An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

November 2019

Published by the UK Microwave Group

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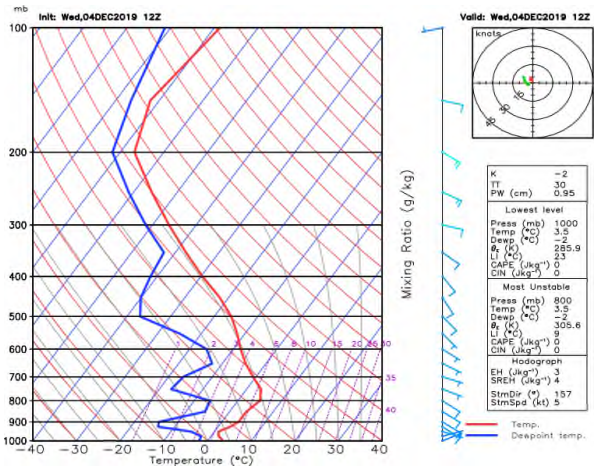
G0FVI Es'Hail dual band feed



G4OGI Activity 4th Dec London Skew-T chart

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 am writing these Chairman's notes a few days before attending the second of the new Microwave Round Tables this year which is in the Midlands. I am planning to attend so will have managed to go to all six of this year's Round Tables. The last two I attended were the Crawley Round Table way back in September and more recently the Scottish Round Table in November. Both of these were very enjoyable events with interesting presentations as well as plenty of time to chat and exchange ideas. I've been a regular visitor (on and off) to the Crawley event for many years but it was my first trip up to Burnt Island on the northern bank of the Firth of Forth opposite Edinburgh. It was good to meet so many of the membership at both events and in the case of Scotland to meet for the first time those I had only contacted on the microwave bands usually via aircraft scatter.

The World Radio Conference 2019 (WRC19) is now over but the decisions taken will influence our hobby for years to come. Whereas there has been agreement to open up more spectrum at 50MHz this is not the case for the microwave bands. Although the threat to the 23cm band is not as strong as it could have been, this might not mean that we get to keep the full range of frequencies or that other restrictions might in future be imposed. Hopefully the studies that will be carried out to determine the level of protection required by radio navigation systems such as Galileo will result in the minimum of change to the 23cm band when it discussed at the next WRC in 2023.

On the issue of loss of microwave bands, Sweden has now lost all access to the 13 and 9cm bands effective from the 1st January 2020. Other counties are also facing the loss of microwave bands. I feel we are relatively fortunate in the UK to have a very good relationship with our national regulator, Ofcom. We do however need to demonstrate that we make good use of our bands and we continue to encourage innovation and band occupancy.

With the end of 2019 upon us I would like to wish you all a very happy Christmas and a New Year during which your logbook will be filled with many contacts on the microwave bands.

Neil Underwood, G4LDR.

UK Microwave Group Annual Report to RSGB Spectrum Forum

Introduction to UK Microwave Group

The UK Microwave Group (UKuG) represents the interests of amateur radio enthusiasts who operate on frequencies above 1.0GHz. The UKuG is open to membership from both the UK and overseas microwavers. The UKuG is now 20 years old, having been formed at the Martlesham Microwave Roundtable in November 1999 and it is affiliated to the RSGB. Current membership stands at over 500 members with the majority being from the UK. There are members from most European countries as well as the Americas, Japan, Australia and New Zealand. An elected committee looks after the interests of the membership.

Events supported during 2019

Each year a series of specialist amateur radio microwave meetings; Microwave Round Tables are organised by local radio clubs and societies and supported by the UKuG. The oldest established event (Martlesham) held at the BT research laboratory has now been run annually for 40 years. In 2019 two new round tables were organised (Cardiff and West Midlands) bringing the total to seven; covering England, Wales and Scotland. These events are well supported by the membership and usually included a series of technical presentations, access to professional test equipment and members selling or exchanging useful microwave components.

Club and outreach

The UK Microwave group has overlapping interests with BATC and AMSAT-UK, where those Groups use the amateur microwave allocations. For example, with the launch of the commercial Es'Hail 2 (OSCAR 100) geostationary satellite in late 2018 and the subsequent release of the 2.4GHz uplink to 10GHz downlink transponders for amateur narrow

band and for wide band use, has seen a rapid increase in amateurs becoming operational on these microwave bands. Additionally UKuG/BATC members have continued to experiment with DATV on the mm wave bands increasing the distance on 76GHz over which Full HD pictures have been exchanged to 25km and to over 35km with reduced bandwidth digital TV at power levels of a few mW.
The group has members on the Spectrum Forum (chaired by one of our members), Propagation Studies Committee, Contest Committee, EMC Committee, ETC Committee, Examination Standards and Audit Committees, IARU Committee, and one of our members chairs the Technical Forum.
Members have again visited a number of radio clubs and societies to present talks on microwaves including four talks on the latest developments in amateur mm wave techniques. The Group membership also provided several speakers at the RSGB convention again covering microwave and mm wave communications.

This year saw the 50th anniversary of the Apollo 11 moon landing. To celebrate the part that Goonhilly played in 1969 in relaying pictures from the Indian Ocean geostationary satellite to the UK and the rest of Europe of the first moon walk, a large public event was hosted by Goonhilly Earth Station. Members of the UKuG put on a public demonstration of Earth-Moon-Earth (EME) communication using the 5.7GHz band and the 32m diameter dish at Goonhilly to a public audience of several thousand people.

Technical Support and loan equipment

To support amateur microwave operation, which is sometimes seen as a difficult and expensive part of the hobby, the Group has several 'loan' systems available for members to use. These are for 5.7, 10(2), 24 and 76GHz. These loaner systems are very popular, always out on loan and have, in some cases, a waiting list. The 76GHz system has been used for the world records using DATV on that band.
The UKuG also supports the amateur microwave band beacon network by sponsoring the build of new beacons and upgrades with financial help to purchase equipment, help with beacon applications and advice on system deployment. Since the last report several new beacons have become operational but at the same time some beacons have had to be taken off air. The loss of beacons (and beacon sites) is usually due to amateur usage of sites no longer being seen as 'compatible' with the commercial interests of the site owners. The presence of a UK and European beacon network provides microwave enthusiasts with consistent, known, signals to allow receive equipment optimisation. Many of the UK's microwave beacons now transmit digital modes, enabling them to be received at long distances under extreme weak signal conditions.
Our free-to-members (including free postage) chip bank has thousands of surface mount components for members to use in their construction. The chip bank expands by thousands of parts each year, mainly due to member donation. In the period January to October 2019 a total of 82 requests for components were serviced. This is more than double the number in the whole of 2018. The increase was due mainly to the activity created by the launch of QO-100 and the development of an up converter by G4EML. The chip bank was taken to two of the roundtables this year where more items were distributed and donations of semiconductors and other items, including mixers and amplifiers, were received.
The UKuG has established regional representatives in G, GW, GM and GI, to assist local members in each of those regions with matters pertaining to amateur microwaves. In addition, a list of members willing to provide assistance to others, (particularly newcomers), for example in providing access to test equipment, is published in Scatterpoint, the UKuG's regular publication.

Publications

UKuG members write several of the regular columns in RadCom, write for Practical Wireless and regularly contribute technical articles and the European activity reports for DUBUS magazine.

Scatterpoint

The e-newsletter of the Group, under the Editorship of Roger, G8CUB, is published at least ten times a year and continues to attract top-line technical articles as well as being a comprehensive repository of reports of activity. Copies of the monthly magazine are available to members via 'Groups.io' links. Older issues are available from the UKuG web site (issues for 2019 will become available at the end of December 2019). An annual index is produced for members.

Scatterpoint carries a regular activity report column, compiled by John, G4BAO, which has detailed reports from members of their activities on the microwave and millimetre bands, illustrating the breadth of propagation modes and modes of operation in regular use. These reports cover Wideband, Narrowband and Machine Generated Modes (MGM) activity used for both local and DX operations as well as reports of amateur television on the microwave and mm wave bands and microwave Earth-Moon-Earth communication.

Group web presence

The Group has established a Wiki, which continues to be populated with amateur microwave related material. The UKuG has an increasing number of microwave related videos on its YouTube video channel. The Twitter feed @UKGHZ attracts many likes and retweets, highlighting innovation such as long-distance QSOs on the 47, 76 and 122, 134 and 241GHz mm Wave bands. Our main website, microwavers.org, also provides listings for Operating Firsts/DX records, chip bank stock updates, regularly updated beacon maps and a rolling events calendar.

- Web: http://www.microwavers.org/
- Wiki: https://wiki.microwavers.org.uk/
- Twitter: https://twitter.com/UKGHz
- YouTube: https://www.youtube.com/c/UKMicrowaveGroup

Our sister site, Beaconspot.UK, created and run by UKuG member G8APZ, continues to be very popular with DXers from VHF upwards. Although the domain had to be changed last year from .EU to .UK due to upcoming changes after Brexit, the site has continued to be widely used by microwave operators throughout Europe. It provides an extremely useful resource for the monitoring of propagation conditions and allows beacon keepers to see how well their beacon is being heard.

Operation

The amateur radio microwave bands continue be under threat from many different commercial radio organisations who would wish to use them for mobile broadband and other activities. Of particular concern at the moment is the future access to the 1.3GHz band which is an amateur secondary allocation, shared with radar systems and radio navigation systems, in particular Galileo. It is likely that WRC19 will agree to studies being carried out to determine what protection systems like Galileo will need to provide uninterrupted service and which could impact on the amateur service.

The RSGB administers NoVs for the use of the 2300-2302MHz additional band and for use of frequencies above 275GHz.

A regular and popular 'Digifest' activity was introduced during 2018. This Wednesday evening event continues to attract many users who arrange contacts using various digital modulation modes on 1.3GHz and higher.
The amateur bands above 100GHz have been increasingly used by radio amateurs. On the 2nd August 2019 the first successful two way contact on the 288GHz band took place between G8CUB/P and G0FDZ/P over a distance of 175m. By the 12th September the distance had been increased to 1.25km.

The number of UK amateurs now using Earth-Moon-Earth (EME) communication has increased sharply during the last few years due mainly to the use of digital modes such as JT65, JT4 and QRA64 and it is now routinely possible to work stations on, at least, the 1.3GHz band whenever the moon is above the horizon whilst using small antenna systems. Besides 1.3GHz, UK stations are active on EME on all microwave bands up to 24GHz.

UKuG Contests and Awards

During 2019 the UKuG scheduled contests on fourteen Sundays, covering eleven microwave bands up to 248GHz. There were over a hundred entries across the bands, the most popular being the 1.3 and 10GHz bands. Operation on the higher bands is exclusively by portable stations due to the necessity of line of sight or near line of site propagation and the very low power levels available.

The UKuG presents trophies annually to recognize the achievements made by microwave operators in a number of different areas. These awards are made at the UKuG AGM at the Martlesham Round Table each April. The awards are for the meritorious contributions in the previous year.

The G3BNL Trophy is presented for innovation or technical development of microwave equipment or techniques, in honour of Les Sharrock, G3BNL. The 2018 recipient was Neil Smith, G4DBN.

The G3EEZ Trophy is presented for contributions to microwave communications, in honour of Alan Wakeman, G3EEZ. The 2018 recipient was Tony Horsman, G0MBA for his continuing support of microwave beacons in North Essex.

The G3VVB memorial trophy is presented for the best microwave home project exhibited at a microwave roundtable, in honour of Cyril James, G3VVB. The 2018 recipient was Dave Crump, G8GKQ.

A number of trophies are also presented each year related to operating on the various microwave bands during the series of cumulative contest organised by the UKuG with both open and restricted (low power) sections being recognised

The UKuG each year nominates who should be awarded the prestigious Fraser Shepard, GM3EGW award presented by the RSGB. This award is for research into microwave applications to radio communications.

The Future

The use of software defined radio (SDR) has become common on HF and VHF frequencies but until recently SDR systems capable of operating at microwave frequencies has not been a reality. Now relatively cheap systems such as the LimeSDR and Adalm Pluto systems are available giving transmit and receive capabilities up to 6GHz. The UKuG has recently introduced the 'Hayling Project' which will use a microcomputer to provide the user interface and encoding to drive SDR units capable of generating and receiving microwave frequencies to form the basis of a (multiband) microwave transceiver. The detailed specifications and requirements are yet to be decided and once they are software will be written and hardware selected. Hayling will require the addition of external hardware such as filters, preamplifiers, power amplifiers and antennas to make a complete system, these will be developed as the project progresses over the coming years. It is hoped that the Hayling project will emulate the success of the BATC Portsdown DATV system leading to an increase in microwave activity.

A recent article in the German DUBUS magazine describing a 122GHz transceiver system based on a 122GHz radar IC has led to significant interest around the world and particularly amongst UK microwavers. The production of ready-made PCBs is being arranged by the Australian authors with a large number being purchased by UK amateurs. It is expected that there will be a significant increase in activity on the 122GHz band in the UK in the next year or two.

Submitted by G4LDR on behalf of the UK Microwave Group, November 2019

This Month I have been building…….

This month in the 'DBN machine shop

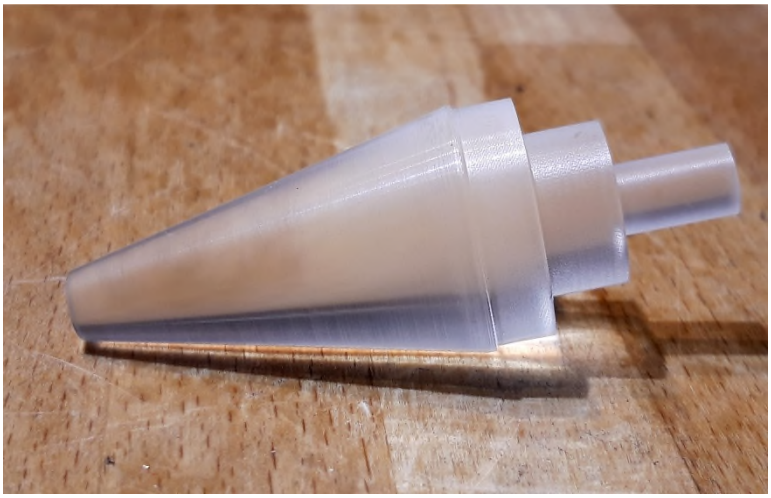
POTY Lenses in Rexolite

A couple of months ago, I made some dual-conical taper Rexolite waveguide. They were based on dimensions originally modelled by Dom F6DRO, but with a small change to allow them to be used with a 0.68 f/d offset dish and UK-sized 0.9mm wall copper tube. They worked well and the pattern looked pretty much as per the modified model I ran in OpenEMS.

The problem was that they were a total pain to make, with the two different tapers requiring a full realignment of the compound slide. The lack of an obvious datum other than the step from 20.22mm to 21.0mm meant that measurement was hard.

The sharp points were also a problem. Rexolite is fairly brittle and needs care with feeds and speeds to ensure a clean finish. The points tended to snap or melt or have a poor surface. I decided to truncate the points as when I re-ran the model with a 2mm flat each end, there was no obvious difference in results.

After a suggestion from Mike, G0MJW, I tried the design by Willi, HB9PZK, with a small chance to fit UK tube. This has a stepped rear multi-stage match and a truncated forward cone. No changes to the compound taper needed, and the face of the rearmost 6mm diameter section makes a very convenient datum. The stock material is one inch diameter, so I use a 26-25mm collet, turn 21.0mm diameter for 40mm, then turn the steps.



A quick polish with fine Scotchbrite and WD40, then I saw off (rather than part off) to 2mm over length, repeating until I have had enough. Next, I swap to a 14-13mm collet and chuck each lens using the middle step, turning the taper, then the truncated point, another polish, and on to the next one. Neil G4DBN http://g4dbn.uk

122GHz threaded-barrel Chaparral-style feedhorns

As a machining exercise, I made a high-speed toolpost spindle to use when cutting tiny face grooves. I use a 14,000 rpm 600W motor with electronic three-wire drive. It has an ER11 collet which can take up to 6mm shank tools. I decided to try it out making the 0.5mm wide by 0.75mm deep grooved choke rings on the face of my threaded version of the VK3CV-designed Chaparral-style 122GHz feedhorns.

I ran the lathe at 8 rpm and used the compound slide to plunge into the 7mm diameter face. It worked without fuss, although it really needs to run at 48,000 rpm. I used a Noga-Cool mister, running dry, to clear the chips.

The finish on the bottom and sides of the grooves is reasonably good considering this is being done on a great big 1980s cast iron manual lathe weighing a ton or so.

I made up a batch of seven to check the repeatability and tool life. All looks good. Neil G4DBN http://g4dbn.uk

Poor Man's Dish Feed Construction

Andy Gilfillan G0FVI

Earlier this year I finally decided to take the plunge and have a go at microwaves, specifically EME on 23cm (also 13cm) and Satellite (Es'Hail 2). Sam G4DDK advised me to go for a dish on 23cm and feed it with an SM6FHZ patch. As someone who is not a metal basher and does not even possess a vice I searched around hard for someone to construct the patch without success (I lost track of the number of local firms contacted who simply were not interested despite advertising 'small jobs undertaken' although I did find a firm in Cornwall who laser cut discs/squares of metal). I spoke to a local Ham who told me how he had built a dual band patch feed for E'sHail 2 by cutting the metal with a saw followed by filing (no mean feat!). Searching around Youtube revealed that people were cutting various metals with a jigsaw and fine blade and consequently I put together the following method for patch feed construction (I claim no originality!), initially an SM6FHZ patch followed by a G0MJW et.al. Es'Hail patch feed. The following write-up is aimed at beginners like me, to show that it can be done with modest tools to construct dish feeds from copper (or brass). Dish feed dimensions and general construction details can be found on the websites referenced below.

Measuring up

It goes without saying that achieving mm precision is essential for microwave band dish feeds. A digital Vernier is essential and thankfully reliable accurate units can be purchased quite cheaply through ebay. Marking up should be done with very fine tipped markers or pencils, and circular elements can be marked out using a locking compass.

Cutting the metal

Not having access to a lathe can make cutting the metal for a dish feed a challenge. It can be done with a jigsaw fitted with a fine metal cutting blade (if done slowly and carefully!). If you decide to use copper, you will almost certainly find a jigsaw will warp the metal and/or leave rough edges (you can probably skip the following procedure if using brass). The way to get around this (most patches seem to use metal thickness of around 1mm) is to sandwich the copper between fibreboard of around 4-5mm thickness (i.e. backings off modern wardrobes etc.). Use contact adhesive to form a fibreboard-copper-fibreboard sandwich, put some weight on the top on a flat surface and allow to set (at least 24 hours is required). After the glue has set mark up your patch and reflector. Allow at least 1mm over the required size (i.e. if your patch element is for example 119mm diameter cut to 120mm) as using a jigsaw is imprecise and at is better to cut oversize. Clamp the sandwich in place and cut with jigsaw using a fine metal cutting blade (photo 1).

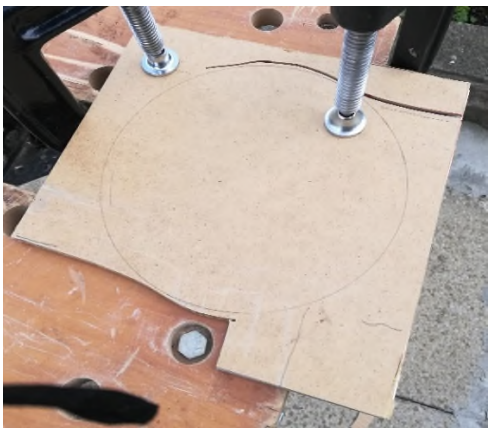


Photo 1: Cutting

Photo 2: Patch element ready for filing

Filing the metal

After cutting you are ready to begin filing to get the patch to the required size. Use the Vernier to mark up to the required dimensions (i.e. diameter) and carefully file whilst clamping. If you have access to a rotary grinder (or Dremel) the job will take much less time.

Photo 3: Use one of these if you can!

Drilling Feed Holes

For the steady-handed you can probably mark-up and drill feed holes reasonably well, although for microwave frequencies great care is required. I used a hand drill pillar clamp (ebay around £12-15). Once again you will need some method of clamping the copper sandwich or brass metal. Once feed holes are drilled, carefully remove fibre board from metal (if you have used copper).

Soldering/brazing

After you have double checked all the dimensions and position of feed holes etc. you can add the required connectors (SMA/N type). Make sure any protruding screws are filed down to avoid detuning. Solder on feed wire to SMA/N sockets. If you are adding a choke ring to your patch, go through the above procedures, once again overcutting by at least 1mm. At this stage you should solder/braze-on the choke ring. Rub down with wire wool and apply flux. Forget soldering with anything less than a few hundred watts, the heat will simply dissipate too quickly. Spot solder/braze on any choke to get adhered to patch reflector before forming a seam of solder all the way round (do not use too much solder and allow an overhang of 1mm which you can file down after you are happy with your soldering/brazing). Hopefully you should end up with something approximating that seen in photo 4 (centre support and feed wires from SMA sockets visible).

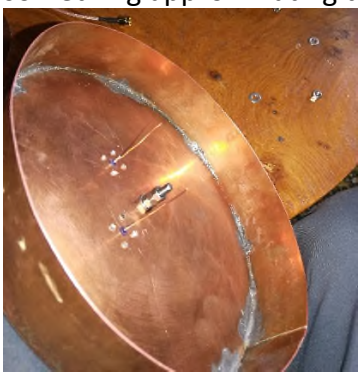


Photo 4: SM6FHZ patch nearing completion
(not pretty, and excess solder to be removed!)

Photo 5: SM6FHZ patch (after filing)
showing rear with SMA sockets

Tuning

Before soldering in place any patch element, it is advisable to check the tuning. Simply assemble and bend back wire(s) from SMA/N socket(s) so that it is in direct contact with patch element. To alter tuning add or remove 1mm thickness (better still 0.5mm) washers to centre support. Tuning is best done with a Vector Network Analyser (VNA) or spectrum analyser/noise source combination. VNA's covering the lower microwave frequencies tend to be relatively expensive as do spectrum analysers. Cheap Chinese VNA's have

appeared on the market and whilst most are not accurate at such frequencies, the Accuracy Agility Instrument N1201SA works well up to 2.7GHz and can be purchased on ebay for around £150. Tuning can also be accomplished with an RF bridge, noise source and SDR receiver combination. Once tuning is accomplished patch element can be put in place and feed wires from sockets soldered (unless you are very competent with a brazing torch it is probably a good idea to solder feed wires to avoid them overheating and coming away from the SMA/N sockets).

Proof is in the pudding!

Photo 6 shows a readout from the N1201SA for a completed SM6FHZ patch. You can see the plot of S11 (return loss) closely matches that which is expected from careful construction. I compared the reading from the VNA with return loss measured using a noise source/rf bridge/SDR combination, both were in reasonable agreement within a dB or two.

Photo 6: Return loss for SM6FHZ patch


Photo 7: Es'Hail dual band feed currently in use!

I have used the above method to construct a feed for Es'Hail 2 (Photo 7, now in use). If you don't have access to a lathe you might find this construction method is for you. Do have a go!

Full details of SM6FHZ patch at:

http://www.2ingandlin.se/Circularly%20polarized%20patch%20feed%20for%201296%20MHz_A.pdf

Dual Band Es'Hail feed at: https://uhf-satcom.com/blog/patch_antenna

Editors Comments

Coming into the Christmas period there is quite often some good winter microwave propagation. Let us hope for some this year!

The next edition of Scatterpoint will be published in early February, and will be a combined December/January magazine.

From Murray

The UKuG Spectrum Forum Report is online with all the others at:

http://rsgb.org/sfmeeting2019

Including our WRC-19 overview slides and some other slides warning everyone to get logged on and renewed for their main licence so they don't lose their callsign in future!

Microsource Synthesiser SNY-0204-550-01

Roger G8CUB

This synthesiser is marked 2.16 – 4.3GHz. Though the samples tried will work down to 2.08GHz.

I had used this type of synthesiser a few years ago, to make a 122/134GHz beacon TX. Having borrowed the synth from a 2.3/3.4GHz transverter project that was never completed.
My problem with the beacon, was that it was on the wrong frequencies, and I had lost my notes on how to program the synth!

After a bit, actual a fair bit of deduction, I worked out the programming. A further complication was that, I was using Dave G4FRE's program on a 12F629 pic. This being an un-modified version of the ELCOM synth program. I was stuck with this, as my programming skills are non-existent.

Firstly the Microsource synthesiser.
A spec on a similar unit is here: http://www.gigatronics.com/uploads/batch_upload_files/D8FH.pdf
It uses a 10MHz reference 0+/-3dBm. Output is +17dBm. Supply +5V and +15V.
Step size is 125kHz.
On the 15V supply, I found in practice that it works fine on 12V, with the output dropping 0.5dB @ 10.8V.

The programming is by a 16 Bit Binary work, preceded by ascii 'C'.
With a bit of trial and error, I worked out, it was as follows:
Ascii 'C'/ 512MHz / 32MHz / 2MHz / 125kHz

Then it is just a matter of working out how many 512MHz, 32MHz etc. in the wanted frequency. Each block being a 4 bit binary word (hex).

To program using the Elcom software, requires putting this in reverse order.
The last block is then ascii 'C' read left to right = C2 in hex.
Each 4 bits are read left to right, and converted back to hex.

3.4GHz normal programming would be:
Ascii 'C' 6 A 4 0

Converting for the G4FRE program, this becomes:
0 / 02 / 56 / C2

2,185,75GHz would be:
Normal: ascii 'C' 4 4 4 E

Elcom program:
0 / 72 / 22 / C2

It will make sense if you try it a couple of times.

Having sorted that, I needed another couple of synths.
Purchasing on ebay in early December from Israel. The cost when buying three with duty, was just over £20 each.

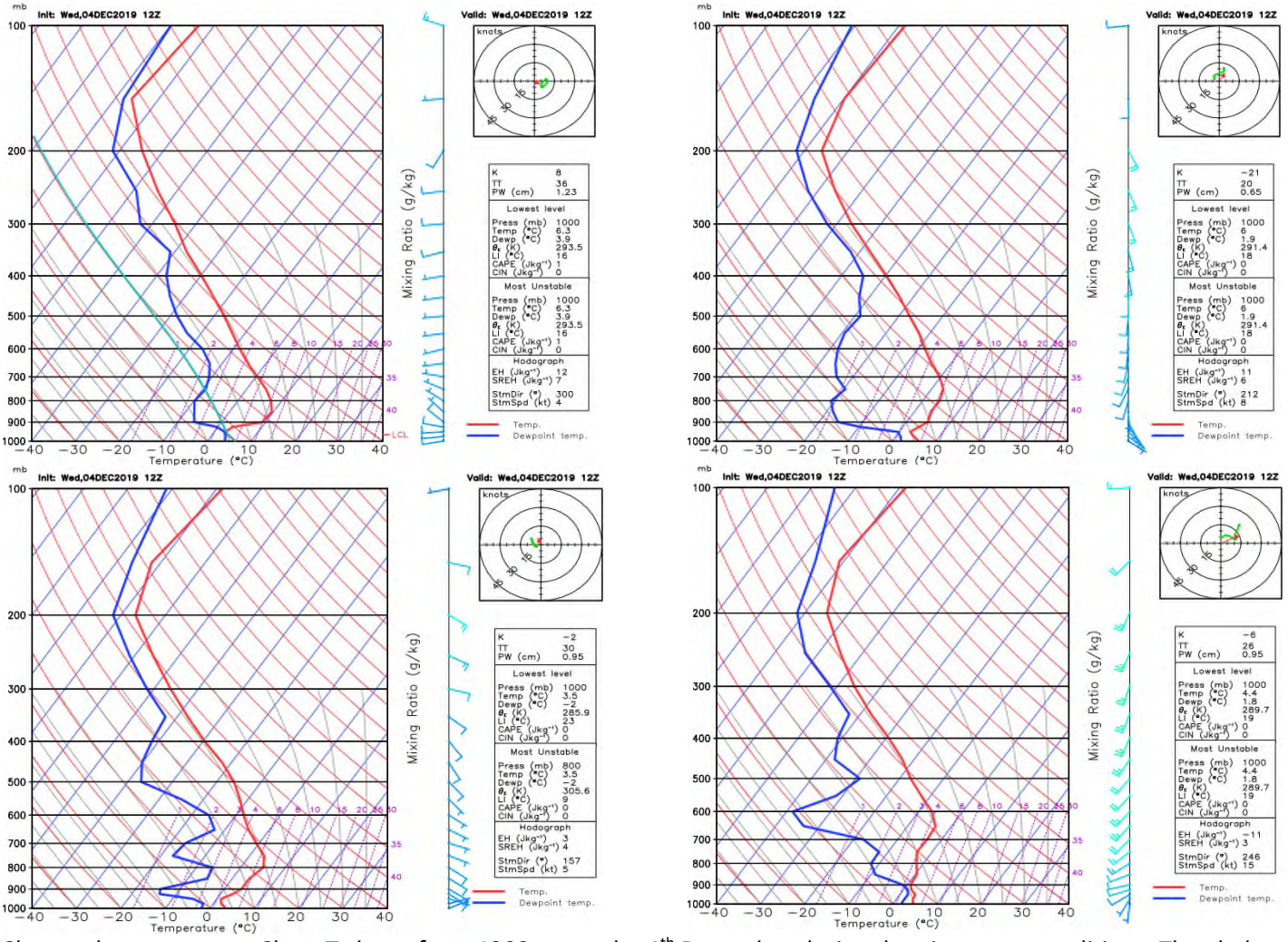
They are rich in harmonics, which is useful as I directly filter the output for higher frequencies. My wanted frequency was 10.2GHz, being the third harmonic of 3.4.
The only issue I found was that the output, at some frequencies, did not like a bad match. This was solved by using a 2 or 3dB pad on the output.
On the beacon I could not get 122.400GHz with 125kHz steps, but settled for 122.402GHz.

By John G4BAO

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

Scatterpoint activity report

From Nick G4OGI



Shown above are some Skew-T charts from 1200utc on the 4th December during the nice tropo conditions. They help to build a picture of the tropo conditions during the day. Clearly it favoured the European continent and if you look at Copenhagen and Frankfurt you will not see a strong temperature inversion suggesting good 23cm propagation, which in fact happened with DL6NCI and DB6NT working 100km into Denmark and Norway. The key is to look at the increase in temperature with height (the red line). The more pronounced temperature increase gives better conditions
The inversion height is at either 900 or 800mb pressure:-

700mb is about 3km
800mb is about 2km height
900mb is about 1km
If you look at them as a set you will see a weak set of conditions for London and Manchester – much stronger in the morning when I was hearing DB0GHZ on 3cm at a decent strength. Any comments on these or to get copies of the other Skew-T charts, please contact me at nick(at)g4ogi.uk
PI7ALK has returned to normal strength this evening. It did get very strong last night and during the daytime here it disappeared. Came back after about 1500utc
Didn't hear anything else apart from DB0GHZ this morning.

UK Microwave Group GX3EEZ

G4BAO has been causing a bit of a stir by using the UKuG's club callsign GX3EEZ on 23cm JT65c EME from his home QTH. Amazing how an unusual call gets you replies to CQ calls! The last leg of the ARRL EME contest was held from the 16th to 17th of November 2019 and on the 17 he aired GX3EEZ to work the following.
(sent report first)

SM4GCC	-18	-17
UA3PTW	-9	-13
ES3RF	-25	-19
OK2DL	-10	O
OK1KIR	-8	O
OK1DFC	-19	O
HB9Q	-1	-4
EA8DBM	-13	-12
K6MG	O	-18
RA3EC	O	-19
OK2DL	O	O
F1RJ	O	-14
OH1RY	O	O
N5BF	O	O
KA1GT	O	-17

On December 6th GX3EEZ worked

G4FQI	-19	-17
IK1FJI	-18	-23
K5DOG	-22	-19
VA6EME	-24	-22

From G4BAO

Operating under my own call in the contest, I decided this time to forgo working "the usual suspects" on CW and focus on picking up some new 1.3GHz stations on JT65c. I was particularly pleased to make a QSO with FR5DN on Reunion Island in the Indian Ocean, LG78 for DXCC #44 and initial #122 on the band, along with new initials DKØZAB, ES3RF, ON5GS, OK2ULQ, DL3EBJ and SM4GGC. Remember that all this is with just a 1.9m dish so there is plenty of DX to be had off the Moon, even from a limited site like mine.

FRARS 10GHZ EME report from John G0API

On the 5th December we setup the system by 1600Hrs, even though a 12V PSU in the external cabinet had developed a fault that tripped the meeting room RCD till we found the fault. The large TWT was first bench tested into 50 Ohm load and finally tweaked on the dish using the CCTV feed to adjust the 3-stub waveguide section whilst watching the reflected power metering on the internal PSU.
Output indicated was 198W, with approx. 6.5W reflected.

The predicted path loss was showing around -2dB and initially the Moon was scraping across the treetops. Other than that the system was performing normally, with around 1.5dB surface noise throughout the session. The revised Medii tracking control worked faultlessly.
We had advised our activity on Moon Net and the HB9Q logger, and stations started to appear on the logger at 16.42 GMT. Between then and 17.21 we had RX reports only from IW2FZR @ -11. CT1BYM @ "FB signal" IW2FZR @ -10 on Spectragram. UR5LX @ -9. IK6CAK @ -8. IW2FZR @ -9 and CT1BYM @ -9 at 17.21. Our own echoes were peaking at 16dB showing some spreading. CW and SSB were tested OK. At 17.43 we managed a 2 way with UR5LX @ -17 sent and -7 RX. He was using 20W to a 2.4m diameter dish. At 20.02 a second 2 way with DF1SR @ -20 sent and -10 RX. Both contacts were initials (first time worked by us). Our Echoes had reduced to a peak of 14dB at that time.
Operations finished at 21.30Hrs and it took 40 mins to remove and store the kit - the TWT umbilicals have been left inside the duct to reduce rigging time.
A possible further 10GHZ EME activity may occur on January 2nd , subject to WX etc .This would be a pm/early evening session.

From David G4RQI

Apart from a sked on 23cm with Ed G3VPF next to Hardy Monument (IO80) in Dorset it's been a very quiet month. We used the repeater GB3DT near Blandford for talkback with Ed able to access the repeater directly while I connected to it via Echolink. Ed was running 10w while I was using 90w to an 18ele. I'm looking for AS skeds on 23cm if anyone is interested QTHR QRZ.com

From Graham G3YJR

Operating on the 26th November SHF UKAC Contest using 13cm & 3cm
I hopped about between both bands. On 13cm it was nice to work Pete G4CLA again. Keith G4ODA was my best DX (longest distance) at 117 km. So my contacts were all pretty local really. I used 25W into the coax to the antenna box, so the Andrew amplifier was under-driven.
I'm running with a BPF now; the loss is a bit more at 2.30 than at 2.32 GHz. I run both transmit and receive through the BPF. On receive, I hope this keeps a lot of out-of-band signals from the Crosspool transmitter masts out of the pre-amp.

From Dave G6KWA

First proper testing of the twin 60 W G4BAO PA completed in the Microwave November Low Band contest with a pleasing 8/21 placing on 1.3 GHz only entry (overall 13/23). Seems to run very nicely at 100 W (47W at aerial connection), so completing my 23 cm station for now. Very pleased with my best ever DX of 528 Km and thanks to GM4JTJ for the trouble he took for the difficult QSO via AS. Not bad from my hole in the ground QTH. The repaired and retuned MVV 1296 pre-amp with Hempt and ceramic trimmer on input is giving me a total system noise figure (using the GM3SEK spreadsheet) is around 1.4db) with the Icom 9100, using 20m of Ultraflex 13 from the pre-amp (with tiny UF13 tail to the HB 47 element Yagi) supplied via a HB bias tee. Just need to finish the G3XDY filter now.

Contests

Low Band Championship 2019

Once again entries went up this year, to a record 40 different callsigns.
Conditions have been flat on most occasions, with variable levels of activity, although the November event seems to be the most popular with several entrants making a first appearance in that session.

1.3GHz

After seeing a new callsign at the top last year, M0HNA/P resumed their winning ways on this band with two session wins. John G4ZTR had to settle for the runner up spot again with one session win this year. A special mention goes to Jon GM4JTJ who convincingly won the November session from Scotland, taking advantage of his high pts/QSO average.

2.30GHz

At last M0HNA/P had some competition this year, with three other entrants, although they still won the band by a large margin.

2.32GHz

Denis G3UVR takes top spot on this band by virtue of two session wins and a second place. M0HNA/P took the runner-up slot with one session win and one second place.

3.4GHz

M0HNA/P won this with maximum points from three session wins. David M0GHZ was second with one session win and two runner-up slots.

Overall

Once again it is the “Combe Gibberlets” group (M0HNA/P) at the top of the table with substantial margin of victory. David M0GHZ was overall runner up and leading fixed station.
Congratulations to the winners and runners up mentioned above.
73
John G3XDY
UKuG Contest Manager

Low Band Championship 2019

Final results after five sessions, the best three events count towards the total

Overall

Pos	Callsign	03/03/2019	07/04/2019	05/05/2019	02/06/2019	17/11/2019	TOTAL
1	M0HNA/P	3595	3865	3289	3670	3544	11130
2	M0GHZ	1091	2286	0	1383	0	4760
3	G3UVR	1541	1511	663	224	1474	4526
4	G6TRM/P	0	908	1266	2168	0	4342
5	G4LDR	1063	1321	548	1804	1084	4209
6	G4ZTR	0	841	0	1000	1453	3294
7	G3UKV	828	1563	0	0	519	2910
8	G8CUL	0	0	0	0	2902	2902
9	M3P	0	0	2874	0	0	2874
10	GM4JTJ	0	0	561	471	1000	2032
11	G7LRQ	0	0	0	0	1234	1234
12	G8AIM	0	680	0	0	478	1158
13	G4KIY	464	283	358	0	0	1105
14=	M0UGA/P	0	1000	0	0	0	1000
14=	G4FRE/P	0	0	0	0	1000	1000
16	G8OHM	0	0	997	0	0	997
17	GI6ATZ	0	950	0	0	0	950
18	GM4BYF	290	327	322	165	0	939
19	G3SQQ	0	0	0	0	852	852
20	G3YJR	53	302	0	0	376	731
21	G3WJG	0	0	662	0	0	662
22	G8DOH	0	0	282	0	315	597
23	G4BRK	0	0	554	0	0	554
24	GD8EXI	0	0	0	0	515	515
25	GM8IEM	406	0	0	0	0	406
26	G6KWA	0	0	0	0	405	405
27	G1PPA/P	0	0	0	0	384	384
28	G8EOP	0	0	0	0	313	313
29	G4RQI	0	0	0	0	312	312
30	GM4DIJ(/A)	103	195	10	0	0	308
31	GW4MBS	0	0	0	0	245	245
32	G4BAO	0	228	0	0	0	228
33	G0LGS/P	0	209	0	0	0	209
34	G6GVI	0	38	58	29	67	163
35	G1DFL	0	42	0	0	88	130
36	GW4JQP/P	0	0	0	0	118	118
37	GD1MIP	0	0	0	0	115	115
38	G0HIK/P	63	0	0	0	0	63
39	M0KPW/P	34	0	0	0	0	34
40	M0XIG/P	0	24	0	0	0	24

1296MHz

Pos	Callsign	03/03/2019	07/04/2019	06/05/2018	03/06/2018	18/11/2018	TOTAL
1	M0HNA/P	1000	1000	837	777	724	2837
2	G4ZTR	0	841	0	1000	703	2544
3	G3UVR	541	545	179	34	474	1560
4	G6TRM/P	0	347	391	587	0	1325
5	M0GHZ	396	622	0	142	0	1160
6	G4KIY	464	283	358	0	0	1105
7=	M3P	0	0	1000	0	0	1000
7=	GM4JTJ	0	0	0	0	1000	1000
9	GI6ATZ	0	950	0	0	0	950
10	G4LDR	253	219	226	398	128	877
11	G3UKV	288	260	0	0	229	777
12	GM4BYF	0	327	197	165	0	689
13	G3YJR	53	302	0	0	304	659
14	G8CUL	0	0	0	0	648	648
15	G8DOH	0	0	282	0	315	597
16	GD8EXI	0	0	0	0	515	515
17	G7LRQ	0	0	0	0	511	511
18	G8OHM	0	0	441	0	0	441
19	GM8IEM	406	0	0	0	0	406
20	G6KWA	0	0	0	0	405	405
21	G1PPA/P	0	0	0	0	384	384
22	G4RQI	0	0	0	0	312	312
23	GM4DIJ(/A)	103	195	0	0	0	298
24	G3SQQ	0	0	0	0	273	273
25=	G8AIM	0	164	0	0	81	245
25=	GW4MBS	0	0	0	0	245	245
27	G0LGS/P	0	209	0	0	0	209
28	G6GVI	0	38	58	29	67	163
29	GW4JQP/P	0	0	0	0	118	118
30	GD1MIP	0	0	0	0	115	115
31	G4BAO	0	85	0	0	0	85
32	G0HIK/P	63	0	0	0	0	63
33	G8EOP	0	0	0	0	62	62
34	M0KPW/P	34	0	0	0	0	34
35	M0XIG/P	0	24	0	0	0	24

2300MHz

Pos	Callsign	03/03/2019	07/04/2019	06/05/2018	03/06/2018	18/11/2018	TOTAL
1	M0HNA/P	1000	1000	1000	1000	1000	3000
2	G4LDR	0	307	0	912	117	1336
3	G8CUL	0	0	0	0	784	784
4	M3P	0	0	450	0	0	450

2320MHz

Pos	Callsign	03/03/2019	07/04/2019	06/05/2018	03/06/2018	18/11/2018	TOTAL
1	G3UVR	1000	966	484	190	1000	2966
2	M0HNA/P	595	865	452	1000	845	2710
3	G6TRM/P	0	561	529	605	0	1695
4	G4LDR	540	647	158	360	209	1547
5	G3UKV	540	712	0	0	290	1542
6	M0GHZ	338	736	0	241	0	1315
7	GM4JTJ	0	0	561	471	0	1032
8=	M0UGA/P	0	1000	0	0	0	1000
8=	M3P	0	0	1000	0	0	1000
10	G8CUL	0	0	0	0	869	869
11	G4ZTR	0	0	0	0	750	750
12	G7LRQ	0	0	0	0	723	723
13	G3SQQ	0	0	0	0	579	579
14	G8OHM	0	0	556	0	0	556
15	G8AIM	0	238	0	0	177	415
16	G8EOP	0	0	0	0	251	251
17	G4BRK	0	0	164	0	0	164
18	G3WJG	0	0	156	0	0	156
19	GM4BYF	0	0	125	0	0	125
20	G3YJR	0	0	0	0	72	72
21	G0HIK/P	51	0	0	0	0	51
22	GM4DIJ	0	0	10	0	0	10

3400MHz

Pos	Callsign	03/03/2019	07/04/2019	06/05/2018	03/06/2018	18/11/2018	TOTAL
1	M0HNA/P	1000	1000	1000	893	975	3000
2	M0GHZ	357	928	0	1000	0	2285
3	G4LDR	270	148	164	912	630	1812
4	G6TRM/P	0	0	346	976	0	1322
5	G4FRE/P	0	0	0	0	1000	1000
6	G8CUL	0	0	0	0	648	648
7	G3UKV	0	591	0	0	0	591
8	G3WJG	0	0	506	0	0	506
9	G8AIM	0	278	0	0	220	498
10	M3P	0	0	424	0	0	424
11	G4BRK	0	0	390	0	0	390
12	G4BAO	0	143	0	0	0	143
13	G1DFL	0	42	0	0	88	130

The rules and calendar for the 2020 UKuG Contests will be set in late December 2019, so now is your opportunity to make suggestions for changes or improvements. No significant changes to the 2019 rules or calendar are planned for next year, subject to your feedback.
Contact John if you have any suggestions: g3xdy@btinternet.com

November 2019 Lowband Contest Results

Activity levels were good for this event, with several portables active, helped by fair weather.

Jon GM4JTJ was the runaway winner on 1.3GHz, with the Combe Gibberlets (M0HNA/P) as runner up. As last year, a number of stations broke the 600km barrier for their best DX distances in this session. The best contact was by GM4JTJ who worked Chris SM6VTZ at 827km in JO58UJ.

This year there were three entrants on 2300MHz, with M0HNA/P winners ahead of Mike G8CUL as runner-up.

Denis G3UVR was the leading station on 2320MHz, with 10 QSOs. The runner-up was Mike G8CUL with 12 QSOs. The best DX reported was between G3UVR and G3XDY at 324km.

A close contest on 3400Mhz saw G4FRE/P emerge as the leader, with M0HNA/P as runners up. Activity was not quite as good as last year on this band. Best DX was G4LDR's QSO with G4ODA at 212km.

The overall winner was the Combe Gibberlets group consisting of G3TCT, G3TCU, G4SJH, and G1EHF, who won on 2300MHz and were second on 1.3GHz and 3.4GHz. Overall runner up and leading fixed station was Mike G8CUL.

Congratulations go to the overall Winner M0HNA/P and Runner-up G8CUL and to the following winners / runners-up:

1.3GHz GM4JTJ, M0HNA/P, G1PPA/P (Low Power)
2.30GHz M0HNA/P, G8CUL
2.32GHz G3UVR, G8CUL, G4ZTR (Low Power)
3.4GHz G4FRE/P (Low Power), M0HNA/P

Overall

Pos	Callsign	1296MHz	2300MHz	2320MHz	3400MHz	Total
1	M0HNA/P	724	1000	845	975	3544
2	G8CUL	601	784	869	648	2902
3	G3UVR	474	0	1000	0	1474
4	G4ZTR	703	0	750	0	1453
5	G7LRQ	511	0	723	0	1234
6	G4LDR	128	117	209	630	1084
7	GM4JTJ	1000	0	0	0	1000
8	G4FRE/P	0	0	0	1000	1000
9	G3SQQ	273	0	579	0	852
10	G3UKV	229	0	290	0	519
11	GD8EXI	515	0	0	0	515
12	G8AIM	81	0	177	220	478
13	G6KWA	405	0	0	0	405
14	G1PPA/P	384	0	0	0	384
15	G3YJR	304	0	72	0	376
16	G8DOH	315	0	0	0	315
17	G8EOP	62	0	251	0	313
18	G4RQI	312	0	0	0	312
19	GW4MBS	245	0	0	0	245
20	GW4JQP/P	118	0	0	0	118
21	GD1MIP	115	0	0	0	115
22	G1DFL	0	0	0	88	88
23	G6GVI	67	0	0	0	67

Midland Round Table and ATV Event

Report in the next issue

UKuG MICROWAVE CONTEST CALENDAR 2020

Dates to be published when available

Events calendar

2020

January 11	Heelweg	http://www.pamicrowaves.nl/
February 15	Tagung Dorsten	www.ghz-tagung.de/
March 7	Cardiff Roundtable	**http://www.cardiffars.org.uk/roundtable/**
April 4	CJ-2020, Seigy	http://cj.r-e-f.org
April 17-18	Martlesham Roundtable & AGM	**http://mmrt.homedns.org/**
May 15-17	Hamvention, Dayton	www.hamvention.org/
June 26-28	Ham Radio Friedrichshafen	http://www.hamradio-friedrichshafen.de/
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/
October 15-18	Microwave Update, Sterling, Virginia	www.microwaveupdate.org
October 10-16	IARU-R1 General Conference, Novi Sad	www.iaru2020.org
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