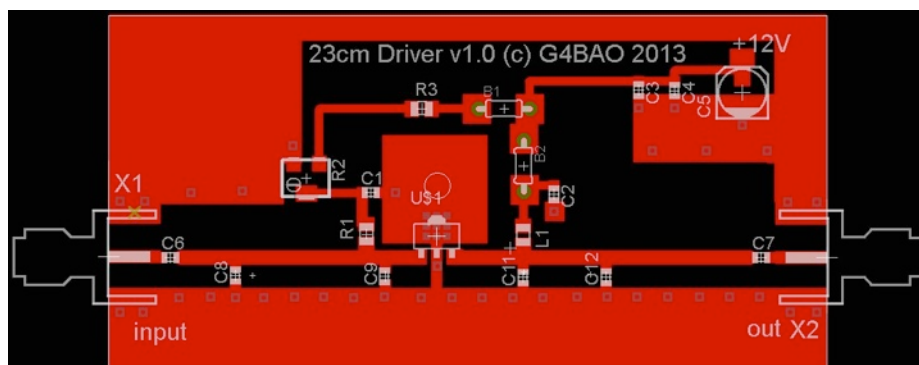




A 2.5 Watt LDMOS Driver for the 1.3GHz band

John C Worsnop, G4BAO



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**A Happy and QSO-filled New Year
to all our readers and contribu-
tors!**

STOP PRESS!

AI, W5LUA and Shichirou, JA6CZD made the **first 24GHz EME contact between the USA and Japan** on January 2 at 1430Z. The two stations had about an hour of common window where each had 15 to 20 degrees of elevation.

JA6CZD uses a 2.4m offset fed dish with a 22W SSPA. W5LUA uses a 2.4m offset fed dish and a TWT mounted on the feed support providing 100W at the feed. JA6CZD sent AI a 559 signal report and AI gave Shichirou a 449 report.

Both stations use linear polarity and must compensate for the 70 degrees of spatial offset between their locations. JA6CZD used horizontal and AI used vertical polarization. The noise figure at both stations was under 2dB.

AI measured his Doppler Shift with his return echoes at 51kHz at the start of the contact. The mutual Doppler Shift placed both at about 24048.108MHz based on a centre frequency of 24048.100MHz.

This shifted down in frequency as the schedule took place.

W5LUA was GPS locked and JA6CZD uses an OCXO and a Rubidium standard to control frequency.

Source: AI Ward, W5LUA, ANS

UK Microwave Group Contact Information

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Editor's corner

New toys for Christmas? Interesting designs? Propagation news? Care to tell us?

The 2011 volume of Scatterpoint is now available [online](#).

Just as there are Easter eggs in the stores, so the UKμG AGM approaches. If you wish to stand for the Committee, please let me know. The calling notice will be in the February edition.

Due to commercial pressures, the ON0VRT Beacon and its co-located repeaters have had to be shut down (see p.4).

Beacon Managers – please tell Scatterpoint about your beacon (e.g. design, usage, running costs) and be the *Featured Beacon of the month*. We hope this might help the hosting group to solicit support from UKμG members. Perhaps members might consider adopting a beacon, particularly where the beacon is remote and is not supported locally by a large, well-funded group?

73 de Martin G8BHC

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, rtf, 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 your co-operation.

Martin G8BHC

UK MICROWAVE GROUP SUBSCRIPTION

The following subscription rates now 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 the [Yahoo group](#).

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.

QUOTE YOUR CALLSIGN PLEASE!

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!)

Colour codes

Editorial & Events

Activity & Contests

Technical

Nanowaves (optical)

Commentary

Reproducing articles from Scatterpoint

If you plan to reproduce an article exactly as per Scatterpoint then please contact the [Editor](#) – otherwise you need to seek permission from the original source/author.

You may not reproduce articles for profit or other

UKμG Chip Bank

A new free service for members

At the Crawley round Table, Alan G8LSD handed over some boxes of chip components from the old Microwave Committee Chip bank to Mike Scott, G3LYP. We have also been offered components from other sources. Mike has catalogued it (*thanks Mike*) and the Committee has decided to operate the service again, and after discussing several options for its operation, have now agreed with Mike on a way to operate it.

We will put the catalogue on the UKμG web site and members will be able to email Mike with requests for components. All will be subject to availability, and a listing of a component on the site will not be a guarantee of availability of that component.

The service will be run as a free benefit to all members and the UK Microwave Group will pick up the cost of packaging and postage, that is, Jiffy bags, small plastic bags for individual component values, and Large letter 2nd class postage, currently 69p.

This is by far the simplest option but this is also the option most likely to suffer abuse so we have decided to run a 4 month trial starting in February with a budget of £100 after which the committee would have to authorise further spend?

The service may be withdrawn at the discretion of the committee if abuse such as reselling of components is suspected. We have asked Mike to check with the Chairman (or designated officer) if any individual is making excessive requests, and we will ensure that the service is only available to members by letting Mike have a regularly updated membership list.

The commencement of the service will be announced on the UKμG Website along with details of how to apply.

John Worsnop G4BAO Chairman UKuG

ON0VRT Beacon Shutdown

At 10:30am on 3/12/2012 all beacons at the ON0VRT site JO20CS (70-23-13-9-6 cm) as well as the collocated repeaters (6, 2, 70) went QRT forever.

These beacons were located at 117 and 230 meter AGL on the former VRT public broadcaster owned towers. As an employee ON7WP got permission to put up the systems. Due to European law the broadcasting facilities were sold a few years ago to Norkring (at a ridiculous low price).

Now it is no longer possible to operate ham radio systems on broadcast sites owned by Norkring. It is all about money with these mast-owning companies. And if not money they start asking for surrealistic insurance policies. I have had enough putting my time, energy and money in community ham radio projects.

Thanks to all, we had so much fun building and using these systems. Thanks to all people spotting and giving reports.

Pedro M.J. WYNS ON7WP-AA9HX-C5WP

pedro.wyns@gmail.com

HEELWEG MICROWAVE 2013

Dear OM,

We'd like to invite you to the Dutch
Microwaves Event on:

Saturday January 19th 2013

This meeting will be the place to exchange ideas with amateurs from Holland, Germany, France, United Kingdom, Belgium, Switzerland and more.

We hope all of you will bring your homebrew equipment which can be measured on performance by our 2013 measuring team operated by:

PA0JEN, PE1BMC, PE1FOD, PA0EHG,
PA7JB, PA3CEG, PE1FYB,
PB0AOK, PE0SSB, PA1KR, PA2M, PA0RYL
and PA3ACJ .

The following equipment will be available:

- Sweeper 0-26 GHz
- Spectrum analyser up to 26 GHz.
- Spectrum analyser 10KHz-3.8GHz + Tracking generator
- Generator 10KHz-3.3GHz (AM, FM, CW, Pulse)
- SWR 5MHz - 3.0GHz (RF-SWR Bridge)
- Spectrum analyzer up to 325 GHz
- Vector network analyser up to 20 GHz
- Tektronix Video generator
- Tektronix VM700 video measuring
- Barco Receiver I & II receiver / video de-modulator range 23cm, 13cm and 3cm,
- NKF video demodulator for baseband measuring.
- Spectrum analyser Agilent to 3GHz.
- Noise meter 24 GHz
- Noise meter 47 GHz
- Power meter up to 76 GHz
- Calibration unit for 24 GHz Filters
- Signal generator from 0 -18.6 GHz (Mar 2031 / HP8673)
- Spectrum analyser from 0-26.5 GHz + Tracking up to 2.7 GHz.
- AM - 70 cm ATV generator
- Counter 24GHz rubidium stabilised.



- Power meter to 250 Watt up to 2.5GHz.
- Rubidium & GPS based frequency standard 10MHz
- HP 5370 Time Interval Meter
- HP 3336 B Signal Generator
- HP 8405A Vector Voltmeter
- GPIB control software based on KE5FX programs

If you have a special project to be measured, please send an email. We maybe can arrange specific equipment.

Please watch our website for updates www.pamicrowaves.nl and our Forum

www.pamicrowaves.nl/website/forum/

Please contact us via info@pamicrowaves.nl

OUR 2012 VIDEO at
www.youtube.com/watch?v=fO6jP7G-HHI

DATE 19 January 2013

Time 10.00 to 15.00

LOCATION CAFE ZAAL "DE VOS"

Halseweg 2

7054 BH WESTENDORP

The Netherlands

73's PA3CEG, PA0BAT, PA7JB, PE1FOT

A homebrew Yagi for 13cm

by Bob Price G8DTF

Introduction

Some time back I bought myself a 13cm transverter which needed some work to get it going. Initially I had 25mW output and was using a borrowed horn-fed Tonna antenna. This was used with some success. An SSPA also came with the transverter, which also needed some work to integrate it into the system. I also found that the 25 element Tonna antenna did not have sufficient gain for serious DX work on 13cm, so in 2009 I decided to build an antenna to replace it. This also meant that the Tonna could go back into use by the original owner.

Element insulators

I looked at a number of Yagi designs before settling on an approach. The first issue was that of element length modification with through boom designs like DL6WU. The boom effect is pretty large on 13cm and I was concerned that this may have a significant effect on performance, particularly as my metalwork skills are limited these days. There are also issues with ensuring that electrical contact between the elements and the boom.

I wanted to find a way of supporting the elements in a way which did not need correction factors when calculating the lengths. I looked at lots of different ways of supporting elements and concluded that many ways were just too fragile, particularly with



small diameter elements. The Tonna was a good case in point as this had been repaired several times, because of the fragility of the element supports.

What I finally settled on was to use a plastic boom made from electrical 20mm conduit. This was not rigid enough to be self supporting for the length of yagi being considered, so it is supported from below by a 15mm square boom, with long M6 bolts through both booms.

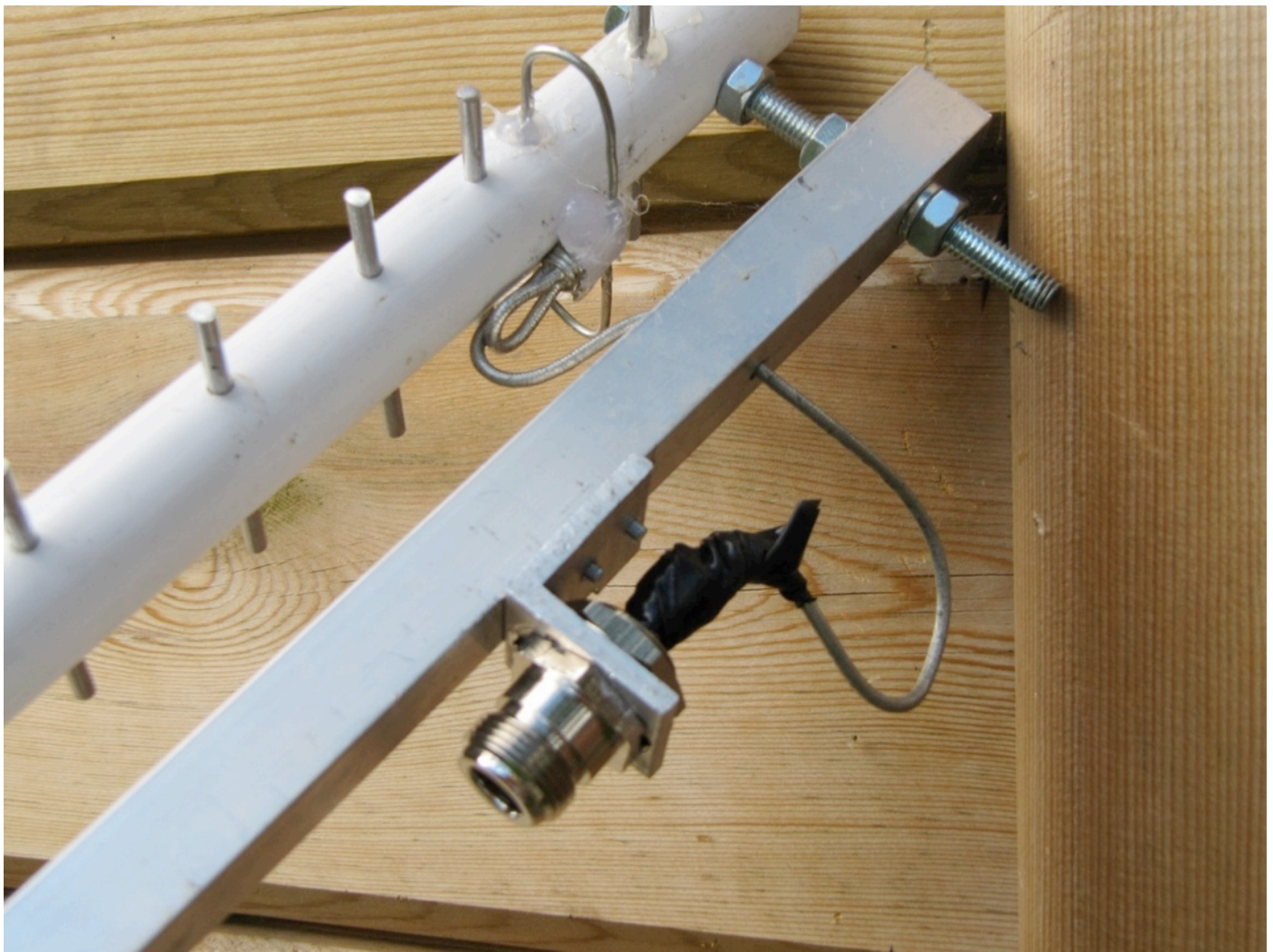
Yagi Design

I found a Yagi design tool on the internet by VK5DJ and entered the appropriate parameters for a Yagi with 60 directors using 3.2mm diameter aluminium welding rod as elements. I measured and drilled the boom for the reflector and directors using a 3mm drill. Elements were roughly cut with a hacksaw and filed to the correct dimensions using an electronic Vernier gauge. The ends of the element edges were sanded down to make them less sharp. Elements were then push fitted into the plastic boom.

The accuracy of drilling the boom in my case was not great, with some elements 10-15 degrees from horizontal, so construction could have been better, but then again I only spent 2 days building it.

The boom length is slightly less than 3m, so the boom is made of two 1.5m lengths of 15mm aluminium and 20mm plastic. The aluminium boom is joined with a length of square section solid 12mm which is filed down to fit. M6 bolts are used to secure the parts. I used a plastic joining piece for the 20mm conduit, which is fixed to each half with a self tapping screw. A U shaped 15mm square section piece from an old TV antenna was used to attach the antenna to the mast with a mast clamp. This allows the antenna to be stored as two 1.5m long pieces. The picture below shows the join between the two halves of the antenna.





I used 2mm tinned copper wire for the driven element. A balun was constructed using semi-rigid .141 coax which is terminated in an SMA plug. An SMA-N type adaptor is fixed onto a piece of aluminium angle to make the feed point rigid.

A slot was cut in the boom to take the Driven element. The solder joints and the ends of the balun coax were protected with hot melt glue from a glue gun. Hot melt glue seems to stay waterproof, particularly if the parts being glued are warmed. Hot melt glue was also used to secure some of the elements in the boom.

When I first used this antenna there was a problem with the two halves of the antenna sagging at each end as can be seen in this picture.





The sagging boom problem was resolved by adding a couple of support arms as can be seen in the above picture.

The design claims 19.7dBd gain and the antenna is quite sharp in use. I have been using this antenna for a couple of years now and it seems to have been reliable.

I took the antenna to the Finningley Round Table the year before last and David G6G XK and Tom G4TWJ measured the gain on their antenna test range. The gain was measured at about 18.7dBd, which did not surprise me given the less than accurate alignment of the directors.

Thoughts for the future

I have been thinking about how to build other antennas using similar methods. I will probably use square section plastic, instead of round section conduit, as this will make drilling the boom for elements much easier.

Bob Price G8DTF

A 2.5 Watt LDMOS Driver for the 1.3GHz band

John C Worsnop G4BAO

Introduction

Since I published the design for the 35 Watt LDMOS PA back in June 2009 RadCom a number of people have asked me if I had a driver circuit to go up from a few tens of mW up to a level sufficient to drive it. Then the two combined amplifiers could become a replacement for the “brick” modules that were popular a number of years ago.

This article describes a simple 2.5 Watt driver amplifier covering the 1.3GHz band requiring around 50-100mW of drive for full output. It can be added after low power transverter designs such as that by G4DDK [1] to boost the power output to a couple of Watts, sufficient to drive a larger PA device if necessary.

The design is very simple and based around a single cheap SOT-89 plastic PD85004 13.8V LDMOS device from ST [2]. The device is rated to give 17dB gain and 4 watts out at 870MHz but it performs well with reduced gain of 15-16dB and output power of up to 2.5 Watts at 1.3GHz.

The PCB is designed to fit in to a readily available 37 x 74 x 30mm tinplate box [3], and if the PCB design is copied should need no heatsink

Circuit description

The amplifier uses 50Ω microstrips and capacitor matching and requires no adjustment. Two big advantages of using just 50Ω lines during development is that a PCB with a single width of matching line is required and capacitors can be moved up and down the line for trimming. Secondly the PCB becomes a general purpose board for SOT-89 50Ω in/out modamps

In this amplifier, device input and output impedances are matched to 50Ω using low pass networks consisting of series, lines, TRL 1-4, and C8, 9, 11 and 12.

The 13.8 volt supply is connected to the drain via a network of two chokes and a 120pF capacitor to ground, and is decoupled over a wide range of frequencies by C3, C4 and C5.

Positive gate bias is also fed via a choke B1 from the 13.8 supply and potential divider to set the standing drain current to 50mA. The gate supply is decoupled by C1. Without gate bias the amplifier takes very little current so that switching the gate supply from the press to talk (PTT) line is a convenient way to switch the amplifier out of standby.

Note that the 13.8 supply to the board must be regulated unless a separate regulated supply is provided for the gate bias!

Construction

The PA is built on 0.8mm thick standard FR4 PCB material. The PD85004 used in the design is in a SOT-89 solder-down plastic package which is now becoming more popular and eliminates the need for hazardous Beryllium Oxide. Under the device tab there must be either six plated through holes to connect the tab both thermally and electrically to the ground plane underneath, which then acts as a heatsink for the device. An alternative to the plated through holes for a home made PCB is to use 5 subminiature copper rivets. [4]. The other grounding holes can be made up with either rivets or hand soldered copper wire vias.

Checking the completed PCB

Connect the output from your low power 1.3GHz transverter to the amplifier input after first ensuring that the input power does not exceed 100mW (+20dBm). Connect the amplifier output to a power meter/dummy load capable of dissipating at least 3 Watts.

Connect the drain to 13.8 volts via an ammeter on the 100mA amp range. Connect the gate bias supply, starting with minimum volts on the gate and VERY carefully increase the gate voltage until the device begins to take current. This onset is very sharp, so be very careful, as the drain current can easily swing up to many Amperes if you are not careful. Set the drain current to 50mA. Switch off and then switch the ammeter to the 1 Amp range. Switch back on. Apply drive and check that the

output power is in the order of 2 Watts depending on drive level. Typical test results for my prototype amplifier are shown in Figure 4 and Figure 5.

Conclusions

This inexpensive driver is relatively easy to build, with readily available components and produces a useful increase in output power for low power transverters such as those based on modamps. It covers the whole of the 1.3GHz narrow band section, and could be adapted to cover the ATV band or the 1240MHz section of the band if band planning eventually forces a move of 1.3GHz narrowband lower in the band.

On request, I will make the PCB mask available on my website [5]

References

- [1] "A Modern 1.3GHz transverter Module" Sam Jewell G4DDK. International Microwave Handbook, 2nd Ed. Chapter 9 p305. www.arri.org/shop/International-Microwave-Handbook
- [2] PD85004 Datasheet www.mouser.com/ds/1/389/CD00178461-55263.pdf
- [3] Tinplate boxes can be obtained from Alan Melia G3NYK at g3nyk.ham-radio-op.net/componen.htm
- [4] Copper rivets from www.megaug.com part number 700-025-4
- [5] www.g4bao.com

Table 1 - Component list

Component	Value	Type
R1, R3	2k7	SMD 0805
R2	10k	SMD preset
C1, C2	120pF	Murata ceramic 0603
C3	1nF	Murata ceramic 0603
C4	10nF	Murata Ceramic 0805
C5	10uF 35V	SMD electrolytic
C6,C7	39pF	Murata ceramic 0603
C8	3p3	Murata ceramic 0603
C9	12pF	Murata ceramic 0603
C11	6p8	Murata ceramic 0603
C12	1p5	Murata ceramic 0603
U\$1	PD85004	LDMOS power
L1	12.5nH	Coilcraft 0805 air core
B1, B2	Dual ferrite bead	Panasonic EXCELDRC35C
TL1	50Ω 1.43 mm x 15mm	Microstrip line, matching
TL2	50Ω 1.43 mm x 4mm	Microstrip line, matching
TL3	50Ω 1.43 mm x 7.6mm	Microstrip line, matching
TL4	50Ω 1.43 mm x 8.2mm	Microstrip line, matching

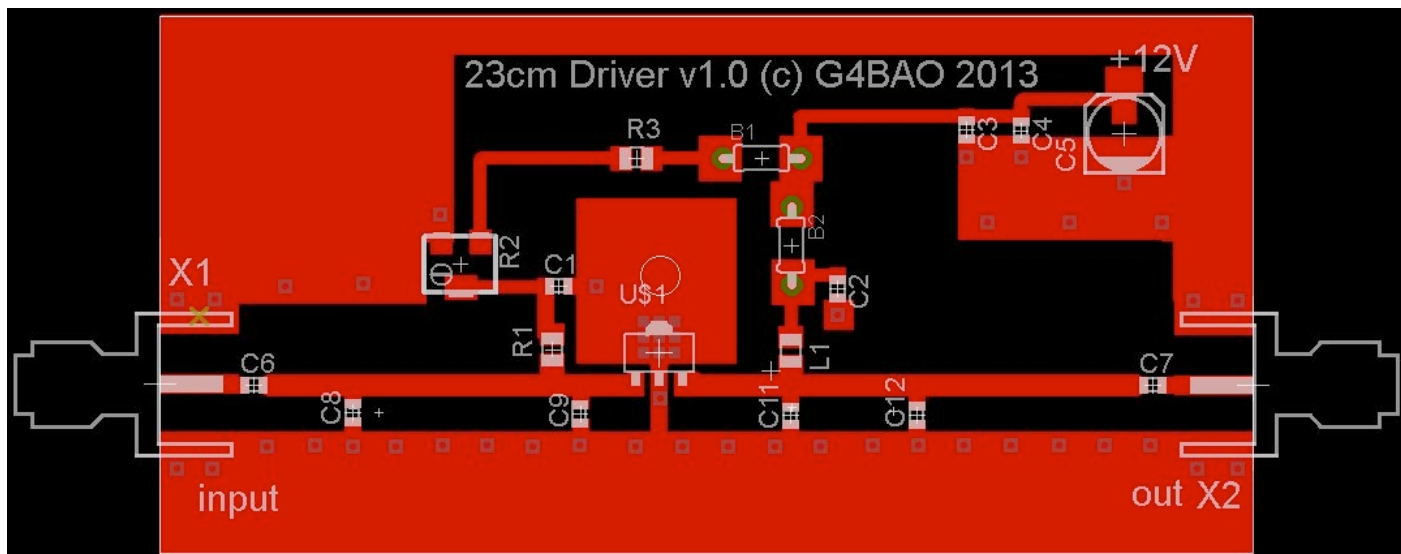


Figure 1: Board layout

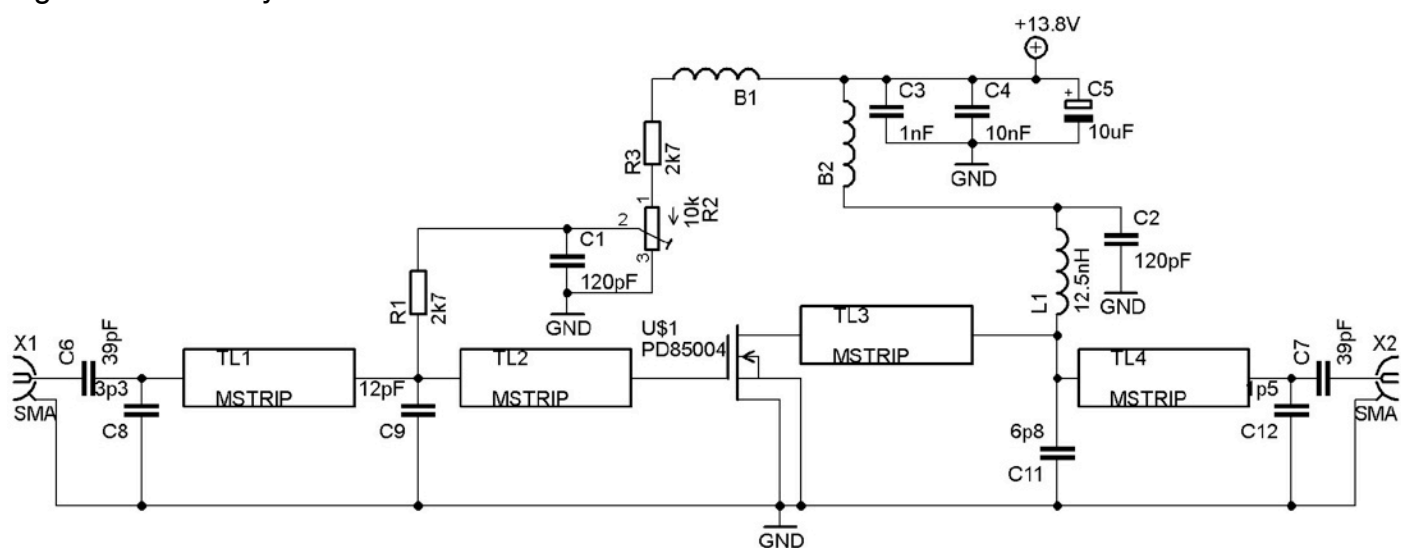


Figure 2: Circuit Diagram

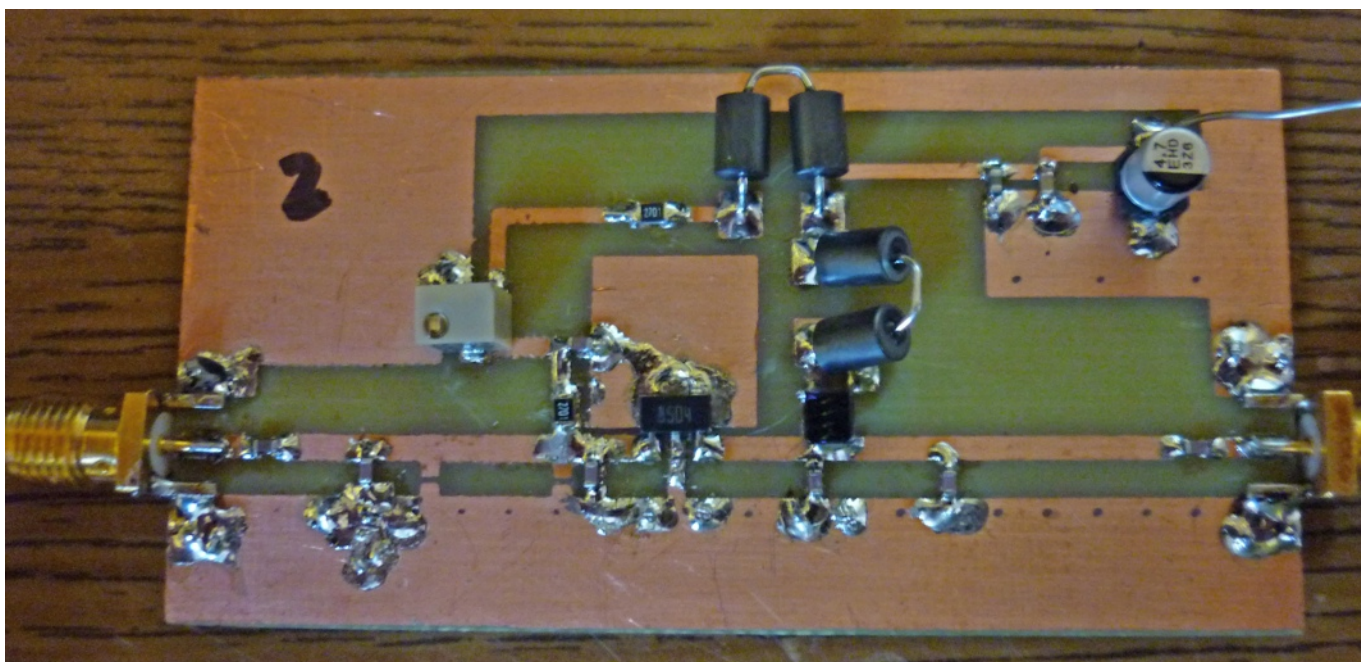


Figure 3: Construction

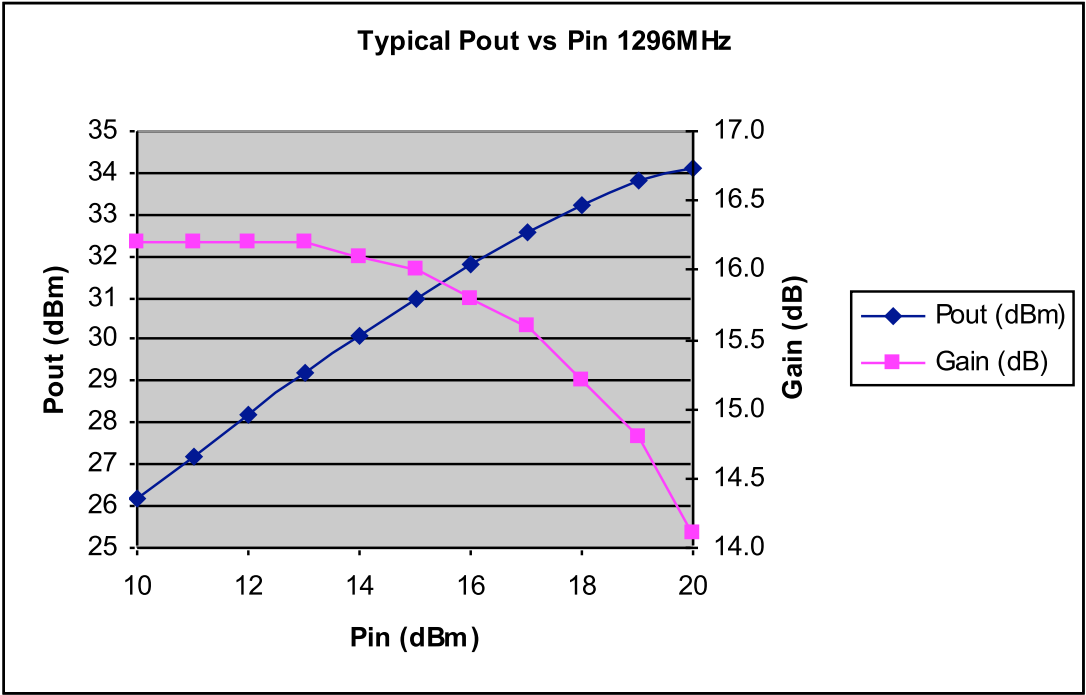


Figure 4 Prototype Amplifier Gain and Power out vs Power in

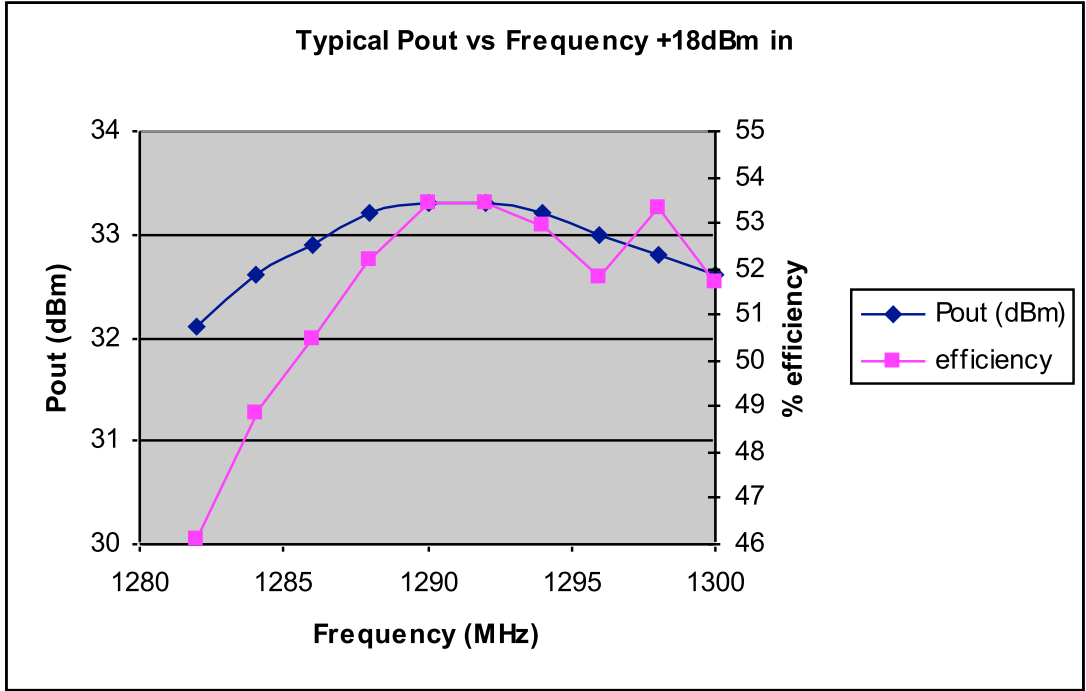


Figure 5 Prototype Amplifier Gain and Efficiency

UKμG Technical support

Another free service for members!

While many of you will have taken advantage of the “test equipment rooms” that we run at the Round Tables, sometimes that project just cannot wait for the few occasions per year when we hold them. 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, more importantly, 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!

I have emailed the people currently listed on the web site and checked if they can continue in the role. The following people have confirmed that they are happy to continue in/take up the role. If anyone would like to step forward and volunteer, especially in the regions where we have no representative, please email john@g4bao.com

Region	Tech support volunteer	Facilities
NW England, N Wales	David Wrigley G6GXX 07811776432	Spectrum Analysis to 24GHz Power measurement to 76GHz Freq Measurement to 26GHz Freq sources to 47GHz NF Measurement to 10GHz Antenna Test range to 24GHz
NE England Yorks and Humberside	Peter Day G3PHO microwaves@blueyonder.co.uk	Available from Spring 2013 Spec Analyser to 24GHz Power measurement to 24GHz (up to 5W on 24GHz), RF sources to 24GHz, direct freq measurement to 3GHz. Setting up/tuning up transverters, etc + general advice.
S and SW England	Brian Coleman G4NNS Paul Marsh M0EYT pjmarsh@uhf-satcom.com	Spectrum analyser to 24GHz Power measurement to 26 GHz Scalar Network analyser and sweeper 2 to 15GHz Antenna test range 2.3, 3.4, 5.7, 10 and 24GHz Waveguide directional couplers for 10GHz and 24GHz Coax couplers 1.3 – 26GHz. Power measurement to 12GHz High power dummy load @ 10GHz (500W) Frequency measurement to 22GHz Spectrum analysers to 6 and 18GHz Frequency generation to 18GHz.
SE England and London	Allan Wyatt G8LSD allan@virtual-museums.org	not known
East Anglia, Essex & Suffolk	Sam Jewell G4DDK sam@g4ddk.com	Spectrum analysis to 24GHz Power measurement to 24GHz Direct frequency measurement up to 3GHz VNA to 3GHz RF sources to 24GHz
West Anglia East Midlands	John Worsnop G4BAO john@g4bao.com	Spectrum analysis to 24GHz Power measurement to 24GHz Direct frequency measurement up to 18GHz VNA to 1.3GHz RF sources to 24GHz High current PSUs at 12, 28 and 48V
W Midlands	Vacancy	
N Scotland	Vacancy	
S Scotland	Vacancy	
N Ireland	Vacancy	

The current list of technical support volunteers is kept at www.microwavers.org/tech-support.htm

Martlesham Microwave Round Table

and UK Microwave Group AGM



Draft Programme

Saturday 27th April 2013

- 10:00 Truck Stop Breakfast
- 12:00 Doors Open
- 13:00 Welcome & opening G4BAO
- 13:15 Talk
- 14:00 Refreshments
- 14:30 Trophy Presentations TBD
- 14:45 Talks
- 16:55 Close
- 19:30 Meet for Dinner at 20:00 at the Cameo Hotel Ipswich

Sunday 28th April 2013

- 09:00 Doors Open
- 09:50 Welcome & Opening G4BAO
- 10:00 UKuG AGM (details in February)
- 10:30 Refreshments
- 11:00 Talks
- 12:30 Lunch break
- 13:30 Talks
- 15:00 UKuG Contest Forum G3XDY
- 15:45 Close

Travel

The talks and testing will be held at:

BT Adastral Park,
Martlesham Heath,
Suffolk, IP5 3RE.

This is located a few yards off the A12,
just east of Ipswich.

[CLICK](#) for map.

The evening meal and accommodation
will be at:

Cameo Hotel Copdock, London Road,
Ipswich, Suffolk, IP8 3JD, England.

Direct number 01473 209988
(09:00-17:30 on weekdays)

[CLICK](#) for details.

There is a shuttle bus between Ipswich
and Stansted every two hours at a
reasonable price.

For more details and booking, see [here](#)

Testing

Test equipment will be available
throughout the day subject to qualified
personnel to operate the test and
measurement equipment (yes, staff
would like to attend the talks too!).
Noise figure testing on many bands.



Activity News

By Bob Price G8DTF

Please send your activity news to:

scatterpoint@microwavers.org

Rain and Hail Scatter

It seems to have been a very wet year, at least here in the Northwest, but we don't often seem to have had the right kind of rain for rain scatter. We have certainly had a lot of persistent widespread rain, which did not give rise to good scatter. Small heavy shower are by far the best.

The following report from G6GVI is really interesting, as it shows the nature of rain scatter from showers passing through the Northwest of England. The Doppler shift from each rain cell can be seen as it passes the receiver.

GB3XGH cannot normally be heard at Ross's QTH with this receiver as it is just the LNB with no dish,

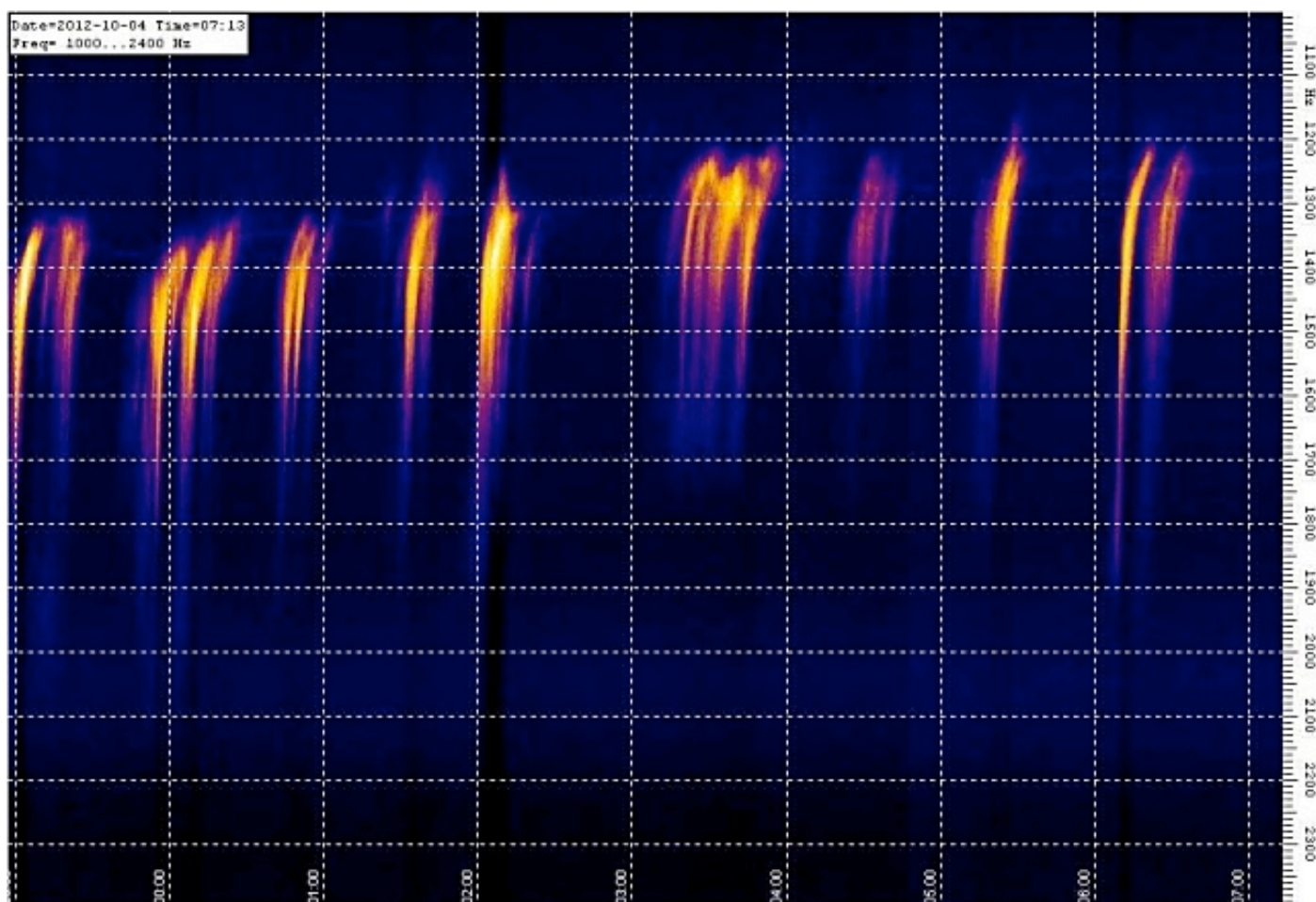
but when the rain starts the beacon can be heard via rain scatter.

The later report from G0API shows similar results, using GB3SCX, from a hail shower passing along the South coast of England.

This underlines the importance of beacons in monitoring propagation conditions on the microwave bands. Beacons can be used very effectively to identify the beam heading of a rain scatter point.

From Ross G6GVI

I wondered if my overnight spectrograph, of rain scatter from GB3XGH, using your Bernie-box would be of interest?



It's 1 hour/div horizontally and 100 Hz/div vertically, and you can even see a slow frequency-drift of around 100 Hz over the 8-hour period (as the temperature falls on my windowsill (I just had the LNB pointing through the window)).

It was recorded from the audio output of my FT817 (tuned to 18.810 MHz) on an ancient laptop running the DL4YHF Spectrum Laboratory software.

From John G0API

Large bundles of Hail rich cloud now moving West to East at this time - big signals on 10GHz. The picture shows GB3SCX which is NW of me and this plot was with 60cm dish pointed at 90 degrees - due east into the large black/white Mother-ship heading eastwards.

Well apart from GB3SCX, which is shown in the SDR-IQ screen dump, I could hear GB3KBQ back scattering from same hail shower and then some ISCAT-B from Andy G4JNT.

The SCX carrier is displayed on the right. I had not zeroed the frequency so it's showing just above the 10368.905MHz which it is actually on. The Doppler shifted Hail scatter (it was hail although the jpg says rain...) is to the left at lower frequency. The cloud was very black and the hail very white for several minutes as it passed overhead towards the East.

December 23cm UKAC

I was active myself for the final session of the 23cm UKAC. I use a DB6NT transverter driven with a TR751. There is also an SSPA I built in the 1980's which does not have much gain, so the output power is just 3.5W or so if I am lucky. The antenna is a 44 element on the pump-up mast fed with 20m of FSJ4-50, no masthead preamp.

Even so I managed to work:-

10 stations in IO83 (G3UVR, GW8ASD, G0CDA, G1SWH, G8REQ, G4JLG, G4BLH/P, M0SDA, G4NTY and G6GVI),

3 stations in IO82 (GW4BVE/P, G3SMT and M5AFG),

3 stations in IO92 (G8OHM, G8LYB and G8AIM),

2 stations in JO02 (G3PYE/P and G4NBS),

2 stations in IO91 (G4BRK and G8CUL), plus David M0GHZ in IO81 and Ray GM4CXM in IO75.

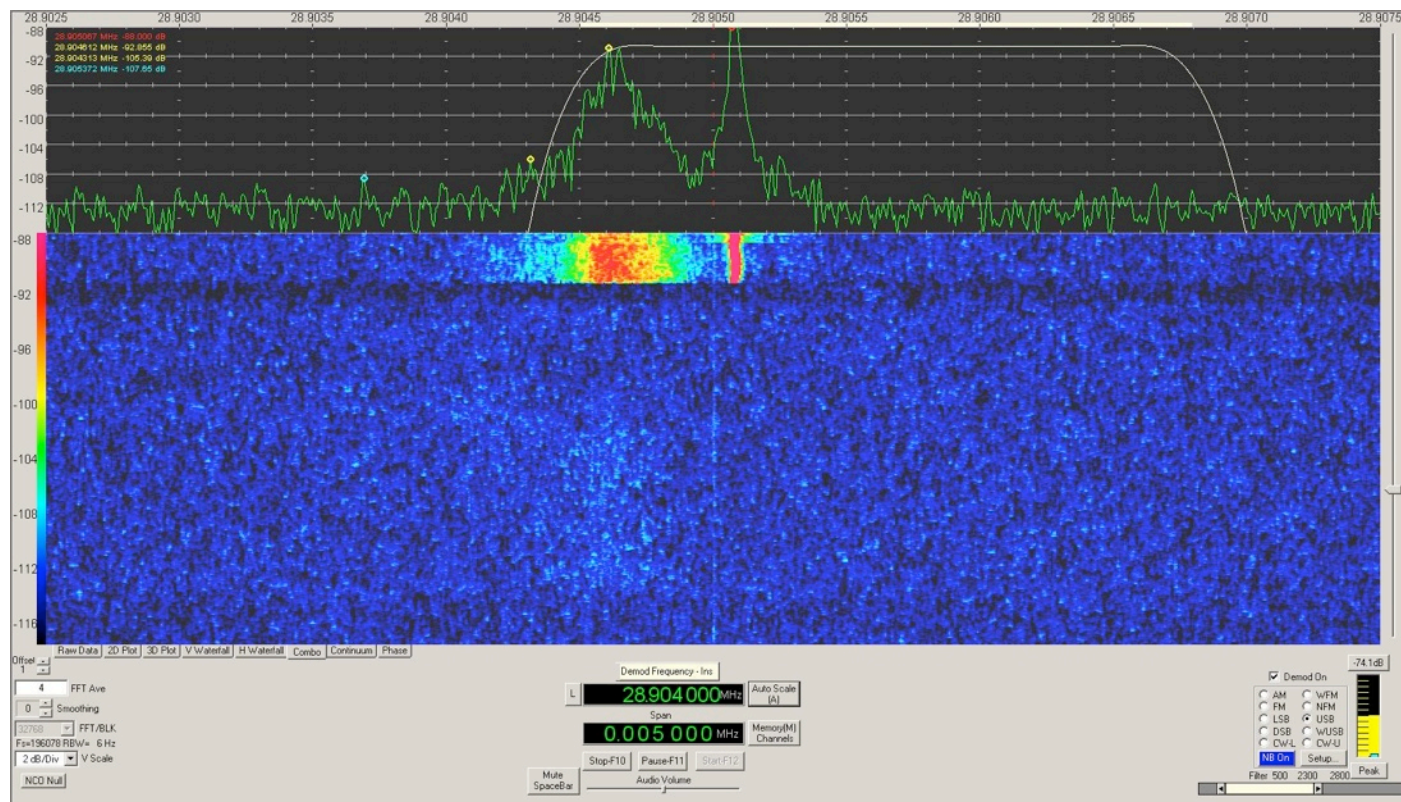
Conditions were not great with lots of QSB. I did hear Gordon G8PNN very loud via aircraft scatter at one point, but just detectable otherwise.

From Ray GM4CXM

Ray sent me his QSO map for the 23cm UKAC and he worked the following stations.

3 stations in IO75 (GM7OIN, GM0USI and GM7GDE),

2 in IO85 (GM4GUF and GM4JR),



5 in IO83 (GW8ASD, G4JLG, G8KBH, G1SWH and G8DTF),

4 in IO93 (G4KCT, G8BUN, G3NEO and G8EOP),

3 in IO91 (G3TCU, G8CUL and G4BRK),

3 in IO92 (G4ODA, G4KIY and G8OHM),

2 in IO94 (G4KUX and G8CYW),

3 in JO02 (G4NBS, G3PYE/P and G3XDY),

plus G8PNN in IO95, G16ATZ in IO74, M0GHZ in IO81, G8XIR in JO01, PA0EHG in JO22 and OZ1FF in JO45.

Bob G1ZJP/M1MHZ

sent me an analysis of his entry for the December 23cm UKAC. Bob worked 23 stations in 11 locators and also records the number of QSO's in each 15 minute period. ODX was GM4JR at 329km. Bob sent me the following report.

I had set myself some personal goals and having reviewed my previous performance and that of others I knew that I had to be keen from the start. I started by trying for Andy GM4JR and failed, but kept returning several times in between working a few others. I could hear Andy, but he was having a lot of difficulty hearing me. Conditions improved slightly quite quickly into the contest and allowed me to work Andy for best DX within the first 30mins.

Using mainly search & pounce tactics I managed to maintain a very steady flow of contacts and was surprised to be running neck & neck on QSO numbers with a good friend Keith G4ODA who has a much better system than me. Activity was good, especially as it was the last UKAC of the year, however there were some regulars absent. Av Pts/Q was 148 compared to November which was 110 Pts/Q and October was 150Pts/Q.

A pleasing personal result to finish the year on – more to come next year.

IC1275e 10W 23 ele @ 23m AGL, 6m ASL approx 3dB feeder loss.

From John G3XDY

A short summary of QSOs over 500km I made in the UKAC/NAC on 19th December, mostly if not all by aircraft reflection :

DL2ALF	JO5ØIW	669km
OZ9KY	JO45VX	709km
DG5ACX/P	JO52IJ	647km
DLØVV	JO64AD	758km
OZ1FF	JO45BO	600km
F5SVQ	JN38NS	556km
DJ5AR	JN49CV	546km

DF9IC	JN48IW	633km
DC6UW	JO44VJ	627km
GM4CXM	IO75TW	564km

No other microwave activity this month – weather dreadful and conditions flat! At least aircraft reflection works even if there is not much else going on.

Christmas Activity

From Graham G4FSG

Happy Christmas to everyone! As has become tradition, Sam, G4DDK, and I made contacts on as many bands as possible this morning. This year we were aided by Simon, G3LQR.

Sam and I had full two way contacts on 6m, 4m, 2m, 70cm, 23cm and 13cm. Sam had a 'one-way' to Simon on 9cm and I had a 'one-way' on both 6cm and 3cm to Simon.

Between us we learned a number of lessons! The problems were not with RF but DC Tx/Rx switching. All three of us had problems resulting from reconfigurations that have occurred over the last few weeks/months. Simon could receive but not transmit on any frequency above 70cm. Sam had problems with 13cm and I had problems with 23cm. I also realised afterwards that in making contact with Sam on 6 bands, I had used 5 different driver rigs!

Despite the problems we were pleased that the East Coast of Suffolk had activity on all 9 bands from 50MHz to 10GHz. We left it to others to operate on 30MHz and below. Next year we should aim to add another band.....472kHz?

Back to the Malt Whisky and mince pies!

...and finally

December has been a quiet month with no SHF UKAC because of Christmas and I hope next month will be more active.

I want to encourage you all to report your activity to clearly document use of the amateur microwave bands. This means not just DX, but also local activity with low power or WB equipment.

Please send your reports to
Scatterpoint@ukmicrowaves.org

73

Bob Price G8DTF

UK Microwave Group Contests 2013

Aims and comments:

This year there are a few changes as a result of feedback and a review of participation.

There will now be five low band events on 1.3/2.3/3.4GHz spread through the year, and an overall championship decided on the best three scores out of a maximum of five. The championship will include awards for each band and an overall Low Band winner based on the normalized championship band scores.

The extra event coincides with the last 6 hours of the IARU Region 1 UHF contest in October 2013.

The 5.7/10/24GHz Cumulatives will now be run as five separate events with an overall championship for each band which will determine the trophy awards. Contestants can choose a total operating period of up to 6 hours within a 12 hour overall duration, and this can be split into two sessions, which will facilitate rover operation.

The 24/47/76GHz Trophy Contest in July will continue to include all bands to 1THz in the 76GHz+ section. As there was no support in 2012 for the lightwave event, this has been dropped.

The Rover rule has been amended to permit a minimum distance between locations of 5km which may be useful for the higher bands.

The online log entry system will continue in 2013. We will continue to target publication of contest results in Scatterpoint within 1-2 months of each event.

The same sections will be available as last year, ie Radio or Unlimited Talkback, and Low Power sections in some events.

Microwavers in Europe are most welcome to join in our UK contests. There is already a core of French, Dutch and Belgian stations that appear regularly in our summer contests. We would like many more to do the same!

THE RULES listed below are final and binding for 2013 (there are some changes from 2012). The following contests are scheduled for 2013:

1. **Low Microwave Bands - 1.3GHz/2.3GHz/3.4GHz (5 contest days).** An overall championship will be decided on the best three scores out of five.
2. **5.7GHz (5 contest days with 3 to count for the championship), on the same days as the 10GHz/24GHz contests.**
3. **10GHz (5 contest days with 3 to count for the championship), on the same days as the 5.7GHz/24GHz contests.**
4. **24GHz G0RRJ Contests (5 contest days with 3 to count for the championship), on the same days as the 5.7GHz/10GHz contests.**
5. **24GHz Trophy.**
6. **47GHz , 76GHz and up to 1THz**
7. **1.3GHz and 10GHz Microwave Field Day**

The full contest program and rules are published in the January 2013 issue of the Scatterpoint Microwave Newsletter and are also available on the Internet on the UKuG website at

www.microwavers.org

General Rules (applicable to all events)

The Contests are open to all comers (you do not have to be an RSGB or UK Microwave Group member). Stations located outside the UK (G, GW, GM, GI, GD, GU, GJ) may enter a contest, and will be tabulated within the overall results tables, but will not be eligible for UK Microwave Group awards.

Contestants are expected to enter in the true spirit of the event and to adhere strictly to any equipment or power restrictions that apply to the particular contest. Operators may enter as home station or portable (either mixed or separately in the championships) unless specified in the rules for a specific event. In multi-band contests, single-band entries are always acceptable.

Stations:

Entrants must not change their location or callsign during the contest, unless the Rover rule is invoked. In multi-band events, all stations forming one entry must be located within a circle of 1000m radius. An operator may reside outside the station's area ("remote station"), connected to the station via a "remote control terminal". In such a case, the Locator for the contest is the Locator of the station's position. An operator may only operate one single station, regardless if it is locally or remotely operated, during the same event.

Contacts:

Only one scoring contact may be made with a given station on each band, regardless of suffix (/P, /M, etc) during an individual contest or cumulative activity period, unless the Rover rule is invoked. Contacts made using repeaters, satellites or moonbounce will not count for points. Contacts with callsigns appearing as operators on any of the cover sheets forming an entry will not count for points or multipliers.

Scoring:

Contacts are scored on the basis of 1 point per kilometre for full, two-way microwave contacts and at half points for one-way (ie crossband) contacts.

Exchanges:

Contest exchanges on the microwave bands consist of RS(T) + serial number (starting at 001). In addition, the six (or eight) figure QTH Locator must be exchanged either via the microwave band or on the talkback medium. In multiband contests, the serial number will start at 001 for each band (ie a common sequence across the bands is NOT to be used). No points will be lost if a non-competing station cannot provide an IARU locator, serial number, or any other information that may be required. However, the receiving operator must receive and record sufficient information to be able to calculate the score.

Talkback:

Talkback can be used to assist in setting up a QSO, but note that the contest exchange must be made via the microwave band. It is not permissible to use the talkback as a means of checking the report or serial number – they must be copied via microwaves – and after the QSO is complete, care should be taken to avoid accidentally repeating the exchange via talkback. In some events there will be two sections, the Radio Talkback Only section and Unlimited Talkback section. For Radio Talkback, only amateur radio frequencies and technologies can be used for talkback (no internet or mobile phones). For Unlimited Talkback there is no restriction on the talkback methods that can be used –

other amateur band, internet, phone, etc. In setting up the QSO, it is also permissible to send back received audio to the other station, for example to help with antenna alignment. An exception is that our contests do allow one way (cross-band) QSOs for half points, and in this case, the other band can be used by one of the stations. Stations not using any form of talkback should enter the Radio Talkback section.

Entries:

Contestants are asked to make sure their entries have been scored correctly and that all relevant bonus points and multipliers have been claimed.

All entries must be prefaced with a summary / cover sheet showing: Title of contest, name(s) of operator(s), location(s) of station, section entered, callsign used, band score(s), multipliers or bonus points, final claimed score. The sheet should also detail equipment used, particularly the power output, antenna and receiver for both the microwave band and the talkback. This is very important if the logs are entered in one of the restricted sections. Where the contest has a 'rover' facility, it is essential that each location used is clearly stated.

Log entries must be submitted via the online log portal at microwave.rsgbcc.org/cgi-bin/vhfenter.pl. When uploading electronic logs, the format should be one of the following: ASCII text, RSGB Standard Format, Cabrillo, SDV and G0GJV log outputs, and IARU REG1TEST format (preferred). Paper logs may be entered using the online log editor at microwave.rsgbcc.org/cgi-bin/cover.pl

Awards:

Certificates will be awarded to overall contest winners and individual section leaders and their runners up. Additional Certificates of Merit will be awarded to stations in certain categories, as indicated in the rules for each event. With these, as with the logs, the adjudicator's decision is final.

Special Rules:

Applicable if called up for the specific contest:

Rover Concept:

The 'Rover' concept is to encourage lightweight, low power portable activity. This allows the location of the station to be moved as many times as desired and by a minimum of 5 linear kilometres, at any time during the contest period. From each new location, stations worked from any of the previous locations during the event may be worked again, both stations involved in the contact gaining points. The serial number, however, will not revert to 001 each time a move is made but will carry on consecutively from the previous contact.

Low Band Microwave Contest Rules

First introduced in 2004, these contests aim to encourage operation on the three lowest bands in the amateur microwave allocation, particularly as there is growing UK availability of 2.3GHz and 3.4GHz equipment. For 2013, there are five of these events, in March, April, June, October and November. The March, June, and October events are timed to overlap with UHF/SHF events in some other IARU Region 1 countries. The times for the November event have been shortened to make portable operation more practical.

1. The General Rules listed above apply except as modified by these rules.
2. There are five contests, one in March, one in April, one in June and one in November. The March, April and June events run from 1000 to 1600 UTC. The October event runs from 0800 to 1400 UTC to coincide with the IARU Region 1 UHF Contest. The November event is from 1000 to 1400 UTC.
3. There are two sections for Radio Talkback and for Unlimited Talkback, but the leading stations in a number of categories will be marked in the results table, with certificates awarded (see below).
4. Entrants in the October event need not start serial numbers from 001 if they are also participating in the IARU Region 1 UHF Contest.
5. Each event will be scored and tabulated separately. There will be an overall championship determined by taking the best three normalized scores from each entrant across the five events for each band. An overall champion will also be declared based on the normalized championship scores from each band.
6. For each session, certificates will be awarded to the leading entry plus runner-up on each band, the overall leading entry and runner-up across the three bands, plus for each band the leading stations in each of the following categories: home station, portable station, station running less than 10 watts output. Championship certificates will be awarded to the winners and runners up for each band, and to the overall championship winner and runner up.

5.7GHz Contest Rules

The 5.7GHz, 10GHz and 24GHz contests are being run concurrently to take advantage of the growth in activity on 5.7GHz and 24GHz. Although they are on the same days, they are completely separate contests. Any band or all bands can be used on any of the 5 days.

1. The general rules shown above apply.
2. There are five, monthly, events from May to September inclusive, and the events run from 0600 to 1800 UTC on a Sunday. Entrants can operate for a period of up to six hours during each event, either as a single period or two separate periods with a minimum off time of 1 hour between.
3. Logs for all events entered should be submitted in the two weeks after each session.
4. There are two sections, Radio Talkback and Unlimited Talkback, in addition the leading fixed, portable and low power (<1W) stations will be awarded certificates.
5. Moving location during the contest is allowed - the Rover concept is applicable.
6. Certificates will be awarded to the leading station and runner-up in each section.
7. The G3KEU Memorial Trophy will be awarded to the leading entry in the championship, determined from the best three normalized scores during the series of events.

10GHz Contest Rules

The 5.7GHz, 10GHz and 24GHz contests are being run concurrently to take advantage of the growth in activity on 5.7GHz and 24GHz. Although they are on the same days, they are completely separate contests. Any band or all bands can be used on any of the 5 days.

1. The general rules shown above apply.
2. There are five, monthly, events from May to September inclusive, and the events run from 0600 to 1800 UTC on a Sunday. Entrants can operate for a period of up to six hours during each event, either as a single period or two separate periods with a minimum off time of 1 hour between.
3. Logs for all events entered should be submitted in the two weeks after each session
4. Contestants may submit logs for any one of the following sections:

Open Radio Talkback

No power or antenna restrictions (other than those laid down in the amateur licence) on either 10GHz or on the talkback band.

The 'Rover' concept does not apply to this section.

Radio Talkback only.

Open Unlimited Talkback

No power or antenna restrictions (other than those laid down in the amateur licence) on either 10GHz or on the talkback band.

The 'Rover' concept does not apply to this section.

Unlimited Talkback.

Restricted Radio Talkback

10GHz transmit output not to exceed 1.0 watt to the antenna.

Moving location during the contest is allowed – the Rover concept is applicable.

Radio Talkback only.

Restricted Unlimited Talkback

10GHz transmit output not to exceed 1.0 watt to the antenna.

Moving location during the contest is allowed - the Rover concept is applicable.

Unlimited Talkback.

5. Certificates will be awarded to the leading station and runner-up in each section, and to the leading portable and fixed stations.
6. The 10GHz championship will be determined based on the best three normalized scores from each entrant over the five sessions. In addition to winners and runners-up certificates for each section, the following certificates/trophies will be awarded:
 - Leading entry in the Open section - The G3RPE Memorial Trophy
 - Leading entry in the Restricted section - The G3JMB Memorial Trophy
 - Certificates to the leading home station and portable station in each section.

24GHz G0RRJ Contest Rules

The 5.7GHz, 10GHz and 24GHz contests are being run concurrently to take advantage of the growth in activity on 5.7GHz and 24GHz. Although they are on the same days, they are completely separate contests. Any band or all bands can be used on any of the 5 days.

1. The general rules shown above apply.
2. There are five, monthly, events from May to September inclusive, and the events run from 0600 to 1800 UTC on a Sunday. Entrants can operate for a period of up to six hours during each event, either as a single period or two separate periods with a minimum off time of 1 hour between.
3. Logs for all events entered should be submitted in the two weeks after each session
4. There are two sections, Radio Talkback and Unlimited Talkback, in addition the leading stations

in a number of categories will be marked in the results table, with certificates awarded (see below).

5. Moving location during the contest is allowed - the Rover concept is applicable.
6. Certificates will be awarded to the leading station and runner-up in each section, plus the leading home and portable stations.
7. The G0RRJ Memorial Trophy will be awarded to the leading entry in the championship, determined from the best three normalized scores during the series of events.

24GHz Trophy Rules

The 24GHz Trophy contest coincides with the 47GHz and 76GHz – 1000GHz events

1. The general rules shown above apply.
2. The contest will run from 0900 to 1700 UTC on a Sunday.
3. Moving location during the contest is allowed - the Rover concept is applicable.
4. Certificates will be awarded to the leading station and runner-up, and the winner will receive the 24GHz Trophy.

47GHz Contest Rules

The 47GHz contest coincides with the 24GHz Trophy, and 76GHz - 1000GHz events.

1. The General Rules listed above apply.
2. The contest will run from 0900 to 1700 UTC on a Sunday.
3. Moving location during the contest is allowed - the Rover concept is applicable.
4. Certificates will be awarded to the leading station and runner-up.

76GHz – 1000GHz Contest Rules

The 76GHz – 1000GHz contest coincides with the 24GHz Trophy, and 47GHz events

1. The General Rules listed above apply.
2. The contest will run from 0900 to 1700 UTC on a Sunday.
3. Moving location during the contest is allowed - the Rover concept is applicable.
4. The overall score will be determined by adding together the normalized scores from all bands entered.
5. Certificates will be awarded to the leading station and runner-up.

Microwave Field Day

1. The General Rules listed above apply.
2. The contest will run from 0900 to 1700 UTC on a Sunday.
3. Portable stations may enter either the Open or Restricted sections. Fixed stations may enter the Fixed section.
4. The contest will be on the 1.3GHz and 10GHz bands. Talkback can be on any band.
5. Contestants may submit logs for either of the following sections:

Open

No power or antenna restrictions (other than those laid down in the amateur license) on 1.3GHz, 10GHz or on the talkback band.

The 'Rover' concept does not apply to this section.

Restricted

1.3GHz GHz transmit output not to exceed 10 watts to the antenna.

10GHz GHz transmit output not to exceed 1 watt to the antenna.

Moving location during the contest is allowed - the Rover concept is applicable.

Fixed Station

No power or antenna restrictions (other than those laid down in the amateur license) on 1.3GHz, 10GHz or on the talkback band.

6. Contacts between portable stations will attract a multiplier of three. Fixed to portable contacts will have a multiplier of two. Fixed to Fixed contacts will have a multiplier of one. Multipliers will be determined during adjudication, so logs should be submitted with no multipliers applied. An overall score will be derived from the normalized scores on 1.3GHz and 10GHz where a station enters the same section on both bands.
7. Certificates will be awarded to the leading station and runner-up in each section, on an overall basis and for each band.

Other Microwave Contests

The first weekend of May sees the RSGB 432MHz -248GHz Multiband Contest staged in parallel with the Region 1 IARU UHF/SHF Contest. The 10GHz Trophy is run in parallel by the VHF Contest Committee on the Saturday of that weekend, and the rules can be found in the RSGB VHF contest rules.

The first weekend in July is VHF National Field Day which includes 1.3GHz as one of the bands.

The first weekend of October sees the RSGB 432MHz -248GHz Multiband Contest staged in parallel with the Region 1 IARU UHF/SHF Contest. The 1.3GHz Trophy and the 2.3GHz Trophy are run in parallel by the VHF Contest Committee on the Saturday, and the rules can also be found in the RSGB VHF contest rules.

The RSGB also runs a cumulative UK Activity Contest on 1.3GHz on the third Tuesday from 2000-2230 local time, and on 2.3GHz – 10GHz on the fourth Tuesday of every month, from 2000 – 2230 local time.

In addition there are other Continental UHF/SHF Contests held during the year and interested UK microwavers are urged to be active during these. Their details may be found on the Internet.

John Quarmby G3XDY
UKuG Contest Manager

The latest [EME calendar](#) is available from DL7APV's website

Don't forget that

**Every Monday evening is
Microwave Activity Evening**

RSGB Contests 2013

Month	Contest name	Certificates	Date 2013	Time GMT
Jan	1.3GHz Activity Contest	Arranged by RSGB	15-Jan	2000 - 2230
Jan	2.3GHz+ Activity Contest	Arranged by RSGB	22-Jan	2000 - 2230
Feb	1.3GHz Activity Contest	Arranged by RSGB	19-Feb	2000 - 2230
Feb	2.3GHz+ Activity Contest	Arranged by RSGB	26-Feb	2000 - 2230

UKμG Microwave Contest Calendar 2013

Dates, 2013	Time UTC	Contest name		Certificates
3 Mar	1000 – 1600	Low band 1.3/2.3/3.4GHz	1	F, P, U, R, L
21 Apr	1000 - 1600	Low band 1.3/2.3/3.4GHz	2	F, P, U, R, L
26 May	0600 - 1800	1st 5.7GHz Contest		F, P, U, R, L
26 May	0600 - 1800	1st 10GHz Contest		F, P, U, R, L
26 May	0600 - 1800	1st 24GHz Contest		F, P, U, R
2 Jun	1000 - 1600	Low band 1.3/2.3/3.4GHz	3	F, P, U, R, L
30 Jun	0600 - 1800	2nd 5.7GHz Contest		F, P, U, R, L
30 Jun	0600 - 1800	2nd 10GHz Contest		F, P, U, R, L
30 Jun	0600 - 1800	2nd 24GHz Contest		F, P, U, R
21 Jul	0900 - 1700	24GHz Trophy / 47 / 76-1000 GHz		
28 Jul	0600 - 1800	3rd 5.7GHz Cumulative		F, P, U, R, L
28 Jul	0600 - 1800	3rd 10GHz Cumulative		F, P, U, R, L
28 Jul	0600 - 1800	3rd 24GHz Cumulative		F, P, U, R
4 Aug	0900 - 1700	Microwave Field Day		F, P, L
25 Aug	0600 - 1800	4th 5.7GHz Cumulative		F, P, U, R, L
25 Aug	0600 - 1800	4th 10GHz Cumulative		F, P, U, R, L
25 Aug	0600 - 1800	4th 24GHz Cumulative		F, P, U, R
29 Sep	0600 - 1800	5th 5.7GHz Cumulative		F, P, U, R, L
29 Sep	0600 - 1800	5th 10GHz Cumulative		F, P, U, R, L
29 Sep	0600 - 1800	5th 24GHz Cumulative		F, P, U, R
6 Oct	0800 - 1400	Low band 1.3/2.3/3.4GHz	4	F, P, U, R, L
24 Nov	1000 - 1400	Low band 1.3/2.3/3.4GHz	5	F, P, U, R, L

Key:

F Fixed / home station
P Portable
L Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)
R Radio talkback
U Unlimited talkback

**73 John G3XDY, UKUG
Contest Adjudicator**

[UKμG Contest Portal](#)

Events calendar 2013/14

2013

Jan 19	Heelweg	www.pamicrowaves.nl/
Feb 16	Tagung Dorsten	www.ghz-tagung.de/
April 6	CJ-2013, Seigy	cj.ref-union.org/
April 27-28	Martlesham Microwave Roundtable and UKμG AGM	http://mmrt.homedns.org/
May 17-19	Hamvention, Dayton	www.hamvention.org/
June 9	RAL Roundtable	details tbc
June 28-30	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
July 13-14	Finningley Roundtable	detail tbc
July 19-21	Amsat-UK Colloquium, Holiday Inn, Guildford, Surrey	www.uk.amsat.org/Colloquium/
Sept 9	Crawley Roundtable	detail tbc
Sept 13-15	58.UKW Tagung Weinheim	www.ukw-tagung.de/
Sept 27-28	National Hamfest	www.nationalhamfest.org.uk/
Oct 6-11	European Microwave Week, Nuremberg	www.eumweek.com/
Oct 11-13	RSGB Convention	www.rsgb.org/rsgbconvention/
Oct 18-19	Microwave Update, Morehead, Kentucky	http://www.microwaveupdate.org/
Nov 2	Scottish Roundtable	http://www.rayjames.biz/microwavert/

2014

July 1	Scatterpoint 10th Anniversary
August	EME2014, Pleumeur-Bodou near Lannion
October 6-9	European Microwave Week, Rome