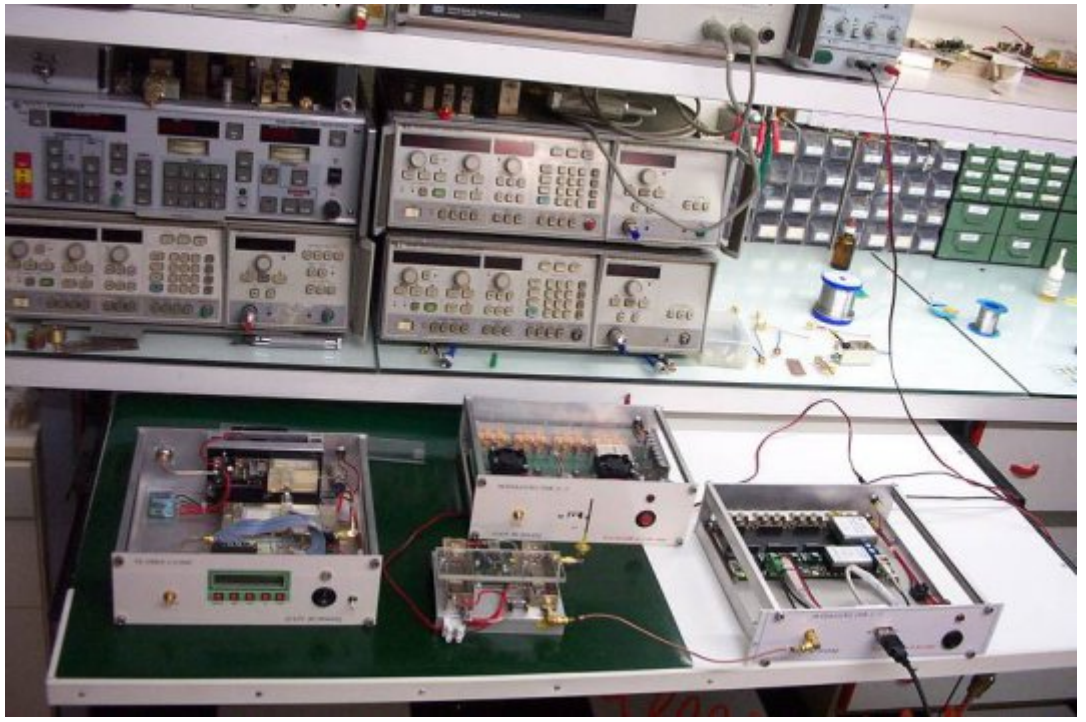


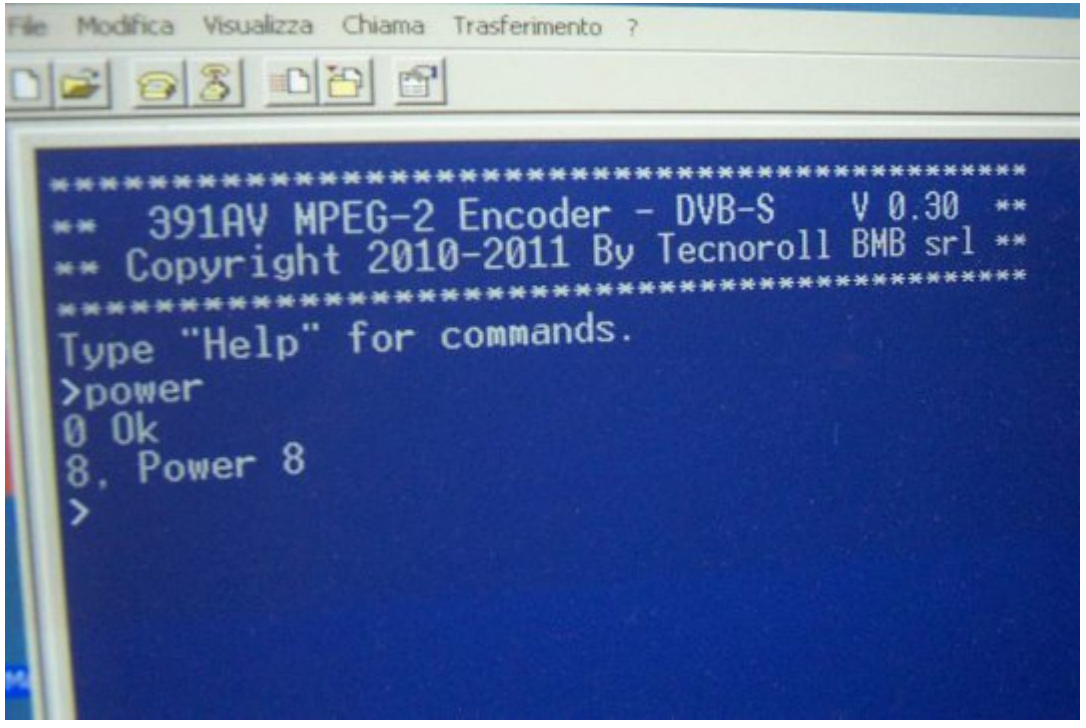
In transmission, it uses a DVB-T module converts Technorol BMB 10 GHz or 1200 MHz.

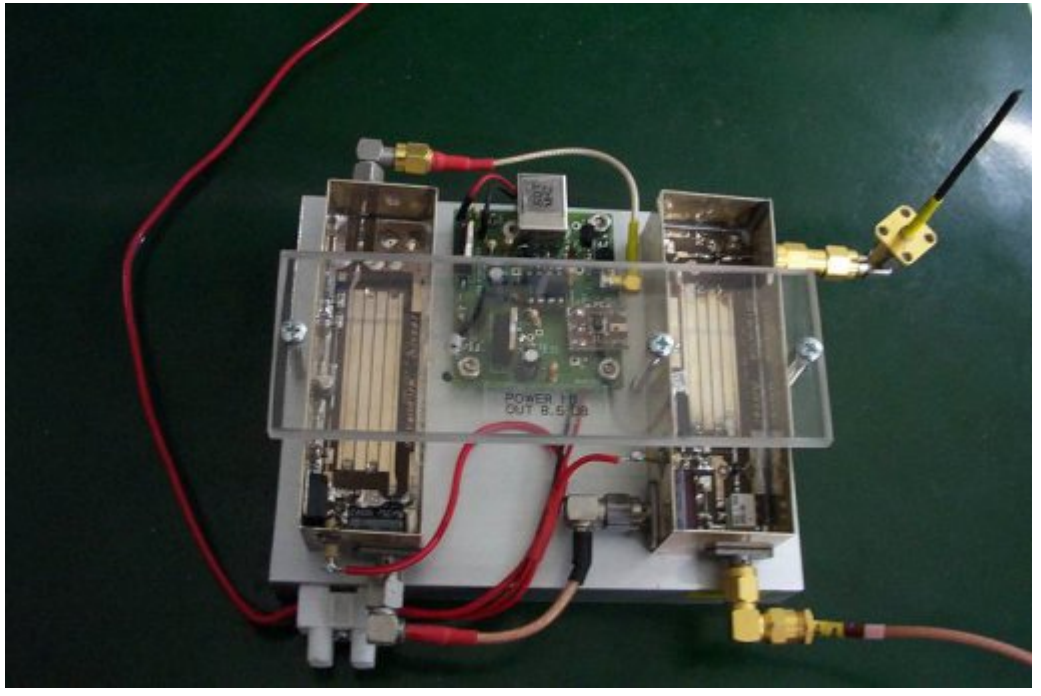




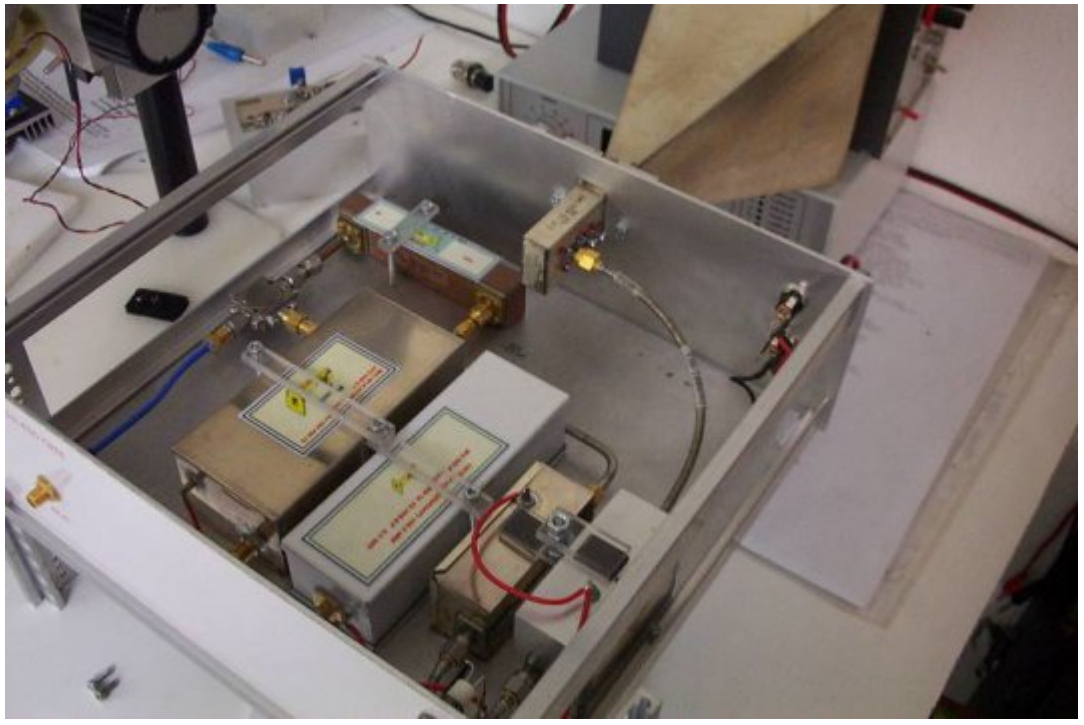


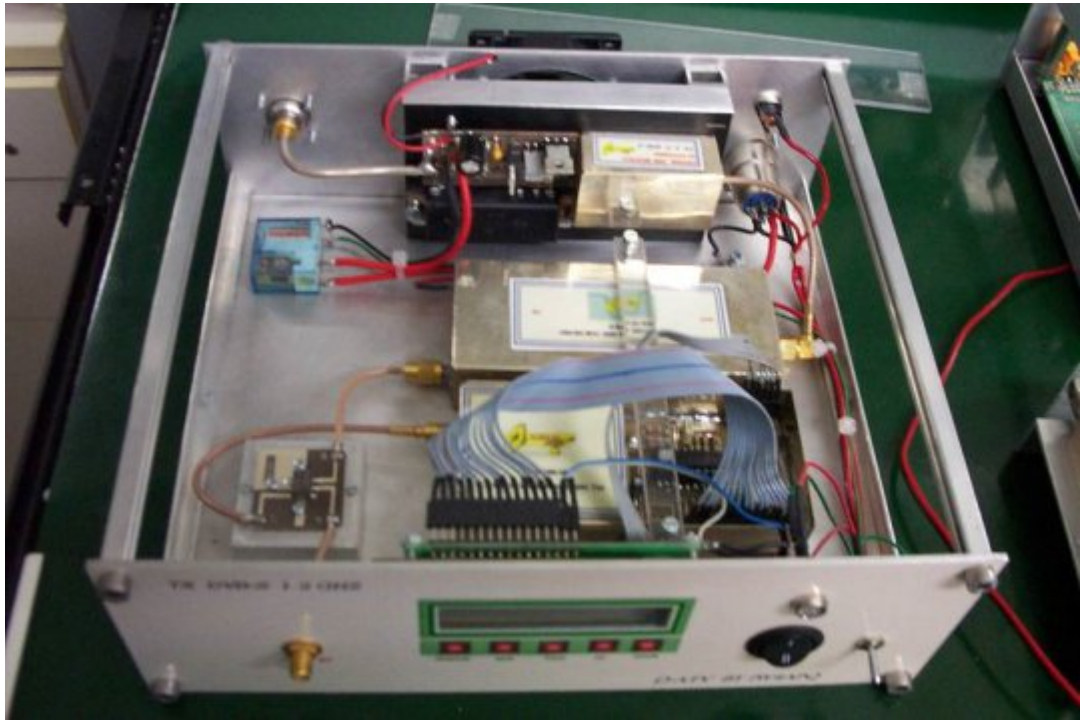






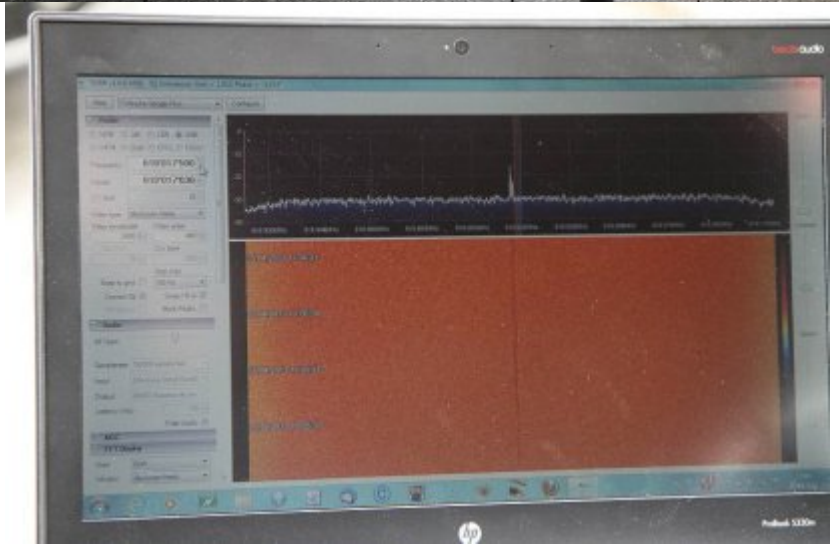
TX 1240 MHz LO DDS Si570 boxes in strip-lines





2013.04.05 Reception of the HB9G tag

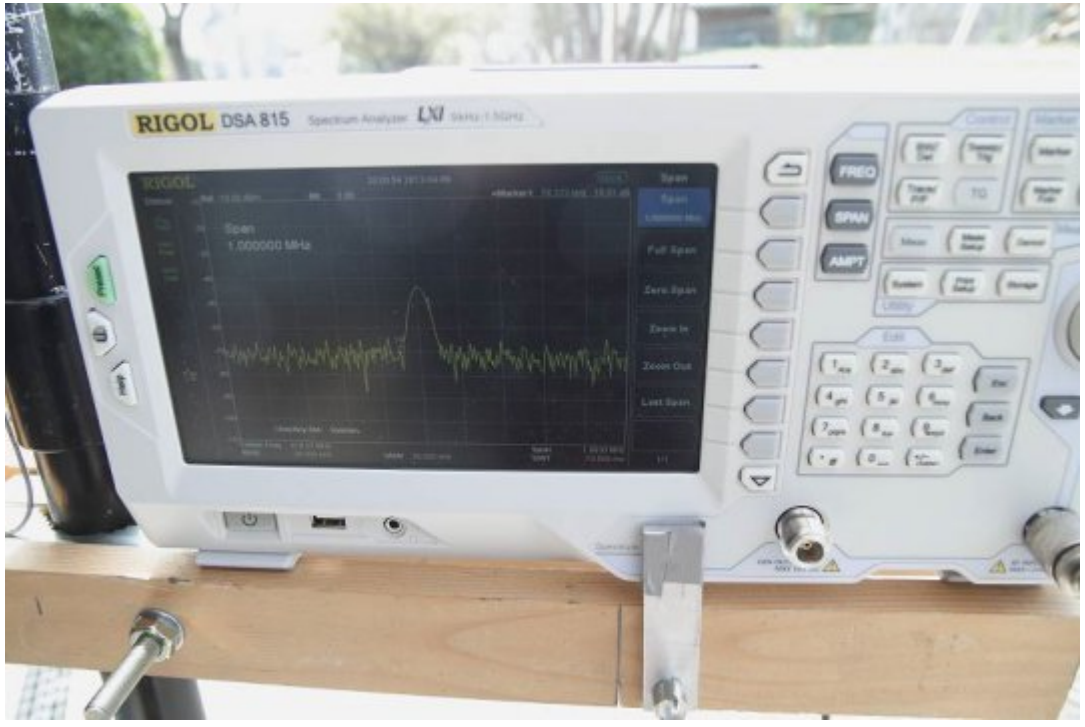
With the only PLL LNB, without a dish. The beacon is hidden by the surrounding houses and vegetation.
Frequency HB9G: 10'368.885 MHz



Left: The receiver dongle FUNcube Pro +, SDR receiver in a USB stick.

Bottom Left: Same but with a dish and Rigol spectrum analyzer

Bottom Right: Dish equipped with a PLL LNB Avenger Dual OutputLNB power by T- and a 12V batteryRigol analyzer



April 2013, to be continued ...

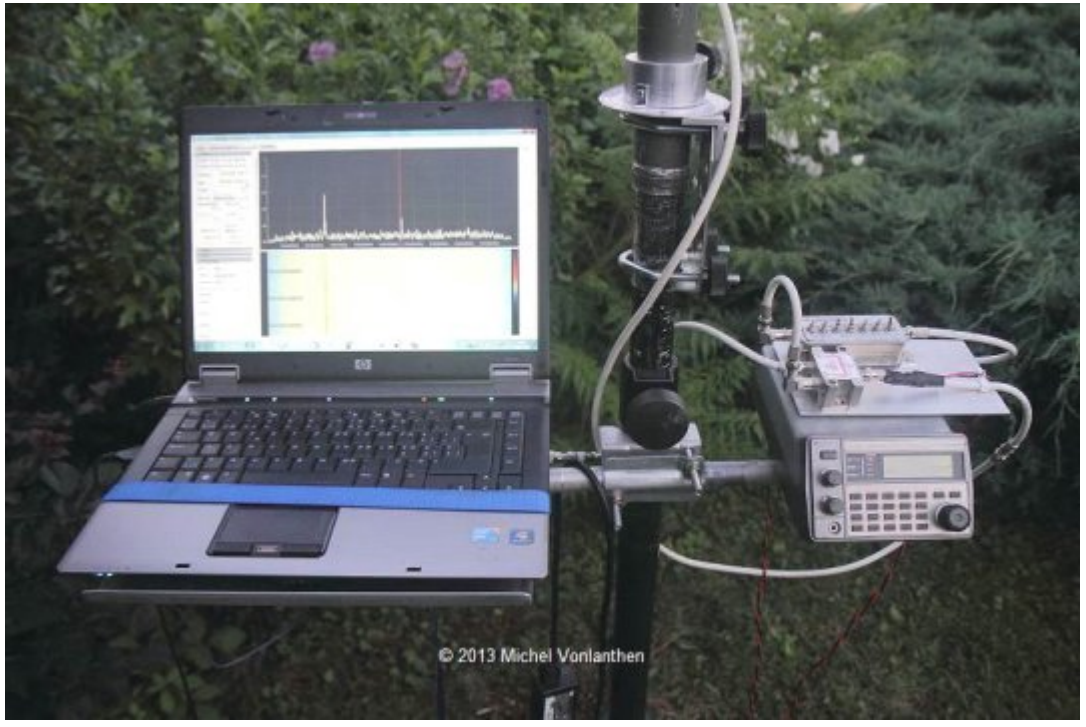
2013.08.09 measures

My attendance system with timing on the solar noise is operational. I come to a pointing accuracy of about 1 degree. In addition I have restarted my FUNcube SDR Pro + on an old notebook. I took the opportunity to make noise measurements (SDR is ideal for this). results:

Ground / sky: approx. 5 dB (single-PLL LNB without antenna)

Solar Noise: approx. 4dB on cold sky (with 60 cm dish)

F1URI / B on Mont Blanc: approx. 25dB S / N max (= S7 on the s-meter from the AR3000) (with 60 cm dish)



On the screen, the left HB9G beacon (10368.885 MHz) and center F1URI / B (10368.928 MHz)

Measured with the FUNcube Pro + SDR and SDR Sharp software.

2013.09.12 Article in HB Radio 3/2013

10 GHz SSB receiver revolutionary

By Michel Vonlanthen HB9AFO

Download (PDF)

2014.11.09 The PLL LNB reception 10GHz (abstract)

Initially, you need a satellite dish and a PLL LNB. Then it depends on the standard to receive:

DVB-S (Satellite)

You have to convert the output range of the PLL LNB (618MHz) and put it in that of a satellite TV receiver using a SUP-2400 converter (or other). The 618MHz PLL LNB is then raised to 1782MHz.

And then a digital satellite TV receiver. This feeds the SUP-2400 and the PLL LNB.

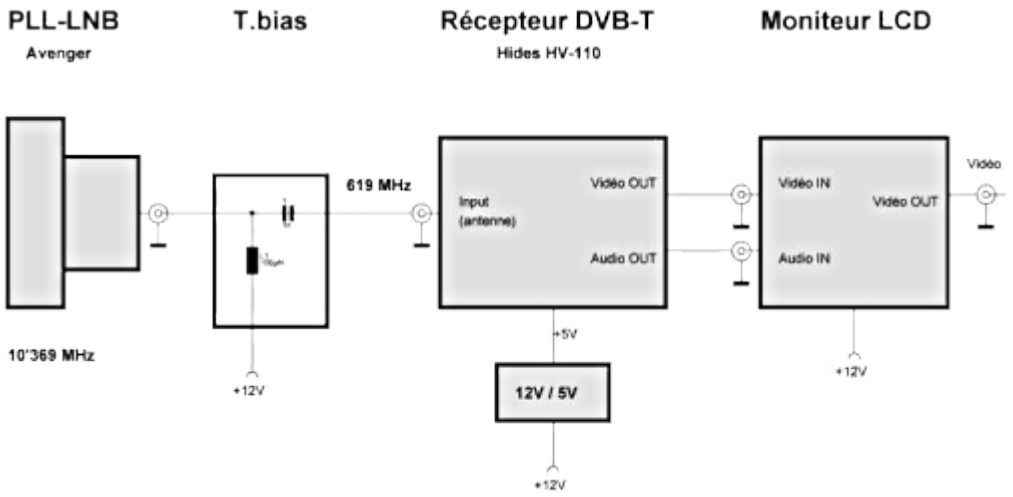
The SL65 / 12 is perfect, he is able to get adequate current.

Analog

Same as above except for the analog instead of the digital receiver.

Analog no longer found on the market but many OM have, including me. If you want one I give to you, but you must come and take it home.

DVB-T (Freeview, Terrestrial)



There is no need converter as DTT receivers can directly receive the 618MHz. By cons it will power injector to power the LNB because it takes 12V / 0.5A wholesale, and DVBT receiver only come out of 5V.

The HV-110 is ideal Hides and receiver can receive signals with a bandwidth of 2 MHz, the standard 437MHz. Consumer receivers can receive only BW between 6 and 8 MHz.

SSB-CW-AM-FM

Any receiver that can receive the 618MHz in the desired mode is. You also need a power injector, called T-bias in English, injector 12V on the coax coming from the PLL LNB.

All this is described in detail in: http://www.hb9afo.ch

The PLL LNB has two defects

1) The local oscillator (LO) is not dead on 9750MHz but can be up to 250kHz off more and less. Now it must be specific to digital (not analog). That's why it happens that a signal is not decoded while it is yet very QRO. That's why. The best is to measure the frequency of the oscillator PLL LNB and taken into account by making a scan. For example, if you must scan the 437.0 MHz and the LO PLL LNB is + 100 kHz, we must give 437,100 as starting the scan.

And if you can not measure its PLL_LNB, just do successive manual scans until it works. By varying the frequency in 50 kHz steps, it generally happens to synchronize.

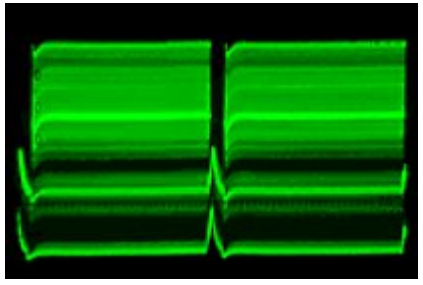
2) The 27MHz oscillator varies with the temperature. In TV it does not matter, the receiver are not so demanding. In SSB against, leave the PLL LNB for 20-30 minutes for it to be stable. Provided that the ambient temperature does not change then. After the power-receiving SSB is OK but you have to follow the station with the VFO, after 20-30 minutes is OK.

I have an external OCXO oscillator that I will use to control the PLL LNB from outside in order to have a perfect stability.

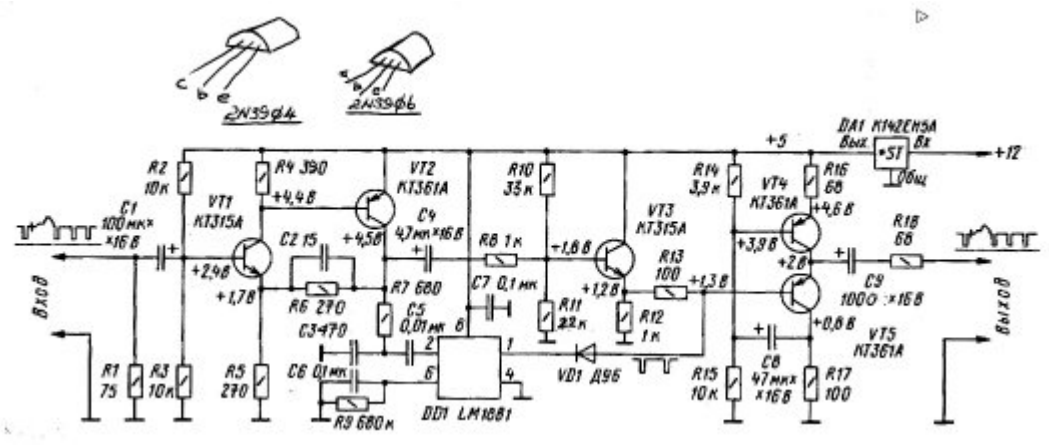
HB9AFO
November 2014, to follow ...

Richard Carden VK4XRL

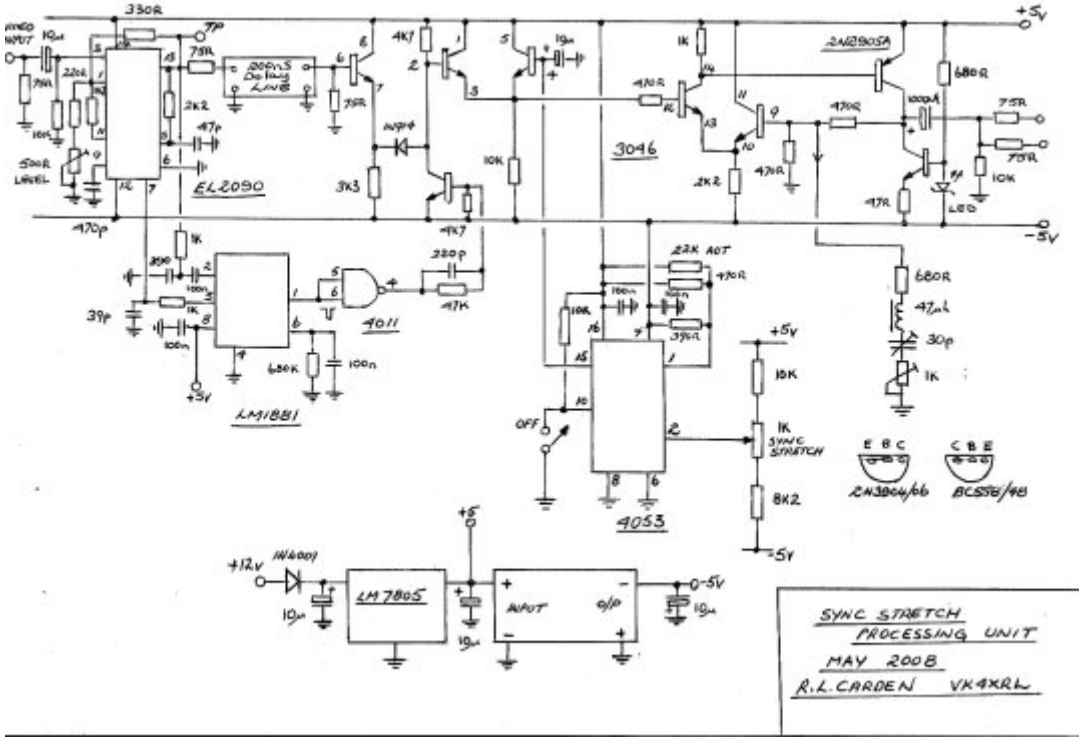
As it often happens one tends to web browse and comes across interesting snippets of information or circuit ideas. This circuit shown is one of those, with 23cm FM and the settings used one would expect around 0.5v P/P video output or a little more if some gain is available from the receiver itself. Also if one is using the Comtech modules field distortion is evident on the receive signal, this is due to the PLL within the transmitter.



By fitting such a unit shown clean syncs can be added to the video output and if one changed R6 then some extra gain can be had if required. The transistors could be changed to the 2n3904/06 and the diode changed to a 1n4148.



The other circuit shown is one that I used for sync stretch in the old analogue ATV transmitters. This unit has video clamping again using the LM1881 or equivalent IC. A delay is used in the video feed because of the delay introduced by the 1k and 390pf feeding pin 2. The 4053 allowed switching between a fixed sync level and an adjustable one, this could be rearranged as that may not be required in this application. Some HF peaking is supplied by the network associated with the output stage.



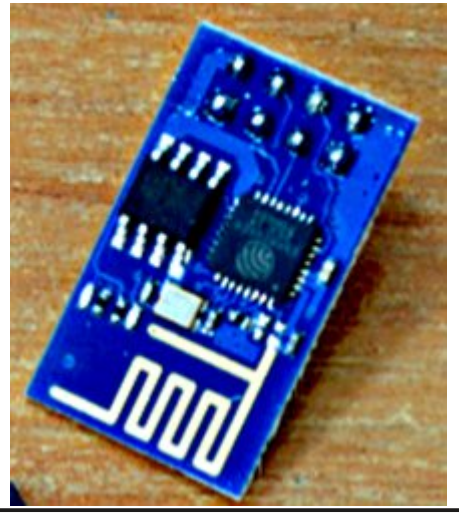
Hope you find them of interest.

Richard VK4XRL

Wi-Fi & Internet connectivity via TTL Serial for your own electronic projects

Mike G7GTN

A tiny module that is fast becoming all the rage of late for the hobbyist maker community is a very small (21mm X 13mm approx) 2.4 GHz Wi-Fi to serial bridge module which is available easily from eBay under the general search term ESP8266. I recently purchased a couple for as little as £2.37 (US $3.74) each. Control since we are talking Serial communications are via a reasonably standard set of AT Style Commands, a little like the HC-05 or HC-06 Bluetooth modules that had been discussed here in a previous edition. The modules are available in several varieties some with a PCB etched antenna and others with small sockets to allow an external aerial. In essence we now have the capability to make any of our home designed electronic projects Wi-Fi enabled by connecting to our home wireless router and having standard web browser interfaces. A quick review of the module technical specifications dictates that it should only be powered by a +3V3 voltage also the UART Serial connection should only be at a 3V3 logic level for communication.



A certain fact that has been established via testing and experimentation is the current consumption for operation should be in the order of at least 300ma and preferably more. These modules have a complete TCP/IP stack within the on board micro controller as opposed to chips such as the LAN RJ45 wired Microchip ENJC8260 (which required you to write this for yourself) or Wiznet 5100 (TCP stack included within the device but quite heavy on available I/O Pin usage on your processor) So with this module we are specifically talking purely about a Wi-Fi connection to a router you have full administration access to. You need to know your router SSID and password to enter in code to allow authorised connection.

Whilst this all seems like a totally free lunch, several issues are mentioned on the site of a joint experimenter Peter Scargill on his own personal blog site https://scargill.wordpress.com/ Peter is really going in to the issues at some considerable depth and is providing a blow by

blow account of things as they develop on this module by other developers and experimenters. Really is a worthwhile five minutes of your time to read his findings on a curious reset problem. Seems that a newer firmware update is going to be in order, and will be my next port of call with these little modules. As these are fairly recent to the market things are being developed on the firmware issues that are present, so I expect within a short time space to see some useful web enabled control projects.

These web browser interfaces can quite easily be further embellished by the use of such already established libraries as JQuery http://jquery.com/ by simply making a call to the web hosted minimal library from your Microcontrollers source code.

The web page (HTML Coded) whilst some elements would be hard coded such as in HTTP headers etc., can also allow for example sensor or real data readings to be taken by your micro controller code and displayed as live data on the web page. This is all handled on the Micro controller that you attach to the module using a combination of the previously mentioned AT Command Set. I see little to no real limitations on the creativity that you can throw at these tiny modules. So if you require a web interface on your latest amateur television project or indeed other electronic gizmo this could be a very good place to start your own web enabled control experiments from.

References

ESP8266 Further Technical information & Manufacturers datasheet

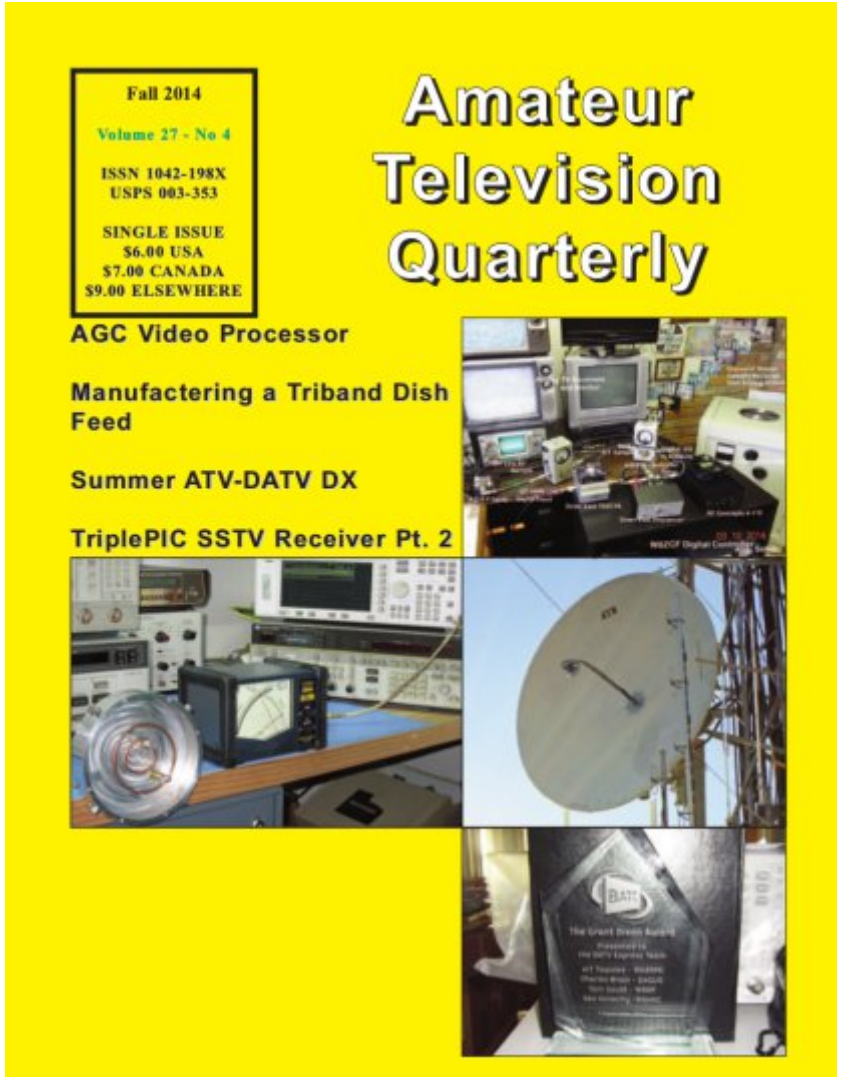
https://nurdspace.nl/ESP8266

The type of cable required for type 02 & 05 modules to connect a 2.4GHz aerial via standard SMA socket.

2.4GHz aerial with matching connector for ESP8266 02 & 05 Type modules

https://www.sparkfun.com/products/11320

eBay is another obvious source of these if you require an external antenna arrangement.



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CQ-DATV dotMOBI

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NARSA

NORBRECK

on Sunday April 12th 2015

Please drop in, say hello and watch GB3FY in action See some of the home construction projects first hand,talk to our engineers

Fabrizio Bianchi IW5BDJ

Our history:

In 2004 a group of Amateur Radio Senesi begins to experience the WiFi technology. The first experiments begin with the access point marked "D-Link" with good results, then were tested for "Linksys" with firnware modified open WRT.

The first tests were carried out on the location of Castellina in Chianti (Siena Tuscany), where there was a node Packet-radio, which processed the digital traffic towards the house of IW5CWB with a link stable even under adverse weather.

Later it was installed a system in Hospital (Siena City) to reach the station Cetamura (Siena Chianti) and here were two other connected OM IK5SQS and IW5BDJ.

After this pioneering experiment were purchased of the Mikrotik router board, much more professional, and with such a link was established by Cetamura to Mount Cimone (Modena Emilia) to 36MB, with a stretch of 110 Km to 5.7Ghz.
Here we found more friends and OM IK4XQC, IW4ATU in Spilamberto (Modena Emilia), which satisfied the connection from Siena and Mount Cimone acquired two Mikrotik to continue the connection between Mount Cimone and the aqueduct his hometown (Spilamberto Emilia) called the "MUSHROOM ".

On the trellis of Mount Cimone was present a dish diameter of 4 Mt of which was
replaced by the illuminator with a 5.7 Ghz to reach the "MUSHROOM", the
connection was stable at 100% with a link to 36MB.

Mushroom illuminator on Mout Cimone

The digital network expanded by connecting other OM Senesi, IW5BLC, IZ5OQO and IZ5RWI.

Noting the excellent performance in the field of Mikrotik, it was decided to replace all the stations with these cards to date, working.

Additional links were made with other friends OM Monte Labro (Grosseto Tuscany), already 'in WiFi network via Mikrotik bringing very simple to implement them in our network.

But it was a big step in 2011 when we tried to make a connection with some friends in the area 3 of Italy
The link was established by Mount Cimone to Mount Falcone

Works replacement

Antenne of IR5UCH Freq. 5,7 Ghz to Cetamura

(Vicenza Veneto) with a stretch of 174 Km to now stable with an escort through VPN.

Amateur radio operators connected to the network in the area 3 are: IZ3NWP, I3LPO, I3GUT, IZ3PYS, IZ3GGR and sections IQ3CO and IQ3VI.

Just this group has proved to be interested in the development of WiFi oriented to 'Digital ATV when it became aware that the Project Digilite can use the' UPD. You can connect the Digital Station through our network and spread by radio digital images.

We hope to develop with them a broadcast station in the band of 1200 Mhz, within this year ', on a strategic position of' Italy to reach a very large radius, connected by our intranet, but also through the Internet from around the world, creating a Static IP address to the receiving station.

To date, the Digital Network WiFi and 'rich in various other services such as FTP, MAIL, APRS, CLUSTER, VOIP, TEAMSPEAK, VIDEO CALLS and, recently, as we have said TRANSMISSION DIGITAL ATVD DVB-S via UDP protocol

In the network we also pass the flow internet for the bridge D-STAR IR5UCC car built by us.

In most locations, for the game, were installed webcams IP online 24h visible on the WiFi network.

The station on Mount Falcone (Vicenza Veneto)...

...and grill 5,7Ghz

Our goal is to look for people to create together a network National Digital.

All beginning of 2015 we were contacted by colleagues of Florence in order to connect via wifi to its network.

We have some points of interest to be contacted and follow our projects:

https://www.facebook.com/groups/420507054636793/

https://www.facebook.com/groups/617827761599060/

www.wifisiena.it

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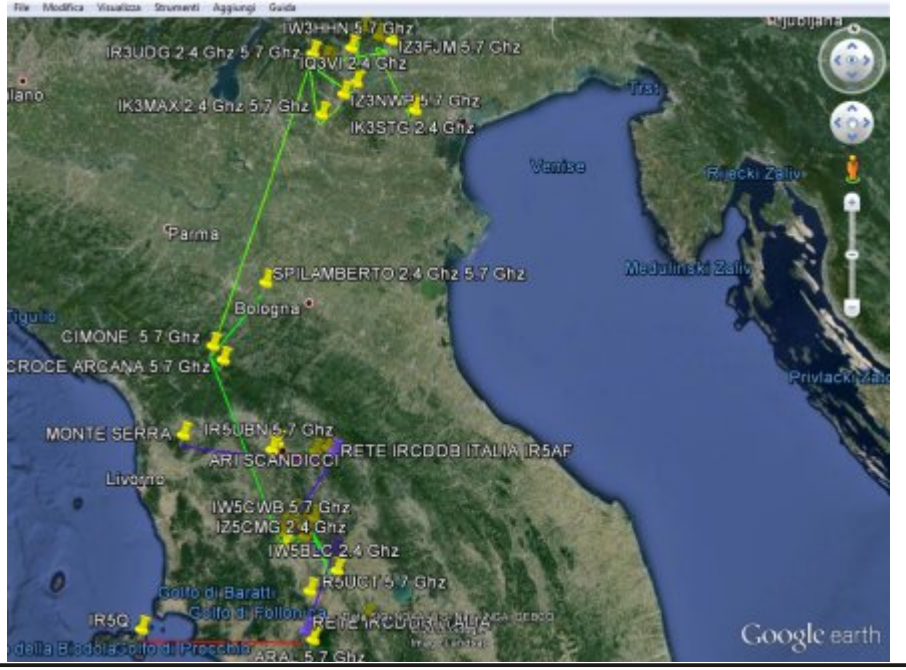
IW5BDJ Fabrizio Bianchi

Hypothetical ray emission

Above right - The servers at the home IZ5OQO

Left - IR5UCC

Right - WiFi Network group of Amateur Radio



UGLYDATV 0.1

by F5OEO Evariste - November 2014

Introduction

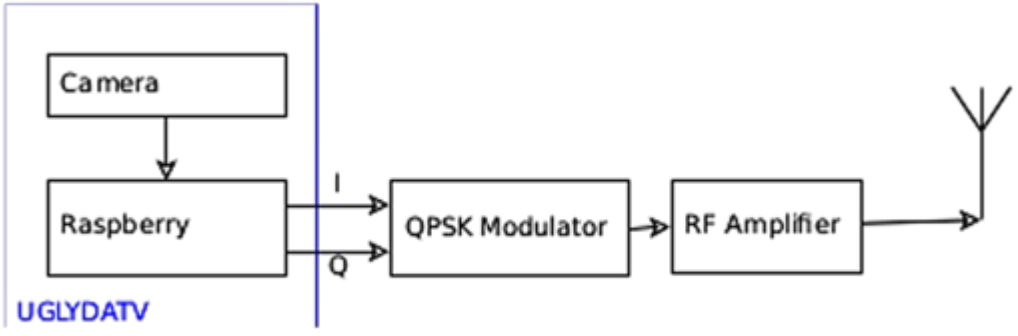
This documentation describes a solution to use the Raspberry Pi as a main component of a DVB-S modulator. Two modes are available :

- *Output I/Q bitstream compliant ready to feed an external QPSK modulator (IQ mode)*
- *A direct HF QPSK modulator (Ugly mode)*

Particular thanks to :

- *Brian G4EWJ for sharing his very efficient code of canal encoding in ARM Assembler*
- *Perceval for his linux emergency support*
- *F4DAY for pionnering the Poor Man DATV*
- *PiFM for idea of using GPIO for transmiIQ Mode*

General diagram

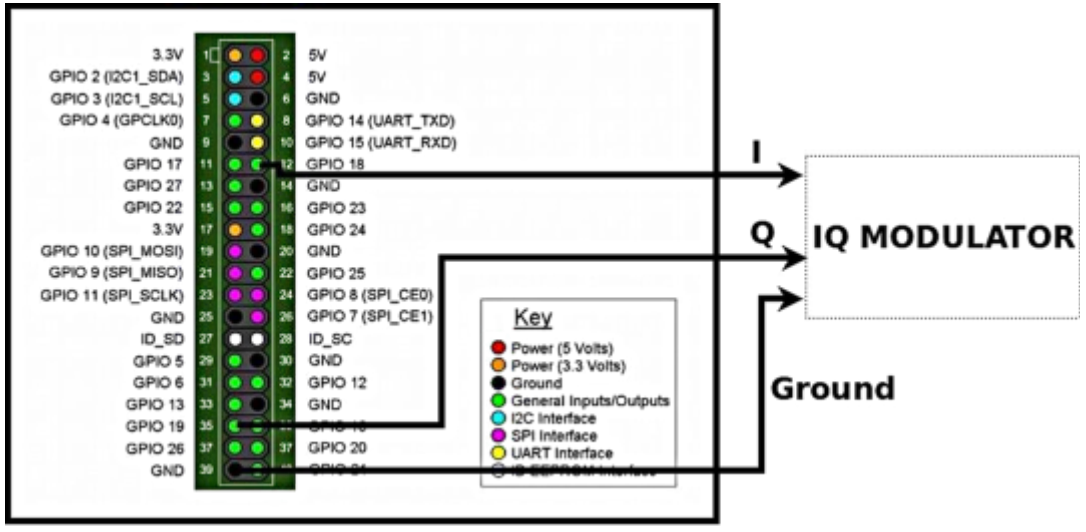


Hardware required

- *Raspberry Pi Model B+ with a Micro SD card of 8 GigaBytes minimum*
- *Camera*
- *External QPSK Modulator and RF amplifier*
- *RF amplifier and antenna*

Link Raspberry to IQ modulator

To link output IQ of Raspberry to an external modulator :



Take care of pin numbering : PIN #1 is located the closest to MicroSD card on B+

- *Pin 12 : output I*
- *Pin 35 : output Q*
- *pin 39 : Ground (you could also take any other ground available on the Header)*
- *Output voltage of I and Q is 0-3.3V.*

Software required

A complete system to write on the SD card:
http://f5oeo.fr/UglyDATV0.1.img.zip

You have to extract the image with (Winzip or other zip decompressor) and then follow the instructions like:
Image installation instruction

Then insert the SD card in the Raspberry and power on.

For now the software requires a minimum of commands to launch the modulation. In a future release, all will be launch automatically and will not require any action.

In order to communicate with the Raspberry there are 2 methods:

Easy:

1. Plug a display by HDMI or composite output
2. Plug a USB keyboard

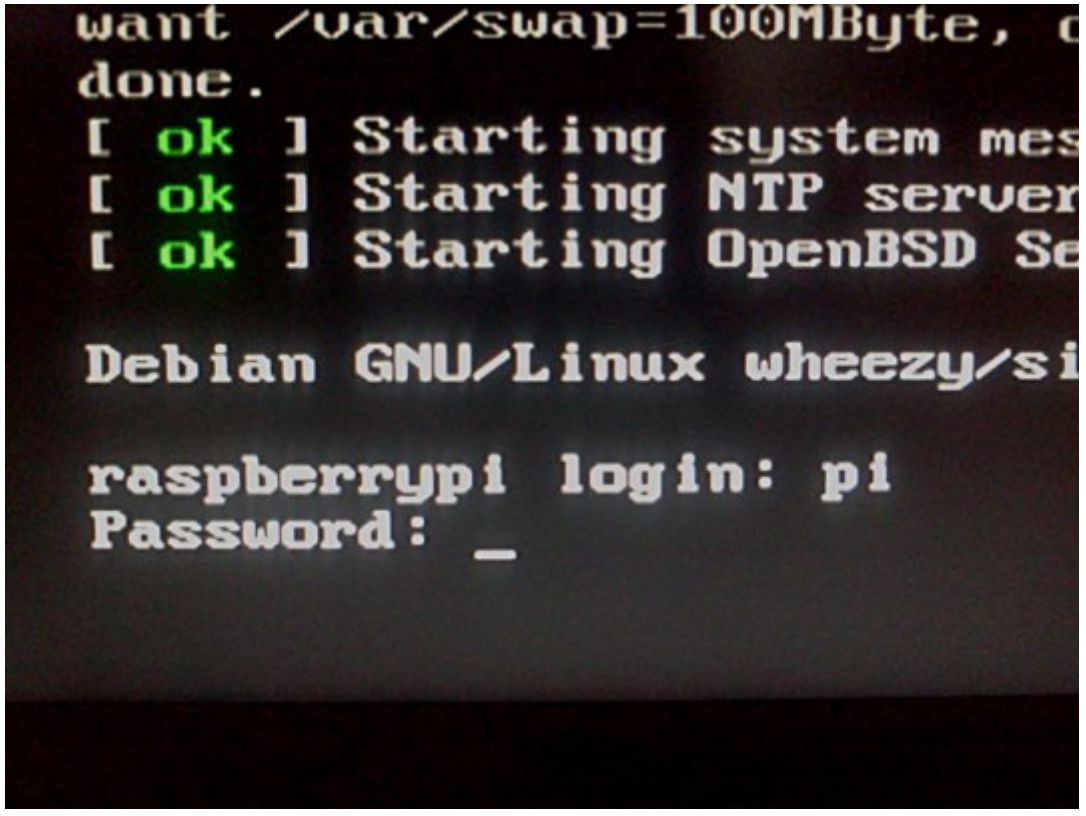
More advanced:

1. Plug an Ethernet cable link to a local network included your PC
2. With PC, discover which IP address is assigned to Raspberry
3. Connect remotely to raspberry using SSH (putty software is your friend)

At this stage you see a prompt

Type pi for login and tv for password.

Note : while typing the password, it is normal that nothing is displayed on the screen (no stars like on windows)

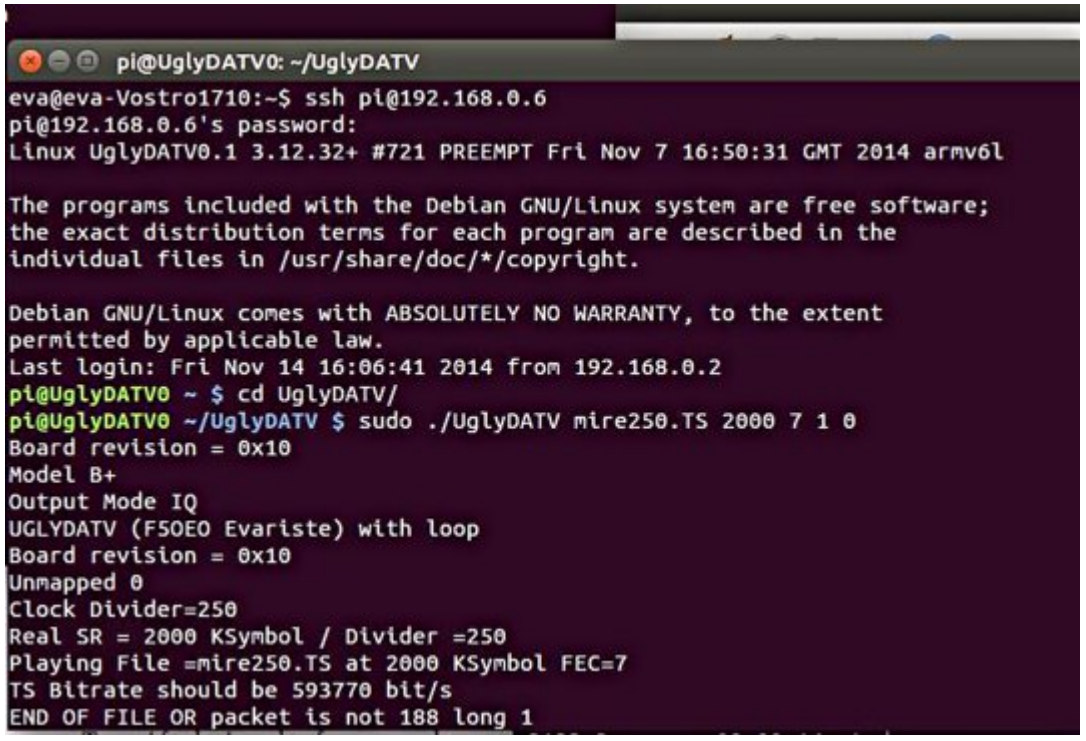


You are now few step to test first transmission: type commands like the picture on the next page.

It launch the IQ modulator at 2000 Ksymbol, FEC 7/8. You should be able to receive it on a set top box if you have plugged a IQ modulator (at least find the channel (service name), maybe not the video at this point).

UglyDATV Software details

UglyDATV software take a Transport stream input file. It then processes it to transform to a DVB-S IQ compliant stream according to Symbol Rate (Rate of transmission) and FEC (Error correction).



Effective rate of data is calculated by

Transport Stream effective rate = Symbol Rate * 2 (QPSK=2 bits by symbol) * 188/204 (16 bytes added at each 188 packet) * FEC

For example for a SR 2000 and FEC 7/8 :

TS= 2000*2*188/204*7/8 = 3225490 bit/s (seems that there is a bug in the UglyDATV calculation)

For a live stream, this Transport Rate should be feed in UglyDATV in order to not have underflow neither overflow.

For file playing, UglyDATV pump the data at the required rate and thus has a perfect timing.

However, in the Transport Stream file itself, there are some clock inside which help the set top box to decoded properly the video and synchronize it with the sound. If the transport file you play is not calculated for the rate you send in UglyDATV, you could have issues with decoding the video which will be very slow or drop frame.

Parameters of UglyDATV

```
sudo ./UglyDATV TransportFile SymbolRate FEC Loop Mode
```

- *TransportFile : a transport stream file containing packets of 188 bytes*
- *SymbolRate : Rate in Ksymbols (tested from 250 to 3000)*
- *Loop : To loop the input file (usefull to have a continuous transmit of short TS File)*
- *Mode : 0 is for mode IQ*

Some scripts

Some scripts are present in the UglyDATV folder. It helps to launch several processes at the same time, for example launching the camera (raspivid) , put the camera stream in a Transport stream format (ffmpeg) and then feed UglyDATV.

To launch it:

```
./a.sh
```

a.sh: Transmit the camera at 250KSymbol/s

Be carefull classical set top boxes could not receive this very low symbol rate. You should adapt the a.sh script if you want other SymbolRate

Modifying the script a.sh: a.sh

```
nano a.sh
```

```
sudo nice -n -30 raspivid -s -n -w 320 -h 288 -b 300000 -t 0 -pf high -fps 15 -g 12 -ih -o videoes &
```

```
sudo /home/pi/UglyDATV/UglyDATV videots 250 7 0 0  &
```

```
sudo nice -n -30 /home/pi/UglyDATV/ffmpeg -loglevel debug -analyzeduration 0 -probesize 2048 -r 15 -fpsprobesize 0 -max_delay 40000 -i videoes -f h264 -r 15 -minrate 300K -maxrate 300K -bufsize 20K -vcodec copy -bufsize 20K -f mpegts -mpegts_original_network_id 1 -mpegts_transport_stream_id 1 -mpegts_service_id 100 -mpegts_pmt_start_pid 1000 -mpegts_start_pid 1001 -metadata service_provider="F5OEO" -metadata service_name="F5OEO-1" -muxrate 403200 -y videots &
```

Number in bold have to be changed in order to send to an other SymbolRate.

If we want a Symbolrate of 2000: modify 250 to 2000: this is the symbolrate

And modify 403200 by 3225490 (which is the bitrate of the TS see above for details of calculation)

But at this point, we just setting the output rate of the TS. We have now a bigger channel, but our video encoding is still at low bitrate, it means that we mainly send some padding packets.

Let's have a higher quality in video by changing the resolution.

```
sudo nice -n -30 raspivid -s -n -w 320 -h 288 -b 300000 -t 0 -pf high -fps 15 -g 12 -ih -o videoes &
```

```
sudo /home/pi/UglyDATV/UglyDATV videots 2000 7 0 0 &
```

```
sudo nice -n -30 /home/pi/UglyDATV/ffmpeg -loglevel debug -analyzeduration 0 -probesize 2048 -r 15 -fpsprobesize 0 -max_delay 40000 -i videoes -f h264 -r 15 -minrate 300K -maxrate 300K -bufsize 20K -vcodec copy -bufsize 20K -f mpegts -mpegts_original_network_id 1 -mpegts_transport_stream_id 1 -mpegts_service_id 100 -mpegts_pmt_start_pid 1000 -mpegts_start_pid 1001 -metadata service_provider="F5OEO" -metadata service_name="F5OEO- 1" -muxrate 3225490 -y videots &
```

- *320 : width of the video*
- *288 : height of video*
- *300000 : bitrate of video*
- *15 : FrameRate*
- *300K : bitrate of video (setting for the transport stream tool)*

So we can change as we have plenty of bandwidth for a 720*576 resolution at 25 frame/s and a video bitrate of 2800000

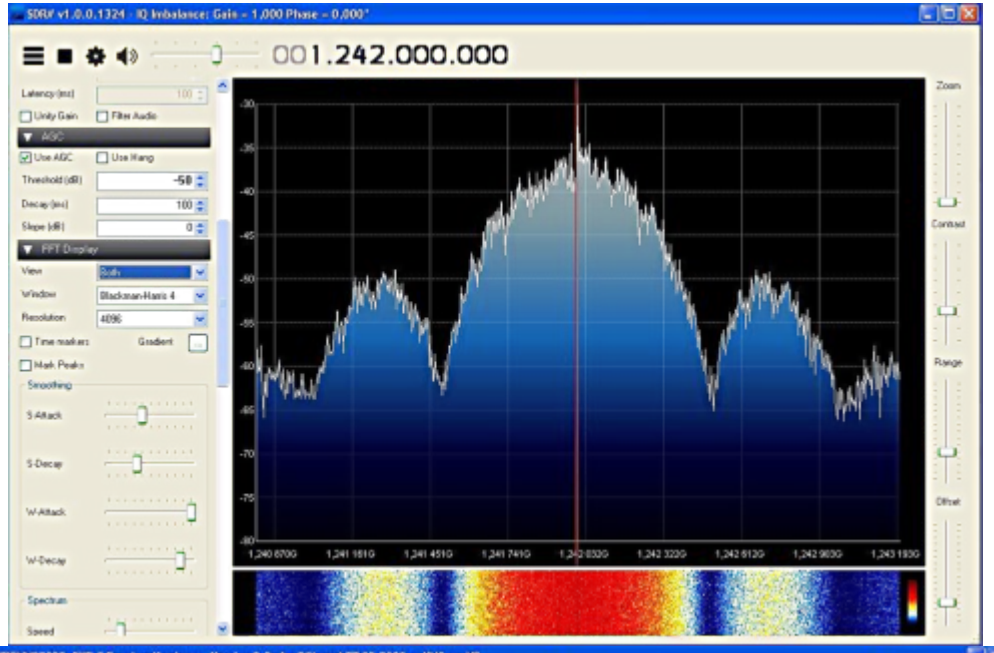
```
sudo nice -n -30 raspivid -s -n -w 720 -h 576 -b 2800000 -t 0 -pf high -fps 25 -g 12 -ih -o videoes &
```

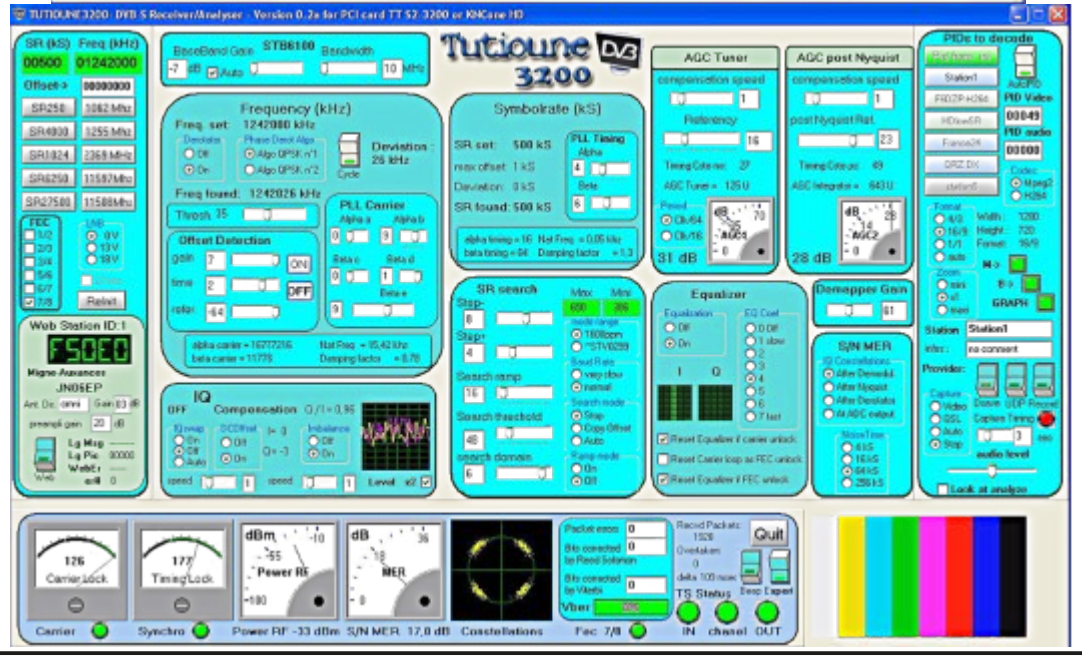
```
sudo /home/pi/UglyDATV/UglyDATV videots 2000 7 0 0 &
```

```
sudo nice -n -30 /home/pi/UglyDATV/ffmpeg -loglevel debug -analyzeduration 0 -probesize 2048 -r 15 -fpsprobesize 0 -max_delay 40000 -i videoes -f h264 -r 15 -minrate 2800K -maxrate 2800K -bufsize 20K -vcodec copy -bufsize 20K -f mpegts -mpegts_original_network_id 1 -mpegts_transport_stream_id 1 -mpegts_service_id 100 -mpegts_pmt_start_pid 1000 -mpegts_start_pid 1001 -metadata service_provider="F5OEO" -metadata service_name="F5OEO-1" -muxrate 3225490 -y videots &
```

Important note : Video bitrate should not excede 80 % of the total bitrate: 3500K*0.8=2800K

To stop the process: press CTRL C

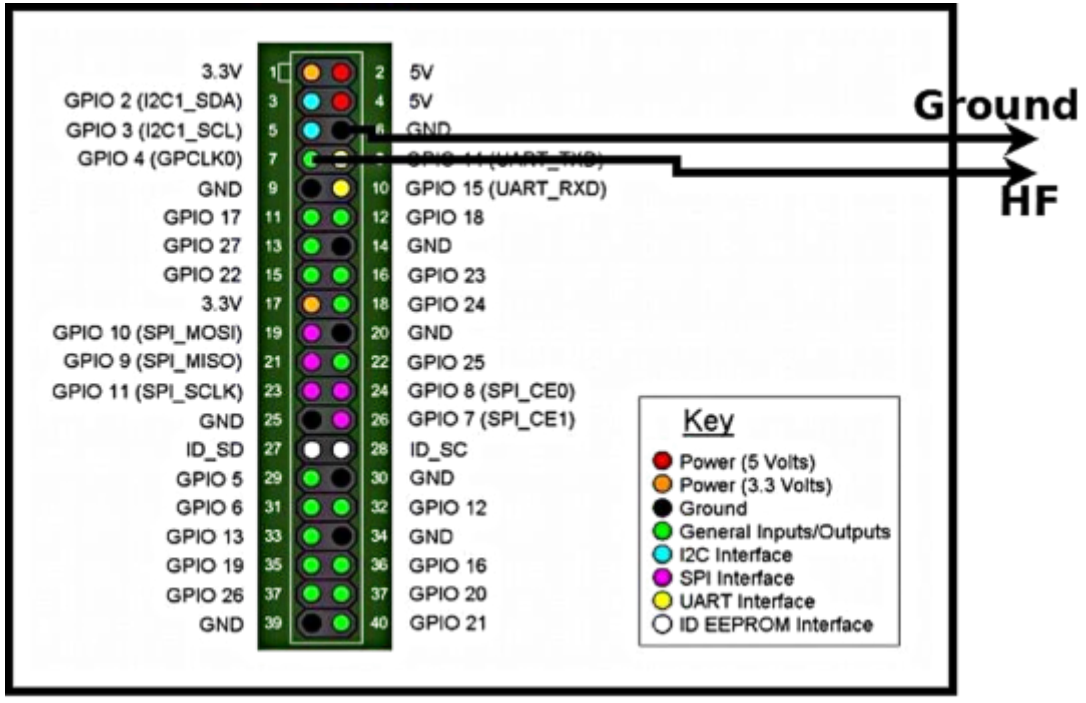




Mode UGLY

This is a particular mode: QPSK RF is directly available on the pin 7 of the raspberry GPIO.

It doesn't require any other hardware!

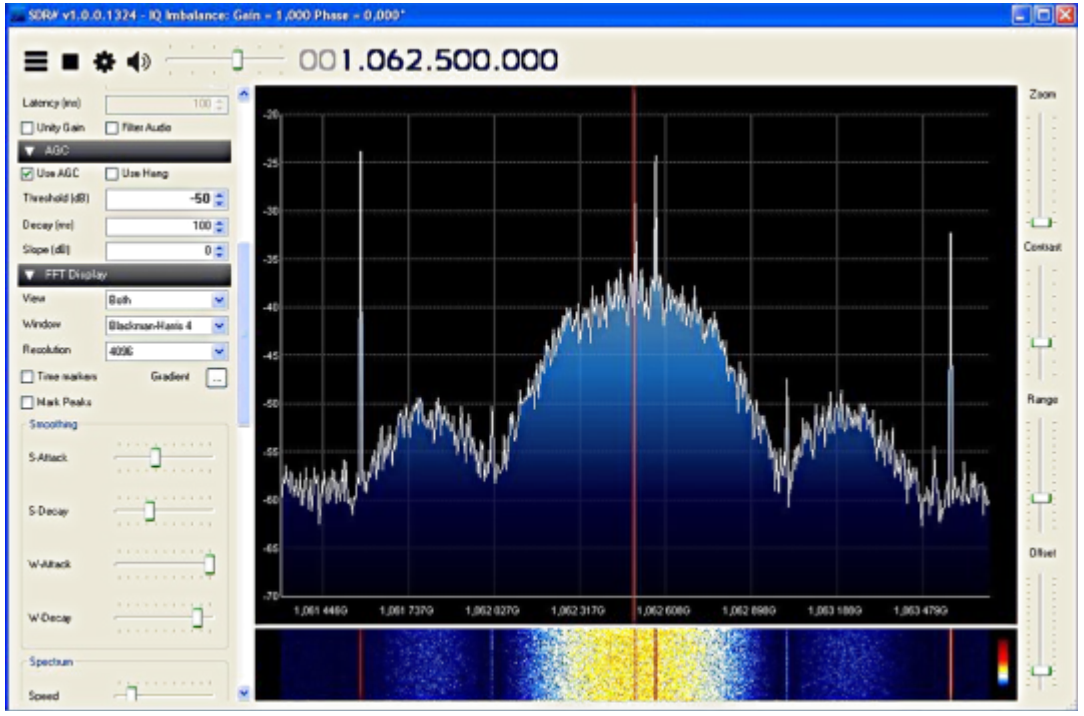


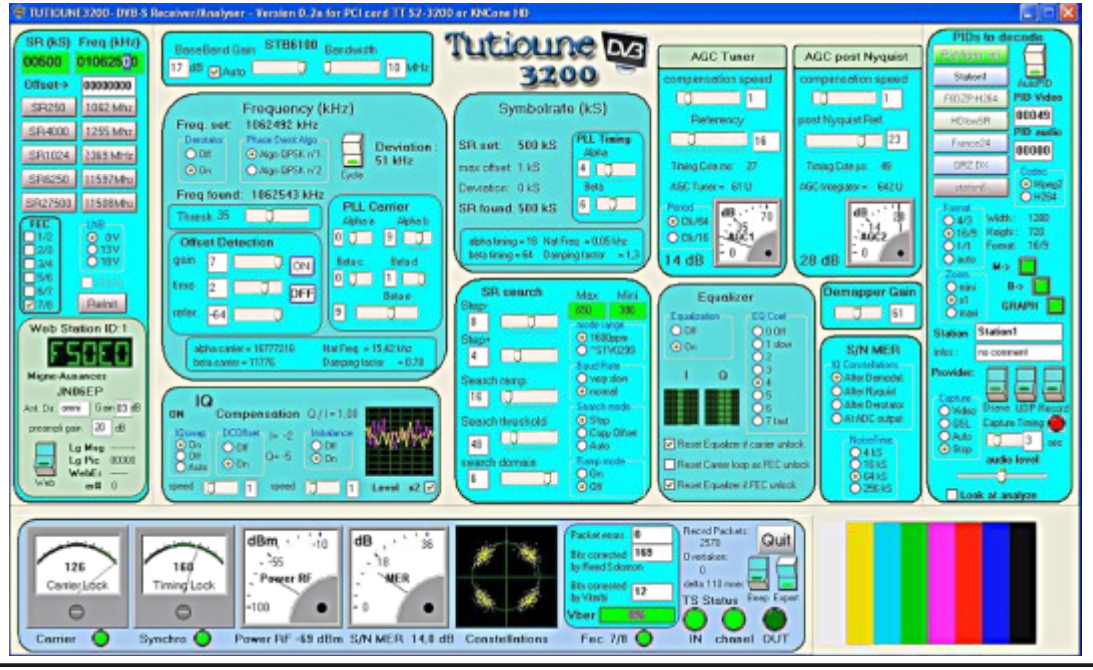
This called Ugly because the RF modulation is done with square signals which implies lot of harmonics (mainly uneven 1,3,5..).

RaspberryPi has a PLL Clock programmable wich can generate frequency up to 250 MHZ. As we have to be precise at Frequency*4 (QPSK), we can generate a RF signal at up to 62.5MHZ.

As the signal is square, we can receive also all uneven harmonics : for example harmonic 7 of 62.5Mhz is 437.5MHZ which is in our ATV HAM Band. Adding a bandpass filter on 437 and you have a ready to send DATV RF Signal.

There is no nyquist filtering thus we have all the SymbolRate harmonics.





For easy receiving on a set top box, we can listen the 17th harmonic (which has still an enough power to be received). So here is the result at 1.0625GHz.

Command to use UGLY mode

This is the same software, just the latest parameter which is the frequency in MHZ of the command line set the mode to Ugly:

```
sudo ./UglyDATV /media/usb0/videots/avsync.ts 500 7 1 62.5
```

- *Model B+*
- *TuneFrequency = 1062.500000 Mhz at harmonic 17*
- *UGLYDATV (F5OEO Evariste) with loop*
- *Board revision = 0x10*
- *Unmapped 0*
- *Clock Divider=1000*
- *Real SR = 500 KSymbol / Divider =1000*
- *Playing File =/media/usb0/videots/avsync.ts at 500000 KSymbol FEC=7*
- *TS Bitrate should be 806372 bit/s*
- *END OF FILE OR packet is not 188 long 0*

Note : All the scripts which are used with IQ mode could be used in Ugly mode by setting the last parameter.

IMPORTANT : Symbol Rate should not exceed 1500KSymbol/s

Comparing DATV models from BATC, DATV-Express, HiDes, and SR-Systems.

by Ken Konechy W6HHC

I found myself completely overwhelmed by the sheer number of different DATV models being offered by HiDes. The following table was prepared to protect my sanity. This table compares ham DATV equipment models from BATC, DATV-Express, HiDes, and SR-Systems.

Comparison of DATV Models from BATC / DATV-Express / HiDes / SR-Systems Page 1 of 2

by Ken Konechy W6HHC

Company MODEL	TYPE	Standalone	Price	Frequency Range	DVB-T Channel BW	Encoding	Average RF Power Output	Protocol
BATC DigiLite (kit)	Transmitter	USB	~ 120 BP with soldering components	420 - 450 MHz or 1200 - 1350 MHz	N/A	MPEG-2 with Hauppauge	-10 dBm to -15 dBm	DVB-S
BATC DTX-1	Transmitter	Y	459 BP 585 euro	70 - 1350 MHz	N/A	MPEG-2	-5 dBm	DVB-S
DATV-Express (w/ 4-core i7 PC)	Transmitter	USB	USD300 215 BP	70 - 2450 MHz	1 MHz -thru- 8 MHz	MPEG-2 with Hauppauge	DVB-S 10 dBm DVB-T -5 dBm	DVB-S DVB-T
DATV-Express (w/ ODROID U3)	Transmitter	USB	USD300 215 BP	70 - 2450 MHz	1 MHz	MPEG-2 with Hauppauge	DVB-S 10 dBm DVB-T -5 dBm	DVB-S DVB-T
HiDes HV-100E	Transmitter	Y	414 euro USD669	50 - 950 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	-3 dBm	DVB-T
HiDes HV-100EH	Transmitter	Y	414 euro	1200 - 1350 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	-18 dBm	DVB-T
HiDes HV-110E	Receiver	Y	125 euro	170 MHz to 950 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	N/A	DVB-T
HiDes HV-200E	Transmitter	Y	492 euro	100 MHz to 2500 MHz	1 MHz -thru- 8 MHz	MPEG-2 & H.264	between -3 and -18 dBm depending on frequency	DVB-T
HiDes HV-310E v02	Transmitter	Y	USD349	50 - 950 MHz & 1200 - 1350 MHz	1 MHz -thru- 8 MHz	H.264	15 dBm at 430 MHz 0.5 dBm at 1275 MHz	DVB-T
HiDes UT-100A	TX/RX	USB	USD199	70 - 950 MHz & 1200 - 1350 MHz	5, 6, 7, 8 MHz	MPEG-2 & H.264	0 dBm	DVB-T
HiDes UT-100B	TX/RX	USB	125 euro	70 - 950 MHz & 1200 - 1350 MHz	2, 3, 4 MHz	MPEG-2 & H.264	0 dBm	DVB-T
HiDes UT-100C	TX only	USB	170 euro	70 - 950 MHz & 1200 - 1350 MHz	1 MHz -thru- 8 MHz	MPEG-2 & H.264	0 dBm	DVB-T
HiDes UT-100D	TX only	USB	USD84	170 - 950 MHz	2, 3, 4 MHz	MPEG-2 & H.264	0 dBm	DVB-T

Please send any additions or corrections to me at W6HHC@ARRL.net

Editors note: a high resolution graphic is available to download at: http://cq-datv.mobi/downloads.php

Comparison of DATV Models from BATC / DATV-Express / HiDes / SR-Systems Page 2 of 2

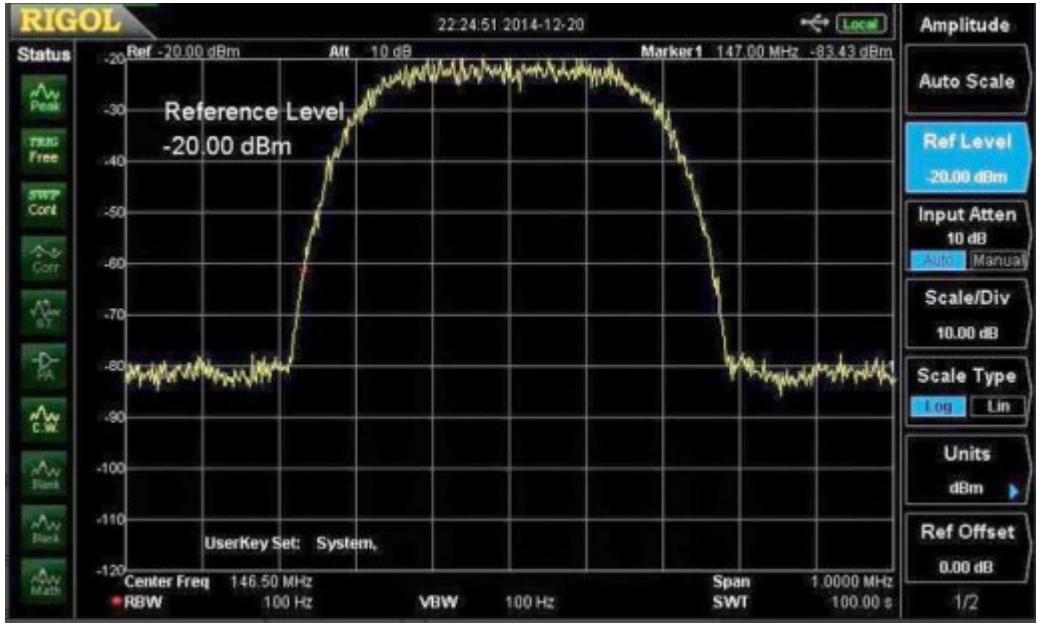
by Ken Konechy W6HHC

Company MODEL	TYPE	Standalone	Price	Frequency Range	DVB-T Channel BW	Encoding	Average RF Power Output	Protocol
HiDes UT-130	RX only	USB	USD199	100 - 950 MHz & 1200 - 1350 MHz & 2350 - 2500 MHz	2 MHz -thru- 8 MHz	MPEG-2 & H.264	N/A	DVB-T
HiDes UT-200AJ	TX/RX	USB	USD239	50 - 950 MHz 1200 - 1350 MHz	TX - 6,7,8 MHz RX - 6, 7 MHz	MPEG-2 & H.264	between -3 and -14 dBm depending on band	ISDB-T/Tb
HiDes UT-210	TX only	USB	USD269	100 - 950 MHz & 1200 - 1350 MHz & 2350 - 2500 MHz	1 MHz -thru- 8 MHz	MPEG-2 & H.264	between -3 and -18 dBm depending on band	DVB-T
SR-Systems e.K MiniMOD4	Transmitter board	Y	350 euro ---- 550 euro (to HAMs only)	70 - 2500 MHz	N/A	MPEG-2 with encoder board	0 dBm	DVB-S ---- DVB-S DVB-S2
SR-Systems e.K MiniMOD5	Transmitter board	Y	500 euro (to HAMs only)	10 - 1100 MHz	1 MHz -thru- 8 MHz	MPEG-2 with encoder board	0 dBm	DVB-T
SR-Systems e.K MiniMOD5/A	Transmitter board	Y	900 euro (to HAMs only)	10 - 1100 MHz	1 MHz -thru- 8 MHz	MPEG-2 or H.264 with encoder board	0 dBm	DVB-T DVB-T2
SR-Systems e.K HD-MOD	Transmitter board	Y	550 euro (to HAMs only)	10 - 1100 MHz	1 MHz -thru- 8 MHz	H.264 encoder is onboard	3 dBm	DVB-T
SR-Systems e.K MPEG2 Encoder	Encoder board	Y	175 euro (to HAMs only)	N/A	N/A	Use with exciter boards	N/A	N/A
SR-Systems e.K H.264 Encoder	Encoder board	Y	400 euro (to HAMs only)	N/A	N/A	H.264 use with DVB-T exciter boards	N/A	N/A
SR-Systems e.K Hamset3 (MiniMOD3 obsolete)	Transmitter	Y	500 euro (to HAMs only)	70 - 2200 MHz	2 MHz -thru- 8 MHz	MPEG-2	0 dBm	DVB-S DVB-T ATSC
SR-Systems e.K nim DVB-S (TS out)	Receiver Tuner (use with modulator)	Y	50 euro (to HAMs only)	950 – 2150 MHz	N/A	MPEG-2	N/A	DVB-S
SR-Systems e.K nim DVB-S2 (TS out)	Receiver Tuner	Y	100 euro (to HAMs only)	950 – 2150 MHz	N/A	MPEG-2 H.264	N/A	DVB-S DVB-S2
SR-Systems e.K nim DVB-T (TS out)	Receiver Tuner	Y	75 euro (to HAMs only)	50.5 - 858 MHz	1 MHz -thru- 8 MHz	MPEG-2	N/A	DVB-T

DATV-Express Project - December update report

Ken W6HHC

Charles G4GUO has been working on adding a new mode to the DATV-Express software, a Reduced-Bandwidth DVB-S Digital-ATV (RB-DATV) signal for the new 146 MHz band in UK. The goal is to start up some DATV activity on the UK's newly opened 146 MHz band using very low Symbol Rates around 0.300 MSymb/sec to 0.333 MSymb/sec to produce a small bandwidth around 0.5 MHz centered on 146.5 MHz.



Narrow-BW DVB-S signal produced by DATV-Express exciter board on 146.5 MHz with SR = 333 KSymb/s.
The frequency span on the Spectrum Analyzer is 1 MHz wide.

The DATV-Express software is being experimentally modified to produce a clean signal spectrum with NO alias images being produced when using very low SR. This is not as easy as it sounds, but, by using SDR and some FPGA coding changes, Charles was able to add x64 frequency interpolators coding simply to get the aliases to go to frequencies outside of the 5 MHz analogue Nyquist filters cutoff (for example 0.2 MSymb/s SR x64 = 12.8 MHz and alias filtering is achieved).

The current plans are to use DVB-S with H.264 video compression to produce a video frame rate that is as fast as possible. G4GUO first tried to use a Mitsubishi 2M RF amplifier brick RA06H1317M (I believe rated at 60W FM at 150 MHz) and obtained terrible spectrum-distortion results.

Charles could only obtain 750 mW average power output before excessive spectrum-distortion set in. Charles is now exploring the use of a "RF amplifier distortion correction" approach (sometimes called "pre-distortion" or "pure signal") to reduce the spectrum distortion.

I hope the reader will realize that these "narrow-bandwidth" techniques are not just restricted to 146 MHz and could also be used on any crowded DATV band in any country to insert a narrow 0.5 MHz BW DATV signal into a crowded band-plan spectrum.

Ken W6HHC has started to investigate software changes needed to use the Logitech C920 web cameras to produce H.264 directly for the DATV-Express board and eliminate the need for Hauppauge video-capture units. Not an easy task.

Looks like Ken will need to do some software coding and learn how to compile in a linux world. Fortunately, Alex OZ9AEC has been working with the C920 web camera on a Raspberry PI and has supplied plenty of direction and suggestions.

Art WA8RMC has received a new production batch of new DATV-Express hardware boards just before Christmas. So there is no shortage of boards that can be ordered directly from http://www.DATV-Express.com.

Here is a report on where boards have shipped in 2014:

- *Australia* 9%
- *Belgium* 3%
- *Brazil* 1%
- *Chile* 1%
- *Denmark* 1%
- *France* 2%
- *Germany* 6%
- *Italy* 1%
- *Japan* 7%
- *Netherlands* 4%
- *Switzerland* 4%
- *UK* 31%
- *USA* 28%

I had a chance to read the blog of Rob M0DTS concerning his current experiments using very low Symbol Rates (aka narrow DATV bandwidth) on the new 146 MHz band allocations.

Rob is using the DATV-Express board as the transmitting exciter with two experimental software modifications from Charles G4GUO, the x64 frequency interpolators coding to eliminate alias images in the spectrum when using very low symbol rates and also some software coding for sending transport streams to the DATV-Express.

Current status is: tests with DVB-S 1 W average power output from the RF amp stages to Terry G1LPS over a 28 KM path have resulted in a reasonable constellation being seen by G1LPS. But, the weak QPSK signal is not fully decoded yet with Tutioune DVB-S software and a TechnoTrend TT-1600 PCI tuner card being used as the DATV receiver.
The URL for Rob's blog on 146 MHz efforts is
http://m0dts.co.uk/index.php?tag=146MHz

(Editor's note – a full two-way QSO between MØDTS and G1LPS was accomplished on Jan 11...see Known DATV DX Records in the DATV NEWS section.)

"Bravo to Rob on his 146 MHz efforts"

"project is set to cruise speed"....de Ken W6HHC

Moving on with film making - Part 2

Trevor G8CJS

In this issue I would like to look at sound, often called the poor relation. The cost of video cameras has plummeted, but unless you want to use the, in camera microphones you need to look at either a more expensive camera that will allow the connection of an external microphone or think about recording sound separately. The best position for the camera is rarely the best position for the microphone. Separate sound recording allows the microphone to be in the best position and negates the need for restrictive wiring.

My first experience of separate sound was editing a dance scene, the young lady had performed to a cassette recorder on location, providing the music track and the director wanted to replace the location sound with a DVD track in the edit. Dance needs to be in sync with the music and can often look worse than poor lip sync and in this case it looked terrible. The cassette had been running slow on site, I suspect due to exhausted batteries, and the DVD track would just not stay in sync, in fact there was a duration difference of several seconds between the tracks and even playing the cassette used on location in a studio deck still delivered a considerable duration error, against the guide sound picked up by the camcorder.

Things moved on, and the late Steve Irwin famous for his tangles with poisonous wild life always had a separate sound recorder in his back pocket fed by a lapel mic, I know because I have put several of the separate sound tapes into sync with the pictures. This was later digital technology and once you found correct lip sync it stayed in sync for the duration of the take. I suspect separate sound was a great relief to the sound man, probably sat in the film car, watching from a safe distance.

So can we adapt this knowledge to our own home made movies, well the first lesson is avoid cassette decks where tape speed is proportional to battery voltage, fortunately most mobile phones will do a better job and are often equipped with remote microphone sockets, but there is some much better dedicated kit out there.

The Zoom H4n is a clever piece of kit and can often be found for £150 on the internet, this will record your sound onto an SD card, it has two tracks so can be used for stereo and has those clever connectors that will accept either XLR or 6m jack plugs.

Try to start each take with something that clearly indicates sync on the sound and vision tracks, something that can easily be found on either the picture or the sound time line, clapper boards are probably over the top for home productions, but the microphone tap works well. Hold your hand over the top of the mic, make sure you are in vision and that the camera and the sound recorder are rolling, pause for a few seconds, bring your hand down and touch the mic and raise it again. This tap should be easy to find on the vision time line and the plop as you touch the microphone should be easy to find on the sound time line so you can then pull the two into sync in the edit.

Just because you are recording sound separately, always also record sound on the camera or camcorder, it's a useful back up and if you walk into any unexpected sync problems you can always use it as a guide, ie put both sound tracks on time lines and move the separate track to remove any echo which will be the result of poor sync.

Never take levels for granted, particularly when using digital equipment, the bottom end kit will have some sort of compressor to adjust levels, the top end kit might not. This is important because digital sound ie 0 and 1's will come to a point where all the 0 are 1's and this will be a hard limiter, pass this point and distortion will result and it will be much worse than overloading any analogue recorder. Digital kit has excellent signal to noise ratio, so when in doubt keep the levels down.

If the recording configuration has monitoring then take advantage of it, with a good set of noise excluding headphones, so you can isolate what you are recording from what you are hearing around you, I love my Bayer headphones for this, they seem to be an industry standard, just watch any pop video that includes scenes shot in the recording studio.

The kit to avoid at all cost is in ear, phones, unless you cover them with ear defenders (I have seen it done).

If possible check the recordings as soon as possible after the shoot, this is particularly important for multiple events, so if improvements are required for the next event you can change the equipment configuration, or sort any other problems, such as lapel microphone crackle from clipping the mic onto ties made from synthetic material.

The last word has to be XLR connectors,

Sound comes out of pins and goes into female connectors, but if you are working with third party kit always carry, some revering adaptors (both sex). These three pin connector support a balanced line for the sound, down a twin screen cable and should be wired pin 1 screen, 2 live, 3 return, ie X, L, R in numerical order, if you have to connect an unbalanced jack or phone to the system to an XLR lead, then join 1 and 3 to the jack sleeve and 2 to the jack tip. You will have lost the advantage of a balance line to reject induced hum into the cables, so last resort (better than no sound).

Remember when working with third party sound these cable can be carrying line or mic levels, more on this in CQ-DATV 21 when we will be looking at microphones

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