RTL-SDR v4 Review *by NNN0BOC*
RTL-SDR v4 on Linux Review *by Wally*
HDSDR ExtIO-DLL *comments by Hayati Ayguen*
Revision date: 10 October 2023

WHAT IS RTL-SDR?
"The RTL-SDR is an ultra cheap software defined radio based on DVB-T TV tuners with RTL2832U chips. The RTL-SDR can be used as a wide band radio scanner. It may interest ham radio enthusiasts, hardware hackers, tinkerers and anyone interested in RF." (per RTL SDR Blog)

I previously reviewed the RTL SDR V3 (2016) and have enjoyed it immensely, since then often wondering what it might be replaced with, and when. Please see that review for my take on the V3 if interested.

Carl (RTL SDR Head Honcho and overall nice guy) hasn't been lazy since releasing the V3, he and the RTL team has recently released a worthy update to the tried and proven design. The best parts of the V3 were enhanced, and new abilities were added, from the RTL SDR Blog we read the following;

"The V4 comes with several improvements and changes that are listed below.

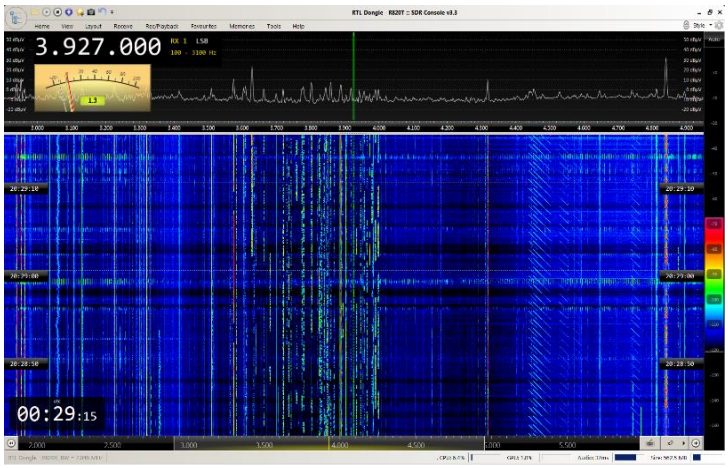
Improved HF Reception. Now uses a built in upconverter instead of using a direct sampling circuit. This means no more Nyquist folding of signals around 14.4 MHz, improved sensitivity, and adjustable gain on HF. Like the V3, the lower tuning range remains at 500 kHz and very strong reception may still require front end attenuation / filtering.

Improved filtering. The V4 makes use of the R828D tuner chip, which has three inputs. We triplex the SMA input into three bands, HF, VHF and UHF. This provides some isolation between the three bands, meaning out of band interference from strong broadcast stations is less likely to cause desensitization or imaging.

Improved Filtering x2. In addition to the triplexing, we are also making use of the open drain pin on the R828D, which allows us to add simple notch filters for common interference bands such as broadcast AM, broadcast FM and the DAB bands. These only attenuate by a few dB, but may still help.

Improved phase noise on strong signals. Due to an improved power supply design, phase noise from power supply noise has been significantly reduced.

Less heat. Due to the improved power supply design the V4 uses slightly less current and generates slightly less heat compared to the V3.



75m Activity

Cheaper price! The price of the R860 chip which is used in the V3 and most other RTL-SDR brands increased significantly at the beginning of 2023 which is part of the reason as to why RTL-SDR dongles have been increasing in price recently. For the V4 we are making use of an existing stockpile of R828D chips which are now priced cheaper than new productions of the R860. In a time when high inflation keeps pushing prices up this is incredibly welcome.'

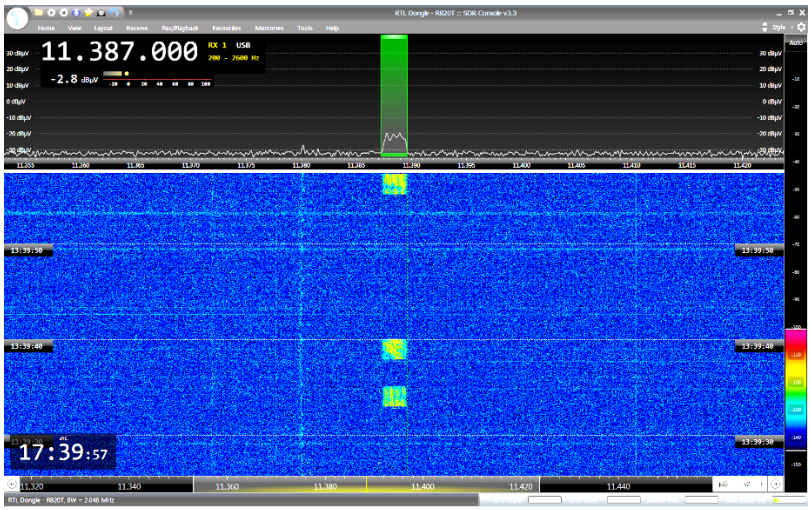
There are some other minor changes including a new bias tee LED and a small cutout hole in the enclosure so it's easy to tell when the bias tee is on.

Of course the same innovations that we brought in with the V3 are still implemented such as the sleek conductive black metal enclosure which works as a shield and doubles as a heatsink, a thermal pad to sink heat away from the PCB, 1PPM TCXO, SMA connector, USB noise choking and improved ESD protection."

The above specs are logical improvements on the V3 design, specifically addressing my greatest concerns for employing an 8-bit RTL SDR on HF, dynamic range and Nyquist aliasing, mostly addressed by the new upconverter implementation. The reduced phase noise due to a cleaner power supply is also welcome as that benefits every band of use. This need for alias-free dynamic range was once embarassingly brought to my attention when I reported receiving a SITOR WX Bcast from an HF marine radio station. I emailed copy of the reception to the station and they noted with concern the frequency I logged, somewhere in the 20MHz or higher range, yet they only transmit in the mid 8MHz range! They wondered if they had a spur or other malfunction at their TX site, but no, it was on my end with not enough bits to tune that high without a lot more front end filtering.

There I was, sending in Nyquisted qsl reports expecting to be praised. You win that round, Harry.

See here for a good treatise on the subject of adc Nyquist aliasing;
https://www.asdlib.org/onlineArticles/elabware/Scheeline_ADC/ADC_NumRep_Nyquist.html



Amazing What 8 Bits Can Do

Caveat Emptor ?
Now that list of updates should be enough to get anyone familiar with and fond of the RTL SDR V3 to bite, but you get all this for an even lower price than the still available V3!

There is simply no better marketing than this; an literally improved in-most-every-way product at a reduced price. I know of no other SDR or analog radio manufacturer that has pulled this off before.

High praise from me, yes, and you may justly ask who am I, a compensated shill touting a product? Did Carl perhaps pay me to sell you on the V3 or V4?

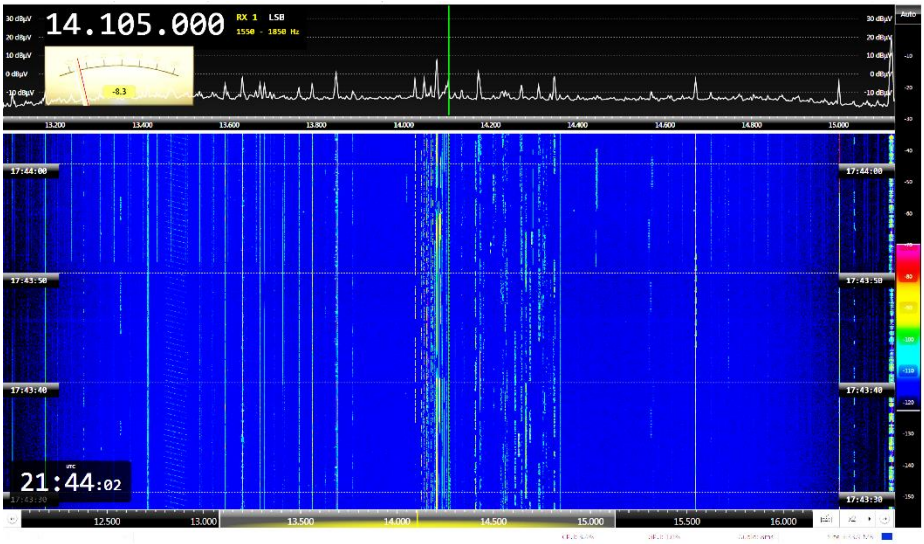
Not at all, he owes me nothing, if anything I owe him as all he has done is send me samples of his products on request, without any input on how I review them, and let me review them to my hearts content..... or discontent.

Revelation!
About as soon as I saw on the RTL SDR Blog that the V4 was a thing, I emailed Carl to beg for a sample and to my delight he graciously complied.

The V4 came to me a few days ago direct from China, in a well padded bubble wrap envelope and with the field antenna kit consisting of a "rabbit ears" tv antenna aka dipole and various doodads as described here;

"RTL-SDR Blog V4 R828D RTL2832U 1PPM TCXO SMA Software Defined Radio with Dipole Antenna Kit Includes 1x RTL-SDR Blog brand R828D RTL2832U 1PPM TCXO SMA V4 Dongle, 1x Dipole Antenna Base with 60cm RG174, 2x 23cm to 1m telescopic antenna, 2x 5cm to 13cm telescopic antenna, 1x 3 meter RG174 extension cable, 1x Flexible Tripod Mount, 1x Suction Cup Mount."

You can order the V4 by itself for even less outlay.



V4 SDR Console 20m HF Packet

In this review, however, we will be using 2 antennas in our HF testing; a coax-fed horizontal loop of 120ft diameter up around 30ft, and a single element Wullenweber, aka the GAP Titan DX HF vertical up around 10ft at the base. So there's the HF antennas sorted.

Unpacking!

The V4 is pretty much identical to the V3 in outward appearance save for the black anodizing and off-white lettering, all professionally executed. The build tag on the back of the device says 8th month of 2023 so this baby is fresh off the production line as of the time of writing. Also I doubt if it was a cherry picked or ringer edition sent to me, meant to sway a unwary reviewer into a more favorable review. Plus there were two V4 in the bag, one will go to a friend for his input who uses a V3 for V/UHF and above only, gaining us perspective from someone who uses the RTL SDR in a way I don't have much experience in. From discussions with the aforementioned (we will call him Wally) relative to V3 performance, receiving a ringer or cherry picked sample did not happen in the past and I do not expect it to happen now as his experience wih the V3 was very similar to mine, save for our respective divergent uses. If a V4 performs superior to a V3 on HF it'll largely be due to the inclusion of the upconverter stage alone, the same upconverter that will accompany every V4 that comes off the line. The V4 itself comes in a pink antistatic bag with a paper user manual in several languages to help get one started quickly, with RTL SDR links where you can download the requisite drivers.

I closely examined the V4 for any obvious defects and found none. I did however use a pair of needle nose pliers to ensure the nut securing the SMA socket to the body was snug, it was. On various pieces of radio gear I have found in the past such nuts to be not quite secure. Here I will advise using an flexible SMA to whatever your coax fitting of choice is to reduce strain on the SMA and USB connectors. Keep in mind SMA connectors aren't designed for many service cycles where one attaches and detaches connectors every day, however if one is careful they may last a long time before operation becomes flakey due to intermittent contact. Always better to use a sacrificial adapter, one with some coax to give it flexibility, however.

Deployment!

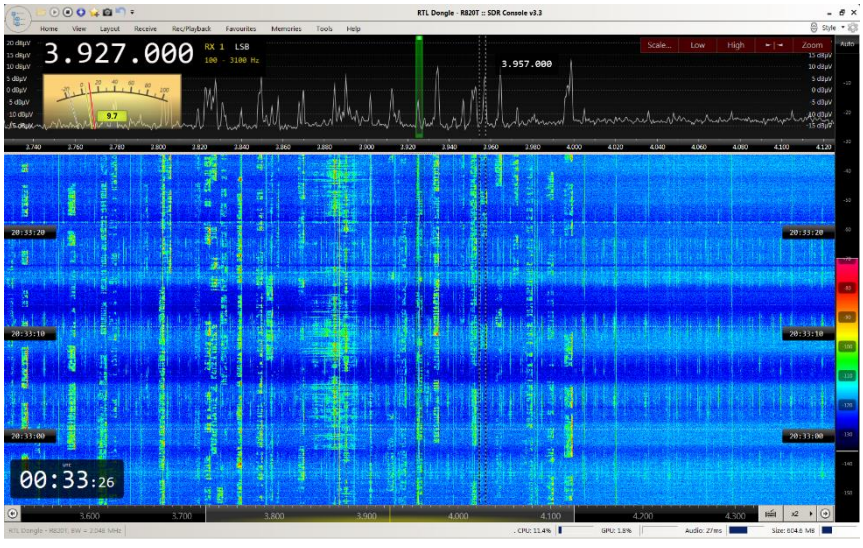
In my main SDR/Decoding pc I have internal radios and expect the V4 will also be permanently mounted internally with a short coax to a pc backplane mounted TNC bulkhead adaptor, however for review purposes the V4 will be external to the pc, connected via rear USB port, a mounting likely far closer to that employed by the vast majority of users.

After inserting the V4 into the backplane of the pc I went in search of drivers needed. Most SDR apps will need an update to their ExtIO_RTLSDR.dll as they've not been updated for the V4 yet, but that is easy to do, grab the dll from the link I've provided below and copy past the unzipped dll into the SDR app directory and you're in fine business.

Setup!

To misquote one of my favorite QST Magazine reviewers, "describing SDR but not mentioning Software is akin to describing fish but not mentioning water". Not going to do anything with an SDR without Software!

I used Simon Brown's fabulous SDR Console for most all my testing as it is the most capable and stable of the apps commonly used in RTL-land, that said HDSDR and others also worked well. I am most familiar with SDR Console and settled on it for all further testing. I cannot stress enough how lovely this piece of code is for the price. SDR Console is an free to use excellent piece of kit. The latest version comes preconfigured for the V4 and recognised and enabled it instantly.

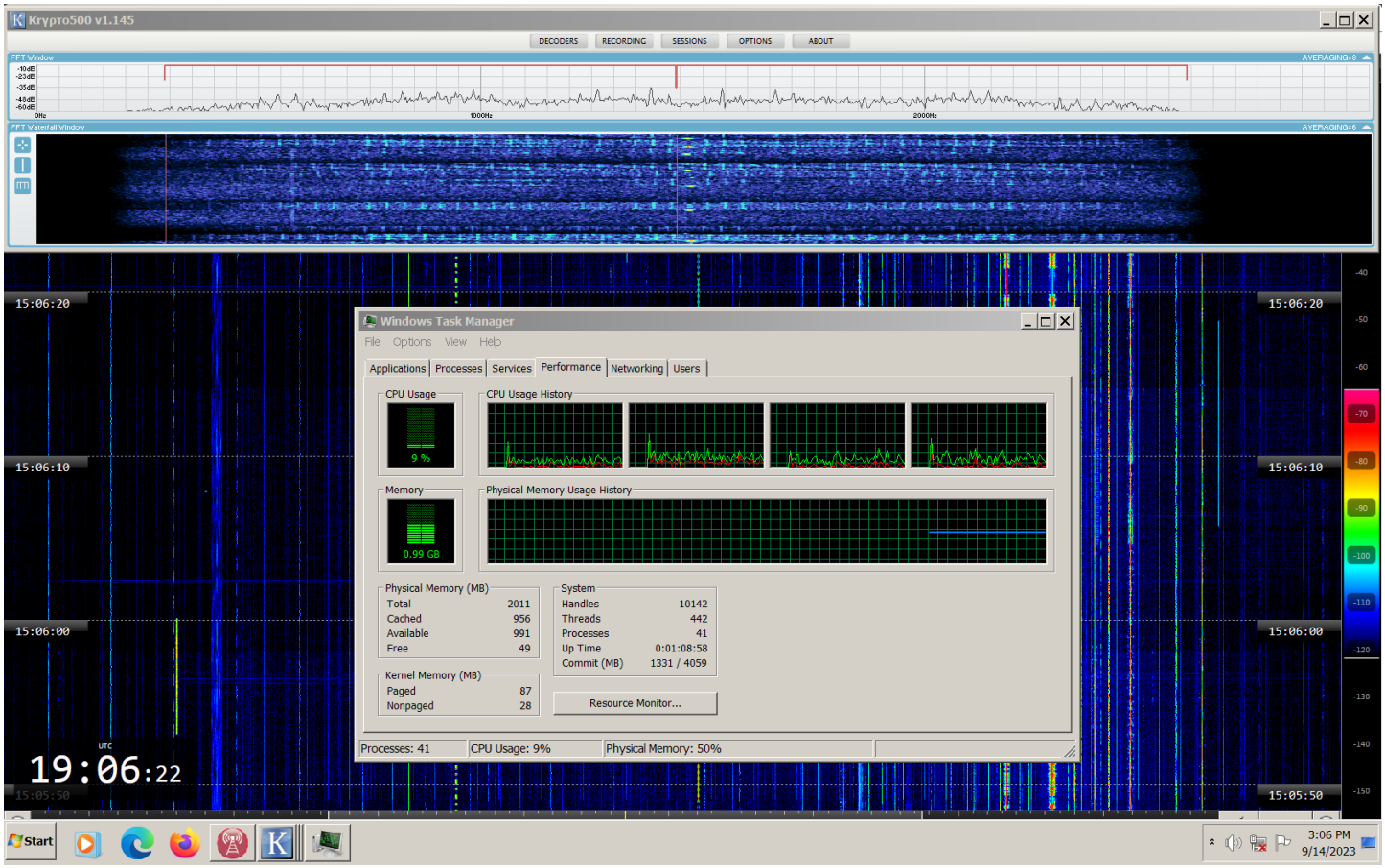


While on the subject there are some SDR settings under the HOME Menu Tab you will want to make sure of, one is the V4 is set to AGC OFF and UPCONVERTER ENABLED, I also dialed in 7dB of gain per the RF GAIN Menu Tab and this seemed to work very well in my instance. I also set the HIGH and LOW under the VIEW/SCALE menu tabs to static values not AUTO, the LOW side will likely vary from band to band.

All I now had to do to visit RTL-land was press the start button and manage some settings to my liking. I first set up SDR Console to view the max bandwidth of a 3.2MHz SAMPLE RATE, the app did so very smoothly as far as visual aspect went,

however audio was cutting out severely, you can see in the included image how that looked - a very nice chunk of spectrum on display. I settled on 2048 Sample Rate for best results for every day use. If for example I wanted to tie the V4 to an analog receiver IF output to simply view spectrum, there'd be no issue with audio dropouts as the analog or hardware receiver would be doing the recovered audio, full viewable bandwidth could be enabled.

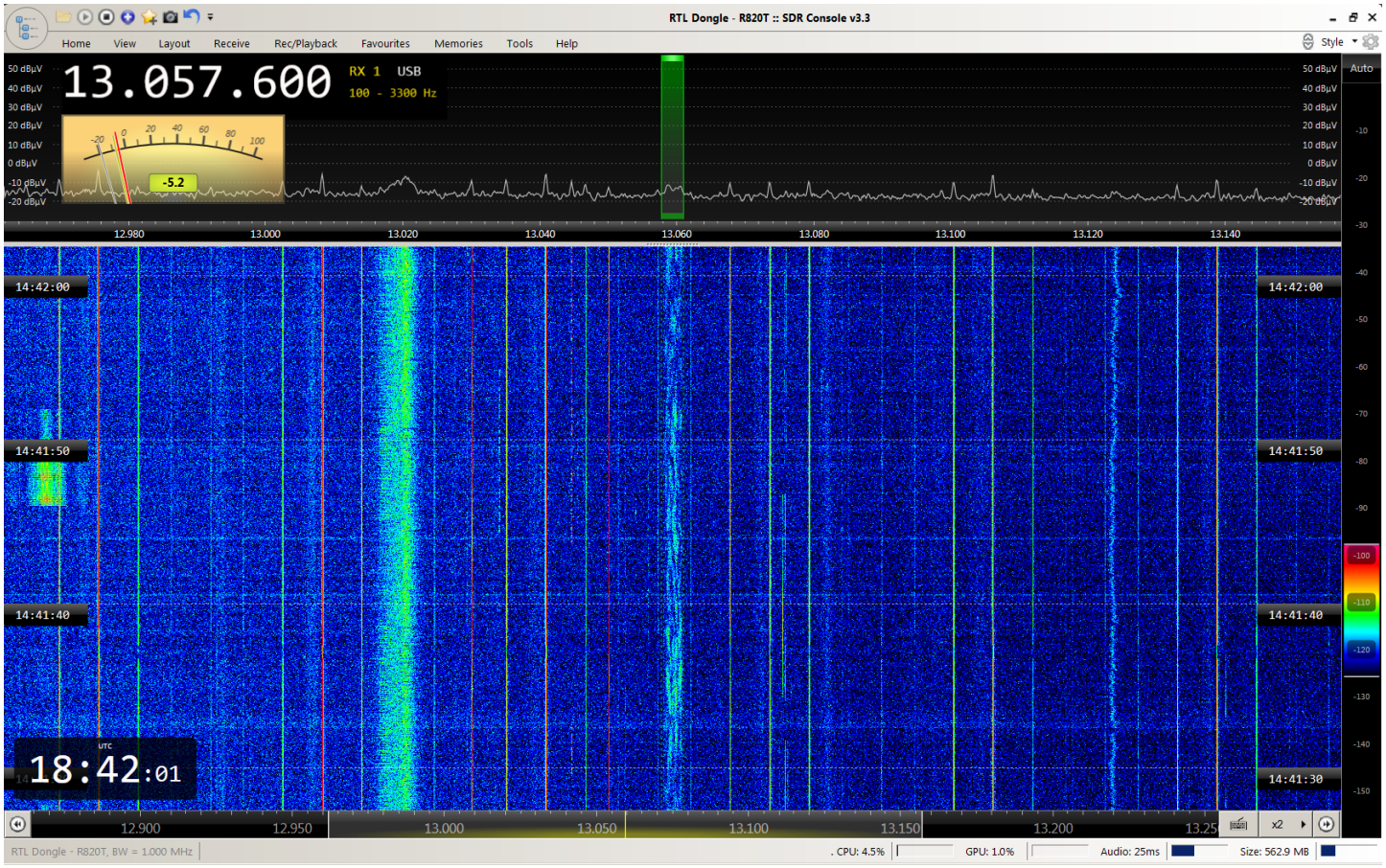
I have a few things I like to see in an SDR app, one is low cpu time and memory use, and other settings are adjusted for effectiveness for purpose, while also being completely stable - tough call. SDR Console I have found to be a bit of a memory hog but nothing that can't be dealt with. I note the sample rate has immediate effect upon how much memory is in use, the higher the sample rate the more the memory. It's cpu use is very low for what it does/can do. I'm going to guess most people with more recent pc hardware will not have many of the problems I faced, such as high cpu time and stuttering performance in the highest sample rate. My pc hardware is 2008 era; 32bit Core2Quad, 2 gigs of ram under Win7, the system was configured for top audio/video performance at the time, it does what I want for the most part even today. More ram would likely take care of many problems, and ram for these ancient relics is relatively inexpensive so I have no excuse. Sadly the Nvidia Quadro video card in the system, a card specifically made for CAD/CAM/CAE and visual effects softwares, is an older variant so I cannot take advantage of the CUDA cores such a card has, a newer Nvidia or AMD card would have to be employed to take advantage of the offloading of processing many SDR apps are designed to do - this would greatly reduce CPU time used.

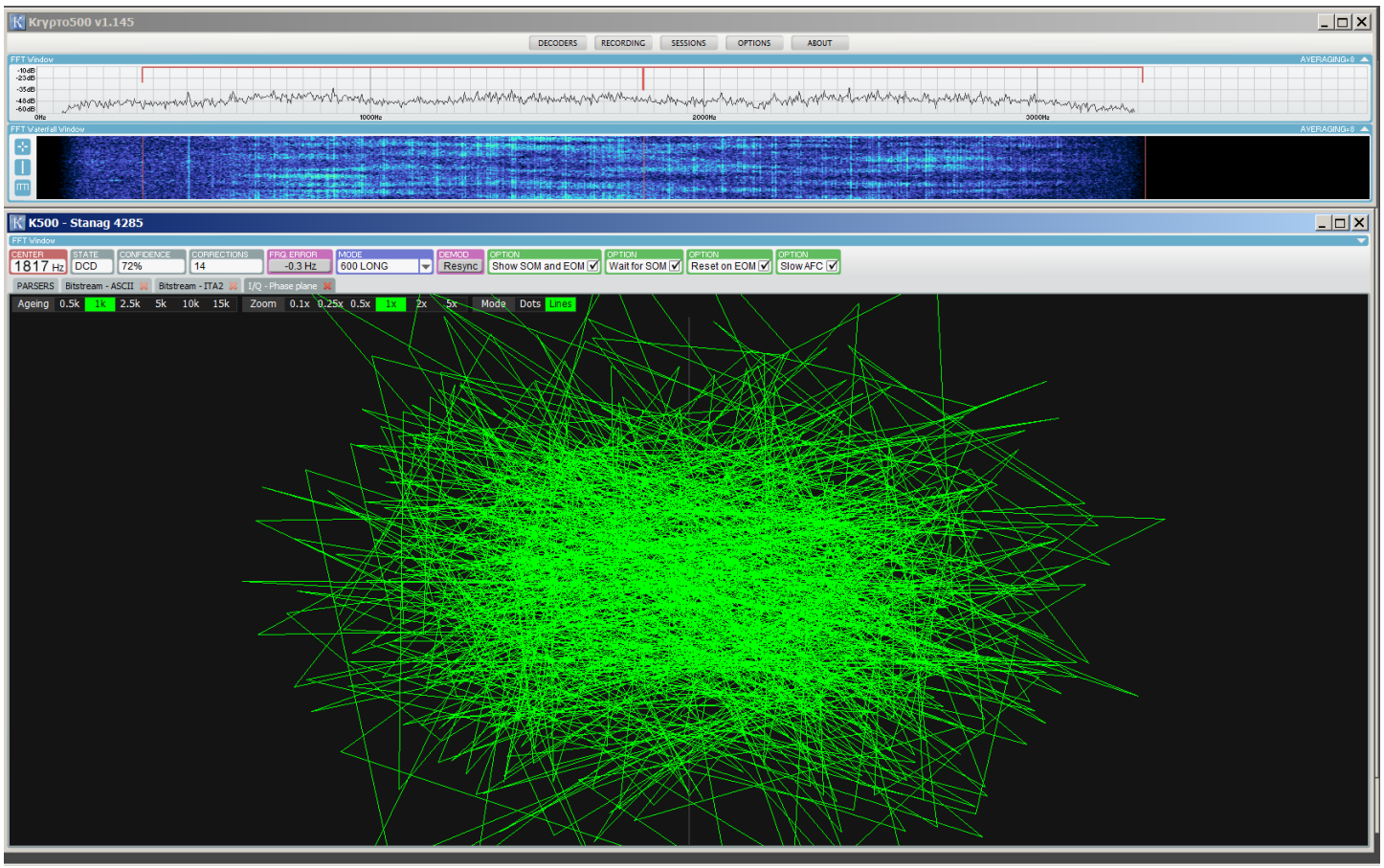


I note a low of 4 percent CPU time with SDR Console running at 2048 Samples Per Second with the app adjusted to my exact likings, very nice! Viewing full spectrum or narrowing it up also has no CPU or GPU penalty, I normally run the ZOOM control at half spectrum for best balance of target signal and nearby spectrum.

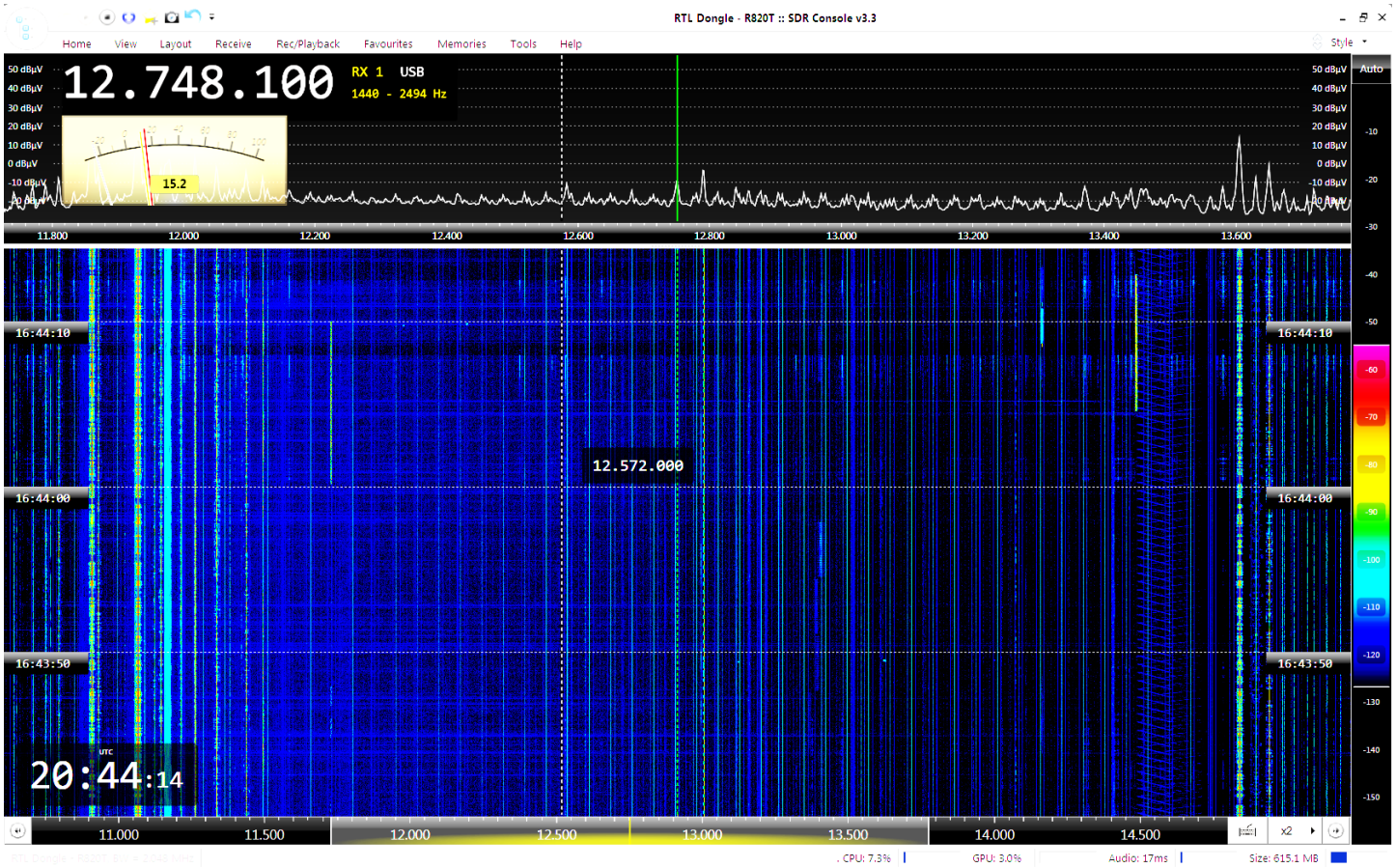
On The Air!
I tuned to a weak/fading STANAG S4285 signal to test V4 performance feeding various Digital Mode Decoders in harsh real-world environment.

The decoder synched and copy began, as you will see from the pic the signal was very weak but synchronisation still took place once tuned precisely. Also I find the V4 to be spot on as far as frequency goes as is evidenced in the same pic.

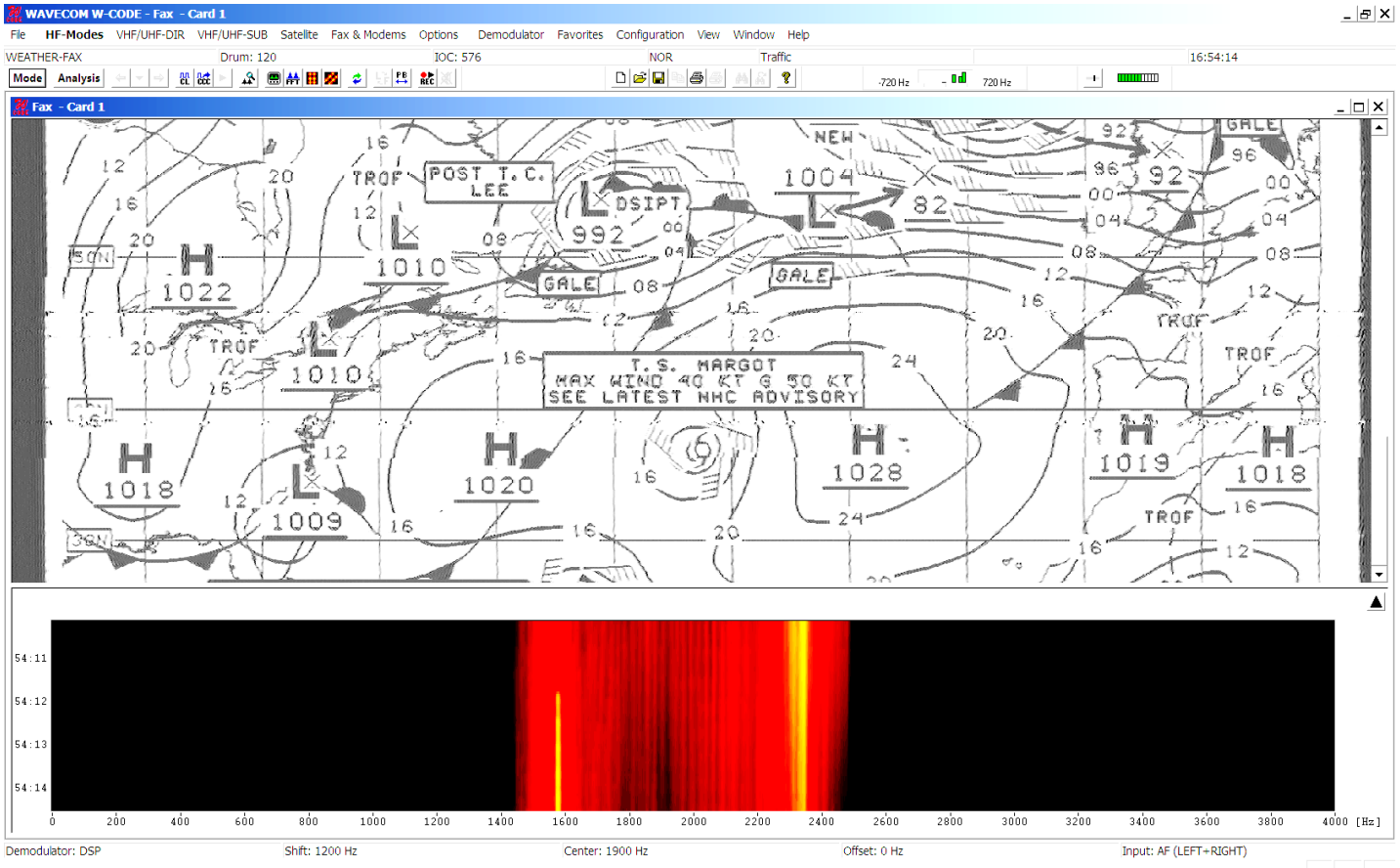




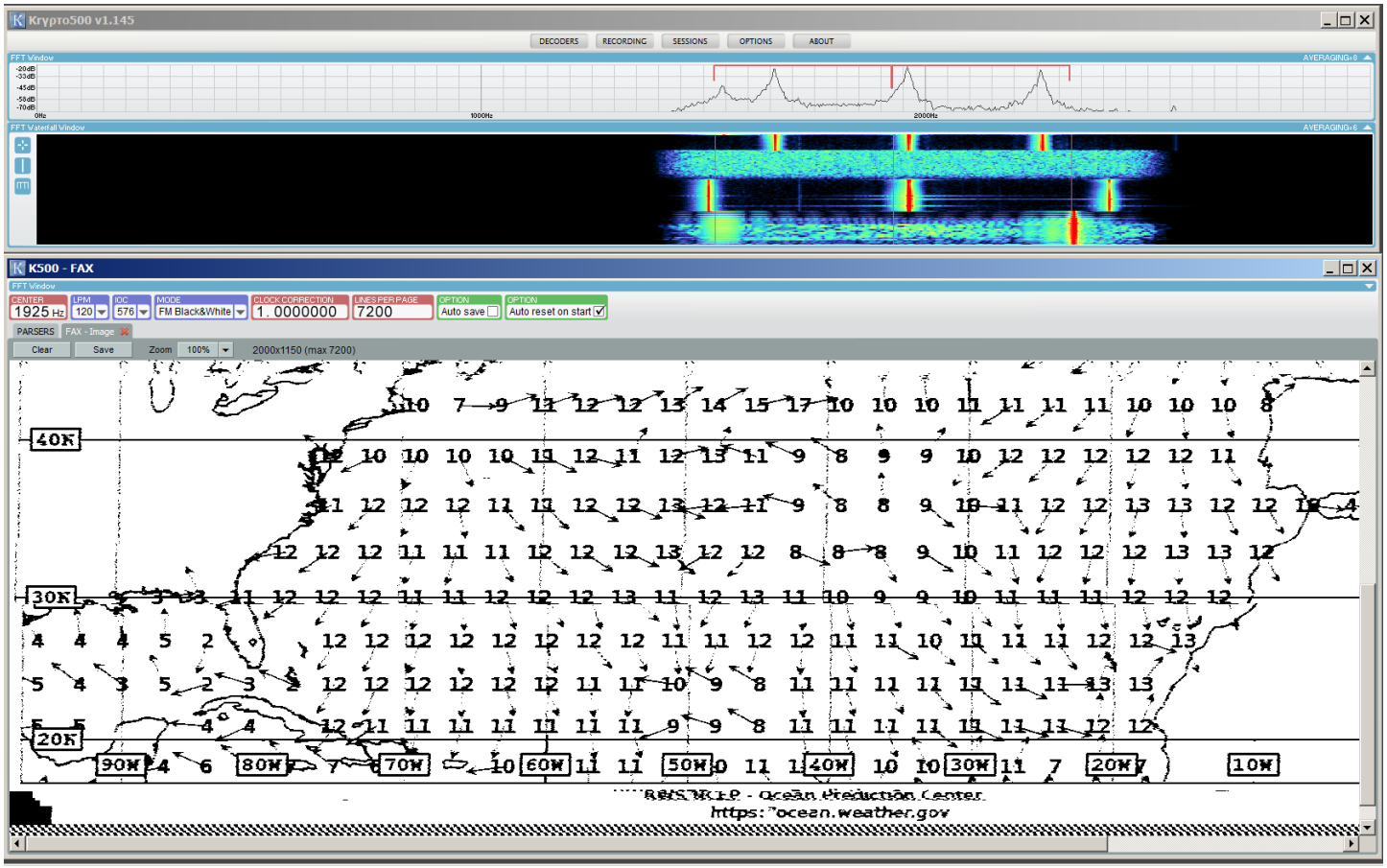
I next tried HF FAX Reception and found the V4 to be to be stable and very conducive to rendering clean HF Fax, see the included images for my results. The USB/Monitor/PSU spurs seen in the SDR Console image can be forced to move to other frequencies by changing the Sample Rate, Monitor Refresh Rate, or just reducing the ground loop or employing ferrite cores on the various lines to and from the pc. Note that these undesired noises aren't due to the fact the RTL V4 employs an 8 bit adc but rather the rfi environment the pc is used in.



SDR Console RTL V4 Showing Ground Loop Spurs



HF FAX



More HF Fax

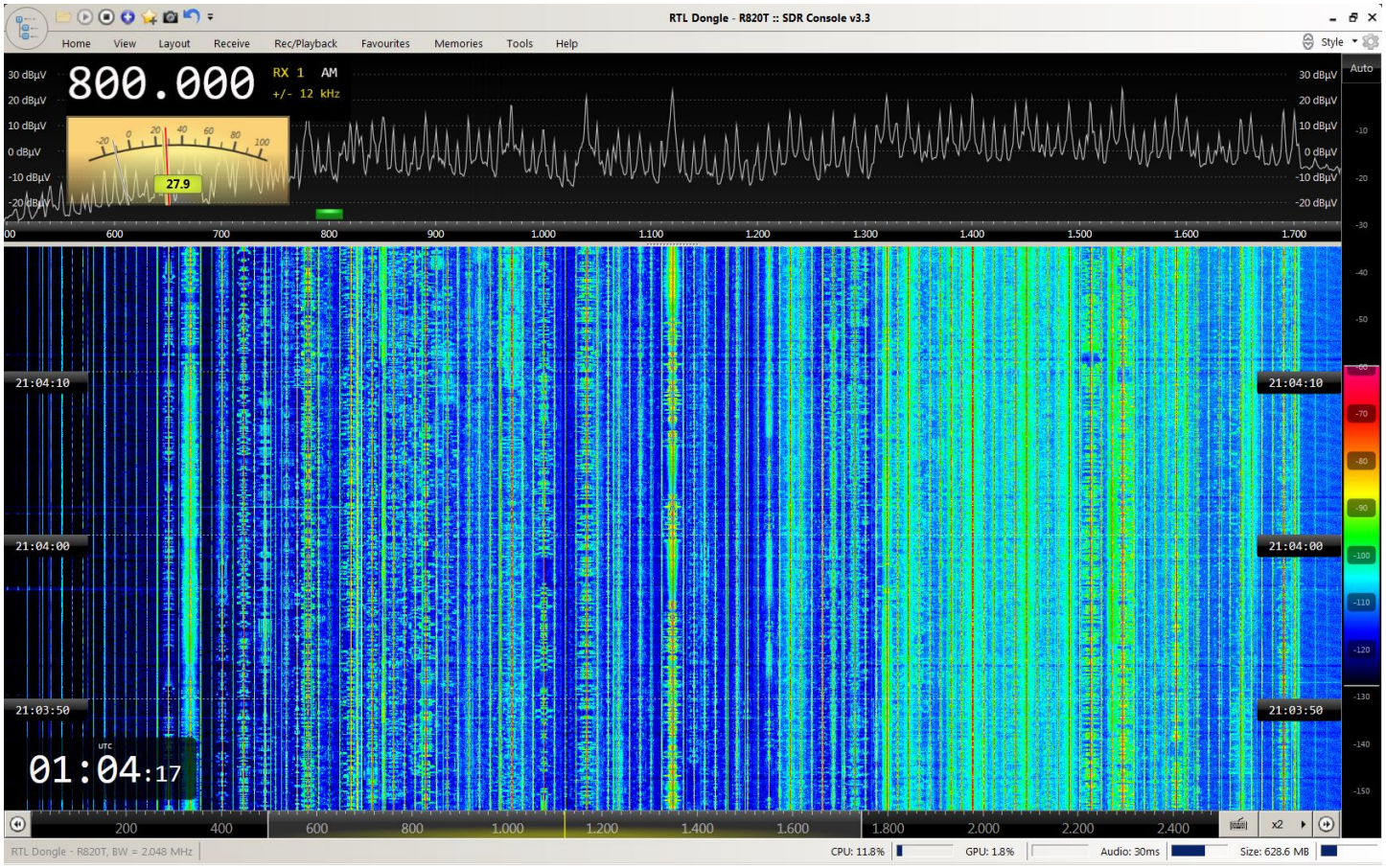
As to overall setup of the V4 (or any radio, sdr or otherwise) for digital decoding, I generally employ fast agc, noise blanker on but set to 50 percent threshold so as to trigger only on large noise spikes, and digital agc to off. When using the V4 for digital work I selected the VB Virtual Audio Cable as the interface between any Decoder and the V4, it never failed to pipe the output to the decoders, however one can simply use the pc audio mixer to share the V4's output with whatever app you choose.

Then all you have to do to produce copy is tune the desired signal, frame the signal within the filter passband, and if warranted adjust the passband to pass the signal alone - this ensures best signal to noise ratio.

I listened to several HF SSB voice sigs for overall behaviour (dynamic range, filtering, noise blanker performance) and noted very nice audio, keeping in mind that criterion is very subjective and also dependant upon the specific pc hardware and sound system, of course.

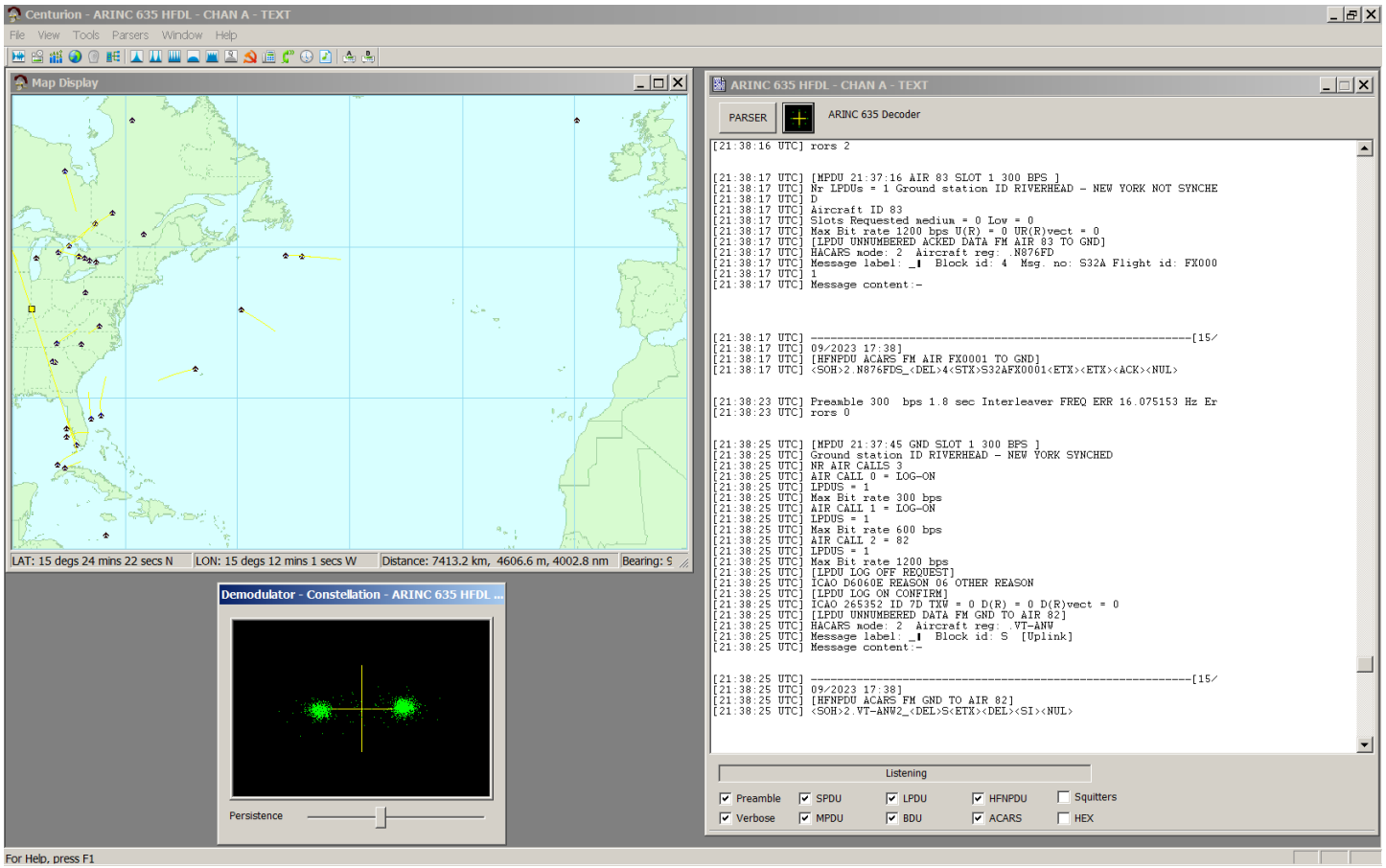
I prefer wider filter bandwidth of around 3KHz or so for voice, and find listening much more enjoyable and informational, wider bandwith - 3KHz as opposed to say 2.4KHz - allows me to understand speech much better than narrower BW. I tuned to several HF HAM bands and the various higher 8MHz region MWARA stations noting stable performance and enjoyed every minute of it. The RTL V4 excells at ssb voice reception.

I also tried out AM and AMS mode on the AMBC and HFBC bands. AM, plain old AM detection without synchronous detection, is amazing on SDR rigs, opening up the filter bandwidth to say 14KHz makes for "in the studio sitting next to the DJ" listening possible on clean signals. AMS makes it even nicer with almost a quasi stereo effect, and allegedly cleans up in band harmonics and phase noise compared to straight AM detection. If you come across an AMBC or HFBC (shortwave broadcast) station with flutter or quick fading, enable AMS and the fade seemingly melts away leaving you with better copy in most cases.

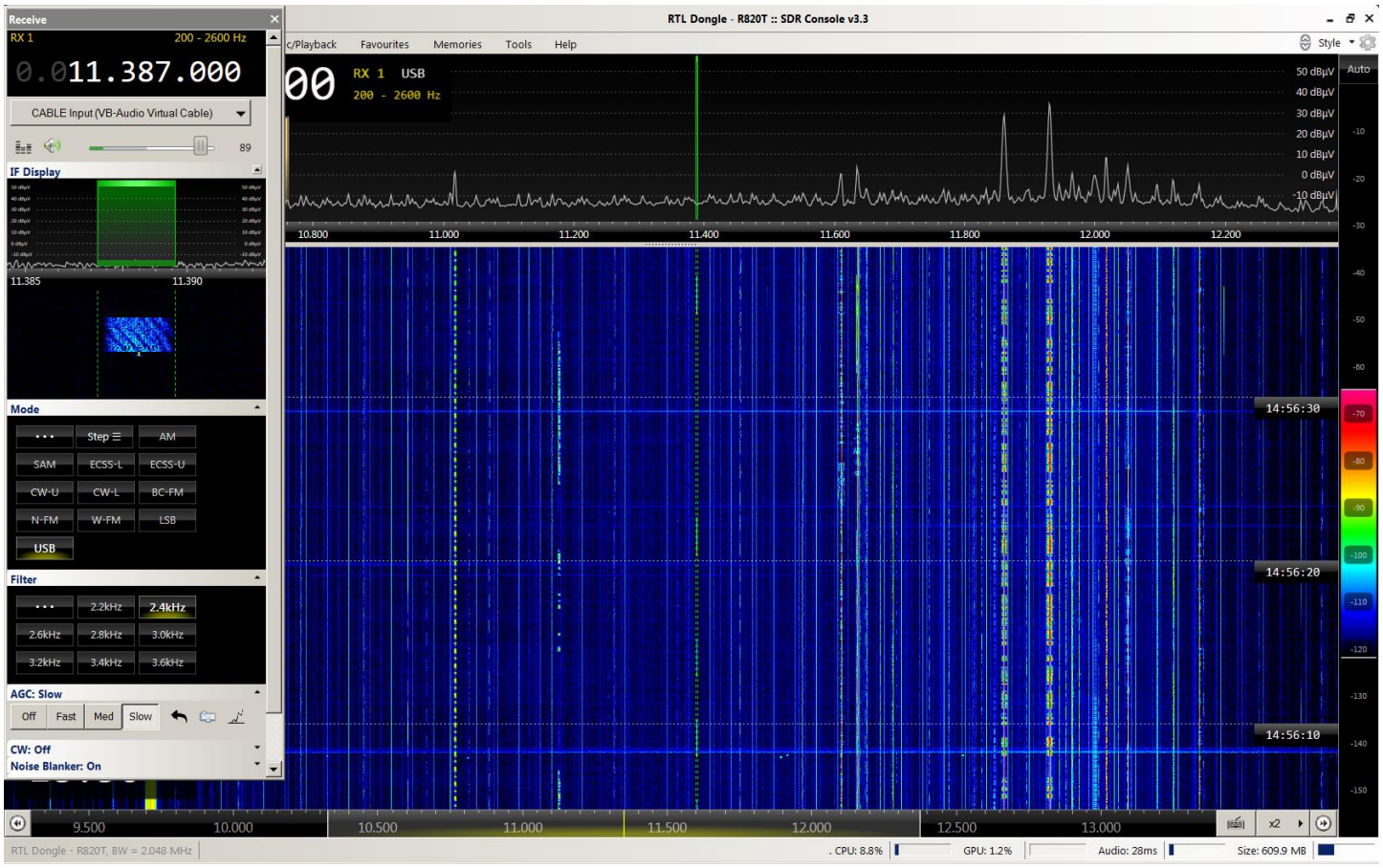


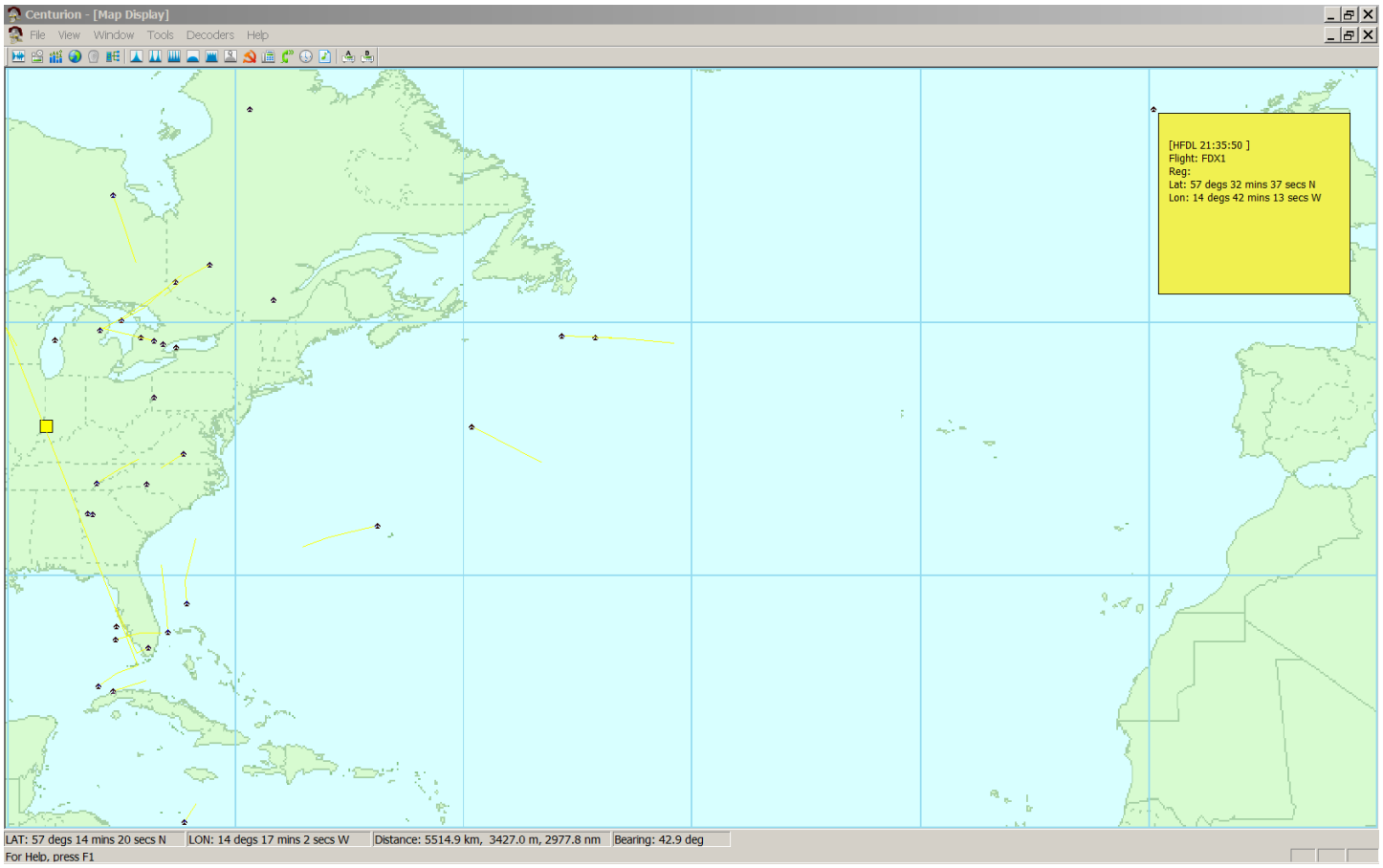
I next revisited HFDL to exercise various Decoders on that mode, letting them run a while every few weeks lets them rebuild their data tables if needed, so this is a good idea. I hadn't run Centurion in ages and recalled it will take reported HFDL (and other mode) lat/lon figures and place them at the exact spot on a map.... if the map is suited beforehand so Centurion can work with it.

I set the map to Eastern US Seaboard/Carribean, activated the HFDl decoder and map, and sat back.

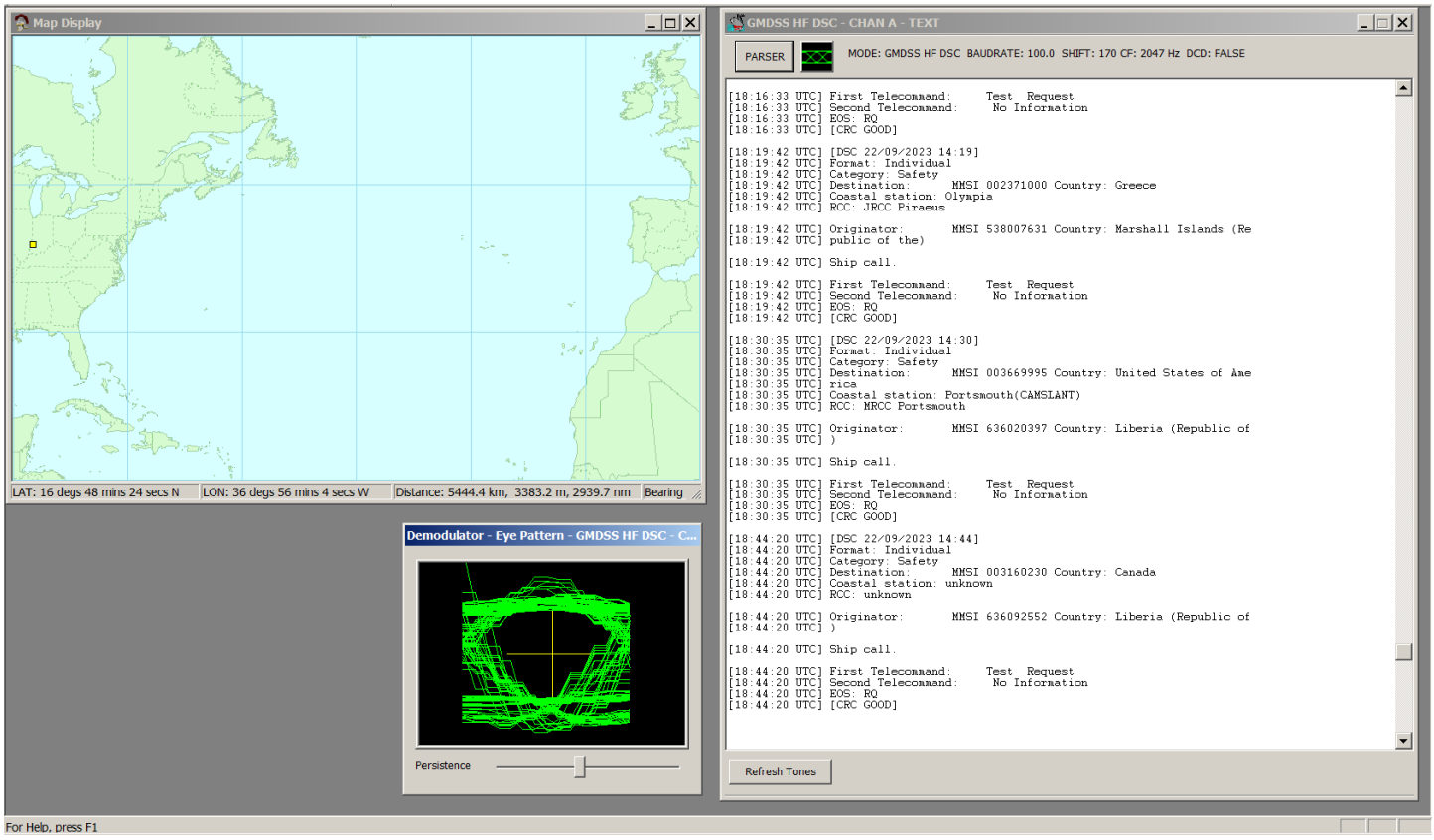


You can see in the images included that I got HFDL copy from as far away as the UK, France, and North Africa while tuned to the Riverhead NY 11387 HFDL channel on the tiny V4. The smaller yellow box at the left center of the map image is the location of the reception equipment; antenna, SDR, and pc.

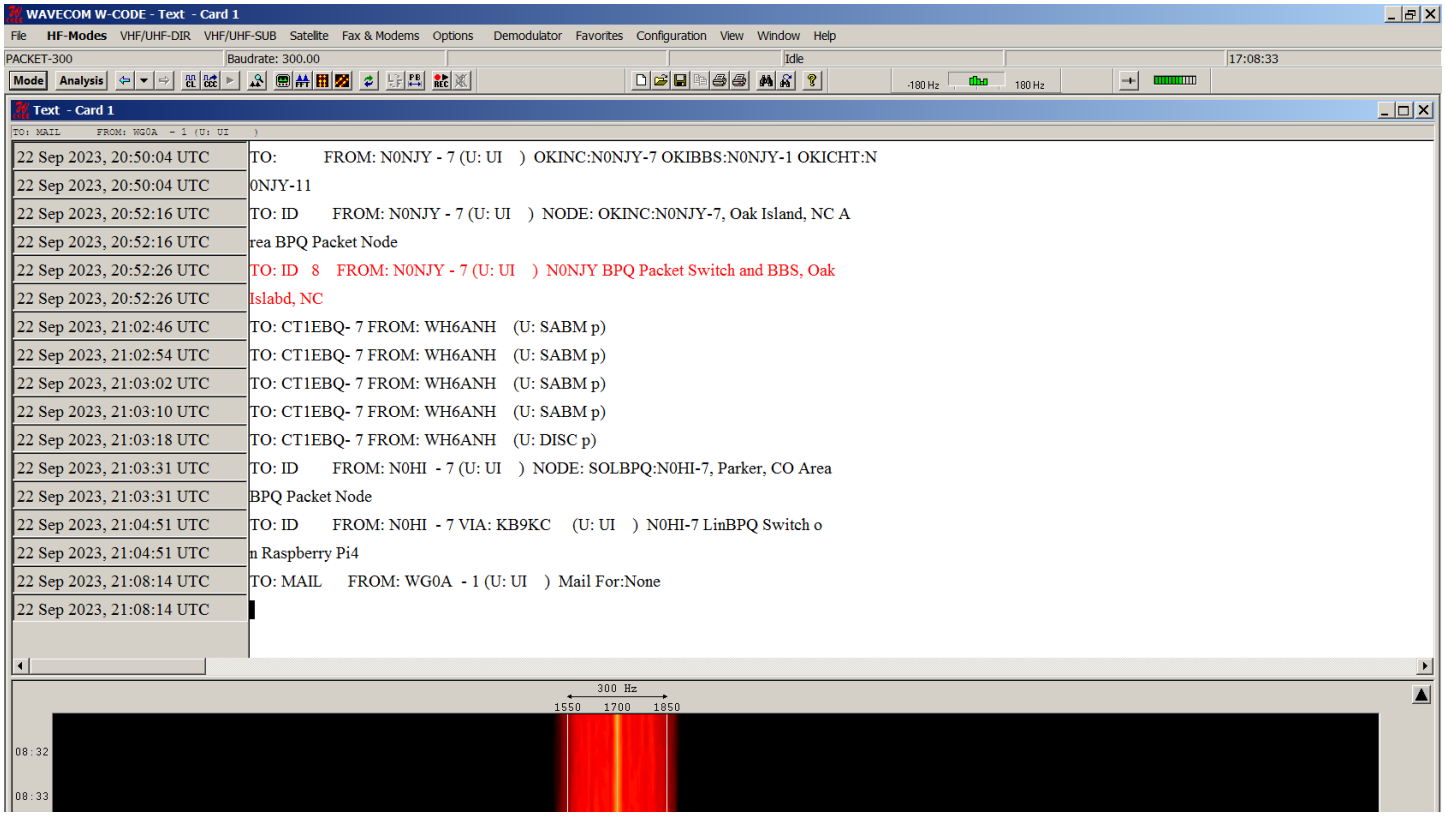




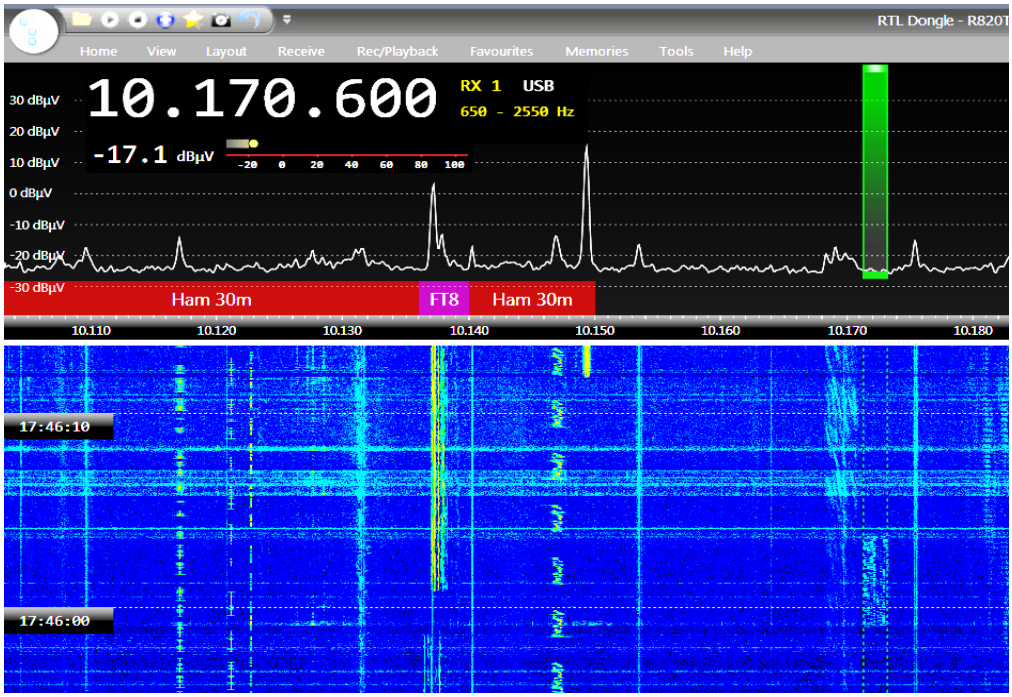
Then I fired up HF GMDSS decoders and let them run a while. HF GMDSS is more or less a tracker akin to HFDL, but for boats. The main Freqs for HF GMDSS or DSC are; 2187.5, 4207.5, 6312, 8414.5, 12577, 16804.5 kHz. In USB mode tune 2KHz lower to center the signal at the 2000Hz point of the SSB filter. I formed a Narrow Filter around the FSK signal employed by all HF GMDSS signals by dedicating a SDR Console filter parameter of 1820Hz low end and 2280Hz high end.



I've wanted to see if Robust Packet was still a thing, so enabled WCODE Decoder and plopped the V4 on 14.103.3 MHz and waited. Wasn't long before copy of sorts scolled across the screen, Robust Packet is more popular in the EU and elsewhere outside CONUS so weak copy of that mode is more or less assured, but I couldn't even hear the first signal when it came through so I guess it's pretty robust after all. Regular 300Bd HF Packet also worked Fine Business as can be seen in the picture below.

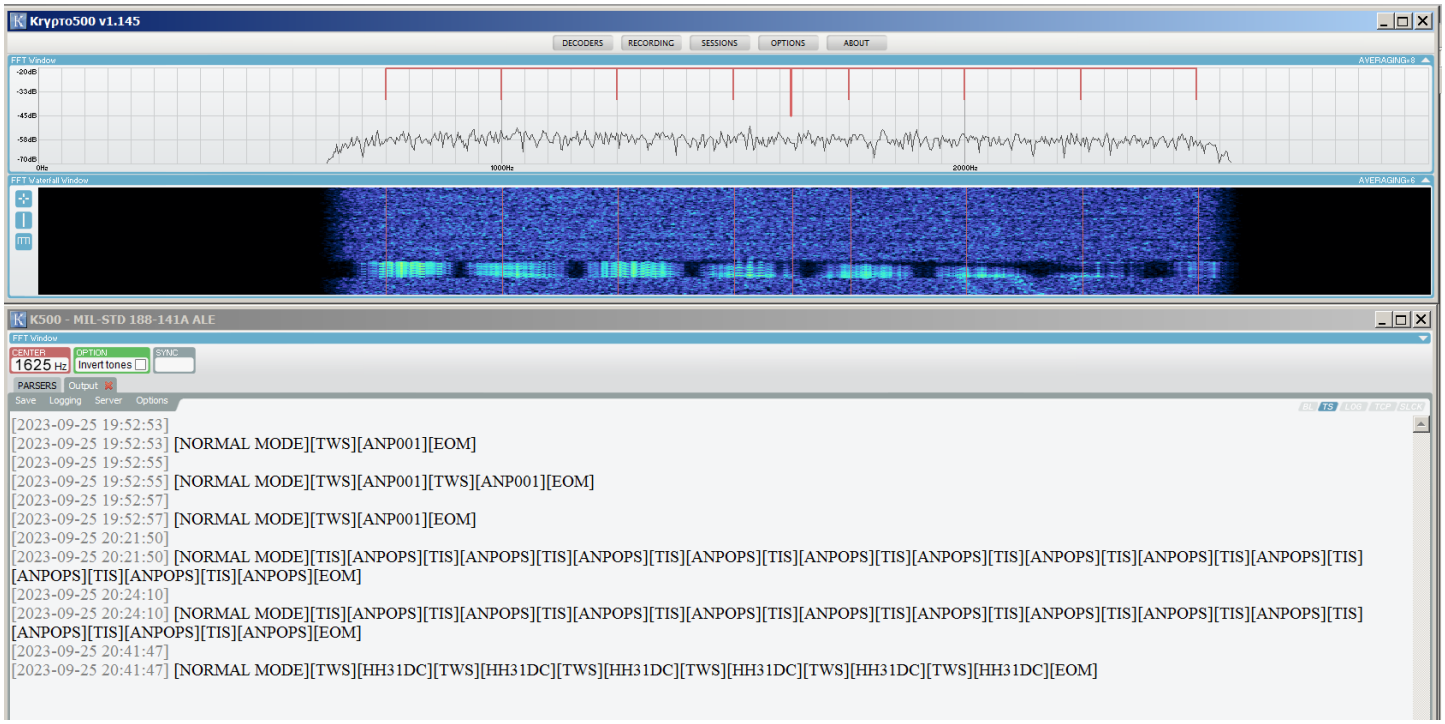


As MilSpec 141A ALE decoding is so prevalent among utility enthusiasts I wanted to do some ALE decoding myself and see what 8 bits could do. Haven't done much in the way of ALE for a long time now but understand the real ALE enthusiasts have all the QRGs (frequencies) to have their HF Receiver scan, while all I am going to do is set the V4 on a single channel and see who drops by. This is called a "Staring Receiver" by SIGINT OPERATORS... I mean Very Dedicated Radio Enthusiasts in these high tech days. A Staring Receiver "stares" at one slice of spectrum forever.... or until the power goes out or I decide to do something else with the V4.



I formed a dedicated ALE filter in SDR Console just wide enough to pass the standard ALE signal; 700Hz to 2500Hz. This my friends is one of the true beauties of SDR; you can form a very effective filter to suit the signal, something that only the most expensive analog / hardware receivers could do with some limitation. SDR does away with all that (hardware limitations of Passband / IF Shift and the expense of high quality Crystal Filters, usually costing several hundred dollars each when new) by turning everything into math problems that a PC can solve with ease. Normally I tell math to solve its own problems, heh. Also the SDR filter will have very flat group delay across the nose of the filter, and little ripple. These Figures Of Merit (Group Delay, Nose Ripple, 6/60dB figure aka Shape Factor, etc) for radio filters are very important to Digital Mode Decoding as the digital world kinda demands input to be perfect, figures of merit that Crystal and Ceramic filters don't provide as well as SDR filters can. As you can see from the included images, the filter passband was very sharp and effective.

As a general rule try to have at least 50Hz of extra bandwidth on each end of a formed filter.

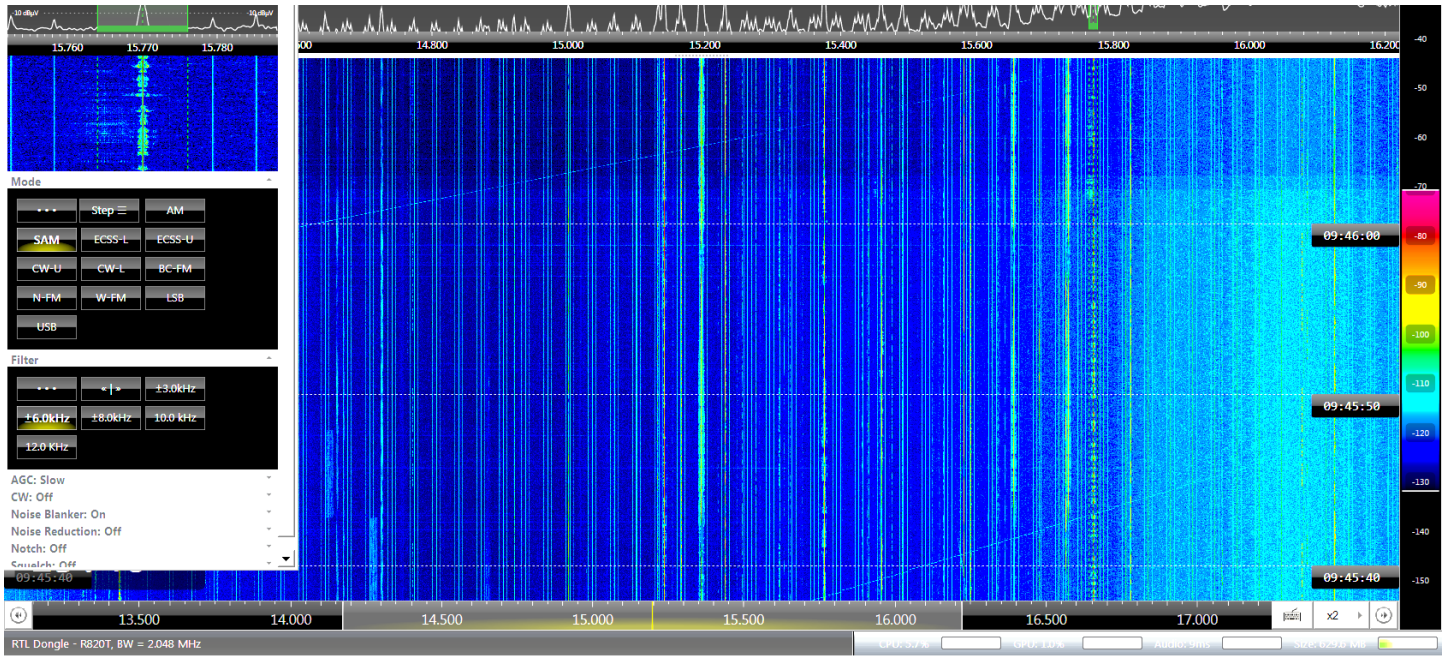


ALE in progress

Something I've not mentioned and should is all the decoders and SDR apps used in my testing have been rock stable, I let them run for days and the performance has been as good at the start as at the end of the monitoring session. This is, however, as much a testament to the reliability of PC Hardware and OS as it is the apps themselves.

On The HFBC Bands!
As you can see from the included images, the V4 behaved well on the HFBC aka SWL bands, no overload was seen. That's with a 120ft horizontal loop feeding the poor little V4. I have yet to do any RF Gain testing to see where the V4 crumbles in my specific case.

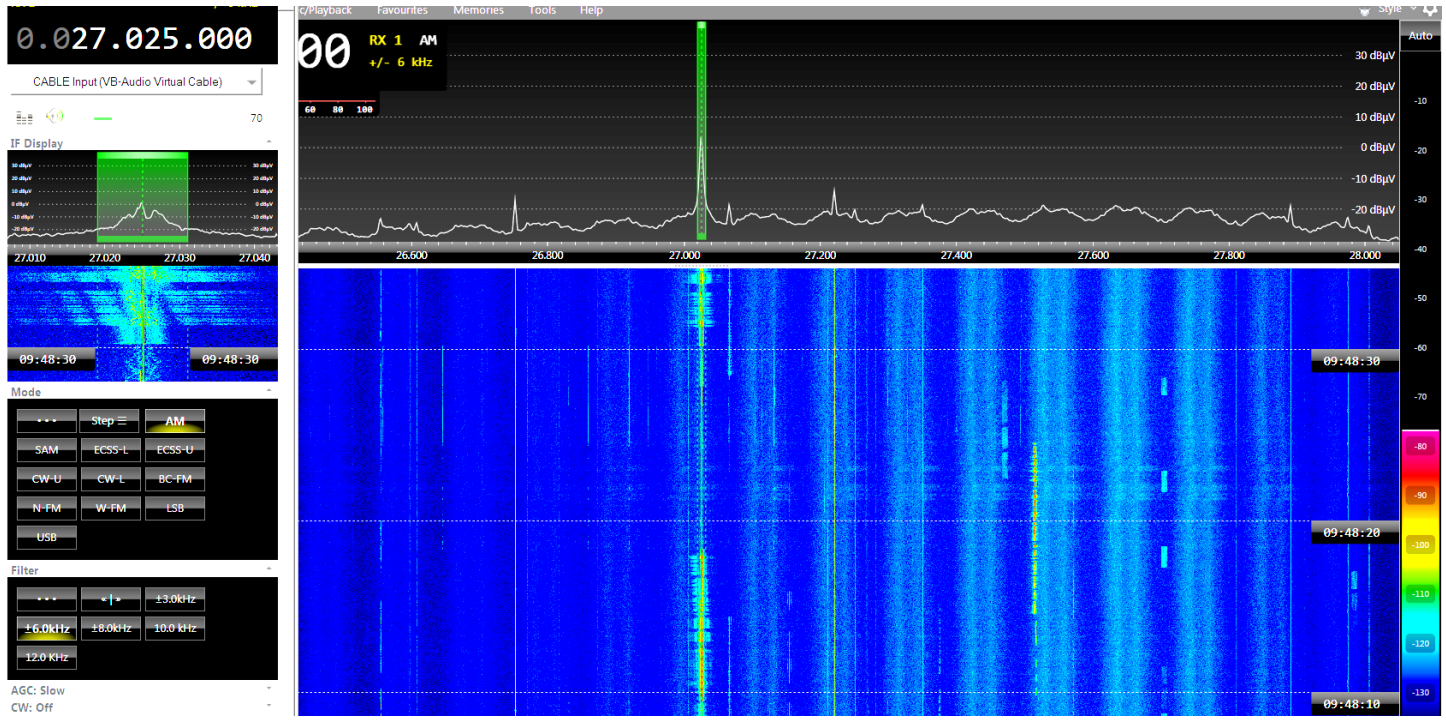
There are several means to record a listening session, I/Q, audio, etc and these features are invaluable to those who record spectrum. It's common among advanced AMBC listeners to copy the entire band at greyline so they can tune later at their leisure, and SDR Console has the ability to start and stop recording automagically at specific dates/times. It never fails to amaze me; the capability of current SDR software and the tiny RTL SDR V series. Not long ago the capabilities inherent to this system, by no means modern in my case save for the V4 and SDR Console app, would cost thousands if not millions, all now available to anyone who has a commodity PC, an SDR, and a little curiosity for very little outlay.



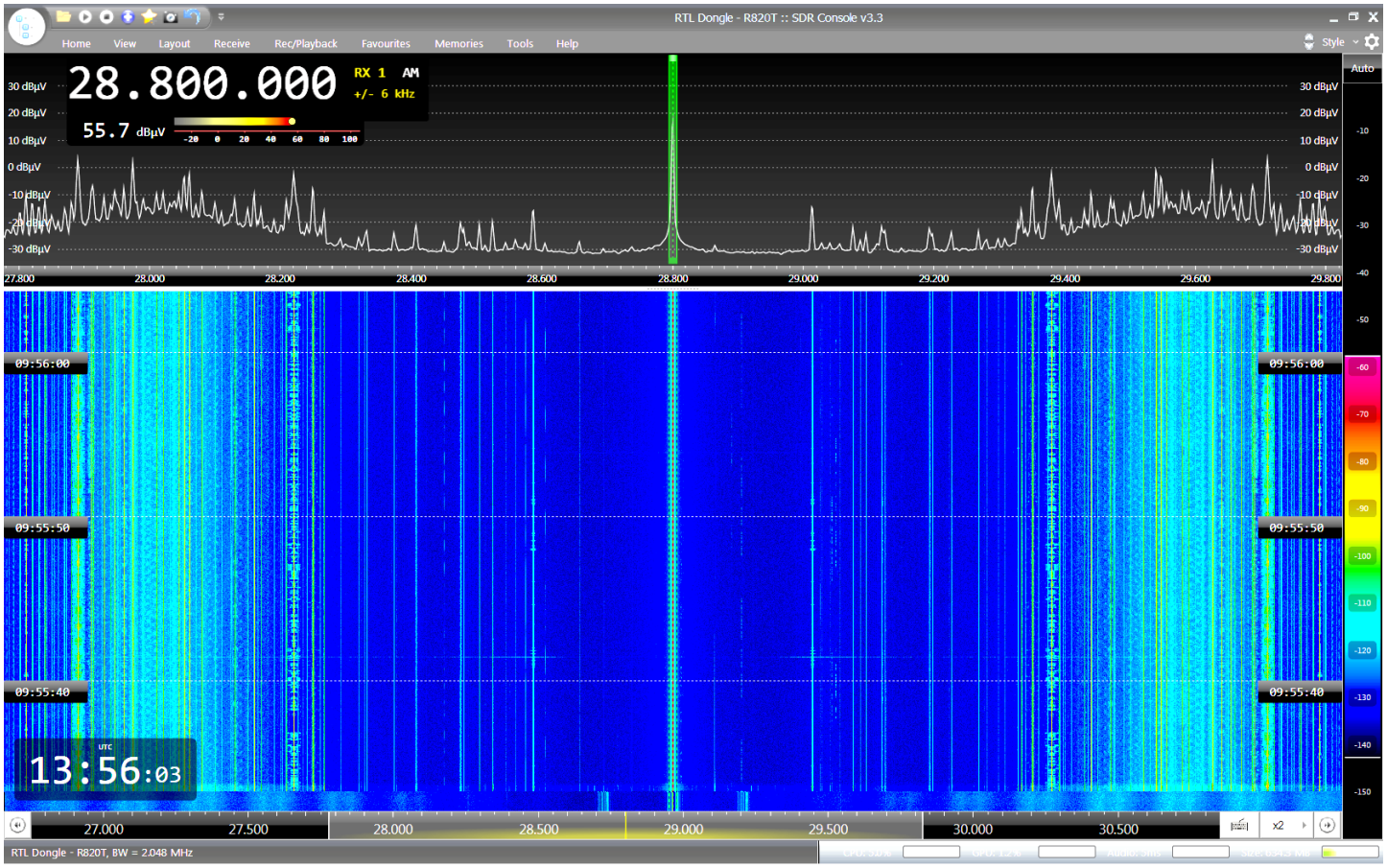
19m HFBC SAM Mode

Nyquist Aliasing!
This is the bane of the V3, its very crux by the way.

As can be seen in the included image, Harry Nyquist was absent from the CB band.



I then took the V4 all the way to its Nyquist limit of 28.8MHz and as you will see in the included image, there is a mirror image of the displayed signals lower than 28.8MHz.



Left Screen Real Signals - Right Screen Nyquist Aliases

Harry Nyquist is looking us in the face here!

With a V4 you are safe up to at least 28.8MHz; if a signal is present below that frequency there's a good chance it is real and on frequency. With a V3, unless you have very good highpass filtering, any signal above 14.4MHz is suspect. The large spike at 28.8MHz is the reference oscillator doing its thing. Kinda like if you tune a Icom IC-R75 to 60MHz, that fat signal is the reference oscillator leaking back into the rig.

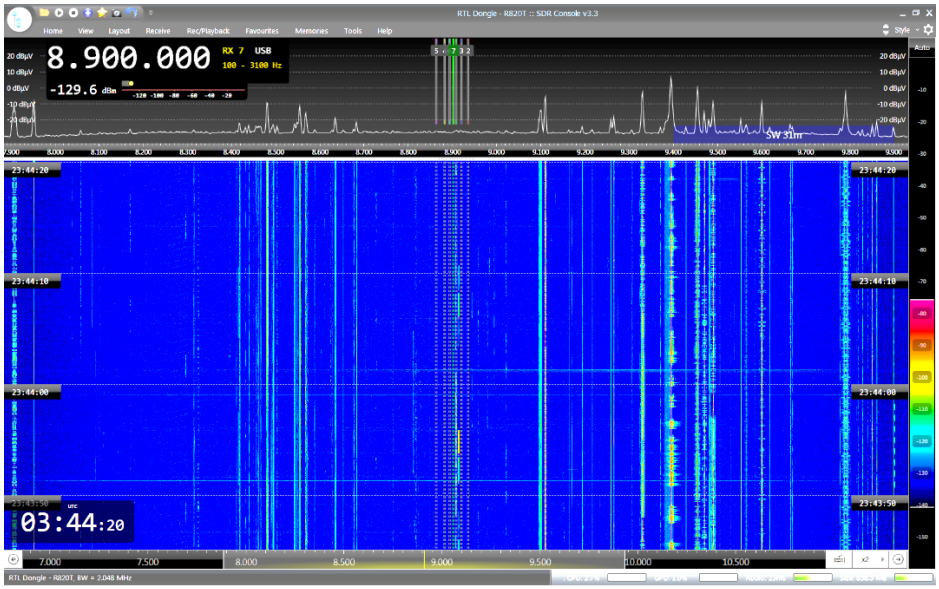
In Summary!
I must admit I spent _a lot_ of time just looking at the beauty of HF with the V4, watching all the crazy goings-on, the weird sweepers and random signals popping up and disapearing.

I didn't run into any dynamic range issues or stability issues stemming from the V4, I wondered if I would have to perhaps place the RTL SDR AMBC Filter in line to suppress the many AMBC signals always present, never had a prob. The 120+ foot horizontal loop antenna feeding the V4 only has a 30MHz lowpass filter in line to hinder any rf that impinges upon it.

For such an inexpensive and tiny device, and free-to-use software, the capabilities are really kinda amazing. I now want an RTL SDR embedded into a cheap phone to use as a spectrum display on non-sdr HF receivers!

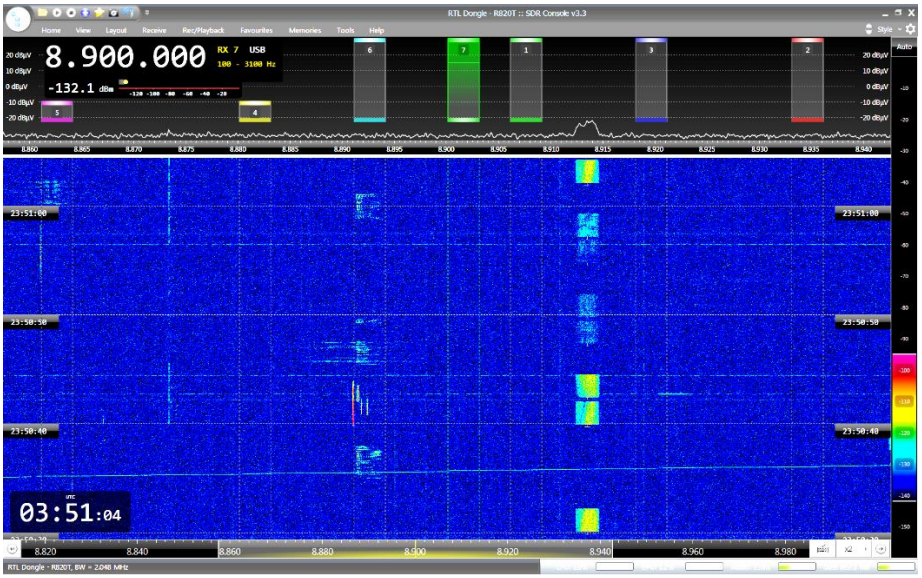
The V4 seems to atone for some of the sins of the V3, especially on HF with specific regard to Nyquist aliasing, have no fear tuning above 14.4MHz dear friends, this thing won't be making aliases unless you are overloading it.

At this time I can't think of a better value for the money when shopping for an SDR to use with a pc or phone in the sub - $50 price range.



7 RX Running Smoothly 3 Percent CPU

7 RX Zoomed In



RTL-SDR v4 on Linux. (Reviewed by Wally)

I followed the rtl-sdr-blog install guideline to replace the old Linux "drivers". I also installed the blog suggested SDR++ software, and got it running.

I have tried to install it before, had issues, and gave up. This install, I had one problem, where a pre-requisit package on my machine was an older version. I "hacked" a solution and got SDR++ working. That had nothing to do with the dongle.

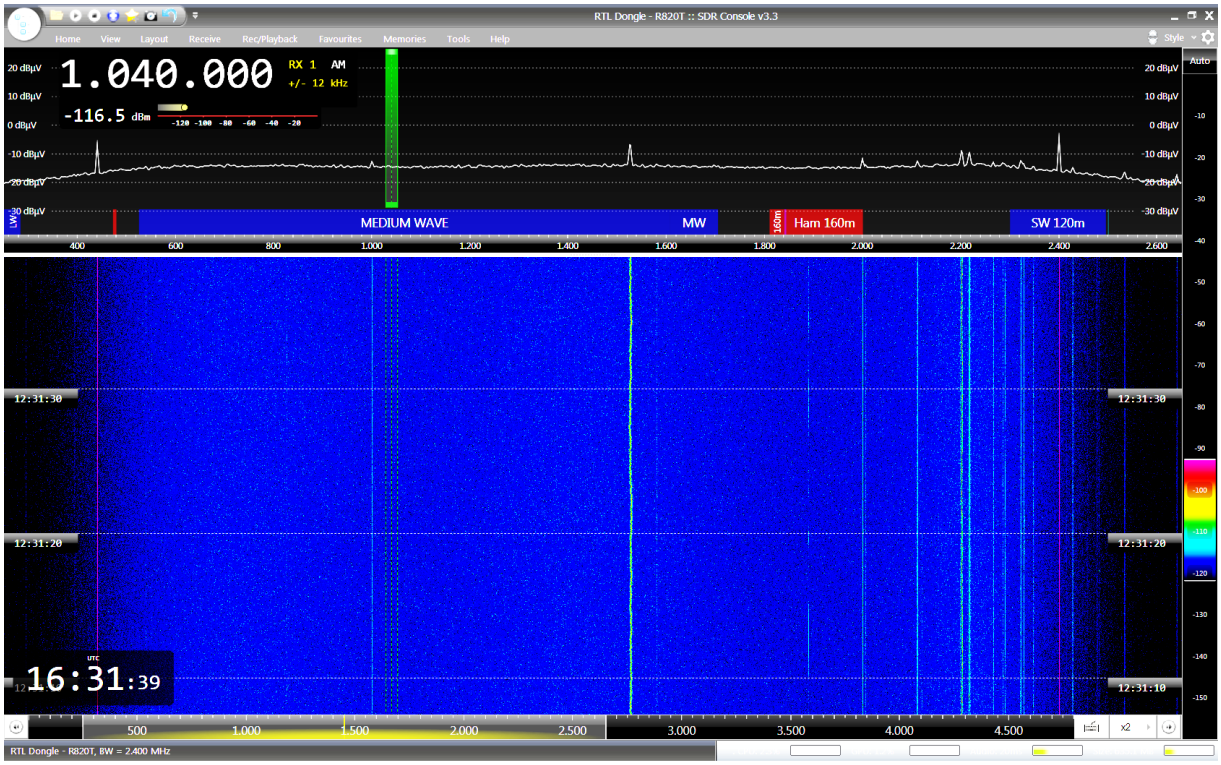
I found the dongle worked well with SDR++ and CubicSDR on the first try. Quisk software did not recognize the dongle I don't know why yet.

I don't have the feeling this dongle is below par, at least not yet. It could be antenna or feedline related. It could be overload now that both my beacons are active. I just started them back up. I don't want to shut them down right now because several people around the country are looking for them.

Can you try a daylight reception of 620 or 650. The "General" hears both way better than the V4. I need to try the V4 on the LNV. I also have a NOELEC LNA module to try. Several more tests to do!

(Editors Note; "The General" alluded to in the above is a 1937 Console Radio made by General Electric that is fairly spectacular on AMBC and HFBC, Wally is quite fond of its sterling audio)

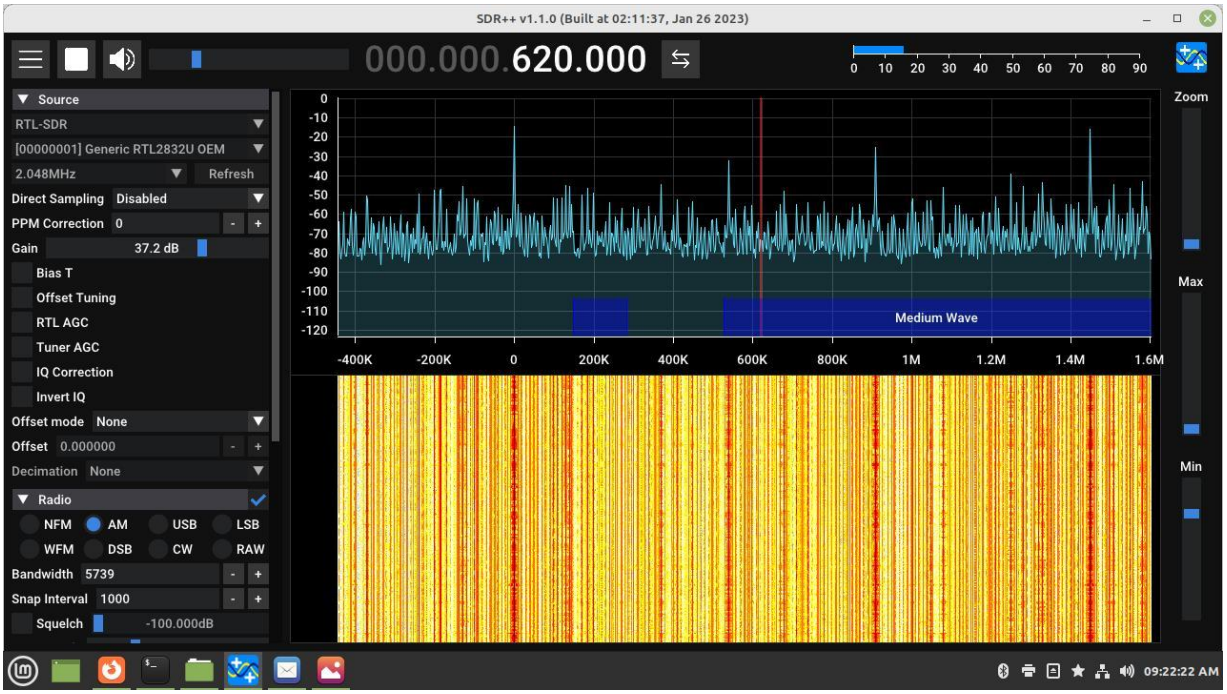
I downloaded and installed the newest sdr++ "nightly" version which has been upgraded for the V4. Linux version of course. Could your version be older? The install guide talks about dll's for windows/sdr++.



V4 2.4SR RTL SDR AMBC Filter Inline

(Editors Note; I responded to the test request and Wally replied;)

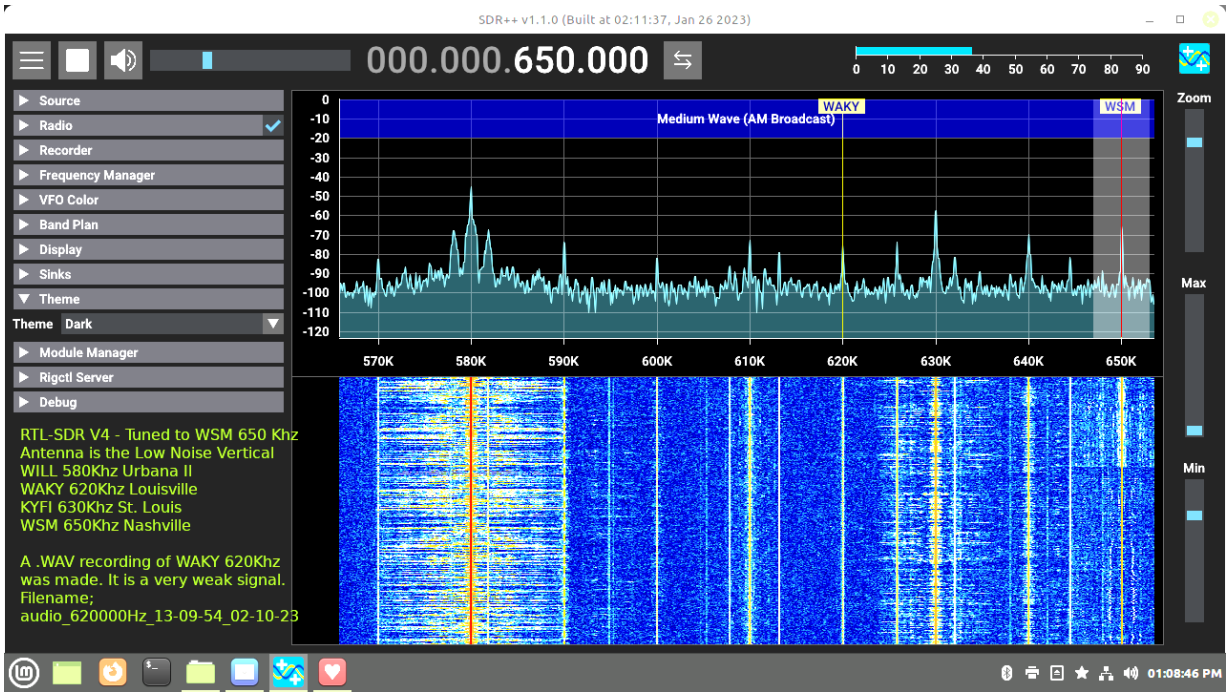
After trying a few things this morning a little success. Two screen shots, the first is with the ambcb filter in place and the rf gain turned up to compensate for the filter loss. WAKY can be heard, I give it a 42 signal report. The second file is with the ambcb removed, all else the same. I can't tell if anything of Waky is there. as I tune from 480 to 700 there are mixing products of various stations. The dongle is in sever overload.



I am still wondering if this is a situation where the V4 can not handle the dynamic range of signals found in the AMBCB. The ambcb filter knocks the heavy hitters down so that kills the mixing, then the RF gain can bring the desired signal up in range for decoding. The V3 dongle does not have the variable rf gain in direct sample mode. It of course has it's own mixing problems. I need to make audio recordings to hear the difference.

I need to repeat this test using the LNV to see if the antenna is part of the issue.

New test;
At the antennas I swapped feedlines so the den coax goes to the LNV. results attached; ALL Good! something wierd about the Trap Vert in the ambcb. The past couple hours I have been reading the mail on 10m SSB, allover Europe has been blasting in using the trap vert.



I played down in the Aero NDB freqs this morning using the LNV. even with the official specs stating the dongle starts at 500Khz, It still does good down to 250Khz. Drops even more down to 150 or so, that will start hurting the Lowfer listening. No go below 100Khz.

A couple weeks ago I was seeing/hearing 40 or so airports on the Kiwi/LNV. This morning the V4 number would be in the 10-12 area. I don't think that number is too bad for being out of the official freq range of the dongle.

The SDRPlay has more sensitivity on the low end, however you must watch the gain closely because it will overload quickly and create all kinds of image problems. The V4 is less sensitive, but more resistant to creating false images. I expect the up-convertor in the V4 is blocking image creation like a high end double or triple conversion receiver.

I am getting comfortable with the V4 to become my general purpose "running in the background" receiver, while I am doing other projects. The frequency/mode "agility" to be able to quickly go from LF, AMBCB, SW, VHF, ... without using a different radio is growing on me. Setting up an antenna system to accommodate that is going to be another challenge.

On another subject, I hope a re-install of the nightly sdr++ version has allowed you to use the V4. I have been playing with the "Scanning Module" and it is promising. That module allows you to specify a frequency range to monitor. When a signal pops in, it will immediately jump on the strongest transmissi on in that range. Unlike a police scanner where it circulates in the low to high. Take the aircraft band 118-137 where planes are seen on complete random frequencies, this setup works nicely. I need to get an antenna up to try the military vhf/uhf freqs.

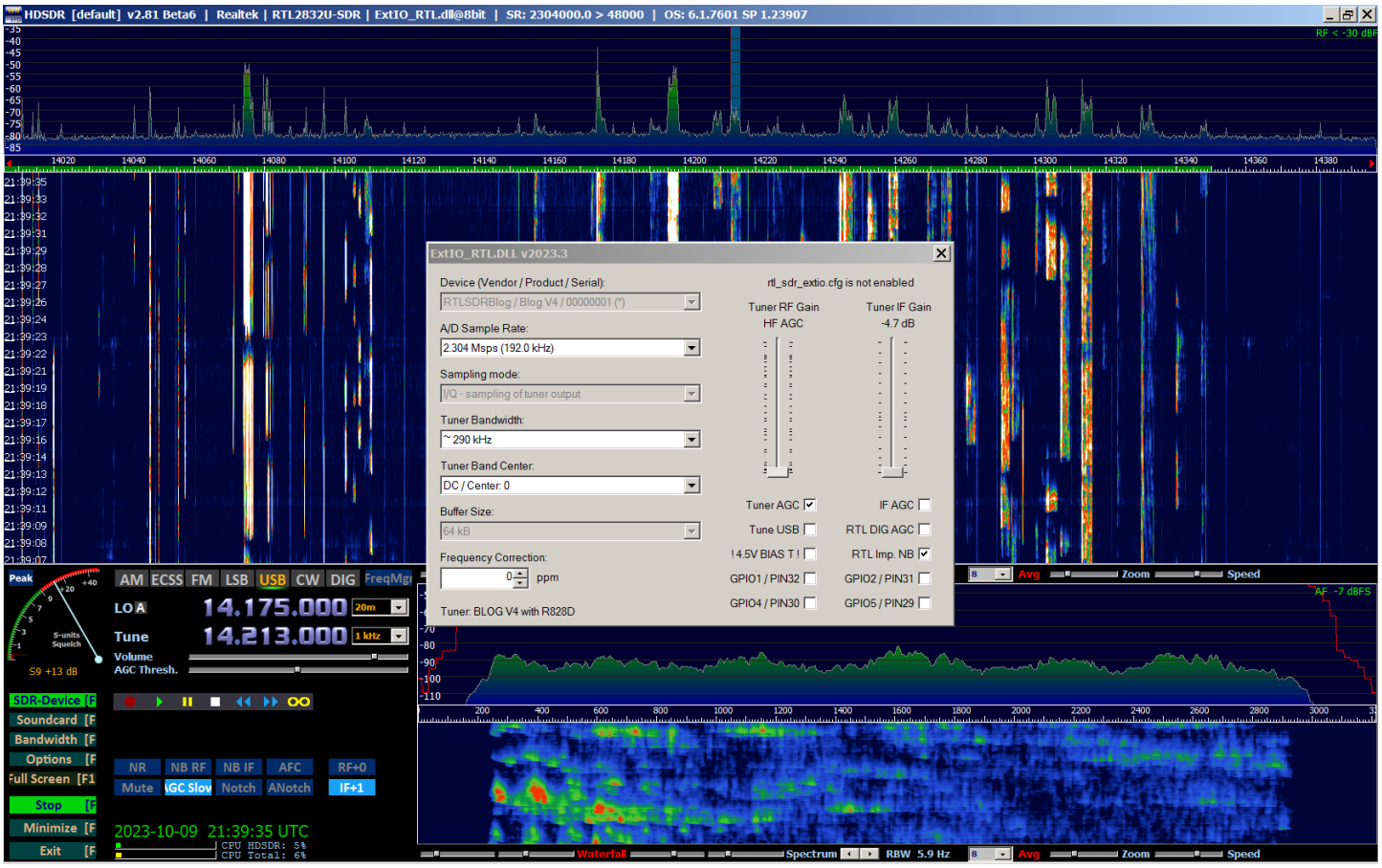
HDSDR ExtIO-DLL for HDSDR and SDRuno

The ExtIO-DLL was created by Hayati Ayguen. He says “There are some flaws, but it works. When running it with SDRuno, the comboboxes don't open, but one can workaround with mouse wheel or Cursor up/down keys.”

Important is, that this ExtIO does support Tuner band filters of R828D tuner in the v4 dongle downto ~300 kHz - at higher samplerates, e.g. 2400 kSps, that processing (decimation) gain is best possible. The tuner band filters and also the reception side band ("Tune USB" checkbox) switches the steeper tuner lowpass filter from high to low frequency. Together, strong signals can be removed in tuner, before they are seen from the ADC - enabling to receive weaker

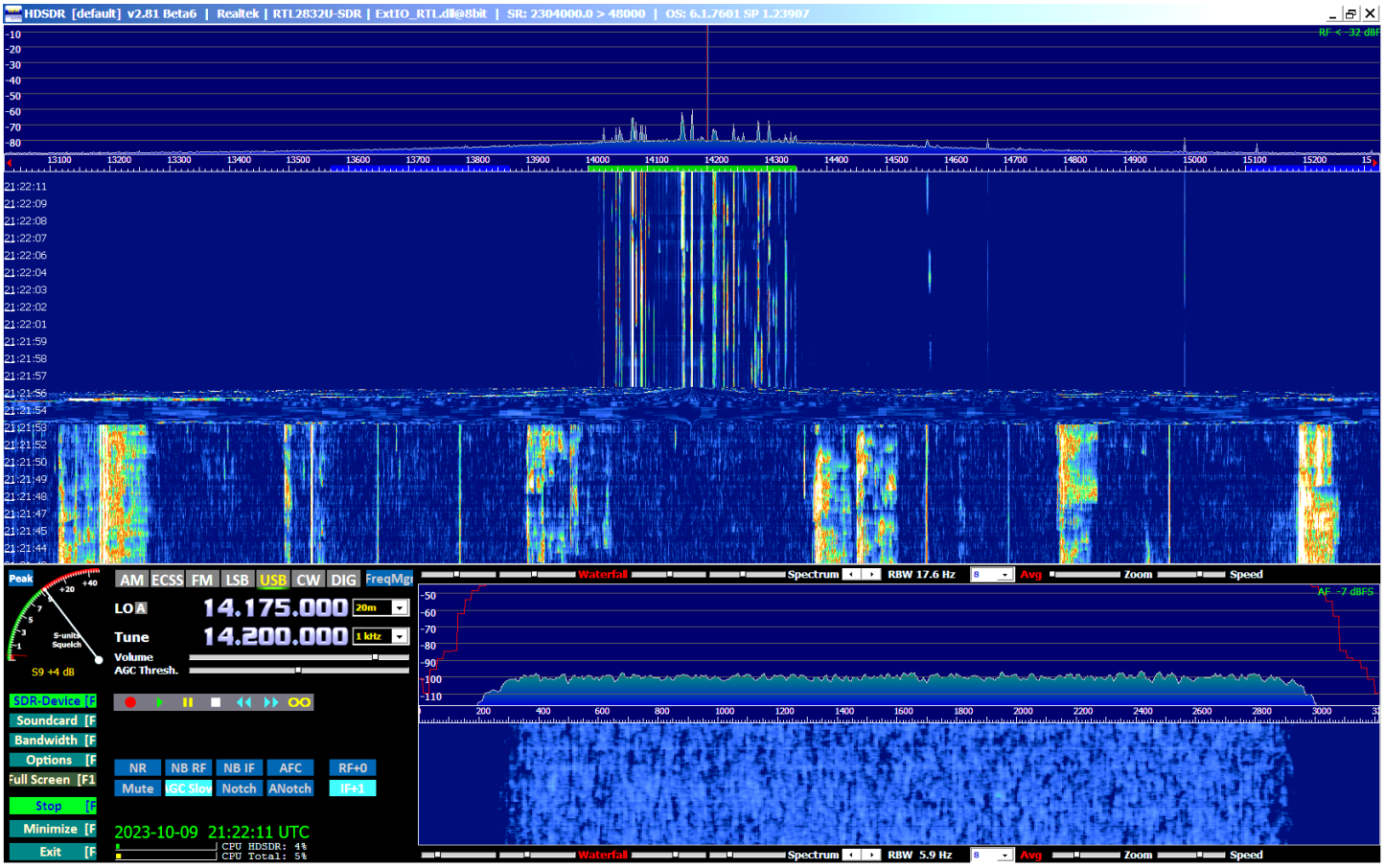
signals "near" those strong ones! These functions should/could be essential on HF.

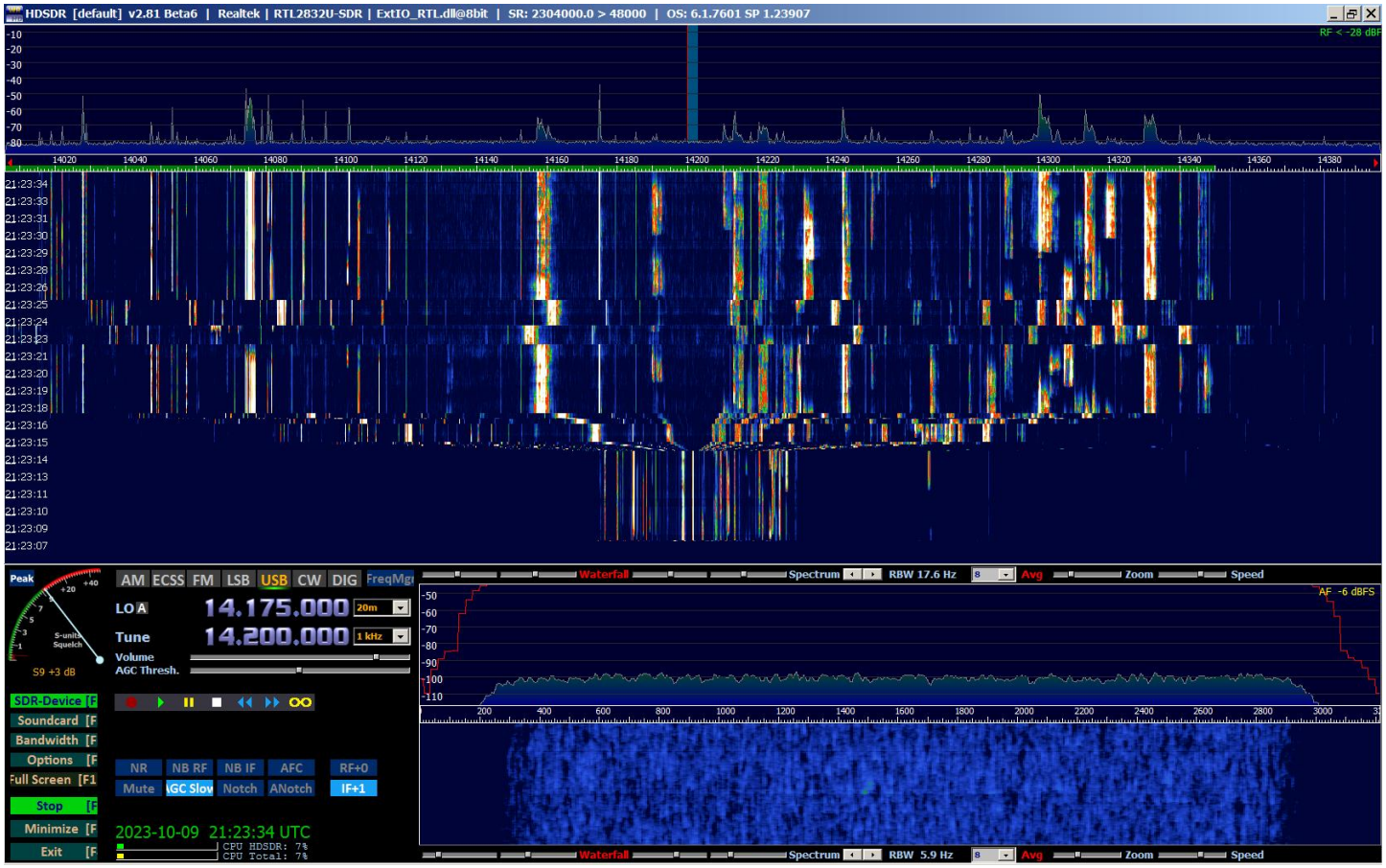
Also worth a note: the RTL2832U chip does have a "Impulse Noise Cancellation" feature. It is available with the "Imp. NB" checkbox. This NB is on by default ... but it would be interesting to see the difference - from disturbed HF environments!



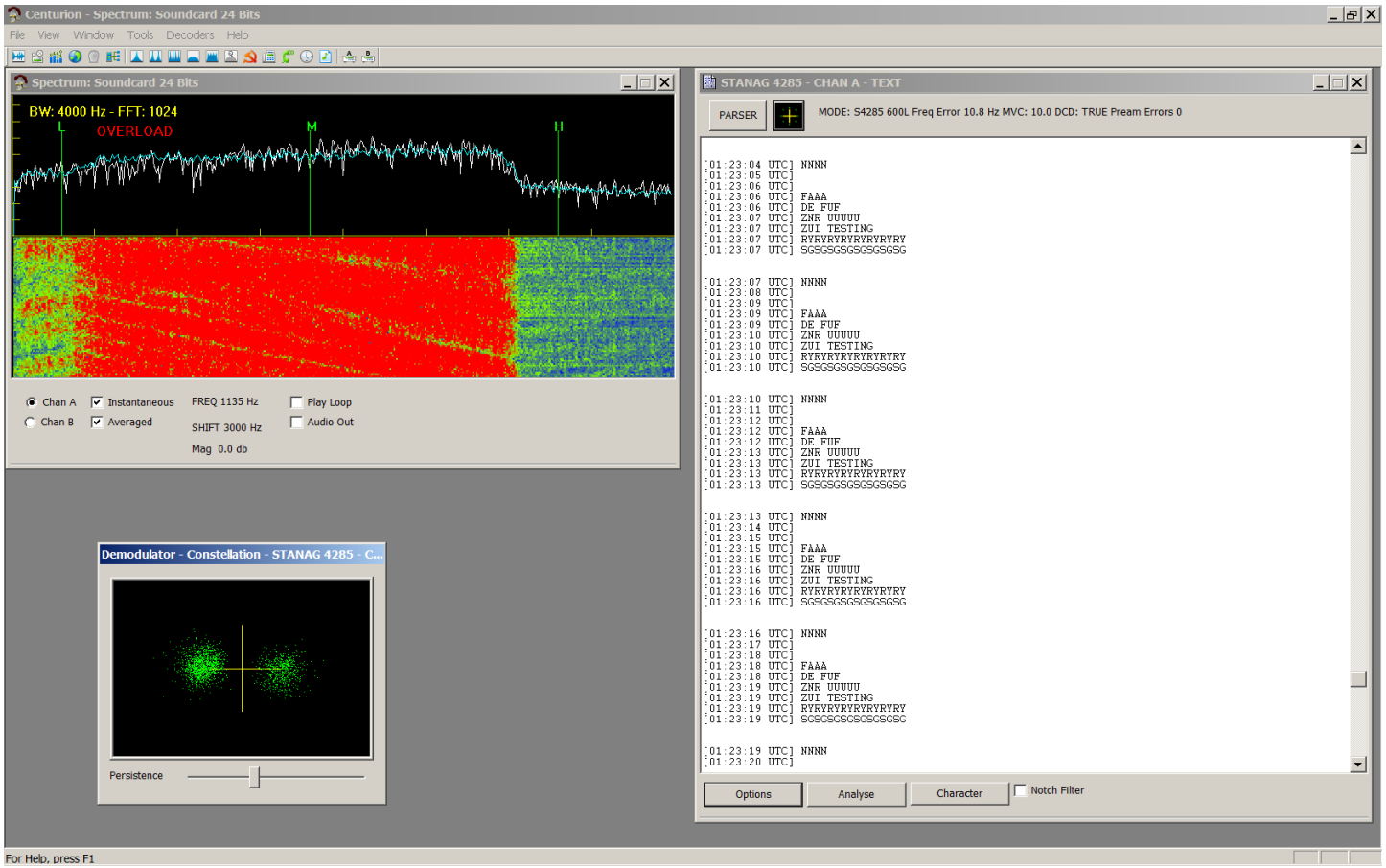
Above: v4 HDSDR Settings

Below: v4 S4285 Mode On HDSDR 290KHz Tuner Filter.

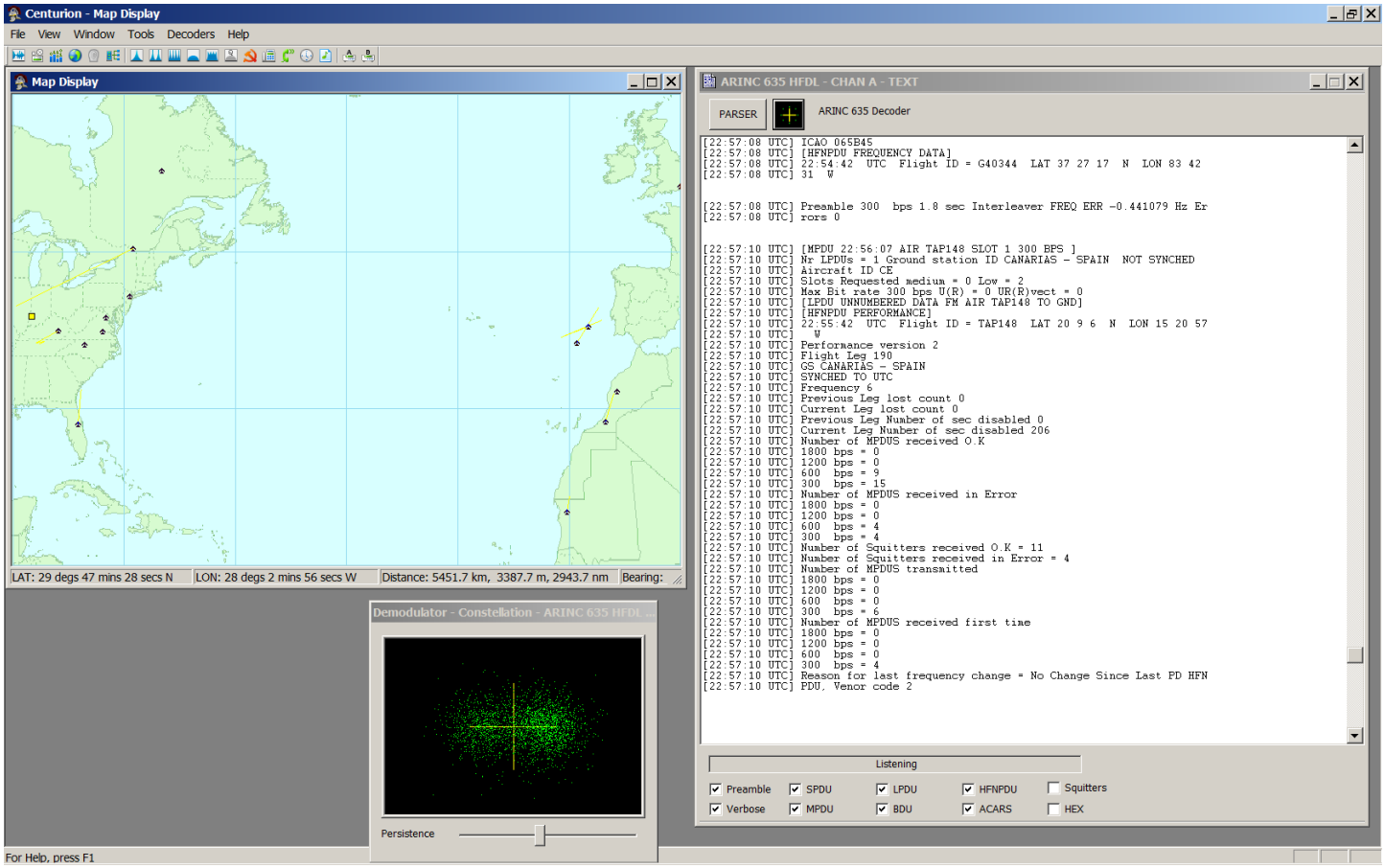




v4 HDSDR Zoomed To Filtered Bandwidth



v4 S4285 Mode performing well on HDSDR 290KHz Tuner Filter



v4 onHDSDR 290KHz Tuner Filter with HFDL North Africa Intercepts

Links:

Get you a RTL SDR V4	https://www.rtl-sdr.com/buy-rtl-sdr-dvb-t-dongles/
Dl drivers for the V4 here	https://github.com/rtlsdrblog/rtl-sdr-blog/releases/tag/V1.3.2
HFDL Info	https://www.sigidwiki.com/wiki/High_Frequency_Data_Link_(HFDL)
HF GMDSS Info	https://www.sigidwiki.com/wiki/GMDSS
Robust Packet Info	https://www.sigidwiki.com/wiki/Robust_PACKET
Nyquist	https://www.asdlib.org/onlineArticles/elabware/Scheeline_ADC/ADC_NumRep_Nyquist.html
ExtIO-DLL	https://github.com/hayguen/ExtIO_RTL
ExtIO-DLL binary release	https://github.com/hayguen/ExtIO_RTL/releases