



An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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JT4 on 122GHz G8KHU & G1TVL



GMRT 2024

Subscription Information

The following subscription rates apply.

UK £6.00 US \$9.00 Europe €9.00

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

<https://groups.io/g/Scatterpoint> and/or

DropboxAlso, **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

payukug@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, rtf, doc, docx, odt, Pages

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

Please send pictures and tables separately, as they can be a bit of a problem.

Thank you for you co-operation

Roger G8CUB

Reproducing articles from Scatterpoint

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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 (e.g. 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 contact the committee.

The current list is available at

www.microwavers.org/tech-support.htm

UKμG Chip Bank – A free service for members

By Mike Scott, G3LYP

Non-members can join the UKμG by following the non-members link on the same page and members will be able to email Mike with requests for components. All will be subject to availability, and a listing of components on the site will not be a guarantee of availability of that component.

The service is run as a free benefit to all members of the UK Microwave Group. The service may be withdrawn at the discretion of the committee if abused. Such as reselling of components.

There is an order form on the website with an address label which will make processing the orders slightly easier.

Minimum quantity of small components is 10.

These will be sent out in a small jiffy back using a second class large letter stamp. The group is currently covering this cost.

As many components are from unknown sources. It is suggested values are checked before they are used in construction. The UKμG can have no responsibility in this respect.

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

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Loan Equipment

Don't forget, UKuG has loan kit in the form of portable transceivers available to members for use on the following bands: **Contact Roger G8CUB (roger@valendine.co.uk) for more information. Neil G4DBN looks after the equipment.**

3.4GHz 5.7GHz 10GHz 24GHz 76GHz

JT4 on 122 GHz - and the Continuing Evolution of a Portable System (Part 1)

Dave Fielding G8KHU / Dave Haynes G1TVL



This is the initial part of a series of articles based on the presentation we gave at the Midlands Roundtable in November 2024. It has been slightly revised in light of insights and feedback of the attendees at the presentation, so some minor detail is different than originally presented. The series covers the work we have done to create a self-contained portable 122GHz system that provides FM and JT4 capability based on the VK3CV 122 GHz transceiver boards and test horns.

The first part of this series concentrates on the link budget calculation as for us this underpins the entire system. A quick show of hands at the MRT was fairly evenly split between those who were confident in calculating a link budget and those who weren't. On that basis we feel that a reasonably detailed walk through of the procedure is in order, the focus will be on 122 GHz but the methodology is applicable to all bands.

The calculation is however hampered by the number of estimations and approximations we have had to make where either data is not available for some parameters, or where we simply do not have the facilities to measure the parameters. We have tried to provide the background and reasoning for our approximations in each case. Should you feel that any of our assumptions are in any way invalid then please do raise your objections – we are far from infallible and objective criticism is always welcome.

This is a project that started during lockdown, and has taken quite some time to evolve. It has only just come to the beginning of fruition with our first JT4 QSO occurring in August 2024.

We placed our orders for assembled boards and horns as soon as Tim VK2XAX launched the first group buy of hardware. While we were waiting for boards to be delivered we worked out the provisional link budget for the FM case. This was based on the limited data we had at the time but it gave us a feel for what might be achieved. We found that a simple horn to horn system should give us in the region of 1 km range. As this didn't seem very far at all we re-ran the calculations for JT4 and estimated a range of around 5 km which was a lot more encouraging.

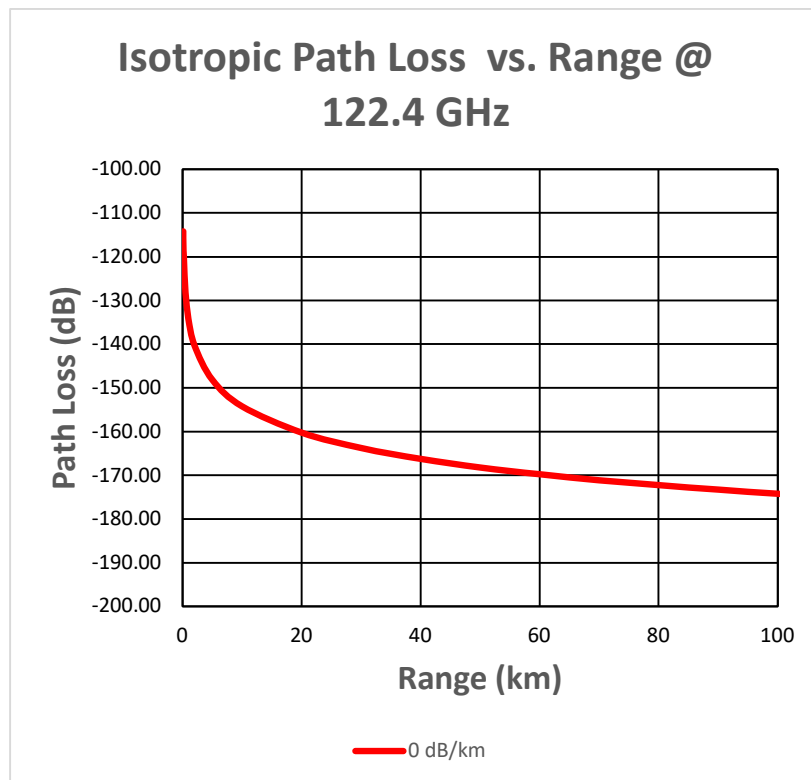
Since then the Link Budget has been much refined as the worldwide 122GHz community has most generously shared their results and insights on groups.io and we have been able to incorporate real-life measurements into the budget. Accordingly we've incorporated these measurements into the following link budget.

The first part of the budget we considered was the path loss at 122 GHz. The equation that defines the free space path loss due to spatial geometry is the Friis equation – originally published by Harald Friis in 1946 [1]. The original Friis format was linear, using Watts for power and metres for range, wavelength and effective antenna apertures. The use of antenna apertures and power in Watts has given way to gain and power in dBi and dBm respectively, wavelength has been superseded by frequency and currently the equation is most often reformatted into log (dB) terms.

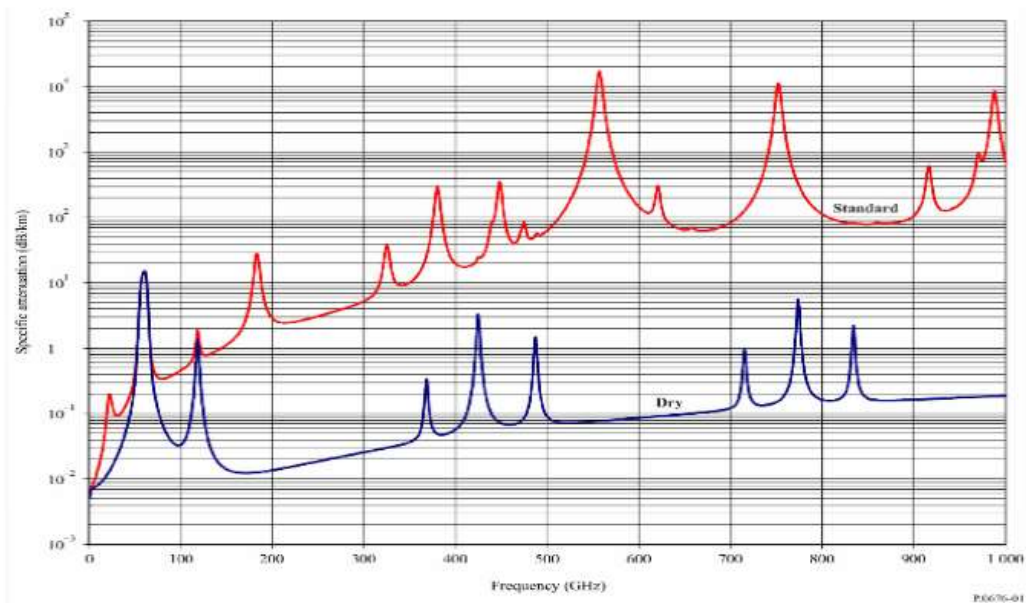
Friis – original linear format $\frac{P_r}{P_t} = \frac{A_r \cdot A_t}{\lambda^2 \cdot d^2}$

Friis – log reformulation $\left(\frac{P_r}{P_t}\right) (dB) = G_r + G_t + 20 \cdot \log_{10} \left(\frac{c}{4 \cdot \pi \cdot d \cdot f}\right)$

Plotting the Path Loss vs Range (distance) for the isotropic case (i.e. both antennas are isotropic and $G_r = G_t = 0$)



This however is only part of the story, we have to consider atmospheric absorption as this is very significant at 122 GHz. Fortunately for us the ITU publish atmospheric absorption figures from 10 GHz to 1000 GHz [2] and the plot is probably familiar to many.



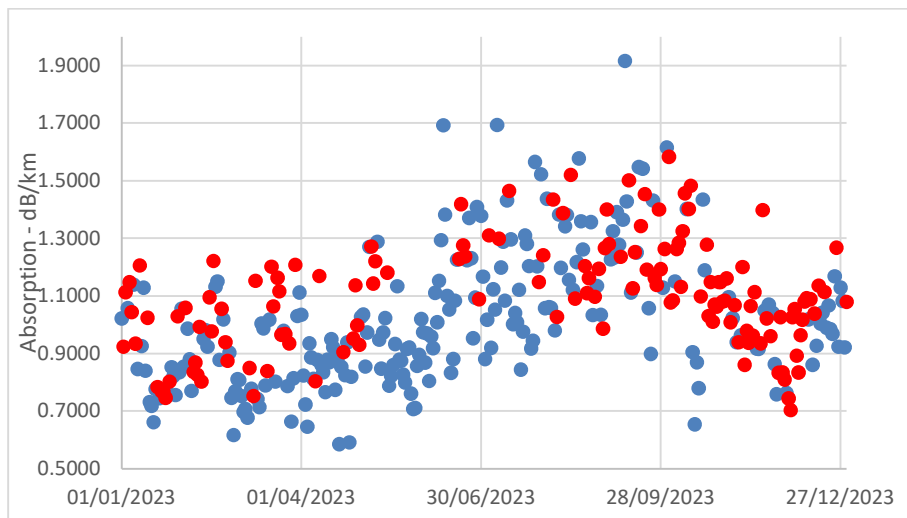
Annex 1 of the publication gives a detailed line by line illustration of how to calculate the absorption loss for a given set of temperature, pressure, relative humidity and frequency. This has been used to great effect by Barry G8AGN in his Weatherbox project [3]. This gives an accurate prediction of the current absorption loss, but what comprises “typical” conditions in the UK?

For this we turned to historic weather data. Historic weather data is available on the internet, but many sites charge for the data at rates ranging from ridiculous to truly eye-watering. Free historic aeronautical weather data is available from Iowa State University Department of Agronomy [4]. The available data is worldwide, goes back decades, and is detailed, most weather sites producing continuous hourly updates.

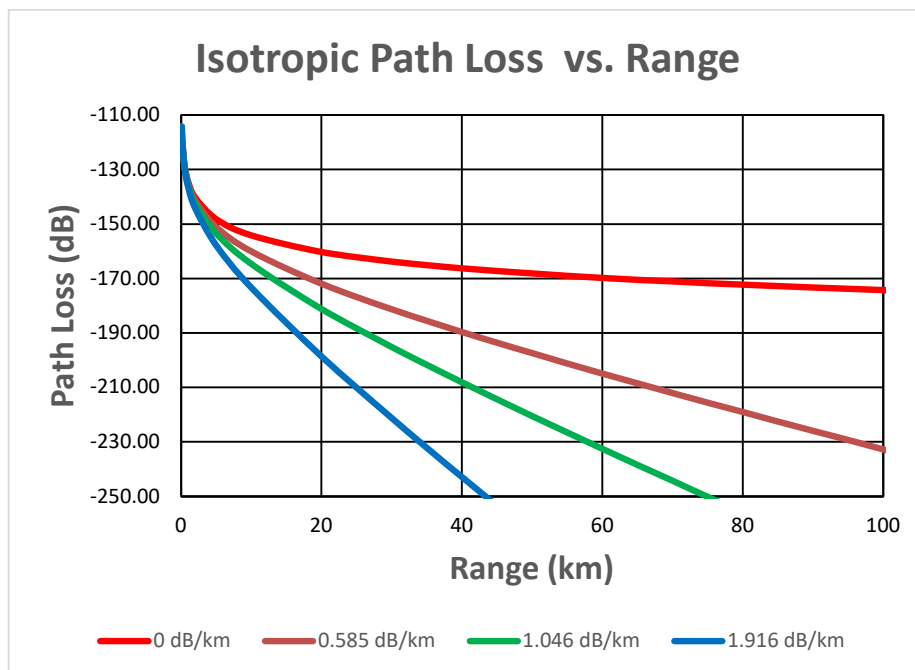
For the presentation we downloaded the full hourly data for 2023 from the Army Aviation Corps Middle Wallop Airfield near Andover UK as it is local to us (as an aside this is the home of the Museum of Army Flying, which is well worth a visit if you’re passing). This was filtered down to the noon report for each day.

Although one of the available downloads is precipitation a lot of stations don’t seem to report this, Middle Wallop included. We therefore inferred that it was a rainy day when the relative humidity was reported as 100% any time between 6 am and 6 pm on that day. Atmospheric pressure in Pa was not available either but the equivalent measure in inches of mercury is given as the ground level altimeter setting, this being the aviation standard.

From the data we calculated the absorption loss for each day of the year which is shown in the plot. Days we decided were dry are shown in red, with wet days being shown in blue. The data shows that the minimum was 0.585 dB/km, the median 1.027 dB/km, the mean 1.046 dB/km and the maximum 1.916 dB/km. It can be seen that our wet/dry criteria probably weren’t the best choice and are in need of some revision.



Returning to the Isotropic Loss Graph we can now add in the effects of atmospheric absorption. These effects are dramatically illustrated, a system capable of just working a path of 100 km on the best day in 2023 would barely make a 30 km contact on the worst day in the same year.



We next turn our attention to the transmitter output power and antenna gain.

Initially the only data that was available was the datasheet – which can best be described as “sparse”. This gives a figure of -3 dBm +/- 4dB for transmit power – whether this is measured or simulated is unknown as various iterations of the datasheet seemed to use the two terms interchangeably. The current version on the website says measured.

Also the datasheet states that the power measured (or simulated) at the output of the die – presumably tested before assembling to the on chip antenna and there are no details of the on-chip antenna gain or efficiency. Therefore any calculation we make using this data has to be treated with caution as we have to make several assumptions without much supporting evidence.

For those who are not familiar with the TRA-120 devices the IC has separate integral antennas for transmit and receive encapsulated within the package. To obtain a single waveguide Tx/Rx path the chip is enclosed within a cavity which acts as a 3 port coupler. The cavity is part of both the VK3CV reference horn antenna design and his Chaparral dish feed design.

A few amateurs have access to appropriate power measurement systems and have generously shared their results on the 122 GHz Project group on groups.io.

KG6OJI used a TRG 980 calorimeter with a V981 head plus adaptors and the combiner cavity from the VK3CV Chaparral feed to obtain a measured total power radiated from the chip as -1 dBm after correction for the losses in the measurement system.

The calorimeter used is capable of reading power to over 700 GHz, with the frequency limitation being the need to provide an accurate taper section to match the WR10 input of the V981 head to the system under test. The basic accuracy of the calorimeter is 2% to 5%. [5]

Andrew VK3CV was very helpful to us in preparing the MRT presentation and in one of his emails to us he says,

“The real Tx power of the chip seems to be around -3dBm (0.5mW), this has been actually measured with a specially designed TX side only rectangular waveguide coupler and a professional mmWave power meter (Erickson PM5B), -3dBm was the best ever reading that we got.”

We therefore have two real world measurements using professional measuring equipment which are in close agreement – albeit at the high end of the datasheet specified power output. Both these measurements are of the power radiated from the chip, i.e. at the output of the on-chip antenna, and therefore cannot be directly compared with the datasheet figure which is at the output of the die, i.e. at the input of the on-chip antenna.

We could postulate that the device that KG6OJI measured had an output at the very top end of the datasheet specification which would be +1 dBm at the input of the on-chip antenna (die output). His measurement of -1 dBm radiated from the chip (output of the antenna) would therefore indicate a 2 dB loss in the antenna, corresponding to an antenna efficiency of 63%. This is not an unreasonable figure and, in the absence of any other data, we have assumed that this figure would also apply to the antenna used by the receiver as the transmit antenna is identical to the receive antenna to the best of our knowledge.

These two measurements would tend to confirm that the datasheet power output specification of -3 ± 4 dBm at the die output is correct and they provide evidence that the efficiency of the on-chip antenna is of the order of 63% (-2 dB) as a coupling structure from die to antenna combining cavity.

For transmit power in our calculations therefore we have used the figure -3 dBm at the output of the die which is the typical power stated on the datasheet.

For the antennas in our implementation we chose to use the 20 dB reference horn designed by VK3CV as it is compact and, with its relatively low gain, it should allow us to test for limit conditions over reasonably short paths (in the 1km to 20 km range).

Based on measurements VK3CV concludes that in the real world implementation the horn coupler/combiner has a 6 dB insertion loss on transmit and receive – i.e. a 3dB coupling loss and a 3 dB loss of which a proportion is due to mismatch. The VK3CV horn does not have the adjustment that the Chaparral feed has so we cannot tune out the mismatch loss loss* when using these horns. (The alternative G4DBN version is however adjustable and should be capable of reducing the mismatch loss with careful adjustment).

The horn gain is taken from CST Studio simulations – a highly regarded professional EM simulator (a free reduced capability learning edition is available for personal use [6]). The simulations also took into account the horn material, surface finish and surface losses/conductivity and the simulations indicate an antenna efficiency of 60% for the horn (i.e. -2.2 dB). In view of the error margins in other factors we feel quite justified in rounding this to -2 dB

Combining the above figures to get the gain of the horn antenna system from the die to the output of the horn. We have:

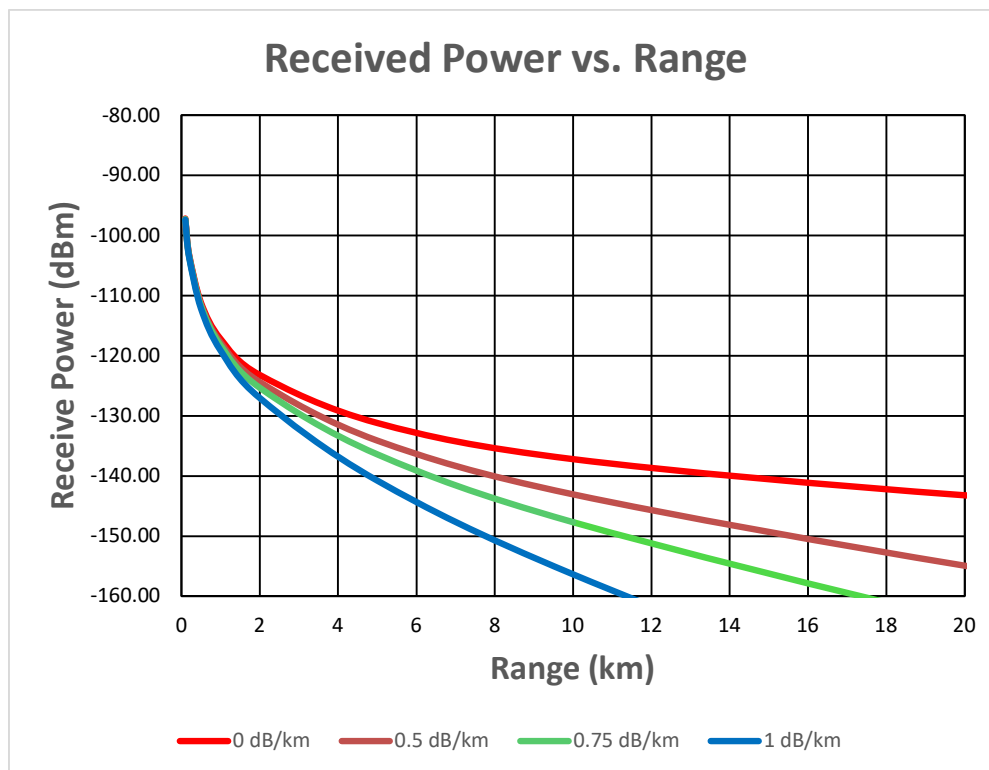
$$(-2) + (-3) + (-3) + (20) + (-2) = 10 \text{ dBi}$$

The components on the left-hand side of the equation are: on-chip antenna efficiency, combiner cavity loss, non-isolated 3 port coupler loss, horn gain and the horn efficiency respectively.

As we now know P_t , G_r and G_t the only unknown in the Friis equation is P_r . A simple algebraic rearrangement gives us:

$$P_r(\text{dBm}) = P_t + G_r + G_t + 20 \cdot \log_{10} \left(\frac{c}{4 \cdot \pi \cdot d \cdot f} \right)$$

Which we plot to provide received power at the die as a function of distance (note that we have rescaled the distance axis).



To predict the maximum range for NBFM and JT4G we need to calculate the limit sensitivity for each modulation mode. In each case we need to find the noise floor of the receiver system which is a function of the relevant bandwidth for each mode and the receiver noise figure.

For NBFM the optimum receive bandwidth can be approximated using Carson's rule [7], which states that the bandwidth is twice the sum of the peak deviation and the highest modulating frequency. For ± 5 kHz deviation and 3 kHz maximum audio frequency this gives 16 kHz. For JT4G the bandwidth is defined as being the "standard" amateur SSB bandwidth of 2.5 kHz [8].

Using the IEEE standard noise temperature of 290K gives the familiar figure of -174 dBm/Hz as the input noise from a standard termination. For the NBFM case where the specified bandwidth is 16 kHz the input noise power to the system is

$$P_n = -174 + 10 \cdot \log_{10}(16000) = -132 \text{ dBm}$$

For JT4 using a 2.5 kHz bandwidth the corresponding input noise power is -140 dBm. To each of these figures we need to add the noise figure of the receiver.

The receiver noise figure is mainly dominated by the noise figure of the TRA-120 device itself. Adding in the contribution due to the IF amplifier on the VK3CV transceiver board increases the overall noise figure slightly, subsequent stages have such little effect that they can safely be ignored.

From the datasheet the transceiver chip has a noise figure of nominally 8.7 dB and a gain of 8 dB. Note that these figures are for a 1 MHz IF and not the 144 MHz IF the VK3CV system uses. Once again we have cautiously used these figures in the absence of any more relevant data.

The first IF amplifier is a BGA2817 which has datasheet figures of 3.9 dB noise figure and a gain of 24.2 dB. These figures hold steady from 250 MHz to 2150 MHz so we have a degree of confidence that they are representative of the device at 144 MHz.

We use the familiar cascaded noise figure formula for two stages to obtain an overall receiver Noise Figure of ~ 10 dB.

$$F = F_1 + \frac{F_2 - 1}{G_1} \quad (\text{Remembering that these are linear terms})$$

As an aside this formulation is the IEEE noise equation first published in 1959 and their Noise Figure is almost universally used in published datasheets. It is however a much simplified version of the original formula published by Friis (once again!) in 1944 [9] which is arguably much more useful. For a detailed comparison of the two formulas see John W McCorkle's article on microwaves101.com [10].

The final part of the jigsaw is the required signal to noise ratio for the modulation mode in use. For JT4G this is -17 dB S/N in a 2.5 kHz reference bandwidth to give a 50% probability of decoding a message [8]. For NBFM the S/N ratio is somewhat subjective.

In the commercial world of analogue mobile radio the receiver sensitivity is measured at the demodulated output and is defined as the RF input level required to produce a specified at the audio output. For the test SINAD is measured using an RF input modulated to 60% of peak deviation by a 1 kHz modulating tone, this standardised in ETSI 301 166 [11]

This gives a repeatable base standard for comparison of signals in the commercial sector, a widely used rule of thumb is that 10 dB SINAD corresponds to an RF S/N of ~ 10 dB. This point is about the onset of quieting and roughly represents the point at which the signal would be readable to a casual user.

As amateurs we often operate below the standardised signal quality – in our case our personal definition of a readable signal is of the order of 6 dB RF S/N for NBFM as both of us have a degree of hearing loss. Your mileage may well vary but for the purpose of our system calculation we've assumed 6 dB S/N in a 16 kHz bandwidth.

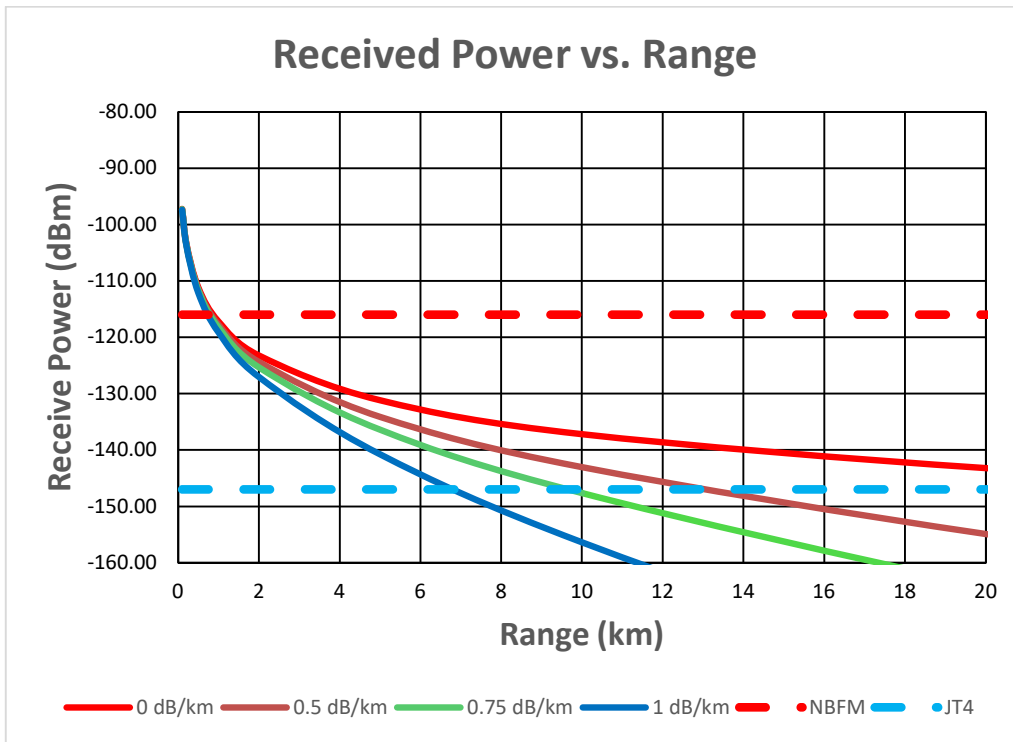
Putting the last parts together we can find the minimum input signal required for each mode. In the FM case we have a noise power in the reference bandwidth of -132 dBm, to this we have to add the Noise Figure of the receiver and the required S/N for a readable signal. This gives us:

$$(-132) + (10) + (6) = -116 \text{ dBm} \quad (\text{the left-hand side is:- Input thermal noise in reference BW, Rx NF, Required S/N})$$

For the JT4G case the equivalent figures give us:

$$(-140) + (10) + (-17) = -147 \text{ dBm}$$

If we plot these minimum signal lines on the preceding received power plot we have a final plot which summarises the entire link budget calculation.



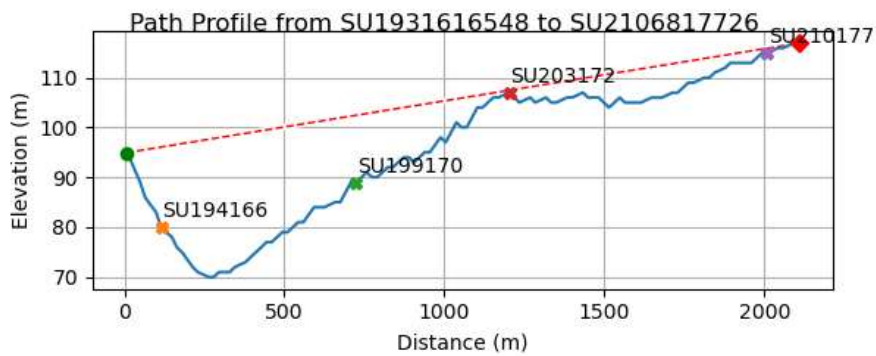
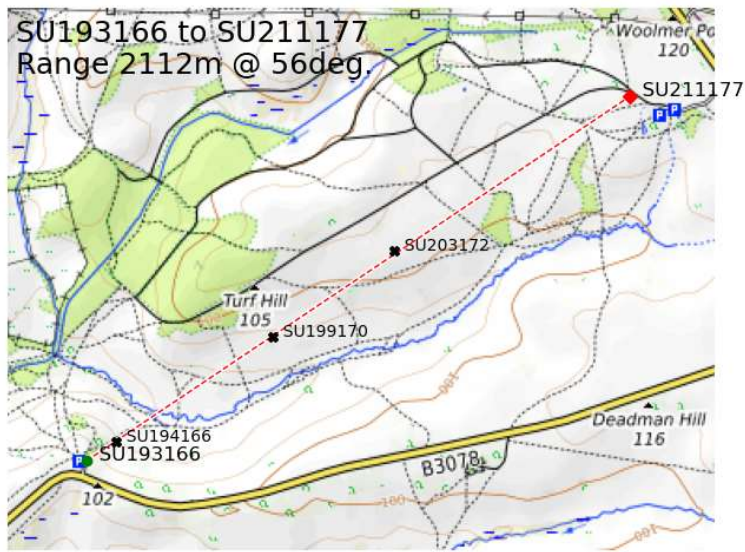
From the plot we see that the limit range for NBFM is around 1 km and for JT4 it should be between 7 and 14 km.

So much for the theory – what happens in practice?

We've had several days over the past couple of years where we've explored the limits of NBFM using a set of paths in the New Forest centred around the disused WW2 Stoney Cross airfield. Our best dx was just short of 2 km and paths of 1 km have been worked semi-regularly. The path profiles are fairly flat and accordingly during the summer foliage effects are very noticeable.

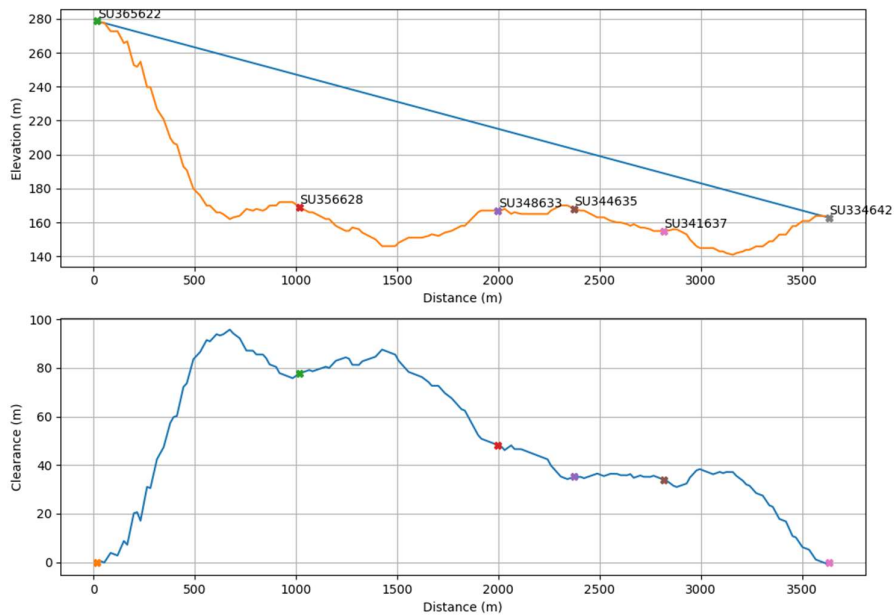
The 1 km paths tie in nicely with the link budget but the 2 km paths are clearly outside the predicted range by as much as 10 dB. This would indicate that some of our underlying assumptions are incorrect. Where the discrepancy lies we currently do not know but it is now high on our list of things to try and resolve. There is some comfort to be drawn however in that it appears our analysis is conservative.

For JT4 we have only recently (late August '24) moved out of the lab and garden and onto paths of some reasonable length. We have had two days that gave reasonable results. One day gave us a solid two way contact at 2.2 km range in the New Forest, from Deadman Hill Car Park to Turf Hill Car Park, despite the ridge between the two.

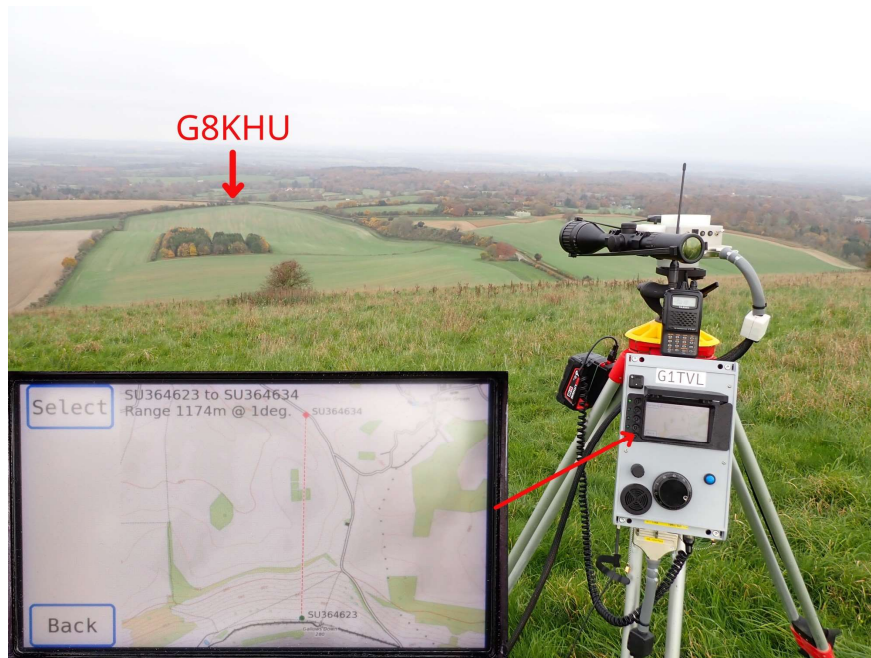


The second day we tried a longer path, which tantalisingly just failed in both directions at a range of 3.6 km, we could occasionally see each other's signals in the waterfall display but they wouldn't hold long enough for a message. This path was from Combe Gibbet to a byway intersection with Bitham Lane (SU3336564146, IO91FJ70JC).

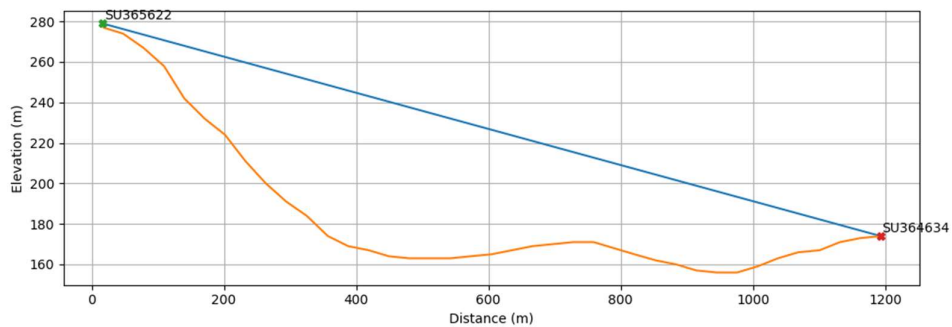
Combe Gibbet to Bitham Lane Footpath
Path Profile from SU3646062245 to SU3336564146
3632.2 m @ 301.6 degrees



En route we tried a short intermediate path of 1.1 km from Combe Gibbet to a farm gateway on the Combe Gibbet to Inkpen road. This turned out to be our most interesting contact to date.



Combe Gibbet to North Road Field Gate
Path Profile from SU3646062245 to SU3636763419
1177.7 m @ 355.5 degrees



Looking at the photograph and the path profile this is a path that should easily work despite it being dull morning with moderate overcast. There was no apparent mist and we could clearly see over 10 km by eye. The temperature was 13°C and the dew point around 4°C giving an absorption loss of ~ 1dB over the path. We've achieved 2.2 km over a more obstructed path and according to our link budget we should have a path margin of at least 20 dB – surely it should work?

The gods of hubris decided otherwise, there was no signal visible at either end. As we chatted on the talkback channel the cloud cover started to break up, the sun briefly came out and we watched it illuminating more and more of the path. As the sunlight spread across the fields so a signal rose in the spectrum display and waterfall – peaking at about 7 dB above the noise in the spectrum display.

The sun then went temporarily behind a cloud and the signal sank back below the noise until nothing was visible. As the cloud cover finally dissipated this cycle repeated itself another 2 or 3 times. We just stood there and watched it to be honest neither of us wanted to mention it first

Once the sun was fully out we had a good solid signal, well out of the noise, and the JT4 exchange was completed with no problems whatsoever.

The variation was at the very least 10 dB and atmospheric absorption changes that would create such a change without the apparent visibility changing seems implausible. However a layer of mist creating a mirror might that rose and fell in response to solar heating might be a possible explanation. It was certainly a most interesting phenomena and we intend to repeat the path under various conditions to investigate further.

In the next part of this series we'll describe the hardware and software components of our implementation.

References

- [1] A Note on a Simple Transmission Formula - H.T. Friis - May 1946
https://capmimo.ece.wisc.edu/capmimo_papers/friis_original_1946.pdf
- [2] Attenuation by atmospheric gases and related effects – ITU-R P.676-13 (08/2022)
https://www.itu.int/dms_pubrec/itu-r/rec/p/R-REC-P.676-13-202208-!PDF-E.pdf
- [3] WeatherBox – an Arduino-based system for real-time measurement of atmospheric data and microwave propagation prediction – Barry Chambers G8AGN
Scatterpoint – January 2020 and February 2020
- [4] ASOS-AWOS-METAR Data Download – Iowa Environmental Mesonet – Iowa State University
https://mesonet.agron.iastate.edu/request/download.phtml?network=GB_ASOS
- [5] Post 2661 – part of thread “Polarization of 122 GHz Transceiver Boards” - Bruce Hunter KG6OJI
<https://groups.io/g/The122GProject/message/2661>
- [6] CST STUDIO SUITE Learning Edition
<https://www.3ds.com/edu/education/students/solutions/cst-le>
- [7] Notes on the theory of modulation - J.R. Carson – February 1922
<https://zenodo.org/records/1432494>
- [8] WSJT-X User Guide 2.6.1 – J. H. Taylor Jr. K1JT
<https://wsjt.sourceforge.io/wsjtx-doc/wsjtx-main-2.6.1.html>
- [9] Noise Figures of Radio Receivers - H.T. Friis - July 1944
https://www.changpuak.ch/electronics/downloads/nf_by_friis.pdf
- [10] Noise Figure One and Two, Friis and IEEE – J.W. McCorkle – January 2019
<https://www.microwaves101.com/encyclopedias/noise-figure-one-and-two-friis-and-ieee>
- [11] Land mobile service; Radio equipment for analogue and/or digital communication (speech and/or data) and operating on narrow band channels and having an antenna connector - ETSI EN 301 166
https://www.etsi.org/deliver/etsi_en/301100_301199/301166/02.01.00_20/en_301166v020100a.pdf

Framing an IC-705

Clive GW4MBS

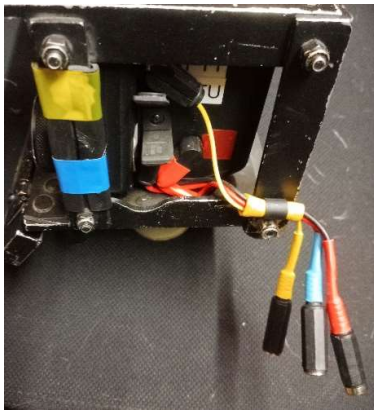
The IC-705 is a popular choice as the IF for microwave transverters. Although quite small it weighs more than 1kg and it is only too easy for it to slip out of your hand onto a hard surface. In the shack this plastic bodied transceiver can be treated with suitable care and respect but out portable all sorts of hazards exist. In the excitement of portable operations, it is so easy for it to slip or be tugged by a cable or even topple over with a dish on a tripod caught in the wind, let alone the journey to the portable site where it may fall or get squashed by the paraphernalia needed for such operations.

Since the initial launch in 2020 a range of accessories have appeared with carrying cases for about £150 and carrying frames for over £100. When I first had my IC-705 there were few options, some of which were so feeble that they have now disappeared from sale. I wasn't so much concerned with carrying it, I just wanted a robust protective frame, with the provision to tilt the rig up a little to make the screen more visible.

From time to time, I buy aluminium off-cuts of both profile and sheet, there is always some project that needs these materials. So, I set about assembling a protective frame for the IC-705 from the available stock. There was no formal design just an evolution of what bits could fit around the rig.



With such a frame it is even more of a fiddle getting the plugs in their appropriate sockets, so I provided some flying leads with right-angled plugs firmly clipped to the case with floating sockets suitably colour coded. Not only is access easier but it reduces the likelihood of damage to the sockets of the IC-705.



The charging power lead supplied by Icom has a right-angled connector, I preferred to make up another fused lead with a straight connector, so that a jerk on the lead would disconnect it rather than strain the wires within the original connector and perhaps even pull over the IC-705 itself. A word of warning, disconnect the new lead from the external supply before plugging the new lead into the IC-705 flying leads, because if you don't do this there can be a momentary short circuit as you plug into the flying lead, and it will blow the fuse in the charge lead.

Because it can seem rather dark when trying to locate the sockets for the mic/speaker, I highlighted these with a white marker pen.



Something I forgot at first was that I had blocked the access to satellite reception. I determined the position of the satellite antenna by going outdoors and holding up the naked IC-705 to get satellite acquisition then slid on a couple of aluminium sheets then moved them away until the signals returned. Then I cut an appropriate aperture in the top of the frame. Satellite linkage can be useful for a time co-ordination and even obtaining a Maidenhead locator, but it is a shame that it can only provide this to just 6 characters. In practice my IC-705 is never out in the open to acquire satellites, so I need not have bothered cutting window in the top of the frame.



The scratched paintwork gives an indication of the sort of trauma the rig can receive during portable exploits. Those of us who use talkback on 2m or 70cm with an IC-7100 might like to have some protection for that rig as well, so I hope these pictures might give some ideas.

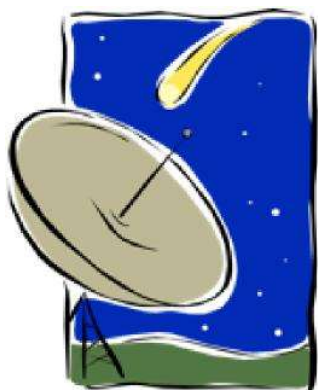


There is no protection for the tuning knob as I couldn't configure a protective frame that would not severely hamper access for tuning. Labelling the two pairs of sockets at the rear is very important as it is so easy to plug in the wrong lead.

The cost of both of the frames was nil, but it was based on having bought a small stock off-cuts. This is much cheaper than designing a frame then ordering what you want need or rather what you think you need as so often I tried a particular off cut then realised it did not do what I had hoped it would do, so can reach out for something a bit different to try. It is surprising how quite ridiculous pieces with no obvious use can at some future date be just what you need!

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Activity News November 2024



By John G4BAO

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

From Peter G3LTF

Moon conditions were excellent, and we had zero wind so no backlash problems. I missed the first 23cm activity weekend so had lots to make up. I worked 51 stations on CW and had a couple of SSB QSOs as well. More details in the 432 and up EME Newsletter. I missed two, G4ALH and OK2ULQ. An interesting statistic... I worked 8 stations from the USA and 7 from Poland. Thanks to all for the nice QSOs, please let me know if you called and I didn't hear you.

From John G4BAO

Little to report this month on the GHz front from me, with 50MHz F2 taking up the majority of my operating time and lots of experimenting with my new Pluto+ SDR and GnuRadio and work on the 24/7 monitoring system for the Kent 24GHz Web SDR. The latter is now up and running due to sterling work from my "software team" namely, Gwyn G3ZIL. We are seeing some fascinating weather and possibly tidal – related effects as we currently monitor GB3PKT from Margate over a sea path that just scrapes the horizon. Sadly, my home 24GHz station seems to have failed with no current up the 12V supply to the top of the mast after the storm. No chance of me getting the ladders out until the Spring, but fortunately 10GHz is still operating.

Just two FT8 contacts on 23cm with OE5VRL and SP6GWB in the second half of the tropo opening and few QO-100 QRP digimode contacts covering the edges of the satellite footprint from Indonesia to Brazil. All with less than half a watt at the feed.

From Johnathan G4KLX

Earlier in the year I bought the late G4BEL's 500Watt 1.3GHz linear and a preamp from his SK sale. I got my EME system up and running on Sunday the 10th of November using 150 Watts from G4BELs amplifier, a 2.4m dish, and a linear dish feed, the driver is an IC-905. On the first night I got fourteen initials, and on the second a further eighteen! Between the two nights I upgraded the preamplifier from the noisy 0.7 dB NF one from G4BELs estate up to a 0.3 dB NF one from WD5AGO, causing most signals to improve their S/N ratio by around 3 dB. The system remained that way until the end of the EME contest on the 17th of November. In that time, I got 67 initials in 55 squares with the best DX being YB2MDU at around 12000 kms. Other highlights were DU3T, JA4LJB, and CX2SC.

From Neil G4LDR

On Tuesday 26th November there was some good rain scatter conditions to the west of me, IO91 (Salisbury), during the RSGB UKAC microwave contest. I started off on 10GHz working GW4JQP IO71KR (251km) with probably our easiest contact for some time, we sometimes struggle to hear each other if at all. Likewise, the 10GHz contact with Clive GW4MBS IO71VX (190km) was easy on SSB, most times when we try we fail to hear each other. In fact, Clive was so strong I initially thought I was hearing G4UVZ trying with G1DFL/P, Clive and I had to QSY to get away from the QRM! Clive and I had never had a contact on 5.7GHz so we tried and although the rain scattered signals were a lot weaker compared to 10GHz, we were finally able to make it, fixed station to fixed station.

Next, I worked Adrian, G4UVZ on 10GHz IO81KX (103km) a path that always goes. As signals were so strong we decided to have a go on 24GHz, and indeed we made our first fixed station to fixed station contact on this band using

SSB. Despite the 24GHz signal being rain scatter assisted it didn't sound too distorted. This made a very nice distraction during the contest. I always have 24GHz mounted on the tower and have regular contacts with a couple of local stations who also have fixed station capability, but it is always nice to work some DX on the band.

From Keith G4ODA

My non-contest log shows a good tropo opening on 15/11. Worked on 23cm OK1YA, OE5XBL, OE5VRL and SP6GWB. Most on SSB but the SP on CW. Just running 45w at feed to 1.9 dish. Then on 29/11 there was a short opening around lunch time and able to work Pierre F4CKV/P in JN16 on 6cm and 3cm. Started on CW but as band improved both on SSB plus 6c also on FM (yes I don't know why either). We'd made it on 6 before but my 1st QSO with Pierre on 3.

From Ross G6GVI

This year has been my busiest ever on 23cm, with more than a thousand contacts on the band. Only a quarter of those have been on SSB in the contests and perhaps another hundred or so during our Saturday (midday) nets, but all the rest have been on FM. Our Wednesday night nets are still going strong: twenty-seven different stations have called in this year and a couple of times we've had as many as eleven participants on the same night. We recently celebrated our 300th session (going back to February 2019), but will be having a night off on 25th December! Our regular activity has brought a lot of old 23cm gear back into action after years of neglect and the use of FM allows mobile sets (and even handies) to join in too.

I still take my Alinco DJG7 out on the local moors (around Winter Hill) each week and have made a couple of hundred contacts on 23cm with it this year, just using 1W into a set-top antenna. There are a handful of regulars who are on most weeks, but I've logged 55 different stations from there since Easter 2019.

From Pierre F4CKV

Report of November 2nd:

After several days of thick fog sometimes well blocked under an atmospheric pressure of 1025HPa and + it was time to come out of the burrow to listen to the bands a little.

The northern half of France had already been enjoying it since Thursday evening in a fairly marked West-East axis from Brittany to Austria and neighbouring countries. Unfortunately, few stations active. I was rewarded with some fairly strong QSOs especially on 5.7GHz with Rudi OE5VRL for a new DXCC and ODX of 870kms, Marc F8DLS 55, Alain F5IGK 59 +10, David M0GHZ IO81 and Keith G4ODA IO92 52/53. An English beacon GB3ZME in IO82 at 795km. Then in the afternoon new successful attempt with Rudi OE5VRL.

The 10GHz was strong up to Paris, and the 24GHz tests with Maurice F6DKW were in vain, due to high humidity over 150km of the journey despite reports at +40 on 10GHz

Report of November 4:

Another day with fog that could be cut with a knife, visibility 50m. In the morning, not very motivated, I go up to the portable QTH, but with a quick installation on a photo tripod, Maurice F6DKW was worked with difficulty. Motivated but sceptical, I return to the portable QTH and both HB9G and F1ZAU beacons in, but nothing extraordinary in the north. On 10GHz I worked DL6NAA 559 from JO50 (new locator) then PA3AWJ in JO21 as strong as a local station. A new DXCC and locator. On 5,7GHz I then worked Staszek SP6GWB located in JO80 at 559, another new DXCC, locator and ODX at 1094km..No luck with him on 10GHz. Several unsuccessful attempts with OM, ON, G and DL. Successful test on 5.7GHz with Sylvain F6DBI, and finally Rudi OE5VRL at 59+30 and "end stop" on 10GHz QRB: 870km. see the video of the 6cm QSO at

<https://youtu.be/-qjM3caN9Nc>

Report of November 30:

I copied HB9G, from 5.7 to 24GHz and towards the north, the Orléans beacon F1ZAI which arrives very strong but also that of F9ZG/b in department 50. Interesting because I do not hear it often. Nothing towards Brittany F1ZAP nor F5ZVV and not much towards Belleuse (dept 80) F5ZTR. A short, a test on 10GHz with Maurice F6DKW showed that the mid-distance propagation was there, with 24GHz also just workable. A little later in the morning the signals were stronger on this band up to 59 despite the arrival of fog on my side. Moving to 5.7GHz brings English beacons located almost 800 km away and Keith G4ODA (IO92 - 740km) for a CW QSO.

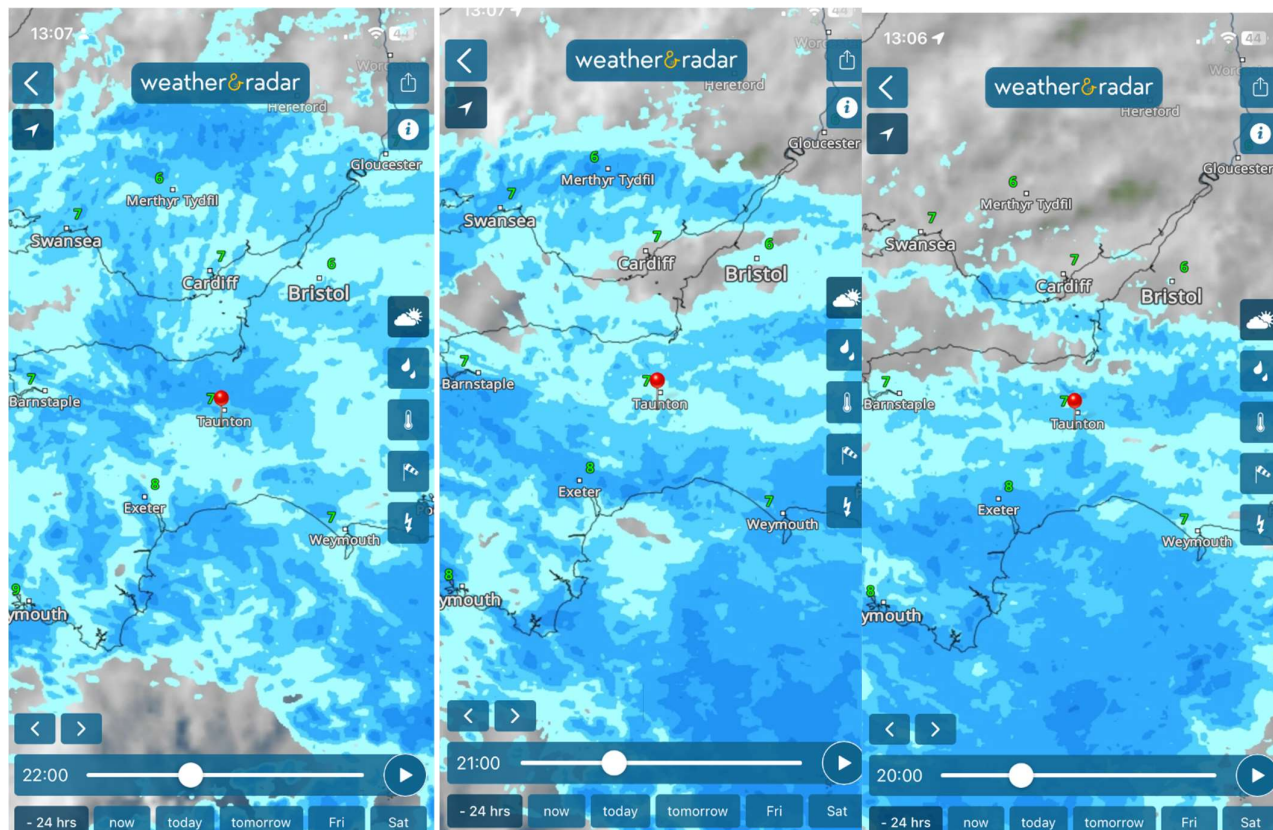
In the afternoon I worked a new station on 24GHz, Anthony F4IDT/P (JN16)

From Staszek SP6GWB

During the November opening I had over 20 DX contacts to the West via a mix of SSB, CW and FT8. Conditions started with good audibility of beacons in HB on 5.7 and 10 GHz but a complete lack of stations to work. Later in the week, conditions were only on 1.3 and 2.3 GHz with a few exceptions. The last time I witnessed such conditions was 20 to 30 years ago, and I've never seen such propagation last over such a long period

From Adrian G4UVZ

Last night on the Tuesday contest bash up to 10 GHz, given the good rainscatter conditions, Clive GW4MBS and I thought we would give 24GHz a go, as 10 GHz sigs were around the 59 mark. We were delighted to be able to have a 529 scatter contact !



Later in the evening I worked Neil G4LDR for the first time on 24 GHz. My 2 watts was sufficient for him to hear my SSB signal at 54 ...his .5 watt signal was readable on CW at S2.

Midlands Round Table 2024 Report

by Roger G8CUB

The Midlands Round table was held on Saturday 23rd November at Eaton Manor. Arriving on the Friday, the last part of the journey was past snow covered verges and icy roads. The warmth of Toad Hall, where the evening meal would be taken, was most welcome. The weather on Saturday was not great, with rain on and off all day. All made up for by the warmth of the assembled visitors, and the hosts John and Nicky.



10pm saw the introduction from the chairman Paul G8AQA. Then the presentation of a new award, the 'Brown Clee Trophy'. David G8VZT explained the details of why an award was being presented by himself in memory of Jim G8UGL and Martin G3UKV. It was total surprise when I found out it was being presented to myself, for pioneering records on the millimetre bands! Thanks Dave and the group.

The first talk was by Alwyn G8DOH. Unfortunately he could not be there in person, as his wife was ill. However he presented the talk from his house in London, which did not lessen the impact at all. It covered the requirements for 23cm equipment and operation. With a particular emphasis on contest operating, and the requirements for good IMD performance of the receiver. Together with the filtering required before the LNA, for successful operation in the crowded band.

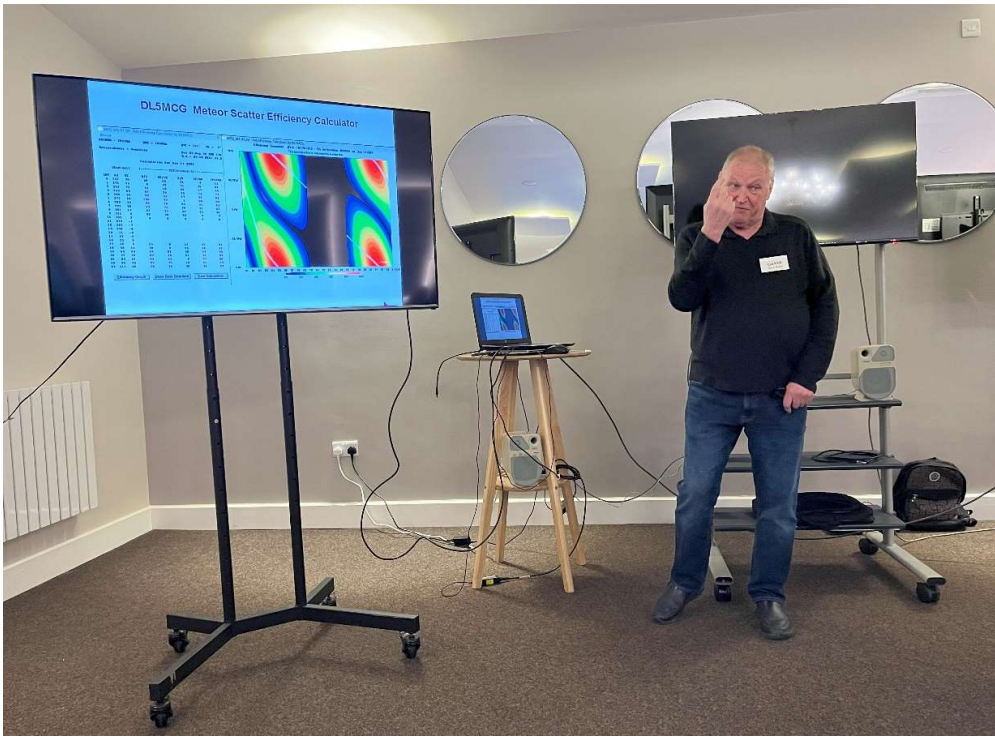
I gave the second talk, on operating above 275GHz. Chris G0FDZ had prepared this talk with great difficulty. It had been presented at Crawley RT in the Summer.



Before lunch was a good time to have a good look around



Following lunch Dave G8KHU presented his talk on JT4 on 122GHz. This with the accompanying demonstration was very warmly received. The article in this issue is based on the first part of his talk.



'I will say this only once'

The last talk by Dave Butler covering all forms of 'Scatter' kept us very well entertained! His enthusiasm for operation by Scatter is to be recommended. Did he mention CW as a useful mode somewhere?



The journey home on Sunday presented a few challenges.

Many thanks to Josh Murray MOJMO for some of the photos.

GMRT 2024 meeting report

The 12th Scottish Microwave Round Table (GMRT) took place on Saturday 9th November in its usual venue of the Museum of Communication (MOC) in Burntisland, with doors opening at 09:30. Greeting us at the door and giving everyone a warm welcome was the familiar face of Peter Dick GM4DTH who was keeping the register of attendees and taking payments for the event and the evening dinner. The turnout for the round table was a healthy 48, almost filling the venue to capacity.

On arrival, attendees tend to split into two groups depending on priorities – those heading for tea, coffee, and other refreshments in the conference room, and others making a beeline for the display area to look through the stalls containing microwave equipment, test gear, and components that were for sale, looking for the best bargains before they disappeared. The test and measurement facility run by Brian Flynn GM8BJF and David Stockton GM4ZNX was already in operation (and was open for business throughout the day during breaks in the presentations). However, the activity in both areas was dominated by the sound of voices renewing old friendships and acquaintances and making new ones, and both groups intermingled as the start of proceedings approached.

The formal event opened at 10:30 AM and Professor Tom Stevenson from the MOC gave the customary welcome to the venue, including domestic arrangements and safety announcement. Martin Hall GM8IEM, the UK Microwave Group (UKuG) Scottish Representative, then welcomed the participants, and acted as chair for the morning session. The first speaker was Mark Hughes GM4ISM whose talk was entitled “Printed Circuit Boards for Small Projects”. He started by briefly describing how breadboarding had changed over the years, and how modern surface mount components had improved performance and reliability. This has led many amateurs to start using Computer Aided Design (CAD) techniques to design their own printed circuit boards, because high quality factory-made boards are now available from the Far East at remarkably low cost. The minimum order quantities of 5-10 have also led to some useful ‘extra’ boards being passed on to other experimenters and a wide variety of functionality becoming available commercially, e.g. on eBay. Manufacturers require Gerber files to make the boards to order, and Mark went into detail with advice about CAD tools suitable for amateur use and design tips to ensure the populated boards would work when manufactured. He covered the best approach to achieving the desired result, including the importance of good circuit design, breadboard design and test, ground planes, vias, RF decoupling, thermal design, multi-layer boards, silk-screening etc. Most importantly he described the pitfalls to avoid during the overall process from initial concept right through to delivery of boards that work, including the checks that are needed at each stage of the development.

Following Mark’s presentation and response to questions there was a short break before Brian Flynn GM8BJF started his talk about “Frequency Standards for Microwaves”. He began by outlining the performance requirements for amateurs, and why we need frequency stability – primarily to find stations so we can work them. He then reviewed the historical background and how frequency standards had improved over the years together with evolving modulation methods and operational techniques. This covered everything from klystrons through Crystal Oscillators, Rubidium standards, TCXOs, OCXOs, DOXOs, Caesium standards, to the latest GPSDOs, in which he looked at the benefits the technology provided in terms of frequency stability, availability and cost for amateurs. Brian reminded us that although GPS Disciplined Oscillators are locked to a Caesium atomic frequency standard in GPS satellites that propagation from transmitter to receiver introduces jitter, and that the overall performance depends very much on the quality of the oscillator design. He then presented the pros and cons of different standards for modern amateur radio activities, including base stations and portable operation, covering power requirements, convenience and cost. After Brian had answered questions from the floor, we vacated the conference room so that lunch could be set out by the MOC volunteers. We re-assembled in the museum where the entries for the GM4LBV Projects Trophy were displayed for examination by the judges Ian White GM3SEK and David Stockton GM4ZNX. When the call went out that lunch was now ready everyone returned to the conference room to enjoy the fine food on offer, and to continue chatting.

Andy Sinclair MM0FMF, President of the Lothians Radio Society, took over as chair for the afternoon session and introduced Malcolm Hamilton GM3TAL as the next speaker. The first slot after lunch is a difficult one to fill, but Malcolm was up to the task with his light-hearted and engaging talk addressing his problems of “Getting Started on 23cm”. He started by describing his objectives – aiming to be fully operational on the band by 2025 whilst adopting a

low-cost approach. He's already started, though it's early days yet, and is aware that "things are different above 1000 MHz", and is finding that "some things are new to him". He described the approach he's adopted to building up a 23cm station, and where he's reached operationally. Having considered make or buy he's decided to buy, rather than build, and to develop the station one stage at a time. He's now considering options for future stages, and presented system and equipment options for linear amplifier, sequencer, transverter, antennas and phasing options, and looked to the floor to help him make his choices, which led to some lively debate. Malcolm finished his talk by thanking those present for help in deciding how he should proceed.

There was another short break before the next presentation, entitled "Working Towards EME and DSN" by David Anderson GM6BIG. By way of introduction David explained that the NASA Deep Space Network (DSN) is a worldwide network of spacecraft communication ground segment facilities located in the USA (California), Spain (Madrid) and Australia (Canberra) which supports NASA's interplanetary spacecraft missions. He illustrated the status of spacecraft being tracked in real time by this network by logging into <https://eyes.nasa.gov/apps/dsn-now/>. Receiving signals from interplanetary spacecraft isn't just for huge dishes – amateurs can do it too. David's project is to set up a 3m dish to track and receive interplanetary satellites in the 2200 and 8400 MHz bands. He described in detail the theoretical architecture of his receiving system and the practical problems that need to be overcome to track and receive signals from such distant spacecraft with a large dish. He compared this with the requirements and problems being addressed in EME (moonbounce) systems. We look forward to hearing more on this subject in the future.

Immediately following David's talk, we had the conclusion of the construction competition and award of the coveted GM4LBV Projects Trophy. There were only 2 entries this year:

- A GPSDO by Brian Flynn GM8BJF
- A transverter control board by Mark Hughes GM4ISM

The judges Ian White GM3SEK and David Stockton GM4ZNX gave a review of each, pointing out their respective merits and achievements. After some deliberation they decided that the winner was Mark's transverter control board, because it had more utility, and he was duly presented with the trophy.

Andrew Holland G4FVL then presented his "A Man-portable QO-100 2400 MHz System", describing and demonstrating a very versatile system that could be used in lightweight (8-9 kg), SOTA (manpack), and ultralight (5 kg) versions. This is based on an 80cm dish, SDR dongle and PC. He described how the systems are used, mentioning the importance of keeping the dish away from the ground, e.g. by mounting it on trigpoints on hilltops.

Andy Sinclair then provided the closing remarks, thanking the museum volunteers for keeping us well supplied with tea, coffee, biscuits, and scones throughout the day, as well as providing the splendid buffet lunch, and they were given gifts in appreciation to a round of applause from the audience. To further applause, Andy also thanked the organising committee, and in particular Peter Bates GM4BYF who had put together the programme.

The formal closure of the meeting was followed by a brief appeal by Heather Nickalls M0HMO for someone in Scotland to offer a receiving site for the 6m Beacon project. Afterwards, the chat continued as attendees slowly drifted away until the doors closed at 17:00.

Twenty attendees (including some spouses and partners) moved on to the Kingswood Hotel in the evening for further socialising and an excellent meal. An auction of items was undertaken, and thanks go to those who made the donations. The proceeds from the auction, other donations, and a small surplus from the door takings are donated to the MOC to support their activities. Further discussions continued until late!

Post meeting notes:

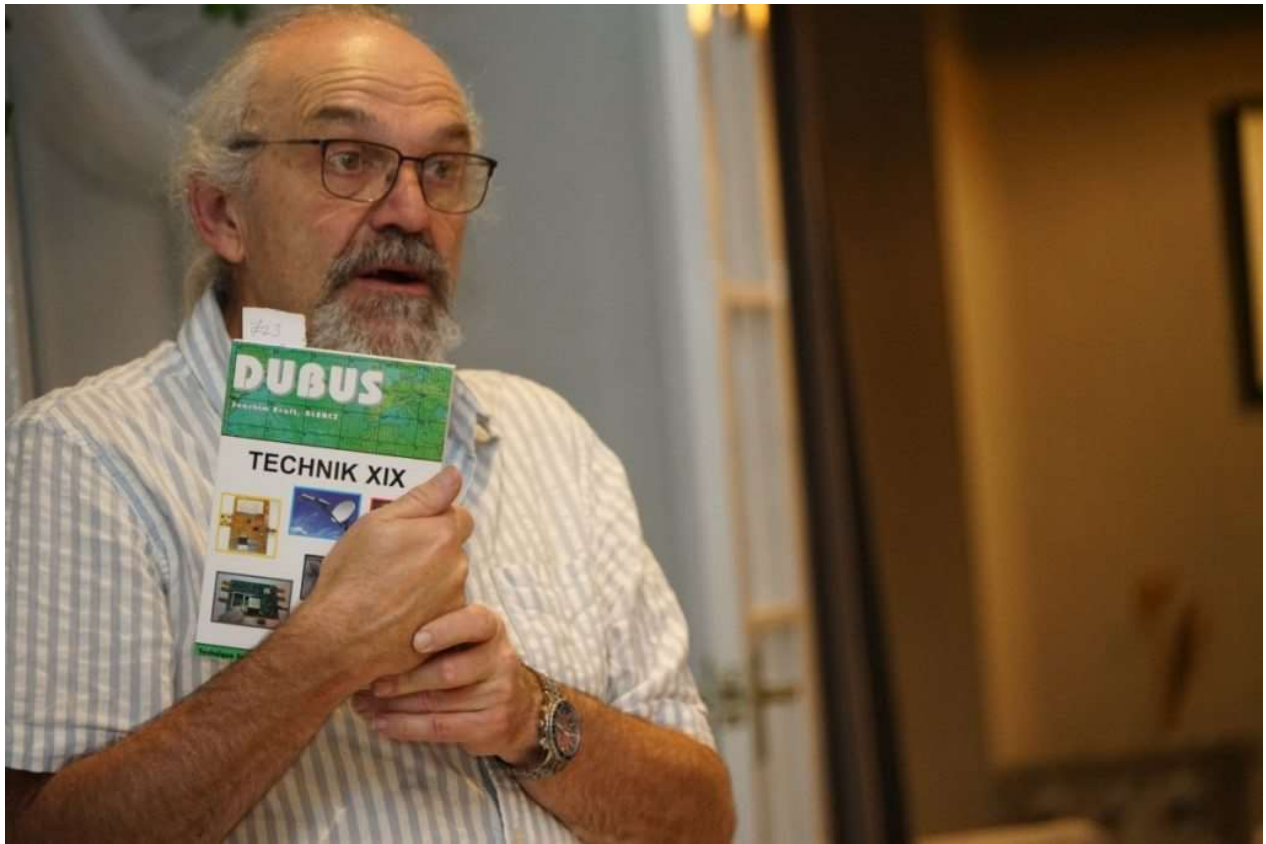
- a. We gave a donation of £236 (our excess funds, details above) to the MOC for which they were very grateful.
- b. Peter GM4BYF has asked for feedback on the event, ideas for future talks, and any offers of future talks. Please contact him by email – his address is available on qrz.com.

Thanks go to the organising committee of Roger Blackwell GM4PMK, John Cooke GM8OTI, Brian Flynn GM8BJF, David Stockton GM4ZNX, Colin Wright GM4HWO, Ian White GM3SEK, Peter Dick GM4DTH, Andy Sinclair M0FMF, James Gentles GM4WZP, Colin Murray GM4EAU, Peter Bates GM4BYF, and Brian Howie GM4DIJ.

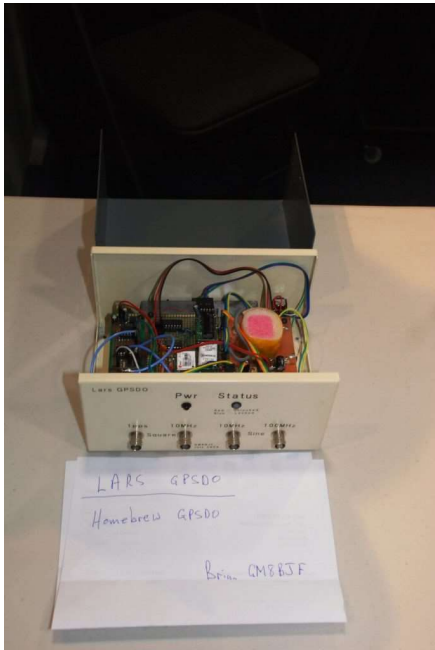
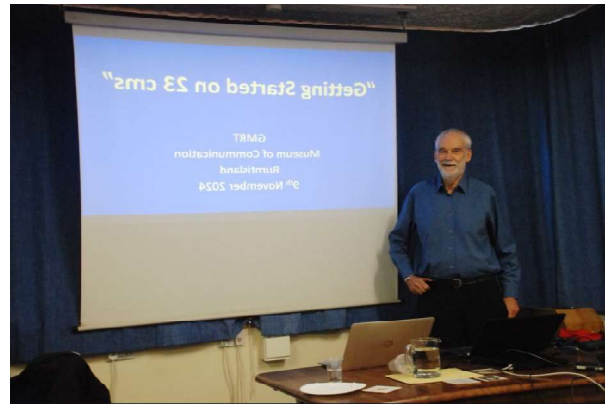
Prepared by Martin Hall GM8IEM, with contributions from the organising team.



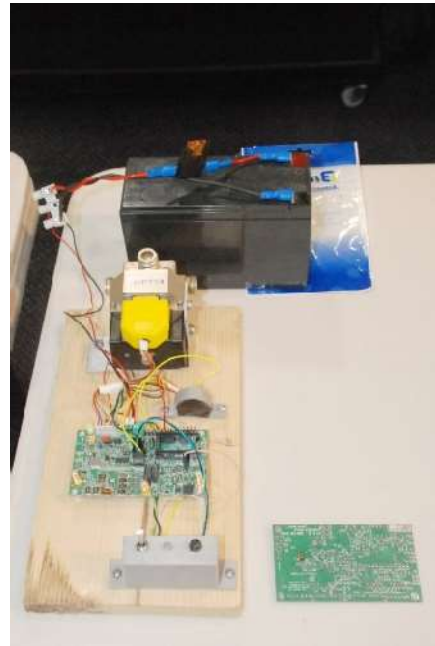




Andy MM0FMF



GM8BJF project entry

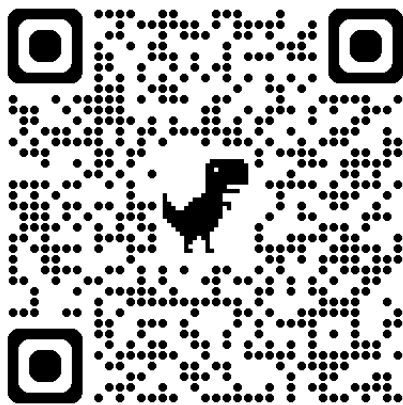


GM4ISM project entry

Thanks to Martin GM8IEM, James GM4WJP, Colin GM4HWO & Brian GM4DIJ

A full range of pictures can be found here:

<https://gmroundtable.org.uk/gmrt-2024/>



Beacon News.....

The Farnham VHF Group's website has been updated, there is now more detail of beacons. And, importantly a "Click here to donate through PayPal" link on their home page.

If anyone wishes to make a donation, however small, it would be very much appreciated.

A lot of work has already been done to reduce power demand and move towards a more sustainable situation.

73, Phil G3TCU

If donating please add a note saying 'support for microwave beacons' – if we all do that they may realise the beacons are a good thing to host!

<http://www.farnhamvhfgroup.com/help.htm>

Spectrum Update

The other thing is that 2320 may get noisier....

<https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/consultation-supporting-increased-use-of-shared-spectrum/associated-documents/statement-enhancing-the-shared-access-framework.pdf>

73

Murray G6JYB

Editor's note

Greater power on 13cm, 3.8-4.2GHz +24dBm. 26GHz +23dBm all indoor (24.45-27.5)

2320 – 2340MHz ex MOD. As Muray says 13cm may get a lot noisier!

Also for 24GHz with injection on the high side, good filtering may become more essential.

Editors Comments

Another excellent Midlands RT. I visited Chris G0FDZ this week, who is now at home but very frail. He showed great interest in all the pictures from the Midlands event. He also appreciated that the RSGB has included his slides for operation over 275GHz. I am sure that we would all like to wish him well.

January issue should contain any remaining 2024 contest results, and a calendar for 2025.

Don't forget the New Ridgeway RT is on 1st February. Have a great Christmas and New Year.

Roger G8CUB

122GHz Frequency Doubler



PM 125/2/13-02 (SN: 2300)

Datasheet

Frequency Doubler (120-130 GHz)

Serial Number: 2300

Description

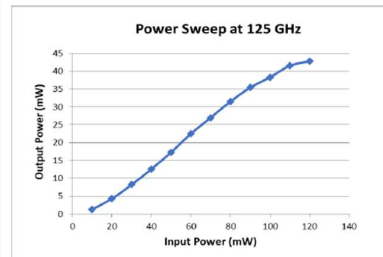
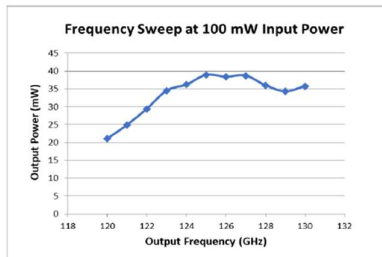
The PM 125/2/13 series is a passive frequency doubler based on Teratech's Schottky diode technology. This device is operated at fixed or variable bias.

Specification	Unit	Min	Typ	Max
Input frequency	GHz	60	62.5	65
Output frequency	GHz	120	125	130
Input power	mW			200
Output power	mW		30*	
Doubler bias	V		-10 to -1	
Doubler current	mA		0.01 to 5	
Input port		WR-15 (UG-385/U)		
Output port		WR-8 (UG-387/U-M)		
Dimension	mm	24 x 19 x 19 (length x width x height)		



* Performance changes with input power and bias voltage

Typical Performance



Note: Teratech reserves the right to change the data for this device without notice. For different frequency and power requirements contact the sales team at the email given below.

Attention:

Teratech Components Ltd. assumes users will be familiar with microwave and millimetre wave products.

This product is sensitive to Electrostatic Discharge (ESD). Teratech Components Ltd assumes the user will only be handling and working with these products in an ESD safe environment, where the component will be grounded at all times. Any attempt to open, pull apart, or damage the component will immediately void the warranty. Any damage caused to the component by improper handling is highly likely to void the warranty.



To order this component please contact sales@teratechcomponents.com
www.teratechcomponents.com

The doubler shown is an efficient passive doubler, that works on 122GHz. Being a biased doubler it will work with modest drive from >10mW. Though requiring 100mW to get around 30mW out.

Though nothing Millimetre is cheap, a small number of these are available at a competitive price. Contact me for more information. Although not tested at 134.4GHz, they may well give some useful output. More info when I have tried one!

Roger G8CUB

Letters to the Editor

A letter is something written on paper and posted in an envelope.....

You may remember those from your youth. Emails to the editor work just as well!

From Dave G1EHF

UK Microwave Beacon Support

As long as I can remember, the microwave newsletter has contained something along the lines that UKuG project support is essentially a small-scale grant scheme, based on 'cash-on-results' and is unable to provide ongoing financial support for running costs. Historically, this has been a good solution for getting beacons established and operational, at least initially. However, a recent episode has highlighted a problem that I suspect will only get worse.

The 5.7GHz beacon at Farnham, GB3FNM was originally built and installed around 2007. The ongoing funding for running costs has been borne by the Farnham VHF Group, who operate four repeaters and currently this one beacon. Whilst the group are primarily interested in repeater operation, they have supported this beacon and others in the past from their funds generated from membership subscriptions, rally boot sales and donations. However, with rising electricity costs the group has started to question their ability to support beacons and have recently looked for support from the local microwave community. Luckily this has been forthcoming.

This situation makes me think that the UKuG need to reconsider their position on ongoing financial support for microwave beacons. In practice not all beacons require support, for example the 10GHz beacon GB3GCT for which I am keeper, is fortunately housed and powered at zero cost by the trustees at Greenham Common Tower. Sadly, this isn't the case elsewhere and I fear that many beacons will simply become too expensive to remain viable and will be taken off-air. Can we afford for this to happen?

Beacons are very useful to the UK microwave community. They provide propagation indication, known signal sources for testing new kit, heading indication and equipment checks for home and portable operation and demonstration of band occupancy to OFCOM. I think there should be several solutions considered. 1) UKuG agrees to support beacons where needed from existing funds, 2) UKuG increases our subscriptions by a modest amount in order to support beacons or 3) UKuG sets up a completely separate fund for beacons, supported by donations from users. Financial support could still be provided on a grant basis and would ideally only be paid against submitted invoices. Maybe a review of UK microwave beacons is in order, to consider the importance of each, current running costs and future vulnerability.

Should this be debated at the next UKuG AGM? What do we need to do right now?

Dave G1EHF

HEELWEG MICROWAVE MEETING 2025



**SATURDAY
JANUARY 18th 2025
(10.00 - 15.30)**

LOCATION:

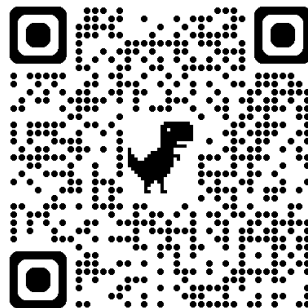


KULTURHUS "DE VOS"
HALSEWEG 2
NL / 7054 BH WESTENDORP



INFO@PAMICROWAVES.NL

PE1FOT/PA7JB/PA3CEG/PA0IBR/PA0BAT



Ridgeway Round Table

Saturday 1st February



The Ridgeway Roundtable is a new event in the annual calendar of gatherings for radio amateurs interested in the microwave bands from 1.3GHz to 241GHz and above.

This meeting takes a new format, with fewer talks and focusses on 'show and tell' of equipment and operating modes, together with an opportunity to purchase a few goodies from a small selection of sellers.

Radio amateurs of all experience and skill-level are welcome, from complete beginners with a passing interest, to those with years of knowledge in building and operating equipment. It will be a chance for all to exchange ideas, gain knowledge and examine some typical equipment setups. Hopefully we will be able to demonstrate some of the equipment in operation.

We are also planning to have a few items of test equipment available for you to use or for you to be guided by others.

Proposed programme

- 10am: Doors open
- 10am to 11am: Registration, 'Show and Tell' and trading
- 11am to 11.30am: Welcome and talk by Barry G4SJH (RSGB Microwave Manager) on our bands in the spotlight
- 11.30am to 12.30pm: Talk and demonstration by Dave G8HKU and Dave G1TVL on some of the problems encountered with getting JT4 going on the 122GHz band (this is a follow-up to the MRT talk in 2024)
- 12.30pm: Lunch break and time for a chat
- 12.30pm to 3pm: 'Show and Tell' and trading continues
- 3pm: Close

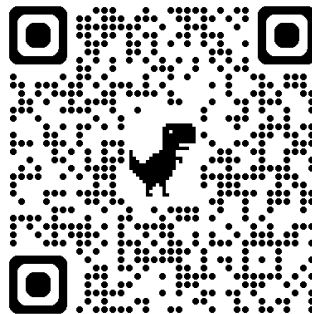
The Ridgeway RT is being held at a location convenient for the A34:

Chilton Village Hall, Chilton, Didcot, Oxfordshire, OX11 0SH

<https://temp-tntdyedoigtcbfjkdtpz.webadorsite.com>

To understand the number of people attending the Ridgeway RT, we would appreciate that people register beforehand. This will allow us to estimate seating arrangements and catering needs. We do not anticipate excessive demand but numbers may have to be limited.

To register, please send an email to ridgewayrt@btinternet.com stating your name, callsign (if applicable) and whether you are likely to purchase a lunchtime bacon butty. If a number of you are travelling together, one email with multiple details is sufficient. Thanks!



Contest Results 2024

122GHz Contest February 2024

This event saw five stations active of which three submitted logs. Some stations roved between two sites. The weather was wet, windy and grey which was very unhelpful but perhaps to be expected in the middle of winter. Most contacts were made using the Opera digital mode, with one or two on CW.

Congratulations go to Dave G1EHF/P who roved between two locations and made four contacts to win the event.

John G3XDY

122GHz Contest February 2024

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX kms	Power(mW)	Ant
1	G1EHF/P	IO91JH01	4	74	G8GTZ/P	25	0.2	30cm Cassegrain
2=	G8CUB/P	IO91GI25	2	54	G8GTZ/P	27	10	30cm Cassegrain
2=	G4LDR/P	IO91GC68	2	54	G1EHF/P	27	0.2	30cm Offset dish

24GHz Trophy Contest August 2024

This year's event saw a good entry level, with the leading stations getting into double figures of contacts. Many entrants made good use of the roving rules to move site and rerun tests to increase their scores, mostly from two sites but some from three.

Congratulations go to Dave G1EHF/P as winner of the 24GHz Trophy, and to Dave G4FRE/P as runner up.

Please ensure that your submitted logs contain 8 character locators, one entrant had a cached copy of an outdated logging application which took a while to sort out.

John G3XDY

24GHz Trophy Contest

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX kms	Power	Ant
1	G1EHF/P	IO91GI44	13	946	G4UVZ	123	0.25	60cm
2	G4FRE/P	IO81XW91	12	802	GW4HQX/P	79	2	18 inch dish, pen feed
3=	GW3TKH/P	IO81KR73	7	615	G1EHF/P	121	0.5	50cm pf dish
3=	GW4HQX/P	IO81KR73	7	615	G1EHF/P	121	0.6	30cm pf dish
5	G8CUB/P	IO91CL35	7	484	GW3TKH/P	94	5	30cm dish
6	G8GKQ/P	IO80WP01	6	477	G8GTZ/P	98	0.5	45 cm prime, pen feed
7	G1DFL/P	IO92DB29	7	474	G1EHF/P	84	0.25	30cm PF Dish
8	G4XAT/P	IO90MX13	5	300	G8KMH/P	91	1	Andrew 300mm dish
9	G4LDR	IO91EC02	7	296	G8GKQ/P	63	1	30cm dish
10=	G0MDQ/P	IO82QJ85	3	207	G1DFL/P	71	1.5	30cm Dish
10=	G7MHF/P	IO82QJ85	3	207	G1DFL/P	71	1.5	30cm Andrews Dish
12=	GW4JQP	IO71KR94	1	76	GW4MBS/P	76	2	Sky offset 43cm
12=	GW4MBS/P	IO71XW37	1	76	GW4JQP	76	2	30cm dish
14	G1PPA/P	JO03AE03	1	48	G4ODA	48	2	65cm dish

UKuG MICROWAVE CONTEST CALENDAR 2025

Dates will be here when decided

MICROWAVE CONTEST CALENDAR 2024

Month	Contest name	Organiser	Date 2024	Time GMT	Notes
Jan	1.3GHz Activity Contest	Arranged by RSGB	16-Jan	2000 - 2230	RSGB Contest
Jan	2.3GHz+ Activity Contest	Arranged by RSGB	23-Jan	1930 - 2230	RSGB Contest
Feb	122GHz Contest	UKuG	4-Feb	0900 - 1700	New event
Feb	1.3GHz Activity Contest	Arranged by RSGB	20-Feb	2000 - 2230	RSGB Contest
Feb	2.3GHz+ Activity Contest	Arranged by RSGB	27-Feb	1930 - 2230	RSGB Contest
Mar	Low Band 1296/2300/2320/3400MHz	UKuG	3-Mar	1000 - 1600	First 4 hours coincide with IARU event
Mar	REF/DUBUS EME 3.4GHz	Arranged by REF/DUBUS	17-Mar	0000 - 2400	REF/DUBUS EME 3.4GHz
Mar	1.3GHz Activity Contest	Arranged by RSGB	19-Mar	2000 - 2230	RSGB Contest
Mar	2.3GHz+ Activity Contest	Arranged by RSGB	26-Mar	1930 - 2230	RSGB Contest
Apr	Low Band 1296/2300/2320/3400MHz	UKuG	7-Apr	0900 - 1500	
Apr	REF/DUBUS EME 2.3GHz	Arranged by REF/DUBUS	14-Apr	0000 - 2400	REF/DUBUS EME 2.3GHz
Apr	1.3GHz Activity Contest	Arranged by RSGB	16-Apr	1900 - 2130	RSGB Contest
Apr	2.3GHz+ Activity Contest	Arranged by RSGB	23-Apr	1830 - 2130	RSGB Contest
May	432MHz & up	Arranged by RSGB	4-May to 5-May	1400 - 1400	RSGB Contest
May	10GHz Trophy	Arranged by RSGB	5-May	0800 - 1400	Sunday, to coincide with IARU
May	Low Band 1296/2300/2320/3400MHz	UKuG	5-May	0800 - 1400	Aligned with IARU event
May	24GHz/47/76GHz	UKuG	5-May	0900-1700	Aligned with IARU event
May	REF/DUBUS EME 1.2GHz	Arranged by REF/DUBUS	11-May to 12-May	0000 - 2400	REF/DUBUS EME 1.2GHz
May	1.3GHz Activity Contest	Arranged by RSGB	21-May	1900 - 2130	RSGB Contest
May	5.7GHz/10GHz	UKuG	26-May	0600-1800	
May	2.3GHz+ Activity Contest	Arranged by RSGB	28-May	1830 - 2130	RSGB Contest
Jun	Low Band 1296/2300/2320/3400MHz	UKuG	2-Jun	0900 - 1500	Aligned with some Eu events
Jun	REF/DUBUS EME 24GHz	Arranged by REF/DUBUS	8-Jun	0000 - 2400	REF/DUBUS EME 24GHz
Jun	REF/DUBUS EME 10GHz	Arranged by REF/DUBUS	9-Jun	0000 - 2400	REF/DUBUS EME 10GHz
Jun	1.3GHz Activity Contest	Arranged by RSGB	18-Jun	1900 - 2130	RSGB Contest
Jun	2.3GHz+ Activity Contest	Arranged by RSGB	25-Jun	1830 - 2130	RSGB Contest
Jun	5.7GHz/10GHz	UKuG	30-Jun	0600-1800	
Jul	VHF NFD (1.3GHz)	Arranged by RSGB	6-Jul to 7-Jul	1400 - 1400	RSGB Contest
Jul	24GHz/47/76GHz	UKuG	15-Jul	0900-1700	
Jul	1.3GHz Activity Contest	Arranged by RSGB	16-Jul	1900 - 2130	RSGB Contest
Jul	2.3GHz+ Activity Contest	Arranged by RSGB	23-Jul	1830 - 2130	RSGB Contest
Jul	5.7GHz/10GHz	UKuG	28-Jul	0600-1800	
Jul	REF/DUBUS EME 5.7GHz	Arranged by REF/DUBUS	28-Jul	0000 - 2400	REF/DUBUS EME 5.7GHz
Aug	24GHz Trophy Contest	UKuG	18-Aug	0900 - 1700	New event
Aug	1.3GHz Activity Contest	Arranged by RSGB	20-Aug	1900 - 2130	RSGB Contest
Aug	2.3GHz+ Activity Contest	Arranged by RSGB	27-Aug	1830 - 2130	RSGB Contest
Aug	ARRL Microwave EME	Arranged by ARRL	24-Aug to 25 -Aug	0000 - 2359	ARRL EME 2.3GHz & Up
Aug	5.7GHz/10GHz	UKuG	25-Aug	0600-1800	
Sep	24GHz/47/76GHz	UKuG	15-Sep	0900-1700	
Sep	1.3GHz Activity Contest	Arranged by RSGB	17-Sep	1900 - 2130	RSGB Contest
Sep	ARRL Microwave EME	Arranged by ARRL	21-Sep to 22-Sep	0000 - 2359	ARRL EME 2.3GHz & Up
Sep	2.3GHz+ Activity Contest	Arranged by RSGB	24-Sep	1830 - 2130	RSGB Contest
Sep	5.7GHz/10GHz	UKuG	29-Sep	0600-1800	
Oct	432MHz & up	Arranged by RSGB	5-Oct to 6-Oct	1400 - 1400	IARU/RSGB Contest
Oct	1.3 & 2.3GHz Trophies	Arranged by RSGB	5-Oct	1400 - 2200	RSGB Contest
Oct	24GHz/47/76GHz	UKuG	6-Oct	0900-1700	
Oct	1.3GHz Activity Contest	Arranged by RSGB	15-Oct	1900 - 2130	RSGB Contest
Oct	ARRL EME 50-1296MHz	Arranged by ARRL	19-Oct to 20-Oct	0000 - 2359	ARRL EME Contest
Oct	2.3GHz+ Activity Contest	Arranged by RSGB	22-Oct	1830 - 2130	RSGB Contest
Nov	Low Band 1296/2300/2320/3400MHz	UKuG	10-Nov	1000 - 1400	
Nov	ARRL EME 50-1296MHz	Arranged by ARRL	16-Nov to 17-Nov	0000 - 2359	ARRL EME Contest
Nov	1.3GHz Activity Contest	Arranged by RSGB	19-Nov	2000 - 2230	RSGB Contest
Nov	2.3GHz+ Activity Contest	Arranged by RSGB	26-Nov	1930 - 2230	RSGB Contest
Dec	1.3GHz Activity Contest	Arranged by RSGB	17-Dec	2000 - 2230	RSGB Contest
Sections		F	Fixed / home station		
		P	Portable		
		L	Low-power <10W 1.3/2.3/3.4GHz, <1W 5.7/10GHz)		

Added 24GHz and 122GHz events, rescheduled 24/47/76GHz events for 2024

EVENTS 2025

January 13	Heelweg, Westendorp, Netherlands	www.pamicrowaves.nl
February 1	Ridgeway Roundtable, Chilton village	https://temp-tntdyedoigtcbfjkdtpz.webadorsite.com
February 15	Tagung, Dorsen, Germany	www.ghz-tagung.de
March 7-9	MicroMeet Madrid. Spain	www.micromeet.es
April 24-26	IARU-R1 Interim meeting / Centenary, Paris	
September 12-14	70.UKW Tagung, Weinheim	www.ukw-tagung.de
September 21-26	European Microwave Week, Utrecht, Netherlands	www.euweek.com