An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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New 24 GHz EME World Record: 17,403 km on 5 March 2014

by Rex Moncur VK7MO and Charlie Suckling G3WDG

In this Issue

Don't forget that

Every Monday evening is Microwave Activity Evening

UK Microwave Group Contact Information

Chairman: GW4DGU Chris Bartram Email: chairman @microwavers.org Located: Wales Address: 16 Lôn Ddewi Meidrim CAERFYRDDIN Sir Gâr SA33 5QR Home Tel: +44 (0)1994 230626	General Secretary: G8BHC Martin Richmond-Hardy Email: secretary @microwavers.org Located: Suffolk JO02PA Address: 45 Burnt House Lane Kirton Ipswich Suffolk IP10 0PZ Home Tel: +44 (0)1394 448213	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: +44 (0)1223 862480
Scatterpoint Editor: G8BHC Martin Richmond-Hardy Email: editor @microwavers.org See above for other contact details NB editor & scatterpoint email addresses go to both Bob and myself	Scatterpoint Activity News: G8DTF Bob Price 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: +44 (0)1473 717 830	RSGB Microwave Manager: G6JYB Murray Niman Email: g6jyb @microwavers.org Located: Essex (JO01) Address: 55 Harrow Way Great Baddow Chelmsford Essex CM2 7AU Home Tel: +44 (0)1245 474969

UK Regional Reps

John Cooke	Scotland	GM8OTI	john@marwynandjohn.org.uk
Gordon Curry	NI	GI6ATZ	gi6atz@qsl.net
Tony Pugh	Wales	GW8ASD	gw8asd@gw8asd.co.uk

Assistants

Kent Britain	USA	WA5VJB/G8EMY	wa5vjb@flash.net
Dave Powis	Trophies	G4HUP	g4hup@btinternet.com
Noel Matthews	G8GTZ		noel@noelandsally.net
Tony Pugh	Beacon Coord	GW8ASD	gw8asd@gw8asd.co.uk
Robin Lucas	www.beaconspot.eu	G8APZ	

Editor's corner

March would have been a rather slim edition as there was little activity news, so here is a two-month edition with the latest on the Martlesham Round Table and the UKµG AGM and a BIG report on the 24GHz by by Rex Moncur VK7MO and Charlie Suckling G3WDG.

STOP PRESS:

Ofcom Statement on Amateur use of 2310 to 2450 and 3400 to 3475 MHz – page 28.

Dropbox: *Please note* that you do NOT have to subscribe to Dropbox in order to download your copy of Scatterpoint. I'm looking at other ways of distributing Scatterpoint which avoid the use of Yahoo.

73s 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, 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

UK MICROWAVE GROUP

SUBSCRIPTION INFORMATION

The following subscription rates apply.

UK £6.00 US $12.00 Europe €10.00

This basic sum is for **UKuG membership.** For this you receive Scatterpoint for **FREE** by electronic means (now internet only) via 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.

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!)

Colour codes

Editorial & Events

Activity & Contests

Technical

Nanowaves (optical)

Commentary

Reproducing articles from Scatterpoint

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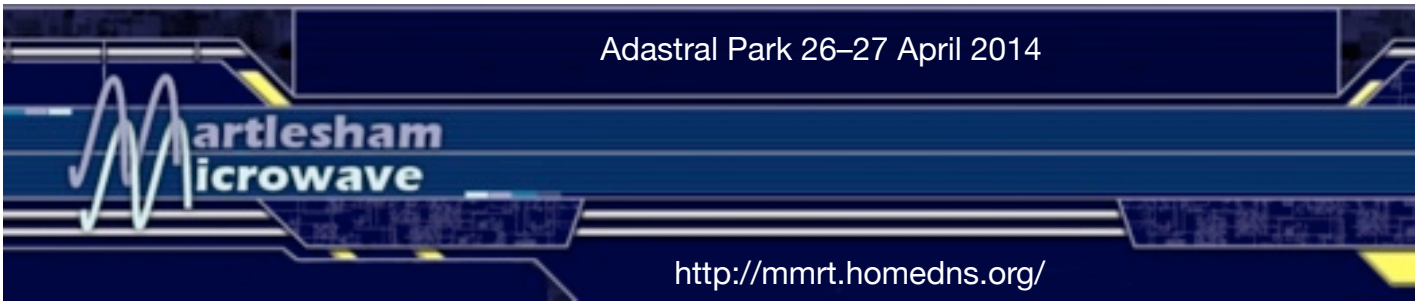


Programme

Saturday 26th April 2014

10:00	Truck Stop Breakfast
12:00	Doors Open
	Refreshments available from 12:00 (drinks, biscuits & sandwiches)
13:00	Welcome & opening
13:15	Workshop: Reflow Soldering Surface Mount Components for the Radio Amateur
16:55	Close
19:30	Meet for Dinner at 20:00 at the Cameo Hotel Ipswich

Sunday 27th April 2014

09:00	Doors Open
09:50	Welcome and Opening
10:00	UK Microwave Group AGM
	Trophy Presentations
10:45	Refreshments & Judging of the Construction Contest *
11:00	Cheap Automatic Noise Figure Indicator – Henning DF9IC
11:45	Dwingeloo Dish - Coming Back Online – Jan PA3FXB
12:30	Lunch Break
13:15	Contesting in Scandinavia - Verner OZ5TG and Torleif SM7EYW
14:00	Millimetre Wave Operation in the UK - John G4EAT
14:45	Refreshments
15:00	Digital TV Update - Noel G8GTZ
15:45	UKuG Contest Forum - John G3XDY
16:30	Close

* For the first time there will be a construction competition held at Martlesham. There will be a certificate awarded to the winner, and the winner will go forward to the overall G3VVB Trophy competition.

Please bring your latest project along and enter.

Travel & Accommodation

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.

Accommodation costs are similar to last year.

Please contact the hotel on 01473 209988 to book accommodation, quoting code BK62261. Rooms are available at £65 for single occupancy and £70 for double/twin. These rates include breakfast. Booking via this route permits cancellation or amendment of bookings until the day of arrival without penalty. Online bookings may not have any flexibility.

Payment for the meals: Payment for the dinner should be made at the time of booking, by Paypal, at least 1 week before the event. Please send £24 to Martlesham Radio Society (g4mrs@btinternet.com).

Visitors from abroad may pay cash at the dinner by previous arrangement with John G3XDY

Testing at the MMRT

Test equipment will be available throughout Sunday, 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.

Roger Ray G8CUB has kindly offered to bring his 47-76GHz noise source & 75 – 170GHz power meter to Martlesham, to aid anyone wanting to do millimetre measurement.

MMRT Dinner Menu Saturday 26 April

Price £24.00 per person

Starters

Roasted Tomato and Vegetable soup

"The Cameo" Prawn Cocktail, Brown Bread and Butter

Duo of Melon, Summer Berry Compote, Lemon Sorbet

Mains

Roast Turkey, Trimmings and pan Gravy

Roasted Topside of Beef, Homemade Yorkshire Pudding, Rich Pan Gravy

Baked Salmon Fillet , Green Herb Crust, White Wine Sauce

Roasted Bell Pepper Stuffed with Spicy Veg Cous Cous

Desserts

Chocolate Brownie, Chocolate Sauce

Homemade Apple Crumble Tart, Creamy Custard

Selection of Cheese and Biscuits

UK MICROWAVE GROUP
ANNUAL GENERAL MEETING – SUNDAY 27th April 2014

Notice is hereby given that the 2014 Annual General Meeting of the UK Microwave Group will be held at 10:00am on Sunday, 27 April 2014 as part of the Martlesham Microwave Round Table event which takes place over that weekend.

This will include the election of the officers of the committee and the presentation of the Chairman's, Secretary's and Treasurer's Annual Reports. We are looking for enthusiastic volunteers to join our committee and help shape the future of UKµG.

This year the following Committee officers/members are standing down.

Chris Bartram GW4DGU, Chairman
Martin Richmond-Hardy G8BHC, General Secretary
Ray James GM4CXM

We are therefore interested to hear from anyone who would be willing to take on these vital UKµG committee positions. If any UKµG member is interested in the office then please submit your name (and the name of your seconder) to the UKµG Chairman, Chris Bartram GW4DGU, as soon as possible.

Note: the Secretary's task is made less onerous by the fact that there is a separate post of Membership Secretary, currently held by Bryan Harber G8DKK which deals with all day-to-day membership issues.

If you are interested in joining the committee, have any agenda or AOB items for the AGM then please contact the UKµG Secretary,

Martin Richmond-Hardy G8BHC by 10 April 2014 by email to secretary@microwavers.org.

73 Martin Richmond-Hardy G8BHC
General Secretary UK Microwave Group

For Sale

HP8620C Microwave sweep oscillator comes complete with 8 plug-ins all with their correct scales. There is also a calibration scale included.

Modules cover 17-22GHz (2 off), 5.9-12.4GHz, 0.1-2GHz, 1.8-4.2GHz, 3.2-6.5GHz, 5.9-9GHz, 1.7-4.3GHz.

Asking price for all the above - £800 ovno

Would be pleased to answer any questions 07801 799855. Items located near Stowmarket in Suffolk.

Martin G3ZQU

Camb-Hams GS3PYE/P Isle of Lewis

(EU-010) 26 April - 3 May 2014

Camb-Hams will be operating GS3PYE/P from the Isle of Lewis (EU-010) 26 April - 3 May 2014

The Camb-Hams have been activating the Scottish Isles each year since 2008 and will be travelling to the Isle of Lewis in the Scottish Outer Hebrides in 2014. Thirteen operators will be active on all bands and many modes from 4m to 80m, 2m & 70cm for Satellites and 23cm for EME.

The HF bands will be covered by five simultaneous stations, while the 6m & 4m stations will have a great take-off towards the UK and Europe from the island's northern tip in IO68 square. 2m and 23cm EME will be available with a portable Yagi system, mainly focussed on JT modes. 2m and 70cm will be available for satellite operations.

Contest operations will take place in the RSGB 70MHz UKAC on 29 April.

The group will be active on the major social networks before, during and after the trip. You can check on progress or interact with the operators via their blog at *dx.camb-hams.com* or through Twitter, Facebook and YouTube [*links below*]. Previous trips have generated some great audio and video recordings of the GS3PYE/P signal from around the world.

Please email *skeds-2014@camb-hams.com* to arrange skeds on the more challenging bands and modes. VHF and EME skeds will also be made via ON4KST and N0UK's EME Chat. All links are available via *dx.camb-hams.com*

dx.camb-hams.com **twitter.com/g3pye** **facebook.com/CambHams** **youtube.com/CambHams**

Birthday celebration for Simon G3LQR

Sam, Graham, Peter and I took Simon out for lunch on 12th Feb to mark his 80th birthday (actually on the previous Sunday).

Peter G3LTF, Graham G4FSG, Jean xyl G4HUP, Margaret xyl G3LTF, Sam G4DDK, Simon G3LQR

Dave Powis G4HUP (behind the camera)

Moon DUBUS 6cm contest

Guy Gervais F2CT

Hello to all EME friends.

We will be qrv on 6cm next week-end during the REF-DUBUS contest

from Pleumeur-Bodou EME 2014 location using 13,50m PB8 Cassegrain dish and 80W at feed.

- call signs will be TM16EME (CW) and TM8PB (JT)

- TX QRG : 5760,108 MHz

Here is our windows time :

- Saturday April 5th : 1030 to 2400 utc

- Sunday April 6th : 1130 to 2400 utc

Depending of weather conditions we will try to test 10 and 24GHz but the feeds support is at 20m above ground and access is very dangerous if it's rainy and windy!

BTW Don't forget to subscribe for EME 2014 : www.EME2014.fr

Kind regards to all of you
Cordialement

73 Guy F2CT

25W TWTA for 10GHz

by Jeff Easdown G4HIZ

Achieving high power at 10GHz can be expensive and one often neglected solution is the Travelling Wave Tube Amplifier (TWTA). The amplifying device, the TWT has high gain and is capable of high output power (hundreds of Watts for some devices). The TWTA still forms the main-stay for power generation on-board satellites and in satellite Earth stations. You often see TWTs floating around at rallies on their own, but not their power supplies. To be clear, the TWT plus power supply is known as a TWTA.

To provide a PSU for a TWT is a daunting prospect, high voltages and currents for a collection of electrodes, together with protection circuits and that's if you can find the data-sheet for the TWT!

Whilst at the Crawley microwave round table last September, I was pleased to bump into Nick Roe G4ACW, who had brought with him two TWTAs for sale. I bought them both, with the intention of possibly phase combining them for EME. What you get is shown in photo 1. A sheet comes with each unit identifying the PSU DC connector pin functions, but there is no data about the TWT itself, which in the picture below is an STC W3PA1W type. Depending on when the units were integrated, an STC W3PA4W type may also be used. The test results below were obtained with a W3PA4W. The indicated PSU DC requirement was 21 to 28V, current up to 5A.

Testing

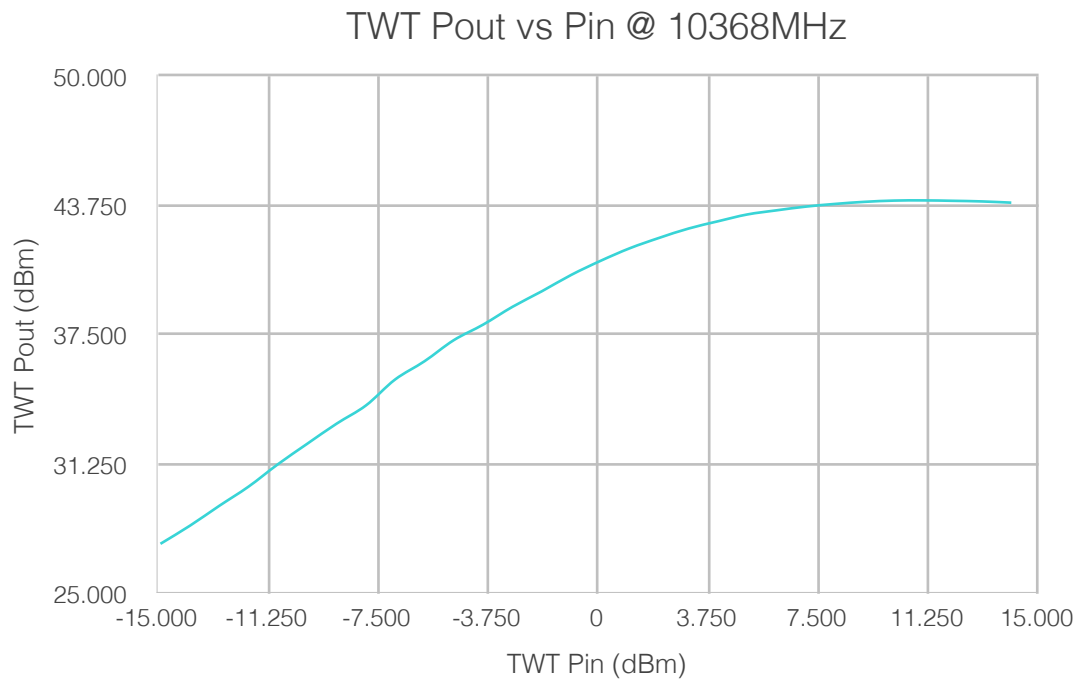
The first thing to do was to bolt the TWT to a heat-sink and try and get some RF power output. TWTs like to be well terminated due to the fragile nature of the 'helix', which is common to the input and output and doesn't like reflected power. The input was fed via a 10dB attenuator and the output was fed via a 30dB coupler to a high power load. The coupler provided a 'sniff' of the output at 30dB down relative to the carrier power. Before starting, the coupler was calibrated as best one could, between 10 and 10.5GHz.

Initially, with no RF drive, the PSU was connected to 24V DC and the current monitored. At switch-on, the initial current after a small in-rush was about 0.4A.In this state the TWT was in the warm-up phase, which is necessary to protect the cathode. After about 2minutes, the TWT switched to operate, at which point the DC current increased to about 2.7A.

24V DC Supply	DC Input Current (A)
During warm-up period (about 120s)	0.4 (initial inrush about 0.5)
After warm-up, no RF drive	2.7
Full output	4.7

Table 1: DC requirements

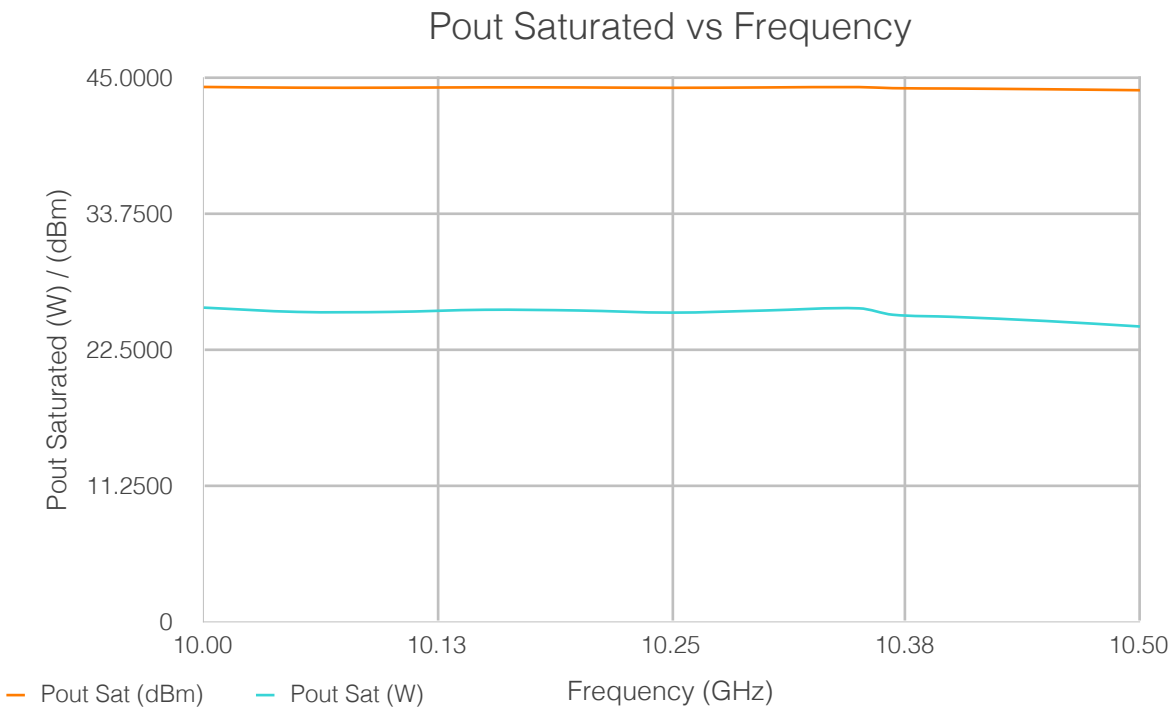
After warm-up, a 10.368GHz RF input was applied via a variable attenuator. The attenuation was then slowly decreased whilst monitoring the coupled power output on a power meter. One characteristic of a TWT is that when the maximum output is obtained for a particular drive, further increases in drive result in a reduction in output power. The maximum output power is known as the Saturated output and is easy to spot due to the peaking. At saturation, the DC current rose to about 4.7A. The saturated RF output power was just over 25W for about 10mW input, see Plot 1.



Plot 1: RF output power vs. drive at 10368MHz

A word or two on heat-sinking, one can see that with 25W RF output and 113W DC input (24V x 4.7A) some heat-sinking would be required for the 88W waste heat. With no RF drive, the DC input was 65W, this all to be dissipated as heat.

The next step was to measure the RF power output across the band. The input signal frequency was adjusted from 10 to 10.5GHz and power output was measured. It was found to be fairly flat until about 10.45GHz when it fell slightly, to just under 25W, see Plot 2.



Plot 2: Saturated output power vs. frequency

An interesting characteristic of the TWT is the input/output power curve. At low input drive levels, the TWT has a 'linear' region. As saturation is approached, the transfer curve starts to flatten off. This gives rise to a linear gain and a saturated gain. For low input levels, the gain was about 42dB, at saturation the gain reduced to about 33dB. Hence, there is a gain compression of about 9dB between low levels and saturation. For an SSB signal, 9dB compression may be ok, for a digital signal it may not (spectral spreading occurs). This opens the discussion about operating point, which needs to be set appropriately, taking into account signal type, allowable intermodulation distortion (eg C/I3) and harmonic output which both increase as saturation is approached.

Having also investigated the PSU, I have characterised the TWT voltages and modified the PSU to provide beam cut-off controllable by a low voltage control input. Needless to say, such intervention in the PSU requires extreme caution due to the high power kilo-Volt supplies present and is only to be attempted by competent persons. With the beam cut off, the DC current is about 0.4A compared to 2.7A and can be used to reduce DC consumption on receive. Also, with the beam cut off, output RF noise is eliminated, which on receive may leak through the transmit/receive switch and cause degradation of the system noise figure.

I understand that Nick Roe has a number of these TWTAs available and can be contacted at nick.roe@exensor.co.uk

Jeff G4HIZ

g4hizuwave@gmail.com

“Green” Beacons

by John Quarmby G3XDY

This paper is intended to generate some ideas for beacon builders on making “sustainable” beacons for the future. It doesn’t offer any ready to go designs, but attempts to point out some of the key design decisions required.

As energy costs continue to escalate, the cost of powering beacons is becoming very significant. Although the UK Microwave Group has financially supported the building of several beacons, it does not have the funds to provide a contribution to running costs.

Reducing energy costs can be achieved in a number of ways:

1. Reducing beacon power consumption
2. Generating/storing power locally

Reducing Beacon Power Consumption

There are several ways to reduce overall power consumption. The first and most obvious is to reduce the beacon RF power. With improvements to the antenna to regain the lost ERP this can be effective. An example might be replacing an Alford slot antenna with a longer slotted waveguide and reducing the RF power from 5W to 2W. There are physical size and cost limits on what can be achieved, but in conjunction with other measures this is worth consideration.

The second step is to improve the overall DC-RF efficiency of the beacon transmitter. One contribution is by minimising the power consumed in the exciter stages. A TCXO instead of an ovened oscillator is a good starting point, and if it is going to be locked to a frequency standard then use the lowest power PLL or DDS parts that will meet the requirements. Modern PLL designs running at GHz frequencies avoid the need for power hungry multiplier stages. The consumption of any frequency standard used for locking also needs to be considered, Rubidium sources will take more power than a TCXO for example.

A major contribution to DC-RF efficiency will be in the PA and driver stages. Here it is important to ensure that the matching networks on the active devices are tuned for maximum efficiency at the power level the beacon will operate at. Using over-rated PA devices will provide good lifetime and improved VSWR immunity, but the output matching will not be the same as when they are used at full ratings. Often this is difficult to design, as the only matching parameters given in the data sheet apply to full output ratings, so some experimenting may be needed. Choosing the right device technology also helps, Silicon LDMOS and GaN devices can provide higher efficiencies than GaAs PA devices as they are designed to be run at lower standing currents. PA designs using Class E (where circulating harmonic energy is deliberately used to improve efficiency) would be an interesting area to explore.

The final stage where efficiency improvements can be made is in the power supply. Switched mode power supplies (SMPS) will almost always outperform linear power supply designs from an efficiency viewpoint, but the effect of switching frequency ripple on the output cannot be ignored. Very good filtering will be needed to prevent the beacon signal being modulated by the switching frequency and its harmonics. Even if the beacon is going to run from a float charged battery, switch mode regulators should be considered to step down voltages to low level oscillator and logic stages, as the ubiquitous 7805 series regulator is not an efficient way to do it.

Local generation and storage of power

There are a number of ways that energy can be generated locally. One way would be to run a petrol or diesel generator at intervals to charge up a battery (this will be more efficient than continuous running on float charge). However, generators are noisy, require regular replenishing with expensive fuel and oil, and are attractive to thieves, so won’t be considered further.

Wind generators

Wind power may be a viable source, particularly as beacons tend to be installed on elevated sites. However, wind power is not dependable as a regular energy source, as calm conditions can extend over long periods in strong anticyclones (just when the

beacon is need for tropo indication of course), with minimum output occurring in summer. A large capacity battery is needed to handle these periods with no wind. A turbine capable of 800W output would typically be about 2m diameter and need to be mounted at least 10m above ground. Models with either a 12 or 24V output suitable for battery charging are available from several suppliers. Deep discharge cycle batteries must be used, as discussed in the next section. Some repeaters using wind power have had mechanical reliability problems when using small turbines on exposed sites, so careful selection of the generator and attention to siting, installation and maintenance is needed.

Solar Photo-Voltaic Panels

Solar photovoltaic (PV) panels can be used to provide power, but also suffer from "down time" every night and in the dark winter months, so again a large battery is needed and the panels need to be over-rated to ensure there is enough energy available.

Figure 1 shows the relative output achieved versus month for a typical south facing installation, but it is worth noting that the variation can be reduced by tilting the panels to be nearer vertical so the angle of incidence is optimised for winter conditions. Many published designs for solar PV battery chargers seem to just use a linear regulator to charge the battery, so this is an area where some further development work would be beneficial to realise an efficient SMPS circuit. Commercial products, often designed for the marine market are available, for example the Victron BlueSolar MPPT 12/24-15A which uses maximum power tracking to get full output from the solar panels. The batteries used must be suitable for deep discharge cycles at relatively low loads. Car batteries are not well suited for this as they are designed to handle brief periods of high current when starting, those sold as leisure batteries for campers and caravaners are more suitable. Even so, lifetime of the batteries will be limited by the diurnal charge/discharge cycling, and may only be of the order of 5 years.

Combination Systems

As PV is more effective in summer and wind generation better in winter, the two can be combined to create a power source with lower peak to trough ratios. However the complexity will generally not make this type of solution cost effective.

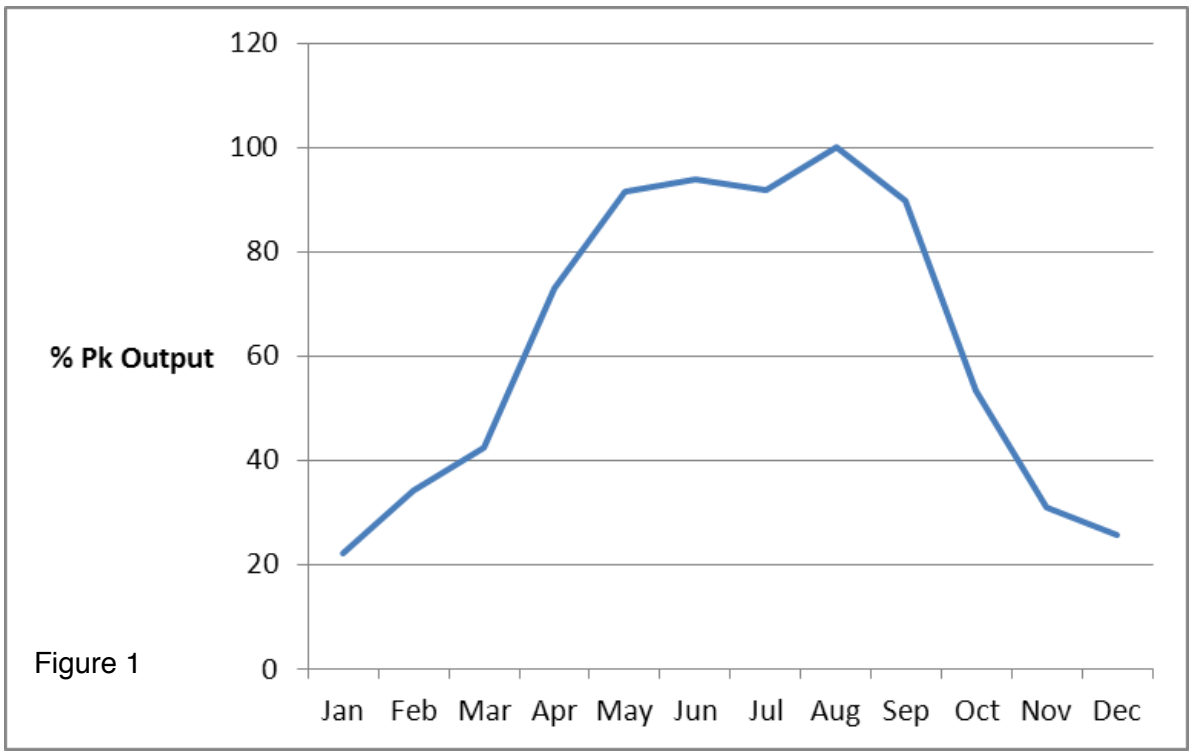


Figure 1

Designing a solar powered beacon

If the beacon hardware already exists the first step is to measure its power consumption in its current form. Cheap plug in mains wattmeters are available from many sources and will give an indication of power consumption in watts. From this starting point decisions can be made on whether to redesign one or more parts of the beacon to achieve better efficiency. Lets say that the eventual design requires 12W DC to produce 3W of RF (this represents very good efficiency compared to many beacons today). So we need to be able to generate 8.64kWh of energy per month to keep it on air continuously, and would need a 13.8V battery with a capacity of at least 150 AH to last for a sunless week during that period. My domestic installation of 8 panels produced 37kWh in the worst month of its operation to date (January 2013), so two PV panels rated at about 220W each would be needed to generate enough power. Each panel is physically about 1.6m x 1m. The site requires checking for unshaded visibility of the sun and sufficient structural strength in the mounting arrangements to withstand the wind forces these will experience. If a south facing sloping roof is available that is ideal. Figure 2 is a block diagram of the system needed.

Issues with locally generated power

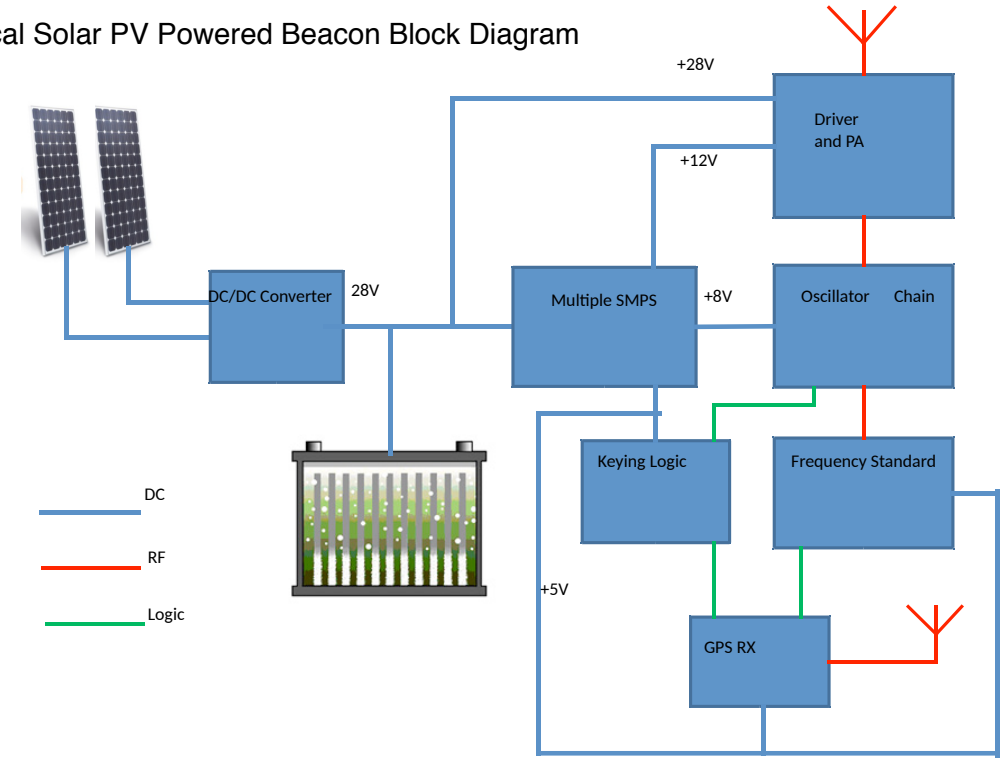
Adding a local power source and designing an efficient beacon add to the complexity of getting a beacon on-air, so it may be better to perform this in two stages, firstly by improving beacon efficiency, and then installing a local power generation system. Finding space for a wind generator or solar panels will require a careful approach to the site owner, and could result in increased site rental charges.

As can be seen from the design discussion above, just powering a single beacon with 3W RF output will need solar panels rated at 440W, so local powering may be impossible to achieve for multi-band and high power beacons. However, it may be practical to add a solar or wind generator to an existing mains powered site and take advantage of subsidised feed in tariffs to considerably reduce the overall electricity bill for the beacon installation. Such installations have to be undertaken by an MCS approved contractor to qualify for the feed in tariff, so the costs may be higher than a DIY off-grid solution.

Reference:

PV Wattage Calculator: rredc.nrel.gov/solar/calculators/PVWATTS/version1/
Wind Speeds: www.rensmart.com/Weather/BERR
MCS: www.microgenerationcertification.org/consumers/consumers

Figure 2: Typical Solar PV Powered Beacon Block Diagram



New 24 GHz EME World Record:

17403 km on 5 March 2014

by Rex Moncur VK7MO and Charlie Suckling G3WDG

Rather than plan for the lowest libration spreading and basic path loss degradation (as for our several previous failed attempts), we compromised by accepting higher spreading (175 Hz) and degradation (1.2 dB) so as to find a time when the elevations between the stations were near maximum (21 degrees total) to reduce atmospheric losses and also give a longer common window to provide more time for averaging. In addition VK7MO operated from Mt Wellington at 1270 metres to further reduce the atmospheric absorption losses. This strategy proved successful, even though signals were marginal and it took over an hour to complete the QSO.

VK7MO

Fig 1a VK7MO's Operating Location on Mount Wellington at 1270 Metres
(photo from earlier test)

G3WDG

Fig 1b 3m dish used by G3WDG

Equipment

G3WDG ran 10 watts to 3 metre dish and VK7MO 10 watts to a 1.14 metre dish. G3WDG's transverter was GPS locked and he monitored the small drift of his non-locked IF with a GPS derived carrier injected at IF to ensure he was correctly tuned. VK7MO's system is fully GPS locked and full Doppler correction was done at his end. Overall frequency accuracy is estimated at better than 10 Hz. G3WDG's dish was tracked using a PIC based system (based on an original idea by VK2ALU) which updates azimuth and elevation every 15 seconds by adjustable increments. Moon noise is monitored on receive to ensure the tracking is correct.

VK7MO was unable to use Moon noise for tracking – as his broadband detector was jumping to the same order as the Moon noise. This could have been the result of other signals within the wide band-pass of the detector resulting from many hundreds of KW for TV and FM stations on the mountain or due to buffeting of the dish in the wind.

Choosing the Date for the QSO attempt

The most critical factor at 24 GHz (unlike lower bands) is attenuation of the signal in the atmosphere. At long distances such as Tasmania to England for the moon to be visible at both ends it's elevation is necessarily very low and thus the atmospheric path much longer and the attenuation higher. Attenuation not only reduces the signal but it increase the noise in that it acts like a resistor at the input of the receiver at the temperature of the atmosphere in deg K. Atmospheric attenuation is primarily a function of water vapour which is measured as the amount of precipitable water (PW) on the path. Data on PW can be found from radio-sondes and is available from the University of Wyoming site at weather.uwyo.edu/upperair/sounding.html. Attenuation is also a function of the form of the water molecules on the path and when the water is in liquid form as in clouds, with drop sizes that are a significant proportion of a wavelength, the attenuation increases markedly. The drop size in turn depends on the type of clouds and it is difficult to gain real-time data. In practice our system margins are so low that we have come to the conclusion that if the moon is obstructed by cloud to the degree it can't be seen, long distance 24 GHz operations are unlikely. Drops of rain in the form of rain are also to be avoided. Forecasts of PW are available up to 6 days in advance for various regions of the Earth at:

Australia:	wxmaps.org/pix/aus.pw.html
Europe:	wxmaps.org/pix/euro.pw.html
North America:	wxmaps.org/pix/nam.pw.html
Asia:	wxmaps.org/pix/ea.pw.html

Other factors that affect system performance are "degradation" and "spreading" of the signal. Degradation is a measure of the signal loss due to the distance of the Moon from it's closest approach and can be up to 2.5 dB. Libration spreading is the result of difference in Doppler for signals received across the face of the moon and can be up to several hundred Hz at 24 GHz. There are, however, times when the spreading can be much lower -- less than 100 Hz. The JT4 mode has been specifically designed to cope with spreading but still loses around 1 dB in system performance for each doubling of spreading.

To date we have planned QSOs at times of lowest PW, degradation and spreading when local forecasts also indicate a low probability of rain or cloud. However, we recently came to the conclusion that this was not the whole story for long distance 24 GHz QSO's. An equally important factor is the common window between both stations. If the common window is short the elevations at both stations can never be very high and thus the atmospheric attenuation will be high. In addition if the common window is short there is insufficient time to use averaging on JT4 which is essential for marginal QSO's. Averaging can theoretically pick up roughly 1.5 dB for each doubling of the number of periods averaged. Accordingly up to 3 dB can be gained by averaging over 4 periods and up to 4.5 dB by averaging over 8 periods (16 minutes). In practice other variable such as the occasional passing cloud, or poor antenna alignment mean that averaging can take much more time than these theoretical values. Given that averaging might need to be applied to at least 3* segments of a QSO it is seen that in practice one can need a window of at least 30 minutes to complete a typical long distance QSO and even longer if cloud is present for part of the time as in this case. (*Note: the use of single tones for RRR and 73 avoids the need for averaging for these segments of the QSO and can be a significant advantage on completing a long distance QSO where the common window time is limited)

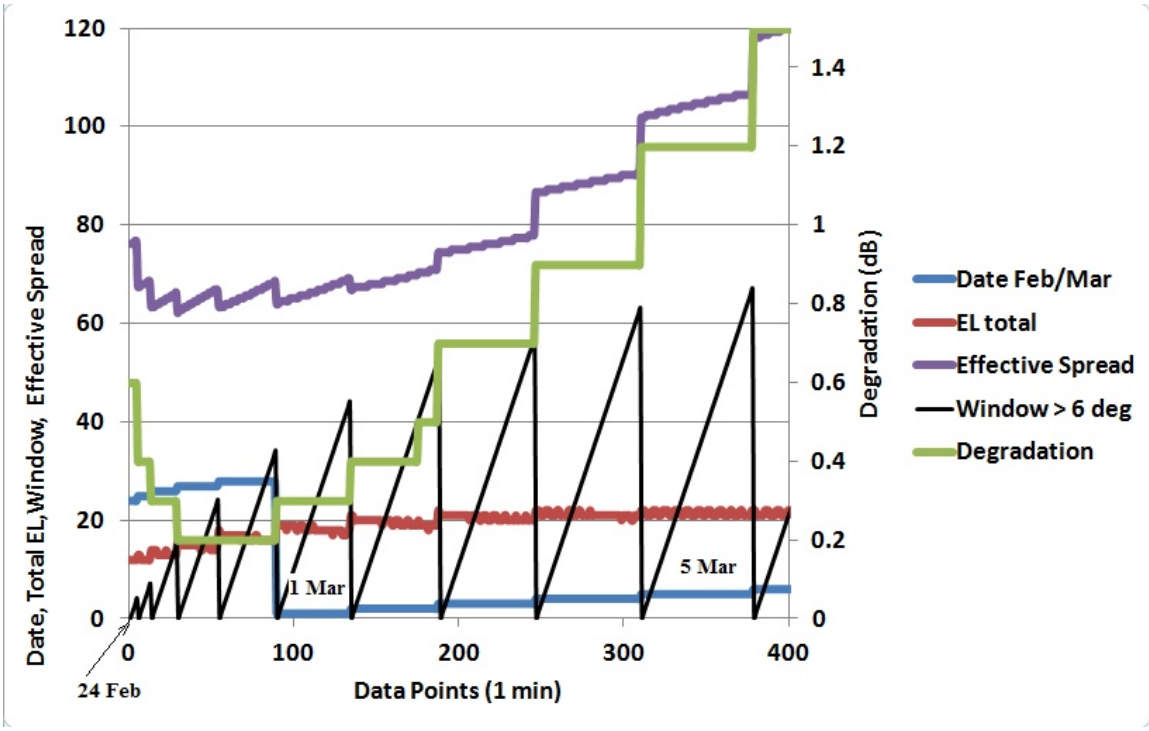


Fig 2: Variables that need to be optimised for long distance 24 GHz QSO

Fig 2 shows the various variables which need to be optimised (data based on Moonsked)

From Fig 2 it is seen that the best time for degradation (green) and effective spreading* (purple) would be around 27 and 28 February. However at this time total elevation (red) is low increasing system loss due to PW. More importantly the saw tooth line (black) which represents the time the window is available above 6 degrees between the stations shows that the common window is only 20 to 30 minutes on 27 and 28 February which would be insufficient to complete a QSO with useful averaging. Based on Fig 2 it was concluded that somewhere around 3 March would be the optimum time if PW was also low at both ends. As it turned out the forecast PW was reasonably low at both ends on 5 March when the QSO was undertaken. (* Note: The actual spreading is around 60% of the total calculated spreading as the beamwidth of G3WDG's dish is narrower than the Moon.)

Conditions on 5 March

At Hobart Airport, near VK7MO's site, the 12:00 Z, radio-sonde data (an hour or so after the QSO) showed a PW of 12.3 mm and as seen at Appendix C most of the water vapour was concentrated in the lower 2000 metres and the effective PW on Mt Wellington at 1270 metres is around 6 mm as shown in Fig 3 below.

The reduction in PW in going up Mt Wellington gives around a 2 dB improvement in system performance as shown by the solid lines of Fig 4 below cf to dashed lines if VK7MO were at sea level.

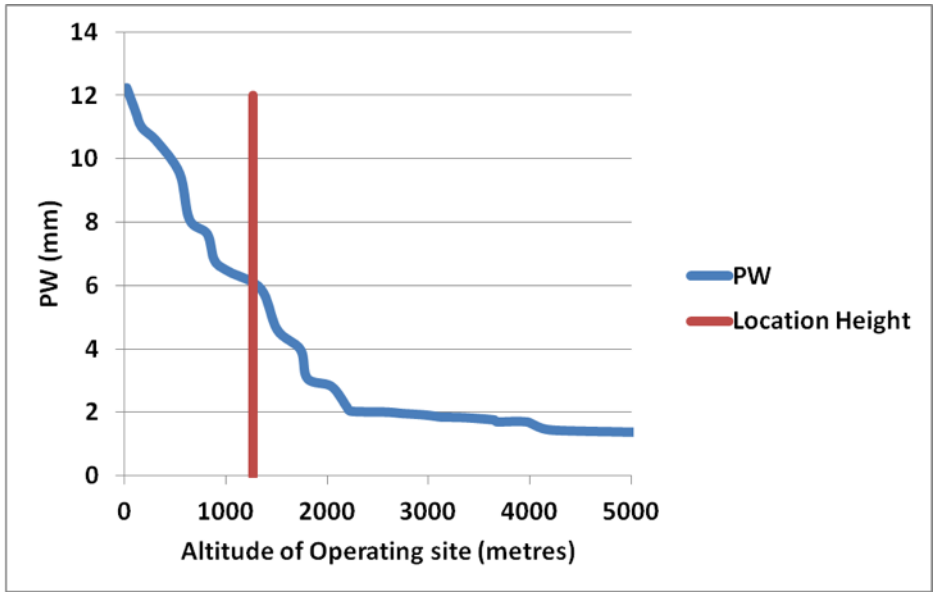


Fig 3: Variation of Precipitable Water with height

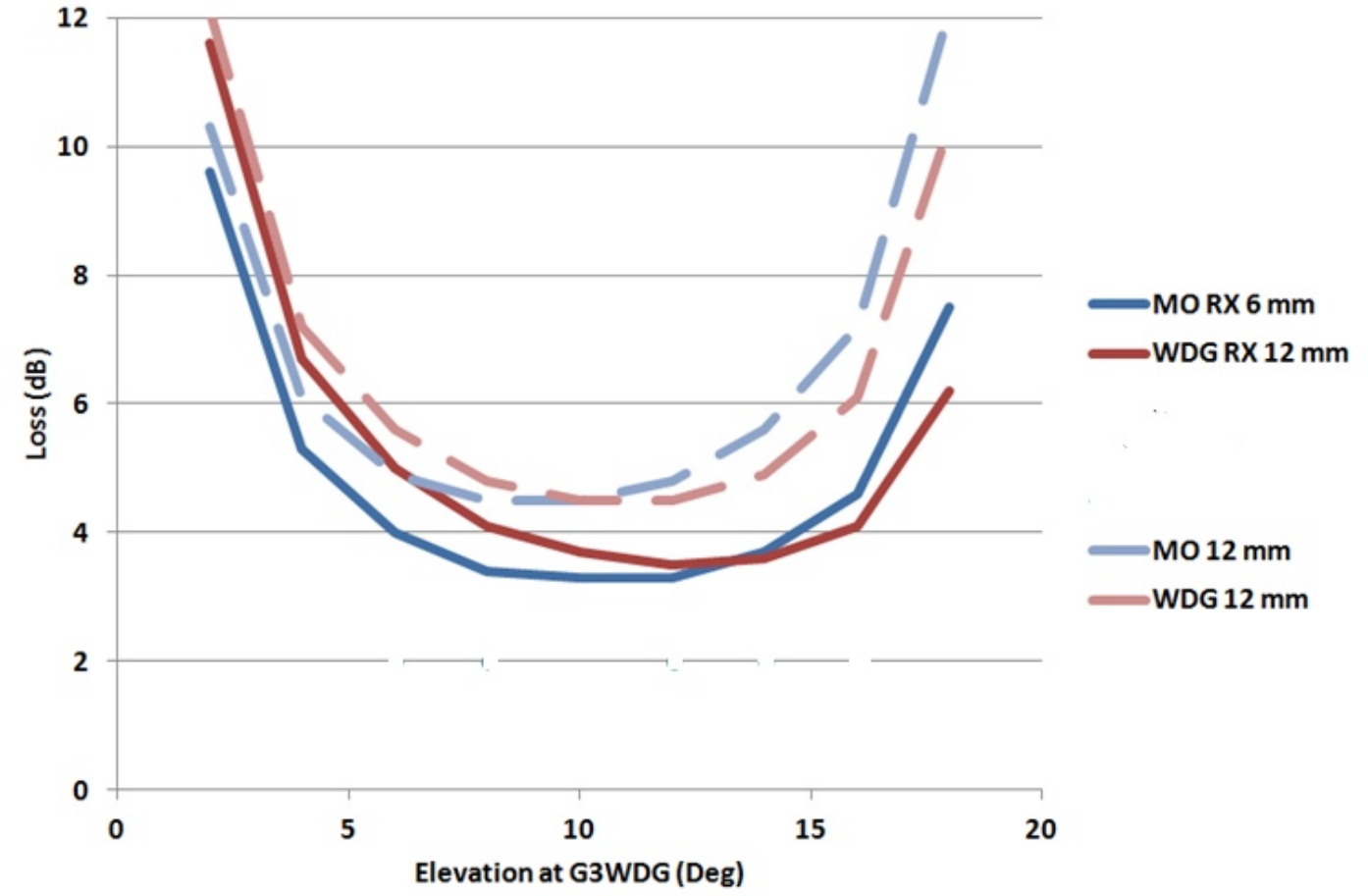


Fig 4: Variation of System Loss with Elevation. Comparing up Mt Wellington with Sea Level

Fig 4 is modelled and derives from a spreadsheet produced by VK7MO based on ITU recommendation P.676-9 which is available at www.itu.int/rec/R-REC-P.676/en .

Fig 4 shows that system loss is greatest when the elevation is low for G3WDG as the signal must travel though much more atmosphere at his end. The system loss rises again at high elevations due to the fact that the elevation is low at the VK7MO end. It is seen that the optimum elevation are from around 6 to 16 degrees. Equal elevation occurs at around 10 degrees at both ends. The non-symmetry around 10 degrees is due to the fact that VK7MO has less effective PW being up Mountain Wellington. The difference between the signal levels at VK7MO and G3WDG is because there is less absorption noise at the VK7MO end even though the total attenuation on the path is the same for both stations. (Note: G3WDG would also have about 1dB more moon noise with his larger dish but this has not been taken into account in the above model.)

VK7MO noted that signals changed from being present to nothing at all each time the moon was covered by cloud. It is suspected that the cloud was cumulous or cumulonimbus. At the average 10 degrees elevation 700 meters of cumulous cloud would reduce system performance by 0.7 dB and cumulonimbus around 5 dB (VK7MO spreadsheet). The air temperature on Mt Wellington during the QSO was around 2 degrees C with the wind gusting to 35 km/hr – not at all pleasant to be out on the top of a mountain in the dark for several hours as alignment of the dish required VK7MO to work outside for the full time.

The closest radiosonde station to G3WDG is Nottingham which did not run a 12:00Z flight. The average PW for the 00:00z flights either side of the QSO was 12.2 mm. G3WDG noted that there were no clouds at his end at the start and had the impression that during the QSO it was clear or just some high cloud. The temperature was 1 to 2 degrees.

Moonsked Data

DATE	UTC	AZ A	EL A	MNR	POL	AZ B	EL B	GHA	DEC	DGR	TSky	RGE Km	DOP	Echo ...
2014-03-05 Wednesday	08:30	315°	+21°	0 dB	+4°	070°	+0°	255°	+13°	1.2dB	3°K	382129	-8293 Hz	169 Hz
2014-03-05 Wednesday	08:40	313°	+20°	0 dB	+3°	072°	+2°	258°	+13°	1.2dB	3°K	382171	-8826 Hz	171 Hz
2014-03-05 Wednesday	08:50	311°	+18°	0 dB	+2°	074°	+3°	260°	+13°	1.2dB	3°K	382213	-9359 Hz	173 Hz
2014-03-05 Wednesday	09:00	309°	+17°	0 dB	+1°	075°	+5°	262°	+13°	1.2dB	3°K	382256	-9893 Hz	174 Hz
2014-03-05 Wednesday	09:10	307°	+15°	0 dB	+1°	077°	+6°	265°	+13°	1.2dB	3°K	382298	-10427 ...	176 Hz
2014-03-05 Wednesday	09:20	305°	+14°	0 dB	0°	079°	+8°	267°	+13°	1.2dB	3°K	382340	-10959 ...	177 Hz
2014-03-05 Wednesday	09:30	303°	+12°	0 dB	0°	081°	+9°	270°	+13°	1.2dB	3°K	382382	-11489 ...	179 Hz
2014-03-05 Wednesday	09:40	301°	+11°	0 dB	-1°	083°	+11°	272°	+13°	1.2dB	3°K	382425	-12016 ...	180 Hz
2014-03-05 Wednesday	09:50	299°	+9°	0 dB	-1°	085°	+12°	275°	+13°	1.2dB	3°K	382467	-12540 ...	181 Hz
2014-03-05 Wednesday	10:00	298°	+8°	0 dB	-2°	087°	+14°	277°	+13°	1.2dB	3°K	382509	-13060 ...	182 Hz
2014-03-05 Wednesday	10:10	296°	+6°	0 dB	-3°	089°	+15°	279°	+13°	1.2dB	3°K	382551	-13576 ...	183 Hz
2014-03-05 Wednesday	10:20	294°	+5°	0 dB	-4°	090°	+17°	282°	+14°	1.2dB	3°K	382593	-14085 ...	184 Hz
2014-03-05 Wednesday	10:30	293°	+3°	0 dB	-4°	092°	+18°	284°	+14°	1.2dB	3°K	382636	-14589 ...	185 Hz
2014-03-05 Wednesday	10:40	291°	+1°	0 dB	-5°	094°	+20°	287°	+14°	1.2dB	3°K	382678	-15086 ...	186 Hz
2014-03-05 Wednesday	10:50	289°	-0°	0 dB	-6°	096°	+21°	289°	+14°	1.2dB	3°K	382720	-15577 ...	187 Hz

The Moonsked data shows that the total elevation for both stations is around 21 degrees and that over the period of the QSO the spreading ranged from 175 to 180 Hz and the degradation was 1.2 dB. Compared to earlier failed tests when spreading and degradation were lower the penalty would be 1 to 2 dB.

Test Results

The test results are at Appendices A and B. Overall VK7MO achieved 15 good syncs and G3WDG 12 good syncs. However, VK7MO gained 4 good single line decodes whereas G3WDG had to average over 6 periods to gain just one decode. The difference might be explained by the fact that G3WDG with the larger dish has to cope with more moon-noise but it could also be that VK7MO achieved his decodes when the Moon was at high elevation at his end and thus there was less absorption noise at his end. By the time that G3WDG had a similarly high elevation, cloud at VK7MO's end would have attenuated the signal. Good syncs were generally achieved with Signal to Noise levels around -19 or -20 dB and single line decodes at about -18 dB – suggesting that an improvement in system performance of just one or two dB could dramatically improve the decoding success.

As noted earlier VK7MO found that as soon as the Moon was obscured by cloud he lost the signal.

When syncs were considered to be valid VK7MO's data showed an average error of -5.5 Hz and a standard deviation of 19 Hz. G3WDG's data showed an average error of -38 Hz and a standard deviation of 18 Hz. The standard deviations are well within the 175 Hz spreading and are probably due to the difficulty of a maintaining G3WDG's narrow dish exactly on the centre of the moon. The reasons for the difference in absolute frequency are not clear at this stage, but are not too bad for 24 GHz!

With the wider spreading, single tones were more difficult to detect than on previous occasions. In this case the spreading was around 175 Hz reducing to around 90 Hz with G3WDG's 3 metre dish. In practice this reduction is only valid if G3WDG can stay aligned to the exact centre of the moon so it is likely that the actual spreading is much wider than 90 Hz.

Lock-up on averaging

Both stations noted that WSJT stopped decoding after several averages and had to be restarted. VK7MO has also seen this on a long terrestrial run on WSJT 10. G3WDG thinks this might have been due changing the tolerance. This is something to watch and see if it re-occurs.

Conclusions

There are so many variables that it is difficult to draw firm conclusions but it is likely that the success of the QSO was due to:

- Choosing a time that maximised the length of the common window and elevations (even at the expense of increased spreading and degradation).
- Using a mountain location to reduce absorption loss.

There is evidence that cloud can be a major factor and that for such long paths through the atmosphere one needs clear sky at both ends -- although this effect does depend on cloud type.

With wider spreading single tones are much more difficult to see.

It seems that a system performance improvement of just one or two dB such as might be achieved with the proposed JT9W (possible improvement of 3 dB) or with increased power could dramatically improve the prospects of a QSO.

Appendix A

Set parameters: MinW = C, Tol=100, WSJT version 9.5 r3033

Good DTs are highlighted in Green and show an average DF error (highlighted in Magenta) of -5.5 Hz with a standard deviation of 19.6 Hz – if we assume the Standard Deviation is the short-term error due to Moon alignment and the statistical variation due to spreading, then this dominates the much smaller average error due to tuning or the accuracy of the Doppler correction and thus we cannot say if there is any error due to tuning or Doppler correction based on this data.

Table headings

DT is the difference in Time between both stations and for good signals should relate approximately to the distance of the Moon or 2.5 seconds in this case

DF is the difference in frequency between both stations in Hz

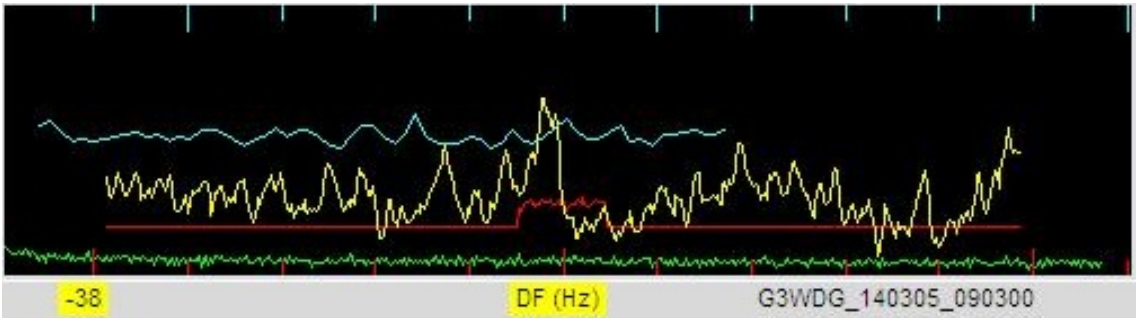
Spread is an approximate measure of the spread of the signal in Hz

Sync form is either * or # where the # form indicates a report is being sent – this is useful for averaging as if the other station starts to send a report one must clear the average to start averaging the new message.

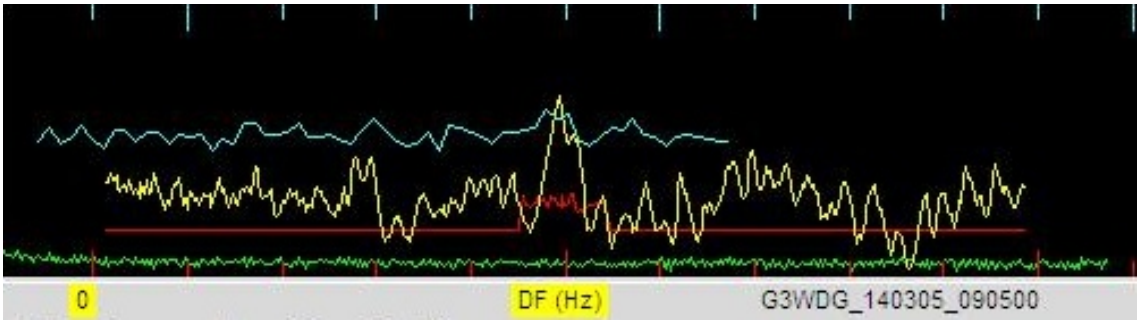
UTC Date: 2014 Mar 05

084800 Transmitting: JT4F @1270 Moon visible with no clouds nearby

Time UTC	Sync	S/N	DT	DF	Spread	Sync form	
084900	0	-20	-0.9	-105	4	*	
085100	0	-20	5.4	15	9	*	
085300	1	-20	2.3	85	15	*	
085500	0	-21	1.5	-92	9	#	
085700	0	-20	-0.8	53	7	*	
085900	2	-19	3.9	96	4	*	
090100	0	-21	-0.6	-123	4	*	
090300	1	-19	1.6	66	7	#	First Sign of 1270 Hz 38 Hz low as below

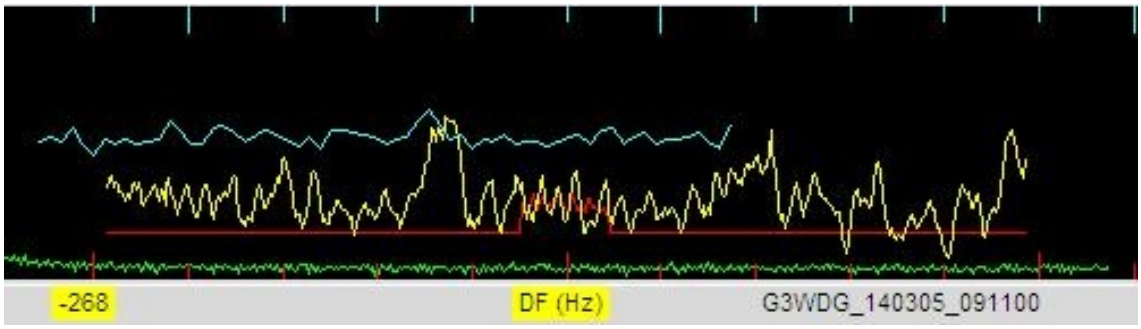


090500 0 -21 -1.3 158 13 # 1270 Hz on Frequency at 0 dF as per Yellow box



Time UTC	Sync	S/N	DT	DF	Spread	form							
090700	0	-21	5.7	90	4	*							1270 now 57 Hz low

090900	1	-19	5.3	50	7	#							No Evidence of 1270 or 1000 Hz
091100	1	-20	3.6	-136	4	#							Evidence of 1000 Hz at -268 Hz which is only 2 Hz low



Time UTC	Sync	S/N	DT	DF	Spread	form							
091206	Transmitting:			JT4F			G3WDG	VK7MO	QE37				VK7MO TXing calls and grid
091300	1	-20	0.9	103	7	#							
091500	1	-20	1.1	7	7	*							G3WDG started TXing calls and Grid
091700	2	-18	2.6	0	68	*							
091900	0	-20	-0.1	-88	4	*							
092100	2	-19	2.6	15	57	*							
092100	2	2/2					VK7MO	G3WDG	IO92	?0	3		Decode on Average
092235	Transmitting:			JT4F			G3WDG	VK7MO	-1				VK7MO TXing calls and report 35 secs late
092300	3	-18	2.6	-2	61	*	VK7MO	G3WDG	IO92	0	20	D	Single line decode
092300	2	3/3					VK7MO	G3WDG	IO92	0	27		
092500	1	-19	2.6	-18	57	*	VK7MO	G3WDG	IO92	?0	1	F	Single line decode
092500	2	4/4					VK7MO	G3WDG	IO92	0	26		
092700	1	-19	2.7	-22	68	*							
092700	2	5/5					VK7MO	G3WDG	IO92	1	25		Convolutional decode on Average
092900	3	-18	2.6	13	72	*	VK7MO	G3WDG	IO92	?	0	5 D	Single line decode
092900	2	6/6					VK7MO	G3WDG	IO92	1	30		
093100	0	-21	1.8	35	4	#							Lost signal due to Cloud
093100	2	7/7					VK7MO	G3WDG	IO92	1	29		
093100	0	-21	1.8	35	4								
093100	2	6/6					VK7MO	G3WDG	IO92	1	30		
093300	0	-20	4.5	-31	7	#							
093300	2	7/7					VK7MO	G3WDG	IO92	1	28		
093300	0	-20	4.5	-31	7								
093300	2	6/6					VK7MO	G3WDG	IO92	1	30		
093500	1	-20	-0.8	15	7								
093500	2	6/6					VK7MO	G3WDG	IO92	1	30		

Re-started WSJT when stopped decoding

UTC Date: 2014 Mar 05

```
093700  1  -19  5.5 -553    4  #
093800   Transmitting:  JT4F     G3WDG  VK7MO  -18
093700  0  -21  1.3  -11    7  *
093900  0  -21  2.5    4   15  *
094100  1  -19  2.7  -18    7  *
094300  0  -21  1.3  -44    4  *
094500  0  -20  2.6  -11   22  *
094700  0  -21 -0.1  -31    9  #
094900  0  -21  0.7   18    4  *
095100  1  -19 -1.2    9    4  *
095300  0  -21  2.7  -11    4  *  VK7MO  G3WDG  IO92  0    7    F      Single line decode
095300  2  4/4                    VK7MO  G3WDG  IO92  0   11
095500  2  -19  2.6    7   35  *
095500  2  5/5                    VK7MO  G3WDG  IO92  0   23
095700  0  -21  3.4  -20    4  *
095700  2  6/6                    VK7MO  G3WDG  IO92  0   16
095700  0  -21  3.4  -20    4
095700  2  5/5                    VK7MO  G3WDG  IO92  0   23
095900  0  -20  4.0  -26    7  #
095900  2  6/6                    VK7MO  G3WDG  IO92  0   15
100100  1  -20  2.6  -28   22  *
100100  2  6/6                    VK7MO  G3WDG  IO92  0   23
100300  0  -21  4.2  -13    4  *
100300  2  7/7                    VK7MO  G3WDG  IO92  0   18
100500  0  -21  4.7  -11    9  *
100500  2  7/7                    VK7MO  G3WDG  IO92  0   23
100700  1  -20  2.4    9   37  #
100700  2  7/7                    VK7MO  G3WDG  IO92  0   19
100900  0  -21  2.3  -94    7  #
101100  0  -21 -1.0  -13    7  #
101300  1  -20  5.3   44   13  #
101500  2  -18  2.6   20   61  #                Moon became visible with break in cloud
101700  0  -20  2.7  -50    4  #
101900  2  -18  2.6   18   57  #
101900  2  3/3                    VK7MO  G3WDG  R-19  ?    0    1       Decode on Average
102006   Transmitting:JT4F  @1500       (RRR)
102100  0  -21  5.0   42   13  *
102100  2  4/4                    VK7MO  G3WDG  R-19  ?    0    4
                                       Confidence level improved despite wrong DT
102300  1  -20 -1.5    2    4  *
102300  2  5/5                    VK7MO  G3WDG  R-19  ?    0    2
102400   Transmitting:JT4F  @1700       (73)
102500  0  -20 -1.0  -28    7  #
```

Appendix B

Set parameters: MinW = C, Tol=100

Full spreading ~175Hz: ant BW~0.5 of moon, so corrected full spread~90Hz Closest bin=E so MinW set 2 less at C per the manual. No single line decodes this end, so don't know if this was the best choice.

Freq setting accuracy both ends ~10Hz. Rex initially reported DF=0. Rex's 1270 looked about 25Hz low by eye here so froze DF at -25.

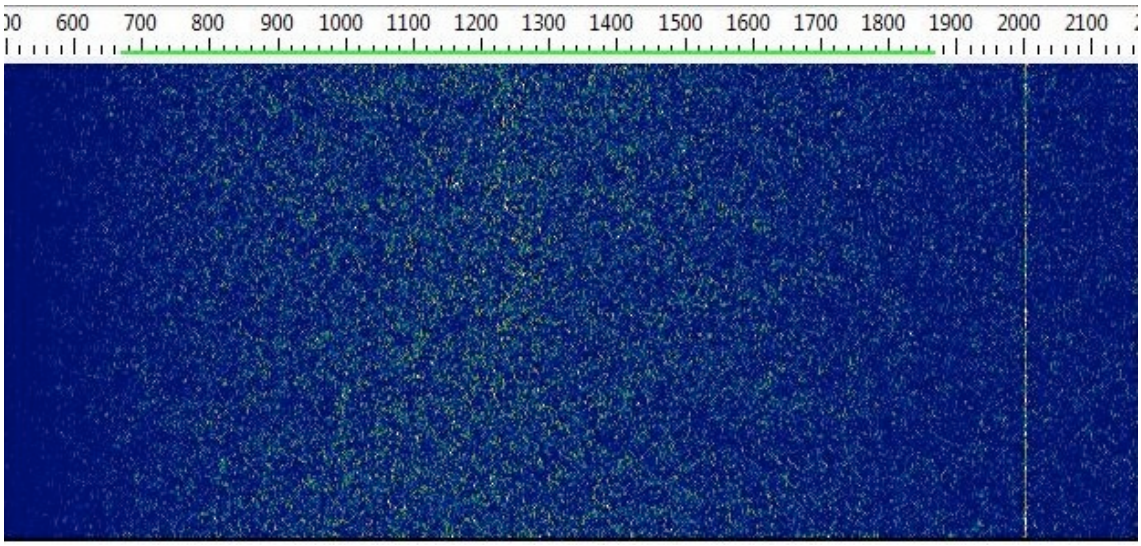
Ratein=Rateout=1.0000 (48kHz sampling set in Vista)

WSJT version 9.5 r3281

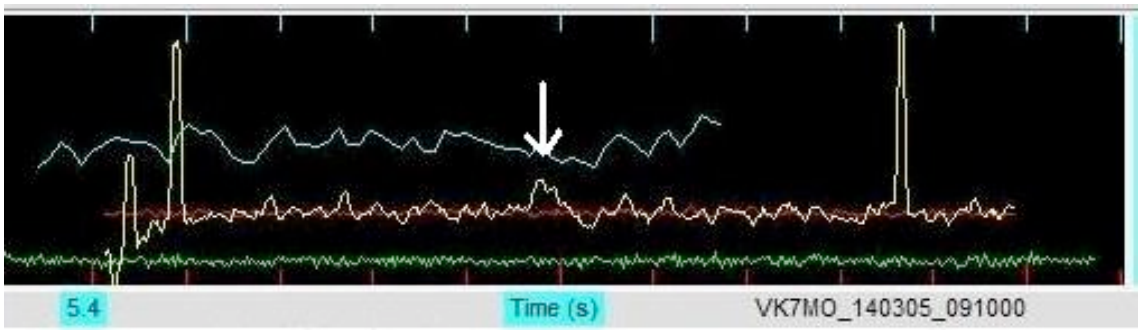
Good DTs are highlighted in Green and show an average DF error (highlighted in Magenta) of -37.9 Hz with a standard deviation of 17.6 Hz – thus as opposed to the VK7MO case the frequency error does appear to be significant cf the Standard Deviation.

Real Time results:

Time						Sync	
UTC	Sync	S/N	DT	DF	Spread	form	
084100	Transmitting:JT4F @1270						
084800	1	-20	3.4	490	7	*	VK7MO started TXing 1270
084900	0	-21	0.4	492	4	*	
085000	0	-21	3.3	492	9	*	
085100	0	-21	-0.1	492	4	*	
085200	0	-21	-1.0	492	4	*	
085300	0	-21	-0.3	494	7	#	
085400	0	-21	2.8	-433	15	#	
085600	0	-21	5.0	494	4	#	
085800	0	-21	0.7	-586	7	#	
090000	0	-21	-0.9	-584	9	#	
090200	0	-21	0.6	-584	11	*	
090400	0	-21	3.4	295	13	#	
090600	0	-21	4.2	508	11	#	
090800	0	-21	2.5	492	4	*	
091000	0	-21	5.5	497	9	#	First sign of convincing 1270 tone



1270 tone from VK7MO – note narrow tone at 2000Hz is locally generated marker signal



1270 tone from VK7MO (averaged spectrum)*

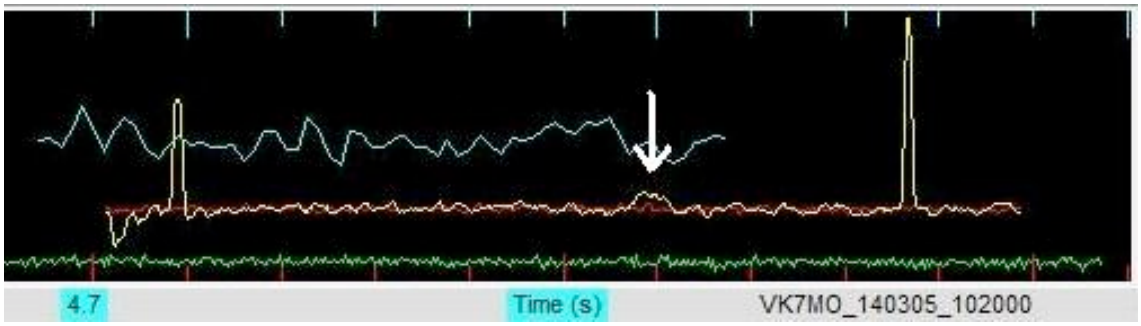
* Note the two peaks on the left are related to harmonics of 50 Hz hum and can be ignored and the large peak to the right is the 2000 Hz reference used to check frequency accuracy of the IF.

Time UTC	Sync	S/N	DT	DF	Sync Spread	form			
091106	Transmitting:				JT4F	@1000			
091200	1	-20	-1.2		24	7 #			VK7MO TXing Calls and grid
091300	Transmitting:				JT4F		VK7MO	G3WDG	IO92
091310	Transmitting:				JT4F		@1000		changed my mind!
091400	2	-19	2.5	-7	61	*			
091500	Transmitting:				JT4F		VK7MO	G3WDG	IO92
091600	0	-20	2.9	35	9	#			
091600	0	-20	2.9	35	9				
091800	1	-20	2.5	-31	53	*			
092000	0	-21	2.5	-18	22	*			
092200	0	-21	-1.6	33	26	*			
092200	0	-21	-1.6	33	26				
092400	0	-21	-1.6	-55	9	#			
092400	0	-21	-1.6	-55	9				VK7MO Txing Calls and report
092600	2	-19	2.4	-55	63	#	Rex probably went to reports (reset averaging here)		
092800	1	-19	2.4	-28	57	#			
093000	0	-21	3.9	-48	15	*			
093000	0	-21	3.9	-48	15				
093200	0	-20	5.6	-101	13	#			
093200	0	-20	5.6	-101	13				
093400	0	-21	-1.1	37	9	#			
093400	0	-21	-1.1	37	9				
093600	0	-21	1.3	-24	9				

Tried to reset DF freeze to ~-50Hz but prog seemed to stop decoding so restarted it

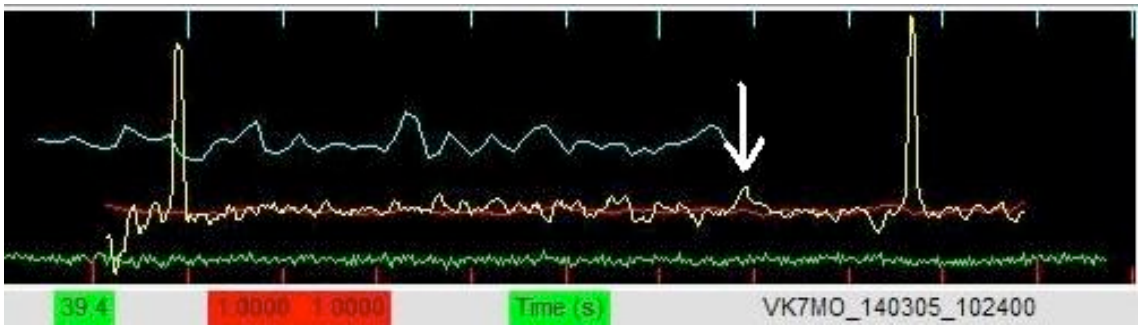
UTC Date: 2014 Mar 05

```
Time                          Sync
UTC   Sync   S/N    DT    DFSpreadform
093800  0  -21 -0.7 -116    22  #
093900   Transmitting:JT4F        VK7MO   G3WDG   IO92
094000  0  -21 -0.1  -35    31  *
094000  0  -21 -0.1  -35    31
094200  0  -21  2.6  -15    24  #                 included in average
094400  0  -21  3.9   15     7  #
094400  0  -21  3.9   15     7
094600  1  -20  5.0 -109     9  *
094600  1  -20  5.0 -109     9
094800  0  -21  2.4  -48    37  #                 included in average
095000  1  -19  3.0 -138     9  #
095200  0  -21 -1.6  -50     9  #
095200  0  -21 -1.6  -50     9
095400  2  -19  2.4  -57    59  #                 included in average
095600  2  -18  2.5  -44    20  #                 included in average
095800  0  -20  0.7  -33    13  #
095800  0  -20  0.7  -33    13
100000  1  -19  5.4   39    13  *
100000  1  -19  5.4   39    13
100200  2  -18  2.5  -55    55  #                 included in average
100200  1  6/6                    G3WDG   VK7MO   -18    ?    0    4
            puzzled why this is 6, unless I included one other frame by mistake!
100300Transmitting:JT4F          VK7MO   G3WDG   R-19
100400  0  -20  4.2 -103    11  *
                        stopped caring about rejecting bad frames at this point!!
100400  1       7/7              G3WDG   VK7MO   -18         ?    0    4
100600  0  -20  3.3 -133     7  #
100800  0  -21  3.0  -46     9  #
101000  0  -21  5.4  -48    11  *
101200  0  -21  2.5  -42    20  #
101400  0  -20  4.5  -59    18  #
101600  1  -20  2.5  -55    42  #
101600  1     13/13               G3WDG   VK7MO   -18    ?    0    5
101800  0  -21  1.3  -15     9  *
101800  0  -21  1.3  -15     9
101800  1     13/13               G3WDG   VK7MO   -18    ?    0    5
102000  0  -21  5.4  -44    13  #
102000  1     14/14               G3WDG   VK7MO   -18    ?    0    2
```



1500Hz tone from VK7MO signifying RRR

```
Time                          Sync
UTC   Sync   S/N    DT    DFSpreadform
102100   Transmitting:  JT4F      @1500   (RRR)
102000  0  -21   5.4   -44    13
102000  1     13/13                G3WDG   VK7MO   -18    ?     0     5
102200  0  -20   1.3   -79    13   #
102200  1     14/14                G3WDG   VK7MO   -18    ?    03
102302   Transmitting:  JT4F      @1700   (73)
102200  0  -20   1.3   -79    13
102200  1     13/13                G3WDG   VK7MO   -18    ?     0     5
102400  1  -20 -1.3    -2    20   #
```



1700Hz tone from VK7MO signifying 73

```
102400  1     14/14                G3WDG   VK7MO   -18    ?     0     4
102600  2  -18   3.1    39     7   #
102700  1  -20 -1.0 -123    13   #
102800  1  -20   1.8   -55     9   *
102900  0  -21 -1.0    39     7   #
```

—— End ——

How to download Scatterpoint from Dropbox

I still get the odd complaint from people who have difficulty in downloading Scatterpoint from Yahoo and Dropbox.

1. You don't need a Dropbox account.
2. Click on the dropbox link in the message you receive, either from Yahoo Scatterpoint group or other route. It may be a shortened url (an **https** one), which will expand in your browser.
3. Let the image of the first page load then click the Download button

4. That's it. Simples! Yes, you've spotted the bootstrap issue: I shall be emailing those with problems directly.

Martin G8BHC

UKµG Chip Bank – A free service for members

will be at the Martlesham Round Table

Happy New Year to all!

A note to say that the chipbank catalogue has just been updated.

The main addition results from the donation of an almost complete 1206 resistor kit. All E24 values from 10 Ohms to 1Meg and E12 values from 1 – 10 Ohms and 1 – 10Meg are now available while stocks last.

There are a few additions, deletions and corrections to the other files in the catalogue on the website.

73, Mike, G3LYP

The catalogue is now on the UKµG web site See 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 miss labelled. 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!

73, Mike, G3LYP

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!

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

Region	Tech Support volunteer	Facilities
NW England, N Wales Wales	David Wrigley G6GXK 07811776432 Chris Bartram GW4DGU	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	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 Wavegide 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 Herts.	Sam Jewell G4DDK sam@g4ddk.com David Kirkby G8WRB, Chelmsford CM3 6DT Bryan Harber G8DKK Letchworth, Herts	Spectrum analysis to 24GHz Power measurement to 24GHz Direct frequency measurement up to 3GHz VNA to 3GHz RF sources to 24GHz Spectrum analyzer to 22 GHz Vector network analyzer to 20 GHz, with calibration kits for N (18GHz), 3.5 mm (26.5 GHz), APC7 (18 GHz), WR90 and WR62 waveguide. Waveguide couplers at X-band. Some other couplers at lower frequencies. Signal generator to 4.5 GHz. Power measurement to 18 GHz
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	Richard Bown G8JVM richard@g8jvm.com	power measurement to 18 GHz Sig gen to 1.3 GHz but can mix up to 3cms SA to 1.3 GHz but can down convert from 3 cms and probably other lower bands , check NF to 3 cms with IFs of 144 and others , check Freq measurement to 18 GHz, Rb standard
Scotland	John Cooke GM8OTI gm8oti@gmail.com	Lot of mutual assistance in GM via GM microwave reflector including David Anderson GM6BIG and Ian Ropper GM0UHC
N Ireland	Gordon Curry GI6ATZ	

Public Sector Spectrum Release:

Amateur use of 2310 to 2450 and 3400 to 3475 MHz - Statement

Ofcom Statement published 07|04|14

Executive Summary

1.1 In June 2013 we consulted on the use of spectrum licenced to radio amateurs which the Ministry of Defence (MoD) plan to release for new civil uses. Specifically, this includes 40 MHz of radio spectrum from 2350 to 2390 MHz and a further 150 MHz from 3410 to 3600 MHz.

1.2 This statement:

i) sets out the results of our consultation and the future use of the release and adjacent spectrum bands by licenced radio amateurs; and

ii) sets out additional protection requirements that need to be implemented immediately as a result of the MoD's new and changing operational use. We have agreed with the MoD that these requirements can be achieved by issuing guidance to amateurs. This guidance is set out in Annex 1 and comes into effect immediately. As required under the terms of the Amateur Radio Licence not to cause undue interference, amateurs must follow this guidance.

1.3 As a result of our consultation we have decided that we will:

i) remove from the Amateur Radio Licence the bands 2350 to 2390 and 3410 to 3475 MHz. This statement provides 12 months' notice from the date of publication that the licence will be varied to remove these bands;

ii) retain amateur access to the bands 2310 to 2350; 2390 to 2400 and 3400 to 3410 MHz and put in place a procedure to enable us to remove these frequencies quickly should harmful interference arise in the future (to other uses in the release and adjacent bands).

1.4 Given the scope of the changes outlined in this statement it provides an opportunity to carry out a more general review of the amateur licence document to introduce improvements. We will consult separately on these changes. However, in order to reduce the administrative burden on both amateurs and Ofcom we plan to implement all changes at the same time.

1.5 We are making available 2300 to 2302 MHz for amateurs to use. This requires a Notice of Variation (NoV) to the standard Amateur Radio Licence. Further details about this arrangement are set out in Section 6.

1.6 To facilitate communication about any information related to future changes to the use of 2310 to 2350 MHz, we request users of this band to provide information as set out in Section 5.

Full statement here: http://stakeholders.ofcom.org.uk/binaries/consultations/public-sector-spectrum-release/statement/PSSR_amateur_statement.pdf

FOR IMMEDIATE ACTION

Extract from the full document

5.29 Amateurs are required to comply with this guidance with immediate effect.

Specifically:

5.33 In order to manage coexistence of government systems with amateurs, it would be helpful for Ofcom to understand the number and location amateurs using the 2310 to 2350 MHz band.

5.34 In order to facilitate communication of any information related to future changes to other uses in this band, we are therefore requesting amateurs using 2310 to 2350 MHz register their use and provide contact details by emailing pssramateurs@ofcom.org.uk providing the following information:

- Name
- Address (and location of use)
- Call sign
- Location of use
- Frequency range uses
- Type of use
- Regularity of use (e.g. evenings and weekends; 24/7; occasional)
- Transmit power

Activity News : March/April

By Marti G8BHC pp John Worsnop G4BAO

Please send your activity news to:

scatterpoint@microwavers.org

Introduction (Trouble 't Fen Edge)

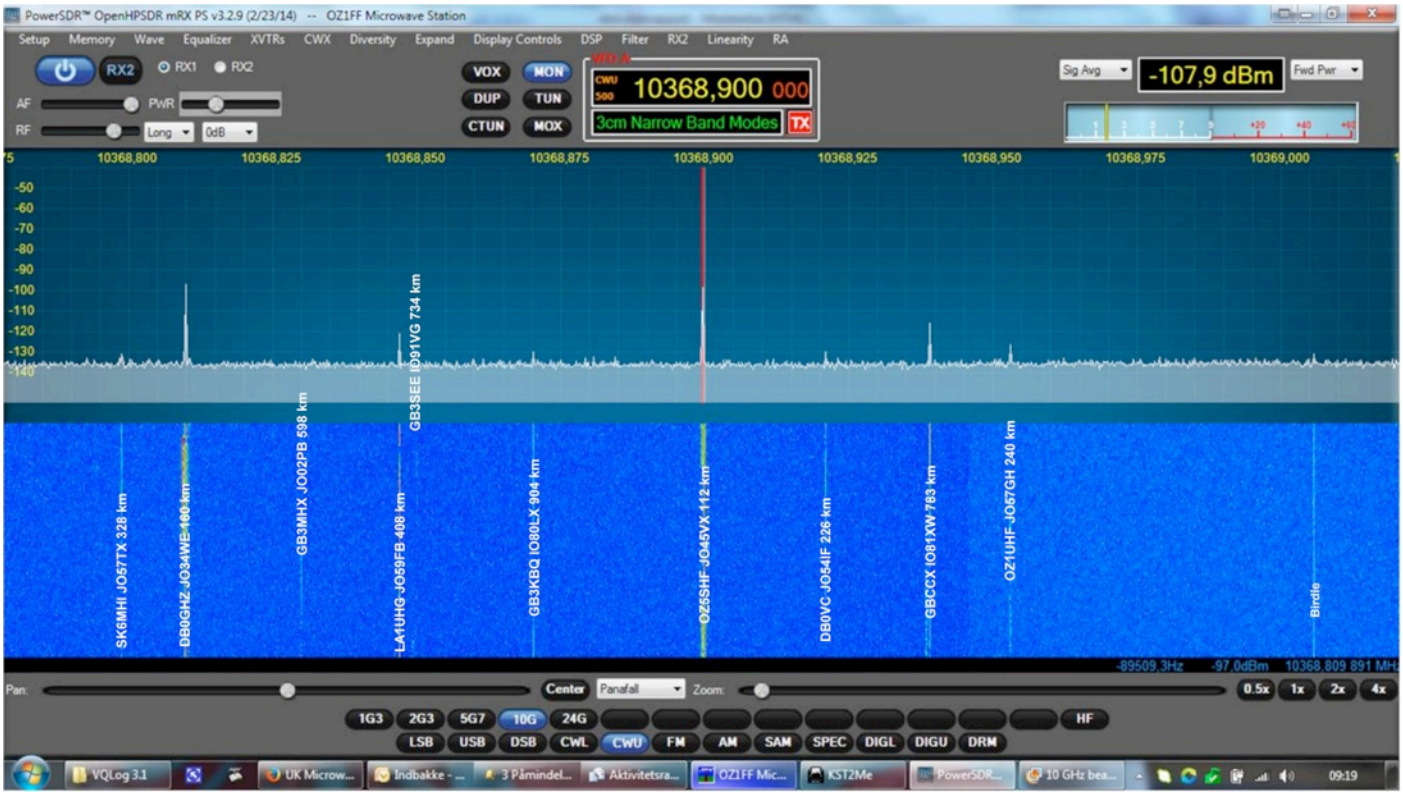
In preparing for his trip with CambHams to the Isle of Lewis (see page 6), John has encountered some "technical issues". No doubt we'll hear more next month. So it's *Not too Much Activity News* this month from me G8BHC.

Beacons

From March 11 to 13 2014 the microwave bands were open from Scandinavia to UK. Only a few stations QRV so most of the time was used listening/looking for beacons. On the 13. Around 10z I took the attached screen shot from 10 GHz showing 10 different beacons from 5 DXCC's with my 65 cm dish pointing 235 degrees.

Only a few QSO's made but worth to mention M0GHZ on 6 and 3 cm and SM7ECM 314 km, DK7LJ 59+ 200 km and SM6AFV 356 km.

Vy 73 de OZ1FF - Kjeld



134 GHz activity

Chris G0FDZ & I had a 134GHz x-thames qso on Monday 24th March.

We both now use separate tx & rx. (to get enough power on transmit)

G0FDZ used an HP module on transmit driven from from a Microsource synthesiser with 130uW into a 4" dish. On receive he used his original transverter now fitted with a Elcom synthesiser, a DBES105A diode and Procom dish.

G8CUB on transmit used a DL2AM block using a DBES105A diode, driven at 34GHz to give 90uW into a Procom dish. On receive a similar system was used, both using Elcom synthesisers.

Reports were 549 / 559 at 6.72km. G0FDZ/P was near Shorne in Kent JO01FK60UC. G8CUB/P was in West Tilbury Essex. Dew point around 1 deg.C

The biggest chalenge was alignment. Using ships going up the Thames helped confirm the right direction!

Roger G8CUB

Chris G0FDZ

... and finally (from 'BAO)

I want to encourage you get on the air as often as possible and 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. Good DX in 2014.

Please send your reports to Scatterpoint@ukmicrowaves.org, remember the deadline is the 1st of the month.

73

John Worsnop G4BAO

UKµG: Draft Rules for G3VVB Trophy

GW4DGU

Preamble

In recent years, the G3VVB Trophy has been awarded at the Crawley Roundtable for individual microwave 'construction' projects. Construction from component level has become less common in recent years, as there has been wide utilisation of ready-built modules, and modification of surplus commercial equipment. Also there are other aspects of equipment development which at the time of the instigation of the Award, barely registered with most people. The most obvious of these is software.

The reason for this rewrite of the rules – actually, I can't find the original rules, if they ever existed - is firstly to broaden the scope of the Trophy to include all microwave, mm-wave and nanowave related projects, whether they be hardware, software, or operational. The operational aspect could, for example, include propagation studies. Secondly, it seems highly desirable to make the Trophy more accessible to potential entrants around the UK.

Structure

We have a number of UkuG sponsored events – Roundtables - around the country. This proposal is that each RT should organise a Projects Competition, and that the organisers of each event should provide documentation in electronic format, such as images, competitors notes, and software listings for their best three entries to a nominated member of the UkuG Committee, possibly the Trophies Manager. Judging at each event will be to the same set of criteria. Final judging of all projects submitted will be by a sub-committee of the UkuG Committee, who may seek opinions from external experts. The G3VVB Trophy will be awarded at the RSGB Convention.

Judging Criteria and Rules

Participants should submit their project – either alone, or in conjunction with other(s) to the Projects competition at a Microwave Roundtable. For a hardware project, this should be the hardware together with any test results. For software, a description along with code and and evidence of functionality. For an operational project, a report including the aim, methodology, and results will be a minimum. It is expected that participants will write-up their project for 'Scatterpoint'. For those not able to do that for any reason, it may be possible to arrange for a ghost writer!

The decision of UkuG judges will always be final!

Judging should be on the basis of the scope of the project, its originality, and the background of the participant. An original 'state of the art' project submitted by one of UKuG's many professional engineer members working in the RF/microwave field might score less highly than a kit assembled with care by someone completely new to amateur radio. Judging will always be subjective. Any attempt to minimise that subjectivity will inevitably be fraught with complications, so it's not productive to try to do that.

Mechanism

It's important that all UkuG members within the UK have the opportunity to enter a project for the the Trophy. Fortunately, UkuG, uniquely amongst special interest amateur radio organisations, has a a number of regional and national meetings ('Roundtables') at which judging of entries can take place. Each group running a Roundtable is encouraged to organise a regional/national heat of of this competition and to present the results to the UkuG Committee. A sub-committee of the UkuG Committee will then make a decision about the award of the G3VVB Trophy.

Rules

1. This Trophy is open to members of the UK Microwave Group either as individuals or as groups.
2. Projects submitted will have strong relevance to the aims of the UK Microwave Group, and may consist of hardware, or of software/firmware, of integrated hardware/software systems, or of other relevant projects, eg. propagation or radio astronomy observations. It is not necessary for projects to be limited to the amateur microwave bands, however projects concerned with frequencies below 1GHz, and software/hardware modifications to type-approved equipment for operation outside the terms of the UK amateur radio licence will not be considered.
3. Each project should be submitted with supporting documentation

Cont.page 34

Contests

Thanks to the good work of Pete G4CLA we now have the results of the March Low Band Contest up on the UKuG Contest webpage.

The preferred method of access is via the contest calendar at:

http://microwave.rsgbcc.org/cgi-bin/readcal.pl

Just click on the Results button (visible for any events that have published results).

Some further work remains to be done to support all the UKuG events fully, watch this space for further developments.

Results will continue to be published in Scatterpoint as well.

March 2014 Lowband Contest Results

Entry levels were virtually the same as in 2013, although numbers of contacts made were down on the lower two bands and up on 3.4GHz.

Most entrants managed some continental DX on 1.3 and 2.3GHz thanks to the coincident European contests. G4DZU takes the best DX prize by some distance with an EME QSO with LU8ENU using JT65. This year EME contacts count for points up to a maximum of 1000 points per contact.

Tony G4NBS won 1.3GHz this time, with 5 PA's, 3 DL's, F, ON, GD, and GW in the log, and nice DX to DF9IC in JN48IW. Runner up was Neil G4BRK with a few less continentals.

G4BRK won 2.3GHz in a close fought battle with Neil G4LDR. Both worked DF0MU in JO32PC as their best DX. Numbers of contacts were noticeably down on the levels achieved in 2013.

On 3.4GHz Martyn G3UKV was the run-away leader with a large margin over G4LDR. Both stations worked G3XDY as best DX.

Overall Results

Pos	Call	1.2 GHz	2.3 GHz	3.4 GHz	Total
1	G4BRK	816	1000	297	2113
2	G4NBS	1000	879		1879
3	G4LDR	439	986	408	1833
4	G3UKV	320	468	1000	1788
5	G4BAO	685	771		1456
6	G3TCT	527			527
7	G4WLC/P		521		521
8	G4DZU	154			154

The overall winner was Neil G4BRK, who won 2.3GHz and was runner-up on 1.3GHz.

There was a tight finish for the runner-up spot with less than 100 points separating G4NBS, G4LDR, and G3UKV. G4NBS prevailed despite not being on 3.4GHz, having the leading score on 1.3GHz.

Certificates go to G4BRK as overall winner, to G4NBS as runner-up and to the following band leaders, runners-up and leading low power/portable stations.

1.3GHz G4NBS, G4BRK

2.3GHz G4BRK, G4LDR, G4WLC/P

3.4GHz G3UKV, G4LDR

Normalised scores will go forward to the overall championship table which will be published when the results of the next low band contest are available.

The results are also now published online - please follow the link from the UKuG Contests Page at: http://www.microwavers.org/?contesting.htm

73
John G3XDY,UKuG Contest Manager

1.3GHz

Pos	Callsign	Locator	QSOs	Score	Norm	ODX	km
1	G4NBS	JO02af	24	6,483	1,000	DF9IC	713
2	G4BRK	IO91hp	19	5,291	816	DF0MU	597
3	G4BAO	JO02cg	16	4,443	685	DF9IC	705
4	G3TCT	IO81qc	11	3,414	527	PA0WMX	598
5	G4LDR	IO91ec	9	2,848	439	PI4GN	620
6	G3UKV	IO82rr	13	2,077	320	G3XDY	265
7	G4DZU	IO93es	1	1,000	154	LU8ENU	11,235

2.3GHz

Pos	Callsign	Locator	QSOs	Score	Norm	ODX	km
1	G4BRK	IO91hp	11	2,280	1,000	DF0MU	597
2	G4LDR	IO91ec	9	2,248	986	DF0MU	626
3	G4NBS	JO02af	11	2,005	879	PI4GN	466
4	G4BAO	JO02cg	8	1,759	771	DF9IC	705
5	G4WLC/P	IO91dv	9	1,187	521	G4KCT	232
6	G3UKV	IO82rr	7	1,066	468	G4BAO	193

3.4GHz

Pos	Callsign	Locator	QSOs	Score	Norm	ODX	km
1	G3UKV	IO82rr	4	701	1,000	G3XDY	265
2	G4LDR	IO91ec	2	286	408	G3XDY	223
3	G4BRK	IO91hp	2	208	297	G3UKV	145

STOP PRESS:

Following the publication of Ofcom's response on release of parts of the 2.3 and 3.4GHz bands, the RSGB Contest Committee has decided to shorten the 2.3GHz section of the April and May sessions of the SHF UKAC to two hours, so they commence at 20:30 local time (after dusk). This should avoid the possibility of interference to the primary user (MOD).

For June and beyond, a move to Sunday evening sessions is being considered. More to follow.

UKuG Microwave Contest Calendar 2014

Dates	Time UTC	Contest name	Low Band#	Certificates
13-Apr	1000 - 1600	Low band 1.3/2.3/3.4GHz	2	F, P,L,R
4-May	0800 - 1400	Low band 1.3/2.3/3.4GHz	3	F, P,L,R
25-May	0600 - 1800	1st 5.7GHz Contest		F, P,L,R
25-May	0600 - 1800	1st 10GHz Contest		F, P,L,R
25-May	0600 - 1800	1st 24GHz Contest		F, P,R
8-Jun	1000 - 1600	Low band 1.3/2.3/3.4GHz	4	F, P,L,R
29-Jun	0600 - 1800	2nd 5.7GHz Contest		F, P,L,R
29-Jun	0600 - 1800	2nd 10GHz Contest		F, P,L,R
29-Jun	0600 - 1800	2nd 24GHz Contest		F, P,R
20 -Jul	0900 - 1700	24GHz Trophy / 47 / 76-1000 GHz		
27 -Jul	0600 - 1800	3rd 5.7GHz Contest		F, P,L,R
27 -Jul	0600 - 1800	3rd 10GHz Contest		F, P,L,R
27 -Jul	0600 - 1800	3rd 24GHz Contest		F, P,R
3 -Aug	0900 - 1700	Microwave Field Day		F, P,L
31 -Aug	0600 - 1800	4th 5.7GHz Contest		F, P,L,R
31 -Aug	0600 - 1800	4th 10GHz Contest		F, P,L,R
31 -Aug	0600 - 1800	4th 24GHz Contest		F, P,R
28 -Sep	0600 - 1800	5th 5.7GHz Contest		F, P,L,R
28 -Sep	0600 - 1800	5th 10GHz Contest		F, P,L,R
28 -Sep	0600 - 1800	5th 24GHz Contest		F, P,R
23 -Nov	1000 - 1400	Low band 1.3/2.3/3.4GHz	5	F, P,L,R

Key:		
	F	Fixed / home station
	P	Portable
	L	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)
	R	Radio Talkback only

The latest EME calendar is available from DL7APV's website

Draft Rules for G3VVB Trophy (continued from page 31)

4. The Trophy will be given to the individual or group entering the project which, given the background of the entrant, in the opinion of the Judges, is most meritorious.
5. Projects will be submitted for the Trophy will be entered initially into projects contests held at UkuG sponsored Roundtables. The documentation of the winner and runner-up of the contest held at each Roundtable, together with any supporting evidence, such as images made by the time of the local judging, along with e-mail contact information for the entrants, will submitted to the UkuG Committee member responsible for the contest by the Roundtable organisers within ten days of the Roundtable. The UkuG Committee will consider the submissions and select a national winner in time for that winner to be presented with the Trophy at the RSGB Convention.
6. The final judging will be by an ad hoc group consisting of members of the UkuG Committee. Judging at Roundtable level will be by ad hoc groups appointed by the Roundtable Organiser.
7. The decision of the UkuG Committee will be final. No correspondence will be entered into regarding their decision.

RSGB & UKµG Contests 2014

Month	Contest name	Certificates	Date 2014	Time GMT	Notes
Apr	5.7GHz EME	*Arranged by DUBUS*	*5-Apr to 6-Apr*	0000-2359	DUBUS EME Contest
Apr	Low band 1.3/2.3/3.4GHz 2	F, P,L,R	13-Apr	1000 - 1600	
Apr	1.3GHz Activity Contest	*Arranged by RSGB*	15-Apr	1900 - 2130	RSGB Contest
Apr	2.3GHz+ Activity Contest	*Arranged by RSGB*	22-Apr	1900 - 2100	RSGB Contest
May	*10GHz Trophy*	*Arranged by RSGB*	*3-May*	*1400 - 2200*	Saturday, to coincide with IARU
May	*432MHz & up*	*Arranged by RSGB*	*3-May to 4-May*	*1400 -1400*	RSGB Contest
May	3.4GHz EME	*Arranged by DUBUS*	*3-May to 4-May*	0000 - 2359	DUBUS EME Contest
May	Low band 1.3/2.3/3.4GHz 3	F, P,L,R	4-May	0800 - 1400	Aligned with RSGB/IARU event
May	1.3GHz Activity Contest	*Arranged by RSGB*	20-May	1900 - 2130	RSGB Contest
May	10GHz & Up EME	*Arranged by DUBUS*	*24-May to 25-May*	0000-2359	DUBUS EME Contest
May	5.7GHz/10GHz/24GHz	F, P,L,R	25-May	0600-1800	
May	2.3GHz+ Activity Contest	*Arranged by RSGB*	27-May	1900 - 2130	RSGB Contest
May/Jun	1.2GHz EME	*Arranged by DUBUS*	*31-May to 1-Jun*	0000 - 2359	DUBUS EME Contest
Jun	Low band 1.3/2.3/3.4GHz 4	F, P,L,R	8-Jun	1000 - 1600	Aligned with some Eu events
Jun	1.3GHz Activity Contest	*Arranged by RSGB*	17-Jun	1900 - 2130	RSGB Contest
Jun	2.3GHz+ Activity Contest	*Arranged by RSGB*	24-Jun	1900 - 2130	RSGB Contest
Jun	5.7GHz/10GHz/24GHz	F, P,L,R	29-Jun	0600-1800	
Jul	VHF NFD (1.3GHz)	*Arranged by RSGB*	5-Jul to 6-Jul	1400 - 1400	RSGB Contest
Jul	1.3GHz Activity Contest	*Arranged by RSGB*	15-Jul	1900 - 2130	RSGB Contest
Jul	24GHz - 248GHz Contest	O	20-Jul	0900 - 1700	
Jul	2.3GHz+ Activity Contest	*Arranged by RSGB*	22-Jul	1900 - 2130	RSGB Contest
Jul	5.7GHz/10GHz/24GHz	F, P,L,R	27-Jul	0600-1800	
Aug	Microwave Field Day	O,L	3-Aug	0900 - 1700	
Aug	1.3GHz Activity Contest	*Arranged by RSGB*	19-Aug	1900 - 2130	RSGB Contest
Aug	2.3GHz+ Activity Contest	*Arranged by RSGB*	26-Aug	1900 - 2130	RSGB Contest
Aug	5.7GHz/10GHz/24GHz	F, P,L,R	31-Aug	0600-1800	
Sep	1.3GHz Activity Contest	*Arranged by RSGB*	16-Sep	1900 - 2130	RSGB Contest
Sep	2.3GHz+ Activity Contest	*Arranged by RSGB*	23-Sep	1900 - 2130	RSGB Contest
Sep	ARRL Microwave EME	*Arranged by ARRL*	27-Sep to 28-Sep	0000 - 2359	ARRL EME 2.3GHz & Up
Sep	5.7GHz/10GHz/24GHz	F, P,L,R	28-Sep	0600-1800	
Oct	*1.3 & 2.3GHz Trophies*	*Arranged by RSGB*	*4-Oct*	*1400 - 2200*	RSGB Contest
Oct	*432MHz & up*	*Arranged by RSGB*	*4-Oct to 5-Oct*	*1400 - 1400*	IARU/RSGB Contest
Oct	1.3GHz Activity Contest	*Arranged by RSGB*	21-Oct	1900 - 2130	RSGB Contest
Oct	ARRL EME 50-1296MHz	*Arranged by ARRL*	25-Oct to 26-Oct	0000 - 2359	ARRL EME Contest
Oct	2.3GHz+ Activity Contest	*Arranged by RSGB*	28-Oct	1900 - 2130	RSGB Contest
Nov	ARRL EME 50-1296MHz	*Arranged by ARRL*	15-Nov to 16-Nov	0000 - 2359	ARRL EME Contest
Nov	1.3GHz Activity Contest	*Arranged by RSGB*	18-Nov	2000 - 2230	RSGB Contest
Nov	Low band 1.3/2.3/3.4GHz 5	F, P,L,R	23-Nov	1000 - 1400	
Nov	2.3GHz+ Activity Contest	*Arranged by RSGB*	25-Nov	2000 - 2230	RSGB Contest
Dec	1.3GHz Activity Contest	*Arranged by RSGB*	16-Dec	2000 - 2230	RSGB Contest

Key:

F Fixed / home station

P Portable

L Low-power (<10W on 1.3/2.3/3.4GHz, <1W on 5.7/10GHz)

R Radio Talkback

Main changes from 2013 calendar

1. ARRL/DUBUS EME updated
2. Low Band event moved from October to May
3. No separate radio talkback sections

73 John G3XDY, UKUG Contest Adjudicator

UKµG Contest Portal

Journées d'Activité

Robin G8APZ

Here are the dates for 2014 provided by Jean-Paul F5AYE (JN36dh).

All are Sat/Sun weekends apart from the scatter tests via Mont Blanc.

24 GHz and up

29/30th March

1296 GHz and up

26/27 April

24/25 May

21/22 June

13th July morning - F6BSJ Memorial JA - Scatter tests via Mont Blanc, (Last year a scatter contact of 600 km was made...)

26/27 July

30/31 August

27/28 September

25/26 October

73
Robin, G8APZ

Events calendar

2014

Apr 12	CJ-2014, Seigy	cj.ref-union.org/
April 26-27	Martlesham Round Table	mmrt.homedns.org/
May 16-18	Hamvention, Dayton	www.hamvention.org/
Jun 22	RAL Roundtable	
Jun 27-29	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
July 1	Scatterpoint 10th Anniversary	www.scatterpoint.org/
July 12–13	Finningley Round Table	
July 25–27	AMSAT Colloquium, Holiday Inn, Guildford	www.amsat-uk.org/colloquium/
July 23- Aug 3	Commonwealth Games, Glasgow	www.glasgow2014.com/
August 23–26	EME2014, Pleumeur-Bodou near Lannion	www.eme2014.fr
Sept 12–14	59.UKW Tagung, Weinheim [*note date correction*]	www.ukw-tagung.de/
September 21	Crawley Round Table [date tbc]	
Sept 26–27	National Hamfest	www.nationalhamfest.org.uk/
Oct 6-9	European Microwave Week, Rome	www.eumweek.com/
Oct 10-12	RSGB Convention	www.rsgb.org/rsgbconvention/
Oct 18-19	Microwave Update, Rochester, New York	www.microwaveupdate.org/
Nov 1	Scottish Round Table	www.gmroundtable.org.uk/

2015

Apr 11	CJ-2015, Seigy	cj.ref-union.org/
May 15-17	Hamvention, Dayton	www.hamvention.org/
Sep 28 – Oct 2	European Microwave Week, Paris	www.eumweek.com/

2016

May 20-22	Hamvention, Dayton	www.hamvention.org/
Oct 4-7	European Microwave Week, London	www.eumweek.com/