An Amateur Radio publication for the Microwave Enthusiast

# scatterpoint

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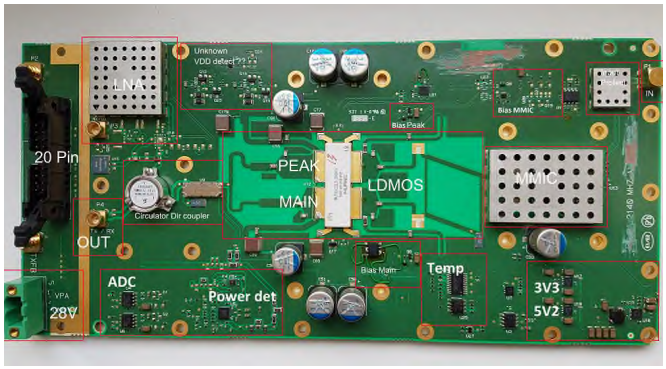
In This Issue






MODIFYING CHIPBANK BLF8G22-310 SSPA

*Maarten Heuvelman PA0MHE*

Martin GM8IEM – IO78HF

UK Microwave Group

# Subscription Information

The following subscription rates apply.

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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

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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

# MODIFYING CHIPBANK SURPLUS BLF8G22-310 SSPA to 13cm

*Maarten Heuvelman PA0MHE April 2020*

From Mike's Chipbank I received a surplus 2.1GHz CDMA basestation module, it comes with a LDMOS BLF8G22LS-310AV (see *Figure 1*).

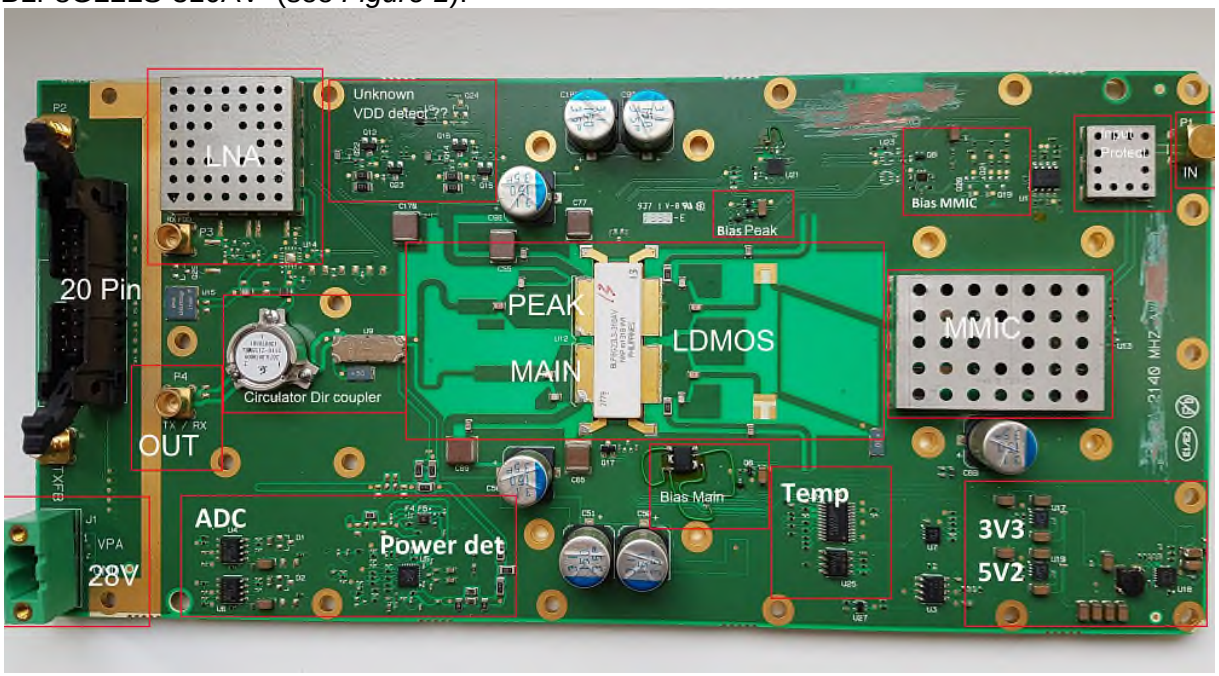


*Figure 1*

Next to the LDMOS the module consist of an MMIC MW71C2240N from NXP 4 W average, a printed 90 degree hybrid coupler, printed drain matching, a directional coupler his 20dB port is used for forward power measurement, a circulator 2110-2155MHz for RL protection and measurement, an LNA not used or tested by me, U18 TPS54320 buck convertor and stabilizers U19 5.2V and U17 3V3, U5 LTC5583 Power meter with 2x MAX1242 10 bits ADC with I2S output this uses forward from directional coupler and RL in combination with the circulator, a SW driver is written but a max forward power of only 45dBm can be measured, LM87C1MT temperature control, with Q17 as sensor. I2C output, in a tin can, most probably an input power protection but not sure, this is disabled.

20pin flat cable connector

| | | | |
|---|---|---|---|
| 1 | GND | 2 | SDA U24 |
| 3 | GND | 4 | SCL U24 |
| 5 | GND | 6 | SLC U4, U6 |
| 7 | GND | 8 | DOUT U4, U6 |
| 9 | CS U6, FWD | 10 | CS U4, RL |
| 11 | GND | 12 | Bias MP close to U23 |
| 13 | MP close to U2 | 14 | GND |
| 15 | ?? | 16 | GND |
| 17 | 12V in | 18 | GND |
| 19 | GND | 20 | GND |

As this module was most probably still in development stage it is not sure all modules are same. The module is using an LDMOS Ampleon (formally NXP) BLF8G22LS-310AV, a internally matched device for 2150 MHz which can deliver 310W peak and is intended for a Doherty architecture. This device has never been released at the supplier side, hence no datasheets are available. Most probably the device was custom made for a (to me unknown, Nokia?) customer and most probably cancelled before production start. I have neither circuit diagram nor other PCB information. After some DC modifications the PCB can deliver about 150W SSB in class-AB (please be aware it is not a high efficiency Doherty application anymore, mainly cause the internally matched device and PCB-matching circuitry is used outside its intended frequency range). The PCB has integrated heatspreaders but still an external large heatsink is required as roughly 400W is dissipated. The best results are managed by biasing the amplifier reversed as intended in the original Doherty design, so the Main in Class-C and the Peak in Class-AB. For only RF power, the 20pin connector and it's 12V can left unused.

**Modifications**

General soldering on this PCB is quite difficult as it has very good thermal properties, so removing or soldering components has some challenges. A heat gun helps sometimes to add the required extra heat. For 4 stages a new bias circuit has to be made and the original bias circuits need to be disconnected.

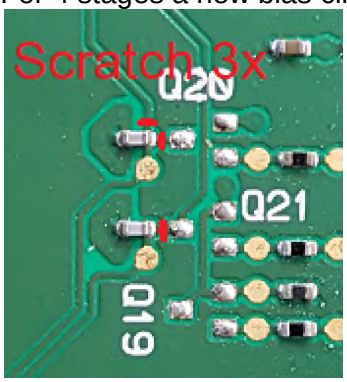


*Figure 2*


*Figure 3*

MMIC stage 1 and stage 2: Scratch tracks (*see Figure 2*) and connect the new bias circuits to existing both decoupling capacitors (*see Figure 3*). The side of Q20 is Stage 1, side of Q19 is Stage 2.

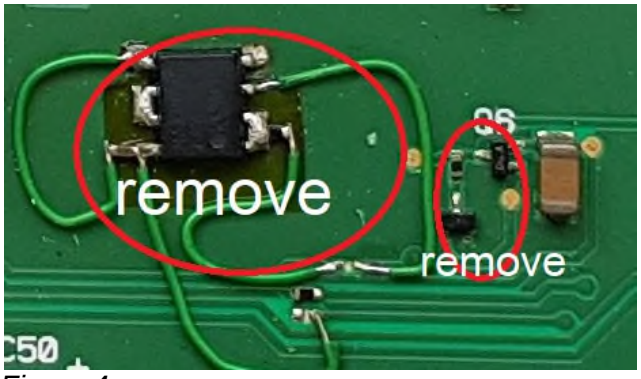


*Figure 4*

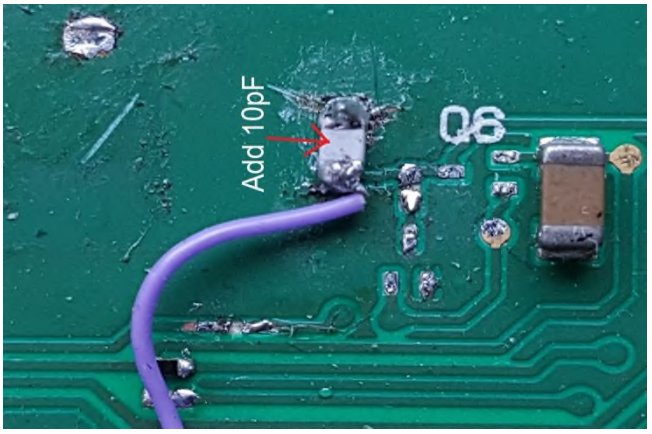


*Figure 5*

Main bias: (*see Figure 4*), remove patch up IC and wiring and remove 3 components, add a decoupling capacitor e.g. 10pf and connect main bias circuit (*see Figure 5*).

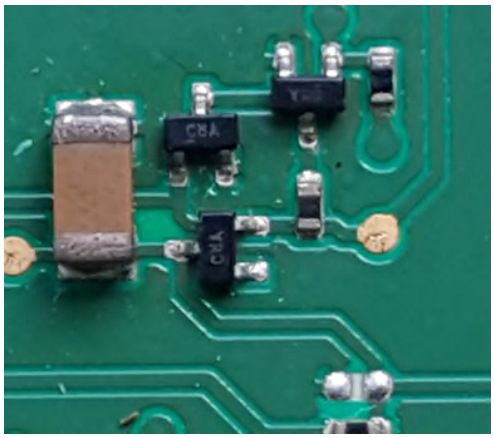

*Figure 6*


*Figure 7*

Peak bias: Scratch track, add a decoupling Capacitor e.g. 10pF and connect Peak bias circuit close to U21 (see *Figure 6, 7*).

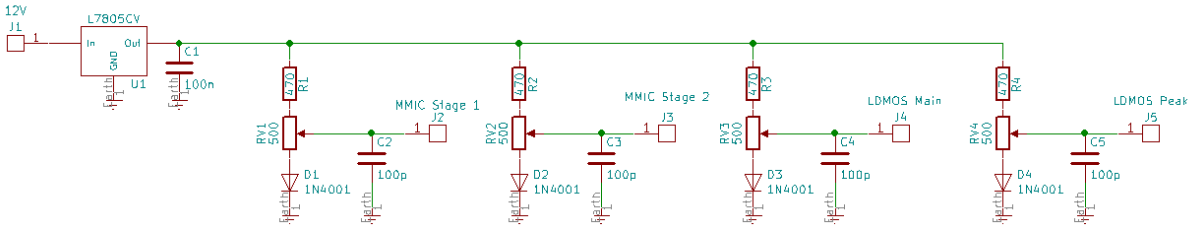


*Figure 8*

Bias circuits: a very generic bias circuit was build (see *Figure 8*) however many different variants are around.

- MMIC Stage 1, IDq1 = 90mA Vbias= ~2.72V
- MMIC Stage 2, IDq2 = 420mA Vbias= ~2.74V
- LDMOS Main IDq= 80mA Vbias= ~1.1V
- LDMOS Peak IDq= 600mA Vbias = ~1.9V

Bias alignment: to avoid cutting the high current 28V tracks, you can initially connect all 4 gate connections to ground, and turn all 4 potentiometer to lowest value ~0.65V. Connect a 28V PSU with a current limiter of around 1.5 A. Then connect one at the time the gate connections to the potentiometer slider and align the bias of each FET one-by-one. Finally reconnect all 4 gates to their potentiometer sliders, the total bias current should be the sum of the separate FET's. During this process it is a good habit to add 50 ohm loads to input and output.

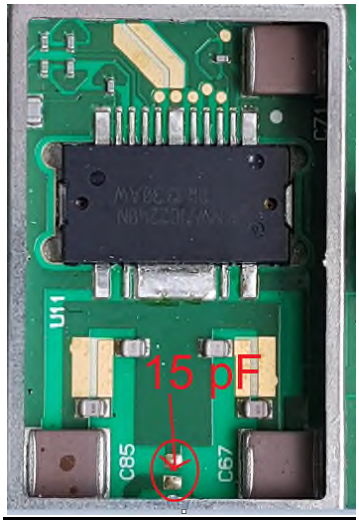


*Figure 9*

MMIC coupling capacitor: In the model I received one important component was not mounted, the output coupling capacitor between the drain of the MMIC and the 90 degree hybrid. In the tin screening box, mount there a coupling capacitor e.g. 15pF ATC800A (*see Figure 9*)

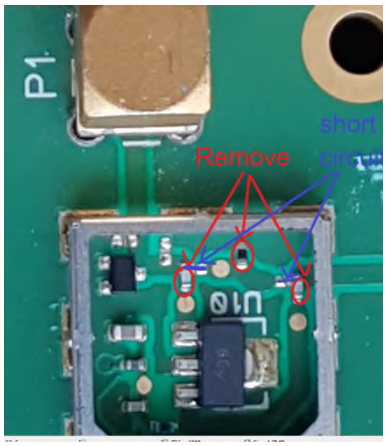


*Figure 10*

I'm not sure if this modification is absolutely necessarily, but in the beginning I was not aware of the missing MMIC coupling capacitor. So without understanding what the functionality was I removed the circuit which I

named “Input power protection”.  I removed 2 capacitors and 1 zero ohm resistor (see red *Figure 10*). Then I put zero ohms on the 2 open 0603 positions (see blue *Figure 10*). The black SOT23 package can remain, it is most probably 2 diodes anti parallel.

Others modifications

I replaced both the input connector P1 and output connector P4 with SMA types.

**Results**

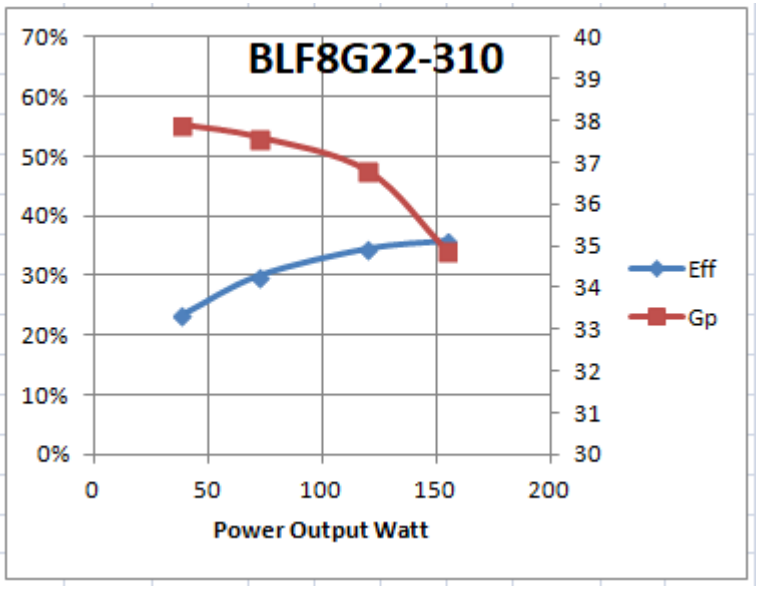


*Figure 11*

In my LDMOS test bench, with the circulator still in place and 55mW drive,  during a 50ms pulse, a peak power of 150W could be achieved (*see Figure 11*), this while the total module is consuming around 560W from the 28V (20A). The total dissipation is 400W so a good heat-sink is required. However the limiting factor on power is the Pavg of the circulator, and next the temperature of the LDMOS (dissipation). From this circulator no datasheet could be found, but similar types are 60Wavg.  As processed SSB has a PAR (Peak to Average Ratio) of  only 3dB we should not go above 120W PEP SSB, 150W CW (PAR 4dB) or  60W FM-ATV (PAR 0dB). One can decide to remove the circulator, with the risk of blowing up your LDMOS in a small mistake, In that case 150W PEP SSB can be made. However you have carefully to monitor the temperature of the LDMOS, we use as rule of thumb a maximum case temperature of 50C.

Success Maarten PA0MHE

# This Month I have been…….

from Martin GM8IEM

Like many amateurs during this lockdown I've been catching up on all those projects I've been meaning to do for years. Back in November 2013 the mounting on my 18 month old 67el WiMo failed during strong winds (picture 1), and I replaced it with a more sturdy 60el PowAbeam, which I've used successfully ever since. However, the WiMo performed well for me, and I've had a hankering to re-mount it, finally doing so during a recent upgrading and re-cabling of the antennas on the tower. The photo (picture 2) shows how I've mounted it onto a 1.25" square Al secondary boom – the mounts use three existing holes in the WiMo boom, and only one extra hole had to be drilled; the mounts are solid aluminium rod drilled and tapped top and bottom by a friendly neighbour with his own vintage machine shop. It's now back up the tower and performing well (picture 3). Also shown is the masthead preamplifier mounted closer to the feed point. Later in the year I'll decide if I want to put the PowAbeam back up for the winter and keep the WiMo in reserve as a spare and maybe for future EME operation.

73, Martin GM8IEM – IO78HF

# Scatterpoint activity report

## Activity News: May 2020

 By John G4BAO

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

The April and may Covid-19 Lockdown has produced a remarkable amount of input this month! Great to see some new contributors. Let's hope we can keep this level up!

### From Jim, GM3UAG

Some activity here though mostly beacons as ever.
Things livened up at 1800 on the 22nd April, 2020 with GB3MHZ and PE9GHZ both about S2 on 23cm.
Tuning around 1296.200 I picked up and worked PA0O on CW at S5 then 5 minutes later I worked him at S9+ on SSB when he'd turned his beam in my direction. Nothing else heard except MHZ on 23 at S1 about 2300.
On 23rd April at from 1430 I logged GB3MHZ (S5), PI7ALK (S2), SK6MHI (S1) on 23cm and GB3MHZ (S5) and PI7ALK (S2) on 13cm. Around 1830 I heard ON0UHF (S5), GB3MHZ (S9+), PI7QHN (S3) and PE9GHZ (S7) on 23 and GB3ANT (S2) on 13. Things quietened down after that.
On 6th May at about 2200, GB3MHZ was coming in at S9 on 23cm and S8 on 13cm, PI7QHN at S2 and PI7ALK at S6 on 23 and S3 on 13cm. About 2220 PA0TGA was S5 on 13cm and DB0XY was S6 on 13 and S5 on 23 at 1007km.
These beacons were still quite strong at 0230 but nothing heard at 0500.
On 7th May there were weak signals from GB3MHZ and PI7ALK on both 23 and 13cm but things went back to the usual white noise by early afternoon.
Despite calling CQ on 23 and 13cm regularly, I heard no amateur stations.

### From Ed, G3VPF

Activity has mostly been constructional with a rebuild of the 23cms home station to incorporate a data capability. Recent on-air activity on 23cms has resulted in three new stations worked to the west of me in Devon and Cornwall. In five years I have now managed eight stations worked from home. Also managed my first data QSO from home with G3NJV on the Lizard. Tried a data QSO with David G4RQI but failed through lack of aircraft.
Still waiting for my 9cms transverter from SG-Labs but hope to be on the band later this year.
Now just need the National Trust to unlock the local hilltop car parks and I can get out portable again.

### From John G4BAO

Last month's changes to my 10GHz EME allowed me to use it on my 1.1m offset dish with 10 Watts and this brought digital mode QSOs with:

OZ1FF, -14 -19, OZ1LPR, -07 -21, F5VKQ, -14 -19, OK2AQ, -15 -20, OK1DFC, -16 -15, OK1KIR, -12 -18, PAØBAT, -15 -19, W5LUA, -11 -23 VE4MA, -17 -15, and K2UYH, -12 -22
(my received report second)

QSOs were either JT4F or QRA64 and all were all initials except OZ1LPR who was also received at 569 on CW.

The 1.1m offset dish easily outperforms my 1.9m Mesh Prime focus dish!

I'm currently working on a 30W 10GHz PA for EME, combining 2 x 15W modules using 8.9 - 9.6GHz GasFETs (that I was fortunate to be given!) Each module is a "clone" of the DB6NT 8 Watt PCB designed with Eagle PCB and made on Rogers PCB using "Press n' Peel". I have one of the 15-Watt modules complete and working, producing around 17Watts at 10GHz, I need to etch a PCB and machine up the second box for the other one.

On fitting my "junk box parts" 24GHz EME transverter to the little dish, and before optimisation (only 0.4dB Moon Noise) I decoded OK1KIR on QRA64. On The following day I focussed the dish properly giving me 0.7dB Moon noise and look forward to next month to decode some more 24GHz. I have now located a suitable TWT to install in the system so hopefully QSOs later this year!

I also built myself a 32GHz Downconverter (based on a Broadern TRX module) for Deep space probe reception using the little dish. More of that next month

Back on Earth the tropo on the 23rd of April brought me late night 23cm CW QSOs with SM6VTZ (JO58UJ) 599 599 at 994km and SM6CEN (JO67AJ) 559 539 at 966km.

## From Bernard, G4BXD

Being fairly new to anything above 70cm I was tempted by Oscar 100 early last year and found it fairly easy to both receive and transmit through it. I bought the 13cm transverter from SG Labs, which also covers 2.4Ghz, along with the PA they offered at the time, 2.4Ghz 20watt. Several dishes were obtained, and the system now uses a 1.1mtr offset with patch feed as the uplink and a 1Mtr offset with Octagon LNB and SDRconsole on receive.
After that, my thoughts turned to 23cm and the SG Labs transverter and amplifier were purchased and a simple Bi-Quad built which got me a QSO into the Isle of Wight. Currently upgraded to a 16 element Yagi.

The arrival of a new proper13Cm PA and LNA from SG Labs to go on the end of my SG Labs 13Cm transverter required a reboxing of that set with the old SG Lab 2.4GHz PA still being used on the satellite with the DX Patrol upconverter. A 40 element Yagi for 13cm was obtained and numerous QSOs made on the Tuesday nights and odd weekend contests. I have just tested the newly boxed station, at least on receive, its working very nicely, just heard the Martlesham beacon for the first time.
A further 9cm transverter from SG Labs along with a Stealth 20W pa has been acquired and are in the process of being boxed along with the construction of a 9cm Horn antenna which might suffice until I can get my LPA fixed to the dish and sorted out. I have already made a couple of 9cm QSOs with just the 2W transverter and the little PCB Yagi sent with the transverter.
Steep learning curve, not in electronics of course but in such as SMD soldering, inline couplers, spectrum analysers (have up to 18GHz now), power meters and the "dreaded dBm system". I still need to sort out a decent signal generator and some good quality couplers but all in all, it's been an interesting 14 months.
10GHz is not far off on the horizon and looking forward to all the problems that entails. I have a nose radar out of an aircraft, dish, waveguide fed with three rotating waveguide couplers, the radar had 3 axis of rotation, so if that can be pressed into service and the motors sorted out, might be quite fun.

## From Neil G4DBN

I've been trying my Pluto for characterising return loss of 2.3 and 3.4 GHz feedhorns, using SATSAGEN and some HP directional couplers. Comparing with a signal generator and HP power meter or spectrum analyser, the performance is pretty decent, at least down to -35 dB or so. Certainly good enough for real-time tweaking of feeds.
On April 12th I had a 59+ 3 cm SSB rainscatter ragchew with John G4ZTR on NBFM then more NBFM with Sam G4DDK and a rare QSO with G4RGK off the same storm. Dave is behind my tree belt so normally an impossible path. F5ZTR/b then came up via rainscatter, but it was too much of a stretch to reach the active stations in JN18. On 23rd I had a short 3 cm SSB chat with OZ1FF in JO45 (614 km). DB0GHZ (JO34) on 3cm has appeared on five days in the last month, often on highly-skewed paths. I had a near-miss with SM6VTZ at around 930km, we both heard carriers, but then the duct faded before we could exchange reports. It would have been easy
with a digimode.
GB3KBQ in IO80 (342 km) has not been consistently present this month, and
my signals on the Mow Cop WebSDR have often been well down. GB3PKT in

JO01 is almost always just around the noise level, not decodable, but
visible on a very long FFT in Spectrum Lab.
Since adding elevation to my 3 cm terrestrial system, I've had contacts scattered off wet leaves at 15 degrees elevation, and found a lot more aircraft scatter at high angles. I've been trying to brush up my plane-following skills with the reduced traffic. I followed one plane on the approach to East Midlands over 5 degrees of azimuth, copying GB3LEX well off-axis and watched the rate of change of doppler change when the plane turned. That needs to be automated, taking the ADSB feed and
steering the dish to keep a chosen plane in the antenna beam.

## From Dave G4IDR

I am slowly getting ready for 3, 6 and 9cm EME to add to my 23cms 3m dish EME capabilities. I have SM6FHZ Septum feeds for 6 and 9cm and a rectangular to circular adapter from the waveguide switch to the feed on 3cms (made from 22mm Copper pipe and formed on a wooden former which makes a neater job than just bashing the pipe and squashing it in a vice.
All transverters , preamps and amplifiers will be inside a 150mm square feed box.
I just need to determine whether to run 110v ac to the feed box or put a common power supply at the bottom of the dish and 13 or 28v up to the feeds. Pros and cons for both methods per recent reflector discussions

I use a common 144MHz IF, 10MHz for ref lock ( Arduino Mega and ADF4351 to injection lock the LO Xtal oscillator ) and TX/RX 12v switching up a common coax from the shack with a triplexer. This way just 2 connections to unplug when changing bands.

From John G8SEQ
While trying to revive my SSB electronics L 23 S TVTR, my brain went into overdrive. Having recently bought a NanoVNA, I now have an easily programmable LO with which to make a simpler SDR for QO-100. My LNB puts out 739 MHz. By injecting 739 MHz into a suitable mixer ( ie a copy of the Rx mixer in the L 23 S, I down convert the 739 MHz to baseband to use with some existing software I have.
But there are more questions than answers. Will I need any amplification/filtering at 739 MHz before the mixer or will it have sufficient gain? Should I put an audio buffer amplifier between the mixer and the sound card input. Has anyone already done this or am I barking up the wrong tree?

## From Andy G4JNT

I came on 3.4GHz for the April and May cumulative events, having built a transverter for that band the year before and never used until now. In each event I worked three stations, the same ones, but conditions were noticeably down for May's event over April's. SO much so I had to resort to - almost afraid to say this - CW to work G4ODA. It had been 55 SSB the month before. The other two, G4LDR and M0GHZ are semi-local so SSB guaranteed. My antenna is a simple 15dBi horn made from PCB material, and the PA is a old Ionica one, through about 12m of LDF450, 3dB loss. 'DDK LNA at the bottom end - nothing active is masthead mounted. I'll perhaps try for 4 QSOs in June's event!

## From Denis G0OLX

I have a receive only 10GHz EME system at the moment, and am working on waterproofing 20 Watt TWT to get TX up and running
I've so far decoded or heard 19 callsigns in 15 countries and two continents with DB0SHF best decode-8, Usually about -10 -11 with signal audible in Speaker!!!!
I use a 1.25m offset dish with a SPID RAS 1 degree Az / El rotator and a G4DGU dish feed with all coaxial connections. RX is a Khune 0.8 dB pre amp into a G4 transverter locked to 10 MHz and an IC9700 GPS locked. USB audio connection to a W10 laptop running WXJT-X software. Most reports using QRA64D but also several using JT4F Also 3 CW signal were seen and heard but admit must improve my wide CW decoder in my brain!!

## VK 122GHz Project - update

Tim in Oz, has tested all the complete boards. Boards and horns are being shipped next week from Australia, and are expected in the UK by the end of the month.
Once received I will then contact everyone who has placed orders.

Roger G8CUB

## UK Microwave Group Wiki

More contributions are requested for the Wiki to advance Microwave knowledge.

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

## Editors Comments

Thanks to Maarten PA0MHE for his excellent article, and to the other contributors this month. With all this extra time that we have available, there is no excuse not to write for the magazine.

## Forthcoming Contests

John G3XDY has made some changes to the contest calendar. This is in particular for the highest frequency contests, where portable operation is almost essential. Please check the Microwave Group website for the latest information.

# Contests

## May 2020 Lowband Contest Results

Thanks to activity from the continent several entrants made respectable QSO totals in this event despite the lack of UK portable stations. The lack of air traffic limited the number of longer range contacts made though.

Conrad PA5Y won 1296MHz by some distance, thanks to tapping into good levels of activity in Germany as well as working a good proportion of the UK entrants. Runner up was Anthony G7LRQ, and Gordon GI6ATZ took third place. Best DX was the aircraft scatter contact from PA5Y to SM6VTZ at 844km. John G3SQQ was the leading low power station.

2300MHz had two entries. G1EHF was the winner, and G3YJR runner up. The G1EHF to G4ODA contact was the best DX.

On 2320MHz Anthony G7LRQ was the winner with David M0GHZ not far behind as runner up, and Neil G4BRK in third place. Best DX was M0GHZ's contact with PA0S at 463km. G4FRE was the leading low power entrant.

David M0GHZ was the clear winner on 3400MHz, with Dave G4FRE in runner up spot just ahead of Andy G4JNT. Best DX reported was from M0GHZ to G3XDY at 246km.

David M0GHz was the overall winner, with Anthony G7LRQ in overall runner-up position.

Certificates go to M0GHZ as overall winner, with G7LRQ as runner-up and to the following band leaders, runners-up and leading fixed and low power stations.

1296MHz PA5Y, G7LRQ, G3SQQ
2300MHz G1EHF, G3YJR
2320MHz G7LRQ, M0GHZ, G4FRE
3400MHz M0GHZ, G4FRE

Normalised scores are included in the overall championship table which is published in Scatterpoint.

Thanks go to G4ODA, G1SHM, M5BOP and G1B (G1PPA) for their checklogs.

John G3XDY
UKuG Contest Manager

## May 2020 Low Band Results

**Overall**

| Pos | Callsign | 1296MHz | 2300MHz | 2320MHz | 3400MHz | Overall |
|---|---|---|---|---|---|---|
| 1 | M0GHZ | 370 | 0 | 910 | 1000 | 2280 |
| 2 | G7LRQ | 523 | 0 | 1000 | 0 | 1523 |
| 3 | G1EHF | 0 | 1000 | 133 | 0 | 1133 |
| 4 | PA5Y | 1000 | 0 | 0 | 0 | 1000 |
| 5 | G3YJR | 0 | 678 | 213 | 0 | 891 |
| 6 | G4LDR | 110 | 0 | 374 | 401 | 885 |
| 7 | G4BRK | 247 | 0 | 554 | 0 | 801 |
| 8 | G4FRE | 0 | 0 | 178 | 439 | 617 |
| 9 | GI6ATZ | 519 | 0 | 0 | 0 | 519 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 10 | G0EAK | 0 | 0 | 441 | 0 | 441 |
| 11 | G4JNT | 0 | 0 | 0 | 438 | 438 |
| 12 | G3TCU | 355 | 0 | 0 | 0 | 355 |
| 13 | G8AIM | 65 | 0 | 186 | 74 | 325 |
| 14 | G4KIY | 319 | 0 | 0 | 0 | 319 |
| 15 | G3UKV | 83 | 0 | 226 | 0 | 309 |
| 16 | F4VRB | 297 | 0 | 0 | 0 | 297 |
| 17 | G3SQQ | 275 | 0 | 0 | 0 | 275 |
| 18 | G3TCT | 240 | 0 | 0 | 0 | 240 |
| 19 | G3VKV | 0 | 0 | 38 | 148 | 186 |
| 20 | G6KWA | 134 | 0 | 0 | 0 | 134 |
| 21 | G3YJR | 74 | 0 | 0 | 0 | 74 |
| 22 | GM4BYF | 41 | 0 | 10 | 0 | 51 |
| 23 | G4KZY | 42 | 0 | 0 | 0 | 42 |
| 24 | GM8IEM | 40 | 0 | 0 | 0 | 40 |
| 25 | GM4DIJ | 22 | 0 | 13 | 0 | 35 |
| 26 | G4BXD | 33 | 0 | 0 | 0 | 33 |
| 27 | GD1MIP | 32 | 0 | 0 | 0 | 32 |
| 28 | G3VKV | 26 | 0 | 0 | 0 | 26 |
| 29 | G6GVI | 9 | 0 | 3 | 0 | 12 |

**1296MHz**

| Pos | Callsign | Locator | QSOs | Score | ODX Call | ODX kms |
|---|---|---|---|---|---|---|
| 1 | PA5Y | JO21VO | 48 | 15215 | SM6VTZ | 844 |
| 2 | G7LRQ | IO91TQ | 46 | 7959 | DF2VJ | 580 |
| 3 | GI6ATZ | IO74AJ | 23 | 7902 | G3XDY | 543 |
| 4 | M0GHZ | IO81VK | 33 | 5634 | PA5Y | 554 |
| 5 | G3TCU | IO91QE | 34 | 5407 | GI6ATZ | 506 |
| 6 | G4KIY | IO92WN | 32 | 4861 | GI6ATZ | 437 |
| 7 | F4VRB | IN98PT | 16 | 4515 | G4ODA | 443 |
| 8 | G3SQQ | IO93JC | 27 | 4178 | PA5Y | 504 |
| 9 | G4BRK | IO91HP | 26 | 3758 | GI6ATZ | 433 |
| 10 | G3TCT | IO81QC | 18 | 3658 | PA5Y | 587 |
| 11 | G6KWA | JO02AD | 16 | 2037 | PA5Y | 400 |
| 12 | G4LDR | IO91EC | 11 | 1681 | PA5Y | 518 |
| 13 | G3UKV | IO82RR | 12 | 1257 | G4ZTR | 249 |
| 14 | G3YJR | IO93FJ | 9 | 1119 | GI6ATZ | 310 |
| 15 | G8AIM | IO92FH | 12 | 988 | G3XDY | 190 |
| 16 | G4KZY | IO91EE | 8 | 639 | G3XDY | 219 |
| 17 | GM4BYF | IO85JV | 6 | 623 | GI6ATZ | 242 |
| 18 | GM8IEM | IO78HF | 2 | 608 | GI6ATZ | 428 |
| 19 | G4BXD | IO82UJ | 9 | 507 | G4KIY | 148 |
| 20 | GD1MIP | IO74TI | 2 | 487 | G3SQQ | 251 |
| 21 | G3VKV | IO81XV | 9 | 390 | G8XVJ | 176 |
| 22 | GM4DIJ | IO85IW | 5 | 332 | GI6ATZ | 241 |
| 23 | G6GVI | IO83SN | 4 | 140 | G3SQQ | 98 |

**2300MHz**

| Pos | Callsign | Locator | QSOs | Score | ODX Call | ODX kms |
|---|---|---|---|---|---|---|
| 1 | G1EHF | IO91LH | 1 | 174 | G4ODA | 174 |
| 2 | G3YJR | IO93FJ | 1 | 118 | G4ODA | 118 |

**2320MHz**

| Pos | Callsign | Locator | QSOs | Score | ODX Call | ODX kms |
|---|---|---|---|---|---|---|
| 1 | G7LRQ | IO91TQ | 18 | 2318 | PA0S | 334 |
| 2 | M0GHZ | IO81VK | 10 | 2110 | PA0S | 463 |
| 3 | G4BRK | IO91HP | 10 | 1284 | ON/PA0MHE | 327 |
| 4 | G0EAK | IO93MH | 8 | 1023 | M0GHZ | 226 |
| 5 | G4LDR | IO91EC | 7 | 867 | G3XDY | 223 |
| 6 | G3UKV | IO82RR | 5 | 523 | G4ODA | 163 |
| 7 | G3YJR | IO93FJ | 5 | 493 | G4ZTR | 230 |
| 8 | G8AIM | IO92FH | 4 | 430 | G3XDY | 190 |
| 9 | G4FRE | IO82UC | 3 | 412 | G4ZTR | 218 |
| 10 | G1EHF | IO91LH | 5 | 309 | G4ODA | 174 |
| 11 | G3VKV | IO81XV | 2 | 87 | G8AIM | 58 |
| 12 | GM4DIJ | IO85IW | 2 | 30 | GM8MJV | 23 |
| 13 | GM4BYF | IO85JV | 2 | 24 | GM8MJV | 17 |
| 14 | G6GVI | IO83SN | 1 | 6 | G4AQB | 6 |

**3400MHz**

| Pos | Callsign | Locator | QSOs | Score | ODX Call | ODX kms |
|---|---|---|---|---|---|---|
| 1 | M0GHZ | IO81VK | 6 | 788 | G3XDY | 246 |
| 2 | G4FRE | IO82UC | 4 | 346 | G4ODA | 165 |
| 3 | G4JNT | IO90IV | 3 | 345 | G4ODA | 224 |
| 4 | G4LDR | IO91EC | 3 | 316 | G3XDY | 223 |
| 5 | G3VKV | IO81XV | 2 | 117 | G4BXD | 59 |
| 6 | G8AIM | IO92FH | 1 | 58 | G3VKV | 58 |
| 7 | G4BXD | IO82UJ | 0 | 0 | | 0 |

# Low Band Championship 2020

Results after three sessions, the best three events count towards the total

**Overall**

| Pos | Callsign | 08/03/2020 | 05/04/2020 | 03/05/2020 | TOTAL |
|---|---|---|---|---|---|
| 1 | M0GHZ | 2003 | 2218 | 2280 | 6501 |
| 2 | M0HNA(/P) | 4000 | 1481 | 0 | 5481 |
| 3 | G3UVR | 1429 | 2289 | 0 | 3718 |
| 4 | G4ZTR | 1902 | 1762 | 0 | 3664 |
| 5 | G7LRQ | 0 | 1408 | 1523 | 2931 |
| 6 | G4LDR | 0 | 1745 | 885 | 2630 |
| 7 | G4BRK | 0 | 1455 | 801 | 2256 |
| 8 | G3YJR | 791 | 452 | 965 | 2208 |
| 9 | G3UKV | 1085 | 223 | 309 | 1617 |
| 10 | G8AIM | 486 | 701 | 325 | 1512 |
| 11 | G4FRE | 0 | 778 | 617 | 1395 |
| 12 | G4JNT | 0 | 922 | 438 | 1360 |
| 13 | G1EHF | 0 | 0 | 1133 | 1133 |
| 14 | G8DMU | 0 | 1078 | 0 | 1078 |
| 15 | GD8EXI | 0 | 1000 | 0 | 1000 |
| 16 | PA5Y | 0 | 0 | 1000 | 1000 |
| 17 | G3TCU | 0 | 598 | 355 | 953 |
| 18 | G6KWA | 467 | 259 | 134 | 860 |
| 19 | G3VKV | 303 | 329 | 186 | 818 |
| 20 | G3TCT | 0 | 522 | 240 | 762 |
| 21 | G3SQQ | 478 | 0 | 275 | 753 |
| 22 | F4VRB | 0 | 415 | 297 | 712 |
| 23 | GI6ATZ | 0 | 0 | 519 | 519 |
| 24 | G8EOP | 306 | 146 | 0 | 452 |
| 25 | G0EAK | 0 | 0 | 441 | 441 |
| 26 | G4KIY | 0 | 0 | 319 | 319 |
| 27 | G4RQI | 0 | 279 | 0 | 279 |
| 28 | GM4DIJ(/P) | 222 | 12 | 35 | 269 |
| 29 | G8AQA | 0 | 258 | 0 | 258 |
| 30 | G4KZY | 0 | 187 | 42 | 229 |
| 31 | G4BAO | 0 | 190 | 0 | 190 |
| 32 | G4BXD | 26 | 123 | 33 | 182 |
| 33 | GM8IEM | 51 | 64 | 40 | 155 |
| 34 | GW4MBS | 43 | 72 | 0 | 115 |
| 35 | G6GVI | 0 | 40 | 12 | 52 |
| 36 | GM4BYF | 0 | 0 | 51 | 51 |
| 37 | GD1MIP | 17 | 0 | 32 | 49 |
| 38 | G0HIK | 0 | 41 | 0 | 41 |
| 39 | G4GUG | 0 | 0 | 0 | 0 |

**1296MHz**

| Pos | Callsign | 06/03/2019 | 05/04/2019 | 03/05/2020 | TOTAL |
|---|---|---|---|---|---|
| 1 | G4ZTR | 905 | 762 | 0 | 1667 |
| 2 | G7LRQ | 0 | 840 | 523 | 1363 |
| 3 | M0GHZ | 367 | 549 | 370 | 1286 |
| 4 | M0HNA(/P) | 1000 | 276 | 0 | 1276 |
| 5 | G4BRK | 0 | 866 | 247 | 1113 |
| 6 | GD8EXI | 0 | 1000 | 0 | 1000 |
| 7 | PA5Y | 0 | 0 | 1000 | 1000 |
| 8 | G3UVR | 355 | 639 | 0 | 994 |
| 9 | G3TCU | 0 | 598 | 355 | 953 |
| 10 | G6KWA | 467 | 259 | 134 | 860 |
| 11 | G3TCT | 0 | 522 | 240 | 762 |
| 12 | F4VRB | 0 | 415 | 297 | 712 |
| 13 | G8DMU | 0 | 614 | 0 | 614 |
| 14 | GI6ATZ | 0 | 0 | 519 | 519 |
| 15 | G3SQQ | 218 | 0 | 275 | 493 |
| 16 | G3UKV | 209 | 126 | 83 | 418 |
| 17 | G3YJR | 59 | 229 | 74 | 362 |
| 18 | G4KIY | 0 | 0 | 319 | 319 |
| 19 | G8AIM | 87 | 151 | 65 | 303 |
| 20 | G4RQI | 0 | 279 | 0 | 279 |
| 21 | G4LDR | 0 | 159 | 110 | 269 |
| 22 | G8AQA | 0 | 258 | 0 | 258 |
| 23 | GM4DIJ(/P) | 222 | 12 | 22 | 256 |
| 24 | G4KZY | 0 | 187 | 42 | 229 |
| 25 | G4BAO | 0 | 190 | 0 | 190 |
| 26 | G3VKV | 64 | 97 | 26 | 187 |
| 27 | GM8IEM | 51 | 64 | 40 | 155 |
| 28 | G4BXD | 26 | 90 | 33 | 149 |
| 29 | G1PPA/P | 140 | 0 | 0 | 140 |
| 30 | GW4MBS | 43 | 72 | 0 | 115 |
| 31 | G4FRE | 0 | 67 | 0 | 67 |
| 32 | GD1MIP | 17 | 0 | 32 | 49 |
| 33 | G0HIK | 0 | 41 | 0 | 41 |
| 34 | GM4BYF | 0 | 0 | 41 | 41 |
| 35 | G6GVI | 0 | 0 | 9 | 9 |
| 36 | G4GUG | 0 | 0 | 0 | 0 |

**2300MHz**

| Pos | Callsign | 06/03/2019 | 05/04/2019 | 03/05/2020 | TOTAL |
|---|---|---|---|---|---|
| 1 | M0HNA(/P) | 1000 | 1000 | 0 | 2000 |
| 2 | G3YJR | 648 | 0 | 678 | 1326 |
| 3 | G1EHF | 0 | 0 | 1000 | 1000 |
| 4 | G4LDR | 0 | 121 | 0 | 121 |

**2320MHz**

| Pos | Callsign | 06/03/2019 | 05/04/2019 | 03/05/2020 | TOTAL |
|---|---|---|---|---|---|
| 1 | M0GHZ | 645 | 736 | 910 | 2291 |
| 2 | G4ZTR | 997 | 1000 | 0 | 1997 |
| 3 | G3UVR | 657 | 921 | 0 | 1578 |
| 4 | G7LRQ | 0 | 569 | 1000 | 1569 |
| 5 | M0HNA(/P) | 1000 | 205 | 0 | 1205 |
| 6 | G4BRK | 0 | 589 | 554 | 1143 |
| 7 | G4LDR | 0 | 465 | 374 | 839 |
| 8 | G8AIM | 173 | 243 | 186 | 602 |
| 9 | G3YJR | 84 | 223 | 213 | 520 |
| 10 | G3UKV | 268 | 0 | 226 | 494 |
| 11 | G8DMU | 0 | 464 | 0 | 464 |
| 12 | G8EOP | 306 | 146 | 0 | 452 |
| 13 | G0EAK | 0 | 0 | 441 | 441 |
| 14 | G3VKV | 157 | 97 | 38 | 292 |
| 15 | G3SQQ | 259 | 0 | 0 | 259 |
| 16 | G4FRE | 0 | 0 | 178 | 178 |
| 17 | G1EHF | 0 | 0 | 133 | 133 |
| 18 | G6GVI | 0 | 40 | 3 | 43 |
| 19 | G4BXD | 0 | 33 | 0 | 33 |
| 20 | GM4DIJ | 0 | 0 | 13 | 13 |
| 21 | GM4BYF | 0 | 0 | 10 | 10 |

**3400MHz**

| Pos | Callsign | 06/03/2019 | 05/04/2019 | 03/05/2020 | TOTAL |
|---|---|---|---|---|---|
| 1 | M0GHZ | 991 | 933 | 1000 | 2924 |
| 2 | G4LDR | 0 | 1000 | 401 | 1401 |
| 3 | G4JNT | 0 | 922 | 438 | 1360 |
| 4 | G4FRE | 0 | 711 | 439 | 1150 |
| 5 | G3UVR | 417 | 729 | 0 | 1146 |
| 6 | M0HNA/P | 1000 | 0 | 0 | 1000 |
| 7 | G1PPA/P | 650 | 0 | 0 | 650 |
| 8 | G3UKV | 608 | 0 | 0 | 608 |
| 9 | G8AIM | 226 | 307 | 74 | 607 |
| 10 | G3VKV | 190 | 232 | 148 | 570 |
| 11 | G4BXD | 0 | 0 | 0 | 0 |

# UKuG MICROWAVE CONTEST / ACTIVITY WEEKEND CALENDAR 2020

| Dates, 2020 | Time UTC | Contest name | Certificates |
|---|---|---|---|
| 25-26 Jan | | Activity Weekend | |
| 22-23 Feb | | Activity Weekend | |
| 8-Mar | 1000 - 1600 | 1st Low band 1.3/2.3/3.4GHz | F, P,L |
| 28-29 Mar | | Activity Weekend | |
| 5-Apr | 1000 - 1600 | 2nd Low band 1.3/2.3/3.4GHz | F, P,L |
| 3-May | 0800 - 1400 | 3rd Low band 1.3/2.3/3.4GHz | F, P,L |
| 17-May | 0900 – 1700 | 122GHz Activity Day | |
| 30-31 May | | Activity Weekend | |
| 31-May | 0600 - 1800 | 1st 5.7GHz Contest | F, P,L |
| 31-May | 0600 - 1800 | 1st 10GHz Contest | F, P,L |
| 7-Jun | 1000 - 1600 | 4th Low band 1.3/2.3/3.4GHz | F, P,L |
| 21-Jun | 0900 - 1700 | 24/47GHz Trophy / 76GHz/122-248 GHz | |
| 27-28 Jun | | Activity Weekend | |
| 28-Jun | 0600 - 1800 | 2nd 5.7GHz Contest | F, P,L |
| 28-Jun | 0600 - 1800 | 2nd 10GHz Contest | F, P,L |
| 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

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

# 80m UK Microwavers net

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

**73 Martyn Vincent G3UKV**