An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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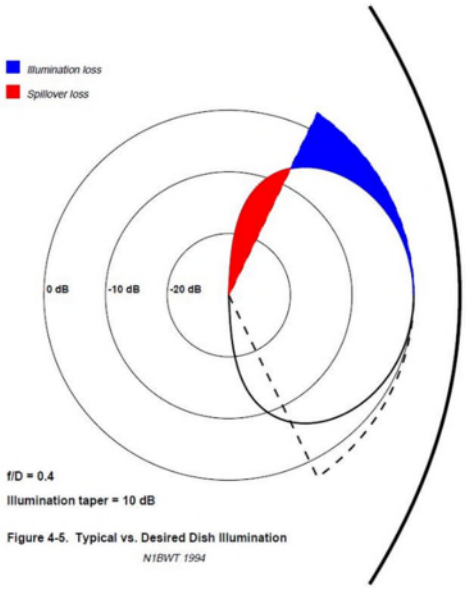

OM6AA Loop – John G4ZTR

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 have coped with the COVID-19 lockdown.
While we are not out of the woods yet with COVID-19, and may not be for many months or more; things are gradually being relaxed which has meant that portable operation in England has been possible since May. It has been good to hear some portable operation during the numerous contests and activity periods that has taken place recently. Unfortunately Wales and Scotland still have restrictions in place until the 6th July and in line with the RSGB we have not been able to accept contest entries from portable stations as it would be unfair on those that do not live in England. John G3XDY has an important update on portable station entries later in this issue following the RSGB's decision to allow portable entries to their contests once travel bans are lifted across the UK.

I said in my last 'Chairman's Notes' in April that we had to postpone the AGM until it was clearer what impact COVID-19 would have. One of the options the committee discussed at the time was to hold the AGM at the RSGB Convention in October. With the convention now being an online event that option is no longer available to us. I have asked the committee for their views on what we should do. We will update you once a decision has been made.

The 122GHz boards and antenna parts finally arrived in the UK in early June. We must thank Roger G8CUB for making the arrangements for the boards to be imported from Australia. I am keeping an eye on what is going on, on the 122GHz Groups i.o. chat. Some people have already done tests across the shack or down the garden and there has been much discussion about modifications to the boards particularly in relation to external frequency locking. Probably the hardest part in putting together a 122GHz system will be interfacing to a suitable dish and the aligning the transverter and feeds on the dish to obtain maximum gain. It will be good to see people out portable in the September mm-Wave event, which has been re-scheduled from June, with their 122GHz systems. I expect however that we will need to wait until the coldest and driest (i.e. lowest absolute humidity) days in the middle of winter before we see DX being worked and the UK distance record on the band being increased. The current UK record was set in 2017 by GJ/DB6NT and F/DG8EB at 35.8km.

Take care and stay safe.

Neil Underwood, G4LDR.

THE OM6AA LOOP FEED FOR PRIME FOCUS PARABOLIC DISHES

By John Lemay G4ZTR

Introduction

In an ideal world, a dish feed should:

1. illuminate all parts of a parabolic reflector with an equal amount of power (no taper of illumination or "illumination loss" towards the edges); this is shown by the dotted line in the illustration below, and
2. provide no illumination beyond the dish edge (no "spillover loss").

In practice, most feeds will illuminate the parabola unevenly with reduced levels towards the dish edge and some illumination beyond the edge; shown by the oval shaped solid line below.

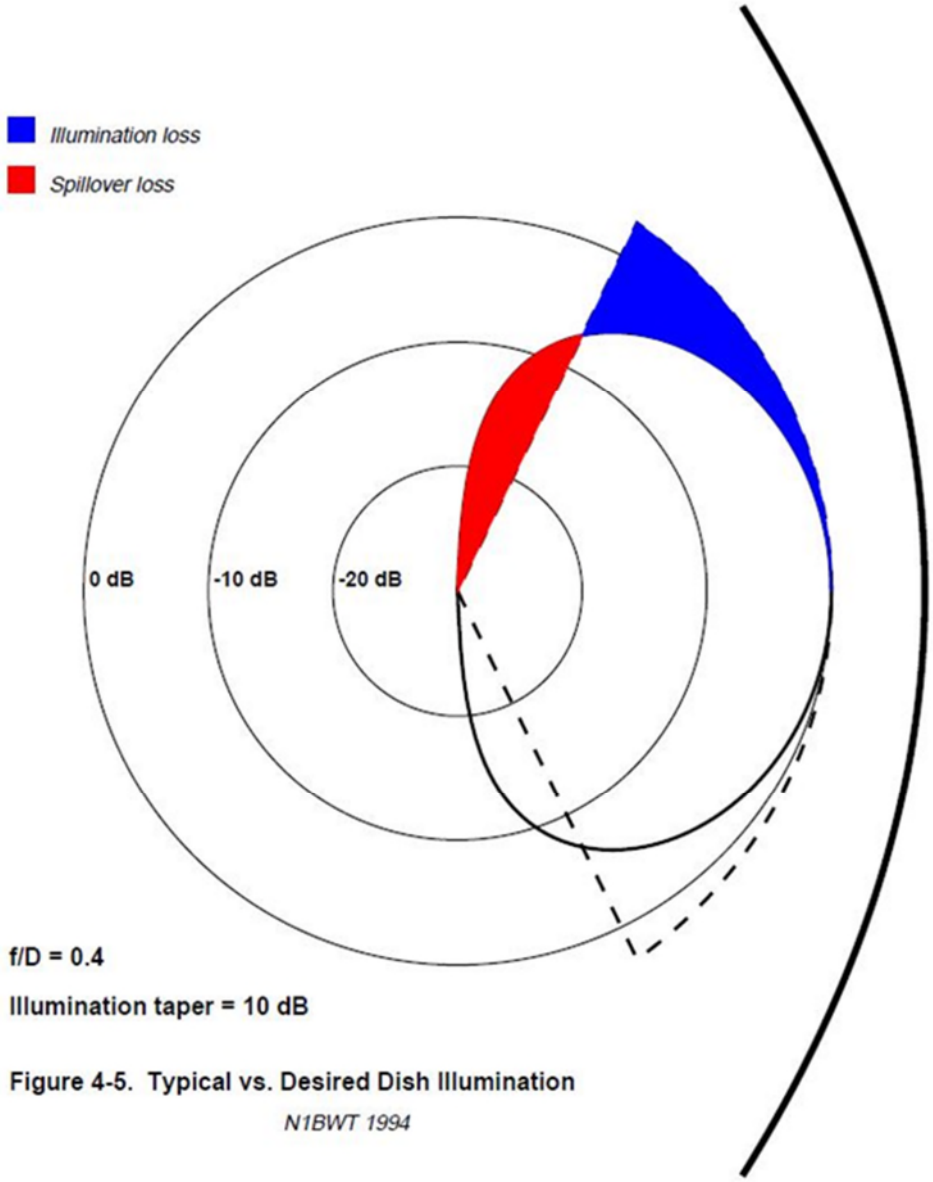


Figure 4-5. Typical vs. Desired Dish Illumination

N1BWT 1994

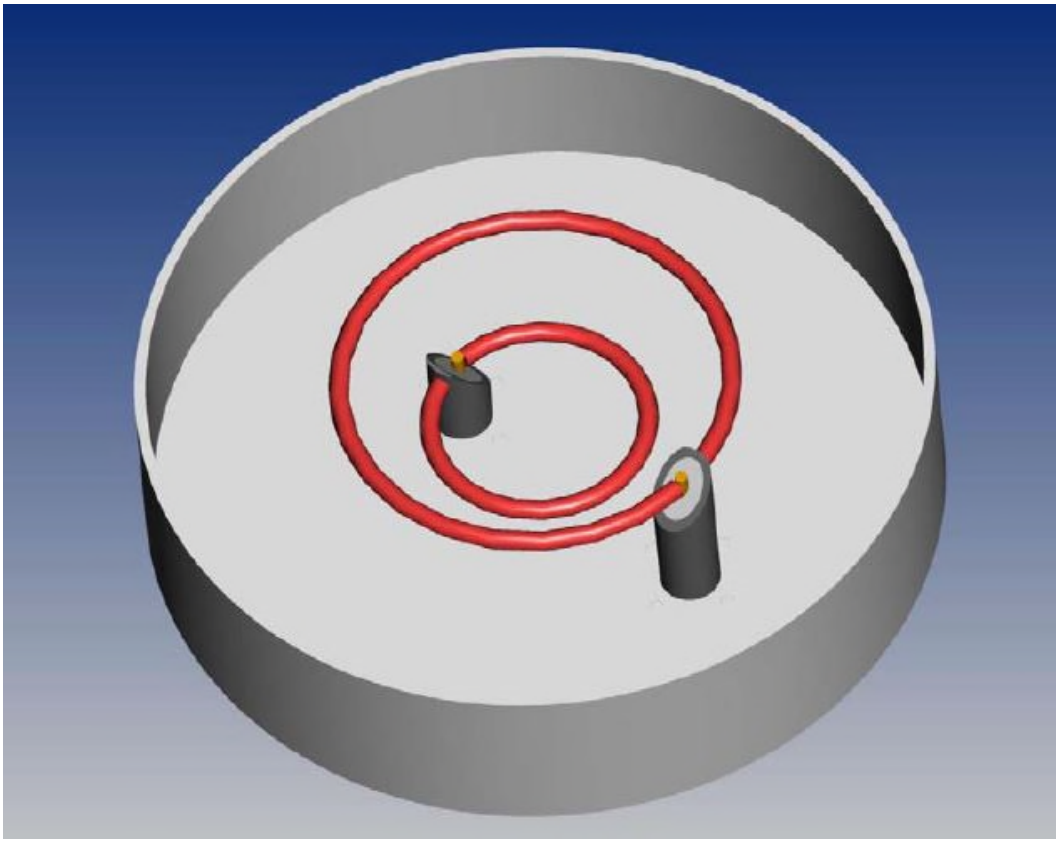
A few carefully designed single band feeds approach ideal illumination, but dual or multiband feeds do not. In 2007 OM6AA designed and built a useful compromise dual band feed for 23 and 13cms.

Analysis

OM6AA analysed the radiation characteristics of a one wavelength circular loop feed placed 1/8th wavelength above a reflecting disc. CST MW Studio software was used. Three different reflector sizes were investigated and as is widely reported, the beamwidth is unequal in the horizontal (E Plane) and vertical (H Plane). The unequal beamwidths mean that illumination of the parabolic surface will not be uniform.

A small reflector with a choke ring was also analysed and this has horizontal and vertical beamwidths which are closer to being equal because the provision of the choke widens the horizontal beamwidth. Small reflectors are desirable to minimise blocking of the parabola, particularly if the dish is small.

Reflector disc diameter (wavelengths)	Main beam gain (dBi)	Rear lobe suppression (dB)	Total horizontal angle for -10dB (degrees)	Total vertical angle for -10dB (degrees)
0.5	8.2	5.8	113	144
0.75	8.9	13.7	112	140
1.0	9.4	17	107	129
0.606 with choke ring by OM6AA	8.2	17.4	133	143



By using the reflector with choke ring a more even illumination of the parabolic dish is achieved, in other words the horizontal and vertical radiation patterns become similar.
OM6AA tested the feed with choke for 23cms in an anechoic chamber and good correlation of theory and practice was shown, down to around -15dB on the radiation pattern.
Following good results with the single loop for 23cms, a loop for 13cms was placed inside the 23cms loop, with the following results;

Reflector disc diameter (wavelengths)	Main beam gain (dBi)	Rear lobe (dB)	Total horizontal angle for -10dB (degrees)	Total vertical angle for -10dB (degrees)
Approx. 1.1 at 13cms	-	-	100	120

Construction
The loops are formed with wire a few millimetres thick, or by using .141 semi-rigid cable. The feed between the loop and a connector mounted on the reflecting disc can also be .141 cable. If the reflecting disc is formed of relatively thick material, such as 5mm aluminium, this will provide excellent rigidity, and the choke ring can be a much thinner material which is easily bent to shape. Good contact between the choke ring and the reflector is important.

Observations
My observation is that the choke (designed for the 23cms loop) has no impact on the 13cms radiation – which behaves as a simple loop over a 1.1 wavelength diameter reflector.
My 2m (diameter) dish, with 0.45 f/D has a total angle from the feed to the rim of 116 degrees. Rearranging the data from the tables above for the OM6AA dual band feed:

Band	Total angle from feed to dish edges (degrees)	Total horizontal angle for -10dB (degrees)	Total vertical angle for -10dB (degrees)	Comment
23cm	116	133	143	Feed provides undesirable spillover loss; "over-illumination"
13cm		100	120	Slight under-illumination in the horizontal plane

In summary and considering the dual band performance, the design is a good compromise.
Maximum overall efficiency of a parabolic dish occurs when the radiation pattern at the edge of the dish is around -10dB (from W1GHZ). However, best G/T occurs when the radiation pattern is around -13dB at the dish edge, which would provide slight under-illumination. G/T is a good indicator of reception characteristics of an aerial.

Proposals for changes
Having used my dish and OM6AA feed on 23 and 13cms for 6 months, experience suggests that the compromise of over illumination on 23cms is not desirable. Intuitively the 13cms performance is better. This is not a criticism of the design – it is a reflection of my personal requirements.
Consequently it is proposed to produce a simple feed using a 23cms loop over a reflecting disc of around 1.1 wavelengths diameter. There will be no choke ring. This will provide performance on 23cms comparable to the existing 13cms loop. The 13cms loop will therefore now be situated over a disc of some 2 wavelengths diameter – I don't have data on how this is expected to perform but it's anticipated that under illumination will increase and overall efficiency will fall a little.

Further comments on loop feeds
Loop feeds are relatively easy to construct, and several bands (not necessarily consecutive) can be built on one reflecting disc with separate connectors. Power handling is only limited by the connector and feed to the loop.
Bandwidth is quite large and the effects of rain on the radiating loop are very small. This is quite a contrast with yagis, which can go off tune rather easily.
Diameter of the loop determines the operating frequency and spacing of the loop from the disc determines the match to 50 ohms. Adding a second or more loops will affect resonance of the first loop and tuning becomes an iterative process.
Placing the feed in the parabola also causes a small change in the match.
Isolation between the loops is poor – expect around 15dB. This can be a crucial factor in a multiband station.

Google these for more information:-
OM6AA loop feed with enhanced performance
W1GHZ Microwave Antenna Book
DL4MEA loop feed
CT1DMK deep dish feed
OK1DFC loop feed

Modification of Tripods for Microwave Use

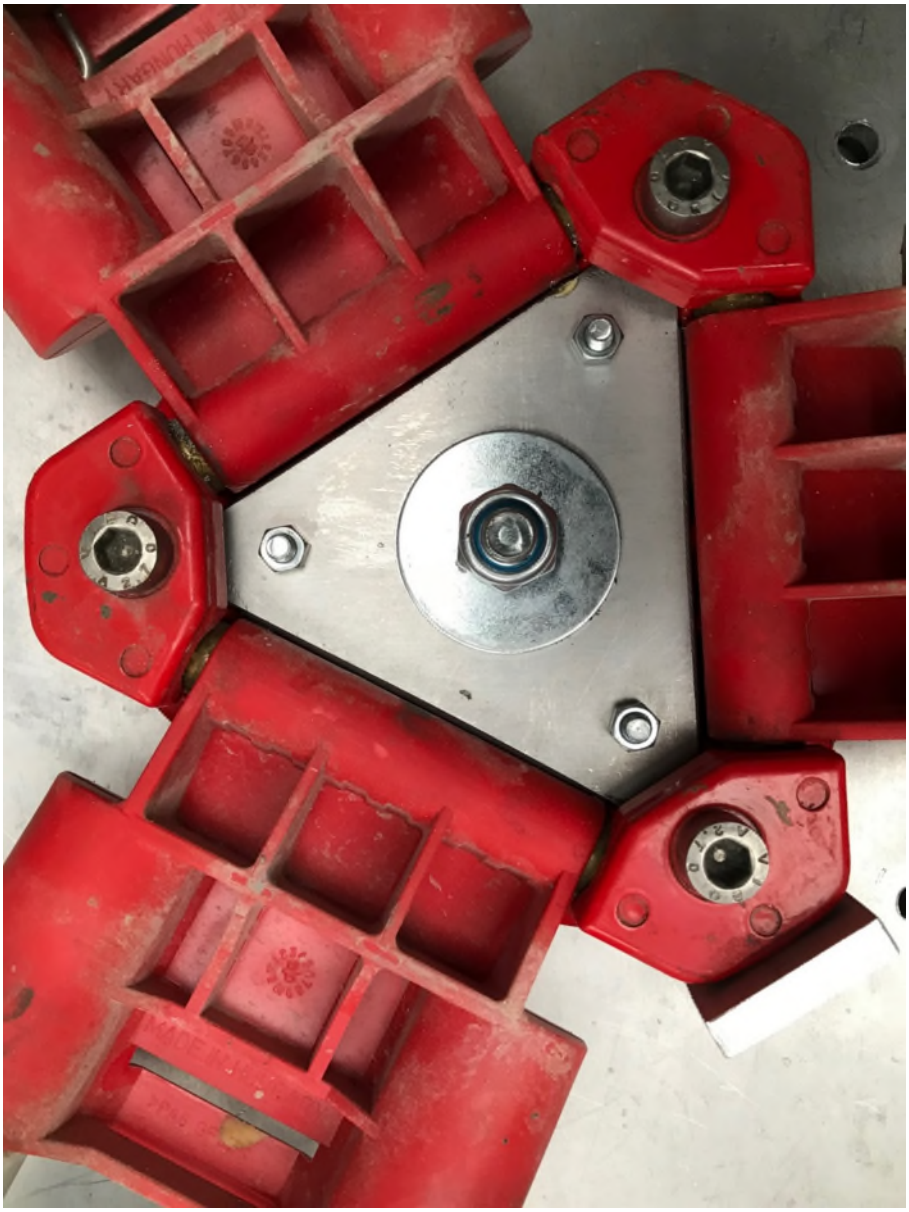
By David Newman G4GLT

The prototype surveyor's tripod was a sturdy 'Red' wooden version and cost little on Ebay. The turned aluminium attachment made by an engineering firm in Totnes was not cheap, and with all the associated metalwork is rather heavy. That said, the top platform that all my gear goes on is very sturdy and can be detached by undoing a wing nut, so is ideal for the back of a hatchback.

By having a square platform I find it very useful to line the side of my Silva compass up with one of the sides of the 6mm aluminium platform. The disadvantage of using the top of the tripod as part of the swivel joint is that without due care, grit gets into this joint and stops it working, despite the grease.
So if you are going down this road then do cover the top of the tripod in plastic sheet in the back of the car.
A wing nut underneath enables quick detachment of the head unit, though there was a facility for four screws, which could keep the two parts joined on a permanent basis. The wing nut can also control the tension in the head unit joint.
The prototype does have a couple of small spirit levels
at right angles to each other to make sure the platform is completely level. When setting up the tripod I do press each leg into the grass firmly with my foot before levelling.
The general feeling about this set up is that it does work well and is detachable but is very heavy, is prone to grit problems and the locking/tension mechanism could be improved.

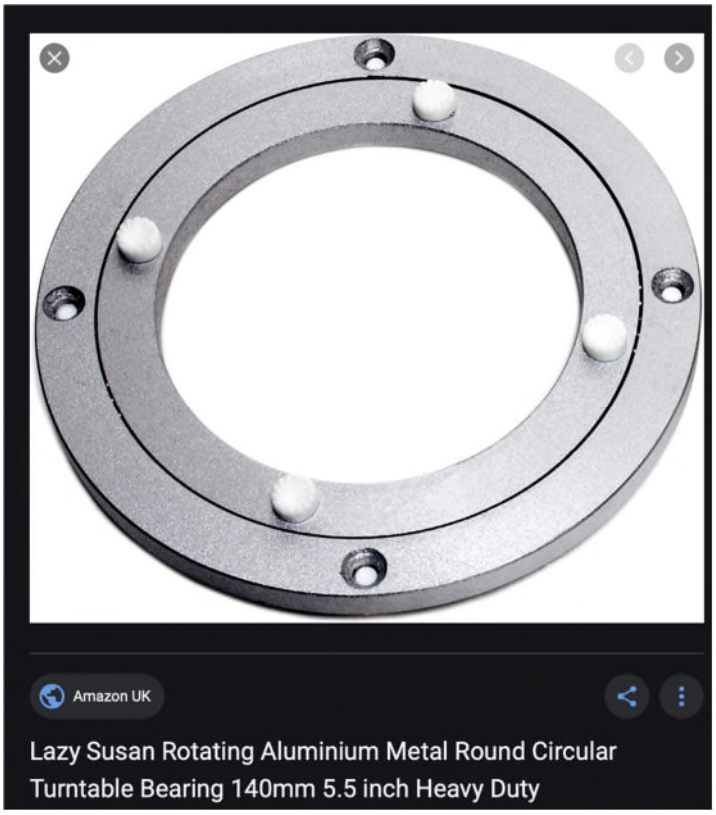
Mark 2 Tripod

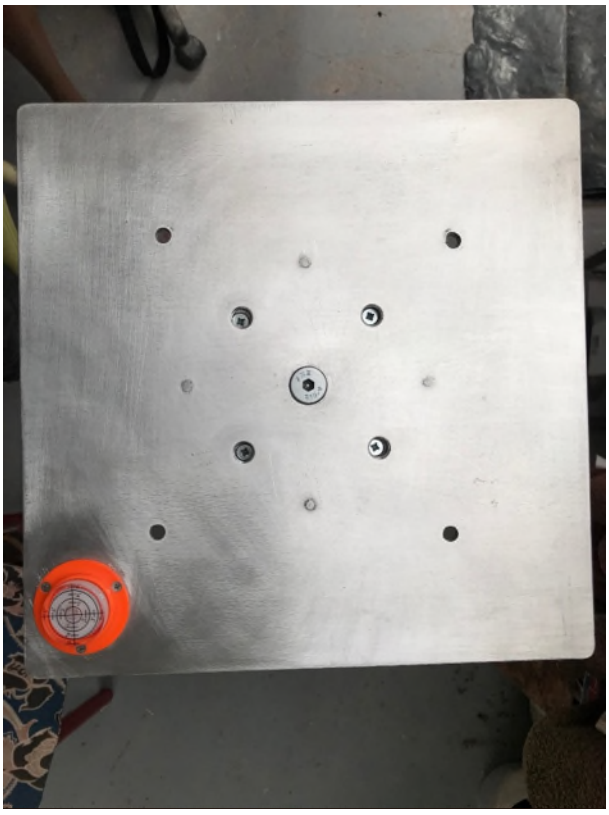
After discussions with Neil, G4DBN, it was clear that I needed
to use a bearing in the next version. I bought a red and silver Leica GST05L surveyors tripod on Ebay, at a very cheap price.
Mind you, it was covered in concrete which I managed to get off eventually. The first thing to do is to remove the legs by unscrewing the three bolts underneath. Remove the central fixing knob and the bar attached to it.
That will leave a bed underneath that is not completely flat.
Remove the aluminium projection in the bed so that it is completely flat. Use 6mm aluminium plate, cut to a roughly triangular section to fit in this bed, and make sure that as the legs open out there will be sufficient clearance for them. A paper template might make this easier if you want accuracy.
In doing the metalwork from this point onwards I would advise the use of sturdy spring metal callipers, a metal punch and a metal scribe. I also have an optical centre punch device from Axminster Tools that makes this easier. The electronic digital calliper is also very useful.
Fix the triangular plate with three holes separated by roughly 120 degrees 40mm from the approximate centre point. Find the exact centre point of this plate by inscribing the outline of the inside of the tripod base after having fixed the plate to the base with M5 countersunk bolts with the countersink uppermost.



Having inscribed the circle use callipers set to the radius to mark the exact centre from 0, 90, 180 and 270 degrees.
Use the exact centre point to mark the radius of the 4 holes of the inner circle of the bearing on the tripod head.
Place the bearing over the tripod base and align the holes over the circle, the mark the holes as accurately as possible preferably with a sharp fine pointed scribe to mark the outlines of the holes. The optical centre punch helps to get the centre of each marked hole.
Mark the position of the bearing relative to the base with a marker, and also later with the plate and the bearing as there may be subtle differences in alignment.
Make sure that the alignment of the holes does not interfere with anything underneath. Tap four M5 holes into the tripod base. The countersunk holes in the bearing may have to be enlarged a little. The bearing is spaced from the base using four M5 washers.
Once this has been done, after centre punching, a 10mm hole can be drilled in the triangular base piece.
This is best done working through the drill set from small to large as there is a tendency to drilling an offset hole if you go straight to the 10mm drill.

The Platform:
Take a piece of 6mm aluminium plate and cut it exactly square to 300 x 300mm.
Where the diagonals bisect each other mark the centre.
Get hold of a 'Lazy Susan' aluminium bearing via Amazon or Ebay (not expensive). The outside diameter of the one I used was approx. 140mm.





Using the centre point, and the callipers set to the radius of the 4 holes in the outside circle of the bearing, mark a circle.
Place the bearing over this and accurately mark the edges of the holes as previously described. Tap four M5 holes. (The eight M5 bolts going through the bearing were secured in their tapped holes using a Loctite thread locker to prevent loosening.)
Now mark the inner circle of the bearing on the underside of the platform using the bearing to mark the holes. Drill four screw ACCESS holes (about 10mm dia). Now that the centre mark of the platform has been used a 10mm hole can be drilled (as previously described) and a countersink can be put on the top surface. The large countersunk 10mm bolt was obtained on Ebay.
I made several large washers from 6mm aluminium sheet to put into the central recess in the tripod base. This could equally be made up of multiple washers. The function of the central bolt is to provide some strength and stability to the unit. I was sure that I did not want to pinch the bearing by tightening the bolt, so the various washers should roughly come to the level of the top of the bearing. When attaching the bearing to the four outer platform holes, the holes are tapped with an M5 tap and four M5 washers space the bearing from the platform to prevent rubbing.
At this stage of assembly the platform should, if the centres coincide, rotate freely. The central bolt with a self-tightening nut should be adjusted to give free movement without being too loose. The locking mechanism (shown) is simple in construction and consists of an M5 thread cut into the centre of one of the sides of the tripod. The locking mechanism has a piece of aluminium that is curved to the radius of the bearing and is forced on to the outside of the bearing with a wing nut. This works but will be improved upon when I have found a suitable knob. The stub mast was obtained from the base of a standard 90 degree satellite wall bracket and in my case is 390mm high which is more than adequate for most dishes. This should be located as centrally as possible with the nuts underneath.
The mast base also has the benefit of protecting the access holes from dirt and grit.
David (G4GLT) April 2020

The spirit level is a 360 degree version that was obtained on Ebay. It is worth getting a solid one that will not compress when fixing it to the platform.
Enjoy your portable operating.

Scatterpoint activity report

Activity News: May 2020

By John G4BAO

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

From Eddie G0EHV

This past month I have been completing my 9cms portable system. Based on the excellent SG-Labs transverter with Stealth power amplifier. Designed for masthead operation, the idea to run without preamp or cable loss on transmit. A small 35 element loop yagi completes the ensemble. First test from my garden (IO94FU) on May UKAC netted 3 locals G8KPD/P, G1LPS, G8PNN plus GM4JTJ as best DX. Unfortunately, only able to work to the North as my house plus the estate are South of the garden! There is now a pocket of NE based 9cms stations active, mostly for UKAC. Looking forward to getting out /P at my usual IO84 site.

From Graham G3TCT

Thanks to G4BAO for pointing out the tutorial on propagation by Mike G0MJW http://www.mike-willis.com/Tutorial/refraction.htm
in a recent GHz bands column. I was interested in Mike's discussion of refraction after my recent experience in recent 23cm contests. There seemed to be a significant difference between the sessions on 3 and 19 May, so I looked further into it. Using Mike's formulae for refractivity plus some other references on the web [2,3] I used radiosonde data at Herstmonceux to calculate the refractivity, and hence its variation with height (N/km). I also derived an equivalent earth radius k, which is normally reckoned to be 1.33. The standard atmosphere gives a value -40, super refraction at -157 and sub refraction >-40. For 3 May when I found conditions so poor I nearly gave up, I derived a value of -16, equivalent to a k value of 1.1 For 19 May when conditions were much better, I obtained a value of N/km of -146, equivalent to k = 14.5! These are pretty rough calculations, but the qualitative agreement is interesting. At least it made me try to understand refraction more thoroughly so thanks to John and to Mike for the education! Now to read the rest of his tutorial!

From Graham G3YJR

I've set up a 1.1m fixed dish with a view to dedicating it to QO100. As it can get very windy here. I've mounted the dish on a section of scaffold pole fixed to two separate chimney brackets/lashings. I set the rather low so as to be in the lee of the westerlies. Hillsborough in the distance in the picture and Ferrybridge and Drax power stations somewhere in the mist.
I've also built a MiniTiouner DATV receiver. This has decoded GB3VL Lincoln on 23cm. This is my first try at DATV. I intend to try Portsdown. A couple of other Sheffield and District Wireless Society members are also experimenting with DATV.
On April 23rd, while chatting to Tony G8DMU on 3cm, we both checked beacons on the continent on 3cm. He could hear the DB0GHZ beacon which I could not. I could hear beacons in the Netherlands which he could not: PI7ALK, PI7RTD and PE9GHZ. Neil G4DBN joined us. A few of us worked Kjeld in JO45BO (at 670 km for me). I chatted with Kjeld on SSB. He gave me 55 for my 3W to the 80cm dish.

I entered the 23cm and SHF UKAC contests, 13cm+3cm, the 10GHz Trophy contest and also the Low Bands contest when the Trophy contest was over, 23cm+13cm (2300 & 2320 MHz), so quite a few contests in May

From John G4BAO

Not to many QSOs to report, but I have been rebuilding my 10GHz EME system to include a 20W PA. It uses a pair of 15W 9GHz GaAs FETS

From Bernard G4BXD

Pleased to get on both 9cm and 3cm now. 9cm is the SGLab transverter which when I tested it gave nearly 4W out, specified at 3W typically, but I turned it down to just under 3W. Using a homemade horn, calculated from the design values given by Roger WA0IUJ and a bit of spreadsheet work, and tried on the low band event it got me 6 contacts, 4 over 100km with 153km the best result. Having acquired a Kuhne 3cm transverter and a G4DGU feed horn on its own I got a QSO, though a weak signal one, to G3VKV 56km away with the horn poking out of the window. I have a larger rectangular horn and once I get the transition I will see if it improves my signal while waiting to get an amplifier of some sort. A couple of new 60cm dishes have been acquired and another sturdy tripod so gearing up for operating portable, sometime in the future!

From Neil G4DBN

As part of my evening ritual, I check the 10GHz beacons to see if there is anything interesting. After the big tropo signals I heard reflected off the 500ft chimney at Drax power station, I now check it as well as the direct paths. Tonight, I can hear DB0GHZ, PI7ALK, PI7RTD and ON0EME direct, with PI7ALK strongest as usual, but I can only hear RTD and EME off Drax, but both are much stronger on the reflection than direct. DB0GHZ is skewed 5 degrees south, the others appear on normal headings direct. Seems mightily odd that I can't hear ALK off Drax, but the two more southerly beacons are very loud when reflected. Is it possible that the usual mouth-of-the-Humber duct is sloping and that the entry for those more southerly beacons is elevated, whereas ALK and GHZ are closer to the ground? Doesn't really explain why I can't hear them off Drax unless the duct entry is really low, like under 30 metres high.

This is the Drax reflection, with ON0EME in the middle and the somewhat itinerant PI7RTD a little higher. Drax is at 260 degrees, the beacons are at 124 and 118 direct. ALK is now very strong direct, but not so much as a sniff off Drax. ON0GHZ has popped out of the noise on direct heading, but nothing off Drax.

I am hearing DB0GHZ at up to S7 from JO34WE direct QTF 82, and PI7ALK, S9+ also direct QTF 106. However, on almost the same heading, there is a 599 signal from GB3CAM and 549 from F1BQ, both almost as strong as they are direct. GB3LEX and GB3SEE are also audible close to that heading, right down the mouth of the Humber.

Beaming at Drax power station chimney to my west, I can see *nine* 10GHz beacons at the moment, GB3FNY, CAM, SEE, LEX, PI7ALK, RTD, DB0GHZ, ON0VHF and F1BQ from here in the East Yorkshire flatlands.

I have a 400ft hill between me and DB0GHZ and I am hardly "coastal", being 57km from the sea in the direction of DB0GHZ and 84km in the direction of PI7ALK. I get best signal about 1 degree above the horizon to the east. Drax chimney, being 500ft tall, perhaps gives me a way in to elevated ducts by reflection. Interesting conditions. No humans about of course.

From Paul G4KZY

I've been entering the Low bands cumulatives from home during the lockdown, using my FT736R. I have been able to work more on 23cm than I had expected from home, with contacts with G3XDY and G4ZTR in particular surprisingly reliable. Missed out with G4BAO.
Over the past month I have been assembling a system for the higher bands based on Colin G4EML's Langstone project (which is essentially a Raspberry pi combined with an ADALM Pluto). Progress on the front-end aspects of the Langstone has been a bit slower than I would have liked. I have obtained an Ionica PA, and a 3.4GHz 20dBi gain flat panel antenna but the supply and control for the PA have not yet materialised. Last weekend I decided to try on 9cm using the Pluto barefoot. This gives maybe a milliwatt output and no better than 7dB noise figure by the time feeder losses etc. are taken into account. I was able to work G1EHF/P, on SSB over about a 25km path. I also heard Neil

G4LDR's CW signals quite well over a shorter but more obstructed path, although not nearly strong enough to attempt a QSO with such a low power output. So quite a success really, and my first QSO on 9cm.

From Dave G6HEF

I'm a real newbie to anything above 1GHz. Over the last year or so I have been lucky enough to land a job in a place that does a bit of SMT stuff, but now furloughed. So, attacking stuff at home with various methods.
Started with Oscar 100 and built a system based on the SG labs stuff. That seemed to work OK. Now moving over to 23cm. I bought an IC9700 last year but unless I take it out fell-top portable feeder losses prohibit any useful activity on 23cm.
The obvious solution is to put stuff masthead. So, built a G4DDK VLNA and braved my own Rogers PCB for a G4BAO 45W PA. Both seem to work on the bench. I am grateful for the help received so far from both gents.
Luckily I still have access to my works Altium license. Currently designing a combined relay and sequencer board using quite inexpensive and seemingly good performance relays. (Farnell 9913599) good to 50w at 3GHz with good isolation, according to the datasheets. I've already got one working in my Es'Hail system at 20W and on FR4 too!

From Martin VK7GN

After reading G4BAO's "Got an IC9700 - what next? in RadCom, I was faced with exactly that and under some pressure as there was a race to see if we could get 23 stations on 23 in Hobart! There were designs for Yagis going the rounds down here, but I wanted something quick. The antenna is my version of one in the ARRL Antenna book originally designed by WA5VJB who should get the credit. The separation is 10mm and I found that the standard chassis mount bnc gave me that. It is connected at the centre with a bolt. My junk box produced some old single sided PC Board. A 300 by 300 bit gives the earth plane and a 100 by 100 gives the panel. A bolt and a BNC socket and within very little time I had an antenna. Although these designs claim between 7 and 9 dBi, I was less than optimistic! The picture shows how simple is this construction - the PC material still has an old price label on it!
That all may change when I set the IC9700 up at my remote site which is about 50 Km from the city and I may need the extra gain. The point is that simple antennas can work! Even at 23cm!
23 has been an interesting experiment. We have a huge chunk of rock behind Hobart - Mt Wellington. It is amazing what we can work as reflection/scattering off the mountain. This antenna covers all the Hobart metro area and so far I have not felt the need to build a Yagi. In fact, I am consistently as loud as stations running multi element Yagis however I put a lot of that down to my location.

From Dave G1EHF

Following the postponement of the mmwave contest session today, a few of us decided to try some 24GHz activity anyway. I travelled to nearby Farleigh Wallop IO91KF42 with 100mW to 30cm dish.
I started by testing with Noel G8GTZ over a short but very obstructed path. We tried the direct path and one potential reflected path but neither would go. I'm sure we could have succeeded but it may have taken some time to find a good reflection point. I then worked Pete G1DFL/P over a 37km path to Remenham Hill IO91NM78 with 58 SSB and NBFM each way. Next was a 58 each-way SSB contact with Neil G4LDR at 38km, with significant QSB noted. Finally Pete roved to Britwell Hill IO91LO98 for a 58 each-way 40km SSB contact, again with notable QSB. So nothing exceptional but good to dust off the kit.

From Pete G1DFL

Some local stations in IO91 square had mentioned they planned go out to test gear and various paths on 24GHz. So I packed the car and drove to my local site at Remenham Hill (IO91NM78) which is 99m ASL, about 10 minutes from home. This is usually a very quiet farm gate off a footpath south of the A4130, with space for one car parked off road. I quickly set-up the FT-817ND and pointed the 0.250W 30cm Nortel ODU system towards Dave G1EHF/P who was to the South West at Farleigh Wallop near Basingstoke (IO91KF42, 36km).

Unusually there were a lot of walkers, cyclists and even a trials motor bike zoomed past behind me, thankfully keeping 2m social distance! With one hand rotating the dish and the other VFO twirling, Dave was received very stong on SSB and then NBFM at 58's both ways. My dial frequency was 580Kc's high and there was the usual warbling and drift as the LO stabilised over time. A recently purchased Leo Bodnar mini-GPS will provide future frequency locking. After logging into ON4KST, I tried with Neil G4LDR (IO91EC, 69km) in Salisbury, with nil heard either way. The same path always works on 10GHz easily.

After packing up, I drove for 25 minutes up to Britwell Hill (IO91LO98) 229m ASL on the Chiltern Ridge. This is another farm gate with parking for 2 or 3 cars off Britwell Hill Road, a quiet country lane. This has stunning views over what is left of the Didcot power station and you can just see the x-BT PMR mast at Sparsholt Firs about 20km or so West along The Ridgeway path.

The 24GHz system was set-up again and I soon found Dave G1EHF/P this time due South a direction partially obstructed about 1,500m away with a large clump of trees. Surprisingly signals were stronger 59's both ways at 42km distance. Via ON4KST I tried once more with Neil in Salisbury but nothing was received. I also called out again on 144.390MHz SSB and on Zello (SHF Chat) but no one else was about.

It was great to get out again up onto the hills and test 24GHz and make a couple of QSO's!

24GHz from Remenham Hill

From Neil G4LDR

During the total lockdown period John, G8ACE and I were able to carry out some tests on 24GHz. There is no direct path between John's QTH (Winchester) and mine (near Salisbury), we have tried, so we have been investigating scatter points. We have discovered two which provide good signal levels for ssb. One is to the north of the direct path with the actual scatter point being near the point where the A303 joins the M3 southwest of Basingstoke. The second

and better scatter point is to the east of Winchester probably near Medstead/Fourmarks making the round trip distance about 65km compared with the distance between our QTH's of about 23km.
John, G8ACE was keen to know if the 47GHz Bell Hill beacon, GB3SCQ, which he built was still operational after the winter storms. I had last visited Bell Hill 18 months ago but had heard the beacon at a distance several times last year. When I needed to go to Blandford Forum this month I took the 47GHz gear and had a listen at a point a few km from the beacon where I had heard it several times before. This time I was unable to hear it. I drove up to the Bell Site and confirmed the beacon was still radiating. Increased vegetation growth local to the beacon is probably now blocking the signal to location where I had tried to listen for it. Two weeks later I listened again at a point mid-way between Blandford and Salisbury (20km from the beacon). There was a thunderstorm in the area and I was able to copy the beacon via rain-scatter over a +/- 30deg arc, however once the rain had moved away the signal disappeared.
In the middle of June I operated in the IARU ATV contest. I started by going portable to work Noel G8GTZ/P (who was using UKuG loan equipment) on 76GHz DATV. We only managed a one way contact over a 14km path. On the second day of the contest I went to Walbury Hill south of Hungerford and did manage a two way contact with Noel over a very short path. On returning home I discovered the waveguide inside the transverter connecting amplifier to lens horn antenna had become unsoldered from the flange. I also worked from home and had a number of DATV contacts on all bands between 2.3GHz and 24GHz.
I have also been active during some of the other UKuG and RSGB microwave contests but have found conditions relatively poor. On EME I listened during the DUBUS 5.7 and 2.3GHz contests and heard lots of stations off the moon even with my poorly performing dish. However I need to improve my CW skills before I can participate fully in an EME contest (no comments please from the treasurer) and replace my 3m mesh dish with a newly acquired 3.7m solid dish.

VK 122GHz Project - update

All UK boards and antennas from Australia have now been distributed to their owners. There are a few dos and don'ts that may make life easier, when these boards are first tried.

Firstly, try out the board, by connecting 12V. The on board LED should change from green to red, showing the synthesiser has locked.
I would suggest doing this first, and after any modifications at each stage.

If you fit header pins – DO NOT drill out the pcb. This will write off the board. If they are the usual square pins, file off the corners with a small file, before fitting.

Generally the Murata 5V switching regulator is mounted on the wrong side of the board, for easy mounting. This can be unsoldered and moved to the other side. However it is quite easy to wipe out R3 100k in the process. So either remove it first, or be very careful. If this resistor is missing, a low voltage will be indicated by the LED alternating between red and green.

The jury is out on the advantages of an external reference. I have found the internal reference better than expected, and reasonably stable. Adding the GPS locking ensures that it is bang on frequency. Plus without modification the FM works as intended. Should you wish to go the external reference route, I would suggest that you refer to the latest discussions on the 122GHz reflector.
This is to follow the modification sheet, with the following changes. Leave C200 in place. Remove R200. This removes the supply to the internal tcxo, to avoid beating between that and the external reference.

There are further improvements to be had by using the IQ outputs, to reject the image. But I would strongly suggest using the boards as they are first.

Another potential pitfall is in the use of large offset dishes. These can be very difficult to align. Plus once aligned, they have a very narrow beamwidth, and significant side lobes. Horn antennas are much easier to use, until you are looking for that ultimate distance contact. I look forward to reporting the first 2 way qso of over 1km using the new boards. The Award for this is …. A full report in Scatterpoint!

Roger G8CUB

HAM RADIO ONLINE – Friedrichshafen 2020

Last weekend the traditional Ham Radio Fair in Friedrichshafen/Germany had to be held as a virtual conference "HAM RADIO ONLINE".

There were many interesting presentations also about the QO-100satellite which are still online. This is the agenda: https://www.darc.de/fileadmin/filemounts/gs/oeffentlichskeitsarbeit/Veranstaltungen/HAMRADIOnline/HAMOnline_Sendeplan_200627_03.pdf

Here are some of the links:

Youtube video with several presentations about QO-100:
https://www.youtube.com/watch?v=n4uKq1i0FzI
from 1:25:40 until 2:01:00 interview with Peter DB2OS (president of AMSAT-DL) Status of QO-100
from 3:00:30 until 4:35:00 presentation of Charly DK3ZL DXpedition in southern Africa activating Namibia, South Africa and Botswana via QO-100
from 11:30:20 until 11:54:55 presentation of Patrick DO8PAT How to get started on QO-100

Charly25 project team: Charly25SDR goes ES'Hail2 - QO100
https://www.youtube.com/watch?v=JEU9zeXtinE

DARC YL Steffi DO7PR Contact with Antarctica via QO-100
https://www.youtube.com/watch?v=H7I8RGmKa5s&feature=youtu.be

Severin DL9SW QO-100 - how to get QRV -concepts and instructions how to build your station
https://www.youtube.com/watch?v=zTok1zE_fJU&feature=youtu.be

Heiner DD0KP School stations for QO-100 donated by AMSAT-DL and DARC to various schools
https://www.youtube.com/watch?v=sOCprzjJU-k&feature=youtu.be

Andreas OE3DMB LoRA based APRS via QO-100 with omni antenna and very low power
https://www.youtube.com/watch?v=bZQ13fAXcs8&feature=youtu.be

Wolfgang OE1WBS and Nicolas OE1NBS Frequency Sync Box for QO-100
https://www.youtube.com/watch?v=jerbwNb4TVI&feature=youtu.be

Thanks to – Matthias DD1US www.dd1us.de

Contests

Forthcoming Portable Contests

I am sure many of you will have been watching the reduction in lockdown measures in the various countries in the UK in anticipation of portable entries being accepted again for UKuG contests. A roadmap now exists to achieve this if the virus does not flare up again, with the Welsh and Scottish governments announcing plans to remove the 5 mile radius travel restrictions in both countries.

By 6th July it should be possible to operate portable anywhere in the UK, subject to locally managed closures of some public locations. Accordingly the UKuG will accept entries from single operator portable stations again from 7th July.

Entries from multi-operator teams will not be accepted until further notice. Should the lockdown easement timetable change, or more restrictive lockdown measures return, then the UKuG may need to maintain or re-impose restrictions on portable entries. Rule revisions will be published on the UKuG web site when changes of restrictions of movement are confirmed.

73
John G3XDY
UKuG Contest Manager

The first of the Millimetre 24 / 47 /76GHz Contests will be on 19th July, with portable activity!

May 5.7GHz Contest 2020
David M0GHZ was the clear winner of this event, with a creditable 11 QSOs, and he also worked the best DX with G8DMU in IO93. Anthony G7LRQ, making his debut on 5.7GHz, was runner up. Thanks go to G1DFL/P for his check log.
73
John G3XDY
UKuG Contest Manager

5.7GHz Contest May 2020

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX kms
1	M0GHZ	IO81VK	11	1407	G8DMU	287
2	G7LRQ	IO91TQ	6	597	M0GHZ	130
3	G1EHF	IO91LH	4	316	G4ODA	174
4	G8AIM	IO92FH	1	73	G8JVM	73

May 10GHz Contest 2020
The Covid-19 restrictions rather decimated entry levels for this event, although the leaders did make a reasonable number of contacts overall. Several stations operated portable and submitted check logs for this event, thanks go to G1PPA/P, G1DFL/P, and G4EML/P.
Winner was John G4ZTR, with David M0GHZ fairly close behind as runner-up. John also worked the best DX of the day with F6DKW in Paris. Conditions were run of the mill with no noticeable enhancements.
George G8AIM asked that these contests should be run without internet assistance, but it doesn't seem likely that the genie can be put back in the bottle now it is established practice to use ON4KST for setting up skeds.
Thanks go to M0EYT/P, G1DFL/P, G1PPA/P, and G4EML/P who submitted checklogs.
73
John G3XDY
UKuG Contest Manager

10GHz Contest May 2020

Open Section

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX kms
1	G4ZTR	JO01KW	14	2465	F6DKW	365
2	M0GHZ	IO81VK	16	2190	G8DMU	287
3	G4BAO	JO02CG	7	761	G4DBN	178
4	G3YJR	IO93FJ	3	250	G4ODA	118
5	G8AIM	IO92FH	1	73	G8JVM	73

UKuG MICROWAVE CONTEST / ACTIVITY WEEKEND CALENDAR 2020

Dates, 2020	Time UTC	Contest name	Certificates
19-Jul	0900 – 1700	2nd 24GHz Contest	
19-Jul	0900 – 1700	2nd 47GHz Contest	
19-Jul	0900 – 1700	2nd 76GHz Contest	
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	
13-Sep	0900 – 1700	122GHz Activity Day	
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	
18 -Oct	0900 - 1700	122GHz Activity Day	
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

2020

August 20-23	EME 2020 Prague *postponed to Aug 2021*	www.eme2020.cz
September 11-13	65.UKW Tagung Weinheim *cancelled*	http://www.ukw-tagung.de/
September 13-18	European Microwave Week, Utrecht *postponed to Jan 2021*	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 *now virtual*	**http://rsgb.org/convention/**
October15-18	Microwave Update, Sterling, Virginia *postponed to 2021*	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/

2021

January ?	Heelweg	www.pamicrowaves.nl/
January 10-15	European Microwave Week, Utrecht	www.eumweek.com/

80m UK Microwavers net

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

73 Martyn Vincent G3UKV