An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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In This Issue

Dave G8GKQ video received by Neil G4LDR on 6cm

Chris G0FDZ 241 / 122GHz transmitter

UK Microwave Group

Subscription Information

The following subscription rates apply.

UK £6.00 US $12.00 Europe €10.00

This basic sum is for **UKuG membership**. For this you receive Scatterpoint for **FREE** by electronic means (now internet only) via

https://groups.io/g/Scatterpoint and/or Dropbox. Also, **free access to the Chip Bank**

Please make sure that you pay the stated amounts when you renew your subs next time. If the amount is not correct your subs will be allocated on a pro-rata basis and you could miss out on a newsletter or two!

You will have to make a quick check with the membership secretary if you have forgotten the renewal date. Please try to renew in good time so that continuity of newsletter issues is maintained. Put a **renewal date reminder** somewhere prominent in your shack.

Please also note the payment methods and be meticulous with PayPal and cheque details.

PLEASE QUOTE YOUR CALLSIGN!

Payment can be made by: PayPal to

ukug@microwavers.org

or a cheque (drawn on a UK bank) payable to 'UK Microwave Group' and sent to the membership secretary (or, as a last resort, by cash sent to the Treasurer!)

Articles for Scatterpoint

News, views and articles for this newsletter are always welcome.

Please send them to

editor@microwavers.org

The CLOSING date is

the FIRST day of the month

if you want your material to be published in the next issue.

Please submit your articles in any of the following formats:

Text: txt, rtf, rtfd, doc, docx, odt, Pages

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

I can extract text and pictures from pdf files but tables can be a bit of a problem so please send these as separate files in one of the above formats.

Thank you for you co-operation.

Roger G8CUB

Reproducing articles from Scatterpoint

If you plan to reproduce an article exactly as in Scatterpoint then please contact the Editor – otherwise you need to seek permission from the original source/author.

UKµG Project support

The UK Microwave Group is pleased to encourage and support microwave projects such as Beacons, Synthesiser development, etc. Collectively UKuG has a considerable pool of knowledge and experience available, and now we can financially support worthy projects to a modest degree.

Note that this is essentially a small scale grant scheme, based on 'cash-on-results'. We are unable to provide ongoing financial support for running costs – it is important that such issues are understood at the early stages along with site clearances/licensing, etc.

The application form has a number of guidance tips on it – or just ask us if in doubt! In summary:-

- Please apply in advance of your project
- We effectively reimburse costs - cash on results (eg Beacon on air)
- We regret we are unable to support running costs

Application forms below should be submitted to the UKuG Secretary, after which they are reviewed/ agreed by the committee

www.microwavers.org/proj-support.htm

UKµG Technical support

One of the great things about our hobby is the idea that we give our time freely to help and encourage others, and within the UKuG there are a number of people who are prepared to (within sensible limits!) share their knowledge and, what is more important, test equipment. Our friends in America refer to such amateurs as “Elmers” but that term tends to remind me too much of that rather bumbling nemesis of Bugs Bunny, Elmer Fudd, so let’s call them Tech Support volunteers.

While this is described as a “service to members” it is not a “right of membership!”

Please understand that you, as a user of this service, must expect to fit in with the timetable and lives of the volunteers. Without a doubt, the best way to make people withdraw the service is to hassle them and complain if they cannot fit in with YOUR timetable!

Please remember that a service like our support people can provide would cost lots of money per hour professionally and it’s costing you nothing and will probably include tea and biscuits!

If anyone would like to step forward and volunteer, especially in the regions where we have no representative, please email john@g4bao.com

The current list is available at

www.microwavers.org/tech-support.htm

UKµG Chip Bank – A free service for members

By Mike Scott, G3LYP

Non-members can join the UKµG by following the non-members link on the same page and members will be able to email Mike with requests for components. All will be subject to availability, and a listing of components on the site will not be a guarantee of availability of that component.

The service is run as a free benefit to all members of the UK Microwave Group. The service may be withdrawn at the discretion of the committee if abused. Such as reselling of components.

There is an order form on the website with an address label which will make processing the orders slightly easier.

Minimum quantity of small components is 10.

These will be sent out in a small jiffy back using a second class large letter stamp. The group is currently covering this cost.

As many components are from unknown sources. It is suggested values are checked before they are used in construction. The UKµG can have no responsibility in this respect.

The catalogue is on the UKµG web site at
www. microwavers. org/chipbank. htm

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Loan Equipment

Don't forget, UKuG has loan kit in the form of portable transceivers available to members for use on the following bands: **Contact John G4BAO for more information**

5.7GHz 10GHz 24GHz 47GHz 76GHz

Chairman's Notes

I hope you are all well and coping with the current COVID-19 lockdown.
On April 19th the UKuG should have been holding the AGM at the Martlesham Round Table but it will have to be delayed until later in the year. If we can't hold a physical meeting at a suitable event this year then the committee may decide to hold it on-line using one of the video conferencing applications. We will keep you posted. I would like to thank the members of the Martlesham Radio Society for the work they have done in organising our most popular round table of the year and it must be disappointing for them that the event cannot take place.
Microwave operating has become more difficult during the present crisis. The requirement to stay at home has meant no portable operating, this has been most noticeable during our own contests and those organised by the RSGB. In addition the vast reduction in international travel has meant very few passenger aircraft are flying which of course has a direct impact on the ability of stations to make long distance contacts via aircraft scatter. There are still cargo aircraft flying on most routes so don't give up on aircraft scatter. Another factor making contacts harder to make, although not related to COVID-19, has been the lack of rain for the last month or so, particularly in the southern half of the UK. I'm sure the lack of rain will come to an end as soon as the lockdown begins to be lifted.
As I mentioned in the activity report that I submitted for this issue of Scatterpoint I was very encouraged by the number of stations who had set up equipment in the gardens or pointed antennas out of bedroom windows to attempt contacts during the April Low Bands contest. If you normally operate portable try setting up something at home if you can, you might be surprised by the results you can achieve. Roger G8CUB has some useful tips in this edition.
I was unable to attend the Cardiff round table this year as I was too unwell to travel. I understand it was a very successful and well attended event. Thanks go to Derek MW0LNA and the Cardiff University Radio Society for organising the first, (and hopefully not the only) round table of the year.
Don't forget to 'Stay at Home, Protect the NHS and Save Lives'. If you do need to go out remember to keep 144MHz apart.

Neil underwood, G4LDR.

Tri-fold leaflets

Barry G4SJH has produced a leaflet that explains Amateur Microwaves in a way that can be understood by the general public. This is particularly useful when operating portable. These would have been available at Martlesham. With the current situation with no portable operation and no events, they may not be required for a while. However they could be useful to explain to a neighbour, or others interested.
Please contact Barry if you need a few.

ADALM PLUTO as RF Test equipment

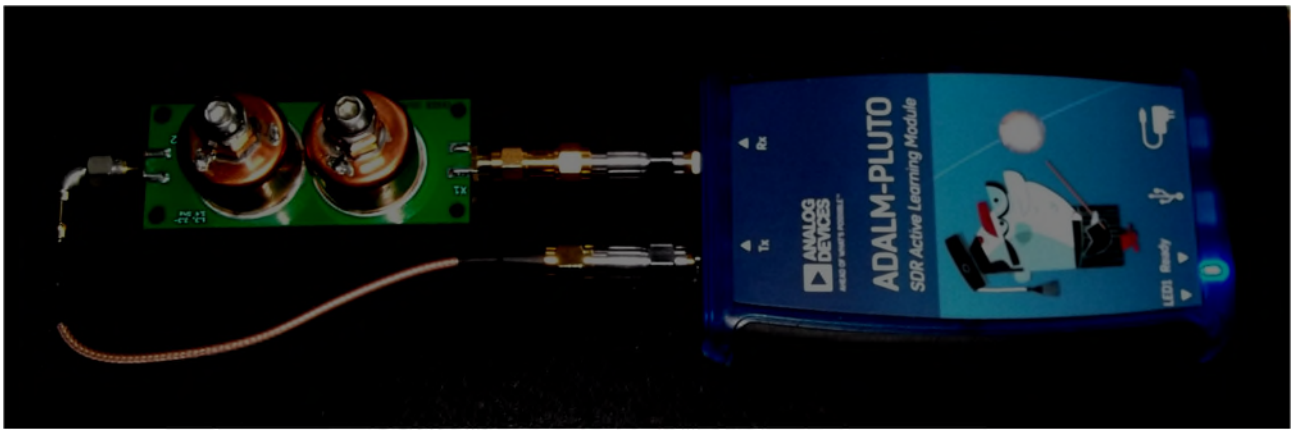
Ken Vickers G3YKI

We have seen a lot of opportunity in the past year for amateurs to get their hands on low cost RF test equipment in the form of a vector network analyser with the release last year of the "Nano VNA". This device originally worked the frequency range up to 900 MHz. Recent firmware upgrades took its frequency range up to 1500 MHz, putting it just into the microwave category.

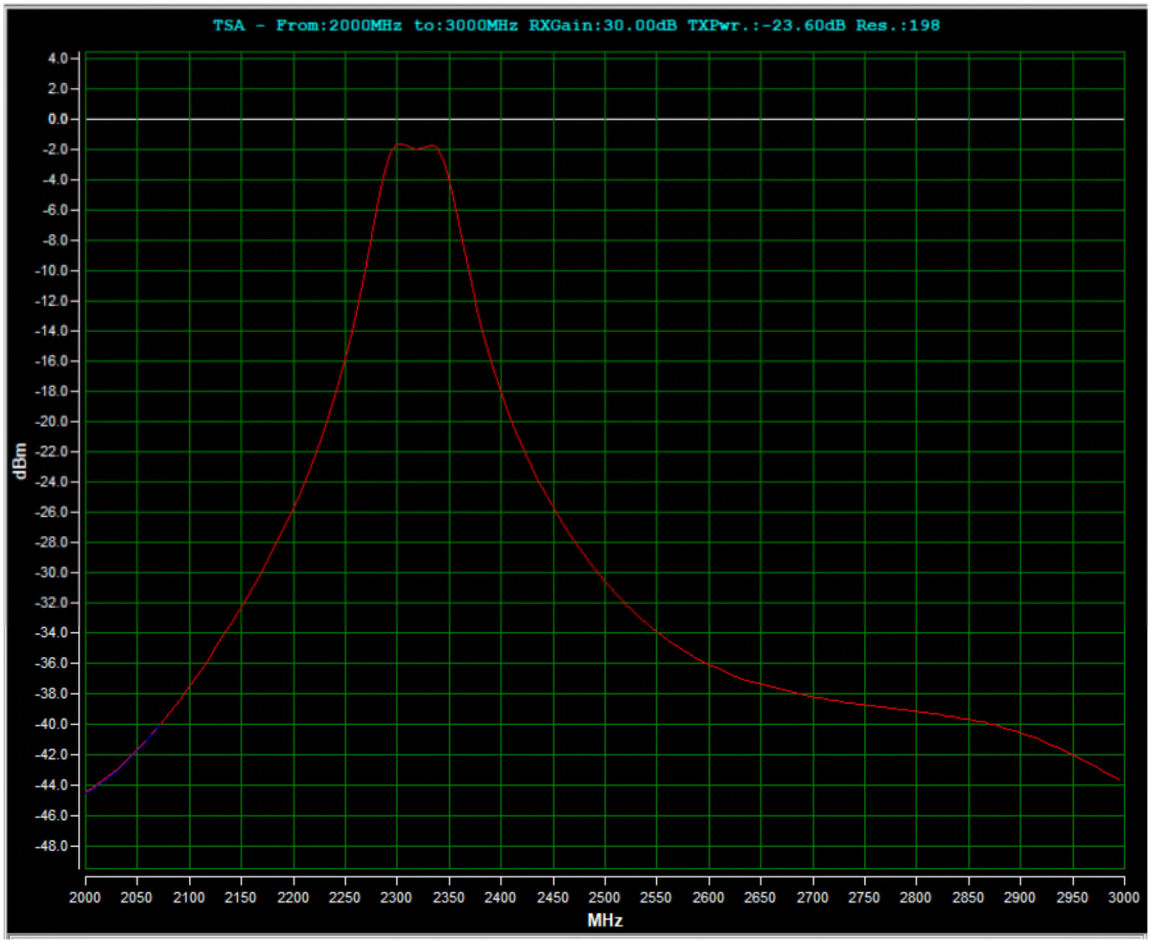
When I bought a Pluto SDR at the end of 2019, I had some hope that I could get it to work as a measurement device in its frequency range, which extends to 6 Gigahertz. After studying the software requirements for some time I decided it was well beyond my capabilities to do this. However within the past month Alberto, IU1KVL has published software which does exactly that. He calls his software are SATSAGEN, it being Spectrum Analyser, Tracking Spectrum Analyser and signal GENerator. Generators and spectrum analysers have been available previously for SDR equipment in the form of "SDR Console" and other PC applications, but this is the first I've seen one which sets up the SDR as a network analyser.

I downloaded the Windows software and installed it and it was all very easy and straightforward (Software is only 3 megabytes) and worked straight away.

The user interface could be said to be refreshingly simple, compared to some software we use, but does what you need for the basics. All you need to know is described in a 5-minute video which is also available on his website.



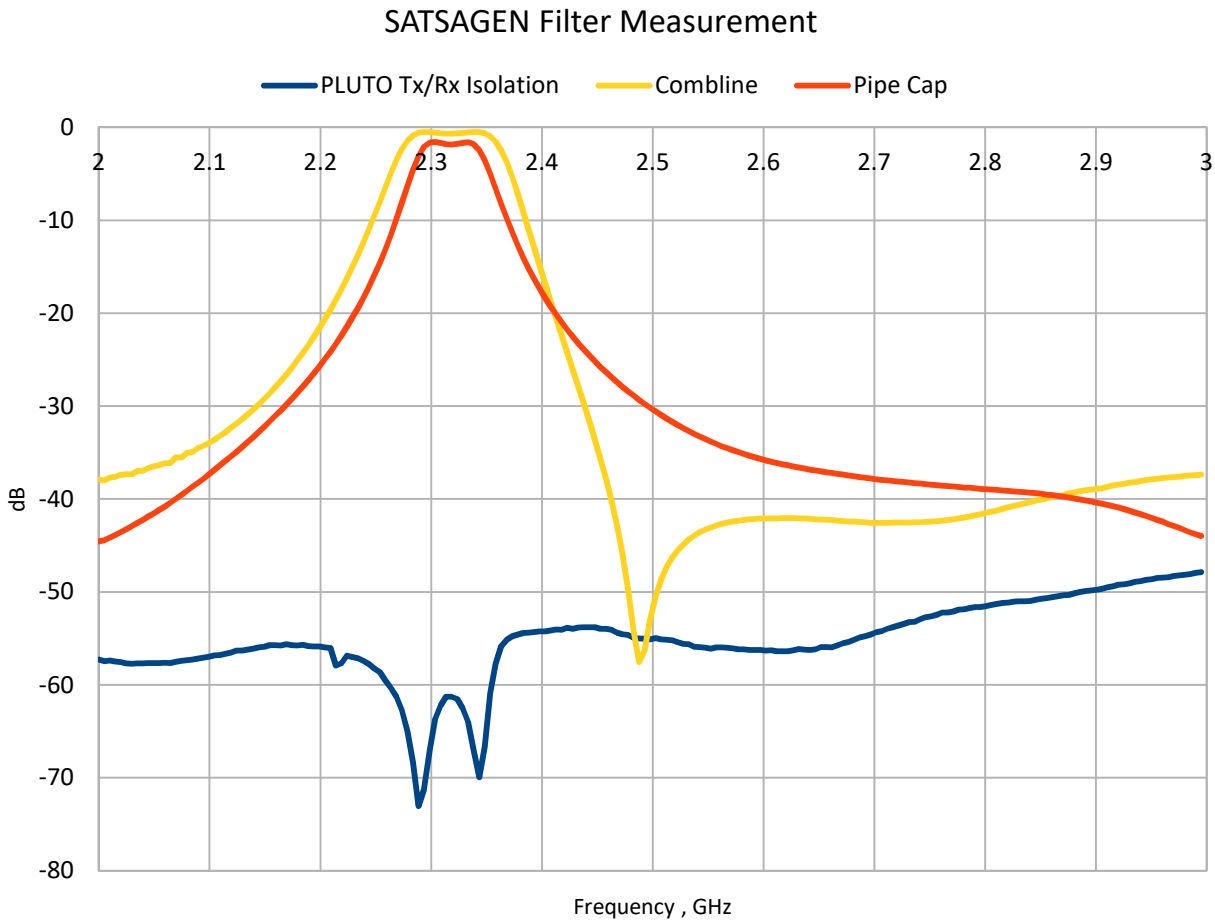
I measured a pipe cap filter for the 13 cm band, and the plot as seen on the screen is shown here.



You can actually zoom into any part of the plot using the graph axes without changing the actual frequency span setting. I believe Alberto may be working on further development of the software to include additional features such as markers, or saving and comparing plots, but as it stands it is still very useful edition to the toolbox. Plot data can be exported in a text file, so at the moment if you want to compare plots you need to copy it into Excel or similar.

Pluto probably has its limitations for this application in that at the transmitter and receiver are on the same silicon chip and there is a limit to the isolation that is available between the two. I have measured this, and it can be seen in the second plot where it has been added to two filter responses. You will see that 50 to 60 dB is the maximum available dynamic range in the 2 to 3 Gigahertz region. By the time you get to 6 Gigahertz that will be reduced to about 40 dBs. I have been using 6 and 10 dB attenuators in the system to guarantee good match at the ports which obviously uses up some of the available dynamic range. The isolation measurement does vary somewhat with proximity effects if you put in your hands near the device which is currently in a plastic enclosure. I'm not convinced that putting it in the metal box would improve the situation all that much, but it would obviously reduce hand effects. The plots shown are completed in about 3 or 4 seconds, so probably too slow for tweaking a multi-pole bandpass filter with a lot of adjustments on it, but OK for something simple like the filter shown, and ideal for just checking out those unknown filters, isolators or attenuators in your junk box.

See http://www.albfer.com/



G3JVL award legacy

We have already announced the new G3JVL award for newcomers to the GHz bands. We had everything in place to award the G3JVL trophy at this year's AGM to ensure the significant contribution that Mike made to amateur microwaves would not be forgotten, but clearly the COVID-19 crisis has put this on hold.

After Mike's funeral last May the Walters family made a donation to the RSGB Radio Communication Foundation (RCF). Mike's brother Terry also wanted to ensure that the microwave community would be a beneficiary, so he recently contacted the UKuG on behalf of the Walters family. They wish to make a regular donation in Mike's memory, and in March, Terry donated £100 which is to be presented to the winner of the G3JVL trophy. Terry intends to continue to donate £100 each year whilst he is alive, and then, after consultation with his daughter, she will continue to make a donation after Terry's death.

The committee would like to thank the family for this kind legacy.

A Look at Power Meters for Microwaves

Roger Ray G8CUB

1. The HP432A

This is an absorption power meter having remote heads, which are connected to the indicator unit via a lead.

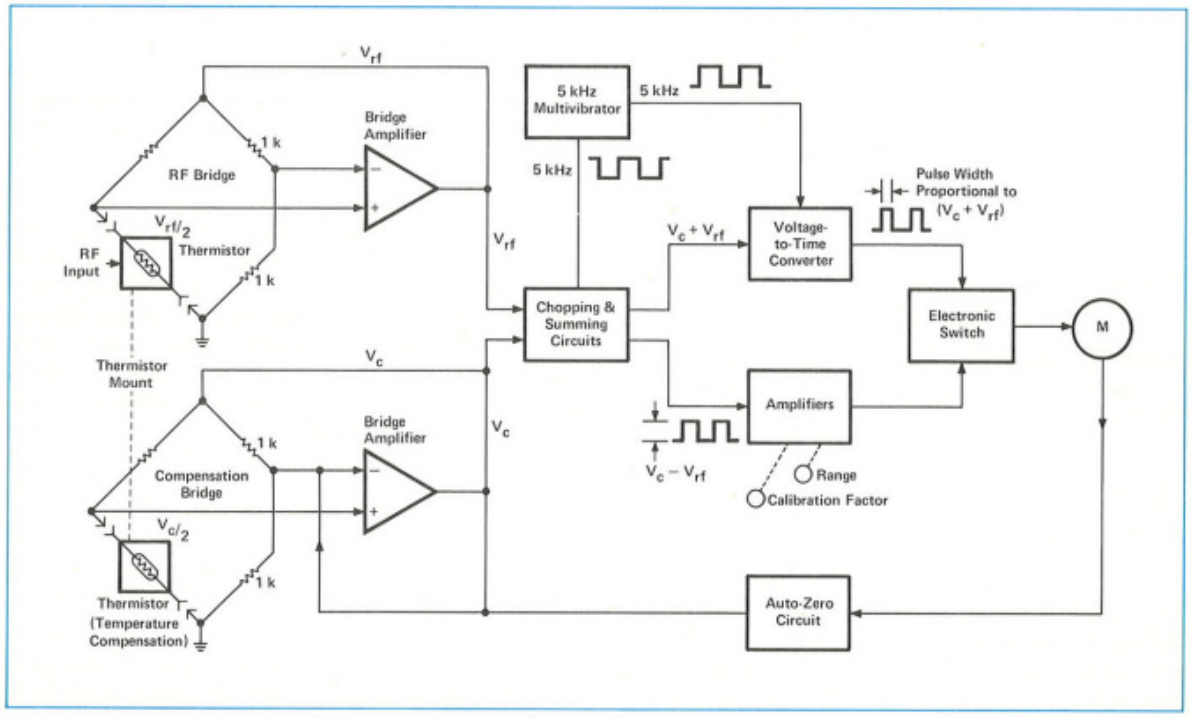
The HP478A is a thermistor head, for use with the 432. The fundamental premise in using a thermistor for power measurement is that rf power absorbed by the thermistor has the same heating effect on the thermistor as the dc power[1].

The 478A contains four thermistors, two to measure RF, two to provide temperature compensation. The power meter uses a self-balancing Wheatstone bridge. This was used in the earlier 431C (and even earlier valve 430C, now best forgotten), the 431C was the first solid state meter. Here a 10kHz audio signal was used to balance the bridge.

The 432A was a leap forward using DC to balance the bridge, and incorporate an automatic zero. The other advantage of using DC, is that it can be calibrated by DC.

H53-478A Thermistor 200 Ω head with calibration factor chart

The 478A covers 10MHz – 10GHz, while the upgraded version 8478A works to 18GHz.#



Simplified block diagram of HP 432A power Meter[1]

My first job was as a development engineer, in Marconi microwave group in 1971. Early on I was measuring amplifiers at low level, with a 432A. I hated it, having to continually use the auto zero switch, to get an accurate result. Nearly 50 years on, I love this meter!
Yes, it is a pain if you are trying to continually measure down at -20dBm, but -15 to +10dBm is fine. Why do I like it? A number of reasons:
a. It is accurate within 1%.
b. It measures the RF energy it sees (rms power), not worrying about modulation type bandwidth etc.
c. The heads have a good match (low vswr).
d. Waveguide heads, although not common are available.

Some HP Waveguide heads:
X486A 8.2 – 12.4GHz
K486A 18 – 26.5GHz
R486A 26.5 – 40GHz

Hughes Waveguide heads[2]:
45771H-xxxx 26.5 – 40GHz
45772H-1xxx 33 – 50GHz
45773H-1xxx 40 – 60GHz
45774H-1xxx 50 – 75GHz
45775H-1xxx 60 – 90GHz
45776H-1xxx 75 – 110GHz
45777H-1xxx 90 – 140GHz
45778H-1xxx 110 – 166GHz
Note -1100 = full band
My 45776H-1000 is only calibrated 85-95GHz. However by adding a factor, if can be used up to 134GHz. 122GHz -5.9dB, 134GHz -9.5dB. Anyone with a 45777H-1100 going spare, please contact me!

The 432A was made by Agilent until 2011. Mainly as it a standard in metrology, and required by some FCC standards. A digital metrology meter using the same heads, was made by Tegam, the 1830A. Keysight still have an updated version the N432A. There is a digital display version of the 432A, the 432B & C though less common, and probably less reliable.
Units are available on ebay etc. I paid £50 last September for an immaculate meter as pictured. Go for a later cream coloured unit, rather than the older grey one. One they look better, plus you will probably pay more for the older HP power lead than the meter!
Power heads, probably £50-75 for a good 486A / 8478A. £100+ for Hughes millimetre heads.
References:

1. HP Application Note 64-1

http://hparchive.com/Application_Notes/HP-AN-64-1.pdf

2. Hughes Millimeter-Wave Products

http://www.dudleylab.com/hughes%20mmwave%20products.pdf

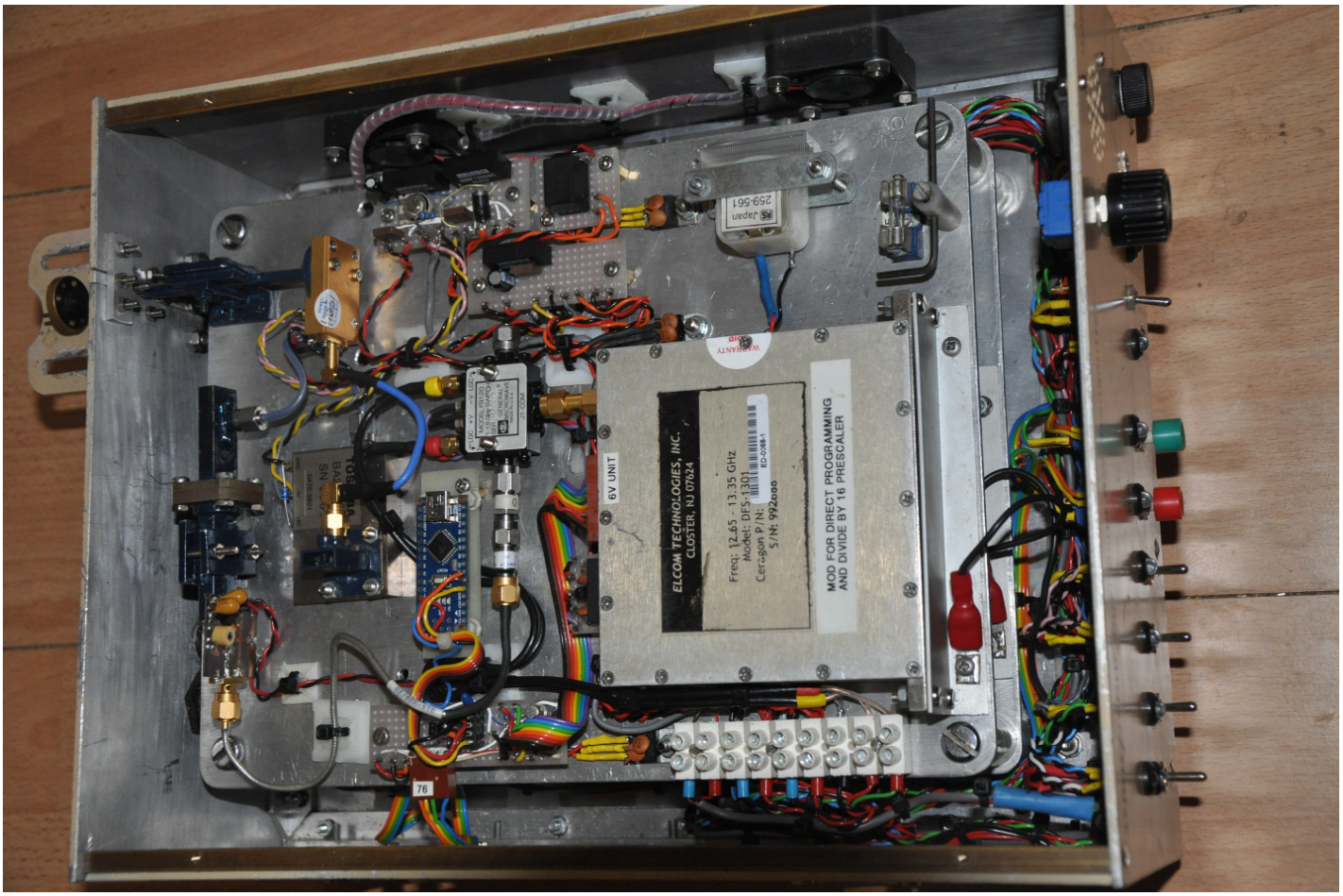
The following is from a presentation by Chris to his local club.

Three transmitters in three years

Chris G0FDZ

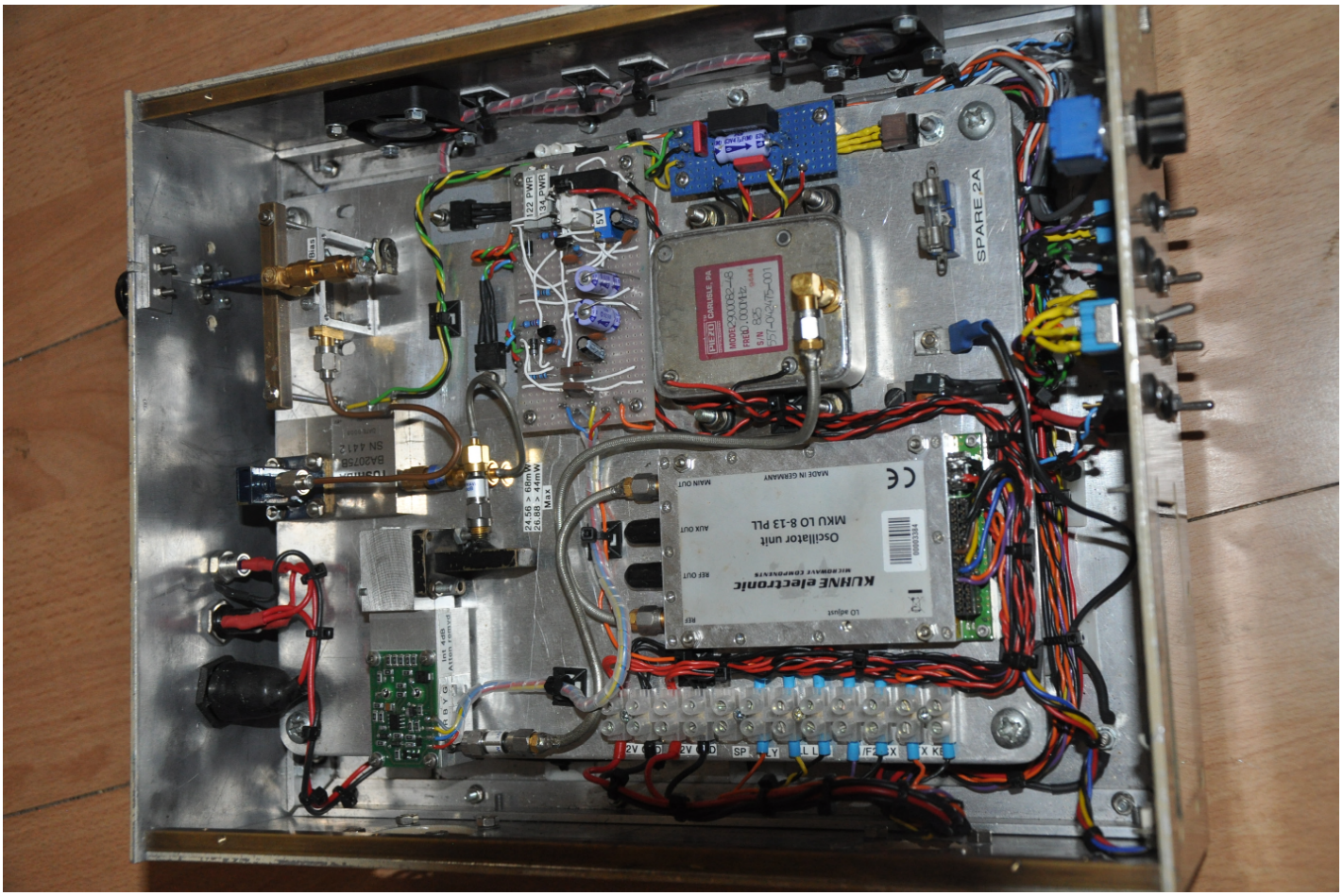
The three completed transmitters

A review of my construction efforts for the Millimetre bands.
For those of you that have seen my presentation on Millimetre waves you will recall seeing my transverters for each of the bands (most are dual band devices) and you may recall that the power output on transmit is somewhat low. Although the transverters have a reasonable performance on receive (as far as a bare mixer is concerned) the efficiency on transmit is poor and the transmit performance is somewhat inferior.
To improve my station on the Millimetre bands required either fitting a PA and pre-amps to the transverters which is very expensive for the lower bands and requires an even larger amount of money and the difficulty of acquiring such an item for the highest bands, so this was ruled out on several measures. I therefore decided to have separate transmitters for each of the bands (47, 76, 122, 134 & 241 GHz) with higher power, by using multipliers rather than mixers and using only CW as the mode.
I considered the situation and decided to build three transmitters, each dual band at a rate of one per year. As there are only five bands of interest, one band eventually used two different technologies to generate the RF.
The first transmitter was started at the beginning of 2017 and this was to be the unit for 47 & 76 GHz and would use a double deck (plate) for each band.



47-76 GHz transmitter

The 47 GHz section plate used an Elcom 11.75 GHz synthesiser that was modified to give direct access to the synthesiser. This enabled much smaller steps than the restrictive 3.3 or 5 MHz steps with the original units. The synthesiser code to generate the frequency was loaded when the unit was powered up (and additionally could be reloaded when the unit was active by a manual load button) by means of an Arduino Nano.
The output of the Elcom synthesiser was fed to a PIN switch that was to be used for keying at 11.75 GHz
After the switch the RF was doubled to 23.5 GHz using a mixer configured as a doubler, and amplified with a surplus 24 GHz amp to give 13 dBm, and then fed to a DB6NT design varactor doubler to 47 GHz giving me a very useful output of 15 mW.
The 76 GHz section plate uses a completely different set up, but also starts with a different type of Elcom synthesiser again modified for the smaller steps and also having the synthesiser code again loaded by an Arduino Nano at start up in the same way as I used on 47 GHz. The RF is keyed by a PIN switch and then actively doubled using a 'Franco' waveguide filtered doubler to 25 GHz and then amplified by a Toshiba 24 GHz amplifier before being fed at a third of the final frequency to an injection locked oscillator giving an extremely useful 100 mW output at 76 GHz. This first transmitter was approximately £450 in component costs.



122-134 GHz transmitter

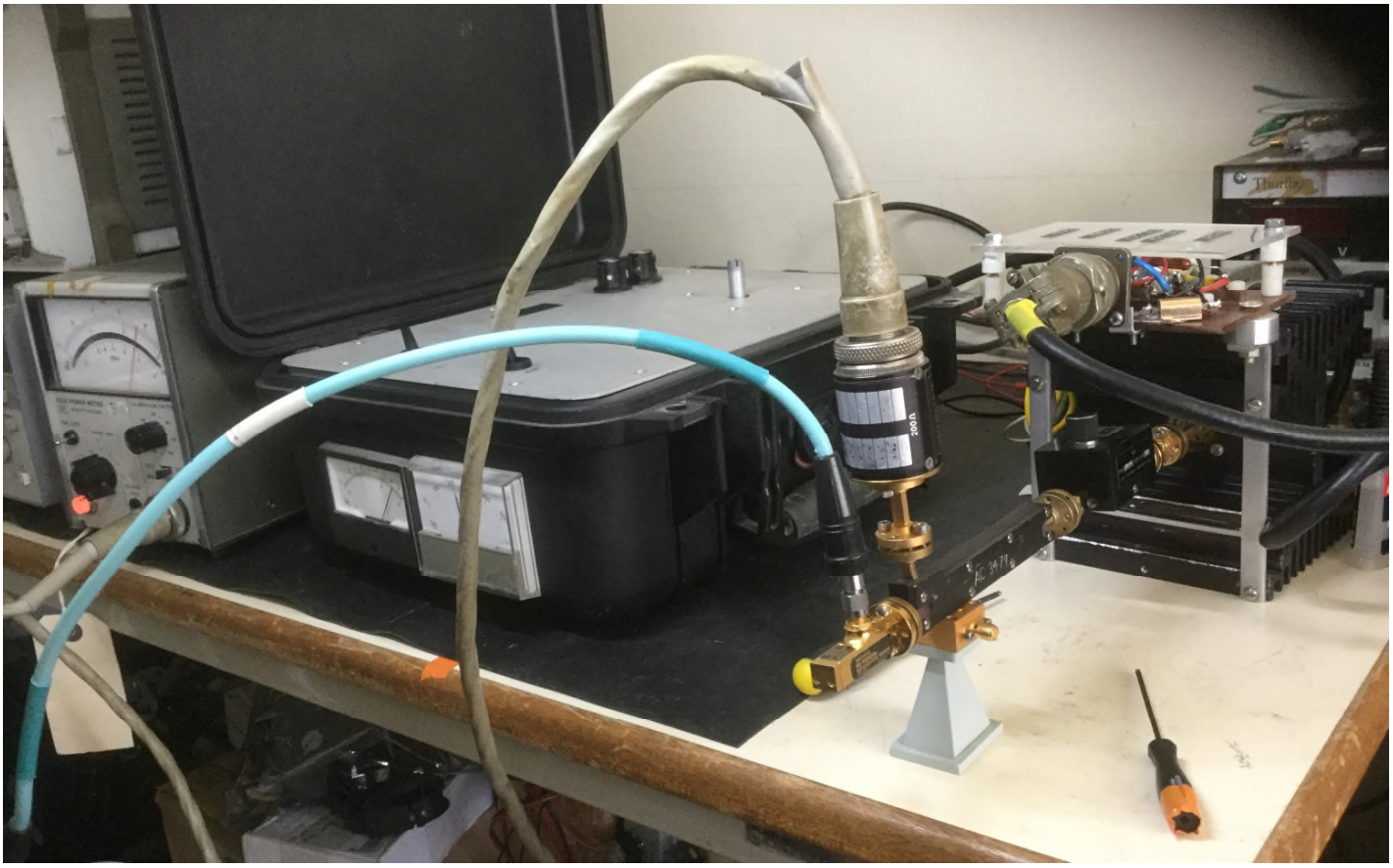
The next transmitter was started at the beginning of 2018 and was for the two bands of 122 & 134 GHz, but it used common architecture for RF generation and multiplication.
At this time a new very low phase noise (essential at the frequencies that it would ultimately be used at) LO source covering 8 -13 GHz became available from DB6NT and this was ideal for the RF generator as it was very frequency agile and could easily be changed at will with a touch screen interface. The other great advantage is that keying was already built into the unit so I just needed to arrange for some sidetone. The touch screen also gives a visual display of PLL status, frequency and other essential info. The synthesiser required an external 10 MHz reference and a high quality source was obtained from a seller in Germany on e-bay
The output of the DB6NT frequency source is then doubled and amplified with a Toshiba 24/26 GHz amplifier and the control board for the doubler had to be modified so that the output at the two band frequencies could be equalised after amplification, and it then fed a diode x5 multiplier. This gave several tens of uW at the required frequencies and was then connected to the antenna by a common waveguide output. The rather lower output than desired had to be increased by the additional gain of a new 14” antenna dish and associated feed that I had to make. A varactor was tried for the job and although giving output at the required frequencies it proved troublesome in performance largely due it is thought to the absence of a suitable idler circuit in the multiplier PCB design. This transmitter cost me approximately £750

241-122 GHz Transmitter

The final step was the construction of the transmitter for the highest band at 241 GHz and this was also combined with a new multiplier for 122 GHz. Construction started in early 2019.
The frequency generator for this transmitter uses a new low phase noise 8 - 13 GHz RF generator by Wayne ZL2BKC and the device is ideal as it is somewhat cheaper than the DB6NT LO without compromising the performance, and can easily be programmed from a PC. The frequency change uses a BCD (or Hex) switch. The unit again needs an external 10 MHz reference, but a suitable type was also supplied by Wayne. The unit does not have any keying facility built in, so again a PIN switch at 12/13 GHz is used.
This was followed by an amplifier at 12/13 GHz (CT manufacture) and then fed via an SMA relay to ether a DL2AM varactor multiplier block x10 to 122 GHz giving 1.1 mW output or else to a DB6NT multiplier design (x21) giving around 10 uW output. The multiplier units themselves have additional on-board multipliers fitted so the final multiplication is not as severe as first thought. The cost of the transmitter was approximately £850.
For all the five bands, the keying also incorporates sidetone, for without having sidetone is always a problem for me sending CW, and the all the units also incorporate a low 12v battery supply alarm at 11V.
This completed the dual band transmitter's project after three years of building, and the transmitters can also be used with an auto-keyer as personal beacons for receiver and antenna testing and optimisation.

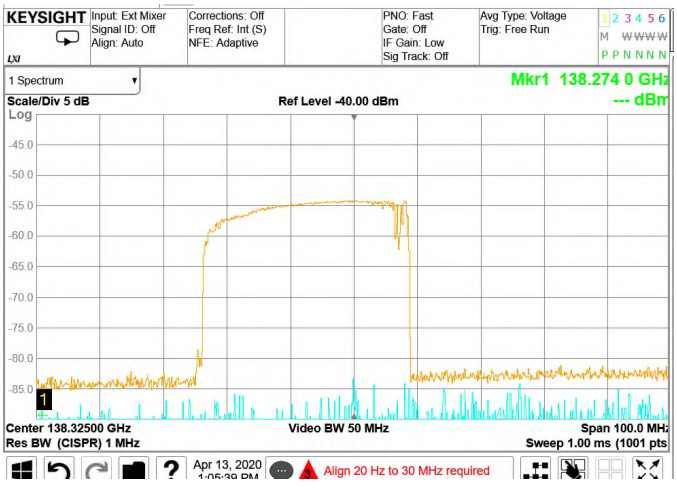
This Month I have been…….

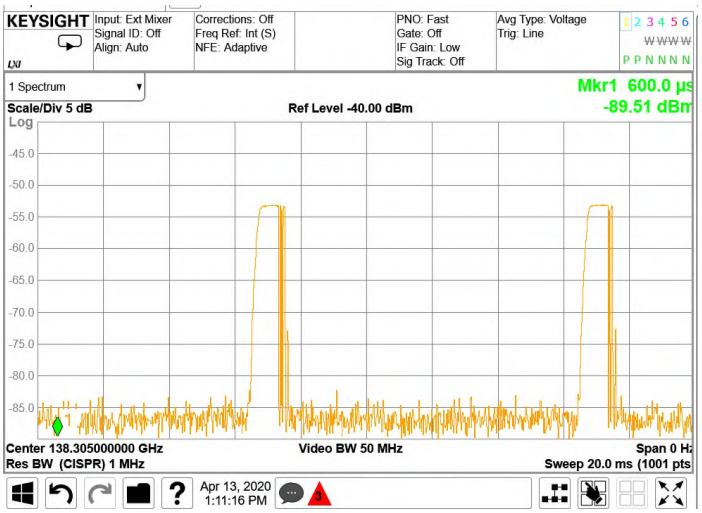
Reviving an old project Roger G8CUB



Inspired by comments on the US Microwave Reflector. I have relooked at a Klystron oscillator for 134GHz.
I had initially made a PSU to see if it worked at all. I did get RF, but a real 100sMHz wide fir-ball.
It has been in the back of the cupboard for a few years. Just waiting for a rainy day. As commented on the US Reflector – the rain has come…..

The first problem was the reflector bias supply. Not enough decoupling, a larger C worked wonders.
This still left a signal 35 MHz wide. Power circa 30mW @ 138GHz.
Investigation on a Keysight Receiver (under review), showed the signal shifting at 50Hz (20mS). So next job to improve the 2.5kV supply (basic, variac adjusting volts to transformer with voltage doubler).



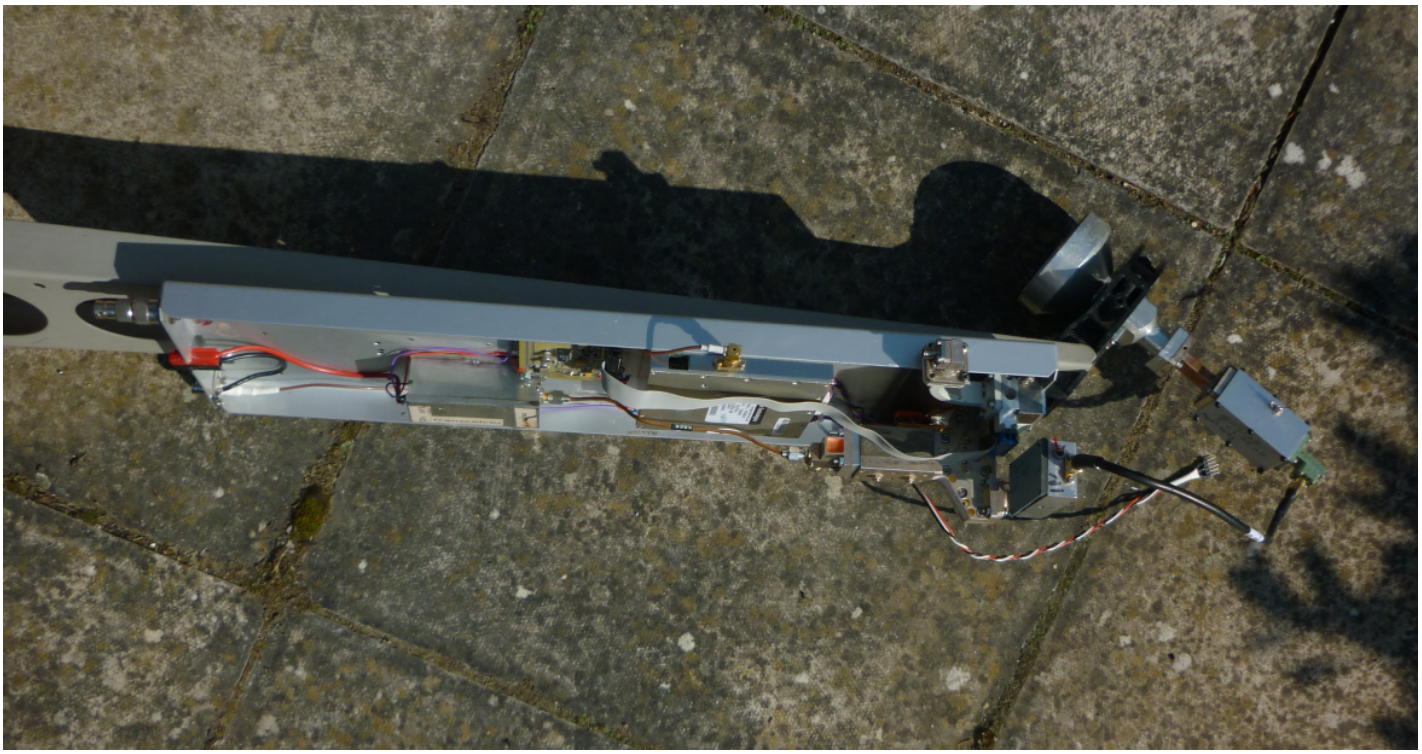


Scatterpoint activity report

Activity News: April 2020

By John G4BAO

Please send your activity news to: scatterpoint@microwavers.org



From G4BAO

Lockdown has kept me busy with assorted projects. I've finally got back to my "junk box parts" 24GHz EME transverter for my little 1.2m offset dish and made some changes to my 10GHz EME feed to allow me to try that on the small dish as well. I hang the transverters under the offset LNB arm, quick release with 3 wing nuts. It will be interesting to compare my poor (at 10GHz) 1.9m mesh dish to the solid 1.2m offset on 10GHz. Now need a fine day to take the 1.9m dish off and put on the 1.2m.

See photo attached of 24GHz unit feed arm.

I'll be 24GHz receiving only to start with, but I'm still looking for some cheap power for the band, so if you have a TWT lying around that you can sell/loan or give me, 😊 please contact me by email. john@g4bao.com.

Also getting back to writing up the modifications I did to my SPID-RAS az-el rotator to fit 0.1degree sensors. Sam G4DDK hopes to beta test the mods soon. Hopefully that'll get published in Dubus, but if anyone wants a preview, please email me direct.

Easter Sunday saw some nice rainscatter here in the East. Did you miss it? Yes, you probably did as it wasn't a contest day was it….?
As well as making my first 3.4GHz QSO with Denis G3UVR up on the Wirral I had a 10GHz CW QSO with G3RGK. This was followed by a 3-way 10GHz NBFM QSO with G4DBN on the banks of the Humber and G4DDK on the Suffolk coast via thunderstorm over the Fen Edge! Both were copyable on any dish heading from here. This is why I still love the GHz bands. Here are this month's contributions, almost exclusively about 10GHz

From Nick G4OGI

I have used the furlough time to put some effort into developing the 3cm system.
I now have the ability to raise and lower the 75cm dish up to about 6m before objections from neighbours overrides the benefit.
Have the dish at the new height has opened up the North to East segment giving me the ability to cover from LB2SHF through to DB0VC
Sadly the main path to "UK Beacons" is still obstructed due the mast and a tree in the garden ignoring social distancing rules.
The tree is due to be recycled but that work has been delayed by COVID-19. Whilst I see it as essential work those who make the rules suggest otherwise.
I have taken time to align the system using Sun noise and luckily the result align with bearings expected for terrestrial beacons.
PI7ALK had a little problem earlier in March with what was thought to be a waterlogged antenna. One of the beacon team modified the antenna housing and the signal gradually returned to normal levels. The beacon is still providing valuable insights into propagation across the North Sea. The Sea Surface Temperature appeared to reach its minimum on 5th March and I have noted a steady increase from 6 deg.C to its current 8 – 9 deg and a clear improvement in evaporation duct signal levels. Only a few days have been lost due to wave height exceed 1.6m, but the signal from the beacon appeared as a weak scattered signal instead.

This first week of April has seen a surge in tropo activity. A couple of High pressure systems, one centred over Poland and the next one over the Atlantic gave us strong winds curtailing activity. When the wind subsided enough to operate I noticed both weather systems has "noses" across this part of the UK and propagation remained poor. The month is also notable for the first reception of GB3MHZ since November 2019. Not due to any much needed repairs to the beacon but down to improved East Coast propagation. From Tuesday 8th April though a system over France moved north to sit in the North Sea and this has provided some additional fun, providing some very strong signals from the two mainstay beacons DB0GHZ and PI7ALK.
Wednesday provided good conditions with marked path skewing (the same had been noted on Tuesday evening but not to the same degree).
For the first time I logged PI7ALK along with severe Wind Turbine modulation which I traced to have probable origins from the two wind farms off the Netherland coast. Earlier in the day (0945utc) I heard Maurice F6DWG run up a temporary beacon on 10368.845 from JN19aj and the tropo signal was replaced by continuous wind turbine scatter.
All the usual beacons appeared on the band throughout these days:

* DB0GHZ
* PI7ALK
* PE9GHZ
* PI7RTD
* ON0VHF
* ON0EME
* ON0GHZ

DB0VC and LB2SHF have yet to be logged.

This morning (Saturday 11th) I scanned the bands an hour or so before sunrise with these results:
DB0GHZ and PI7ALK were very strong. ALK in particular lifted the "calibrated" flex-6700 s-meter reading to s9 again as it did earlier in the week

Basically all the normal beacons but at greater strength:-

G4OGI 10368810.0 DB0GHZ/B 0402Z 11 jo01mg<tr>jo34we 579

G4OGI 10368815.0 PE9GHZ/B 0404Z 11 jo01mg<tr>jo011wm 529

G4OGI 10368882.5 PI7RTD/B 0405Z 11 jo01mg<tr>jo21fv 519

G4OGI 10368898.8 PI7ALK/B 0407Z 11 jo01<tr>jo21ip 599

G4OGI 10368972.0 DB0MU/B 0410Z 11 jo01mg<tr>jo31qx 519

G4OGI 10368830.0 GB3MHZ/B 0414Z 11 jo01<tr>jo02pb 519

G4OGI 10368945.0 GB3PKT/B 0415Z 11 jo01mg>tr>JO01mt -12dBjt

G4OGI 10368925.0 ON0VHF/B 0447Z 11 jo01mg<tr>JO20KV 519

G4OGI 10368875.0 ON0EME/B 0527Z 11 jo01mg<tr>jo21jg -13dBpi4

A couple of unidentified beacons, one on 10368.905.540 which could have been PE1ITR. A definite signal on 10368.958.0 which may have been OZ1UHF as propagation was very good to DB0GHZ at the time. No other OZ beacons were noted however. At the stage when PI7ALK was very strong a weak and ocxo type signal appeared on 10368.891.936 but it remained stubbornly below (my) readable threshold. The bearing suggested, given strength of other beacons at the time, a backscattered signal from LX1DB. Within 30 mins after sunrise conditions fells dramatically so that only the normal coastal beacons are audible. The band has returned to normal conditions as I write this (09.00utc).
One thing has become clear this week is that many signals are being reflected a large angles from the numerous wind farms and most of these reflections are NOT from the rotating turbines. One main one I have discovered is hearing PI7TRD on the heading to Gothenburg (SK6MHI) a path that crosses the Thames Array wind farm.
GB3PKT is subject to some very strange propagation thanks to the special weather of the Thames Estuary but it is also noticeable reflected by objects further out in the North Sea. Quite a bit of work ahead to look into these paths

From Sam G4DDK

Having put his 60cm 10Ghz dish back on the mast in late March, Sam has been working with Nick looking at 10GHz North Sea paths and reflections from the coastal wind farms between Suffolk and North Kent.
He wrote, “I have been regularly monitoring 10GHz beacons from across the North Sea. Around the first few days in April Belgian beacons ON0GHZ and ON0VHF started to appear, but at low level of typically 5 to 7dB in a 3Hz bandwidth using Spectran. Nothing was heard from PE9GHZ, PI7ALK or DB0GHZ. I appeared to be cut off from these beacons by the extra attenuation of trees in that direction. ON0VHF has been there consistently, as if there was a direct path between the beacon and my QTH. On 8th April PI6ALK has come up to between 10 and 15dB in 3Hz and was just discernible by ear. DB0GHZ was just showing on the display.”

On April 11th he wrote to me with some observations on rotator accuracy.
“I spent some time this evening trying to get sensible bearings on the wind generators and then checking my rotator against readout against the noise from the setting sun. There is significant error in the Yaesu rotator DXC1000 readings between east and west (now, there is a surprise!). I carefully set the westerly readout as the sun set and I also measured sun noise as the sun set. Since my antenna does not elevate it was horizon to sun noise. Who knows exactly what the horizon noise is.... But assumed about 170-200k. I saw a 1dB RISE in noise as the sun sank low enough to be in the main lobe of the 660cm dish, I could check accuracy of pointing by the shadow of the feed on the dish, since it was still sunny. I checked refraction on to off using VK3UM as the angle reading and confirmed that although at up to 0.5 degrees below sunset, with refraction off, I was not back to horizon noise, refraction on showed the sun was still a degree or so above the horizon due to refraction. A most interesting test. Like watching paint drying.....

Having got the rotator lined up reasonably well, turning it to eastish showed a good 5 degree error, looking at those wind generators.
By sighting I can see about 1.5 degrees error in where the dish peaks PI7ALK and actually looking directly at the generators. The reflection may NOT be the generators. In which case I have no idea what it is then, and it is consistent with the peak for GB3PKT.

From Graham G3YJR

I've been entering SHF UKAC contests on 13cm and 3cm. No great DX and poor conditions generally.

I entered the Low Bands contest for an hour in March on 23cm and 13cm, both on 2.32 and 2.30 GHz sub-bands. So on 2.30 GHz, I have now had two contacts, both with Keith G4ODA!

In the Low Bands contest I worked Brian GM4DIJ/P on 23cm, unfortunately I made a typo entering the received report, so I got no points for this contact. Actually the logger puts a default '5' in, so when I typed in '519', I ended up with '551' as the report. Does anyone else do this?

This month I've been dodging the COVID-19 virus and my engineering has mostly been aimed at fixing domestic equipment. (My most popular blog post is about fixing the c/h programmer!). I'm hoping to get a dish pointing at Es'Hail2 again once better weather settles in.

On 13cm I have added an Andrew amplifier, currently ticking over at about 25W PEP. The amp is in the shack, feeding a fairly short length of Ultraflex coax up to the relay/BPF/pre-amp box on the yagi pole. The pre-amp and relay seems to have increased the NF on receive, but at least the Andrew amp should mean I can be heard better. I look to improving things on receive.

Contest maps here: g3yjr.wordpress.com

From Neil G4LDR

Before the COVID-19 lockdown there was some activity on 24GHz in the Wiltshire/Hampshire area. Dave G8GKQ had rebuilt his 24GHz transverter so needed some tests. In early March he operated /P from near his QTH just north of Salisbury and we were able to exchange 59+ reports on FM. Brian G4NNS near Andover was just able to detect Dave's signal. Further 24GHz tests were then carried out between G8GKQ/P south of Salisbury and Noel G8GTZ/P south of Basingstoke and myself including exchanges of DATV signals.

The Monday evening microwave activity night that used to cover much of the south and midlands of England has carried on in the South in recent years. Recently there have been several stations in the Southampton/Salisbury/Andover area being active on 23cm including G4NNS, G1JRU, G3WIE, G4BPN and myself. Frequency is 1296.210 or 1296.220 on thereabouts and activity usually starts around 19:30UTC after several of us have completed test on the other bands up to 24GHz.

I found it encouraging in the Low Bands contest in April that a number of stations had made the effort to operate from home instead of being able to go out portable. In addition there were several stations active on the bands for the first time. Some stations had set up their portable equipment in their gardens whilst several operated with antennas pointing out of bedroom windows. I used my 'Langstone' SDR transceiver (which is an experimental system based on a Raspberry Pi 4 and a Pluto SDR with software developed by Colin G4ELM) on 2300MHz during the low bands contest. Langstone is on the way to Hayling if you look at the map.

On Friday 10th April; following successful tests on 6cm narrow band between Dave G8GKQ and myself over a short (9km) but obstructed path, we completed the first two way 6cm band contact on DATV in the UK. We were a long way short of the UK record for FM TV on that band which currently stands at about 350km, but it is a start.

Pictures below show (Left) Dave G8GKQ as received by G4LDR and (Right) Neil G4LDR as received by G8GKQ.

VK 122GHz Project - update

Bare PCBs have got to the UK, but not to my front door yet! Assembled production boards are expected by early May. Second samples of the feed horns will be evaluated, before the go ahead is given for full production.

Roger G8CUB

UK Microwave Group Wiki

Contributions are requested for Wiki to advance Microwave knowledge

https://wiki.microwavers.org.uk/Main_Page

SK Dave GM3WIL

Just to let you know one of the members has passed away Dave, GM3WIL in Ayrshire had a major heart attack while in QSO at the start of April.
He had been very active in the past on wideband 10GHz and 24 GHz and was back on narrow band working portable on 13cms, he was currently building for using the QO-100 satellite. He was at last year's GM round-table.
Amateur radio was very important to Dave especially as he had recently lost his wife Jan to cancer at the end of January this year.
He was a very good friend and sadly missed.
Perhaps you could post on the microwave reflector as I don't have the facility to post.

From Richard Bown G8JVM

Contests

March 2020 Lowband Contest Results

Last year storm Freya depressed entries for this event, but in 2020 entries recovered to exceed the levels seen in 2018, which was welcome.

On 1296MHz the Combe Gibberlets group (M0HNA/P) won with John G4ZTR in second place, and David G6KWA in third. G4ZTR had the best DX contact, working DJ3AK in JO52 at a distance of 661km. John G3SQQ was the leading low power station.

2300MHz had two entries this time which was welcome, with M0HNA/P as leader, and runner up G3YJR. Both worked G4ODA.

On 2320MHz there was a close battle for the top two slots, with M0HNA/P just pipping G4ZTR to the post. G4ZTR also worked the best DX on this band, with a 600km QSO to DL3IAS (JN49). John G3SQQ won the low power section on this band too.

There was another close run result on 3.4GHz with M0HNA/P just shading it over David M0GHZ in the runner up slot. Best DX reported was between M0HNA/P and G8DMU/P in IO94 at 303km.

The Combe Gibberlets group were overall winners, with David M0GHZ in overall runner-up position and leading fixed station.

Certificates go to M0HNA/P as overall winner, to M0GHZ as runner-up and to the following band leaders, runners-up and leading fixed and low power stations.

1296MHz M0HNA/P, G4ZTR, G3SQQ
2300MHz M0HNA/P, G3YJR
2320MHz M0HNA/P, G4ZTR, G3SQQ
3400MHz M0HNA/P, M0GHZ

Normalised scores will be included in the overall championship table which will be published when the results of the next low band contest are available.

Thanks go to Keith G4ODA and Dave G4FEV for their checklogs.

John G3XDY
UKuG Contest Manager

March 2020 Low Band Contest Results

Overall

Pos	Callsign	1296MHz	2300MHz	2320MHz	3400MHz	Overall
1	M0HNA/P	1000	1000	1000	1000	4000
2	M0GHZ	367	0	645	991	2003
3	G4ZTR	905	0	997	0	1902
4	G3UVR	355	0	657	417	1429
5	G3UKV	209	0	268	608	1085
6	G3YJR	59	648	84	0	791
7	G1PPA/P	140	0	0	650	790
8	G8AIM	87	0	173	226	486
9	G3SQQ	218	0	260	0	478
10	G6KWA	467	0	0	0	467
11	G8EOP	0	0	306	0	306
12	G3VKV	64	0	157	82	303
13	GM4DIJ/P	222	0	0	0	222
14	GM8IEM	51	0	0	0	51
15	GW4MBS	43	0	0	0	43
16	G4BXD	26	0	0	0	26
17	GD1MIP	17	0	0	0	17

1296MHz

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX kms
1	M0HNA/P	IO91GI	38	8317	DL2DAO	614
2	G4ZTR	JO01KW	26	7529	DJ3AK	661
3	G6KWA	JO02AD	17	3884	DK5EZ	497
4	M0GHZ	IO81VK	14	3055	DG1E	638
5	G3UVR	IO83KH	15	2956	G3XDY	324
6	GM4DIJ/P	IO74MU	6	1843	G4ODA	393
7	G3SQQ	IO93JC	13	1814	GM4DIJ/P	313
8	G3UKV	IO82RR	11	1738	GI6ATZ	292
9	G1PPA/P	IO93RI	8	1163	M0GHZ	242
10	G8AIM	IO92FH	7	724	G3XDY	190
11	G3VKV	IO81XV	7	532	G3UVR	174
12	G3YJR	IO93FJ	4	494	G4ZTR	230
13	GM8IEM	IO78HF	1	428	GI6ATZ	428
14	GW4MBS	IO71XW	2	355	M0HNA/P	190
15	G4BXD	IO82UJ	3	215	M0HNA/P	130
16	GD1MIP	IO74TI	1	142	G3UVR	142

2300MHz

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX kms
1	M0HNA/P	IO91GI	1	182	G4ODA	182
2	G3YJR	IO93FJ	1	118	G4ODA	118

2320MHz

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX kms
1	M0HNA/P	IO91GI	13	2673	ON4CJQ/P	445
2	G4ZTR	JO01KW	11	2665	DL3IAS	600
3	G3UVR	IO83KH	11	1757	G4ZTR	311
4	M0GHZ	IO81VK	7	1724	ON4CJQ/P	497
5	G8EOP	IO93EQ	5	817	M0HNA/P	260
6	G3UKV	IO82RR	6	717	M0HNA/P	170
7	G3SQQ	IO93JC	5	694	M0HNA/P	196
8	G8AIM	IO92FH	4	463	G3XDY	190
9	G3VKV	IO81XV	5	420	G3UVR	174
10	G3YJR	IO93FJ	2	224	G4ODA	118

3400MHz

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX Kms
1	M0HNA/P	IO91GI	8	1208	G8DMU/P	303
2	M0GHZ	IO81VK	7	1197	G8DMU/P	294
3	G1PPA/P	IO93RI	5	785	M0GHZ	242
4	G3UKV	IO82RR	5	735	M0HNA/P	170
5	G3UVR	IO83KH	3	504	G4ODA	210
6	G8AIM	IO92FH	3	273	M0GHZ	108
7	G3VKV	IO81XV	3	230	G3UKV	99

Editors Comments

Thanks for the contributions this month. With all this extra time that we have available, there is no excuse not to write for the magazine.

Forthcoming Contests

Activity on the contests has been good so far this year. The Millimetre contest next month will present some real challenges, with no portable operation. It is hoped that there will be more home station operation on 24GHz. Rain scatter on the band works with FM, and there is opportunity to work via reflection etc. So the new challenge could produce interesting results. There may be potential paths from upstairs windows and gardens. So get your details to G3XDY early, so we can consider these new paths. Of course 47 & 76GHz will be an even greater challenge, but you never know!

UKuG MICROWAVE CONTEST / ACTIVITY WEEKEND CALENDAR 2020

Dates, 2020	Time UTC	Contest name	Certificates
5-Apr	1000 - 1600	2nd Low band 1.3/2.3/3.4GHz	F, P,L
3-May	0800 - 1400	3rd Low band 1.3/2.3/3.4GHz	F, P,L
17-May	0900 – 1700	1st 24GHz Contest	
17-May	0900 – 1700	1st 47GHz Contest	
17-May	0900 – 1700	1st 76GHz Contest	
30-31 May		Activity Weekend	
31-May	0600 - 1800	1st 5.7GHz Contest	F, P,L
31-May	0600 - 1800	1st 10GHz Contest	F, P,L
7-Jun	1000 - 1600	4th Low band 1.3/2.3/3.4GHz	F, P,L
21-Jun	0900 - 1700	24/47GHz Trophy / 76/122-248 GHz	
27-28 Jun		Activity Weekend	
28-Jun	0600 - 1800	2nd 5.7GHz Contest	F, P,L
28-Jun	0600 - 1800	2nd 10GHz Contest	F, P,L
25-26 Jul		Activity Weekend	
26 -Jul	0600 - 1800	3rd 5.7GHz Contest	F, P,L
26 -Jul	0600 - 1800	3rd 10GHz Contest	F, P,L
29-30 Aug		Activity Weekend	
30-Aug	0600 - 1800	4th 5.7GHz Contest	F, P,L
30-Aug	0600 - 1800	4th 10GHz Contest	F, P,L
13-Sep	0900 - 1700	3rd 24GHz Contest	
13-Sep	0900 - 1700	3rd 47GHz Contest	
13-Sep	0900 – 1700	3rd 76GHz Contest	
26-27 Sep		Activity Weekend	
27 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
27 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
18 -Oct	0900 - 1700	4th 24GHz Contest	
18 -Oct	0900 - 1700	4th 47GHz Contest	
18 -Oct	0900 – 1700	4th 76GHz Contest	
24-25 Oct		Activity Weekend	
15 -Nov	1000 - 1400	5th Low band 1.3/2.3/3.4GHz	F, P,L
28-29 Nov		Activity Weekend	
26-27 Dec		Activity Weekend	

Key:	F	Fixed / home station	
	P	Portable	L
	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)		

EVENTS 2020

Events may be subject to cancellation due to the Coronavirus
For latest information consult https://microwavers.org

April 18-19	Martlesham Roundtable & AGM- *postponed until Autumn2020*	**http://mmrt.homedns.org/**
May 15-17	Hamvention, Dayton *cancelled*	www.hamvention.org/
June 21	RAL Roundtable *cancelled*	
June 26-28	Ham Radio Friedrichshafen	http://www.hamradio-friedrichshafen.de/
June 27-28	Finningley Roundtable *cancelled*	http://www.g0ghk.com/
August 20-23	EME 2020 Prague	www.eme2020.cz
September 11-13	65.UKW Tagung Weinheim	http://www.ukw-tagung.de/
September 13-18	European Microwave Week, Utrecht	www.eumweek.com/
September 20	Crawley Roundtable	
September 25-26	National Hamfest	http://www.nationalhamfest.org.uk/
October 9-11	RSGB Convention & Amsat-UK Colloquium	**http://rsgb.org/convention/**
October15-18	Microwave Update, Sterling, Virginia	www.microwaveupdate.org
October 10-16	IARU-R1 General Conference, Novi Sad	www.iaru2020.org
October 24-25	BATC Convention, Coventry	https://batc.org.uk/events/
November 7	Scottish Round Table	www.gmroundtable.org.uk/

80m UK Microwavers net

Tuesdays 08:30 local on 3626 kHz (+/- QRM)

73 Martyn Vincent G3UKV