An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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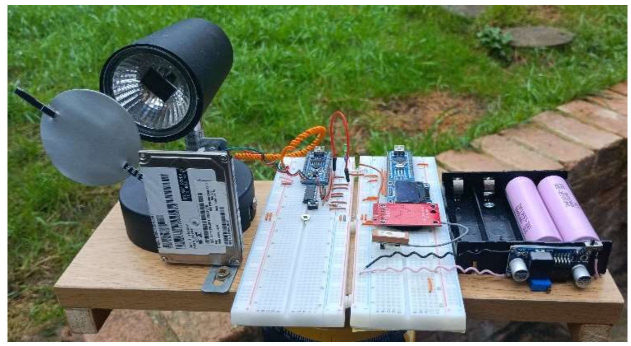

30THz distance extended to 75 metres - Remi M0LRH

GPS Antenna Pointing System – Barry G8AGN

UK Microwave Group

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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)

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

If you plan to reproduce an article exactly as in Scatterpoint then please contact the Editor – otherwise you need to seek permission from the original source/author.

UKμG Project support

The UK Microwave Group is pleased to encourage and support microwave projects such as Beacons, Synthesiser development, etc. Collectively UKuG has a considerable pool of knowledge and experience available, and now we can financially support worthy projects to a modest degree.

Note that this is essentially a small-scale grant scheme, based on 'cash-on-results'. We are unable to provide ongoing financial support for running costs – it is important that such issues are understood at the early stages along with site clearances/licensing, etc.

The application form has a number of guidance tips on it – or just ask us if in doubt! In summary:-

- Please apply in advance of your project
- We effectively reimburse costs - cash on results (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 Neil G4DBN for more information**

5.7GHz 10GHz 24GHz 47GHz(g8cub) 76GHz 122GHz(soon)

An antenna pointing system based on the u-blox C94-M8P-3 evaluation kit

Barry Chambers G8AGN

Introduction

In a recent Scatterpoint article, I discussed some ideas for achieving accurate antenna alignment, especially when using very high gain antennas, such as dishes, on the mm wavebands. My interest was aroused after reading an article in DUBUS 3/2019 by David, VK3HZ, and Rex, VK7MO, in which they discussed the use of a RTK DGNSS (real-time kinematic, differential global navigation satellite system) setup based on a u-blox C94-M8P evaluation kit to align EME antennas when operating portable at 10GHz [1].

I will not give a detailed discussion here of how RTK positioning systems work since there are several good YouTube videos available (for example, see [2]) but the point of interest to radio amateurs is that they can provide extremely high-quality information about the separation and compass bearing between two GNSS "modules", normally referred to as the Base and the Rover. This information may then be used to calibrate a rotatable protractor mounted on the operator's dish antenna tripod, such as that shown in Figure 1. Then it is a simple matter to point the dish accurately in the direction of a distant station whose beam heading has been determined previously using Google Earth or calculation from known Lat/Long coordinates or Maidenhead locators.

Figure 1 Rotatable protractor on dish tripod (the protractor rollers and bed are made of PTFE)

Let us begin with the system geometry shown in Figure 2. Here the Rover is co-sited with the dish antenna and the Base is located some distance away, typically in the range 2 to 20m. Actually, it is the locations of the Base and Rover GNSS antennas which is important, since these are the reference points for timing or phase measurements. The electronics of the Base and Rover modules is identical and each contains a high-grade u-blox M8P GNSS receiver and a UHF radio transceiver (working in the 433MHz band for operations in Europe, 915MHz in the US). The radio link is used to send position correction data from the Base to the Rover. The distinction between a Base and a Rover lies solely in the way it has been configured in software, as will be discussed later.

In our application, the locations of the Base and Rover are interchanged from those of a normal RTK positioning system and in theory, at least, both the Base and Rover are not fixed and so the separation and angle between them can vary with time; this is known as the "moving baseline" mode. This is done for two reasons. Firstly, the Rover needs to be at the location of our dish antenna since this is where we will need to display to the operator the information about the angle between the Base and Rover; secondly, it is only when the system is configured to be in moving baseline mode that we have information from the Rover about where it is in relation to the Base. This information is expressed as two quantities dN and dE in Cartesian coordinates, as shown in Figure 2. (Actually, we have information available about this offset in three dimensions through a third quantity dD, for height, but this is not used).

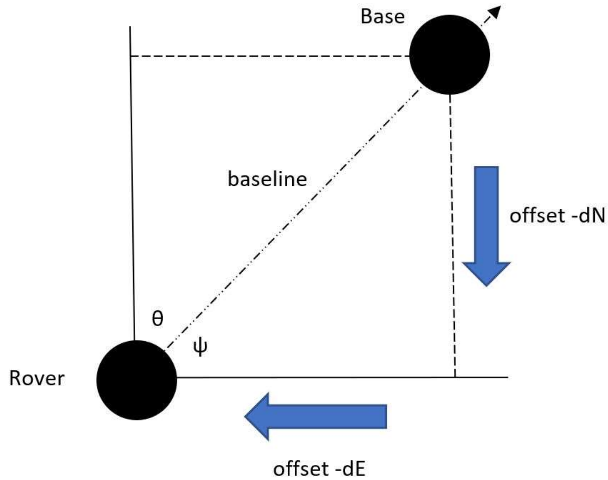


Figure 2 Configuration of Base and Rover locations (blue arrows show displacements from the Base)

We need to calculate the angle θ, since this is the orientation of the Rover-Base baseline with respect to true North; it is given by

$$\theta = 90 - \psi = 90 - atan\left(\frac{-dN}{-dE}\right)$$

It should be noted that for this application, we do not need to know the location of the Base with very high accuracy since we are only interested in the relative location of the Rover with respect to that of the Base. Hence the Base location can be determined without recourse to a “Survey-In” procedure and an accuracy of about a metre will be adequate. The system should then be able to determine the length of the baseline to within a few mm and the baseline orientation to within about 0.1 deg. Once the latter has been determined, the dish antenna, with its associated sighting scope (which is fitted with cross-hairs) is then rotated to face the Base and the protractor rotated independently so its pointer indicates the value θ. The protractor is then locked into position on the tripod base; this completes the protractor calibration and now any dish pointing angle may be set accurately by simply rotating the dish so that the pointer indicates the desired angle.

Hardware requirements

Figure 3 shows a C94-M8P module and its various interface and power connectors.

When used as a Base, there are only four connections to the outside world. Two of these are via SMA sockets into which are plugged the GNSS and UHF radio antennas; these are supplied as a part of the evaluation kit. The other two connections are for the power supply; the hardware can operate on any voltage between 3.7 and 20v. I chose to use a small 12v gel battery as the current required is modest, but a small LiPo battery would also be suitable.

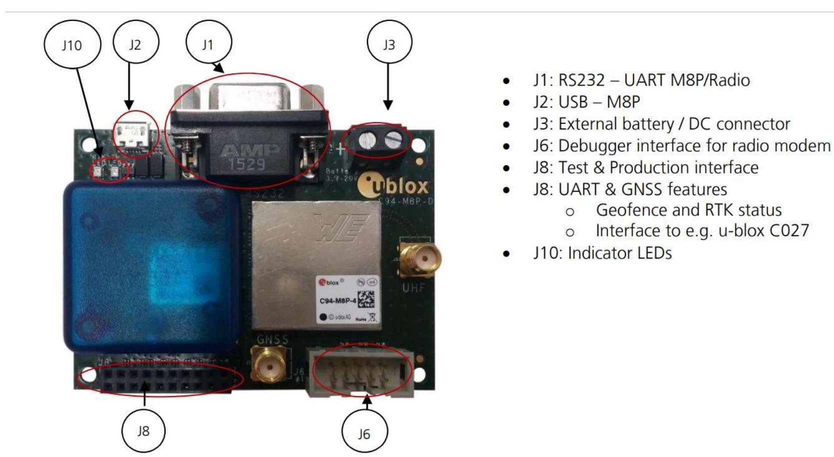


Figure 3 The C94-M8P evaluation kit includes two of these modules. Source: [6]

When used as a Rover, as well as the above connections, an additional one is required to carry data from the Rover, via J8 pin 10, to a serial interface input on an Arduino Nano or Uno as shown in Figure 4. This serial data is transmitted at 19200 bauds. The Arduino is used to parse the message data and to display the results on a 20 x 4 LCD display via a I2C interface.

It should be noted that the data passed from the Rover to the Arduino is not in the form of NEMA messages, but in a proprietary u-blox message format called UBX.

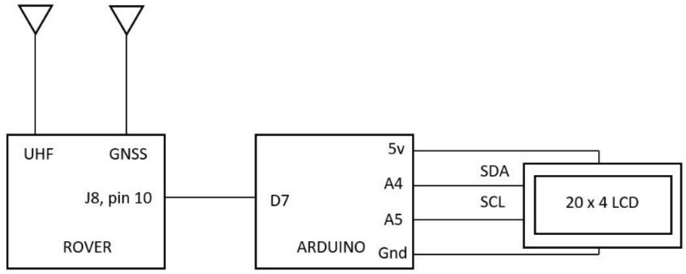


Figure 4 Rover configuration (power connections to Rover u-blox module and Arduino not shown)

Arduino sketch

The Rover electronics, as originally described in [1], used an Arduino Uno and a colour 320 x 240-pixel TFT display with integrated touchscreen. The latter was used to display two "screenfuls" of data, with the touch screen acting as a switch between the two. In my implementation, I opted to use a 20 x 4 I2C LCD display as it was cheaper, needed fewer connections to the Arduino, and was more readable in strong sunlight. I also replaced the Uno by a Nano.

The original second data display "screenful" showed a graph over a period of twenty minutes of the variation of the derived Rover to Base azimuth angle θ, thus providing a check on the (hopefully very small) azimuth angle variation with time. As my LCD display was not capable of displaying such a graph, this was replaced by a number representing the standard deviation of the azimuth angle variation over a period of one minute (based on a sample of twelve values of azimuth angle, collected at the rate of one every five seconds and stored in a circular data buffer). In addition, I also wanted my display to show the Maidenhead locator of the Rover; this facility was not available in the original system described in [1]. The resulting format of the information displayed on my LCD is similar in some ways to that shown on the first data screen described in [1], but the absence of colour was overcome by displaying some information relating to the system status (for example, does the Rover have a valid GNSS fix) in either lower case (representing "no") or upper-case letters (representing "yes"). A typical LCD screen of data is shown in Figure 5.

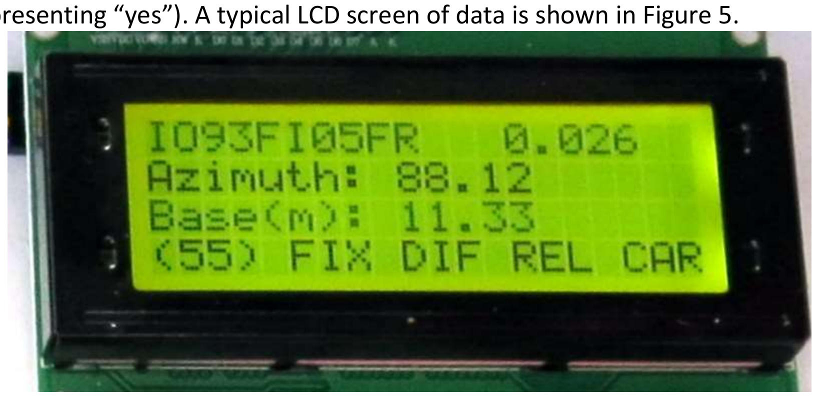


Figure 5 Rover LCD display

The top line of the display shows the Maidenhead locator and the standard deviation of one minute's values of the derived Rover to Base azimuth angle θ. The second line shows the current value of the azimuth angle in degrees. The third line shows the current derived value of the Rover to Base baseline length in m. The fourth line displays information about the Rover system status. FIX (in upper case) shows that the Rover has a valid GNSS fix. DIF (in upper case) shows that differential position corrections are being applied, REL (in upper case) shows that the relative position components (dN and DE) are valid and CAR (in upper case) shows that the GNSS receiver is operating using a carrier phase range solution with fixed ambiguities. The number (55) indicates that all the status flags described above are "true". When the Rover is first powered up, this number starts at 0 and increases in steps up to 55 as the various status flags become true.

A copy of my Arduino sketch can be obtained on request via e-mail [3].

u-blox board configuration

As mentioned before, the two u-blox modules included in the C94-M8P kit are identical but need to be configured differently, so it is wise to label them as Base and Rover before proceeding further. A block diagram of the modules is shown in Figure 6, [6].

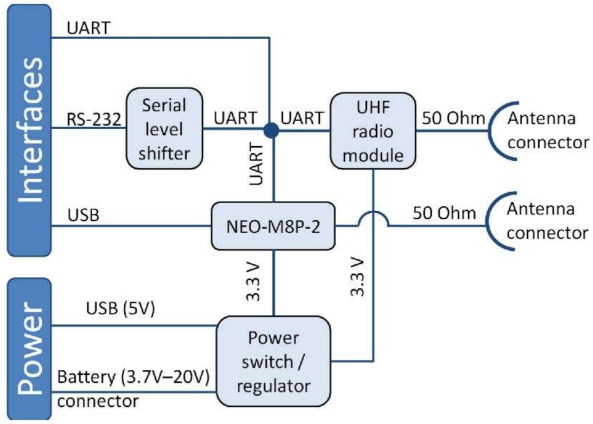


Figure 6 Block diagram of the C94-M8P Base and Rover modules. Source: [6]

Configuration is carried out by connecting a u-blox module to a laptop or PC via the USB interface J2, whose location is shown in Figure 3. The PC should be running the u-blox configuration software "u-center", which can be downloaded from [4]. The latest software version, at the time of writing, is v22.05. Once a u-blox module is connected to u-center, it will act as a conventional GNSS receiver and transmit the usual NEMA messages; these can be viewed using the u-center "View" pull-down menu options. This data can also be viewed as lists/plots of visible satellites, position data etc. This step confirms that the u-blox module is working in its factory-default configuration. If, later, a mistake is made in the RTK configuration process, the module can be restored to the factory-default condition by pressing the "restore" button (cog-wheel logo situated near the top RHS of the u-center main screen).

Returning now to Figure 6 for a moment, it can be seen that the actual u-blox M8P GNSS receiver is connected to the UHF radio transceiver and to the outside world via a UART. This will be referred to in the configuration documentation as UART1. This is also accessible via the multi-pin connector J8, shown in Figure 3. In particular, pin 10 of this connector provides us with a means of extracting 19200 baud-rate serial UBX messages from the Rover GNSS receiver which are subsequently processed by the Arduino. This facility is not used in a conventional RTK application and so will require additional configuration steps to be taken in the Rover procedure which is described below. These are not discussed in either the u-blox documentation or in the DUBUS article [1].

At this stage it is advisable to download the C94-M8P Setup Guide [5] and the C94-M8P User Guide [6]. The latter is a lengthy document but Section 4.3 (Moving Baseline RTK Configuration) is the relevant part. It may also be helpful before proceeding further to view a very helpful (but long) YouTube video [7] which shows the setup process for both the Base and Rover boards, as described pictorially in the quick setup guide [5]. As mentioned above, the steps shown in [5] do not quite correspond to those we require but this is clarified in the paragraphs below.

<u>Base configuration</u>

The Base should be configured as discussed in [5] but with the following modifications.

(1) In the u-center tool bar select "View", then "Messages View". Place your mouse over NEMA and right-click. Then click on "Disable Child Messages". This will stop the GNSS receiver from outputting NEMA messages.
(2) Now go to Slide 7 in the quick setup guide [5]. This step is not needed so just check that the "Mode" box is set to "Disabled" (it should be, as this is the factory-set default).
(3) Turn now to Slide 9 and fill in the boxes as shown. Then press the "Send" button to send these commands to the GNSS receiver in the module.
(4) Fill in the boxes as shown in Slide 10 but replace the F5-05 RTCM3.3 1005 message with F5-05 RTCM3.3 4072.0 (the guide mentions messages as RTCM3.2 rather than 3.3 but this is OK). Note that each time you fill in the CFG_MSG window with new data in the boxes, you must press "Send" before moving onto the next data set.
(5) This completes the Base configuration procedure but before disconnecting the module from the PC, go to UBX-CFG-CFG and "save current configuration".

The procedure outlined above is also explained in more detail in Section 4.3 in [6].

<u>Rover configuration</u>

(1) Repeat step 1 of the Base configuration for the Rover module (turn off NEMA messages).
(2) Move the mouse down to UBX and right click. Then click on "Enable Child Messages". This will command the GNSS receiver to only output u-blox proprietary UBX messages. A list of these may be seen by clicking on the + sign to the left of UBX.

(3) Turn to Slide 12 in the quick setup guide and fill in the boxes as shown, but for "Protocol out" select UBX. Press "Send"
(4) Select UBX-CFG-MSG. In the message dropdown list find "01-3C NAV-RELPOSNED". Tick the box next to UART1 and change the 1 in the adjacent box to 5. This commands the Rover GNSS receiver to output a RELPOSNED message via UART1 (and pin 10 on J8) every 5 seconds. It is this information which the Arduino will process to provide the Rover-Base offsets and hence the baseline length and azimuth angle. Press "Send".
(5) Select UBX-CFG-MSG. In the message dropdown box find "01-02 NAV-POSLLH". Tick the box next to UART1 and change the 1 in the adjacent box to 10. This commands the Rover GNSS receiver to output a POSLLH message via UART1 (and pin 10 on J8) every 10 seconds. It is this information which the Arduino will process to provide the Rover Maidenhead locator. Press "Send".
(6) Finally select UBX-CFG-CFG and "save current configuration". It is now safe to power down the Rover module and the configuration process for both u-blox modules is now complete.

The interested reader will find detailed information about the UBX NAV-RELPOSNED and UBX NAV-POSLLH message formats in [8].

Using the C94-M8P system "in the field"

To achieve optimum results, both GNSS antennas need to be mounted on ground planes. The ones supplied are just about adequate but ideally the Base antenna should be mounted on a larger one. Both antennas should have a clear view of the sky so as to access as many GPS and GLONASS satellites as possible.

A series of tests of the complete system has been carried out "in the field" over nominal baseline lengths of 2m, 10m and 20m and with both GNSS antennas having a very clear view of the sky down to the horizon. The baseline lengths were measured out over fairly level ground using a 30m tape and the tripods supporting the Base and Rover GNSS antennas positioned accordingly; see Figure 7 which shows the 10m baseline test configuration. The Rover electronics was housed in the car as shown in Figure 8. The Rover GNSS antenna is on the tripod nearest to the car and the baseline length could be changed by moving the Base GNSS antenna nearer or further away. The baseline orientation (Rover to Base) was roughly pointing East.

Figure 7 10m baseline configuration

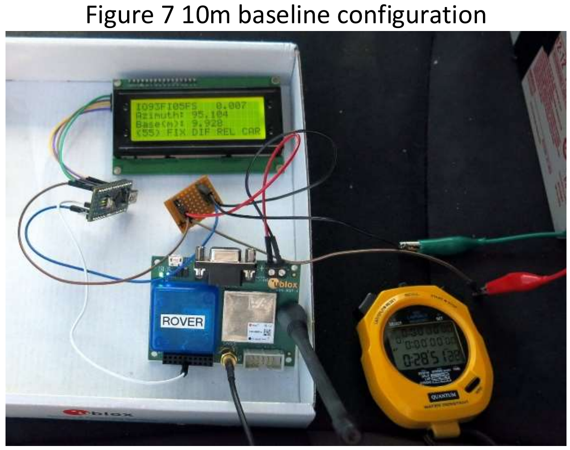


Figure 8 Rover electronics package in the car (not yet properly boxed up!)

Each test was carried out over a 20-minute period after the system was first locked up and showing a status value of 55, indicating that a carrier phase range solution with fixed ambiguities had been obtained. Every minute the following

data were recorded: time, status flag number (always 55), indicated azimuth angle θ in degrees, indicated baseline length in m and the one-minute standard deviation of the indicated azimuth angle values.
Figure 9 shows the derived baseline azimuth angle variation with time for the three baseline lengths.

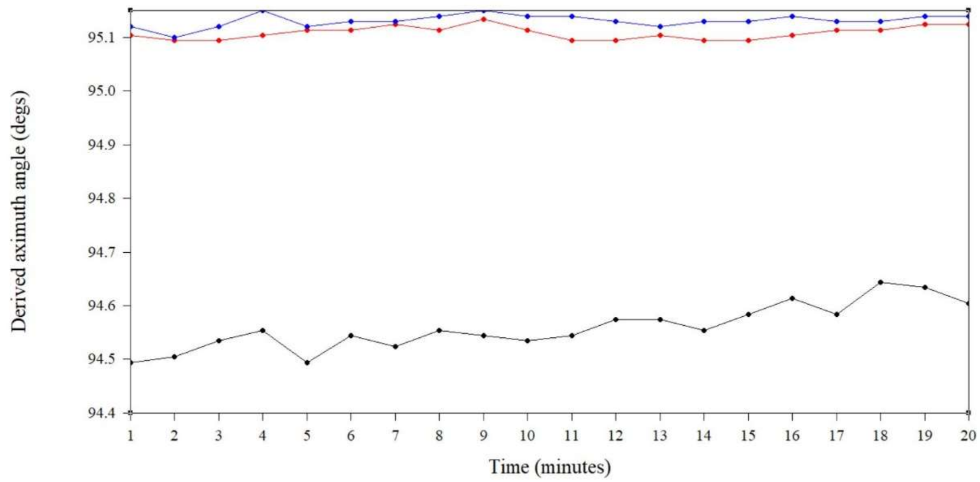


Figure 9 Variation of derived baseline azimuth angle with time
Black curve = 2m, red curve = 10m, blue curve = 20m

The actual mean value of the derived baseline azimuth angle for the different baseline lengths is of no interest here since in moving the Base GNSS antenna tripod when altering the nominal baseline length between tests, some variation in tripod positioning transverse to the baseline direction was inevitable; this effect will become less important as the length of the baseline is increased.

What is of interest is the peak-peak variation of the azimuth angle with time. As might be expected, this becomes larger in the case of the shortest baseline, but even then, the variation is less than +/- 0.1 degree and for the 20m baseline the variation is approximately +/- 0.03 degree. Looking at the azimuth graph for the 2m baseline, the azimuth angle seems to increase slightly with time, unlike the 10 and 20m cases. It is suggested that this might be due to the tripod holding the Base antenna tilting slightly. The ground where the Base tripod was situated for the 2m test was uneven with long "tufty" grass. I did not "dig-in" the tripod feet and as the tripod had almost no weight on it, it is possible that over 20 minutes the grass "relaxed" and tilted the tripod very slightly in a direction transverse to the baseline. Only a small amount of tilt would be required to see the slight change in azimuth angle and the effect would be most evident for a 2m baseline. When positioning the Base tripod for the 10 and 20m tests, the ground was flatter with shorter grass and so the tripod was unlikely to move over time.

Although the data is not shown here, the derived baseline lengths (2.098, 9.938 and 19.890 metres, respectively) showed no variation over the 20-minute test periods. When considering the 1-minute azimuth standard deviation results, as might be expected, the largest values were found for the shortest baseline, but even then, the majority of the values were around 0.02 with the occasional value reaching 0.033, which is very acceptable.
A final comment to make about these results is that the complete set of tests took place over a period of almost two hours and so the GPS and GLONASS constellations as seen by the GNSS antennas will have changed considerably in that time; nevertheless, this appears to have had minimal effects on the results observed.

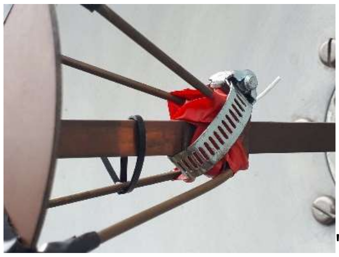
Acknowledgement

I am grateful to David, VK3HZ, for his useful advice and suggestions concerning future work on this project.

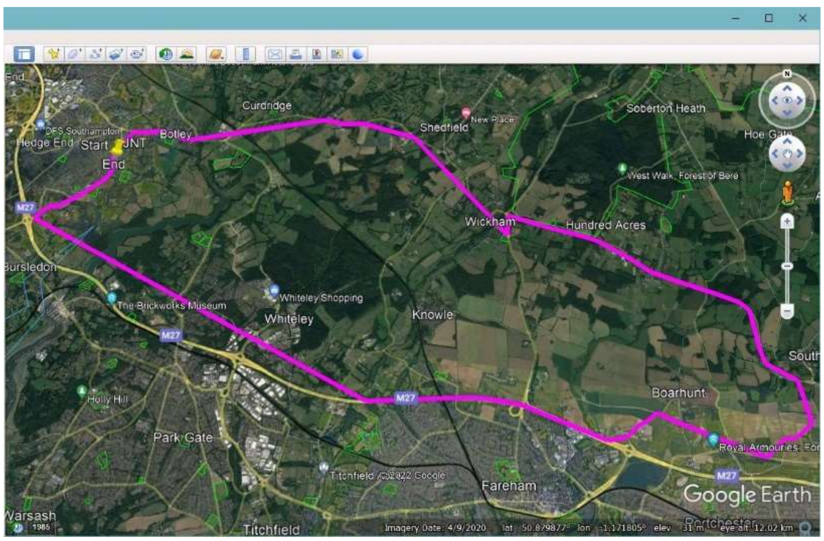
References

1. "Differential GPS Azimuth Reference for Microwave Portable Operations", David Smith VK3HZ and Rex Moncur VK7MO, DUBUS 3/2019, pp 9 – 15.
2. How RTK works - YouTube
3. b.chambers@sheffield.ac.uk
4. u-center | u-blox (u-center download)
5. Product Presentation (u-blox.com) (C94-M8P Application Board Setup Guide)
6. C94-M8P (u-blox.com) (C94-M8P User Guide)
7. Neo-M8P RTK setup and demo (courtesy u-blox) - YouTube
8. https://www.u-blox.com/docs/UBX-13003221

This month I have been........



" As a regular operator on the 24GHz band contests, it was brought home to me that going /P has its problems rarely encountered when operating from the comfort of the home QTH. Whilst transferring the required equipment on Sunday (Sept. 11th) to a 100ft hillock alongside the access tarmac lane by the summit of Brown Clee, Shrops. (IO82QL), a sudden gust of wind 'flipped' the dish, even though it was lying flat in the heather, awaiting personal transport to the peak spot. I was at the summit and heard the 'clunk' below. The 60cm PF dish uses a sub reflector to illuminate the dish, mounted in front of the W/G feed, using brass struts. In the accompanying photo you can see a proper bodge on-site repair job. Note the cable tie, stiff wire, tape and the star-of-the-fix, a jubilee clip. The sub-reflector is on the L/H side, and the dish centre is just about visible on the R/H side. It does pay to carry a few bits and bobs on such expeditions! To my surprise it still worked, and I had 4 QSOs over the course of the day. To round off a great (?) day, I dropped the access gate key on my way down, and it was not recovered until I returned to the area on Monday - an extra round trip of 65 miles."
Martyn Vincent G3UKV



Readers of the Data Column in October's RadCom will see the results of a recent test, transmitting through QO-100 from a mobile platform, sending real time location data coded as a 12 character locator, (like IO90IV58AK12) as free format text using the JT9G-Fast data mode. In there I state that results were worse than expected, compared with a previous test using a fixed JT9G-Fast message. The degradation was assumed to be down to foliage on trees screening the signal to the satellite, and a vague idea that the satellite gain had been reduced.

HOWEVER, I now discover that I'd programmed the wrong tone spacing for JT9G-fast into the transmit source, using the 111.1Hz spacing of JT4G (normal speed) instead of 100Hz for JT9G-Fast. What is really astonishing is that there were any decodes at all using this wrong tone spacing. Especially that there were enough to show roughly the route taken.

When the same route was repeated, but now with the proper tone spacing programmed in to the transmit source, a much better track could be plotted.
See attached.
For those who don't see RadCom, the transmission consists of a 2 frame burst of JT4G-Fast (1.7 seconds) sent every 10 seconds with an updated 12 char locator each time. RF power is 10 Watts at 2400MHz, antenna a quadrifilar helix.
Andy G4JNT

Millimeter Bits

My new car has 6 millimeter Radars to try and keep driver stupidity to a minimum.
But in the event of most any collision, the odds are one of these Radars is going to get damaged. Usually it's just breaking off the mounting tabs.

The shop just replaces the Radar module. So make friends with a mechanic working in a shop specializing in collision repair and see about keeping these 'bad' from going to the local garbage dump. Not sure which ones are the best to modify to a ham band yet, but getting a good sample is the first step.
Kent G8EMY/W5

Now back in Bournemouth, with a clear sea path take-off, and active on 10G. Worked 4 stations in the August cumulative from the apartment window with 10W to a 43cm prime focus. Best DX was F6DKW at 365km. Hope to be out portable in the next one and over the winter with higher bands.

73
Lehane G8KMH

Crawley Microwave Round Table Program

Sunday 18th September 2022

Welcome to the Crawley Roundtable hosted once again at the premises of the Crawley Amateur Radio Club.
The morning session will feature the usual 'bring and buy' sale, so if you have surplus radio items then please bring them along.
Again this year following we will be holding a heat for the UK Microwave Group annual Project contest. Please do bring along your constructed equipment or project and enter. Entries do not necessarily need to have been finished during the last year. Please note that the contest will also accept software entries as well as hardware.
CARC award the G3GRO trophy to the winner of this round. The winner will also go on to be considered, together with entries from all the other round tables over a year both before and after this event for the G3VVB trophy.
Below is the timetable:

10:00: Venue opens
10:00: 'Bring and buy', general socialising
12:00 UKuW Group Project contest round/G3GRO trophy judging commences
12:15 Lunch (hot dogs and burger rolls etc and tea/coffee available)
13:15 Welcome and results of the Project contest heat
13:30 Talks:
Langstone SDR Transceiver, Colin G4EML
30THz, Chris G0FDZ
10GHz Small Dish Moonbounce, Denis Stanton, G0OLX
16:30 End of meeting

The venue is the Crawley Amateur Radio Club's hut and directions can be found at:
http://carc.org.uk/find-us/

Scottish Microwave Round Table

A reminder that the 2022 GM Microwave Round Table will be held on Saturday 22 October in the Museum of Communication in Burntisland, Fife. Full details are at
https://www.gmroundtable.org.uk/ .
I am in the process of putting together the programme of speakers. If you have some project that you would like to share with the attendees I will be glad to hear
from you. Presentations generally last about 40 minutes.

Brian Flynn
GM8BJF

Microwave Round Table Dates

Crawley 18th September 10.30 -14.00
Scottish 22nd October 1030 – 17.00
Midlands 3rd December 10.00 – 16.00

Editors Comments

Thanks for the contributions this month. Especially all the replies to my request for what you have been doing this month. I need to ask more often!
Please note that the **Crawley Round Table**, is this **Sunday 18th**. Not as previously stated elsewhere as the 19th!

Beacon News

GB3RPE

Mark GW8KCY the beacon keeper for GB3RPE has asked me to write a report as I took on the integration of the beacon hardware, so here goes.

GB3RPE returned to active service from its new location in Carmarthen IO71UU on Thursday 1 September.

It uses a GPS-locked exciter designed and built by Roger GW4NOS, generating mixed CW, carrier and PI4 modulation on a 1 minute cycle.   This is mixed up to the final frequency of 10368.910MHz and amplified.

The antenna is at 39m agl and radiates 8dBW from a slotted waveguide.

Reports are accumulating on Beaconspot, and ODX after just a week is G4ZTR at 356km.

Grateful thanks to all who have worked on and supported the project, including GW8KCY and GW4RVA for completing the installation, and the UKuG for financial support.

Please continue to send reception reports to Beaconspot.

Peter GW4JQP Wales Representative UKuG

GB3MHZ

The 23cm beacon at Martlesham was restored at lunchtime 7th September.
Reports via the DX Cluster welcome.

73

John G3XDY

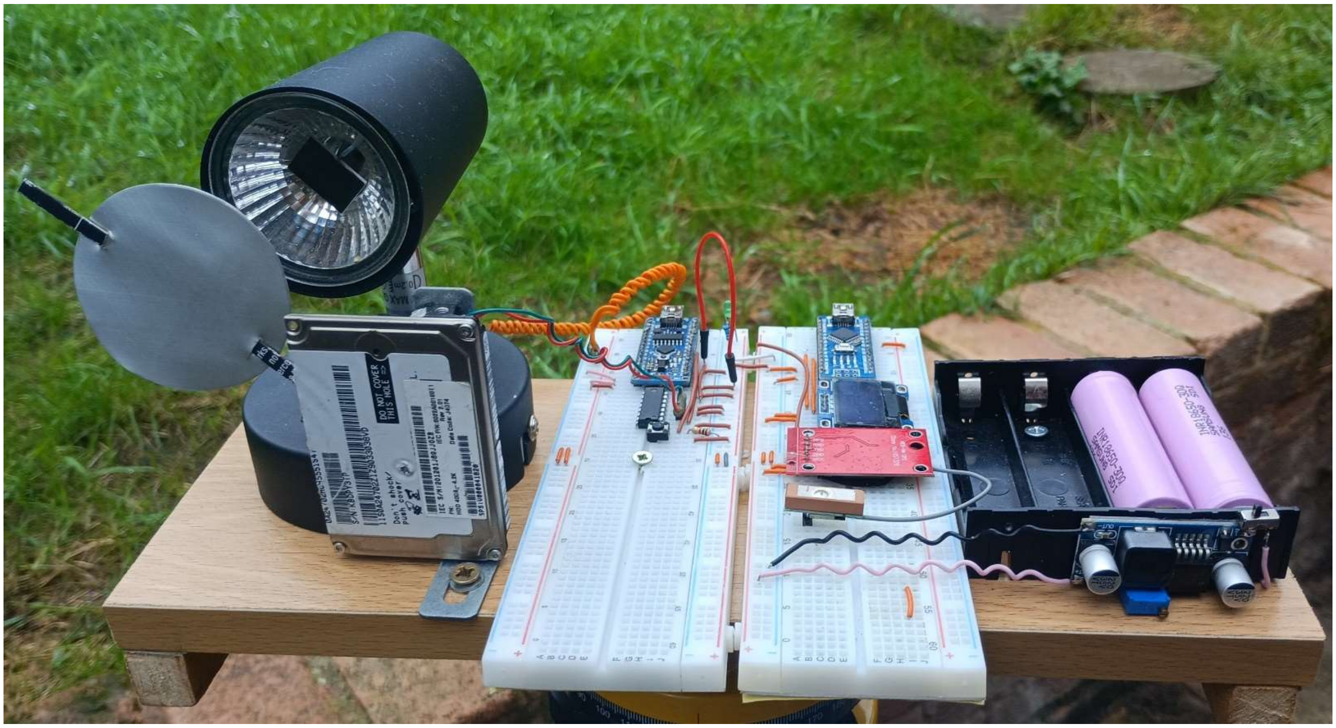
30THz Record?

The 30THz band has enormous potential for the future, and experiments in this band are easily accessible to ham radio enthusiasts. A basic black body transmitter can be made from an ordinary ceramic resistor, and there is also a range of cheaply available thermal detectors (e.g. pyroelectric PIR sensors, digital infrared non-contact thermoelectric temperature sensors and more) that are suitable for experimenting in this band. Andrew Anderson VK3CV/WQ1S was the first amateur to demonstrate a practical ham radio 30THz experiment; he used a black body transmitter and a MLX6014 sensor infrared temperature sensor as a detector. This experiment was further developed by Barry Chambers G8AGN who achieved a distance of 65 meters using a transmitted power of 300W.

On the 21st of August 2022, at Samphire Hoe, Kent, our family team (Iza M7IBL, Hieronim M7HBL, Tymek M7TBL, and Remi M0LRH) completed a series of experiments on 30THz bands. We achieved a similar distance (75m) compared to previously published results, but we achieved a significant reduction in transmitted power, using only 5W. This was possible due to using an astronomical telescope in the receiver, as well as lock-in detection and phase modulation. We strongly believe that a distance measured in the kilometres can be achieved by ham radio enthusiasts in the near future.

The video from our experiments in Samphire Hoe can be found at:

Youtube: https://youtu.be/GKiRo0Hqu04
Remi M0LRH



Transmitter

Receiver

Some technical details of the equipment used:

Transmitter:
1. Black body radiator - simple, but most ham radio enthusiasts would not be familiar with it.
2. Mechanical modulator - interfacing with the hard drive actuator and making it mechanically robust was more difficult than I expected.
3. Unusual application of GPS to produce a 1pps signal for synchronisation. Two independent GPS (one in the receiver and one in the transmitter) produce a 1pps phase synchronised signal for lock-in detection.
4. Arduino to control the beacon and generate a phase-modulated signal - this part is simple

Receiver:
5. PIR sensor, how it works and how to interface with it.
6. Terahertz optics (parabolic mirrors, germanium and ZnSe lenses)
7. Analogue signal amplification - this part is trivial
8. SDR lock-in amplifier - this would be hard to explain in plain language. Demodulating noisy, phase-modulated signals into digital, noise-free morse code is done using basic math transformations over less than 20 lines of code.
9. Using the GPS 1pps signal as a reference for the SDR lock-in amplifier/detector/demodulator

Timing is adopted from QRSS3, but the signal is phase coded.
The dot is 3 seconds of 3.3Hz carrier signal with **0-degree phase** (0-degree phase relative to the phase of 1pps signal from GPS).
The Dash is 9 seconds of 3.3Hz carrier signal with a **0-degree phase**.
Space is a 3.3Hz carrier with a **180-degree phase.**

It looks like "continuous" 3Hz CW as it is difficult to notice changes in phase without an oscilloscope.

The absolute phase (not phase shift) is decoded in the lock-in amplifier by comparing the phase of the detected signal with the phase of the 1pps signal from GPS.


By John G4BAO

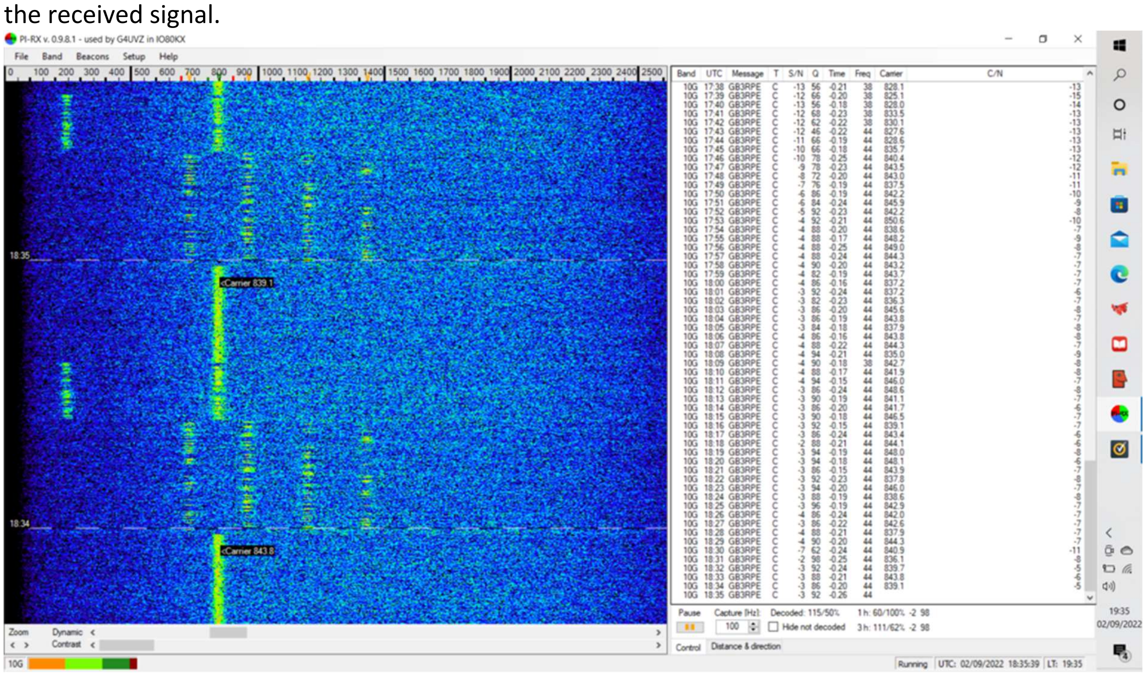
Please send your activity news to: scatterpoint@microwavers.org

Reports on the new GB3RPE beacon

Beacon news of the month was the return of the GB3RPE 10GHz beacon in from IO71UU on 10368.910MHz. It's return coincided with some good rainscatter.

Clive GW4MBS reported it initially at 539. He commented on the reflector, "Might not sound much of an achievement at 22km but I am in a valley and RPE is behind a row of very tall trees. My 9m mast is not high enough to see over these trees, but if I lower the mast by about a metre, I lose the signal. I am hoping Autumn will raise the signal level." He later reported it at 59S via Rainscatter.

Adrian G4UVZ gets reliable PI decodes for 60 -70 % of the time under flat conditions with the signal reported as coming from a wide has the signal is coming over Exmoor! He later copied it via rainscatter, and the screenshot shows the received signal.

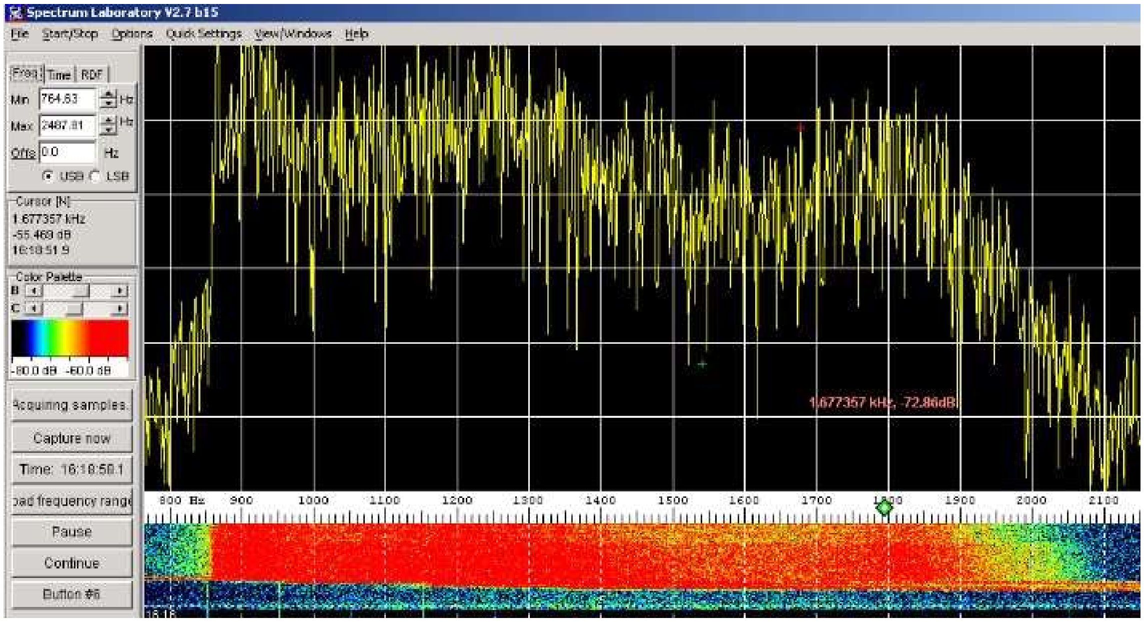


On the 8th of September, ***John G4ZTR*** was pleased to report copy of the new 3cms beacon "in darkest Essex" at 356km.

From Keith GW3TKH

The GB3AMU beacon was restored on 09/08/22 after a period of nearly 5 years shutdown! The antenna is a sectoral horn at 266 m asl. beaming 135 degrees -3dB points at +/- 80 deg. Please report via DXC/Beaconspot.

From Julian, G3YGF



Some 10GHz beacon reports from IO92VL during the rainscatter event on the 8th of September. The normal beacon signal levels here are GB3SCX (161km) 20dB in a few Hz wide, GB3GCT, (76km) GB3LEX (154km) and GB3PKT (94km) inaudible, due to trees. Signals were up considerably during Thursday's very heavy downpours. SCX was 1kHz wide on headings of 250 - 290 degrees, 15-20dB in 1Hz (See photo). Also audible on 100 degrees. GCT was audible 240 - 000 degrees, spread, at 20dB in 200Hz, also audible on 100degrees. PKT was audible at 15dB, but clean. LEX was audible at 15dB, but clean.

From John G4BAO

Busy GHz month for me for a change, Starting on the 18th of August with a phone call from Phil, G8MLA who was in our local park with his new SG lab 3.4GHz transverter, This resulted in an SSB QSO with G8MLA/P at 59 both ways. Phil's first QSO on 3.4GHz

I switched to EME on the 23rd in preparation for the 2.3GHz and up EME contest and was awarded with digimode Q65 QSOS with SM6CKU JO67 for initial #32 on 10GHz EME, then OK2AQ JN89EU.

Back to terrestrial modes for the August SHF UKAC, on 10GHz CW I worked G4RQI IO93IRat 191km, G4BXD IO82UJat 170km, G4ZTR JO01KW at 59km, G4DBN IO93NR at 178km, and G3XDY JO02OB at 72km ODX was G4ASR/P IO82LB at 223km. On SSB I worked G4CLA at 99km and G0WZV JO01KV at 62km. On 3,4GHz CW I worked G3XDY, G4BXD and G4ZTR

Returning to 10GHz digimodes EME on the 24th I worked G4RFR IO90AS for initial #33, and in the contest proper, on the 27th worked OZ1LPR JO44UW, W3SZ FN10, PA0PLY JO32LR, VE4MA EN19LU and OK1CA JO70GM. I was also pleased to work GB2FRA celebrating 40 years of the FRAS. Sadly, this does not qualify as an EME "initial" as they used the G3RFR system and QTH.

Finally, back to 10GHz terrestrial on the 29th for the UKuG contest I worked 8 stations, ODX being GW3TKH/P IO81KR on CW at 236km

After a long hot dry summer, we finally got some rain here on the Fen Edge. September 6th brought backscatter from Dutch 10GHz beacons by beaming SW in to the rain band. That was followed by reception of the new GB3RPE beacon from Wales, and RS QSOs with some of the few 10GHz home stations that are active outside contests, namely G4RGK IO91ON on CW at 104km, G4DBN IO93NR, fully-quieting on NBFM at 178km and G4HSK JO01FS on SSB backscatter at 58km.

First Scatterpoint report from Mike G7AQA

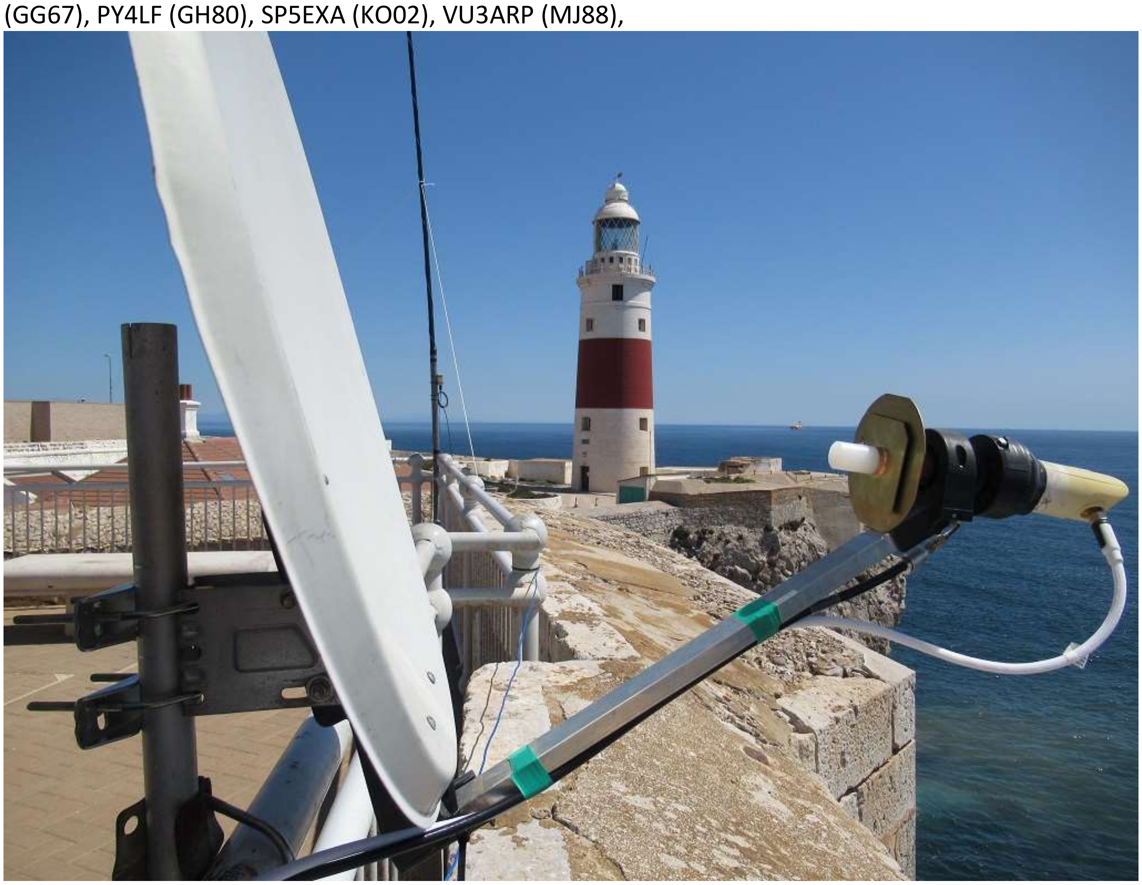
I made a very last-minute decision to go out portable in the recent contest. This was my first time on 10GHz, first time out portable, first time in a contest of any kind and actually first time on the air in quite a few years! It's a wonder I managed to get myself in place with everything I needed.... I'm really grateful for how easy the people I worked made it for me and I had such a good time. Apologies to G4ODA and G4KUX whom I could hear very strong but as it turned out the TX had turned up its toes and I ended up with an early bath. I hope to be about next month (tx permitting!) to try some more distant contacts.

From Denis G0OLX

I managed to work 5 stations on 10GHz EME on Sunday 28th August. Using just a 1.2m dish I managed Q65 QSOs with OZ1LPR, OK2AK, OK1CA, PA3DZL and OK1DFC. I also had a partial QSO with G4RFR who were using their GB2FRA callsign and Q65120E mode. This is the first time they have managed to decode anything from me, and we have tried several times in the past. The Moon path degradation was 2dB on the moon path at the time so hopefully I'll work them when conditions improve!

From Kev ZB2GI

Gibraltar Amateur Radio Society activated Europa Point Lighthouse ZB2LGT (GI 001) for the ILLW on the 20th & 21st August. GARS members Kevin Hewitt ZB2GI, John King ZB2JK and Ronnie Payas ZB2RR took part in the event, assisted by club regular Andy Rainer (white stick operator). Kirill Kats VE3AXC operated CW on Sunday. The station operated on QO -100 (plus HF + 6m, 2m, 70cm), the QO-100 set up comprising a DX Patrol up-converter and power amplifier connected to POTY mounted on a 60cm dish, driven by an FT817. The RX consisted of an LNB fed via a basis tee, connected to an RTL_SDR dongle running on SDR Console with the Beacon lock feature activated.
Photos show the setup of the Q0-100 station at Europa Point Lighthouse.
On SSB they worked DD1US (JN38), DG3SBJ (JN48), DH1TS (JO30), DJ7AO (EM59), DK4HH (JO53), DL4EA (JN48), DL7UE (JO62), DL8UVG (JO71), EA1SK (IN83), HB9GWJ (JN36), I/DL2GRC (JN72), OE3CRD (JN88), OE3FKB (JN88), ON7EQ (JO21), PA3FYM (JO22), S57NML (JN76), SM3NRY (JP82), YT7VG (JN95), and on CW, DL2AAW (JN37), DL5ST (JO60), DL5XL (JO43), DL7ULM (JO52), DL8FBH (JO40), DM4JM (JO30), EA3A (JN01), G4TQM (IO83), G7BTP (IO93), I2OIM (JO60), OE3OSB (JN88), OH5LK (KP20), ON4ASG (JO11), PA2U (JO22), PA3FYM (JO22), PP2RON (GH53), PY2PIM (GG67), PY4LF (GH80), SP5EXA (KO02), VU3ARP (MJ88),




ZB2LGT - Europa Point Lighthouse (IM76HC).

From Dave G4GLT

On Monday 12th September I arrived late at my portable spot (IO80DO) as conditions were not predicted to be good across the Channel earlier on.

I was somewhat surprised on switching on the gear to hear F5ZLF 10 GHz beacon coming through at good strength from 0839gmt and which continued till 1016 gmt at a distance of 728km. I had been looking for this beacon all summer but had not heard it. Pierre F4CKV is a portable station and is located along the line to this beacon but slightly nearer. The last time I heard this beacon was on 31st December 2019, during that massive event. So it is a rarity. Pierre also commented that there is a taller mountain blocking it's path to the U.K. Anyway, no contact was had with Pierre sadly as he was at work. How lucky we retirees are. Also heard during this event was F5ZBA (645km) and HB9G (861km). The Hepburn chart showed a clear area of enhanced probable propagation in Northern France.

I note also that the ODX for this beacon is held by G4CBW in Newcastle under Lyme, Staffs. On 20th October 2018 at 2220gmt he recorded this beacon at a distance of 874km.

I keep telling Pierre that we will succeed in having a QSO eventually.

July 10GHz Contest 2022

There was improved activity for this session, with Open section leader John G4ZTR making 25 QSOs. Views on conditions were quite mixed, no rain scatter was observed but tropo signals were good for some entrants.
In the Restricted section Barry G4SJH/P was the winner, with Peter GW4JQP the runner up.
In the Open section the runner up was Paul M0EYT/P. Best DX was the 440km QSO between David G4ASR and Maarten ON/PA0MHE.
73
John G3XDY
UKuG Contest Manager

10GHz Contest 31 July 2022

Open Section

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX Kms
1	G4ZTR	JO01KW	25	5728	F6DKW	365
2	M0EYT/P	IO80WP	17	2940	M0DTS/P	419
3	G4LDR	IO91EC	15	2867	G4KUX	395
4	M0DTS/P	IO94LI	10	2516	M0EYT/P	419
5	G4KUX	IO94BP	10	2437	G4LDR	395
6	M0GHZ	IO81VK	13	2092	ON/PA0MHE	383
7	G4ASR	IO81MX	11	2041	ON/PA0MHE	440
8	G4BAO	JO02CG	6	1061	G4KUX	298
9	G1PPA/P	IO93RI	6	885	G4ASR	224
10	G0JBA	JO01PG	6	841	G4LDR	205
11	G4BXD	IO82UJ	5	721	G4ZTR	222
12	GW0MDQ	IO83KC	2	506	G4ZTR	301
13	G3YJR	IO93FJ	2	259	G4KUX	141
14	GW4MBS	IO71XW	2	203	G4UVZ	125

Restricted Section

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX Kms
1	G4SJH/P	IO91GI	11	1420	ON/PA0MHE	331
2	GW4JQP	IO71KR	2	240	G4UVZ	162

July 5.7GHz Contest 2022

Conditions were flat for this session, although some damp weather was reported no rainscatter was reorted,
The winner on this occasion is Telford & DARS G6ZME/P, with Dave G1EHF/P in the runner up position. Best DX was between G1EHF/P and F8DLS at 430km.
73
John G3XDY
UKuG Contest Manager

5.7GHz Contest 31 July 2022

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX Kms
1	G6ZME/P	IO82QL	12	1670	G3XDY	265
2	G1EHF/P	IO91GI	10	1524	F8DLS	430
3	G1PPA/P	IO93RI	7	1283	G4LDR	261
4	M0GHZ	IO81VK	9	1244	G3XDY	246
5	G4LDR	IO91EC	9	1102	G1PPA/P	261
6	M0EYT/P	IO80WP	8	932	G4ODA	274
7	G4BRK	IO91HP	5	498	G4ODA	152

5.7/10GHz Championship Tables

Positions after three events, best three of five count to the total

5.7GHz

Pos	Callsign	29/05/2021	26/06/2021	31/07/2021	TOTAL
1	M0GHZ	867	502	745	2114
2	G6ZME/P	0	1000	1000	2000
3	G1EHF/P	1000	0	913	1913
4	M0EYT/P	877	0	558	1435
5	G4CLA	996	0	0	996
6	G4LDR	0	296	660	956
7	G3ZME/P	916	0	0	916
8	G1PPA/P	0	0	768	768
9	GW4HQX/P	744	0	0	744
10	G4BRK	0	262	298	560
11	G8AIM	193	78	0	271
12	GW4MBS	0	0	0	0

10GHz Open

Pos	Callsign	29/05/2021	26/06/2021	31/07/2021	TOTAL
1	G4ZTR	1000	824	1000	2824
2	G3ZME/P	767	1000	0	1767
3	G4LDR	0	743	501	1244
4	M0GHZ	478	256	365	1099
5	M0EYT/P	573	0	513	1086
6	G4CLA	641	0	0	641
7	G0WZV	234	328	0	562
8	G(W)4MBS(/P)	264	201	35	500
9	GW3TKH/P	456	0	0	456
10	M0DTS/P	0	0	439	439
11	G4KUX	0	0	425	425
12	G4ASR	0	0	356	356
13	GW0MDQ(/P)	231	0	88	319
14	G4BXD	140	0	126	266
15	G4BAO	0	0	185	185
16	G1PPA/P	0	0	155	155
17	G0JBA	0	0	147	147
18	G8AIM	41	46	0	87
19	GM0HIK/P	73	0	0	73
20	G3YJR	0	0	45	45
21	GM4DIJ/P	28	0	0	28

10GHz Restricted

Pos	Callsign	29/05/2021	26/06/2021	31/07/2021	TOTAL
1=	G1EHF/P	1000	0	0	1000
1=	G4SJH/P	0	0	1000	1000
3	GW4JQP	0	0	169	169

UKuG MICROWAVE CONTEST CALENDAR 2022

Dates, 2022	Time UTC	Contest name
11-Sep	0900 - 1700	3rd 24GHz Contest & 24GHz Trophy
12-Sep	0900 - 1700	3rd 47GHz Contest
12-Sep	0900 - 1700	3rd 76GHz Contest
25 -Sep	0600 - 1800	5th 5.7GHz Contest
25 -Sep	0600 - 1800	5th 10GHz Contest
16 -Oct	0900 - 1700	4th 24GHz Contest
16 -Oct	0900 - 1700	4th 47GHz Contest
16 -Oct	0900 - 1700	4th 76GHz Contest
13 -Nov	1000 - 1400	5th Low band 1.3/2.3/3.4GHz

MICROWAVE CONTESTS - 2022

Month	Contest name	Certificates	Date 2022	Time GMT	Notes
Jan	1.3GHz Activity Contest	*Arranged by RSGB*	18-Jan	2000 - 2230	RSGB Contest
Jan	2.3GHz+ Activity Contest	*Arranged by RSGB*	25-Jan	1930 - 2230	RSGB Contest
Feb	1.3GHz Activity Contest	*Arranged by RSGB*	15-Feb	2000 - 2230	RSGB Contest
Feb	2.3GHz+ Activity Contest	*Arranged by RSGB*	22-Feb	1930 - 2230	RSGB Contest
Mar	Low Band 1296/2300/2320/3400MHz	F, P,L	6-Mar	1000 - 1600	First 4 hours coincide with IARU event
Mar	1.3GHz Activity Contest	*Arranged by RSGB*	15-Mar	2000 - 2230	RSGB Contest
Mar	2.3GHz+ Activity Contest	*Arranged by RSGB*	22-Mar	1930 - 2230	RSGB Contest
Apr	Low Band 1296/2300/2320/3400MHz	F, P,L	10-Apr	1000 - 1600	
Apr	1.3GHz Activity Contest	*Arranged by RSGB*	19-Apr	1900 - 2130	RSGB Contest
Apr	2.3GHz+ Activity Contest	*Arranged by RSGB*	26-Apr	1830 - 2130	RSGB Contest
May	REF/DUBUS EME 1.2GHz	*Arranged by REF/DUBUS*	7-May to 8-May	0000 - 2400	REF/DUBUS EME 1.2GHz
May	*432MHz & up*	*Arranged by RSGB*	*7-May to 8-May*	*1400 -1400*	RSGB Contest
May	*10GHz Trophy*	*Arranged by RSGB*	*8-May*	*0800 - 1400*	Sunday, to coincide with IARU
May	Low Band 1296/2300/2320/3400MHz	F, P,L	8-May	0800 - 1400	Aligned with IARU event
May	24GHz/47/76GHz		15-May	0900-1700	
May	1.3GHz Activity Contest	*Arranged by RSGB*	17-May	1900 - 2130	RSGB Contest
May	2.3GHz+ Activity Contest	*Arranged by RSGB*	24-May	1830 - 2130	RSGB Contest
May	REF/DUBUS EME 10GHz & Up	*Arranged by REF/DUBUS*	28-May to 29-May	0000 - 2400	REF/DUBUS EME 10GHz & up
May	5.7GHz/10GHz	F, P,L	29-May	0600-1800	
Jun	REF/DUBUS EME 2.3GHz	*Arranged by REF/DUBUS*	4-Jun to 5-Jun	0000 - 2400	REF/DUBUS EME 2.3GHz
Jun	Low Band 1296/2300/2320/3400MHz	F, P,L	5-Jun	1000 - 1600	Aligned with some Eu events
Jun	1.3GHz Activity Contest	*Arranged by RSGB*	14-Jun	1900 - 2130	RSGB Contest
Jun	2.3GHz+ Activity Contest	*Arranged by RSGB*	21-Jun	1830 - 2130	RSGB Contest
Jun	5.7GHz/10GHz	F, P,L	26-Jun	0600-1800	
Jul	REF/DUBUS EME 5.7GHz	*Arranged by REF/DUBUS*	2-Jul to 3-Jul	0000 - 2400	REF/DUBUS EME 5.7GHz
Jul	VHF NFD (1.3GHz)	*Arranged by RSGB*	2-Jul to 3-Jul	1400 - 1400	RSGB Contest
Jul	24GHz/47/76GHz		10-Jul	0900-1700	
Jul	1.3GHz Activity Contest	*Arranged by RSGB*	19-Jul	1900 - 2130	RSGB Contest
Jul	2.3GHz+ Activity Contest	*Arranged by RSGB*	26-Jul	1830 - 2130	RSGB Contest
Jul	REF/DUBUS EME 3.4GHz	*Arranged by REF/DUBUS*	30-Jul to 31-Jul	0000 - 2400	REF/DUBUS EME 3.4GHz
Jul	5.7GHz/10GHz	F, P,L	31-Jul	0600-1800	
Aug	1.3GHz Activity Contest	*Arranged by RSGB*	16-Aug	1900 - 2130	RSGB Contest
Aug	2.3GHz+ Activity Contest	*Arranged by RSGB*	23-Aug	1830 - 2130	RSGB Contest
Aug	5.7GHz/10GHz	F, P,L	28-Aug	0600-1800	
Sep	24GHz/47/76GHz		11-Sep	0900-1700	
Sep	ARRL Microwave EME	*Arranged by ARRL*	17-Sep to 18-Sep	0000 - 2359	ARRL EME 2.3GHz & Up
Sep	1.3GHz Activity Contest	*Arranged by RSGB*	20-Sep	1900 - 2130	RSGB Contest
Sep	5.7GHz/10GHz	F, P,L	25-Sep	0600-1800	
Sep	2.3GHz+ Activity Contest	*Arranged by RSGB*	27-Sep	1830 - 2130	RSGB Contest
Oct	*432MHz & up*	*Arranged by RSGB*	*1-Oct to 2-Oct*	*1400 - 1400*	IARU/RSGB Contest
Oct	*1.3 & 2.3GHz Trophies*	*Arranged by RSGB*	*1-Oct*	*1400 - 2200*	RSGB Contest
Oct	ARRL EME 50-1296MHz	*Arranged by ARRL*	15-Oct to 16-Oct	0000 - 2359	ARRL EME Contest
Oct	24GHz/47/76GHz		16-Oct	0900-1700	
Oct	1.3GHz Activity Contest	*Arranged by RSGB*	18-Oct	1900 - 2130	RSGB Contest
Oct	2.3GHz+ Activity Contest	*Arranged by RSGB*	25-Oct	1830 - 2130	RSGB Contest
Nov	ARRL EME 50-1296MHz	*Arranged by ARRL*	12-Nov to 13-Nov	0000 - 2359	ARRL EME Contest
Nov	Low Band 1296/2300/2320/3400MHz	F, P,L	13-Nov	1000 - 1400	
Nov	1.3GHz Activity Contest	*Arranged by RSGB*	15-Nov	2000 - 2230	RSGB Contest
Nov	2.3GHz+ Activity Contest	*Arranged by RSGB*	22-Nov	1930 - 2230	RSGB Contest
Dec	1.3GHz Activity Contest	*Arranged by RSGB*	20-Dec	2000 - 2230	RSGB Contest

Sections		
	F	Fixed / home station
	P	Portable
	L	Low-power <10W 1.3/2.3/3.4GHz, <1W 5.7GHz)

Main changes from 2021 calendar

122GHz+ events removed (no fixed dates in 2022)

EVENTS 2022

2022

September 18	Crawley Roundtable, Crawley club, Tilgate forest	CARC – Crawley Amateur Radio Club
September 25-30	2022 European Microwave Week, Milan, Italy	www.eumweek.com
October 7-9	RSGB Convention	rsgb.org/convention
October 15-15	National Hamfest	www.nationalhamfest.org.uk
October 22	Scottish Roundtable	https://www.gmroundtable.org.uk
December 3	Midlands Roundtable	Eaton Manor SY6 7DH

2023

April 1	CJ-2023, Seigy	cj.r-e-f.org

80m UK Microwavers net

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

73 Martyn Vincent G3UKV

Late News

11th September 2022 at 1415 UTC.

I had a QSO with Maarten, ON/PA0MHE/P on 24GHz at a distance of 108km, he was located on top of a sand dune, South of Ostend, Belgium.

Reports 55 each way on SSB and then later worked on FM at 57 each way.

He was using a wave labs system with 30cm PF dish and 2w.

My system by Kuhne and 40cm off set dish and 2w.

Locators JO01PG - JO11KE 108km

There was some QSB and flutter but both were very pleased with the QSO.
My location is 5km from the coast (32m above sea level) and so the path was nearly all across the Sea.

Next location Maarten is going to try is 145km, just inside the Netherlands, again on the coast. If that is successful we will look to increase the distance when conditions are again favourable.

He is going to try a location at a later date from a 25m high dune, near Middleburg, Netherlands.

On the day of the above QSO Humidity was 64% at my location and conditions were not great.

It was a new country and locator grid for me. Now worked 6 Large Grids and 3 countries on 24GHz and all from home on Tropo.

Phil G0JBA