An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

December 2016

Published by the UK Microwave Group

The Scottish Round Table

By John Cooke GM8OTI

In this Issue

UK Microwave Group Contact Information....2
Loan Equipment....2
Subscription Information....3
UKμG Chip Bank – A free service for members....4
UKμG Project support....4
UKμG Technical support....4
Chairman's thoughts for December....5
Heelweg 2017....5
Beacon Coordinator Vacancy....6
UK Beacons and their License Renewals....6
News from the interweb....7
Finningley optical transceiver Mk 2....7
GM Microwave Round Table 2016....10
A High Efficiency Stepdown 27 Volt to 12 V 10 Amp DC – DC Power Supply .15
This month I 'ave mostly been... 18
For Sale....19
Contest Results....21
Activity News : November 2016....26
Events calendar....28

We wish all our readers a Merry Christmas, new toys, good dx and a Happy New Year

Bhliain nua sásta! Blwyddyn Newydd Dda! Athbhliain faoi mhaise dhuit!

UK Microwave Group Contact Information

Chairman: G4DDK
Sam Jewell
Email: chairman @microwavers. org
Located: Suffolk JO02pa
Address: Blenheim Cottage
Falkenham
IPSWICH
IP10 0QU
Home Tel: 01394 448495

General Secretary: G3XDY
John Quarmby
Email: secretary @microwavers. org
Located: Suffolk JO02ob
Address:
12 Chestnut Close,
Rushmere St Andrew
IPSWICH IP5 1ED
Home Tel: 01473 717830

Membership Secretary:
G8DKK Bryan Harber
Email: membership @microwavers. org
Located: Hertfordshire IO91vx
Address:
45 Brandles Road
Letchworth
Hertfordshire SG6 2JA
Home Tel: n/a

Treasurer: G4BAO
Dr. John C. Worsnop
Email: treasurer @microwavers. org
Located: Cambridgeshire JO02cg
Address: 20 Lode Avenue
Waterbeach
Cambs CB25 9PX
Home Tel: 01223 862480

Scatterpoint
Editor: G8BHC
Martin Richmond-Hardy
Email: editor @microwavers. org
Located: Suffolk JO02pa
Address:
45 Burnt House Lane
Kirton
Ipswich IP10 0PZ
NB editor & scatterpoint email addresses go to both Neil and myself.

Scatterpoint
Activity News: G4LDR
Neil Underwood
Email: scatterpoint @microwavers. org

Contest & Awards Manager: G3XDY
John Quarmby
Email: g3xdy @btinternet. com
Located: Suffolk (JO02OB)
Address:
12 Chestnut Close
Rushmere St. Andrew
Ipswich
Suffolk IP5 1ED
Home Tel: 01473 717830

Beacon Coordinator:
GW8ASD
Tony Pugh
Email: beacons @microwavers. org
Located:
Address: Gwersyllt
WREXHAM
LL11 4AF
Wales
Home Tel: 01978 720183

UK Regional Reps

John Cooke	Scotland	GM8OTI	john@marwynandjohn. org. uk
Gordon Curry	Northern Ireland	GI6ATZ	gi6atz@qsl. net
Chris Bartram	Wales	GW4DGU	gw4dgu@chris-bartram. co. uk

Assistants

Murray Niman	Webmaster	G6JYB	g6jyb@microwavers. org
Kent Britain	USA	WA5VJB/G8EMY	wa5vjb@flash. net
Mike & Ann Stevens	Trophies	G8CUL/G8NVI	mike_stevens@btinternet. com
Noel Matthews	ATV	G8GTZ	noel@noelandsally. net
Robin Lucas	www. beaconspot. eu	G8APZ	
Barry Chambers	24GHz and up	G8AGN	b. chambers@sheffield. ac. uk
Mike Scott	Chip Bank	G3LYP	g3lyp@btinternet. com
vacancy	Beacon Coordinator		

Loan Equipment

Don't forget, UKµG has loan kit in the form of portable transceivers available to members for use on the following bands:

5. 7GHz 10GHz 76GHz

Contact John G4BAO for more information.

Subscription Information

The following subscription rates apply.

UK £6.00 US $12.00 Europe €10.00

This basic sum is for **UKuG membership**. For this you receive Scatterpoint for **FREE** by electronic means (now internet only) via the Yahoo group and/or Dropbox. Also, free access to the Chip Bank.

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

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

Put a **renewal date reminder** somewhere prominent in your shack.

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

PLEASE QUOTE YOUR CALLSIGN!

Payment can be made by: PayPal to

ukug@microwavers.org

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

Articles for Scatterpoint

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

Please send them to

editor@microwavers.org

The CLOSING date is the FIRST day of the month

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

Please submit your articles in any of the following formats:

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

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

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

Thank you for you co-operation.

Martin G8BHC

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.

You may not reproduce articles for profit or other commercial purpose.

You may not publish Scatterpoint on a website or other document server.

UKµG Chip Bank – A free service for members

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

Non members can join the UKuG 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 a component on the site will not be a guarantee of availability of that component. The service is run as a free benefit to all members and the UK Microwave Group will pick up the cost of packaging and postage.

Minimum quantity of small components supplied is 10. Some people have ordered a single smd resistor!

The service may be withdrawn at the discretion of the committee if abuse such as reselling of components is suspected.

There is an order form on the website with an address label which will slightly reduce what I have to do in dealing with orders so please could you use it. Also, as many of the components are from unknown sources, if you have the facility to check the value, particularly unmarked items such as capacitors, do so, and let me know if any items have been mislabelled. G4HUP's Inductance/ capacitance meter with SM probes is ideal for this (Unsolicited testimonial!)

Don't forget it is completely free, you don't even have to pay postage!

I have just updated the Inductor file and the ATC file in the chipbank catalogue on the website to reflect some acquisitions at Finningley, and to make a few corrections and clarifications.

Mike G3LYP

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

80m UK Microwavers net – Tuesdays 08:30 local on 3626 kHz (+/- QRM)

73 Martyn Vincent G3UKV

Chairman's thoughts for December

Following on from my visits to each of the other 2016 Microwave Round Tables I decided I would like to attend the November Scottish event. I wasn't disappointed. It was well worth the long weekend away.

There is, I understand, a more complete report on the Scottish Microwave Round Table elsewhere in Scatterpoint, so I will confine myself to just a brief description and my thoughts.

Firstly, the enthusiasm of the attendees was quite infectious and this was my over-riding memory.

I was asked to speak by the organisers and chose to present my Anglian 3 transverter design. I took a few kits with me to sell, of course!

G4BAO spoke about the 2300MHz NoV band and the need to use it or we risked losing it. He also covered equipment and the propagation on the band. This was a fitting precursor to his review of the LZ 13cm transverter in the current issue of Radcom.

Stewart, G8CYW, talked about lightwaves and then moved onto the Northern group's experiences and equipment for some of the middle microwave bands.

Peter, GM4BYF, talked about a low cost sequencer for under £20.

Geoff, GI0GDP, led a small interest group to talk about the 5.7GHz power amplifiers that were recently a hot topic of discussion.

The Scottish round of the construction contest was also judged.

Catering, 'trade stands' and measurements were all included in the event and the lunchtime catering was excellent.

On Saturday evening the meal was held in a nearby hotel and was also really excellent. The accompanying action raised well over £250 towards a donation to the Burntisland Communications Museum in which the event is held.

Altogether the Scottish (GMRT) event was a huge success and my thanks to the organisers for organising the event. I hope to attend again next year, calendar and holidays permitting.

73 de Sam, G4DDK
Acting Chairman, UKuG

Heelweg 2017

http://www. pamicrowaves. nl/website/

Timelapse Part I 2016 made by PA3FXB

https://youtu. be/dEmRo0xHCko

Some of the usual suspects from UKµG will be there –G4DDK, G4BAO, G4HUP and G8BHC.

G4BAO at Heelweg 2015

Beacon Coordinator Vacancy

The UKuG Committee would like to recruit a volunteer to assist the group to coordinate UK microwave Band beacons.

The UKuG supports the UK beacon network with hardware finance, technical help and beacon applications.

The RSGB ETC Committee and the RSGB Microwave Manager are responsible for the interface to OFCOM, specifying beacon frequency allocations and overseeing the issue of the NoV to the beacon keeper.

The beacon keeper (NoV holder) is responsible for the technical design and maintenance of their beacon, maintaining the close-down list details and ensuring that the NoV is renewed at the specified intervals.

The successful candidate will be responsible for interfacing between the Committee and beacon keepers/ groups to enable the smooth operation of the network, identifying problems and keeping the Committee up to date on issues and the state of the beacon network.

The post would suit an active microwave enthusiast who has good organisational, communications and technical skills and who wishes to help keep the UK amateur beacon network in good operational condition.

If you think that this post would be of interest please contact the (Acting) Chairman, Sam Jewell, G4DDK at sam@g4ddk.com for more details.

UK Beacons and their License Renewals

Elsewhere in this issue is an advert for a new UKuG Beacon coordinator. Previously this post was held by Tony GW8ASD and, of course, before that, by Graham G4FSG. This is particularly timely given that...

In the coming months almost all UK Beacon NoVs are falling due for renewal as their 3-year term is due to expire. Indeed many Repeaters which are in the same boat are already being called in early by RSGB-ETCC in a phased process to spread the renewal workload rather than waiting to a big peak in April.

In the UK, the GB3xxx Beacons are licensed by NoVs on a 3yr renewable basis provided they can satisfy all the contact info, site access and closedown list requirements and operational status. The latter factor inevitably means that a few defunct beacons/sites will be officially cease to be (though, on the bright side, 3-years ago it was also the opportunity for some long-delayed changes to be approved and rolled out).

A novel factor this time around is that since Summer-2016, Ofcom have a new IT system. This means we will need greater consistency regarding email addresses and other contact info. So if you are involved, please do prepare…

Keepers: If you are a keeper in particular please ensure that you have re-registered and have full access to the new Ofcom IT system and a refreshed personal licence (the latest format includes a '#' symbol in your nominal callsign on its front page to indicate any regional prefix). Email addresses for your Ofcom Logon should match that used on the ETCC renewal process.

Closedown Operators: If you assist beacon keepers by being on a closedown list, please also ensure that your licence details are also valid with the new Ofcom online system and including your contact phone number (mobiles are preferred) – which also helps with the licence condition on the 5MHz/60m band!

One other thing: If there is a keeper change – this must be done now, PRIOR to any close down list update or NoV renewal….

All the Beacon forms are on the ETCC website at

https://www.rsgblicensing.org.uk/forms-index.php

Hopefully it wont be too onerous!

More broadly whist we will closely liaise, please help both the RSGB volunteers who continue to facilitate licensing and renewals, as well as the new UKuG beacon coordinator who will be better positioned to advise on technical/funding/support aspects.

Seasons Greetings
Murray G6JYB

News from the interweb

RSGB: TeraHertz

Frequencies above 275 GHz, the terahertz bands, are a new area for experimentation and propagation research.

Ofcom have generously enabled low-power NoV access for Full licensees in order to facilitate innovation at the cutting edge of RF technology.

The NoV includes a number of conditions related to frequency bands, and protection zones around key UK radio astronomy sites for which guidance is available.

rsgb.org/main/blog/news/gb2rs/headlines/2016/10/28/new-terahertz-band-nov/

Guidance: rsgb.org/main/operating/band-plans/microwaves/terahertz/

Chelmsford ARS

Chris G0FDZ talk on Millimetric Waves

www.g0mwt.org.uk/meetings/past16-jul-sept/index.htm#September

A three-some

For November it was a Trio! - with a Past, Present and Future theme. Three short talks from CARS Members featured a variety of topics:-

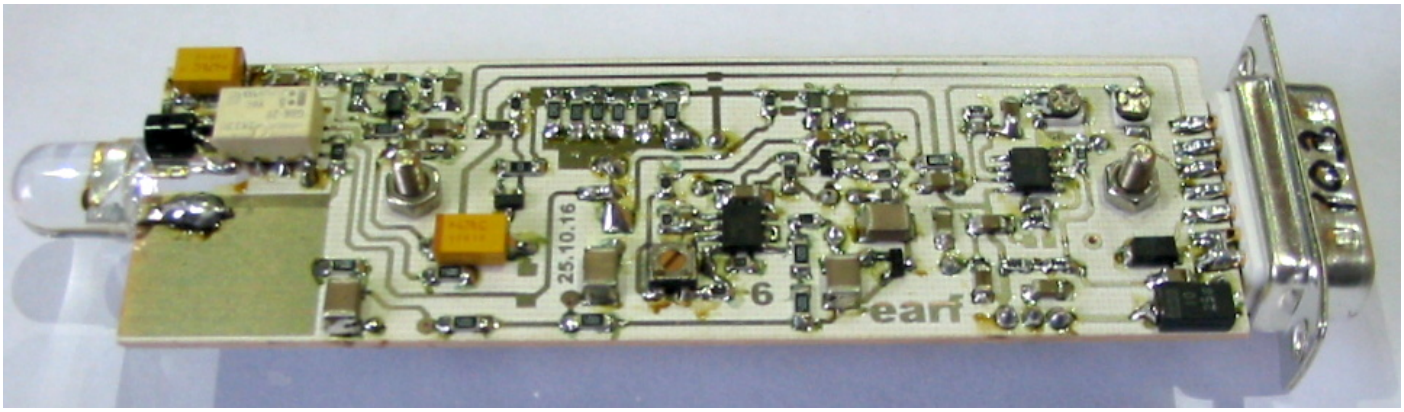
- Jim Salmon 2E0RMI started the ball rolling with his talk entitled "How Did I Get to Here", a look back of how his interest in all sides of radio broadcasting began.
- David Ingrey M0HBV talked about his interest in "Sounds of the Past" and how his skills at broadcast set renovation are put to good use.
- Murray G6JYB, brought us up-to-date with latest information on the "Future 5G Communications" and how some astonishing antennas may affect all aspects of our lives.

www.g0mwt.org.uk/meetings/past16-oct-dec/index.htm#November

Finningley optical transceiver Mk 2

using the transmit LED as the receive sensor

By Bernie Wright, G4HJW



Between 50 and 100 of the Finningley optical transceivers have been built since it was introduced as an SMA build project for the 2013 Finningley Round Table. The project had originally intended to mimic Stuart G8CYW's optical transceivers in that it would also use the transmit LED as the receive sensor, but comparable sensitivity to an Osram SFH-213 photo-diode could not be achieved. Most of the LEDs tried were some 20 dB down, with the best being only 5 dB or so better. Since the transmitter was low power anyway (less than 1W input), to have a deaf receiver would have left the transceiver with little long term value, so late on, a photo-diode was added to prevent such an outcome.

Adding a photo-diode presented a new problem – how could both the transmit LED and the receive photo-diode be made to occupy the same focal point when used with a lens?

The solution adopted was to mount the LED and photo-diode side by side, straddling the centre line of the optics. Rotating the whole assembly by 180 degrees would then result in the two beams swapping place with each other. The station being worked simply needed to be located at one of these two points. Although this works, in practice it is inconvenient and soon becomes an irritation, particularly as it is easy to accidentally nudge the optics slightly off position, unless a really sturdy tripod mount is being used. Most camera mounts are quite vulnerable in this respect...

Usually, when new LEDs are obtained for whatever purpose, they are also tested here for receive sensitivity, since this is an easy thing to do. After many such tests, one was found to be very sensitive, and by good fortune, it was a replacement 10mm 1W red LED from the same supplier that the Finningley transceiver LED had come from. In use (with either a 4" diameter convex or A4 size Fresnel lens), the sensitivity to red light was as good as the SFH-213 it replaced. The LED required about 62 volts of reverse bias to achieve this sensitivity and was initially obtained from seven series connected PP3's, with a pot across the last one to provide some fine adjustment. The optimum voltage requires setting to just below reverse breakdown, but is not that critical (or temperature sensitive). Optical bandwidth is very narrow, and can give the receiver an impression of poor sensitivity when operating outside amongst sodium light pollution, since the orange peak is far enough away from red to be noticeably down the response curve. This feature is quite useful – but does limit reception to stations using red light transmitters!

In updating the Finningley transceiver, the general idea has been to make the fewest changes necessary. However, an exception may be made regarding the use of both receiver and Tx microphone AGC stages. These may be removed, since they both have been prone to suffer from 'pumping'. Feedback from existing users on this point would be welcome.

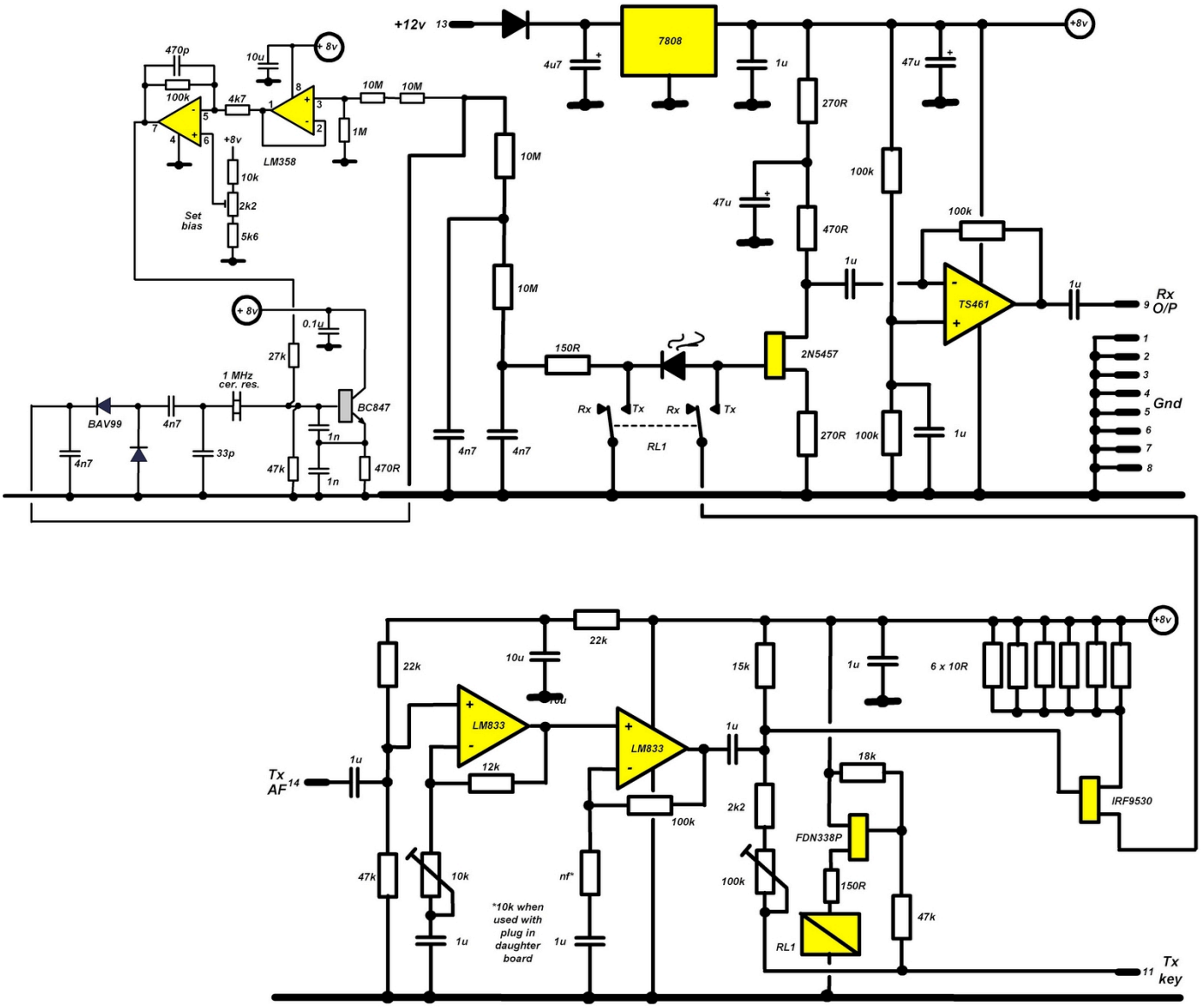
Switching of the LED between Tx and Rx mode on early models of the Mk 2 was done electronically, but changed later when, with an electro-mechanical version, it was found that the relay contact to the LED 'live' end on receive had a capacitance to ground of only 2 pF – ie less than the transistor that it had replaced. Plus, there was still a good supply of this miniature Omron relay available at little or no cost. As the circuit shows, although both sides of the LED are switched, it is not necessary to use the relay's full change-over action, but to simply ground one side of the LED on tx and make a direct connection of the other to the modulator output. This keeps stray capacitance (and microphony) on receive to a minimum.

Providing the 62 volt biasing voltage by use of an external battery could have been continued – the current required being minuscule, but it would add another layer of complexity that could well be done without. The method now adopted owes much to an interesting observation about a decade ago, when a crystal oscillator was found to be still oscillating, despite the ground end of the crystal having become detached. As this lead was pushed back towards the ground plane, a 1mm arc could be drawn. This high voltage is not difficult to understand given the circuit Q and loading capacitance either side of the resonator, though it is something that one probably wouldn't normally think about. By adjusting the value of shunt capacity to ground on the free end of the resonator, the voltage can be changed to a more suitable value and a voltage doubler rectifier used to generate the required maximum (say 70v), as set by the op-amp feedback loop. For a particular LED, the optimum working voltage can be found and the pot left set at that value – there is no need for further adjustment at any time. A large bag of 1 MHz ceramic resonators was available, found to be suitable, and subsequently used on all the test receivers. Variability between resonator activity, and therefore output voltage, has been found to be pleasingly small.

Eight boards have now been made, and all have worked with similar receive sensitivity. No AGC chips were used on the last four. Instead, a high output current op-amp (TS922) was used to drive headphones directly (LM358s worked in a fashion, but clipped a little too soon) . Since a level pot is now needed with this arrangement, both it and the TS922 have been located on the push-on control PCB, which otherwise remains pretty much the same as it is on the Mk 1 build.

One of the new units was taken up to Manton in North Lincolnshire recently and operated alongside Richard G0RPHs set-up, which was used as a reference, and a 66km QSO had with Barry G8AGN and Gordon G0EWN across at High Bradfield, near Sheffield. From that, it was estimated that a range of 100km would be achievable between two of the new transceivers, when used with A4 size Fresnel lenses at each end. Richard was also happy to confirm the similar receive sensitivities of the reference and MK 2 units.

The hope is to have new board kits ready for the next Finningley Round Table, again to use as a build project over that weekend. It might be useful to consider an option of pre-populated sma boards, and again, feedback to Kevin G3AAF or myself on this point would be welcome. With the added simplicity that a LED as both Tx and Rx element brings, the Mk 2 transceiver should be even more useful as a good entry level optical transceiver than the Mk 1 was. It is hoped that retaining the low-cost nature of the original kit should also make it a suitable educational item for schools use.



A more detailed write-up that is being kept updated can be found at: www.earf.co.uk/redleddet.htm

Bernie Wright, G4HJW

GM Microwave Round Table 2016

John GM8OTI

The sixth Scottish Microwave Round Table (GMRT) was held on Saturday 12 November 2016 at the Museum of Communication (MOC), Burntisland. Over 40 participants attended the event during the day.

The programme was scheduled to start half an hour later than usual, when Professor Tom Stevenson from the MOC welcomed us to the venue. The museum staff kept us well supplied with tea, coffee, biscuits and scones (plain and jam!) throughout the day.

Test and measurement facilities were set up by Brian Flynn GM8BJF and David Stockton GM4ZNX, although there appeared to be less demand for these than in previous years. They were in the museum display area as usual, along with the tables occupied by traders. By request, over the years, the programme was organised with longer breaks than previously, allowing even more time for socialising.

The morning session of the formal programme was chaired by John Cooke GM8OTI, UK Microwave Group (UKuG) GM representative, who asked the participants to consider taking over that role as he wished to step down.

The programme opened with a talk given by John Worsnop G4BAO about the 2300MHz Licence Notice of Variation (NoV). The amateur community has been given this option but take-up could be greater, and it seems that use of this part of the spectrum is slow to take off. John made suggestions as to how to go about making equipment changes which would enable use of the new frequencies.

After a break Stuart Wisher G8CYW gave a talk covering "From 1.3GHz to Ultra Violet", which began with an update on experiments at optical frequencies, from infrared to ultraviolet, using new LED devices. He then described a number of experiments with power devices and boards on the microwave bands.

Whilst lunch was being set up in the conference room, attendees assembled in the museum where the entries for the GM4LBV Projects Trophy were displayed. The usual excellent buffet lunch (included in the entrance fee) was provided by the MOC staff.

The afternoon session was chaired by Lothians RS President Andy Sinclair MM0FMF, the first talk being given by Sam Jewell G4DDK, who described the latest development of his 144/28MHz transverter, the "Anglian 3". Sam provided some detail of the design and specifications, together with constructional details.

The final talk was by Peter Bates GM4BYF who described a programmable Tx/Rx sequencer control unit built for under £20 using Arduino components. He also talked about use of cheap components for the microwave bands, including the well known Franco Rota "3 Euro board".

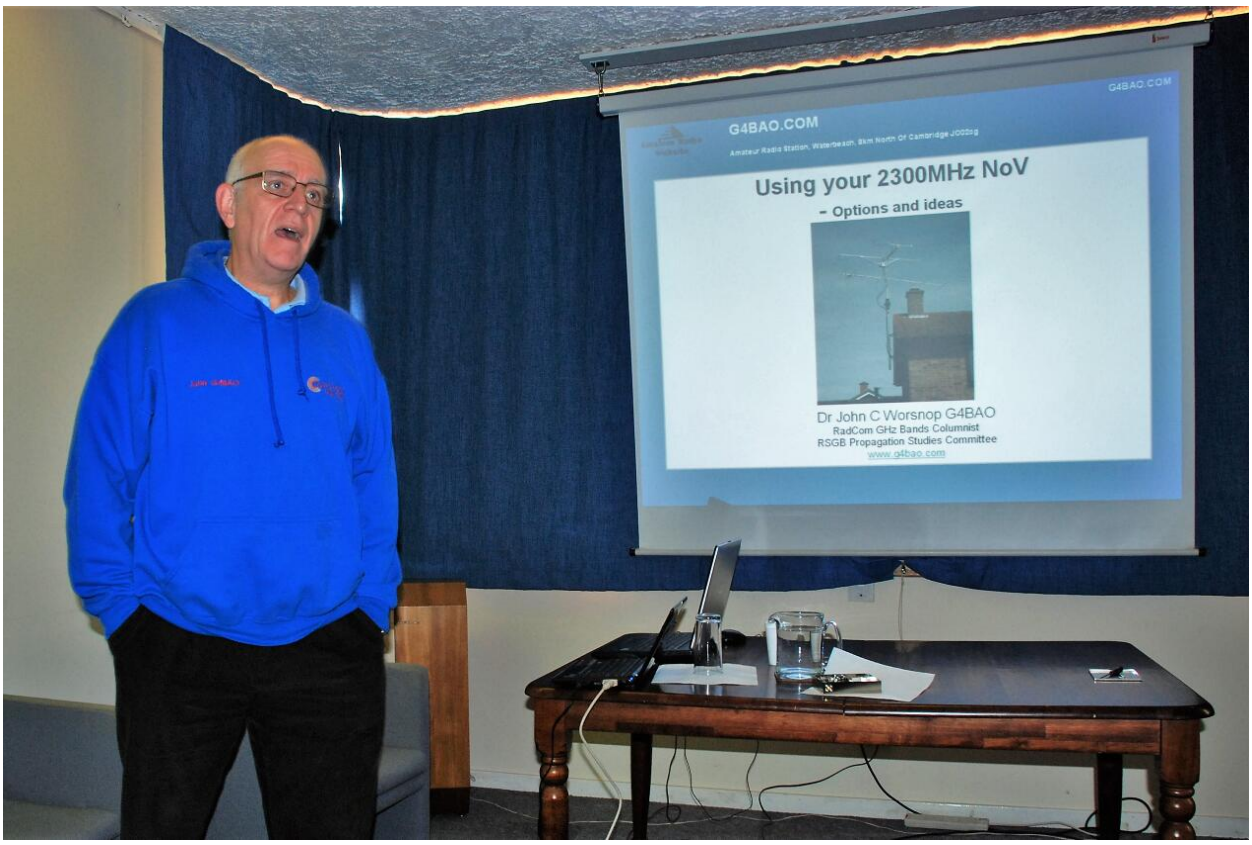
The formal part of the meeting concluded with the award of the GM4LBV trophy for the GM Construction Competition, judged by David Stockton GM4ZNX. The award was made to Mark Hughes GM4ISM for his 10MHz "Rover" frequency standard. Mark will be expected to write up the entry for "Scatterpoint", and it will be taken forward to next year's UK Microwave Group G3VVB Projects Trophy competition. GM (and around) microwavers please remember to submit something next year: built, modified, hardware or software.

Many attendees (and some YL/XYLs) moved on to the Kingswood Hotel in the evening for further chat and an excellent meal, followed by an auction of microwave related publications and some very interesting bits and pieces which raised money for MOC funds. This was followed by musical entertainment provided by the under-strength "Microwave Band" (Chris Bartram GW4DGU being away this year) of Ian White GM3SEK, Nadine White MM0WNW and John Cooke GM8OTI.

The "organising committee" (Roger Blackwell GM4PMK, John Cooke GM8OTI, Brian Flynn GM8BJF, David Stockton GM4ZNX, Ian White GM3SEK and Colin Wright GM4HWO) thanks the MOC Staff for all their efforts before and during the event, and Lothians RS members Peter Dick GM4DTH, Andy Sinclair MM0FMF, Alan Masson GM3PSP and Pete Bates GM4BYF for local support.

The GMRT website is at http://www.gmroundtable.org.uk

The speakers for the event: Stuart Wisher G8CYW, John Worsnop G4BAO, Peter Bates GM4BYF, John Cooke GM8OTI (morning chairman), Sam Jewell G4DDK. Andy Sinclair (afternoon chairman) not in this photo.



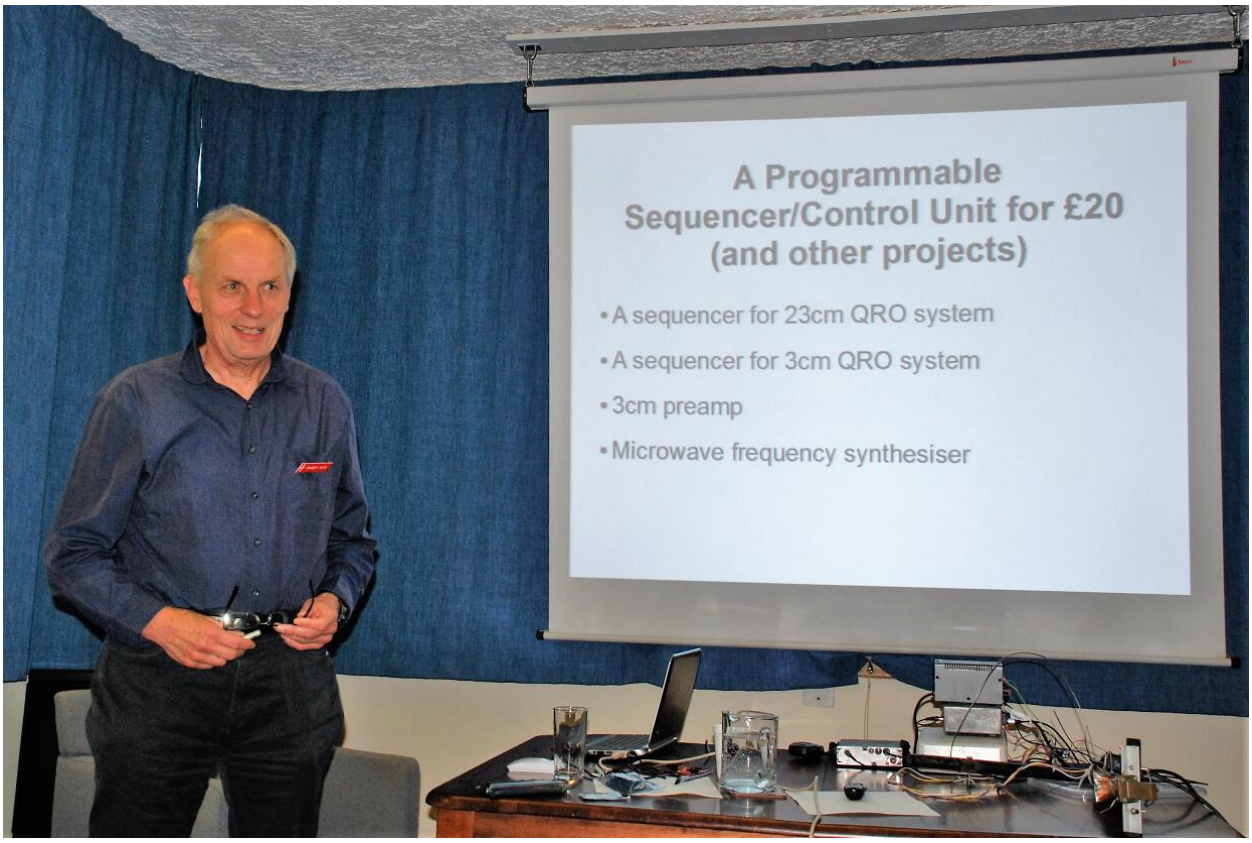
John Worsnop G4BAO talked about the importance of the 2300MHz NoV for future use of the 13cm band.

Stuart Wisher G8CYW gave an update on optical communications done by radio amateurs in NE England

Jack Hood GM4COX and Andy Sinclair MM0FMF
inspect some of the entries for the GM4LBV projects trophy.

The project competition entries, together with the rather fine GM4LBV trophy itself!

Sam Jewell G4DDK (UK Microwave Group Chairman) gave a detailed talk about his Anglian 3 144MHz transverter, designed with microwave transverter use in mind



Peter Bates GM4BYF spoke about inexpensive microwave projects

Mark Hughes GM4ISM was the winner of the GM4LBV trophy

Photos by Alan Masson GM3PSP.
Photos of the dinner, etc., are online at http://www.gmroundtable.org.uk/photos.

A High Efficiency Stepdown 27 Volt to 12 V 10 Amp DC – DC Power Supply

John Worsnop G4BAO

Introduction

This design was inspired by a private communication to G4BAO from G3WDG describing a 12v to 6V stepdown PSU for powering a 24GHz PA module.

This modified version is used to provide 12V at up to at least 10Amps from a 24-28V supply.

Circuit

The circuit is based around the Linear Technology LT1624 High efficiency SO-8 N-channel switching regulator controller IC. The LTC1624 is a current mode switching regulator controller that drives an external N-channel power MOSFET using a fixed frequency architecture. It can be operated in all standard switching configurations including boost and step-down plus others described in the datasheet (1). A maximum

high duty cycle limit of 95% provides low dropout operation and the operating frequency is internally set to 200kHz, allowing small inductor values and minimizing PC board space. The operating current level is user-programmable via an external

current sense resistor. Wide input supply range allows operation from 3.5V to 36V (absolute maximum.)

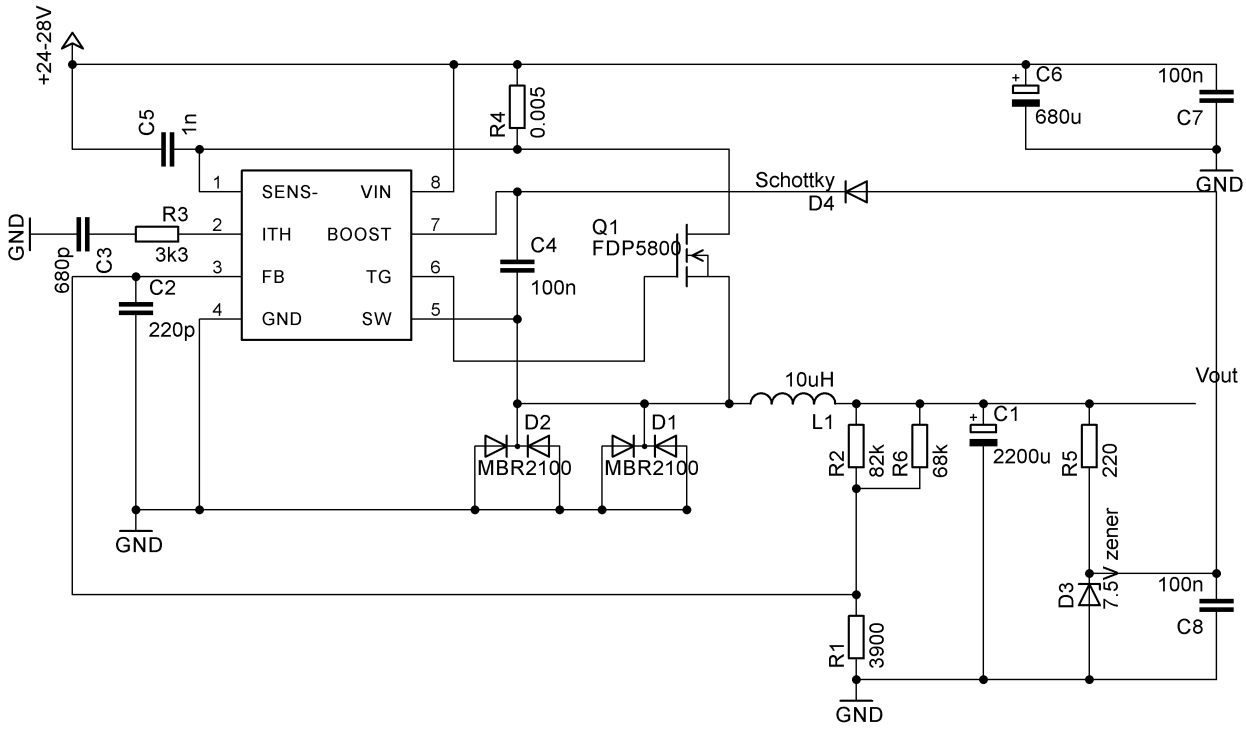


Figure 1 Circuit diagram

The implementation in Figure 1 is based upon the application circuit for a 24V to 12V/10A buck converter with output-derived boost voltage. G3WDG's original 12 to 6V circuit dispensed with the output-derived boost voltage, but modelling using LTSpice (2) showed that due to the higher input-output differential this was required. This improves efficiency.

The switch circuit uses a single logic level Power FET and a pair of double diodes in a conventional buck circuit. The electrolytic capacitors are low ESR types as the AC ripple current flowing in them is very high. Using other than low-ESR components will cause them to run hot. The FET and diodes dissipate little power so need little heatsinking. I found that when bolted to the side of a diecast box (Fig 1) or if fitted with small heatsinks they run cool.

The limiting factor for current supplied by the circuit is the temperature rise of the torroidal inductor. I have run the supply up to 10 amperes and the load line is shown in Figure 2. It produces 12.55 volts on no load, dropping to 12.1 Volts at 10A. The toroid runs hot to the touch at 5 Amps without a forced air cooling, but for

continuous duty cycle use above 5A you will need to use a fan to keep the Toroid cool. Efficiency is quite good at 80% but not as high as the modelling suggests at around 90% so clearly there are more circuit losses to be investigated

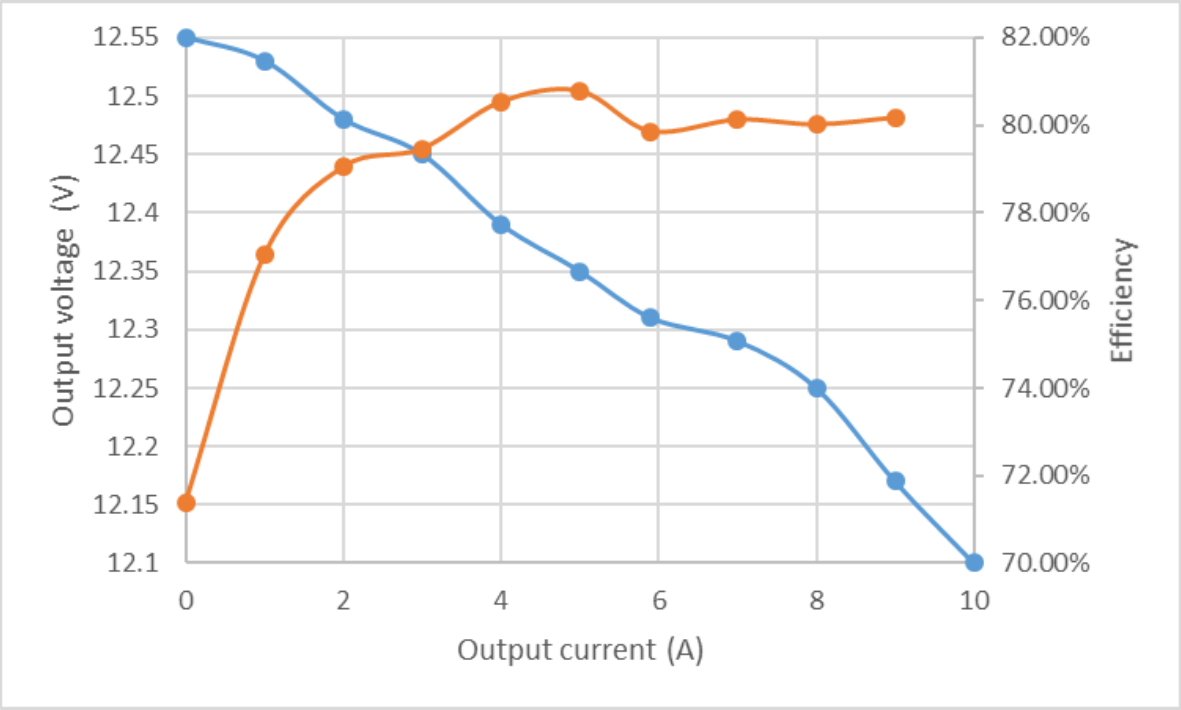


Figure 2 PSU Load Graph

Temperature rise test in a practical usage situation

As my application was for use to power a 12V Microwave SSPA, A test was done running the PSU in a typical JT mode usage of transmitting 1 minute on and 1 minute off at 5 Amps and the temperature of the toroid was monitored with a thermocouple.

The PSU PCB was inside an enclosed diecast box with no forced air cooling for this extreme test.

As can be seen from Figure 3 After about 20 minutes of on off cycling the temperature of the toroid settles down t around 72 degrees. As the operating temperature of the Toroid is rated up to 105 degrees C we are well within safety limits and the PSU could likely operate like this without air cooling at a load of more than 5 Amps.

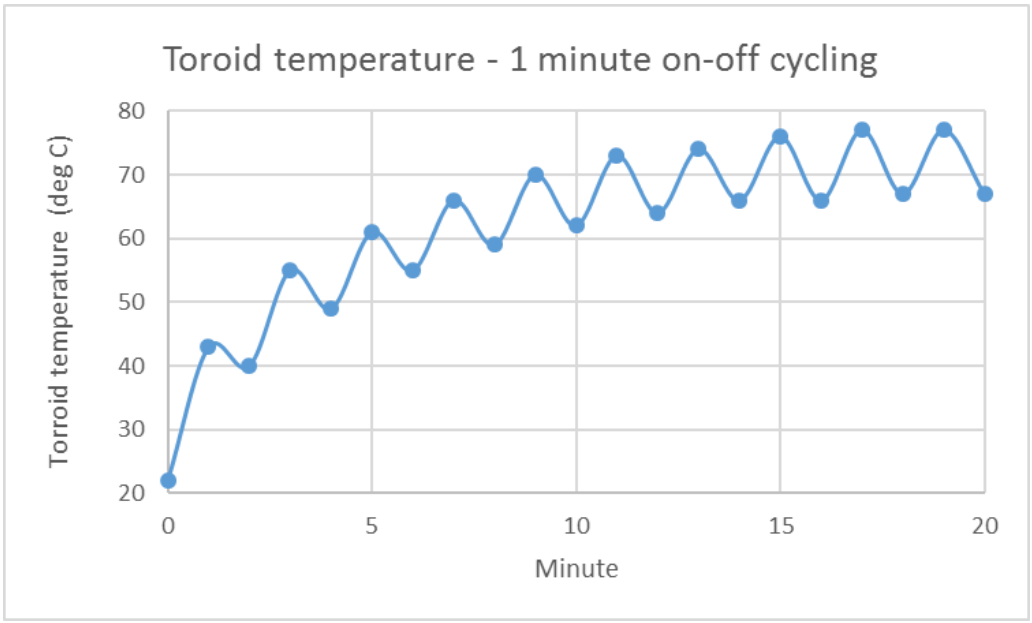


Figure 3 Toroid temperature - 5 Amp load cycling

PCB layout

The PCB layout quite critical so refer to the datasheet and application note if you decide not to use this layout.

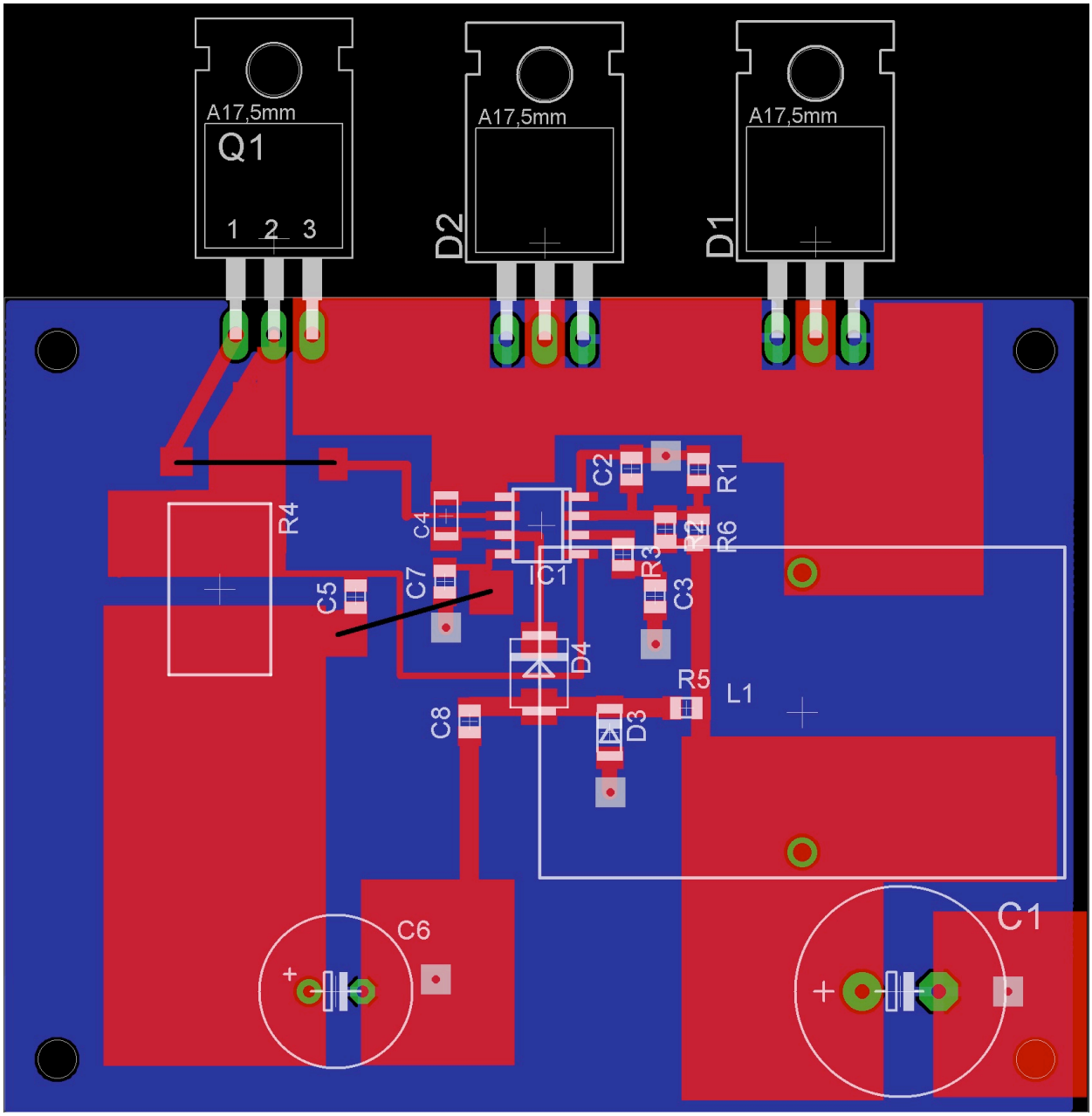


Figure 4 PCB layout

Components list

Circuit Reference	Value	Type
C1	2200u	25V Rubycon ZL Electrolytic Farnell 1144706
C2	220p	0805
C3	680p	0805
C4	100n	1206 (0805 will fit PCB with care)
C5	1n	0805
C6	680u	35V Rubycon ZL Electrolytic Farnell 1144709
C7, C8	100n	0805
D1, D2	MBR2100	TO220 Twin Schottky diode - Farnell 1625129
D3	7.5V Zener	SOD-80 package
D4	1A diode	Schottky SMB package
IC1	LTC1624S8	Switch mode controller – Farnell 1273889
L1	10uH 13.9A Torroid	Farnell 2333662
Q1	FDP5800	TO220 Power MOSFET - Farnell 1495237
R1	3900	0805
R2	82k	0805
R3	3k3	0805
R4	0.005 ohm 5 Watt	Power SMD resistor - Farnell 2420537 or similar
R5	220	R0805
R6	68k	R0805

This month I 'ave mostly been...

From Warren WF0T – Minneapolis, MN U.S.A.

I've been working on finishing my LED, CW Transmitter with Beacon. What makes this unique is the ATTiny 45 microcontroller that is used for generating the PWM tones. The center switch selects either the beacon mode, a series of tones, or a solid tone (approximately 500 Hz). The key jack on the left is a closed circuit type so when a key is plugged into the jack the LED is off until the key is pressed. It runs off a 9volt battery contained in the enclosure.

This build was a proof of concept, the final version will utilize 4 - SFH4550 IR leds using the same configuration as my beacon, and will be attached to the 3" Fresnel lens receiver box. In one-way tests, this combination easily covers 1.5km.

More information and a short video is available on my blog, wf0t.blogspot.com

For Sale

As some of you will be aware I am dealing with the radio aspects of Bob G4BAH's estate. Whilst most of the newer equipment, masts and antennas will be kept for HF and VHF contest use, there are also a considerable number of items for disposal. There are just too many items to manage in one sale, so this is a consolidated list of microwave items that currently are for sale. All of the 'asking prices' are P&P extra and large & heavy items are collect-only. A few of the SSPA modules have been tested and are marked as 'Tested', all the other items are sold 'as is'. Some of the DB6NT kits have instructions (in German). If you are genuinely interested in making an offer I am happy to take photos of the equipment, kits etc but might not have answers to detailed questions.

John G4SWX john.regnault@btinternet.com

Item	Description	Asking Price £
801	Teledyne TWT + PSU x-band (blue)	40
802	SSE Power Amp Ku Band	25
804	Racal MM724 TWT PSU	10
805	Racal MM724 TWT PSU	10
806	TWT PSU (Pye meters)	5
807	TWT PSU (Pye meters)	5
808	W3MC/3F TWT 15W	10
809	TWT PSU?	5
810	EEV TWT (SMA connectors)+ PSU 11GHz	10
811	23cm Ring of four 2C39 PA - water cooled with control board	80
812	23cm Ring of four 2C39 PA - water cooled with control board	80
813	23cm Ring of four 2C39 PA with PSU	100
814	ex BT TWT PSU	5
815	6cm TWT (tube only) W5/2GF 6.5GHz	10
818	13cm Roble 19el antenna	25
821	13cm Huber+Suhner SPA2400 (vert) antenna	20
824	23cm G3VVB 2C39 PA metalwork	15
839	23cm dish feed inc preamp	Offers
844	23cm R&S ex TV cavity – thought to have been modified with 3 x TH347 tubes - serious QRO!	Offers
848	13cm G3VVB 2C39 PA Metalwork	20
849	23cm New GI7B Cavity ~300W 23cm + spare tube	Offers
850	13cm New K9EK PA metalwork with 2 tubes	Offers
851	23cm Twin cavity 2C39 PA	Offers
852	13cm G3VVB 2C39 Metalwork	20
854	13cm 2C39 PA ~40W (ex G4DDK)	20
871	Marconi 1.5GHz circulator	Offers
872	23cm Double stub tuner	Offers
873	23cm Double stub tuner	Offers
874	23cm 4 port 'hybrid coupler'	Offers
875	23cm DB6NT Mk1 transverter built, in tinplate box	40
901	13cm Homebrew 200W PA with 28v PSU using two MRF21120 Ericsson modules - untested	Offers

Item	Description	Asking Price £
902	13cm PA board 50W – MRF21030 driving 2 X MRF21030	25
904	9cm PA 15W ex-Ionica Tested	35
905	13cm Ericsson 300W PA panel, 3 X MRF21120 + drivers	Offers
906	13cm Ericsson 100W MRF21120 PA module	50
909	3cm DB6NT Xvtr kit - Mk1	65
910	9cm DEMI LNA kit	Offers
911	9cm DB6NT 10W PA kit	Offers
912	23cm DB6NT LNA kit	40
913	3cm DB6NT 250mW PA kit	50
914	3cm DB6NT Xvtr kit - Mk1	65
915	9cm DJ9BV LNA kit	40
917	6cm DB6NT LO kit	35
918	23cm DJ9BV LNA PCB only	Offers
919	3cm DB6NT LO kit	25
920	DB6NT Sequencer 18A	Offers
921	CLY10 x 3	6
922	13cm DJ9BV LNA kit inc milled box	10
923	9cm DB6NT LO kit	35
924	9cm DB6NT Xvtr Mk1 PCB only	Offers
925	DB6NT Sequencer 18A	Offers
929	23cm Brand New, SG Labs Xvrtr (inc PCB antenna)	125
932	9cm Brand New, DB6NT PA 15W MKU 342XL	Offers
935	13cm Spectrian PA board – 2 x XRF286S	Offers
936	9cm H/B ring dish feed	25
937	6cm H/B ring dish feed	25
939	6cm DB6NT Mk1 LO built in a tinplate box	35
940	9cm PA 15W ex-Ionica Tested	35
941	9cm PA 15W ex-Ionica Tested	35
942	9cm PA 15W ex-Ionica Tested	35
943	9cm PA 15W ex-Ionica Tested	35
944	9cm PA 15W ex-Ionica Tested	35
948	23cm DL2AM 80W MT-1.3Q80W amplifier - 4 modules	Offers
949	13cm DK2DB 10W PA Tested	Offers
951	6cm DB6NT MK1 transverter and LO kit	Offers
952	3cm Qualcom 1W PA. 2 off unmodified with heatsink	Offers
953	23cm KK7B transverter PCB (G8VLL) – several available	5 each
R01	8 off Sivers Lab 7555/1 SMA c/o 28v	Offers/relay
R02	4 off Sivers Lab 7551 SMA transfer 28v assemblies	Offers/relay

Contest Results

John G3XDY, UKuG Contest Manager

November 2016 Lowband Contest Results

1.3GHz November 2016

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	G4ZTR	JO01KW	22	5807	DL7QY	723
2	GD8EXI	IO74PC	15	5359	F6DKW	762
3	M0HNA/P	IO91RF	23	3809	GD8EXI	426
4	G8CUL	IO91JO	21	3005	F6DKW	398
5	G3UKV	IO82RR	13	2007	G3XDY	265
6	G3TCT	IO81QC	12	1979	GD8EXI	363
7	G4LDR	IO91EC	12	1881	GD8EXI	394
8	GW3TKH/P	IO81LS	11	1523	G3XDY	294
9=	2E0MDJ/P	IO81XW	13	1495	GD8EXI	300
9=	G0LGS/P	IO81XW	13	1495	GD8EXI	300
11	G3YJR	IO93FJ	8	1299	M0HNA/P	251
12	G3WJG	IO91RP	7	894	GD8EXI	391
13	G4GSB	IO82XM	7	889	GD8EXI	250
14	M0XIG/P	IO90MX	4	280	G3TCT	118

2.3GHz November 2016

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	M0HNA/P	IO91RF	10	1186	G4DBN	279
2	G3UKV	IO82RR	7	1117	G3XDY	265
3	G8CUL	IO91JO	11	872	G3XDY	174
4	G4LDR	IO91EC	6	751	G3XDY	223
5=	2E0MDJ/P	IO81XW	6	621	G3XDY	223
5=	G0LGS/P	IO81XW	6	621	G3XDY	223
7	G3WJG	IO91RP	4	243	G3XDY	129

3.4GHz November 2016

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	G3UKV	IO82RR	4	662	M0HNA/P	216
2	M0HNA/P	IO91RF	4	517	G4ODA/P	224
3	G8CUL	IO91JO	5	461	G3XDY	174
4	G4LDR	IO91EC	3	363	G3XDY	223

Activity levels were better than for some time in this event, with several entrants making their first appearance in a Low Band contest. Conditions were about average but the weather was benign, with the best DX generally worked using aircraft scatter.

On 1.3GHz the winner was John G4ZTR, making a first appearance. Runner up was Richard GD8EXI. Some nice DX distances were worked into France and Germany on this band. The leading low power station was Keith GW3TKH/P.

M0HNA/P (The Combe Gibberlets) were the winners on 2.3GHz, with Martyn G3UKV as runner up. Best DX was a rather disappointing 279km.

3.4GHz saw a reversal of the 2.3GHz positions, with G3UKV in top spot and M0HNA/P as runner up, with best DX of 224km. The band was enlivened by the appearance of G4ODA/P from JO03 square, which is very rarely activated on bands above 1.3GHz

The overall winner was the Combe Gibberlets group consisting of G3TCU, G4SJH, and G1EHF, who won 2.3GHz and were runners up on 3.4GHz.. Overall runner up and leading fixed station was Martyn G3UKV, who was the winner on 3.4GHz and runner up on 2.3GHz..

Certificates go to the overall Winner M0HNA/P and Runner-up G3UKV and to the following winners and runners-up:

1.3GHz	G4ZTR, GD8EXI, GW3TKH/P (Low Power)
2.3GHz	M0HNA/P, G3UKV
3.4GHz	G3UKV, M0HNA/P

Low Band Championship 2016

The overall entry level has shown a definite upwards trend this year, with several new callsigns appearing in the tables, and existing entrants adding more bands to their armoury.

Conditions have generally been nothing to write home about, but the June contest (coordinated with events in Germany and elsewhere in Europe) provided some good aircraft scatter DX for well equipped stations.

1.3GHz

Combe Gibberlets (M0HNA/P) return to the top of the table this year, winning four of the five sessions. The runner-up slot is taken by John G4BAO with two runner-up slots out of three sessions entered.

2.3GHz

M0HNA/P also won the 2.3GHz section with three session wins scoring maximum points. In second place is Neil G4BRK with one session win out of four entered.

3.4GHz

M0HNA/P once again cemented victory with three session wins. The runner up was Neil G4LDR who won one session and was runner-up in another.

Overall

Top of the overall table is the “Combe Gibberlets” group (M0HNA/P) with a convincing win. There was a very close battle between Neil G4BRK and Neil G4LDR for second place, with G4BRK emerging ahead by less than 0.1%. M0HNA/P were the only entrant active in all five sessions this year.

Congratulations to the winners and runners up mentioned above.

UK Microwave Group Contests in 2017

The 2017 contest programme for the UK Microwave Group is likely to follow the same pattern as this year. There will be the usual Low Band events in March to November, and the 5.7GHz/10GHz events during the summer months. I have received some feedback about changes to the dates for the mm-Wave events, so these may move to avoid some of the worst months for atmospheric absorption.

If you have any feedback on this year’s programme, or changes you would like to see in 2017, please email me at g3xdy@btinternet.com by 20th December. I aim to publish the programme and rules for next year in the first 2017 edition of Scatterpoint, and update the contest website in early January 2017.

73

John G3XDY

UKuG Contest Manager

Low Band Championship 2016

Final result, the best three events count towards the total

Overall

Pos	Callsign	3/6/16	4/10/16	5/8/16	6/7/15	11/15/15	TOTAL
1	M0HNA/P	2962	2682	2688	3000	2437	8650
2	G4LDR	1759	1669	1299	0	1505	4933
3	G4BRK	343	1647	2000	1282	0	4929
4	G3UKV	1137	0	858	1063	2288	4488
5	G8CUL	0	1805	0	0	1948	3753
6	G4BAO	0	873	397	922	0	2192
7	G4KCT	0	1748	0	0	0	1748
8	G4ZTR	0	0	0	0	1000	1000
9	G3YJR	139	468	306	0	224	998
10	G8EOP	224	0	533	224	0	981
11	GD8EXI	0	0	0	0	923	923
12	2E0MDJ/P	0	0	0	0	781	781
13	G0LGS/P	0	0	0	0	781	781
14	G8DOH	0	0	0	767	0	767
15	M0GHZ	678	0	0	0	0	678
16	GW3TKH/P	0	0	0	319	262	581
17	G3WJG	0	0	0	0	359	359
18	G3TCT	0	0	0	0	341	341
19	G0PEB/P	0	0	266	0	0	266
20	G4DBN	0	256	0	0	0	256
21	GM4TOE	0	0	0	202	0	202
22	GM8IEM	0	0	117	82	0	199
23	GM4BYF	0	0	0	171	0	171
24	G4GSB	0	0	0	0	153	153
25	GM3HAM/P	0	0	142	0	0	142
26	G3ZMF	29	67	0	0	0	96
27	G1DFL	0	0	83	6	0	89
28	M0XIG(/P)	0	0	5	2	48	55
29	G1TYY/A	0	0	8	0	0	8

1.3GHz

Pos	Callsign	3/6/16	4/10/16	5/8/16	6/7/14	11/15/14	TOTAL
1	M0HNA/P	1000	1000	1000	1000	656	3000
2	G4BAO	0	873	571	922	0	2366
3	G4BRK	90	435	604	389	0	1428
4	G8CUL	0	735	0	0	517	1252
5	G3YJR	139	468	452	0	224	1144
6	G4ZTR	0	0	0	0	1000	1000
7	G4LDR	379	255	266	0	324	969
8	GD8EXI	0	0	0	0	923	923
9	G3UKV	209	0	259	240	346	845
10	G8DOH	0	0	0	767	0	767
11	G4KCT	0	748	0	0	0	748
12	GW3TKH/P	0	0	0	319	262	581
13	G0PEB/P	0	0	397	0	0	397
14	G3TCT	0	0	0	0	341	341
15	GM3HAM/P	0	0	306	0	0	306
16=	2E0MDJ/P	0	0	0	0	257	257
16=	G0LGS/P	0	0	0	0	257	257
18	G4DBN	0	256	0	0	0	256
19	G8EOP	6	0	117	116	0	239
20	GM8IEM	0	0	142	82	0	224
21	GM4TOE	0	0	0	202	0	202
22	GM4BYF	0	0	0	175	0	175
23	G3WJG	0	0	0	0	154	154
24	G4GSB	0	0	0	0	153	153
25	M0GHZ	141	0	0	0	0	141
26	G3ZMF	29	67	0	0	0	96
27	G1DFL	0	0	83	6	0	89
28	M0XIG(/P)	0	0	5	2	48	55
29	G1TYY/A	0	0	8	0	0	8

2.3GHz

Pos	Callsign	3/6/16	4/10/16	5/8/16	6/7/14	11/15/14	TOTAL
1	M0HNA/P	1000	682	688	1000	1000	3000
2	G4BRK	24	524	1000	360	0	1884
3	G3UKV	282	0	253	485	942	1709
4	G4LDR	380	539	450	0	633	1622
5	G8CUL	0	279	0	0	735	1014
6	G4KCT	0	1000	0	0	0	1000
7	G8EOP	218	0	274	108	0	600
8=	2E0MDJ/P	0	0	0	0	524	524
8=	G0LGS/P	0	0	0	0	524	524
10	G3WJG	0	0	0	0	205	205
11	M0GHZ	197	0	0	0	0	197

3.4GHz

Pos	Callsign	3/6/16	4/10/16	5/8/16	6/7/14	11/15/14	TOTAL
1	M0HNA/P	962	1000	1000	1000	781	3000
2	G4LDR	1000	875	278	0	548	2423
3	G3UKV	646	0	153	338	1000	1984
4	G4BRK	229	688	396	533	0	1617
5	G8CUL	0	791	0	0	696	1487
6	M0GHZ	340	0	0	0	0	340

Activity News : November 2016

By Neil Underwood G4LDR

Please send your activity news to:

scatterpoint@microwavers. org

Introduction

Little in the way of activity to report this month despite enhanced conditions at the end of November. There has however been some activity using digital modes on Wednesday evenings.

Activity on the cm bands

From Adrian G4UVZ, IO81.

On the 30th November Adrian found the Farnham webSDR was showing several 10GHz beacons including his local one GB3KBQ. He transmitted towards Farnham where his signal was received at good strength, he noticed about a two second delay in the signal coming back via the internet.

From Neil G4LDR, IO91.

On the 29th and 30th November the enhanced conditions were bring in a number of 6 and 3cms beacons. On the 29th the enhancement was more or less east/west but by the 30th beacons from the north of France were also received.

Activity at mm wavelengths

From Pete, G4HQX, IO81.

On 10th November 2016 I successfully heard the new 47GHz Cleeve Hill beacon GB3CCX (IO81WX) at distances of 11 & 39km, signal strengths 599 & 569. There is a short video from the second location, IO81SR23 on YouTube https://www.youtube.com/watch?v=ZDqjwZxt_ms . The frequency drift is the FT817 (I haven't fitted a TCXO yet).

Pete G4HQX/P listening to GB3CCX on 47.088940GHz at 39km.

From John G0API, IO80 via Chris G8BKE.

Now local tree has dropped leaves the signal from GB3SCK on 24.048905GHz is back to normal at +40dB noise floor in 6Hz RBW. That means signal seems to be unchanged in this direction at least - and my HB waveguide (antenna) is still water free.

From Neil G4LDR, IO91.

On the 29th November I was receiving the GB3SEE beacon on 24.048960GHz at 599+++ at times. Normally I don't hear this beacon which is 102km from me. At the same time, the local 24GHz beacon GB3SCK was so strong that if I beamed at it my noise floor for several hundred kHz either side of the beacon frequency was raised considerably.

I managed to raise John G4BAO in JO02 via KST, who was also copying GB3SEE, but at much lower strength than me, so we tried a contact. We first tried CW and then digital (JT4G) but without success. The path between John and I is over a 200km very obstructed path.

From Roger G8CUB

Chris G0FDZ and I made a 122GHz contact over a more reasonable 1.76km path today (Friday 18 Nov). (previous first contact was 120 metres)

Signals were S7 / S9 showing a few km should be possible. TX powers 65 / 300 uW, using 4" dish / 150mm horn. Procom dishes on receive.

Digital modes

John, G4BAO has initiated activity using digital modes on Wednesday evenings centred around 1296.165MHz.

Any reports on the use of digital modes on any microwave band would be welcome.

Beacons

From: Per Dudek DK7LJ (via Moon-Net reflector)

Subject: [Moon-Net] 10GHz EME beacon

The new beacon with the old QRG10368.025 MHz is up again. Andy has made a new program (jt65). Thanks for that. Now averaging is possible. The output power is 40W. Dish is 7.2m.The beacon is up from moon rise to moon set in JO54. The beacon will not be up when the moon does not reach 20 degrees that day in JO54.

Reports are welcome.

… and finally

The deadline for activity news for the next edition of Scatterpoint is Sunday 1st January.

Events calendar

2017

Jan 14	Heelweg, Westendorp NL	www. pamicrowaves. nl/
Feb 11	Tagung Dorsten	www. ghz-tagung. de/
Apr 8	CJ-2017, Seigy	cj. ref-union. org/
Apr 8–9	Martlesham Microwave Round Table & **UKμG AGM**	http://mmrt. homedns. org
Apr 22	RSGB AGM, Cardiff	http://rsgb. org/agm
May 19 – 21	Hamvention, Dayton	www. hamvention. org/
June 11	RAL @ Chiltern Village Hall OX11 0SH	
July 14 – 16	Ham Radio, Friedrichshafen	www. hamradio-friedrichshafen. de/
July 8 – 9	Finningley Roundtable	http://www.g0ghk.com/
Sept 8 – 10	62. UKW Tagung Weinheim	http://www. ukw-tagung. de/
Sept 17–21	IARU-R1 Conference, Landshut, Germany	http://www.iaru2017.org/
Sept 29–30	National Hamfest	http://www.nationalhamfest.org.uk/
Sept ??	Crawley Roundtable	
Oct 6 – 8	RSGB Convention	rsgb. org/convention/
Oct 8 – 13	European Microwave Week, Nürnberg	www. eumweek. com/
Nov 4 (tbc)	Scottish Round Table	www. gmroundtable. org. uk/
tbc	Microwave Update, San Jose, California	

2018

June 22–24	Ham Radio, Friedrichshafen	http://www. hamradio-friedrichshafen. de/
August 17–19	EME2018, Egmond aan Zee,NL	
Sept 23–28	European Microwave Week, Madrid	http://www. eumweek. com/

2019

June 28–30	Ham Radio, Friedrichshafen	http://www. hamradio-friedrichshafen. de/
Sept 15–20	European Microwave Week, Utrecht	http://www. eumweek. com/

NB Some of the 2017/18/19 event links may not be working/updated yet.