

74!

# THE KNIGHTS QRSS WINTER 2022 COMPENDIUM 5th edition

2022 - The dawn of a new solar cycle.

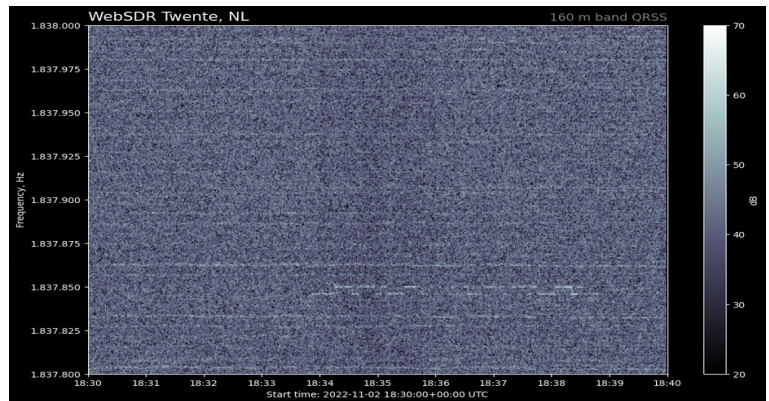


Documenting the year when a  
new solar cycle began and 10m  
rocked!

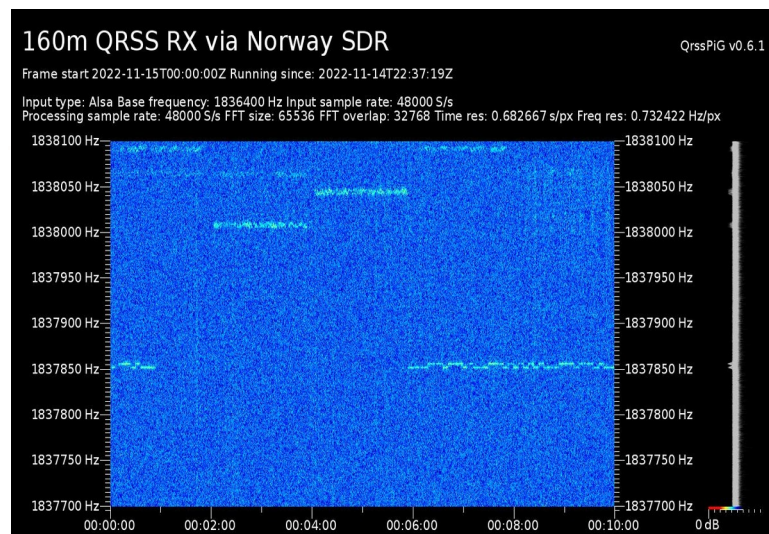


# Knighly News

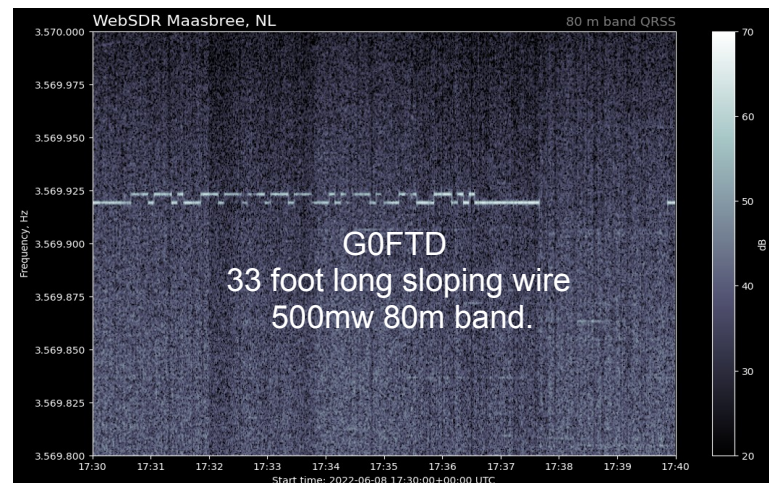
This year has seen QRSS activity on just about every known band. Knights members have certainly been spreading their wings about over the bands. Mike G6GN has been having a bit of a go on 160m, and has been seen in Norway and Holland during the autumn and winter months. As usual, no more than 1 watt is used to a wire antenna. There were no other reports for 160m.



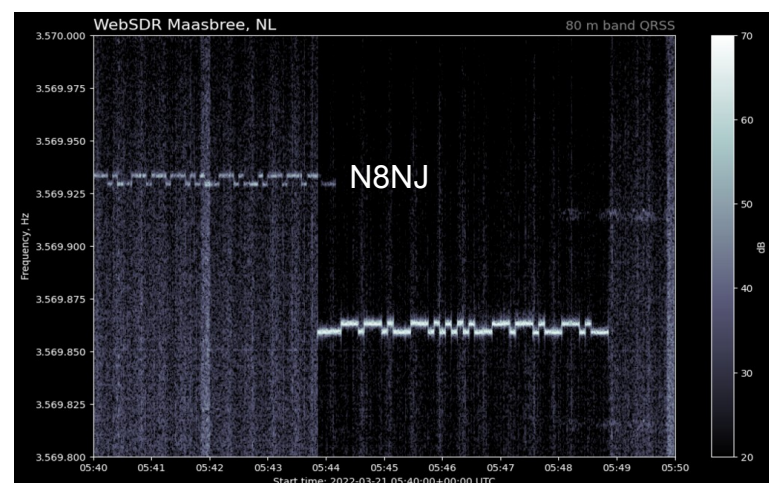
80m. Andy G0FTD who changed QTH and had only a temporary antenna decided to try his luck on 80m. Using only 500mw and a 33ft sloping wire antenna (max height 6m above ground) managed a few grabber sightings but nothing too amazing.



Oddly enough the signals back around August and September appeared to be better than winter time in November. G0FTD was also seen weakly in Sweden and Norway. It was tough getting seen with the small antenna.



The 3<sup>rd</sup> grab down shows reception via PA2ST's grabber in Holland. Using WSPR with the 33ft sloper antenna revealed weak reception with a measly -30db SNR to the US East Coast. Not a DX antenna, but useful for detecting the health of the ionosphere nonetheless. Ben PA2ST uses both QRSSPIG as well as his own custom Labview based grabber software. He has permission to connect 24/7 to some local online SDR's.



But the 80m band appears quite capable of DX signals if a sensible antenna is used. The 4<sup>th</sup> grab down shows an excellent signal from Larry N8NJ seen in Holland and G4IOG.

And now some members news and correspondence. Firstly we hear from Dave WA5DJJ who runs his super grabber station in New Mexico.

**FROM WA5DJJ:** I did take down 3 bands this year because of inactivity, 2200M, 630M and 6M. The discontinuation of 6M was more a equipment problem than inactivity. For some odd reason my florescent lights would blank the 6M grabber every time I turned them on and the extra 6M antenna was in my front yard. I only had a maximum of 6 WSPR spots and a local QRSS transmitter ever on the grabber in over two years. So, It wasn't producing enough to support the equipment's electric bill.

**FROM KENJI JA1NGA:** Attached you see my humble QRSS/WSPR setup. Currently I use a 20m mobile whip, a preamplifier (from W7ZOI and K5IRKs Progressive Receiver), a signal splitter to feed two dongles, and two Raspberry Pis for decoding. I am making a receiving loop antenna and will see how it can reduce the terrible noise around my QTH. As for software, I thank Martin Herren for his wonderful QrssPiG. For WSPR, I use Gqrx and WSJT-X.

The far east is a QRSS dry region: Lawrence of Alaska (KL7L) was the first QRSS station I heard and only a few stations after. I may hear some more if I QSY my grabber to 30m.

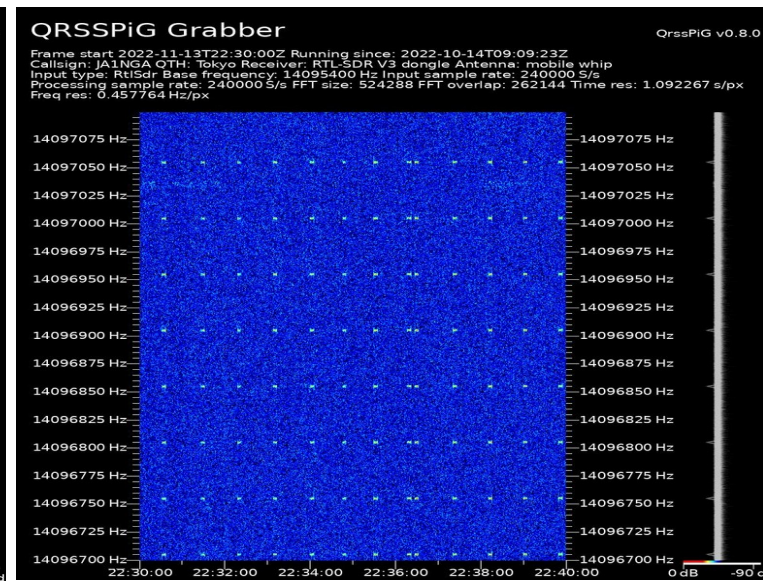
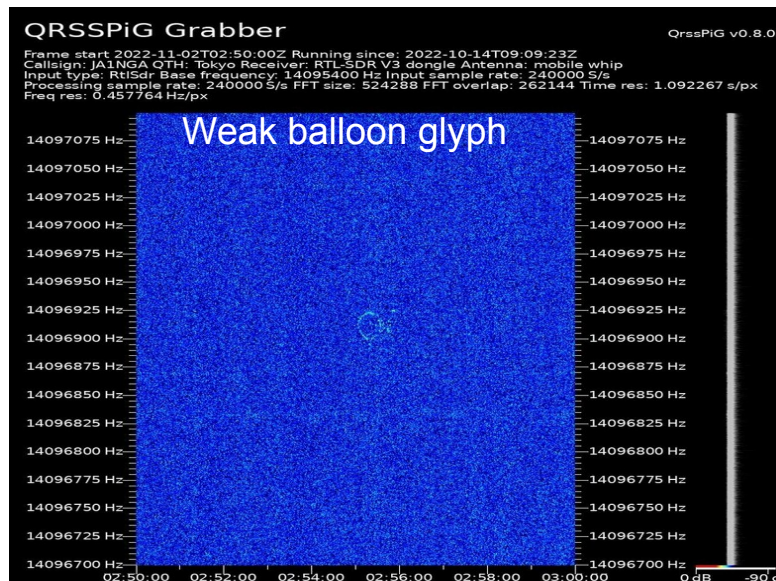
Now I am thinking of transmitting QRSS/WSPR with 5-10W. Both WSPR stations (Netherland and Israel) that I could hear were transmitting with that level of power. I am an avid follower of Bill Meara (N2CQR) blog SolderSmoke, which got me interested in QRSS.

It was when he was stationed in Rome, living in Trastevere, sometimes walking a long distance to the embassy, and getting stolen his pocket radio on the bus, etc. When I visited Rome in early 2010, I looked for his stealth antenna around Piazza San Cosimato in vain (its stealth, of course). I thank Bill for the inspirations.

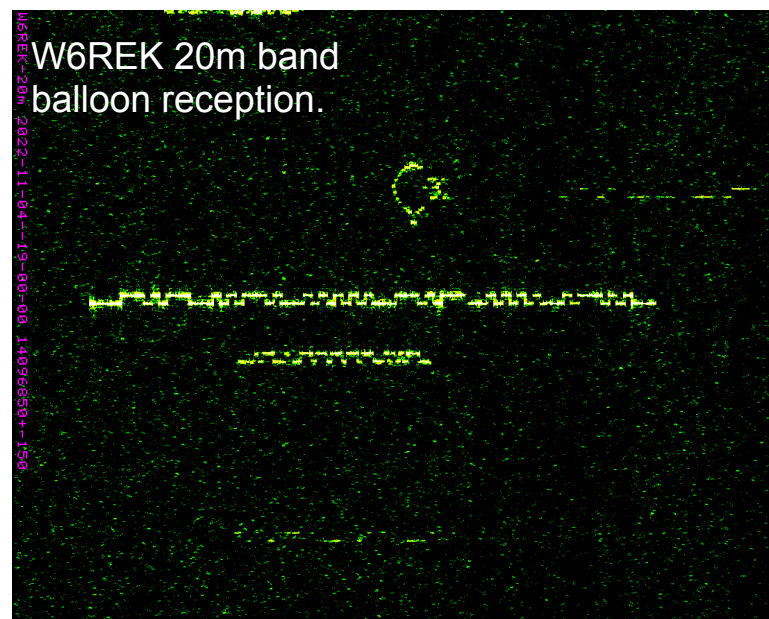
It's great to see QRSS interest in Japan. I don't know much about Japan but I do like "Melt Banana" 溶けたバナナ [ a Japanese noise music band! - GOFTD]



Kenji has commented that JA land is a bit dry when it comes to seeing any QRSS signals, but has received NM7J and more recently the U3B32 balloon. Another frequent visitor to JA2NGA's grabber is the OTHR Radar QRM on 20m as seen on the right side grab. G0FTD has made various attempts this year to see if he could reach out on 20m to Japan, but alas the results have been negative.



At the same time W6REK observed the same balloon, which I believe was over the mid west of Canada.



SILENT KNIGHT: Regretfully Captain Bob K4RCG passed away this year. I knew Bob for a couple of years through the chat forum on WSPRNET.

He had been inspired by Pete M0PWX, myself and others to try QRSS and ended up with multiple grabbers running in a very short while and was always full of enthusiasm. Radio was his drug.

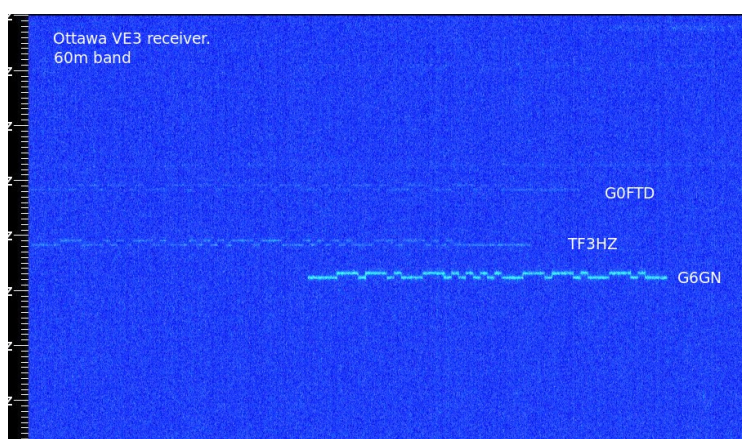
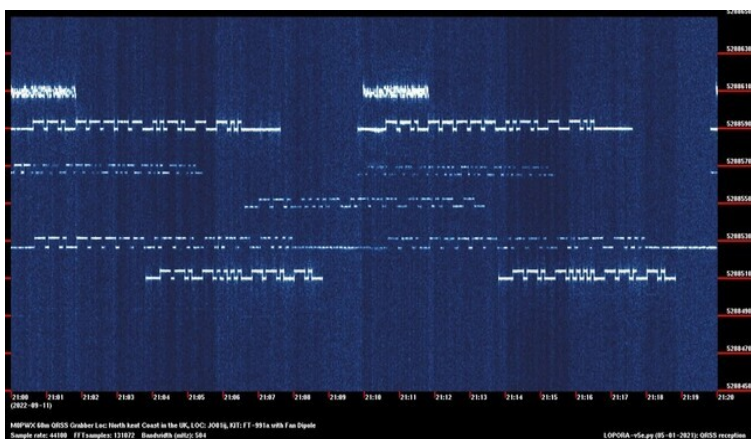
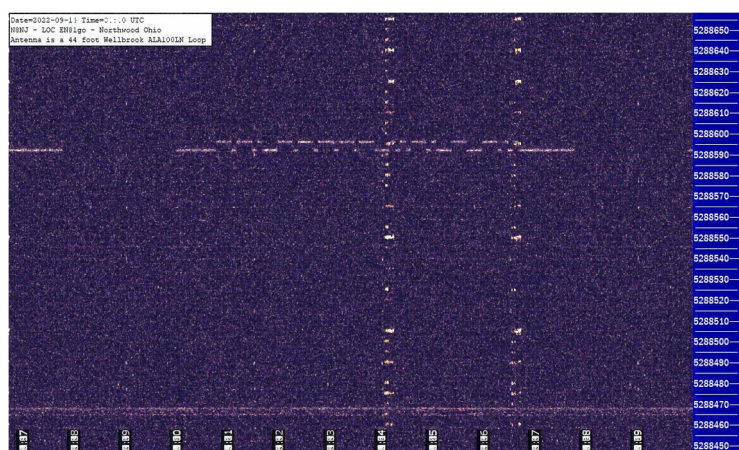
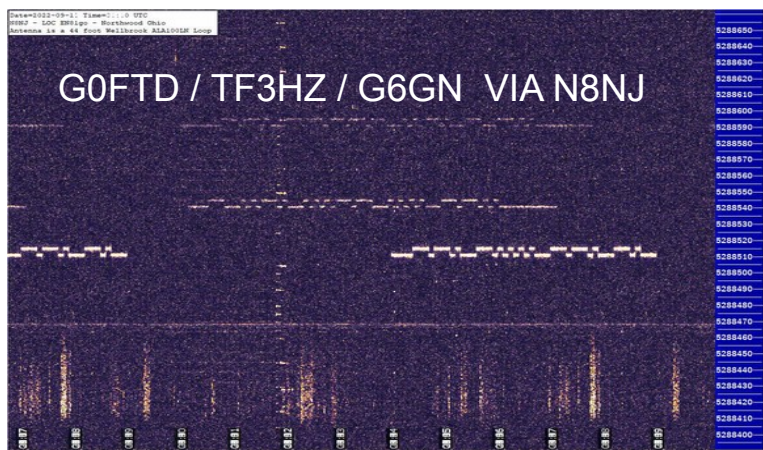
Regretfully although I have seen pics of Bob, I currently do not have anything cleared for inclusion in this issue, sorry.

**60m:** For probably the first time in history the 60m band exploded for about a week of QRSS in September when some random tests were announced. The results were outstanding and many UK and EU stations and grabbers came together just to see what could be achieved. Superb results were seen on grabbers as far away as Canada and the USA too. From memory about nine stations managed to utilise about 50Hz of spectrum, amazing.

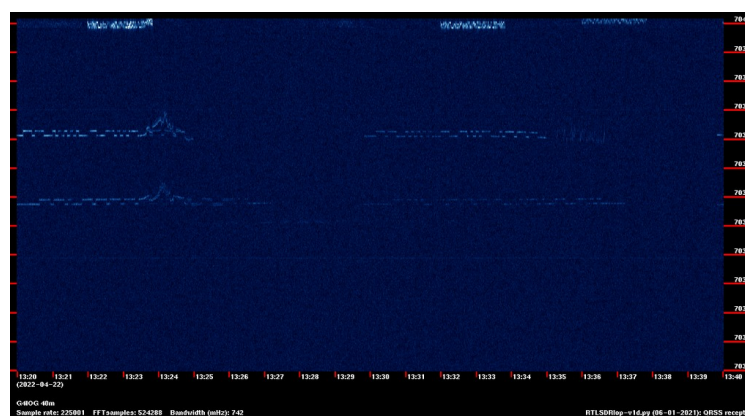
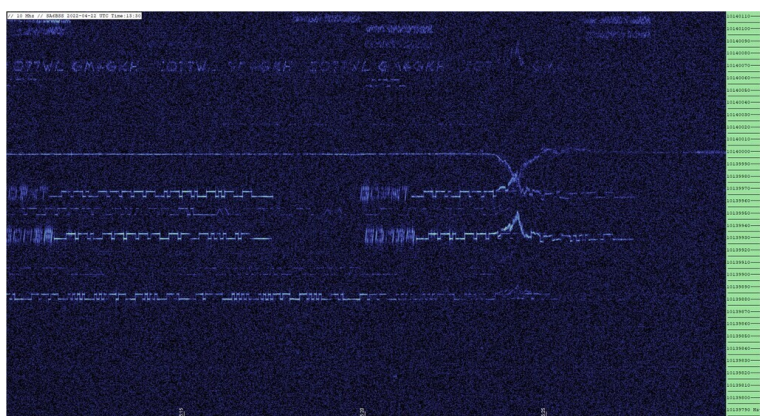
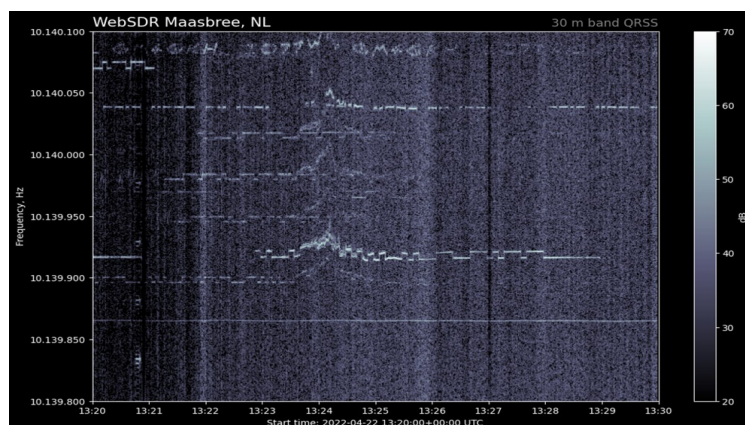
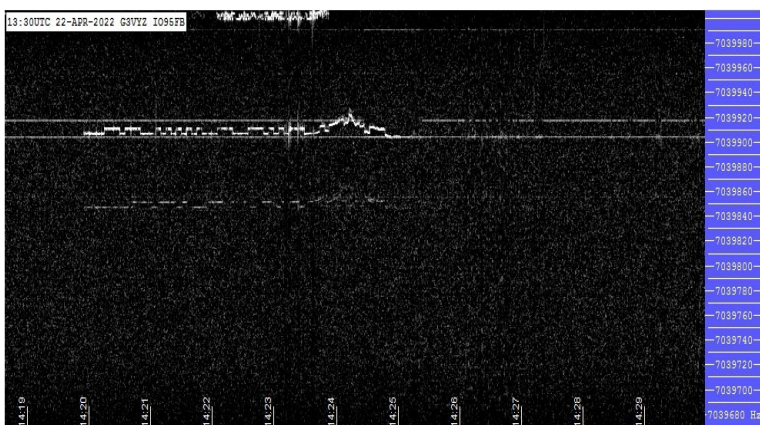
Here are some representative grabs of some of the signals seen on 60m. Not everyone is there since I can't find all the grabs. First grab is of UK/EU signals via N8NJ, and then M0PWX and the last is signals via VE3 land at night.

It was amazing to see how from one or two group posts that the Knights rose to the challenge and added new grabbers and transmitters to add to the party. Well done !

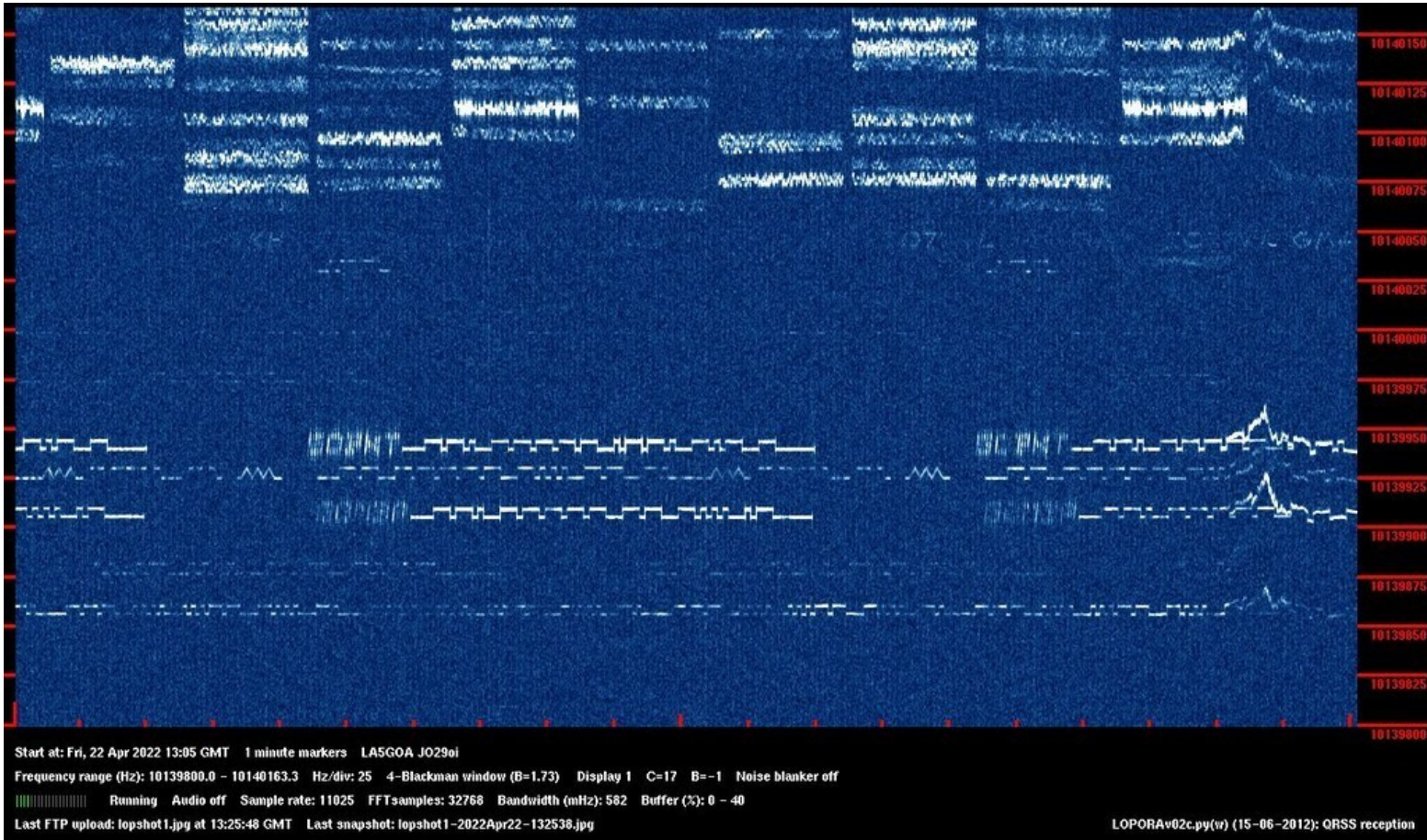
Results of the 60m party. G0FTD was using about 1w and a 33ft sloper wire in these tests.



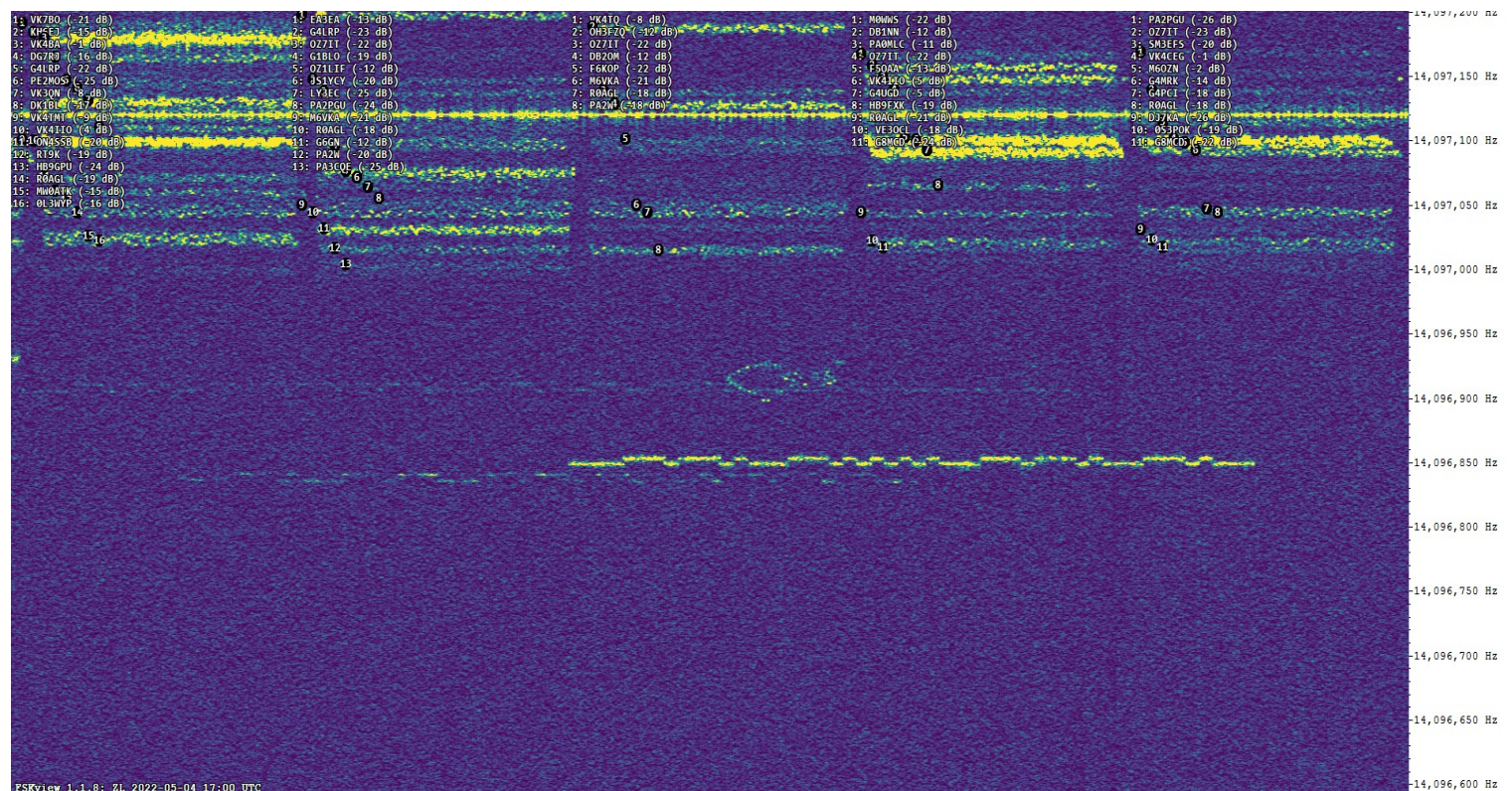
With this years new sunspot cycle having started, so do the solar flares. Many of you managed to capture them in great style. G4IOG,SA6BSS,G3VYZ,LA5GOA,PA2ST managed to view the event on the 22<sup>nd</sup> April 2022 on 40m and 30m being popular. You can spot the event when the signals show a sudden upturn in frequency, looking like a mountain peak on the grabs. But the SA6BSS 3<sup>rd</sup> grab shows a signal with an downturn frequency – why ?



And here's another solar flare as observed by LA5GOA on 30m. See the **mountain peaks** at the end which always indicate solar flares.



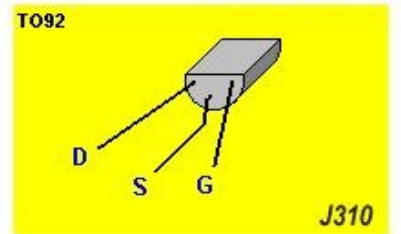
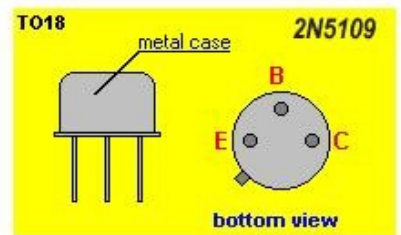
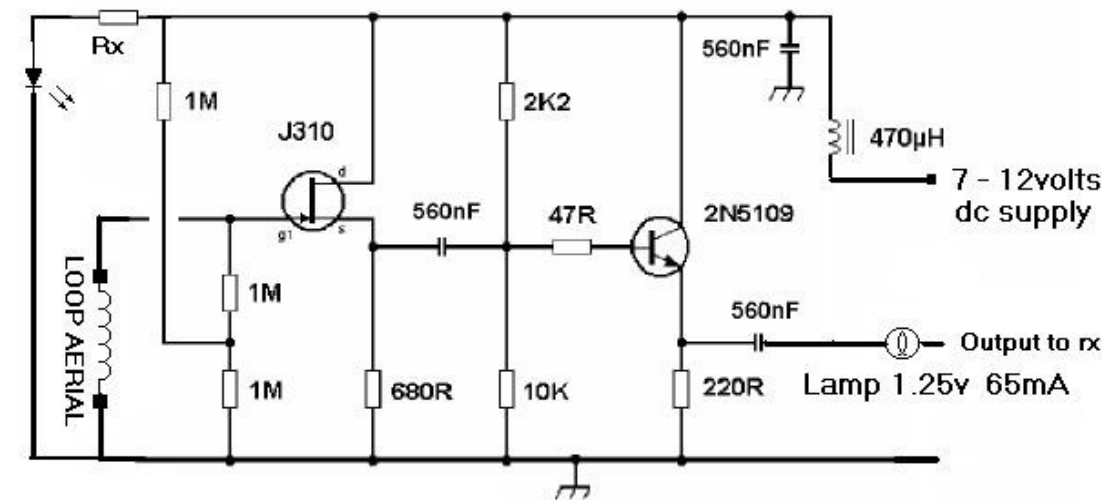
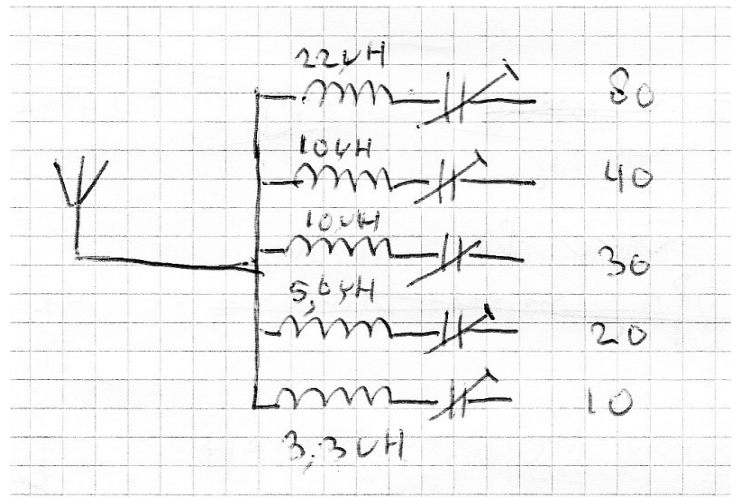
And now we're back to some 20m super DX. Mike G6GN used an online SDR in New Zealand to provide some amazing reception. Here you can see G6GN, and a weak G0FTD with a bedroom loop and 1 watt, ON4CDJ and a 10mw balloon.



Onno PA2OHH appears to be a compulsive homebrew grabber builder, and is constantly trying out everything from simple RTL dongles, direct conversion receivers and now an SI5351 module with an Arduino Nano system. Onno is currently grabbing on 80/40/30/20/10M bands with it. He feeds a PA0RDT Mini Whip antenna via a tuned circuit bank to each receiver input, and in turn this feeds his Lopora software and Raspberry Pi computer to produce the grabs.



Below I have reproduced from one of my own projects a PA0RDT circuit diagram that I once used with my FT817 and a small random loop antenna. In this diagram, you will see that I inserted a light bulb to act as an RF fuse, just in case I accidentally transmitted into it. **(It works!)**



Rx can be about 2K2 or 10K resistor and it maybe wise to include some back to back diodes to protect the J310 FET against static discharge and high voltages induced in the antenna such as nearby thunderstorms.

The wire loop can be replaced with a simple 12 inch capacitive plate (not earthed!), or a few metres of wire. But be sure to earth the circuit to a good ground from the feedpoint.

GOPYB and KL7L have recently introduced a grabber “test card” to their line up to indicate their status. Quite nice to see on the compendium to brighten things up. Some years ago this was quite common, but appears to have tailed off in recent times.

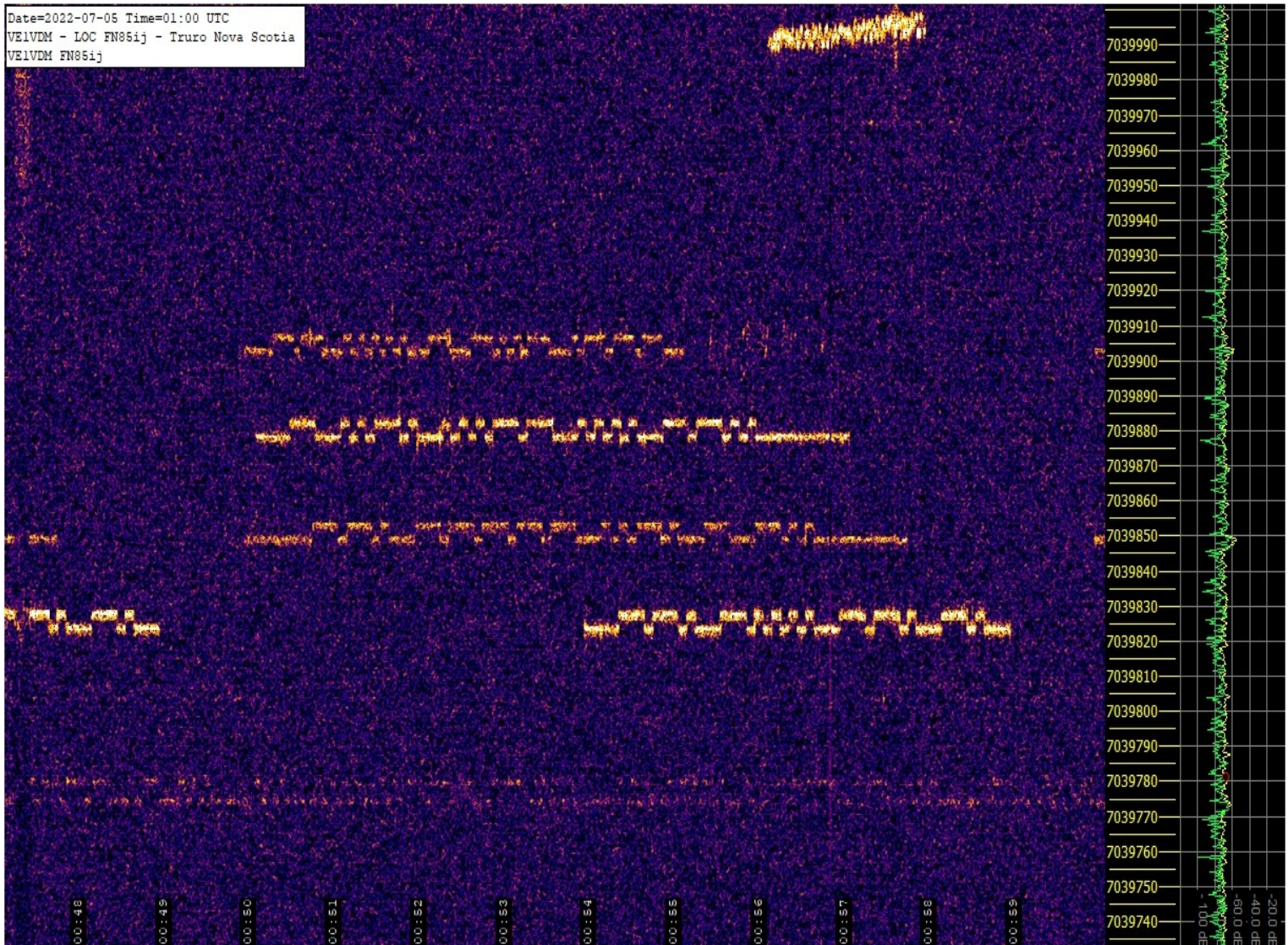
## GOPYB-1

Martin (GOPYB) in Gainsborough UK ([website](#)) inactive (39 minutes)

15:52 (49 min)



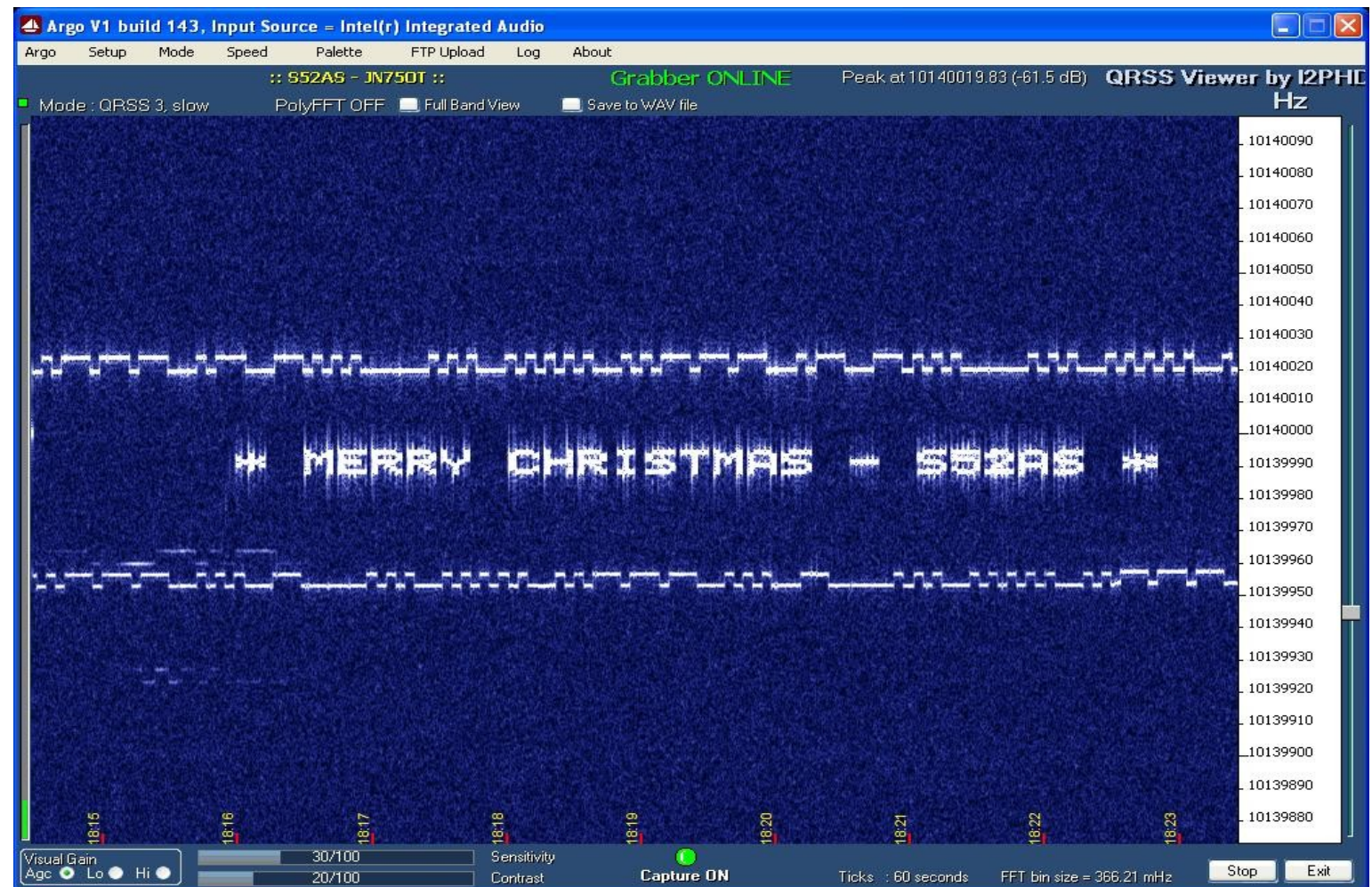
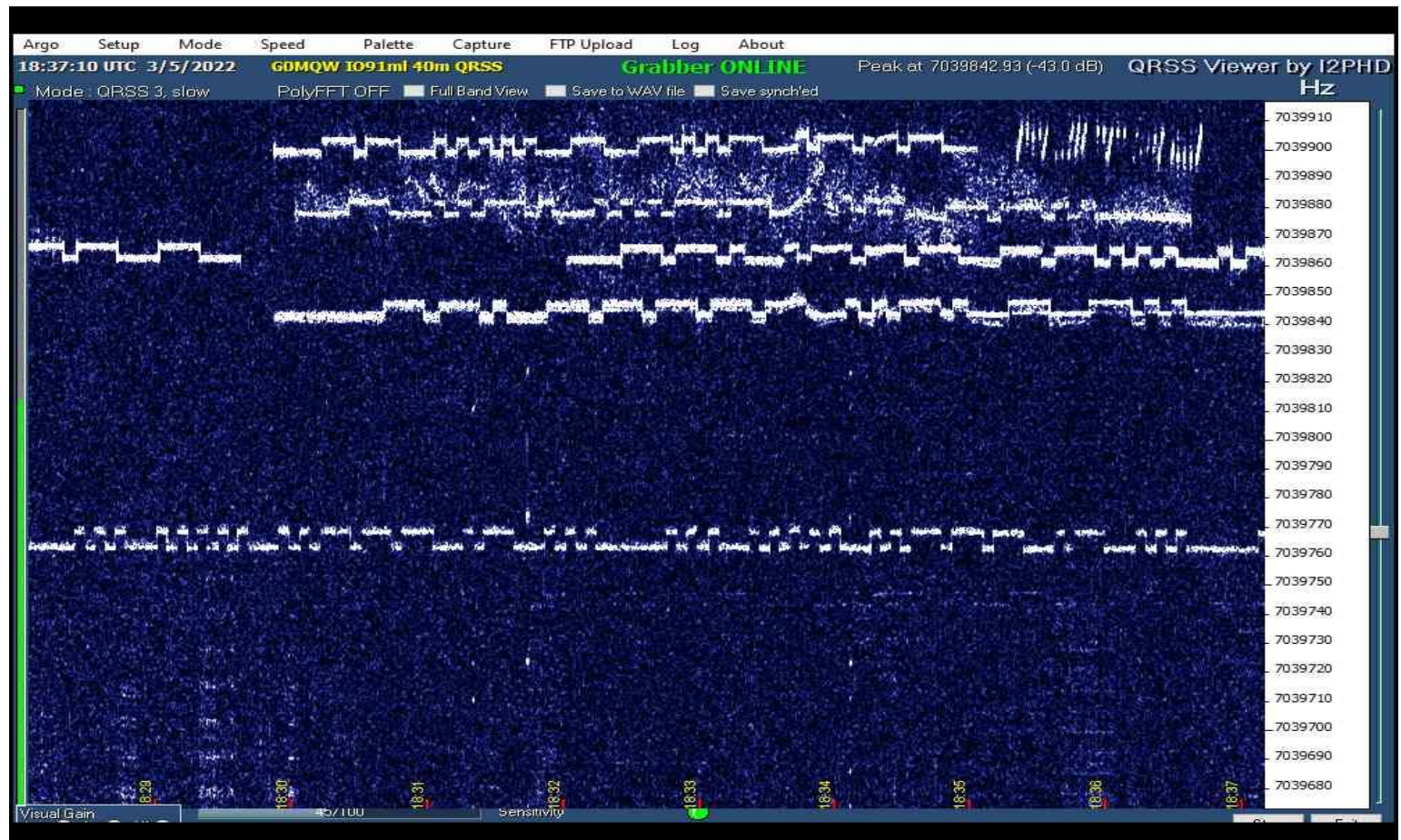
Trans-Atlantic 40m has been good too. Here we can see M5TXJ, TF3HZ, G0FTD, G6GN and S52AS seen by VE1VDM with excellent signals in the summer of 2022.





# Knightly News

And finally, we end with one more solar flare captured by G0MQW on 40m @ 1934 UTC 5<sup>th</sup> March 2022, and S52AB's Christmas message on 30m.



# The 6m & 10m report.

Well folks, 2022 was very different to previous years. Put simply, the Sporadic E season was a total disaster, and so was meteor scatter. But F layer DX took precedence for the first time and we have seen (so far) the best ever results for 10m QRSS. During the last solar peak there was little 10m activity and I think only two or three 10m grabbers doing any tests. Graham VE3GTC and W4HBK were grabbing, as was VE1VDM. And now we see just about everyone having a go. The breakthrough came when QRP Labs started offering DDS controlled transmitters that could extend our world to 30Mhz. Everything before tended to be up to about 10Mhz. And the latest kits provide 50Mhz too, along with sensible power output and stability.

The Sporadic E season as observed by G0FTD for the last few years always seemed to coincide with a slightly magical date of the 18<sup>th</sup> or 19<sup>th</sup> of May. This date seemed to coincide with the first mass openings, sometimes lasting 24 hours and multi-hop paths too to the USA. This year the magic date worked again, but in a different way. 6m was the first band to open as opposed to 10m. So now the magic date has worked for 3 years in a row.

By sheer coincidence whilst looking at the UK's **Short Wave Magazine archive from 1938**, there was even a letter from G6YL that mentioned a magic date of one week earlier.

But this season was characterised by very poor openings until the second week of September when it could be considered that the Sp E season was dead. But then something amazing happened. The 10m band exploded with F layer signals and all hell broke loose.

The 6m band really only had one consistent transmitting station, G0PKT, but there were numerous grabbers trying. G0MQW, G4IOG and OK1FCX. Radovan OK1FCX embarked on a full season monitoring project on the band. Band openings were often short, about 2 - 15 minutes, but one or two last about 1 hour on the G<>OK path. A BIG THANK YOU TO OK1FCX WITH HIS MONITORING PROJECT.

Band openings were not very consistent from day to day.

## LETTERS TO

### A Prophecy Fulfilled

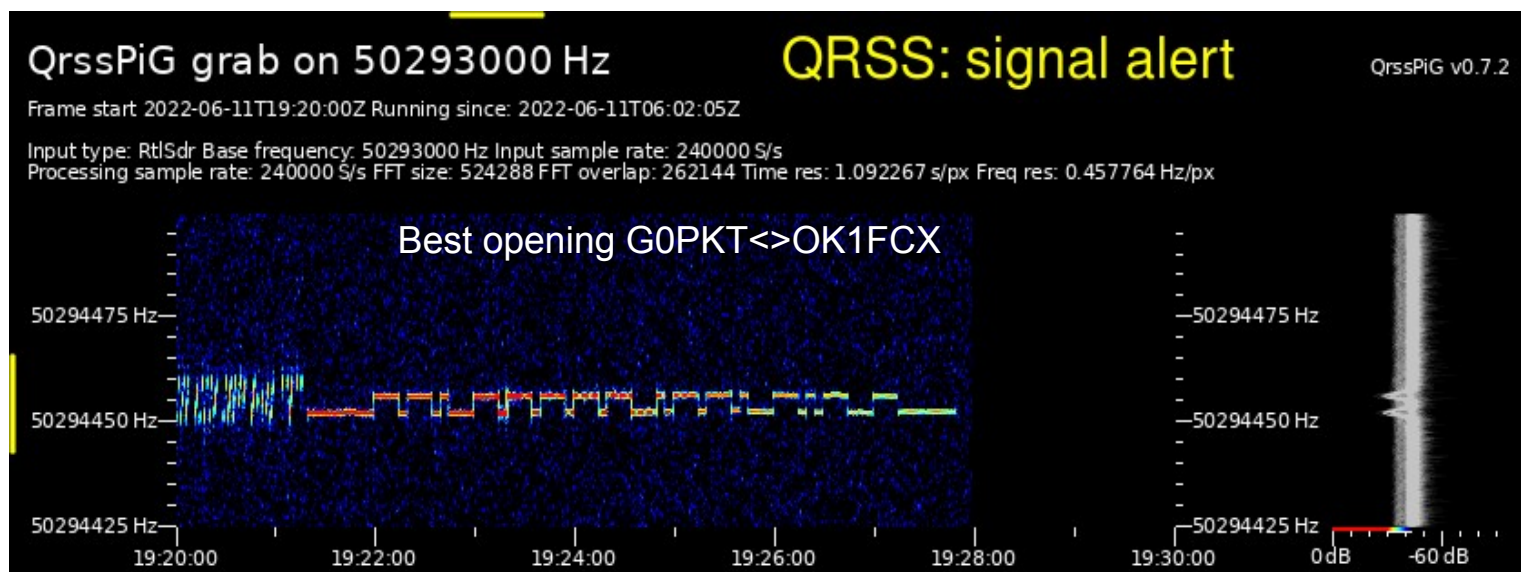
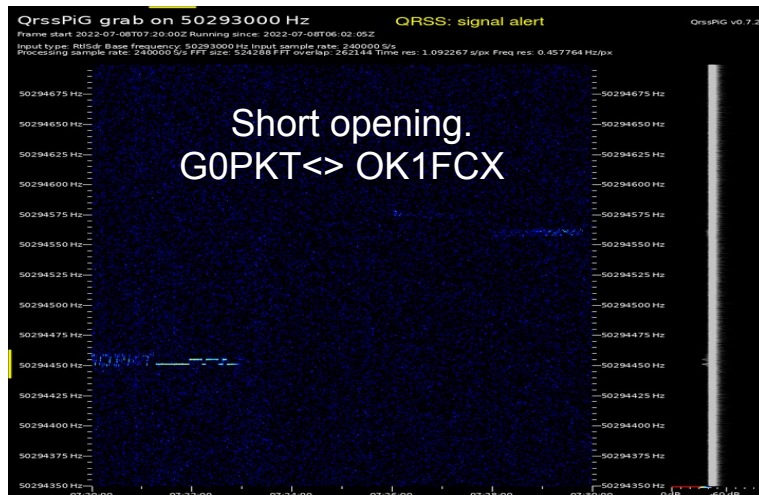
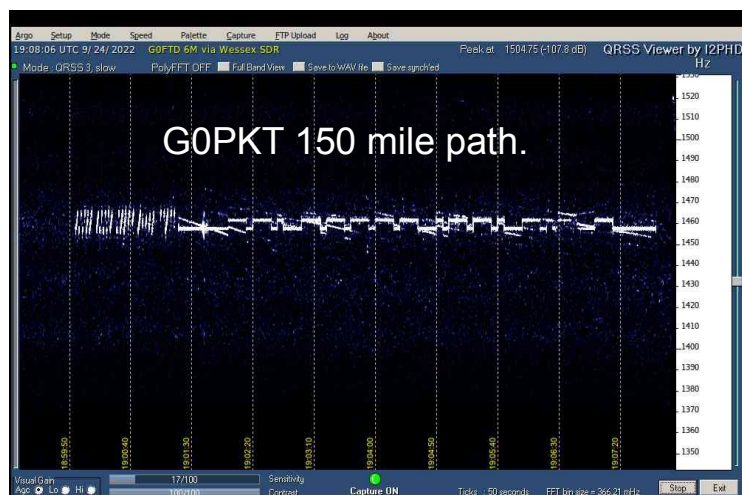
After observations on the 14 and 28 Mc amateur bands during the past seven and four years respectively, I noted that short skip conditions invariably began on May 11 or 12 and continued many days throughout the summer. Thinking it possible that the 56 Mc band might begin to open up for QSOs with stations at distances of 500 to 1,300 miles around May 12, I arranged regular tests this year from that date onwards.

Through lack of interest in 56 Mc on the Continent, only one QSO has taken place—that between G5MQ, Liverpool, and Italian I-1RA. But the American amateur magazines of July record the inter-state contacts which have been effected recently, and all agree that good conditions on 56 Mc began on May 12, and also that when 28 Mc signals are coming in at short skip (less than 400 miles) 56 Mc is good for QSOs at 500 to 1,200 miles.

It is interesting to find one's "prophecies" fulfilled so exactly, and in view of the corroborating evidence, I would urge European amateurs to use 56 Mc and give us in the British Isles the chance of a DX QSO before the autumn. Then we are hoping for the real DX to appear!—BARBARA DUNN, G6YL, Acton House, Felton, Northumberland.

## The 6m & 10m report

Due to the disastrous Sporadic E season, quite a few grabbers operators felt that it might be worth redirecting their resources to other bands. [But let's hope that 2023 will have better propagation.] G0FTD decided to see what online SDR's were available but could only find two, both of which have been unreliable. However a quick test on a 150 mile inter G path (Clacton to Portsmouth) revealed quite a good QRSS signal being received.

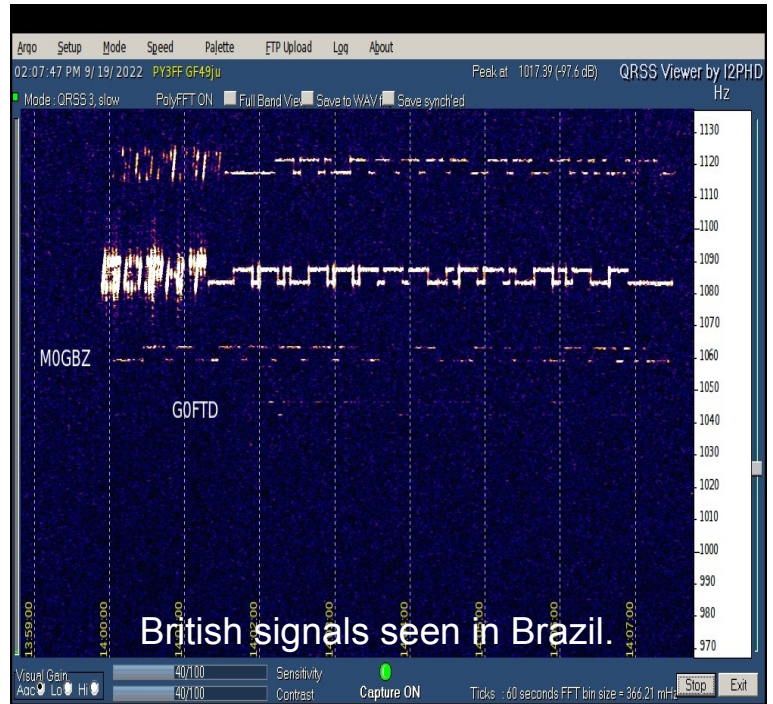


According to my records, some 15 days of useful openings occurred on 6m were recorded of any significance on the G<>OK1FCX path between 20<sup>th</sup> May 2022 and the 4<sup>th</sup> of September 2022. Most openings were often brief, from two minutes to ten minutes long. G0PKT runs 1w output to a dipole. The length of these openings can be considered a good indicator for higher power operations such as SSB / CW. Even if you are running 1000 watts, the openings are not extended by very much at all. A two minute opening with 1 watt might get you a 5 minute opening with 1000 watts. Put simply, if there's no ionised particles up there then no amount of power will work at all. Higher power only tends to reinforce a weaker signal for a little time period before or afterwards.

**28Mhz.** Ok folks, the star band of 2022 ! Despite being only one year into the new solar cycle, we have seen some Mega Milliwatt DX taking place. Signals have been visible from North America, South America, the Middle East and Europe and southern Africa (yes Africa!) And the Knights group has been joined by two welcome observers in Brazil, PY2FF and PU2UIB.

## The 6m & 10m report

We start with Vern VE1VDM who dismantled all his equipment in anticipation of a house move. But during the wait the QRSS bug hit hard and he just had to do something to keep things going. And that a mag mount antenna on a cookie tin. How well did it work ? Huge signals into Europe and Brazil. Here is a selection of all the good stuff seen this year.



## Undefined - check group announcements

QrssiPiG v0.6.1

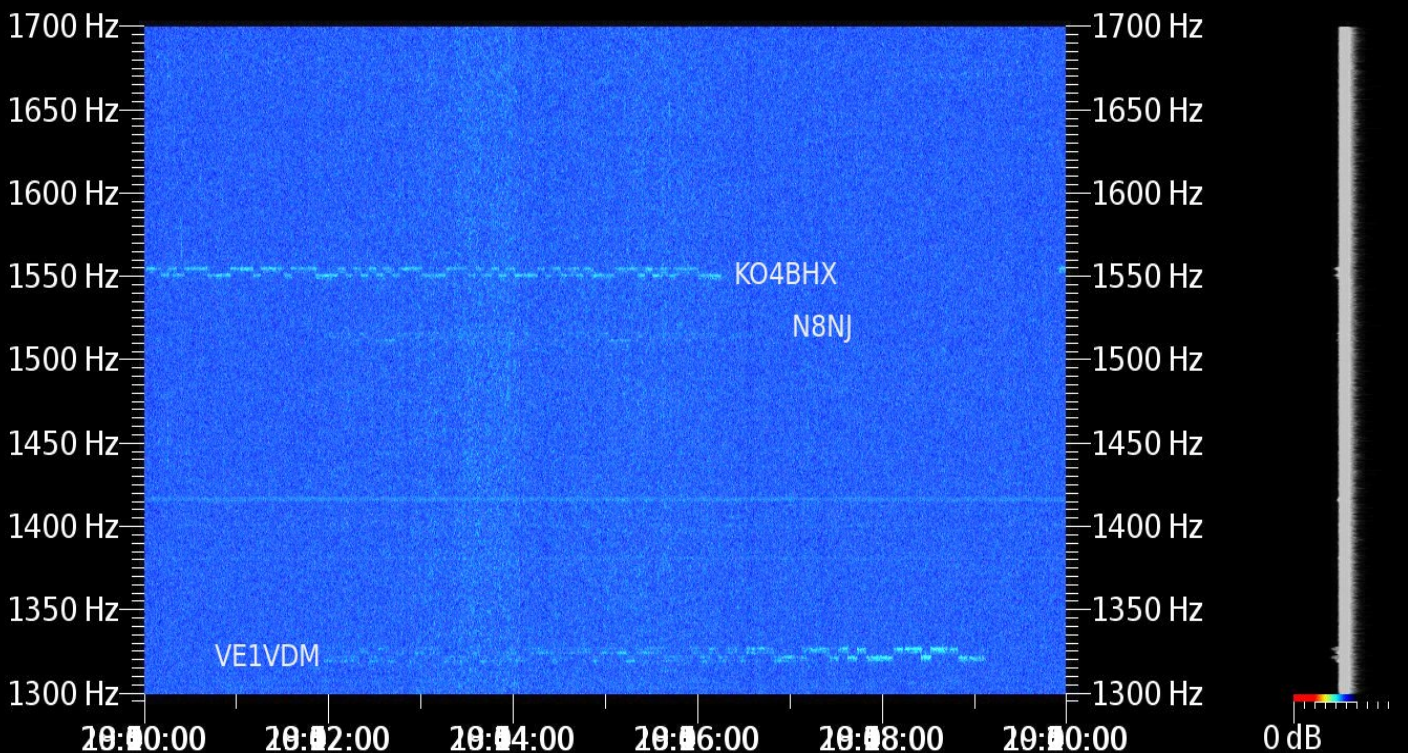
Frame start 2022-11-05T18:50:00Z Running since: 2022-11-05T18:50:01Z

Call sign: GOFTD

Input type: Also Base frequency: 0 Hz Input sample rate: 48000 S/s

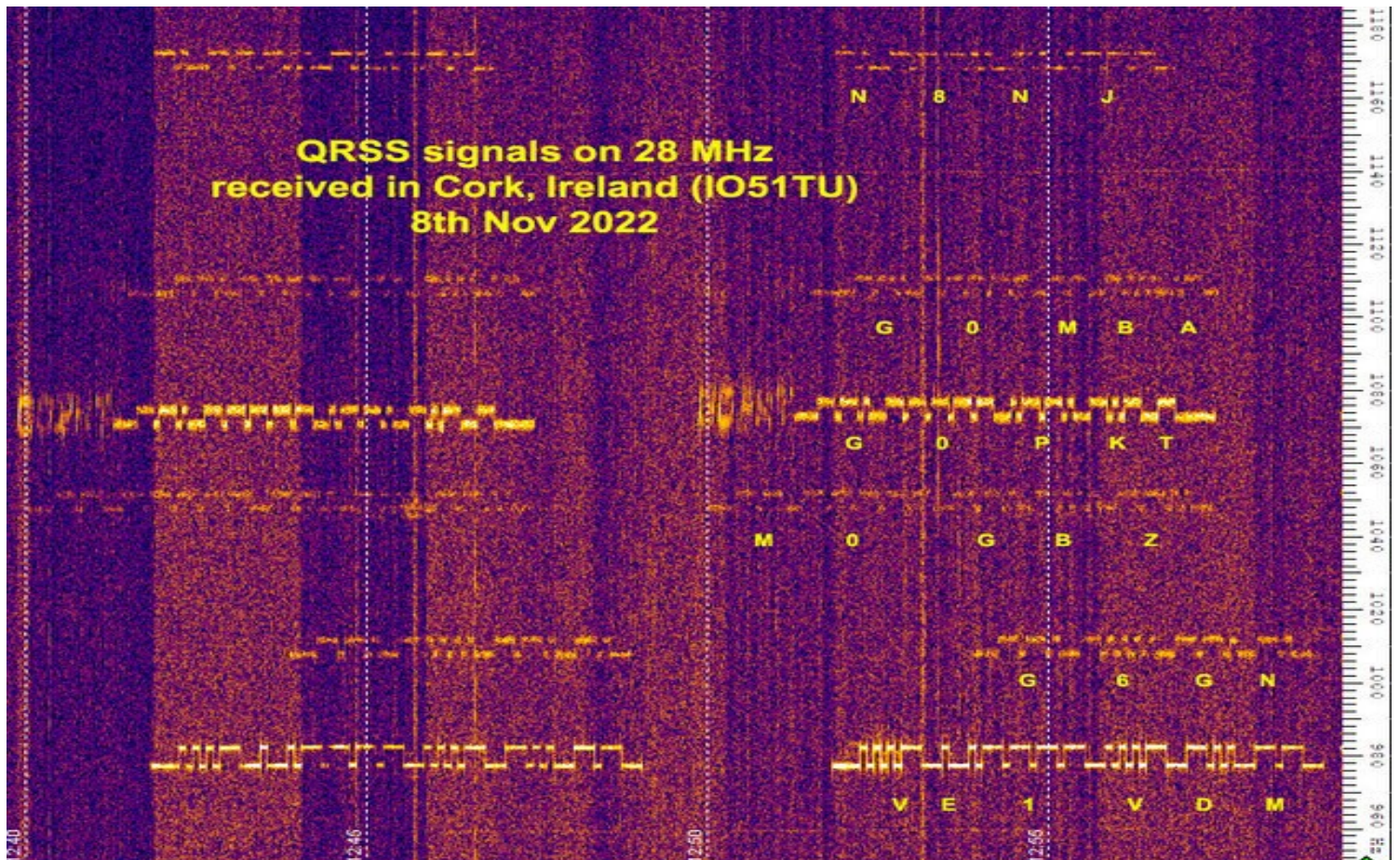
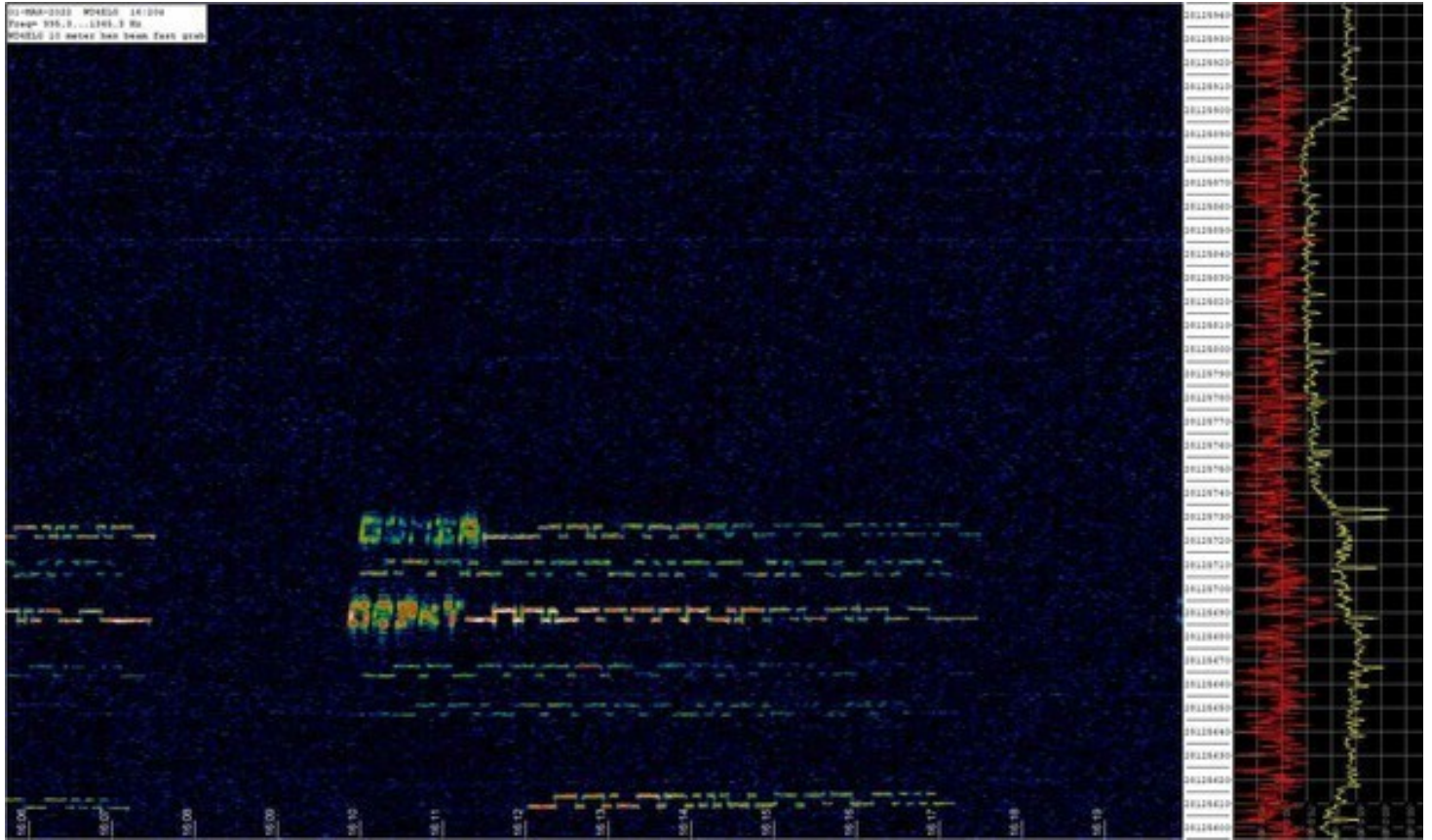
Processing sample rate: 48000 S/s FFT size: 65536 FFT overlap: 32768 Time res: 0.682667 s/px

Freq res: 0.732422 Hz/px



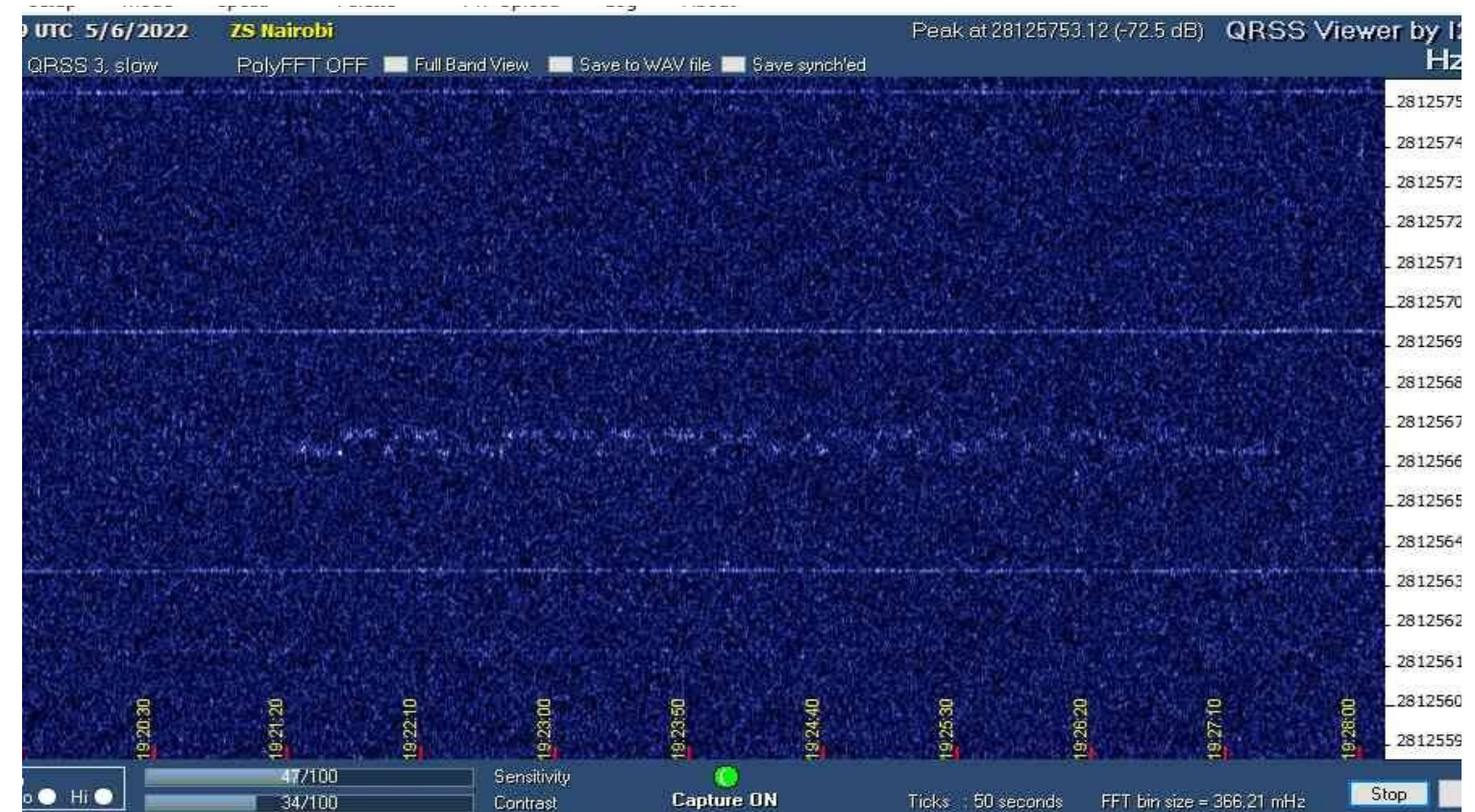
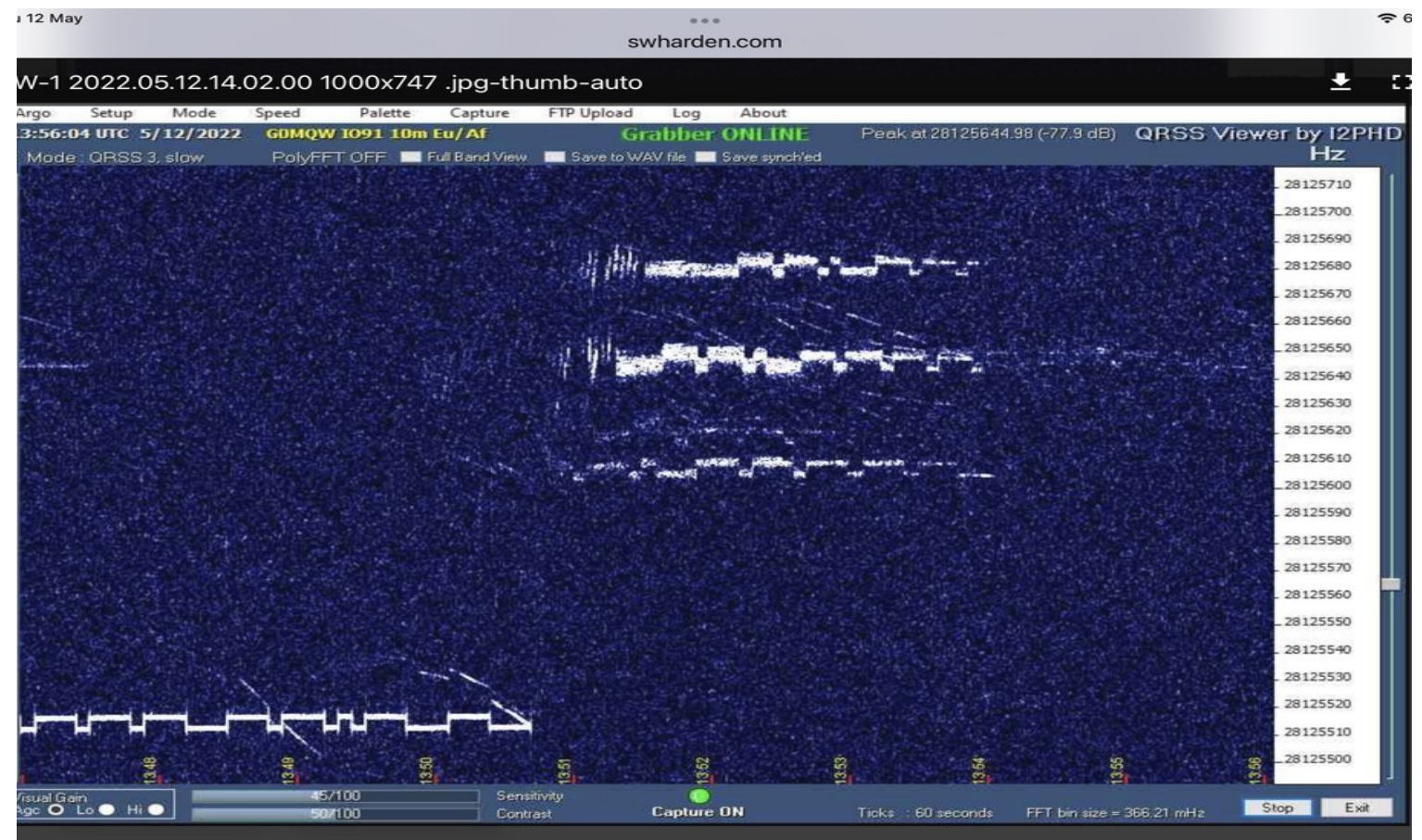
## The 6m & 10m report

Here's a nice grab from WD4ELG. Not only can we see many UK signals, but an excellent signal from PY3FF between G0MBA and G0PKT. G0FTD was using 300mw to a 30ft horizontal wire at 6m above ground level. The lower grab from John EI7GL shows both UK signals and VE1VDM on his cookie tin antenna at the same time.



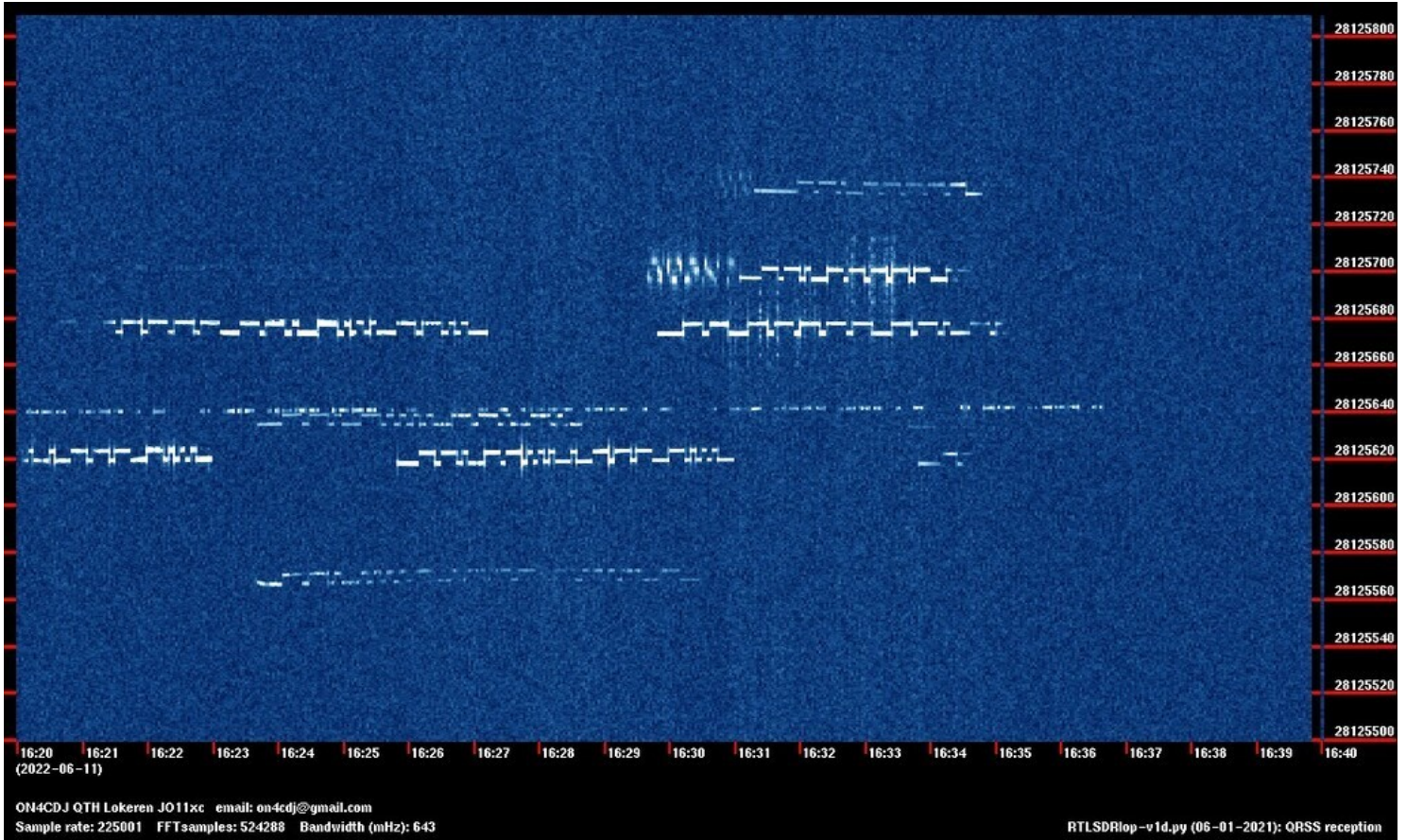
# The 6m & 10m report

No auroras were seen on 10m, and like this years Sporadic E season, meteor scatter was lacking too. The following MS grab comes from Mike G6GN showing Kent / Essex signals, about 150 miles away near Bristol. G0FTD was using an attic vertical quarter wave and 500mw. Bottom trace is G4JQT but NOT via meteor reflections (ground wave maybe ?).

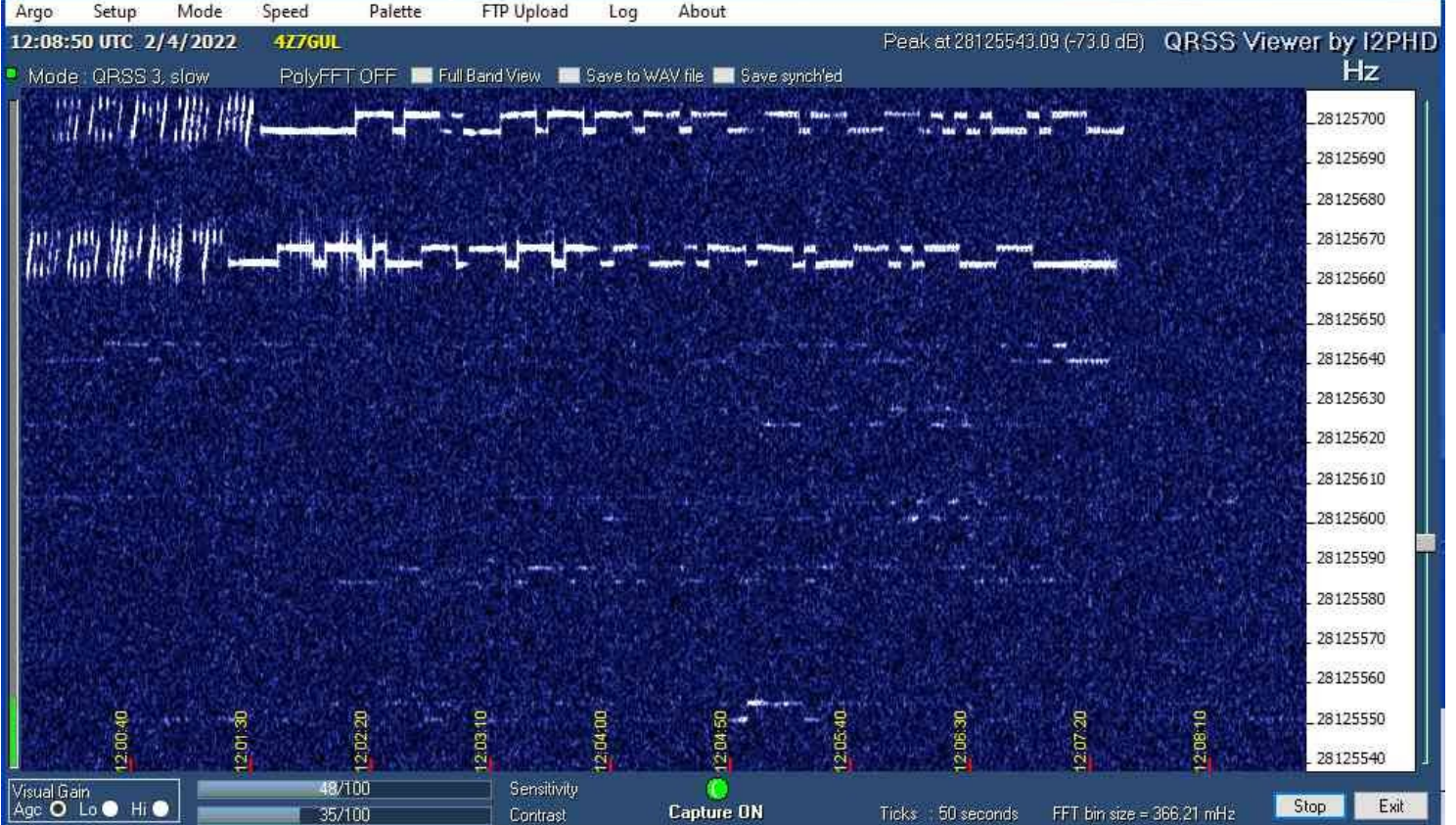


# The 6m & 10m report

And to finish things off, here's a selection of various grabs by miscellaneous contributors. Top grab is of some Sporadic E short skip of UK British signals into ON4CDJ who usually uses a dongle and short wire. Lower grab shows British signals into Isreal, supplied by G6GN remote SDR.



## Submitted by G6GN via online Kiwi SDR receiver via Isreal.





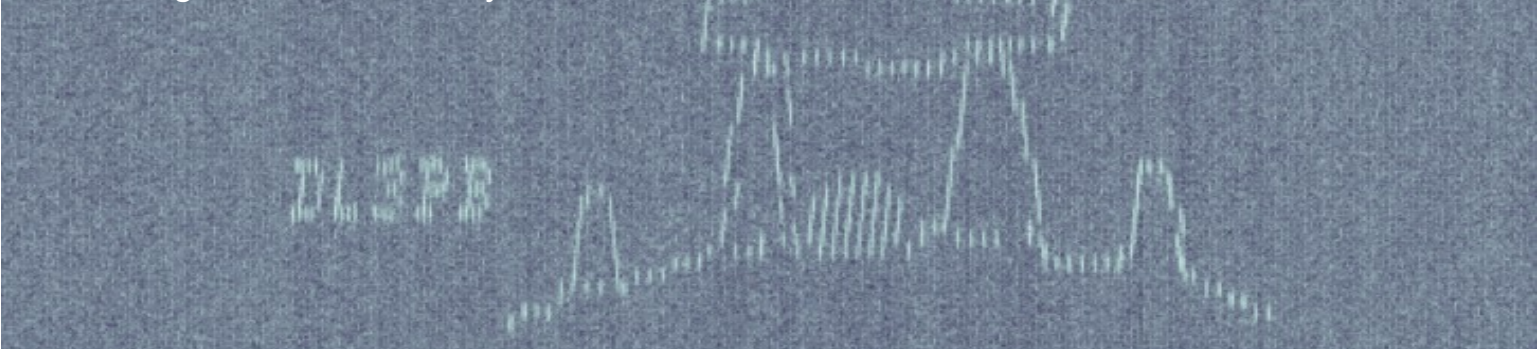
## Graphical QRSS fun with Pete DL3PB

Whilst compiling this years 74! Compendium, I noticed that I had personally collected quite a few of Pete's interesting graphical QRSS offerings. Pete is the latest in line of clever people like OK1FCX and W6REK who have managed to do something a little different within our hobby, has been working for 20 years in RF design. Here's a selection of his work.

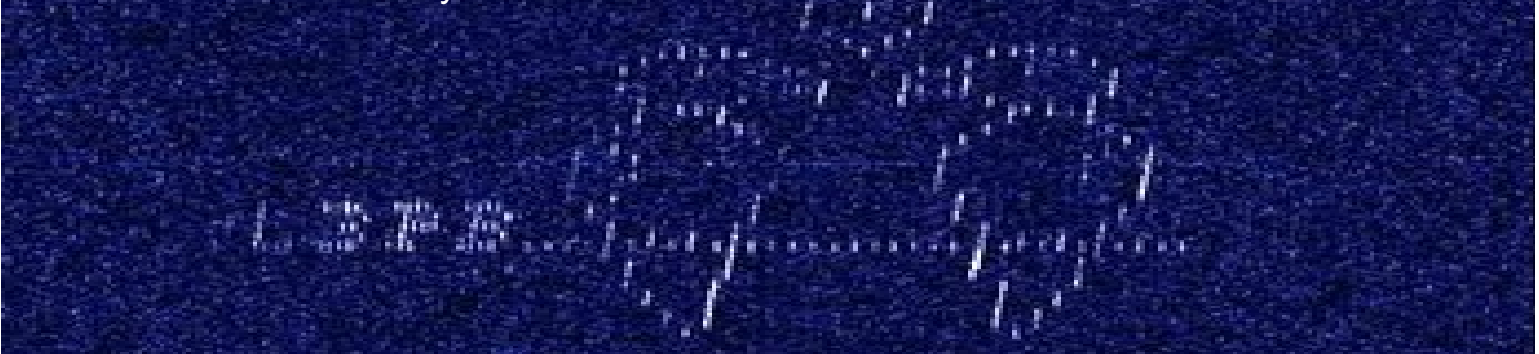
DL3PB (Peter's Bat ?) seen by WD4ELG on 10m



"Stonehenge" on 80m seen by Ben PA2ST



Love birds on 80m seen by G6GN

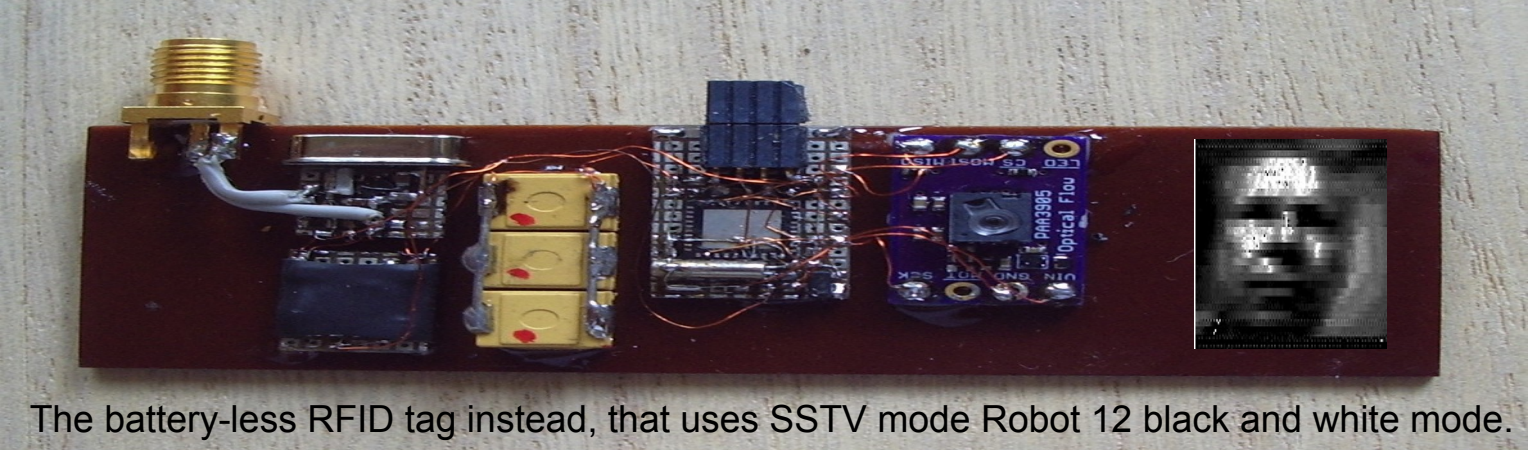


**Pete says** - really like what you call graphical fun, though not all works as intended. My attempts to use a (crude) camera chip (PAA3905) for a grey scale QRSS image failed since the required dynamic range exceeded by far the power I am willing to use. ( Consider 16 grey shades each 2-3 dB apart...) So that project became a battery-less RFID tag instead, that uses SSTV mode Robot 12 to transmit a rough picture.

Now that I'm retired I hope to do some even more sophisticated (animated) glyphs in the future, that is, if I get the RP pico work and myself familiar with Python - the small controller I used so far (MSP430F2013) is already moaning under the heavy work.



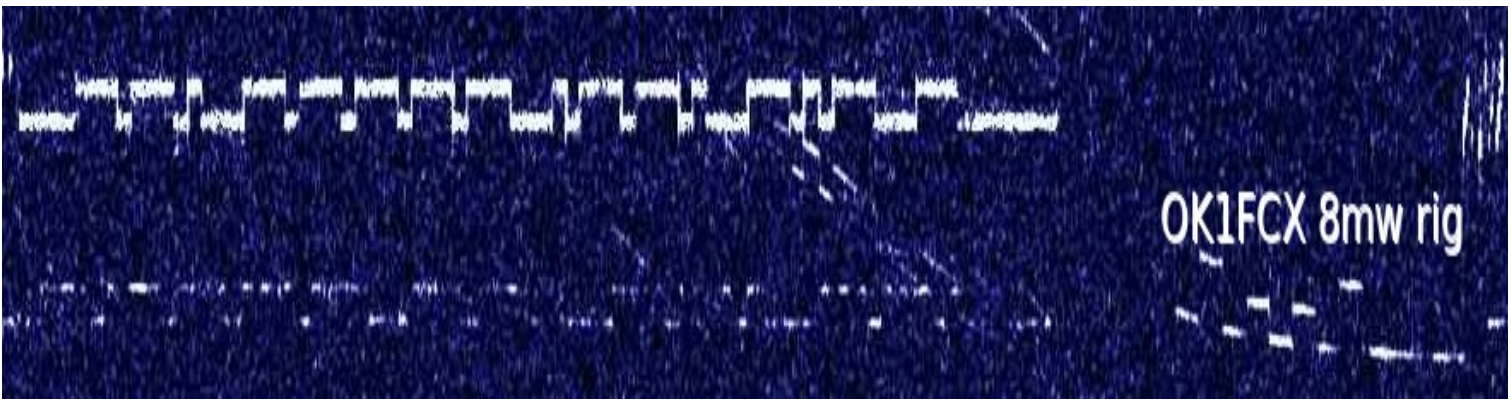
# Graphical QRSS fun with Pete DL3PB



Thanks for making the grabbers more fun Peter ! You can see a short animation of “Peter’s Bat” on 10m as seen by N8NJ by clicking [here](#).

**OK1FCX's  
Mighty Milliwatts  
from the Raspberry Pi.**

One of the taglines for anyone using the Knights group via email is “Where milliwatts feel like kilowatts”. And that is so true. Radovan OK1FCX is an expert with getting the most out of a Raspberry Pi. Early in 2022 he used his Pi to send a signal direct from the GPIO socket on the 10m band with about 8mw to a simple wire antenna, and was seen by G0MQW and in Norway too. He uses what he calls Tri-QRSS mode. 28MHz – the band that can go from zero to hero in a day ! Never dismiss this band.





# News from Brazil de PY3FF

I believe that for the first time there were active PY stations on QRSS (RX and TX). In addition to my station (Rafael PY3FF, GF49ju), we had the presence of Dinan, PU2UIB from the city of Iracemópolis, SP (GG67fk). Throughout the year 2022, I conducted several experiments in the QRSS segments on HF, mainly on 28 MHz. The primary transceiver was an FT-817 with a TXCO module and a simple half-wave dipole antenna installed 5 meters above the roof. The frequency stability of the FT-817 was quite satisfactory.

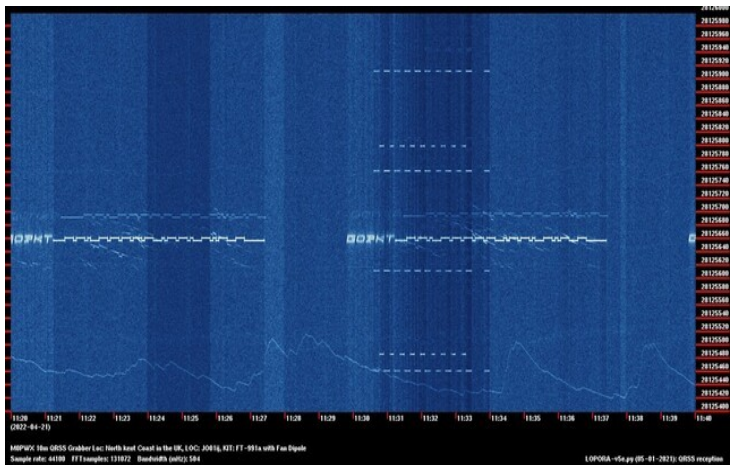
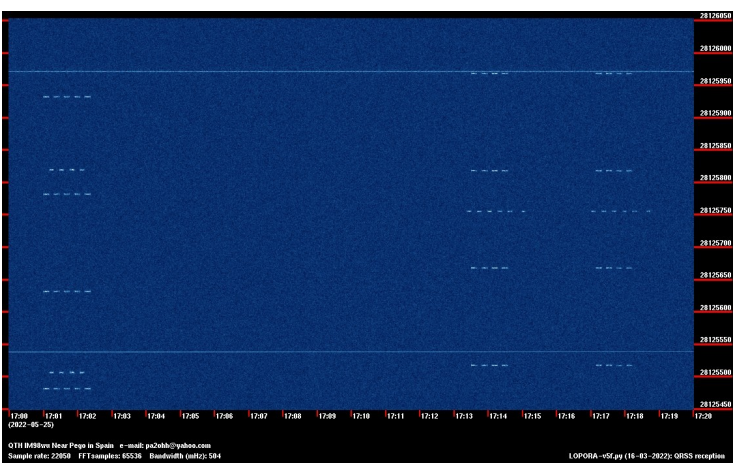
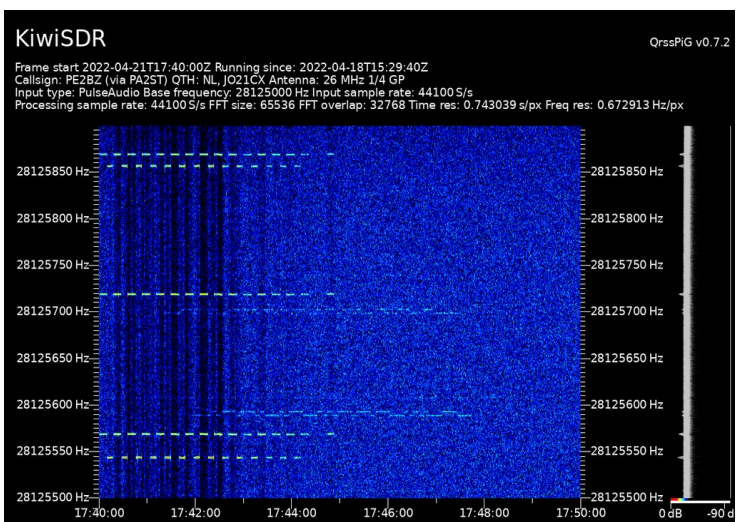
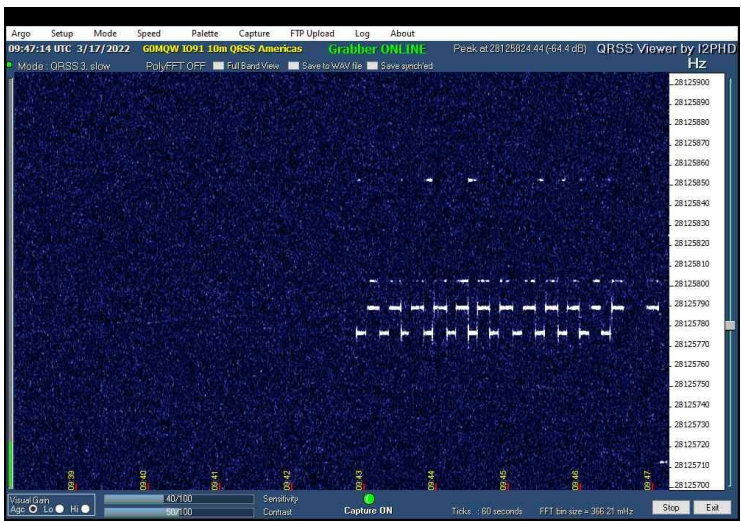


**ABOVE:** The PY3FF QRP shack. The main transceiver used in QRSS and WSPR is the venerable Yaesu FT-817 with TXCO module. **LEFT:** The simple half wave dipole is 5 meters above the roof using a fishing rod glass fiber fishing pole.

I have a 28 MHz Ultimate3S QRSS/WSPR kit, but I haven't started assembling it yet. I have plans to install a 24/7 beacon about 100 km away from my QTH at 28 MHz initially. With the increase in solar activity, the high HF bands are very busy with QRSS and WSPR signals 24 hours a day here in southern Brazil.



Unfortunately there is no ham radio in Iran, and certainly not any QRSS ! But we do see some signals from Iran on our 10m (28MHz) grabbers. This year (2022) has already allowed the QRSS community to detect an Over The Horizon Radar (OTHR) system known as Ghadir due to increased solar activity. The system has an unusual “fingerprint” that was originally highlighted to me by John EI7GL (thanks John), about two years ago.



The Ghadir fingerprint appears on a grabber like a bunch of QRSS style dots or dashes. With other OTHR systems we often see a series of stable horizontal lines, although this can often be confused with modes like CIS8 etc. These lines look like straight carriers when in idle mode, but when modulated they appear with small shifts imposed. According to Wikipedia, Ghadir is an Iranian radar with a range of 1100 km and capable of tracking targets to a height of 300 km. The radar was unveiled by the Islamic Revolutionary Guard Corp. According to official military sources the radar has the ability to detect air targets, stealth aircraft, cruise and ballistic missiles, and low-orbit (LEO) satellites.

Useful links -

<http://www.iarums-r1.org/iarums/radar-2013.pdf>

<https://ei7gl.blogspot.com/2021/11/mystery-signal-heard-on-28124-mhz-2nd.html>

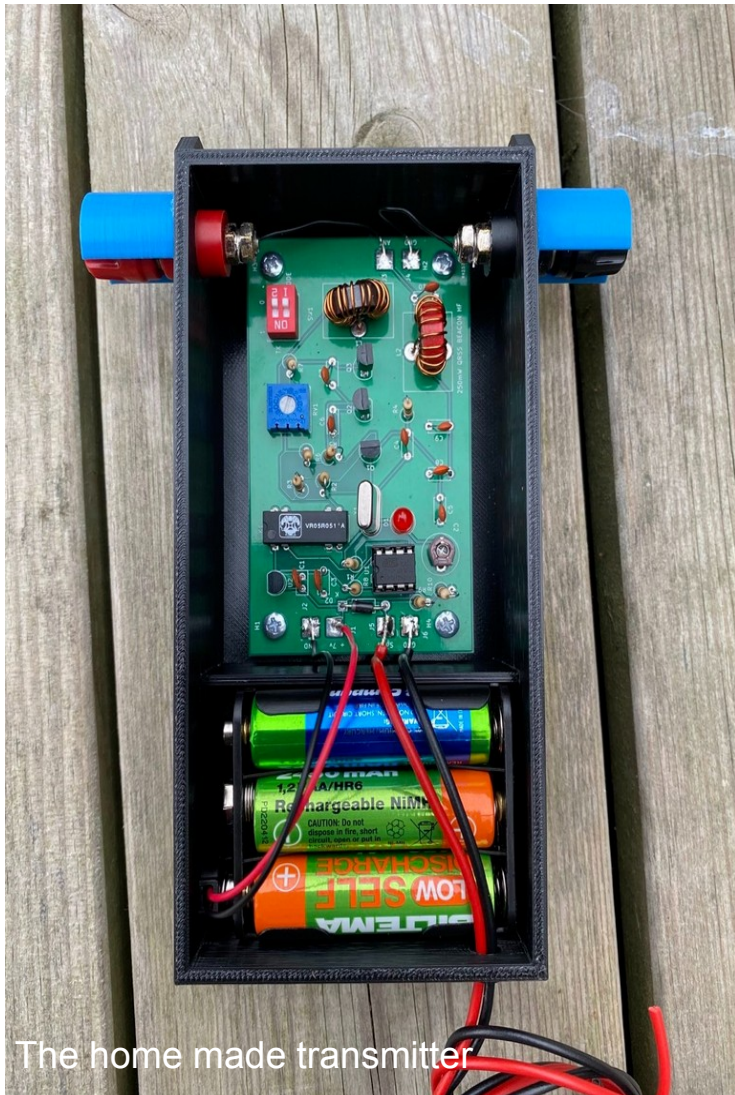


# SA7CNG's 10Mhz Tree Beacon

The following report is by G0FTD, abridged with posts and reports from the Knights group. SA7CNG writes: I don't have much space for antennas where I live, so I tried to put up my QRSS 150mW transmitter at another location. The place I found doesn't have electricity though, so a solar panel will provide power.

The batteries are 6xAA 2400mAh, and they should be able to handle the maximum of 400mA of charge during the period that the panel receives full sunlight each day. When sunny it will probably be running 24/7. During cloudy days, the panel probably will provide about 100mA, enough to keep the transmitter going during daylight, but not into the night. The transmitter stops transmitting at about 1.1v/cell to avoid deep discharge of the battery.

Weather proofing has also been improved with this enclosure, the antenna connections has been moved to the sides and fitted with covers to keep rain from coming into the box. The box lid will be permanently fitted with silicone to keep it absolutely tight. For an antenna I will use a dipole, or a sloper-dipole.



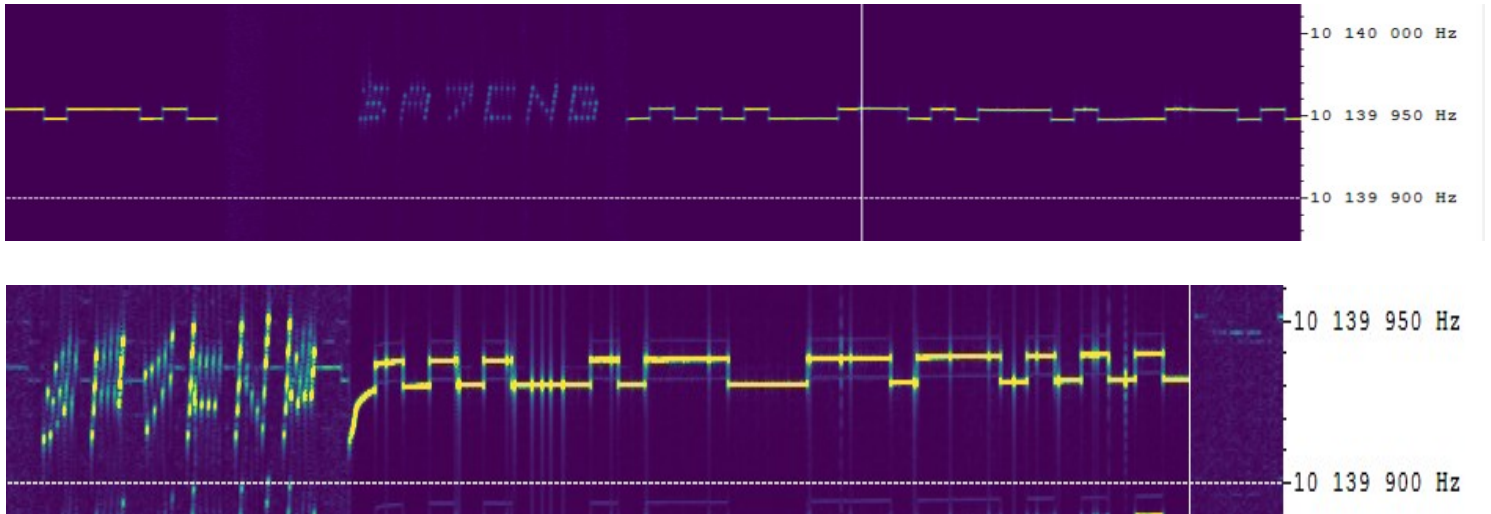
The home made transmitter



TX and solar panel strapped to the tree

## SA7CNG's Tree Beacon

The antenna is a loaded vertical, 4,2m high (height of my roof) with a 5uH base coil and two 7m ground radials. Results on the air: Reports on the grabbers came across Europe.



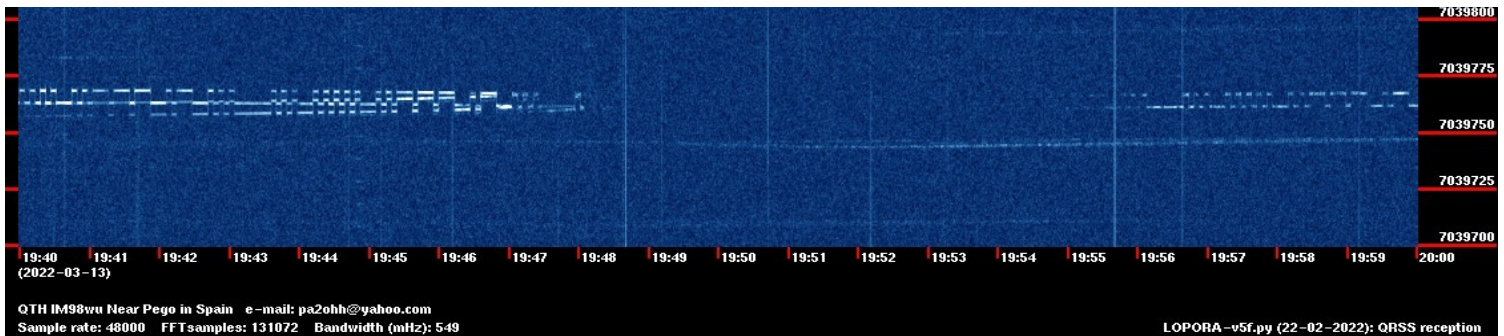
The TX is crystal controlled, and uses an ATMEL CPU to key the rig. Under ideal temperature conditions the rig is quite stable, but outside conditions there is some frequency instability. Great work from Alex SA7CNG. The true spirit of ham radio.



## PA2OHH (A Dutchman in Spain)

**News from Onno in southern Spain (that often confuses some grabber compendium viewers) reveals that Onno is forever active in supporting the QRSS scene.**

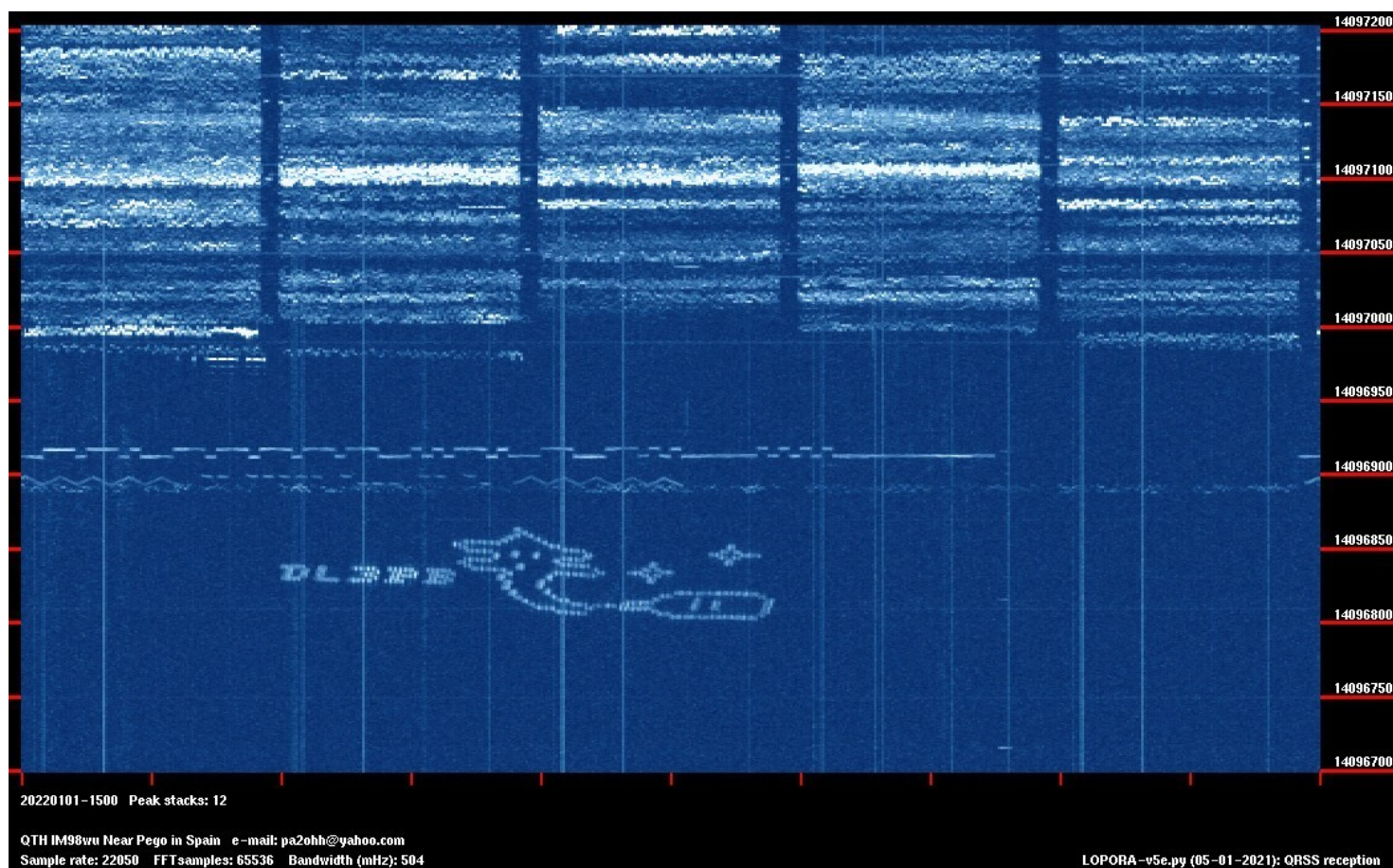
We start off with one of Onno's unusual grabs showing a strange ionospheric effect on S52AS's signal on the 40m band as seen on the left side of the chart. I have seen two paths many times, but three is a new one to me.



There is possibly three paths taken by this signal back in March 2022. This time of year is traditionally chosen and well known to be the greatest time for the most interesting period for propagation to take place globally. It's why the CQWW Contests take place at this time, as well as in October. The two perfect transitional periods between northern and southern hemisphere's take place. The result in a short period of excellent DX signals.

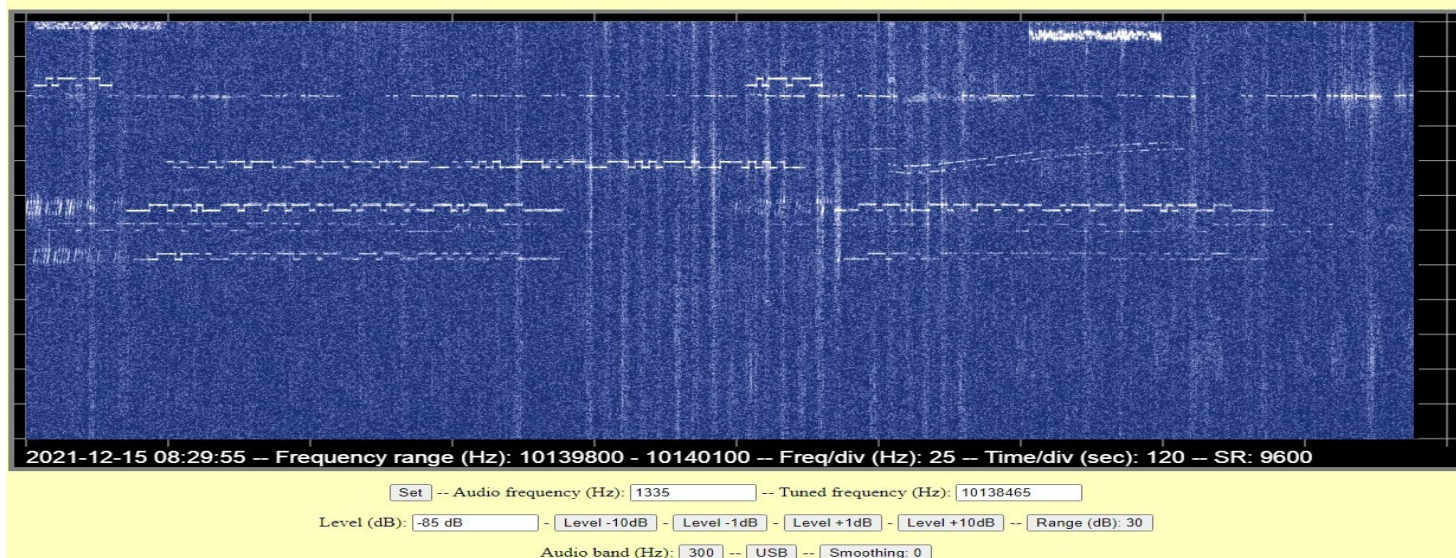
## PA2OHH (A Dutchman in Spain)

One of Onno's favourite grabs is on the 20m band. You can clearly see DL3PB's "Genie from the Bottle" as well as G0FTD's indoor loop antenna. The loop antenna being hidden under the wallpaper and about 12ft by 12ft horizontal fed by about 1 watt of TX power.



Another of Onno's projects is called LiToPo (Little Toe Power). Instead of using grabber software to monitor signals, you use a browser based solution. This negates the need find suitable software for your operating system. It doesn't upload grabs, but there maybe other solutions to this, such as automatic screen grabber software and some trickery by the operator. It does however provide a quick monitoring solution.

### LITOPPO QRSS reception with webbrowser software (2021)



## PA2OHH (A Dutchman in Spain)

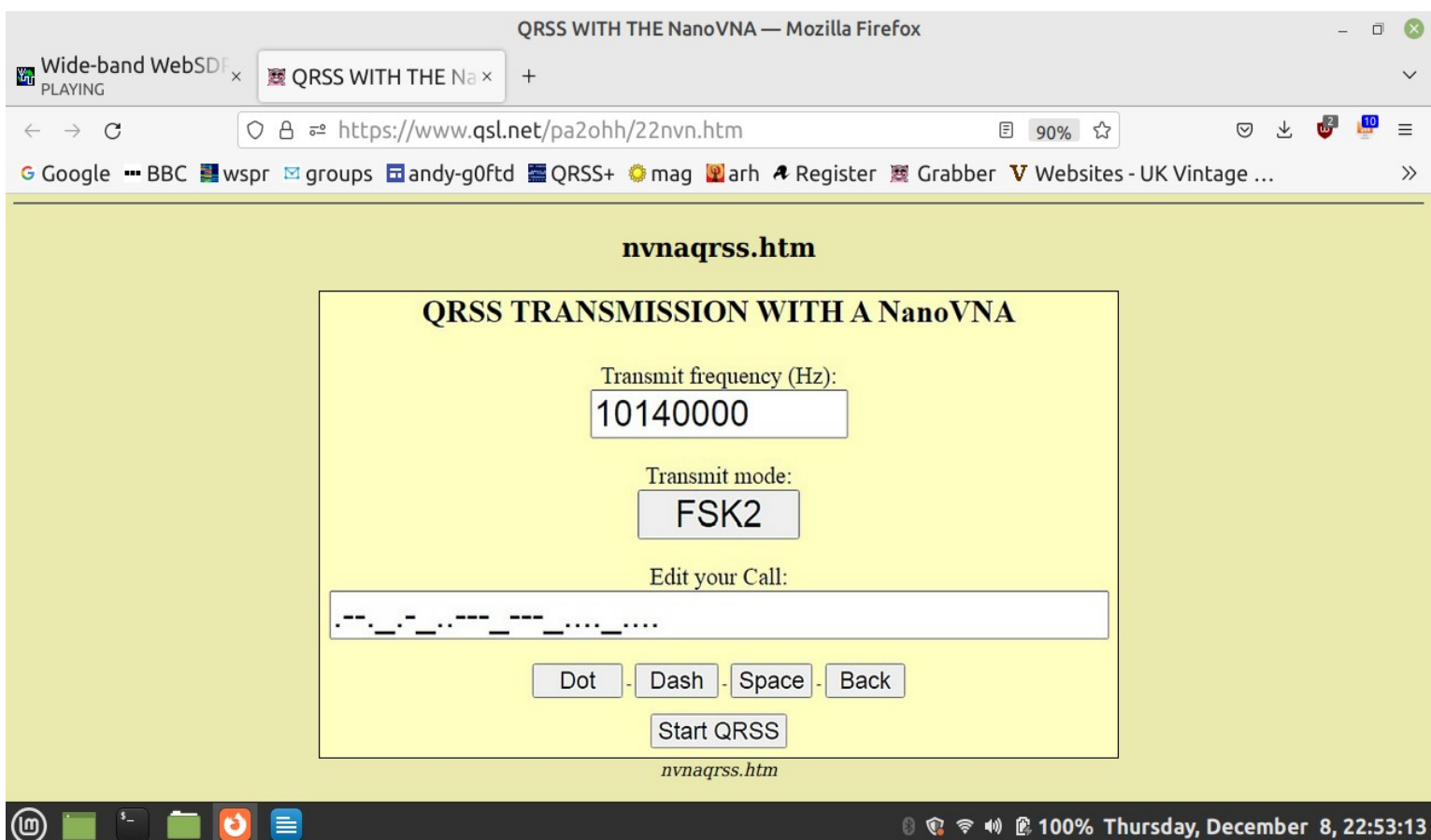
Connect the audio input of your PC, Tablet PC or Smartphone to your SSB receiver. Tune the receiver to 1 kHz below the QRSS band (10139.800 kHz for 30 meter), click a link in your web browser (Chrome or Firefox etc.) to -litopo1.htm-. Play a little with the sensitivity level and the QRSS signals will be displayed on your screen! No extra software required, only the standard functions of your web browser software are used. Modern web browsers have audio processing software like a simple spectrum analyser functionality that is used here. Sensitivity levels, level ranges, smoothing are all settings of this spectrum analyser functionality of the web browser.

I have used it successfully on my Android cell phone, and desktop Firefox. It is necessary to ensure that you give your browser permission to use the sound input or microphone. I often find that I need quite a high gain for it to work too. It's easy to incorporate LiToPo as a simple webpage on any website. Or you can just save the page to disk and open it up yourself, no need for any internet connection. Try it - <https://www.qsl.net/pa2ohh/21li.htm>

Another project allows the use of a Nano VNA to become a QRSS transmitter. The Nano VNA's typically put out about 10mw. This is a perfect drive level for a simple BS170 RF amp. The Nano VNA's feature a small terminal mode, and you can send commands to it. You can obviously vary the frequency to make QRSS, or a sweep generator (useful for testing filters) etc. You can download the simple HTML files and run them locally from your disk.

Onno's main page is here <https://www.qsl.net/pa2ohh/22nvn.htm>

There are also backups in the Knights FILES area: <https://groups.io/g/qrssknights/files>



The screenshot shows a Mozilla Firefox browser window displaying the webpage 'nvnaqrss.htm'. The browser's address bar shows the URL 'https://www.qsl.net/pa2ohh/22nvn.htm'. The webpage content is as follows:

**nvnaqrss.htm**

**QRSS TRANSMISSION WITH A NanoVNA**

Transmit frequency (Hz):

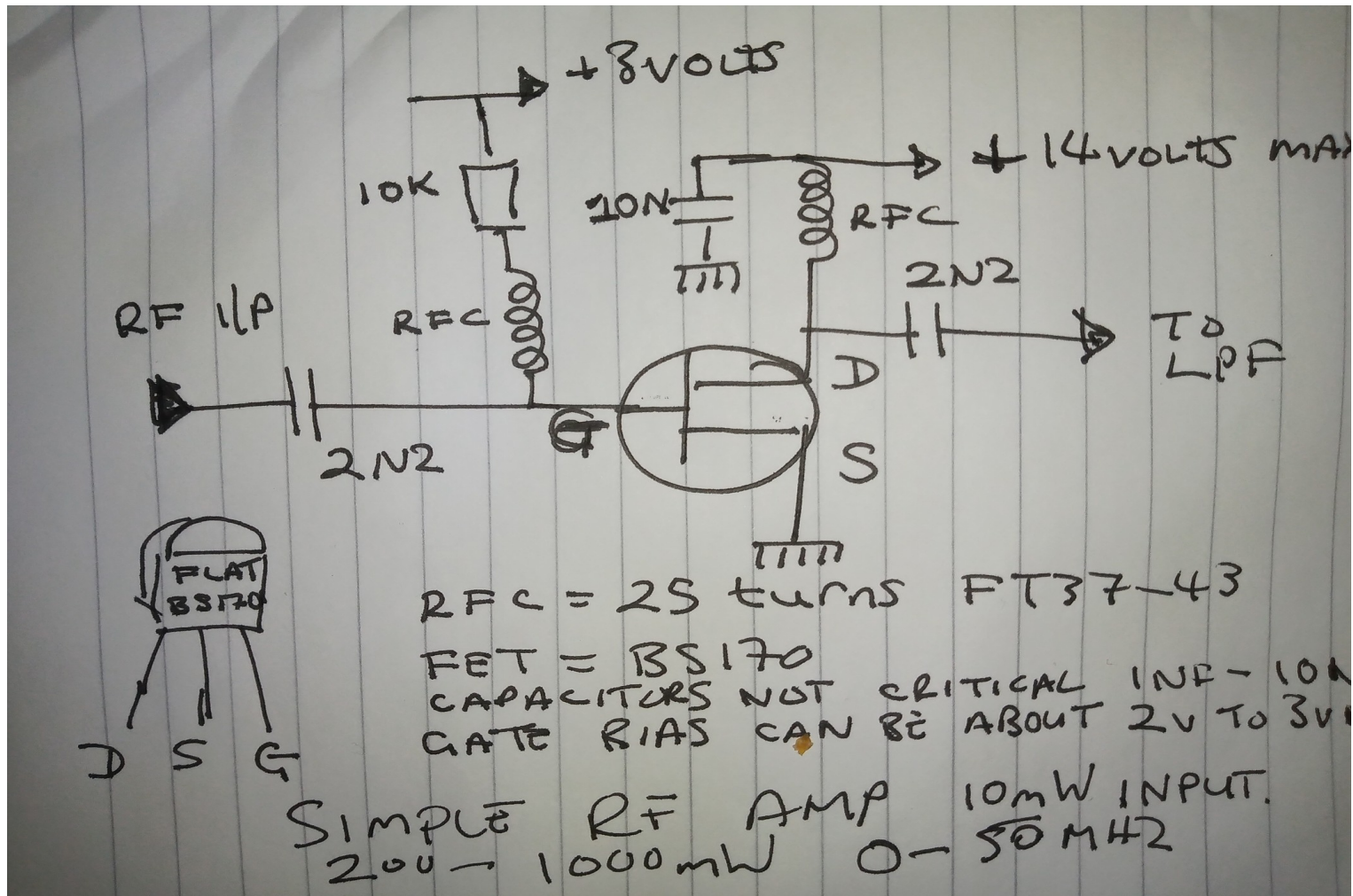
Transmit mode:

Edit your Call:

*nvnaqrss.htm*

# A generic RF amplifier for QRSS.

There are many ways to generate a QRSS signal, or a QRP CW signal. In the previous article a Nano VNA was used, which will typically produce an RF output of 10mw maximum up to about 30Mhz or more. A suitable RF amplifier is reproduced below.



We start off with nothing more than a single [BS170 FET](#). Typical cost is about £/\$/Euro 0.30. Very cheap. We feed it via a capacitor. That capacitor is nothing special. Just so long as the reactive impedance is low at the frequency operation. For typical amateur HF operation we can assume anything from about 4n7 to 1000pF as useful. Now we need to ensure that for the most linear operation we add a little bias to the Gate to turn it on and allow for any swing in the driving signal. 2 to 3 volts max is all you will really need. Not too much or you will break the BS170 ! Never ever exceed 3 volts. This is the maximum Gate voltage in the spec sheet.

Now we need to make sure that any RF input and RF output does NOT escape through any DC feed lines. We can use a simple RF choke on the DC feed to the Drain. The RF Choke should always have a high impedance to the RF output impedance, by about 4 or 5x of inductive reactance. The same with the Gate choke, but we can also add an extra resistor to increase the effect, which is NOT frequency selective too. If you study vintage radio then you often see such a choke wound on a 10-100K carbon resistor. Avoid cheap RF chokes on Ebay that look like resistors. The ferrite in them saturates with low current.



## A generic RF amplifier for QRSS.

RF choke arrangements must ALWAYS be mounted as close to the FET (or any other device) as possible. 10 mm is a good starting point. You never want long lead lengths that can radiate. The amplifier described will typically produce about 200mw at 50MHz and about 1 watt at 1.8MHz. You should always use good RF construction practice. Keep all leads short and mount components as close together as you can.

There are also other useful tricks that you can use when amplifying basic QRP circuits. One of those tricks is to add a small attenuator between the oscillator or drive source and the power amplifier.

This can be between 1-3db. Or you can insert maybe a 200-400 Ohm series resistor between the oscillator and the PA, or a lower value coupling capacitor. **WHY ?**

The reason is that OVER COUPLING can produce frequency pulling (chirp), and we by reducing that coupling we therefore reduce that frequency pulling. When an oscillator or drive source see's a varying or vastly different impedance from it's own output impedance it causes issues, and we want to keep that transfer impedance as stable as we can.

Experimentation is required. A 2.2 Nano Farad might be OK at 1.8MHz, but at 28Mhz you might want to couple via a 47pF capacitor instead in order to under couple the oscillator from the power amp. Also some RF designs use a zero gain buffer amplifier between the oscillator and power amplifier to reduce chirp / frequency pulling.

**Wanna do a test ?** Set up your QRSS rig and monitor it on a receiver using a spectrogram monitor. Argo, Spectrum Lab or QRSS grabber software. Now as you are transmitting start messing about with your ATU and watch your TX frequency wobble. Proof that the load coupling effects your oscillator frequency.



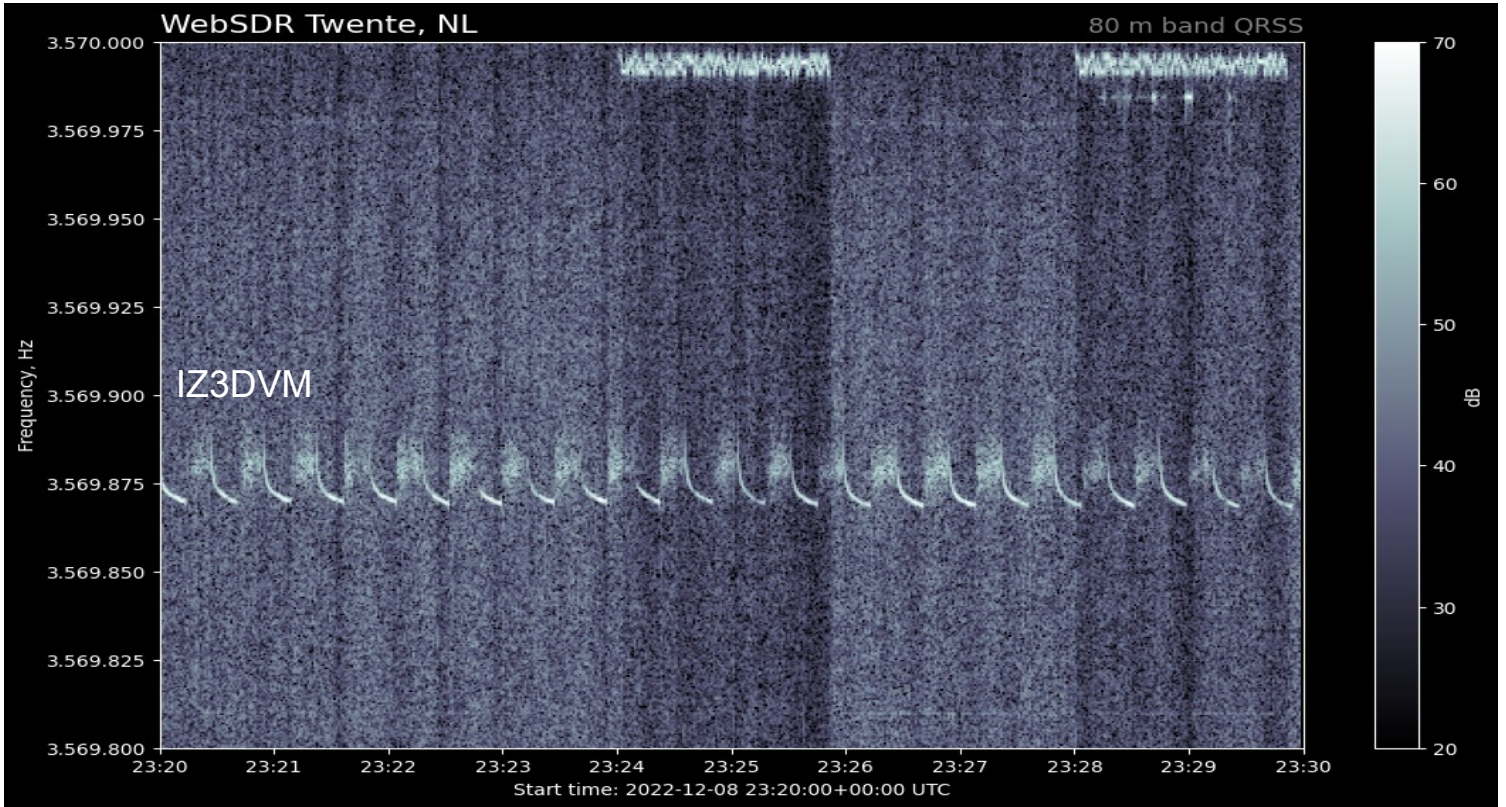
An example of frequency pulling caused by over coupled interstage coupling, a bad PSU or an mismatched antenna system. A mismatch causes heat in the power amp, that slowly changes the internal transfer impedance and ends up as frequency pulling.

**Other operating notes:** The output impedance of BS170 amplifier is typically about 10 Ohms, and suitable for feeding directly into a 50 Ohm low pass filter (some variation may be noted across the frequency range). At lower frequencies the amplifier is more efficient and produces less heat. You could use about 14 volts maximum at maybe 160-40m bands (gives about 1 watt output). At the 10m band you may wish to drop the voltage to 9-10 volts maximum) Do not exceed 600mw RF output at 10m whatsoever unless driving a perfect 50 Ohm load. Heat is the biggest killer with any device.

Did you know that a typical semiconductor device in the real world is best kept to about 25 to 45 degrees Centigrade before it needs to be de-rated ? And the human body is a convenient piece of test gear, because we feel pain at about this temperature. If you can keep your finger on a device without feeling pain, then the semiconductor is being operated safely.

Have you seen?

Keen grabber watchers may have seen what looks like an odd signal on 80m. It is in fact a CW beacon from IZ3DVM. No other details are known. But I have identified it audibly via the Twente SDR. It has some drift and chirp as seen in the grabs.

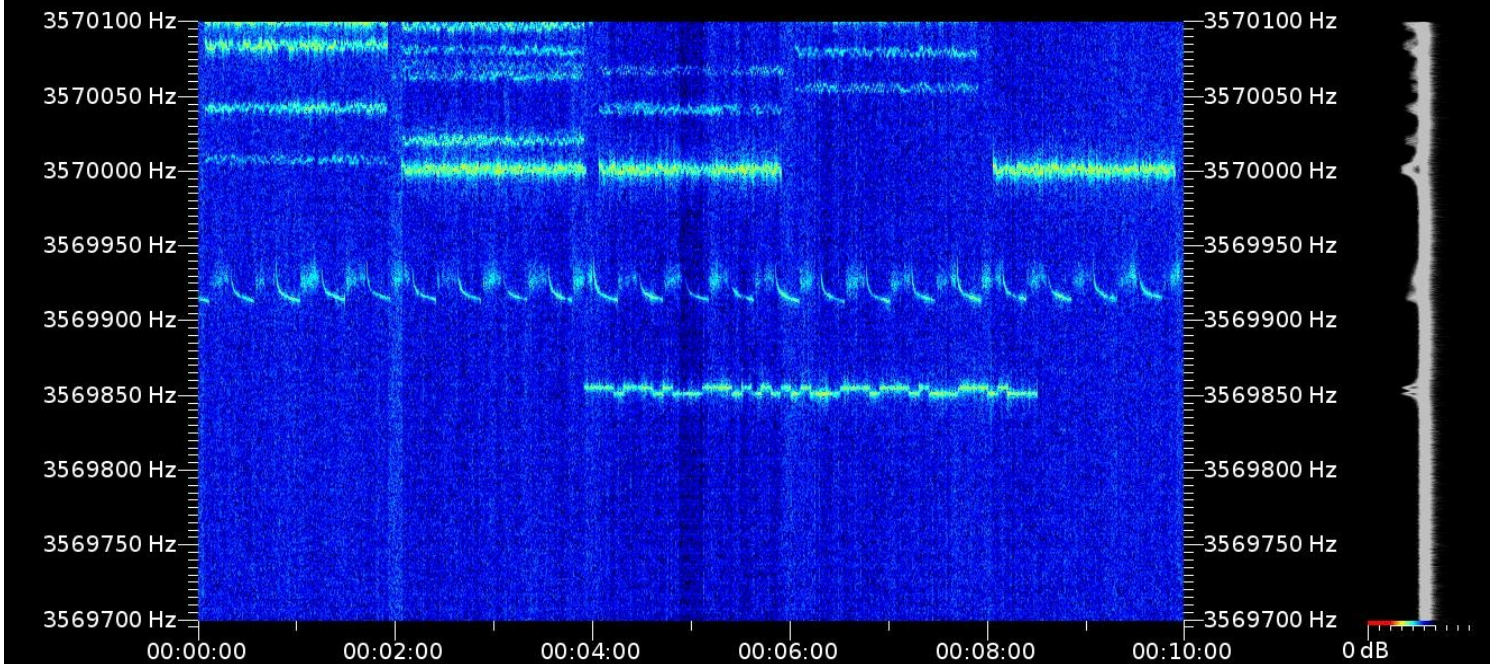


## 80m QRSS RX via Norway

QrssPiG v0.6.1

Frame start 2022-12-10T00:00:00Z Running since: 2022-12-09T21:48:32Z

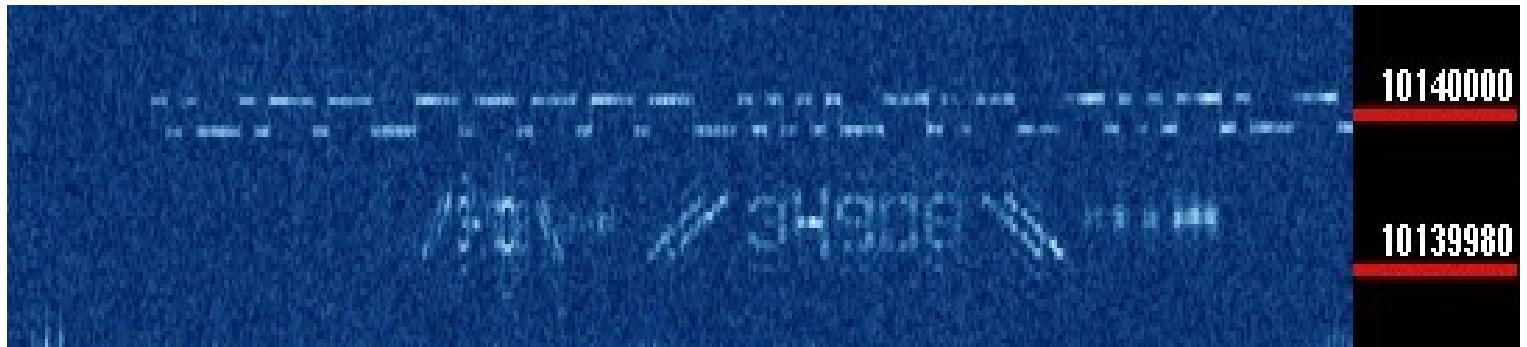
Input type: Alsa Base frequency: 3568400 Hz Input sample rate: 48000 S/s  
Processing sample rate: 48000 S/s FFT size: 65536 FFT overlap: 32768 Time res: 0.682667 s/px Freq res: 0.732422 Hz/px



А Б В Г Д Е Ж З И Й К  
 Л М Н О П Р С Т У Ф  
 Х Ц Ч Ш Щ Ъ Ы Ь Ъ Я  
 Ю Я Ж Й А И Ъ П С

# The Cyrillic Oddity

Here's a quick report about a strange Cyrillic font Slow Hell signal received on the 10Mhz band this year. Nothing else is known about it. The signal reads 34808. In Cyrillic this could be Z-Ch-808, or is it Three-Ch-Eight-Zero-Eight. The first character that looks like the number Three could actually be the Cyrillic letter Z, or Zed. Was it someone messing about or a real message. A simple guide to the Russian Cyrillic alphabet is shown below.



А а	a as in father	К к	k as in class	Х х	h as in loch
Б б	b as in but	Л л	l as in love	Ц ц	ts as in its
В в	v as in van	М м	m as mother	Ч ч	ch as in chess
Г г	g as in get	Н н	n as in name	Ш ш	sh as in fish
Д д	d as in dress	О о	o as in bottle	Щ щ	shsh in fresh chat
Е е	ye as in yesterday	П п	p as in paper	Ъ ъ	"hard sign"
Ё ё	yo as in yonder	Р р	r as in error	Ы ы	i as in bill
Ж ж	zh as in measure	С с	s as in smile	Ь ь	"soft sign"
З з	z as in zoo	Т т	t as in ten	Э э	e as in bet
И и	ee as in meet	У у	u as in cool	Ю ю	yu in Yugoslavia
Й й	y as in toy	Ф ф	f as in farm	Я я	ya as in yard



## SPOTLIGHT ON THE KNIGHT - G6GN

The Knights Intelligence Agency has been active this year trying to track down Mike G6GN (one of the bigger signals on the bands). We know he uses a QRP Labs rig and a 2N3866 PA stage, good to 144Mhz I believe. The KIA have obtained a photo of the original G6GN from the 1920's, and of baby G6GN in 1955 who inherited his fathers callsign. You sure can see the likeness of G6GN Junior to his father in the field day pic.

The original G6GN circa 1920's.



In the UK, callsigns are not traditionally recycled, but may be passed on to family members with permission from OFCOM (the current UK regulator).

G6GN discovered QRSS whilst searching the internet for WSPR related stuff and came across QRSS in 2016, which he felt had a more gentlemanly appeal to it, and has been with it ever since.

Mike is active from 160m – 10m, both on WSPR and QRSS, as well as occasionally doing some grabbing.

The grabs are saved locally to disk and then posted to the Knights forum if he sees anything interesting. So there you have it, almost 100 years of family radio history.





## Useful Notes

During the course of this year, the great semiconductor shortages have been well noted and even the humble and very popular [BS170](#) FET's have been difficult to source. Yes folks, a \$0.20 part has had much discussion with regards to sourcing it. It's a very popular device used in many a QRSS and WSPR output stage.

Attention has been drawn to using the [BS270](#) instead, so investigations commenced. The BS270 comes in a slightly different package to the BS170 and allows for easier heatsinking. However it's power dissipation is lower. 620mw compared to 830mw for the original BS170. And that can make a big difference to running into a mismatched load, as I have frequently discovered. Maximum Drain current 400ma for a BS270 and 500ma for the BS170. Other operating parameters appear to be the same.

So at a push, you could get away with a BS270, but under extreme conditions it is more likely to fail, so be warned. Personally I stick with BS170's wherever possible.

With regards to power dissipation stated in manufacturers datasheets, I have also shown that the spec sheet that shows an 830mw dissipation is rather conservative (in the case of a BS170), it's more like 2400mw absolute max, ASSUMING that this is into a matched load. Remember that this is the DC input, and RF output will vary across the frequency spectrum. You must add the reflected power to the dissipation figure. For example if you're putting 1 watt of DC power in to the device, but have an RF reflected power of 500mw due to a bad SWR then you are using the device at 1.5w ! And never allow a device to be hotter than what your finger tip will allow you to touch for a long time without causing a blister.

Regarding semiconductor shortages. Well there still seems to be many IC's in short supply, but the humble BS170 is unlikely to see too many problems, although some retailers are occasionally quoting long lead times and slightly higher prices.

Do not be tempted to purchase bags of cheap BS170's on Ebay etc, as they are often fakes. I find it incredible that such a basic part is faked but it's true.

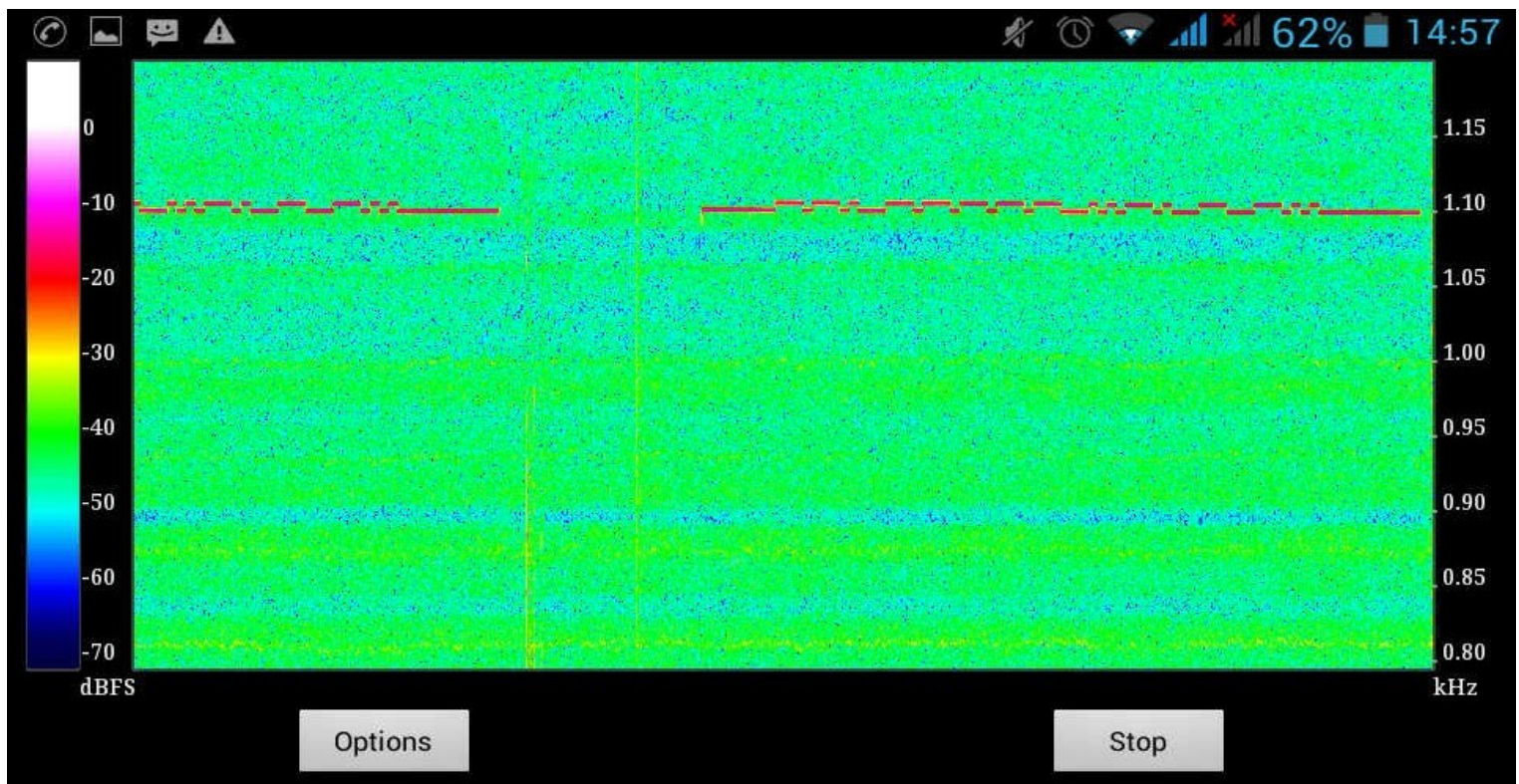
The sellers appear to think that 2N7000's and BS170's are the same, and often mark the device case of a 2N7000 with that of a BS170. The result is that you end up with a bag of mislabelled 2N7000's. (I got caught out by this).

However, once you get your money back you can at least use those 2N7000's as a PA stage, so long as you insert them in 180 degrees reversed, e.g. BACKWARDS. If you don't then you will see your PSU current meter go hard to the right hand side as it will appear as a short circuit.

Power output of a [2N7000](#) (power dissipation = 400mw and max Drain current = 200ma) will be lower than that of a BS170, but still useful especially if you have used a socket arrangement and need to get back on the air whilst waiting for some real BS170's to arrive.

## Viewing QRSS on an Android cellphone.

A simple alpha version quality Android grabber for a mobile phone can be downloaded [here](#). It cannot upload grabs, it is just a simple viewer with no options. But handy to use if portable or just testing. It is assumed that you understand how to install Android applications that are not via the Google Play store (this app never was, it was for test only). This method is often referred to as side loading. I have tested it on Android 4.4 and Android 9 and it works ok. Using the inbuilt microphone is very sensitive. Using the mic / headphone socket can reduce the noise on the grab if connected with care. But then for test purposes it's not really worth it. You can save a grab by holding the power key on your Android 9 system, but this may vary according to OS version and manufacturer. Thanks to GJ7RWT for bringing this to my attention.



An alternative link can be found at G0FTD's QSL.NET website too. <https://qsl.net/g0ftd/other/android/>

The app cannot upload grabs, but it is useful for a quick and dirty monitoring of QRSS signals. Simply tune 1Khz below the centre of the QRSS bands to achieve an audio offset and away you go.

For example, you set your rig to 10,139,100Mhz USB and place your cellphone near the speaker then you should start to see QRSS signals. Each cellphone and it's inbuilt microphone will exhibit a few oddities in it's frequency response, so you may see some "audio banding" on the grabs. This may require some experimentation with your USB settings. USB being the receive mode of course, and doesn't refer to computer communications protocol. Click the links in [BLUE](#) to download.

**Angle of radiation versus hop distance.  
Two useful charts.**

**F-layer angle of radiation vs distance**

<b>Degrees</b>	<b>Miles per hop</b>	<b>Km per hop</b>
0	2485.2	4000
5	1863.9	3000
10	1304.73	2100
15	1087.275	1750
20	931.95	1500
25	776.625	1250
35	497.04	800
45	372.78	600
55	248.52	400
65	170.8575	275
70	124.26	200
80	62.13	100
85	31.065	50
90	12.426	20

**E layer angle of radiation vs distance**

<b>Degrees</b>	<b>Miles per hop</b>	<b>Km per hop</b>
0	1273.665	2050
5	931.95	1500
10	621.3	1000
15	385.206	620
20	310.65	500
25	248.52	400
35	173.964	280
45	124.26	200
55	99.408	160
65	62.13	100
75	31.065	50
80	18.639	30
85	12.426	20
90	3.1065	5



## The LA5G0A grabber

It was in February 2011 that I started with QRSS TX activity after a lecture in the club by LA9BEA (SK) and the great joy when I got the signal through to W4HBK and when he made me aware that my signal was picked up in Tasmania.

It was only in connection with a longer round of hospital stays that I started the 30m band grabber activity in the Autumn of 2011. It's a miracle that the PC, RX and antenna have survived so far with lightning strikes and hurricanes.

At the time of writing, the receiver has developed a problem (it has given many years of trouble free service), and this will hopefully be corrected in due course.

There aren't that many components, so I suspect oscillation in the power regulator that is causing the "blanket snow" on the grabs. [Repaired 25<sup>th</sup> December 2022]



I am located in Visnes on Karmoy in the south of Norway. The RX is a Direct Conversion receiver based on PA2OHH design description (referenced in previous 74!) with personal adjustments.

**74 and Seasons greetings de LA5G0A**



# Adding WSPR spots to a Kiwi RX based grabber using PyRecorder. (John K5MO)

Running a 24/7 QRSS/WSPR monitor can be fun. It can also be a source of great frustration, given the challenges of maintaining all the elements of a monitoring system. This is true especially if not a Linux guru or if you don't want to leave a semi-reliable Windows box sucking up watts all day long. The WSPRdaemon package in combination with your favourite QRSS decoder provides an interesting, reliable alternative for grabber operators.

WSPRdaemon is a Linux package created/maintained by Rob Robinette (K9OJ) and available via Github. Here's a description from the repository:

*"A Debian/Raspberry Pi [WSPR](#) decoding and noise level graphing service".*

*This is a large bash script which utilizes [kiwirecorder.py](#) and other library and utility commands to record WSPR spots from one or more [Kiwis](#), audio adapters and (for VHF/UHF) [RTL-SDRs](#) and reliably post them to [wsprnet.org](#).*

*Schedules can be configured to switch between bands at different hours of the day, or at sunrise/sunset-relative times. Signals obtained from multiple receivers on the same band ( e.g a 40M vertical and 500' Beverage ) can be merged together with only the best SNR posted to [wsprnet.org](#).*

*In addition WD can be configured to, at the same time, create graphs of the background noise level for display on the computer running WD and/or at [graphs.wsprnet.org](#).*

*WD can run on almost any Debian Linux system and is tested on Stretch and Buster for Raspberry Pi 3 and 4, and Ubuntu 18.04LTS on x86. A Pi 3b can decode 14+ bands; a Pi 4 can decode 30+ bands."*

Being mostly interested in QRSS grabs, the real utility is that WSPRdaemon integrates audio control, KiwiSDR radio control and scheduling all in a handy BASH wrapper.

## Hardware:

In my case, I'm using a 2GB Pi 4 (because that was what was handy) and a highly unsophisticated \$2 brand less USB sound card. These were recommended to me by Andy, G0FTD and work great! I am connecting wirelessly to one of my KiwiSDR's but one could just as easily connect to any online Kiwi that allows for extended connections. I'm running Bullseye (Debian 11) on my Pi (more about this later). I have a short USB cable looping soundcard output back to input.

It makes for a very tidy system configuration.

## Adding WSPR spots to a Kiwi RX based grabber using PyRecorder. (John K5MO)

This system has never locked up or crashed in the 6 months I've run it , with one big exception. There was apparently a memory leak in BASH in Bullseye that drained the Pi of RAM. This forced a reboot every 10 days here. It's a problem that has been fixed and a new release of WSPRdaemon has addressed that (though I've just learned of this and have not patched my system yet).

There's a ton of information on GitHub, the WSPRdaemon web page, and the WSPRdaemon groups.io forum that can provide support, documentation and build instructions. I am such a Linux novice that in the interest of accuracy I'll point interested readers towards those resources for detailed instructions on how to install the software and how to edit the configuration files. As with all of my Linux experiments, I quickly reach a point where I swear I'll never mess with this stuff again, but thanks to the support mentioned, this didn't take much to get going.

There's a lot of good info there and with a little help I was able to get it to run. The fussy parts are as always, poking at config's in both the software and the Pi's sound card management software. I'll certainly share details about my installation should anyone need help along the way, but I suspect most of the Knights are more competent with Linux than I am and won't need it.

In addition to the stability of this system, launching it is straightforward. I created a Bash file to integrate the required commands to start a QRSSpig QRSS monitor on 22M and launch 3 band WSPR decoding with this short file:

The K5MO system - Pi4 with USB Soundcard / loopback and Power Cable.



This system has never locked up or crashed in the 6 months I've run it , with one big exception. There was apparently a memory leak in BASH in Bullseye that drained the Pi of RAM. This forced a reboot every 10 days here. It's a problem that has been fixed and a new release of WSPRdaemon has addressed that (though I've just learned of this and have not patched my system yet).

## Adding WSPR spots to a Kiwi RX based grabber using PyRecorder. (John K5MO)

There's a ton of information on GitHub, the WSPRdaemon web page, and the WSPRdaemon groups.io forum that can provide support, documentation and build instructions. I am such a Linux novice that in the interest of accuracy I'll point interested readers towards those resources for detailed instructions on how to install the software and how to edit the configuration files. As with all of my Linux experiments, I quickly reach a point where I swear I'll never mess with this stuff again, but thanks to the support mentioned, this didn't take much to get going.

There's a lot of good info there and with a little help I was able to get it to run. The fussy parts are as always, poking at config's in both the software and the Pi's sound card management software. I'll certainly share details about my installation should anyone need help along the way, but I suspect most of the Knights are more competent with Linux than I am and won't need it.

In addition to the stability of this system, launching it is straightforward. I created a Bash file called `joblaunch2.sh` to integrate the required commands to start a QRSSpig QRSS monitor on 22M and launch 3 band WSPR decoding with this short file (use your own Kiwi RX url!):

```
#!/bin/bash
python3 ~/kiwiclent/kiwi_nc.py -u local -s your-kiwi-url -p 8073 -m usb -f 13553.9 | aplay -c 1 -r 12000 -f S16 -Dplug:default &
sleep 20
qrsspig -c ~/qrsspig-master/qrsspig22Mconfig.yaml &
sleep 20
~/wsprdaemon/wsprdaemon.sh -a &
exit 0
```

Entering the command **bash joblaunch2.sh** at the Linux prompt in the Pi gets everything running.

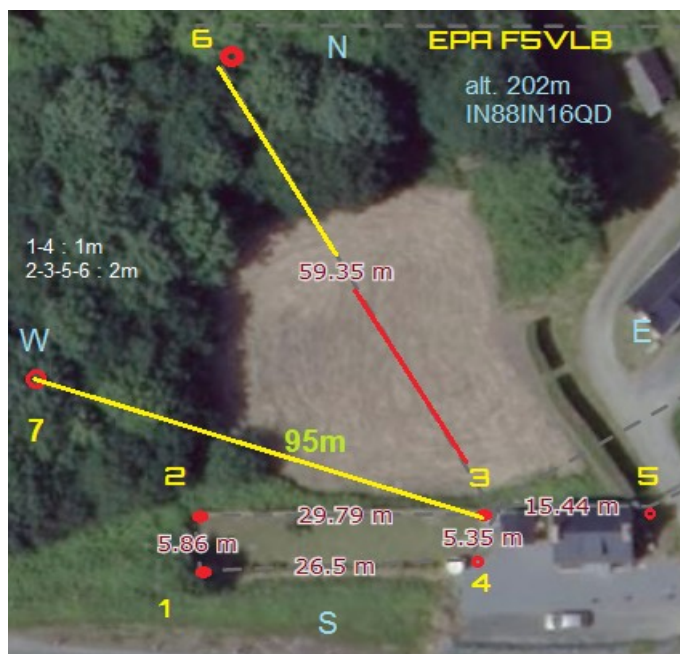
- \* The Python command gets the Kiwi configured
- \* The call to `qrsspig` launches the QRSS stream using the normal 'Pig config file
- \* The last command runs the WSPR decoder (configured via the WSPRdaemon config file to monitor 3 bands and push the output to WSPRnet) via connection to a Kiwi.

While I still use hardware radios for QRSS monitoring at times, this system in conjunction with any networked Kiwi SDR, has proven to provide a very robust, headless and power efficient multi-mode monitoring system. With the patch now being available to address the memory leak, and with the reliability of the Kiwi SDRs, I am sure this system will run unattended for months. The support for the WSPRdaemon software is exceptionally good and the mailing list is quite active with frequent participation of Rob. Due to parts shortages the Kiwi receivers will soon be out of stock so now is a good time to get one before they are all gone. 73 de John

# GOING UNDERGROUND

## Earth Antenna Experiments by Jean F5VLB

My antenna and the cables are underground. I 'planted' two rods of 2m long, separated by 95m and oriented 285°. They are connected to my TX via th ATU and a cat5 cable. This is a four pairs cable, each pair is encapsulated into an aluminium foil. The four pairs are under a shield made of copper braid. The cable is inserted into a pvc pipe. It has been measured that cable is not radiating. This means that the RF is radiated by the earth only and never by the wire that connects the ground rods. More on my FB group - <https://www.facebook.com/groups/earthprobes> The point is that the wires connecting the rods do not radiate, only the rods and the earth radiate. [This is key to understanding the project.] This type of antenna is not my invention... It was used one century ago for military transmissions. The power into the EPA (earth probes antenna) is about 300mW for the moment. I use this power with my wspr module and it works. But I can push to about 1W.



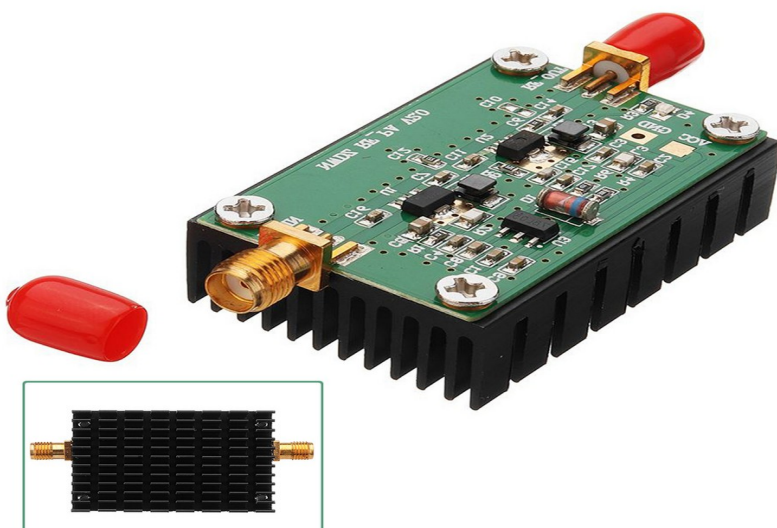
I have 9 stakes of 2m in the ground, both connected to a marshalling box from which I can select two of them as an underground dipole.

Cables are cat 5 cables, armoured, 40cm underground.

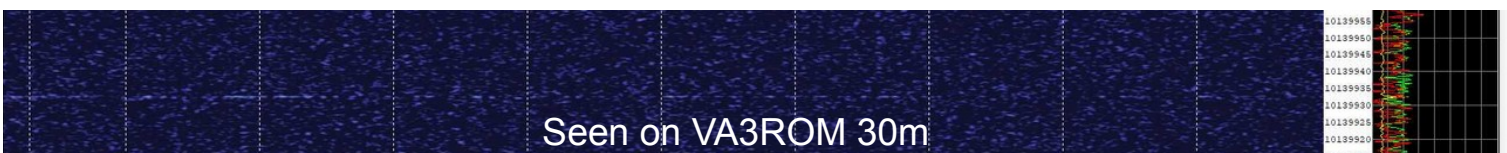
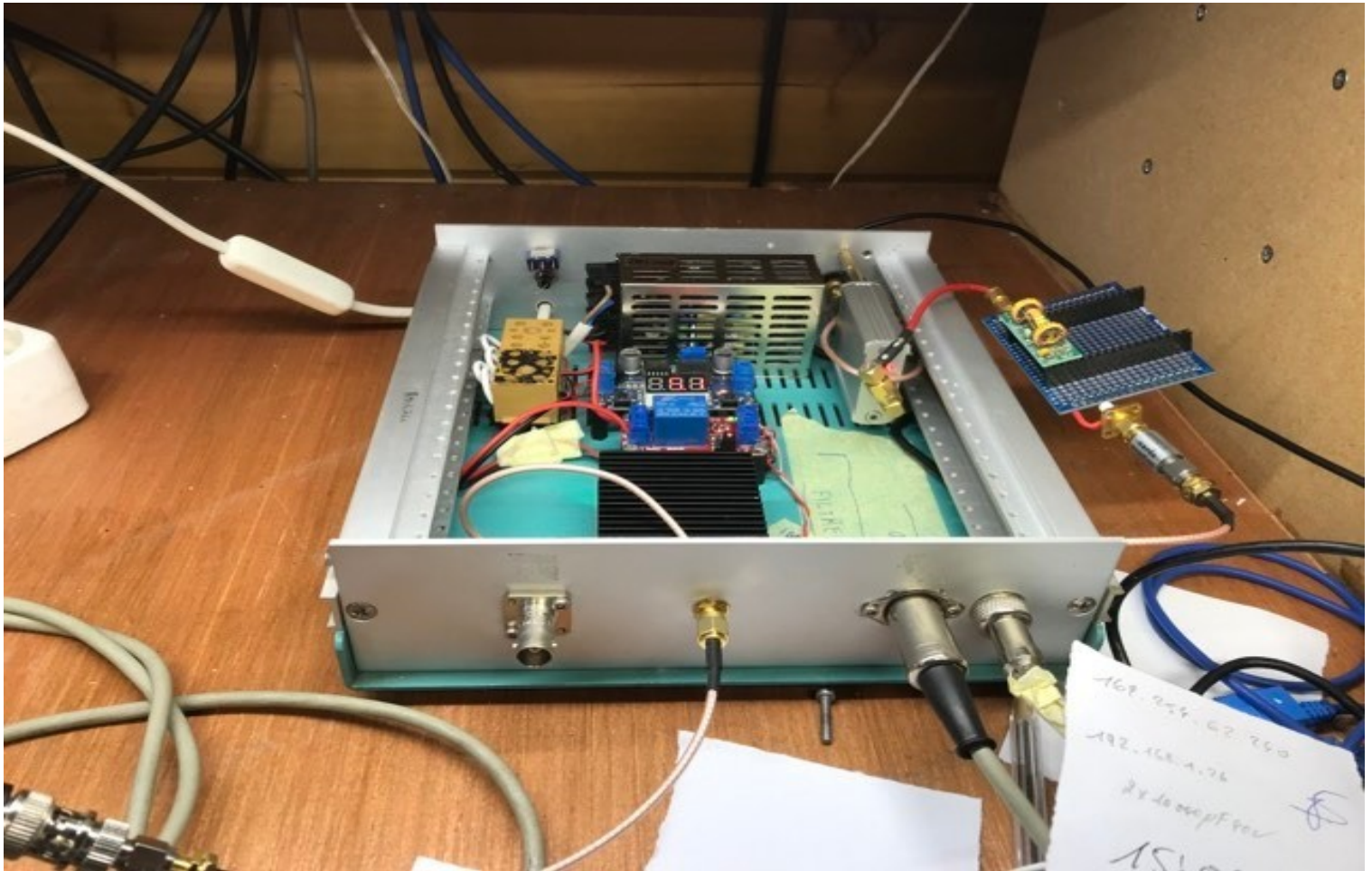
For this test on QRSS I use the 3-7 dipole oriented 285° to reach center of USA.

The RF generator is a GPS locked oscillator from [Leo Bodnar](#) which can run from 800Hz – 800Mhz to a small Ebay [RF amp](#). It is keyed for QRSS using software from -

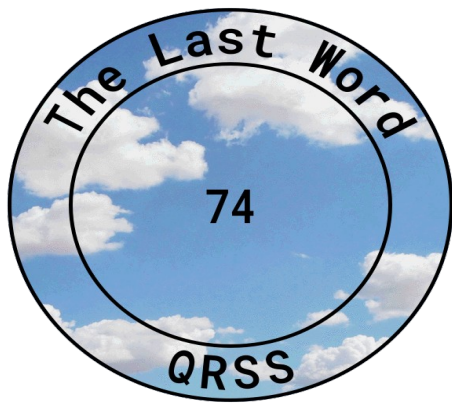
<https://www.qsl.net/on7yd/zip/qrs414.zip>



All of this is assembled into an enclosure with PSU, LPF and a keyer relay for the Leo Bodnar GPS disciplined oscillator.



Normally Earth probe antennas are best at lower frequencies, but it is fun to try them at higher bands. I am now testing a ferrite rod antenna on 40m for my next experiment.



So here we are at the end of 2022. As noted earlier, we are still only ONE year in to the new solar cycle and yet we have seen a massive change in activity and how the ionosphere has changed for the better.

The strange thing is how F2 layer propagation has improved but the Sporadic E situation was TOTALLY different. Previous studies have tended to show that Sporadic E remains almost consistent regardless of what point we are in the solar cycle, but this time it's been different, why ?

It seems that despite the popular view that we have understood the ionosphere from decades of observations, we are still discovering oddities. Radio science is not yet complete !

One thing that has become apparent to me is that good propagation depends upon consistently high sunspot activity. In other words, just because you see one day of good sunspot numbers does NOT mean that propagation is instantly enhanced. Be careful when interpreting all those solar indices.

This year has not been an easy one for myself and many others. A change of QTH meant that several QRSS projects that I hope to publish had to be shelved. Maybe next year ?

But I still continue to be amazed at how our QRSS community keeps on going, and all the amazing friendships that develop from it. Personally I have never experienced so many emails and cellphone text messages in all my life (hard to keep up). And despite the fact that I don't rate my presentation skills, there's folks out there printing 74! for their shack collections, and apparently drawing inspiration from my VERY feeble efforts.

I have been surprised that this year for the first time that the [group live chat box](#) has been used too. Worth bearing in mind if you feel at a loose end.

Please remember that the Knights group is aimed at those using a web browser in order to experience all the features, rather than just subscribing to the email service. This way you get access to all the chat groups, file download areas, Wiki pages etc. Be sure to log in [here](#).

As noted by John K5MO, the Kiwi receivers are about to become out of stock, another victim of the global semiconductor shortages. The world has changed and we can no longer rely upon assuming that we're going to always be able to buy components and parts from one day to the next. We MUST grab what we can now before it's too late. Be prepared, spend some cash and protect your hobby before it's too late. **Create your own world, or live by another mans!**

**74 de Andy GOFTD**



The sun sets on solar cycle 24 - and good riddance to it.

2<sup>nd</sup> edition 27 Dec 2022 74! is a Punkbiscuit production.