



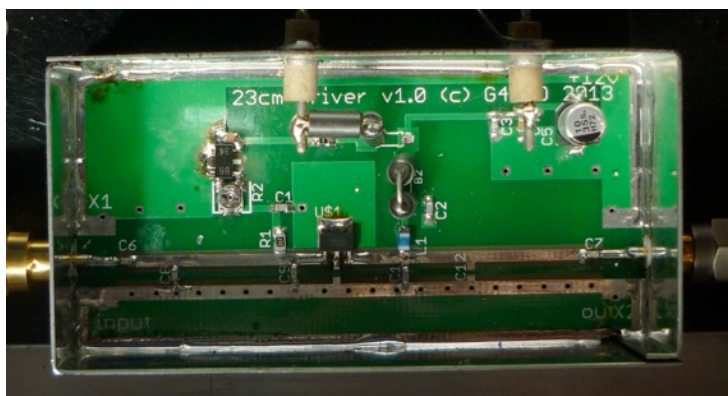
scatterpoint

May 2017

Published by the UK Microwave Group

**Some improvements to the G4BAO
2.5 Watt LDMOS Driver for the 1.3GHz
band**

**By John C Worsnop. PhD CEng MIET,
G4BAO**



In this Issue

Loan Equipment	2
Subscription Information.....	3
UK μ G Chip Bank – A free service for members	4
UK μ G Project support	4
UK μ G Technical support.....	4
Chairman's Thoughts	5
IARU Region-1 Conference	5
Subject: Millimetre Wave Bands and WRC-19	6
Subject: Millimetre Wave Progress and Innovation	7
Some improvements to the G4BAO 2.5 Watt LDMOS Driver for the 1.3GHz band.....	10
More on the Gigawave Amplifiers	12
Small dish feed for 23cm EME	14
April 2017 Lowband Contest Results	17
UKuG Microwave Contest Calendar 2017	21
First intra-South American EME QSO	22
Activity News : April 2017	28
17th Microwave Technical Meeting in Bydgoszcz (JO83WR)	31
Events calendar.....	32

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Loan Equipment

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

5.7GHz

10GHz

76GHz

Contact John G4BAO for more information.

Subscription Information

The following subscription rates apply.

UK £6.00 US \$12.00 Europe €10.00

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

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

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

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

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

PLEASE QUOTE YOUR CALLSIGN!

Payment can be made by: PayPal to

ukug@microwavers.org

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

Articles for Scatterpoint

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

Please send them to

editor@microwavers.org

The CLOSING date is the FIRST day of the month

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

Please submit your articles in any of the following formats:

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

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

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

Thank you for you co-operation.

Martin G8BHC

Reproducing articles from Scatterpoint

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

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UKμG Chip Bank – A free service for members

The catalogue is on the UKμG web site at www.microwavers.org/chipbank.htm and has been updated to include the items from G4HUP's estate plus a few other additions and deletions.

Non members can join the UKuG by following the non-members link on the same page and members will be able to email Mike with requests for components. All will be subject to availability, and a listing of a component on the site will not be a guarantee of availability of that component. The service is run as a free benefit to all members and the UK Microwave Group will pick up the cost of packaging and postage.

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

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

There is an order form on the website with an address label which will slightly reduce what I have to do in dealing with orders so please could you use it. Also, as many of the components are from unknown sources, if you have the facility to check the value, particularly unmarked items such as capacitors, do so, and let me know if any items have been mislabelled.

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

Mike Scott G3LYP

UKμG Project support

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

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

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

- **Please apply in advance of your project**
- **We effectively reimburse costs - cash on results (eg Beacon on air)**
- **We regret we are unable to support running costs**

Application forms below should be submitted to the UKuG Secretary, after which they are reviewed/agreed by the committee

www.microwavers.org/proj-support.htm

UKμG Technical support

One of the great things about our hobby is the idea that we give our time freely to help and encourage others, and within the UKuG there are a number of people who are prepared to (within sensible limits!) share their knowledge and, what is more important, test equipment. Our friends in America refer to such amateurs as "Elmers" but that term tends to remind me too much of that rather bumbling nemesis of Bugs Bunny, Elmer Fudd, so let's call them Tech Support volunteers.

While this is described as a "service to members" it is not a "right of membership!"

Please understand that you, as a user of this service, must expect to fit in with the timetable and lives of the volunteers. Without a doubt, the best way to

make people withdraw the service is to hassle them and complain if they cannot fit in with YOUR timetable!

Please remember that a service like our support people can provide would cost lots of money per hour professionally and it's costing you nothing and will probably include tea and biscuits!

If anyone would like to step forward and volunteer, especially in the regions where we have no representative, please email john@g4bao.com

The current list is available at

www.microwavers.org/tech-support.htm

Chairman's Thoughts

I have been preparing to travel to Dayton (Xenia) later this month. This will be at least my tenth Dayton. Once again I have opted for the long drive from Dallas to Dayton. This is about 1150 miles each way, but allows me to visit Dallas once again. My last visit was five years ago. The amateur radio scene in Dallas is quite dynamic, especially on microwave, but generally covering all aspects of our hobby. I am a long-time member of the North Texas Microwave Society (NTMS) and was once a regular business visitor to that fine metroplex.

The trip to Dayton involves an early morning departure from Grand Prairie in order to miss the Dallas commute grid locks. Once we reach Memphis in the van the route can variously take a northerly route along the Mississippi and across into Missouri, before going east towards Louisville, or maybe through Memphis and up to Nashville and onto Cincinnati before reaching Dayton.

The new venue in Xenia, at the Greene County Fairgrounds, looks interesting and will be a new experience for everyone. Hamvention had been held at the now defunct Hara Arena for too many years.

As well as helping Kent, WA5VJB, in the fleamarket I will be speaking about VHF transverters in the VHF Forum, at the invite of Tony Emanuele, WA8RJF, as was. I haven't memorised his new callsign yet!

The VHF Weak Signal dinner on Friday evening is always a highlight for me. This year is no exception. There are several other social events of interest to weak signal VHF/UHF/Microwave and EME operators and bumping into people you know in the halls and fleamarket are all part of the experience.

Of course, I will be looking for those elusive microwave bits and pieces at what is still probably the biggest microwave event in the world, by numbers.

The trip back to Dallas can also be interesting with previous routes being via Alabama, West Virginia and Kansas.....decisions on the route are usually made towards the end of Hamvention.

One person I will miss seeing this year is Lloyd, NE8I, who passed away a few months ago. He was always a fixture, next door to Kent's pitch, and a real microwave rover enthusiast. And I shouldn't forget Dave, G4HUP, who I had also shared the pitch with in previous years and who I had originally planned to travel out with.

I will report on my trip in a forthcoming Scatterpoint.

Sam Jewell, G4DDK

Chairman, UKuG

IARU Region-1 Conference

Landshut, Germany, 16 – 23 September 2017

Murray Niman G6JYB

The IARU Region-1 Conference papers are now online.

Here are what the two mm ones look like after they went through the Region-1 Secretary.

(There are 48 others for VHF-Microwave!)

All can be downloaded from: <https://www.iaru-r1.org/index.php/general-conference/landshut-2017>

Subject: Millimetre Wave Bands and WRC-19

Society	RSGB	Country:	United Kingdom
Committee	C5	Paper Number	LA17_C5_30
Author	Barry Lewis G4SJH		

1. Introduction

The millimetre wave bands allocated to the Amateur and Amateur Satellite services continue to come under scrutiny during the preparatory studies for certain WRC-19 agenda items. In particular, Agenda Item 1.13 is expected to identify new frequency bands for mass market mobile broadband applications.

2. Background

WRC-19 Agenda item 1.13 seeks to identify new frequency bands for the development of International Mobile Telecommunications (IMT) in accordance with ITU-R Resolution 238. This resolution identifies a number of specific frequency ranges for ITU-R studies within the overall range from 24,25 GHz to 86 GHz. Specific bands that it encompasses or are adjacent to amateur bands include 24,25 – 27,5 GHz and 45,5 – 50,2 GHz.

The IMT technology under development that is expected to be deployed in these frequencies is a family known as IMT-2020 and more commonly referred to as '5G'.

IARU Region-1 has already submitted information to the CEPT Conference Preparatory Group (CPG) and this is reflected in the CEPT Brief on Agenda Item 1.13 that is currently under development. However more might be needed to remind administrations to keep the amateur service interests in mind as the studies conclude and the European common positions are developed ahead of WRC-19.

3. Key Points and Proposal

The two key bands from an amateur perspective are:

- 24 – 24,05 GHz – Primary allocation to the Amateur and Amateur Satellite services
- 47 – 47,2 GHz – Primary allocation to the Amateur and Amateur Satellite services

Neither of these relatively small bands is allocated to any other radio communication service on either a co-primary or secondary basis.

The band 24 – 24,05 GHz is not co-frequency with those identified in Resolution 238. However, the future 5G systems are expected to operate in very wide channels (e.g. 200 MHz) according to information from the standardisation bodies. So only 200 MHz above the top end of the amateur band, there could be many channels intensively used for 5G operation involving both base stations and user terminals.

Therefore, adjacent frequency compatibility between the proposed incoming 5G technologies and the primary amateur services in 24 – 24,05 GHz should be considered within the scope of the Resolution 238 studies. The protection of the amateur services should be addressed.

The band 47 – 47,2 GHz is co-frequency in certain bands identified in Resolution 238 and is therefore undoubtedly within the scope of the Resolution 238 studies.

The RSGB believes these bands are very important for the microwave interests in the amateur radio community as they sit at a transition point where system implementation takes a step from the more readily accessible lower frequencies, towards the more difficult higher frequencies.

They offer challenges that motivate the interest of the microwave communities and offer the potential for innovation and ground breaking activity. These bands can exploit compact high gain antennas and offer opportunities for long range DX by portable stations (>200 km at 47 GHz), as well as EME (moon bounce) activity.

Therefore, the amateur and amateur satellite services in these frequency ranges must be protected in accordance with their primary status.

4. Recommendations

- That IARU member societies fully engage with their national administrations to ensure they are fully aware of the radio amateur interest in their countries in the 24 GHz and 47 GHz bands.
- That IARU member societies ensure their national administrations actively support the protection of the amateur radio services in the 24 GHz and 47 GHz bands in the WRC-19 preparatory studies.
- That IARU member societies encourage their national interest groups to publicise and highlight their achievements in these frequency bands (including by webpages, social media, YouTube, etc.)

Subject: Millimetre Wave Progress and Innovation

Society	RSGB	Country:	United Kingdom
Committee	C5	Paper Number	LA17_C5_31
Author	Barry Lewis G4SJH		

1. Introduction

Experimentation in the highest frequency amateur bands is producing results and “firsts” that demonstrate the extraordinary achievements of UK amateurs dedicated to activating these mm-wave bands.

New developments in licensing in the UK are opening the possibility to experiment in the terahertz frequency ranges above 275 GHz.

2. Background

In common with many countries, the UK amateur licence enables access to frequencies at 122, 134 and 248 GHz.

- 122,25 – 123 GHz is a secondary allocation and subject to high Oxygen attenuation (similar to 60 GHz)
- 134 – 136 GHz is a primary allocation immediately below the amateur secondary band allocation at 136 – 141 GHz.
- 248 – 250 GHz is a primary allocation immediately above the secondary band allocation at 241 – 248 GHz.

At 134 GHz, harmonised narrowband activity centre is nominally at 134,928 GHz, but in practice 134 and 248 GHz operation is dependent on convenient multiples from synthesised/multiplier local oscillators which are chosen for best frequency stability and low phase noise etc.

3. Key Points and Proposal

Annex 1 provides details of activities amongst the most enthusiastic constructors and operators developing and operating systems using the three highest Millimetre Wave bands in the UK. These activities include some “firsts” and are expected to provide the basis for ongoing experimentation and development.

Annex 2 provides information on licensing developments negotiated with the UK administration to provide access to even higher frequency bands in the terahertz region to encourage further experimentation. The approach used is suitable for potential requests in other countries. It is also important to note that there is demand for frequencies in 275-450 GHz from WRC-19 AI-1.15

4. Recommendations

- Member Societies should recognise the importance of the millimetre wave frequency bands as territory for experimentation and innovation.
- Member Societies should recognise that the ability to exploit these frequencies reflects the true amateur radio spirit of self-learning and training.
- Member Societies should encourage national interest-group organisations to provide a forum for efficient sharing of experiences and ideas amongst their amateur communities for the use of these bands.
- Member Societies should facilitate the organisation of events and meetings (including contests) that can allow like-minded enthusiasts to exchange ideas.
- Member Societies should take steps to highlight and promote activity and experimentation in this area with their national and regional administrations. Note: - See also the RSGB Paper regarding the 24 & 47 GHz bands and its recommendations

Annex 1: UK Millimetre Wave Activities

122 GHz: The first UK contact in the 122 GHz band took place on 17 July 2016 between G8CUB/P and G0FDZ/P over a distance of 120 m. The CW reports were 599 both ways. The 122 GHz band is noted for its high signal attenuation due to atmospheric oxygen and water vapour attenuation. The maritime climate of the UK leads to larger water vapour absorption and other gaseous losses than in other parts of Europe. G8ACE has been continuing to experiment and has received signals up to 6,7 km in the 122 GHz band. See <http://microwaves.dsl.pipex.com/> which includes numerous videos of activity in a number of millimetre- wave bands

134 GHz: G8KQW and G8ACE achieved a successful 134GHz CW contact which extended the existing UK 134 GHz distance record to 35,6 km on 16 January 2016 [3]. The key enabler for success on this

extended distance record contact was lower path loss due to less water vapour attenuation; dew point temperature on 16 January 2016 was -1°C whereas on 20 September 2015 it was 14.3°C.

241 GHz: The 241 - 250 GHz bands are the highest frequencies globally allocated to amateur radio. Whilst powers and noise figures are challenging, experimentation is rising, helped by progress in lower bands such as 134 GHz and stable frequency sources. The high antenna gains available from small dish sizes facilitate portable operation, provided they are accurately aligned to accommodate the small beam angles. The first UK 241 GHz QSO took place on 19 Feb 2016 between G8CUB/P and G0FDZ/P in locator square JO01EP. The distance was 30 metres and the CW signals were 559 and 589. With signal to spare both ways an attempt was made to increase the distance to over 50 m but with deteriorating weather likely, a decision was taken to limit to 30 m as antenna alignment was taking a very long time to achieve.



Figure 1: 241 GHz Transverters for the first UK 241 GHz QSOs. Source: Scatterpoint March 2016

All transmitters and local oscillators were derived from surplus commercial synthesisers. Often work is carried out to “hack” these to make smaller frequency increments possible or improve performance for narrow band operations. G8CUB was using 16.0385 GHz as LO (x15) into a Tektronix mixer. G0FDZ used a 1 mm diameter hole to a slab mixer (see below) on Rx with cut-off around 175 GHz, whilst G8CUB used a piece of WR-03 – 173 GHz cut-off wave guide.

G8ACE is another millimetre wave enthusiast and has been making great progress in 2016 and pushing QSO distances out to over 400 m with the most recent tests up to 6.7 km. More information can be found at <http://microwavers.org/241ghz.htm> as well as <http://microwaves.dsl.pipex.com/>.

Technology considerations

The system architecture for narrow band mode transverters in these bands is generally well known but the detailed implementation of component parts can be challenging and is a ripe area for innovative approaches.

For example, a key feature of the 122 GHz system was the use of a slab type mixer housing which has been recently developed by G0FDZ to make millimetre wave mixers easier to construct for numerous bands. This approach has also been used for 241 GHz and it is hoped that the slab mixer format will greatly help those who wish to venture onto the highest frequencies. Its design enables the user to easily adapt the slab to suit the required band by suitable drilling and tapping etc. without the need to obtain specific band metalwork.

Without power amplifier availability at these frequencies, the transmitter power levels tend to be less than 100 micro-watts feeding dish antennas with around 47 dBi gain. Beam widths are very narrow requiring careful alignment for successful QSOs, typically with telescopic sights.

Annex 2 Access to spectrum >275 GHz for further Experimentation

In the UK, from October 2016 licence variations were made available to allow Full Licensees access to certain spectrum blocks from 275 GHz to 3000 GHz, to facilitate innovation at the cutting edge of rf/microwave technology. The licence variation specifies frequency bands based on ITU-RR5.565, including protection zones around key UK Radio Astronomy Sites.

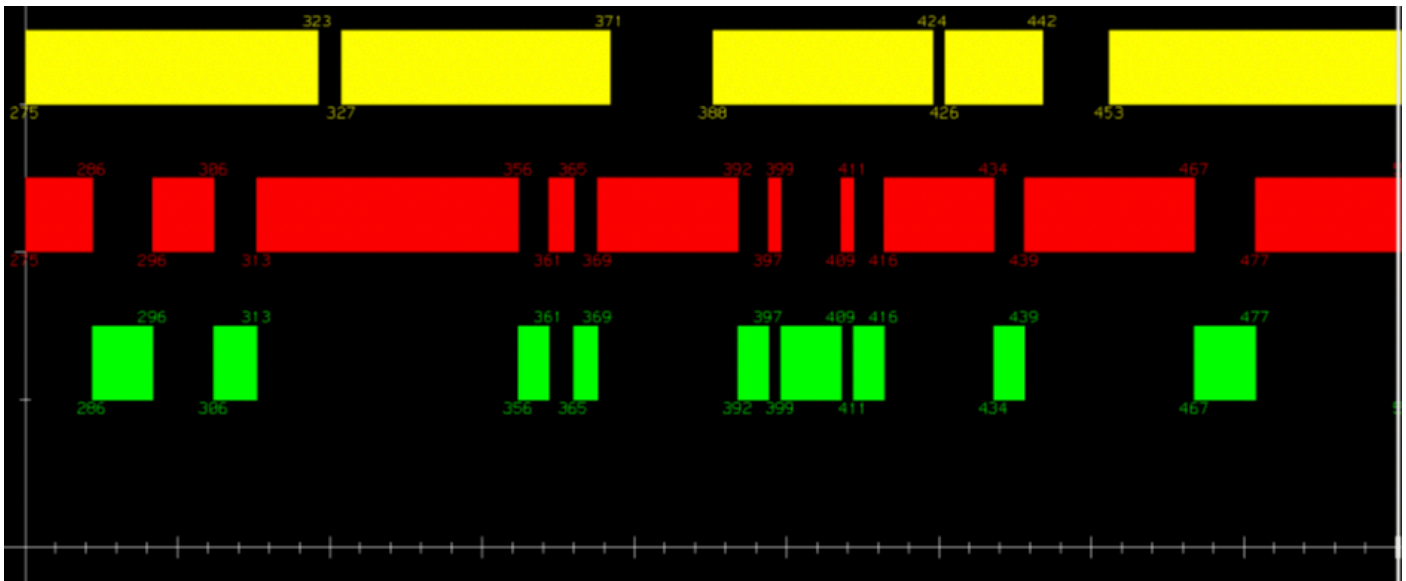


Figure 2: Sub-bands in the 275 – 500 GHz part of the full range (from www.rsgb.org)

Figure 2 illustrates the available blocks in the range 275 – 500 GHz with the

- Yellow ranges indicate the Radio Astronomy frequencies requiring protection.
- Red blocks indicate where no transmissions are allowed, essentially matching the RR5.565 identification of sub-bands for – Earth exploration-satellite service (EESS) and Space research service (SRS) passive applications.
- Green blocks identify the frequencies where operation is authorised although in all the cases in Fig 1 (since they overlap the yellow ranges) a separation distance of at least 20 km is required from identified radio astronomy sites. There are seven such radio astronomy sites in the UK.

Similar blocks can be derived from examination of ITU-RR5.565 for the frequencies up to 1000 GHz and in some cases, there is no overlap with the radio astronomy frequencies.

Regarding the UK case:

- Transmitter power levels up to 100 mW are allowed
- Further guidance <http://rsgb.org/main/operating/band-plans/microwaves/terahertz/>

Note: Part of this frequency range (275 - 450 GHz) is also currently under study as it is the topic of WRC-19 Agenda Item 1.15 for commercial fixed and mobile us

Some improvements to the G4BAO 2.5 Watt LDMOS Driver for the 1.3GHz band

John C Worsnop. PhD CEng MIET, G4BAO

Introduction

Having just recently got a PE1RKI, 250W PA for EME use I found that due to a long feeder run, by the time the 23cm RF from my TS2000X had reached my dish site it was frustratingly about 1-2 dB below the 3W level required to drive the amp to full output.

I decided to see if I could generate the linear 3 Watts required using my 2.5W driver board kit (1) and then back off the TS2000X with attenuators.

Increasing Vdd

The PD85004 device used in the original design (2) is rated to 4Watts at 900MHz and a Vdd max of 40V. I found that with a 15V Vdd supply derived with a linear regulator from the main PA's 28V supply, I could get a linear 3 Watts out with 100mW of drive if I ran the driver standing bias Ids at 200mA instead of 50mA.

The Id increased to around 350mA at full output, an efficiency of about 60%.

Regulated bias and Driver on off PTT control

I didn't want to run the driver "on" all the time, and wanted the ability to switch it off under fault conditions. The PE1RKI PA is switched by applying a low current +12V supply on transmit, so to enable me to switch the driver from the same line, I added a small 5V regulator and capacitor to the driver board (Figure 1) by cutting a single track and scraping off some solder resist. The ferrite choke was desoldered at the supply end and connected to a feedthrough on the box for PTT bias input.

R3 was replaced with a zero ohm resistor. See Photo 1.

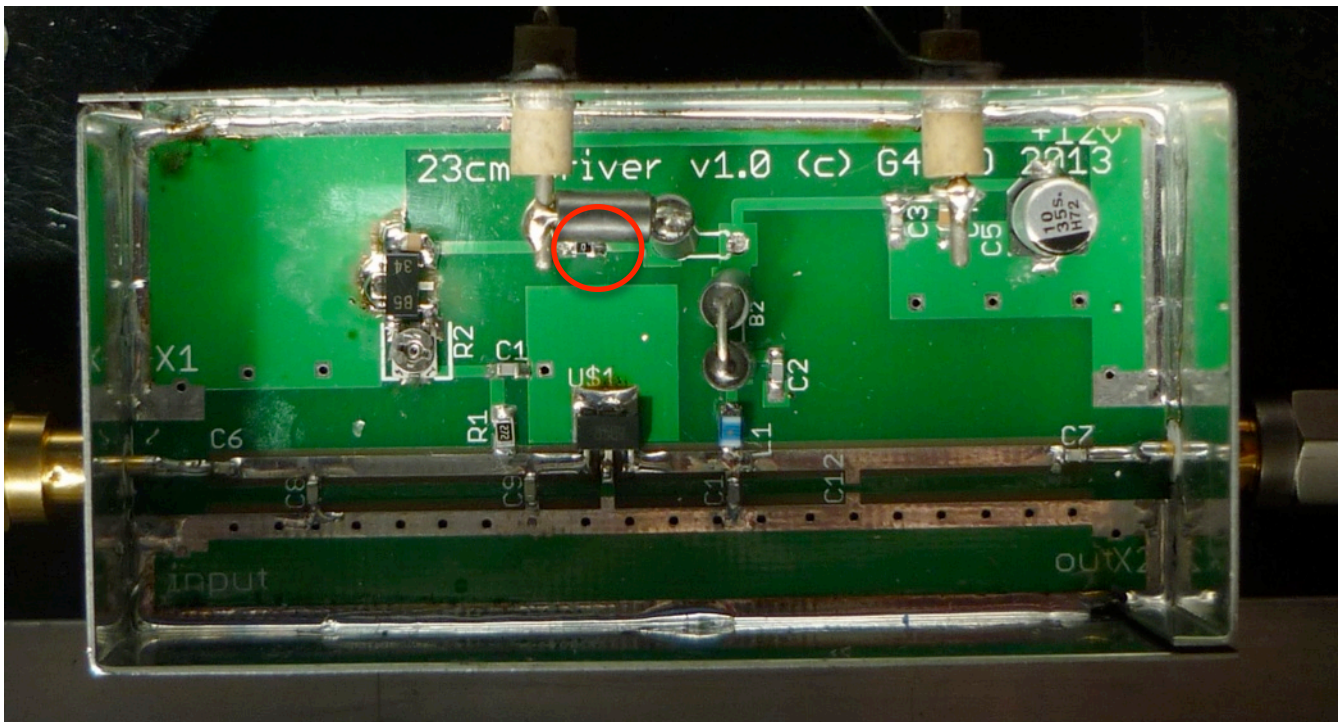


Photo 1: The added regulator and capacitor and moved inductor

The RKI amp produces an over temperature logic level of +5V when the amp gets too hot, so with some extra circuitry I now have a way to switch off the drive under VSWR fail conditions or overheating by disabling the driver's bias regulator.

Checking the completed mods

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

Connect the drain to 15 volts via an ammeter on the 1A amp range. Connect the gate bias supply, starting with minimum volts on the gate, VERY carefully increase the gate voltage until the device begins to take current. This onset is very sharp, so be very careful, as the drain current can easily swing up to many Amperes if you are not careful. Set the drain current to 200mA. Apply drive and check that the output power is more than 3 Watts with 100mW of drive at a drain current of around 350mA.

Conclusions

Increasing Vdd to 15V and adding a switched, regulated bias supply the G4BAO 2.5W driver amplifier can be made more versatile in 28V systems and produce enough power to drive a large SSPA such as the DF9IC or PE1RKL.

Revised circuit

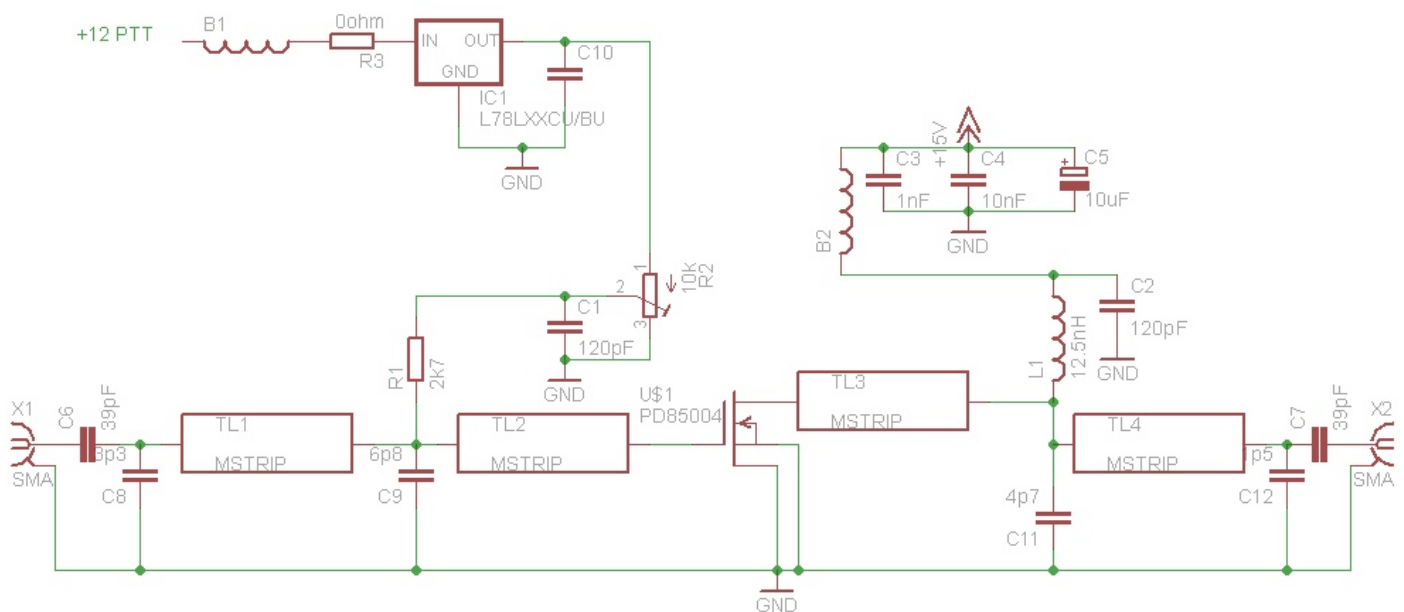


Figure 2: Driver with added 5V bias regulator

Table 1 – Added /changed components

Component	Value	Type
IC1	uA78L05	SMD PK package
R3	Was 2k7 now 0R	805
C13	330nF	Murata ceramic 0805 or 0603

References

1. Original article:- www.g4bao.com/Files/23cm_D.zip
2. PD85004:- www.mouser.com/ds/1/389/CD00178461-55263.pdf
3. Unmodified kits can be obtained from the author. See www.g4bao.com for details.

More on the Gigawave Amplifiers

Andy Talbot G4JNT April 2017

Correction to PSU conditioner diagram– As described in April 2017 Scatterpoint.

Due to some mental aberration I showed the input polarity protection MOSFET as an N-Channel IRF540 device. This is completely incorrect. To sit in the positive input rail, A P-Channel MOSFET is needed, upside down so the +Ve supply input goes to the drain. So both the polarity of device and Source-Drain connections are shown incorrectly in the circuit diagram last month. A suitable P-channel device for this application is something like the IRB80P03; or search the catalogue listings for a device with no more than a few tens of milli-ohms $R_{DS(on)}$ and greater than 30V rating

Power Monitoring

Pin 6 on the ribbon cable connector – the blue wire – carries a logic level signal that indicates when power output is above around 2 watts. This alone is not terribly useful, but does indicate that some sort of power monitoring circuitry is built into the PA stages of these amplifiers. Looking at the feed-through connectors on the PA modules, both 5.8 and 2.3GHz units have a white wire that feeds back to a pin on the DC control board. (Actually there are two white wires in use, one supplies a power control FET. The power monitor goes to the pin on the right hand side, adjacent to one of the original 12v fan supplies that you will have removed to modify the circuitry so the fans can run from +12V)

This connection passes to pin 10 of the quad opamp IC2, marked "074C" on my 2.3GHz unit. Photo 1 shows the relevant IC with pin 10 indicated. Monitoring this point while varying the output power showed a nicely monotonic relationship between P_{out} and voltage. Figures 1 and 2 show the curves for both my two units. Note the surprisingly close similarity for the two different frequency units.

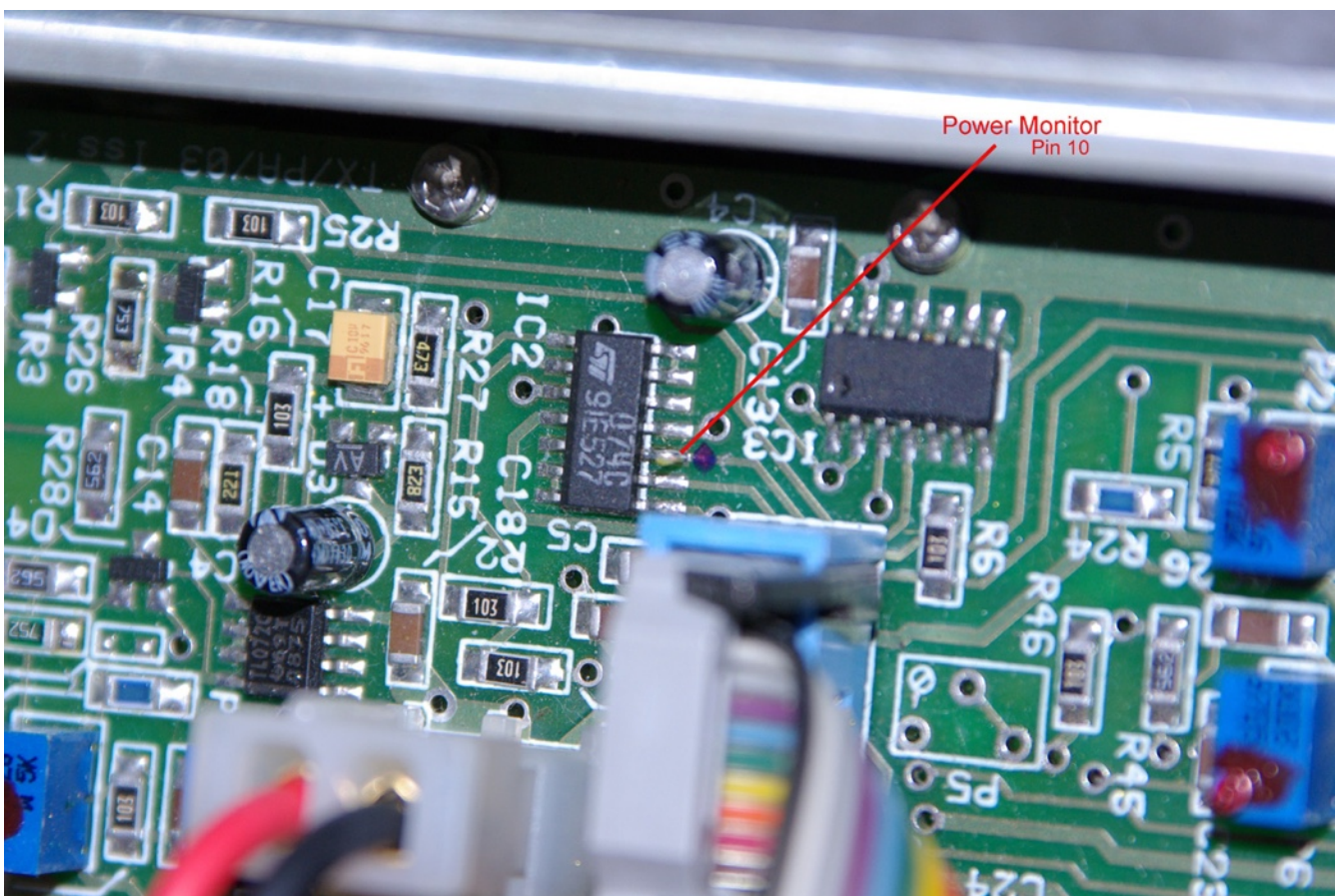


Photo 1: Power Monitoring Point

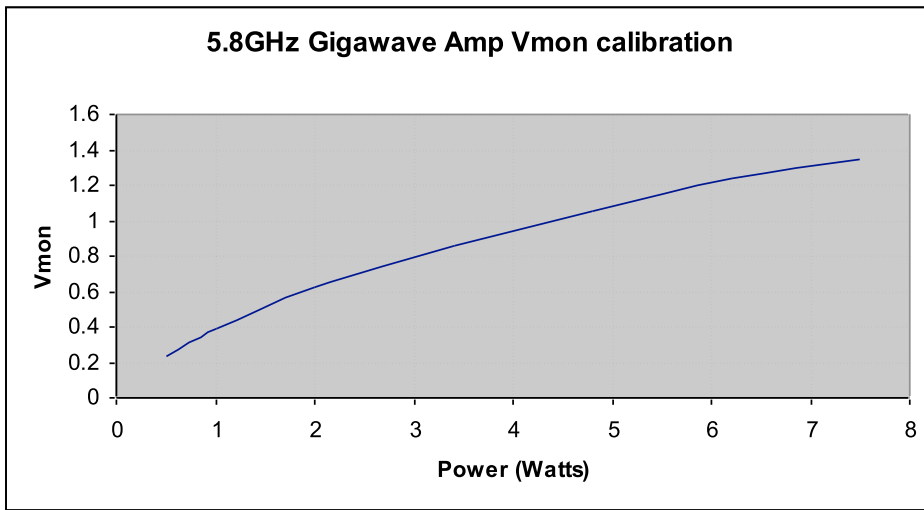


Figure 1

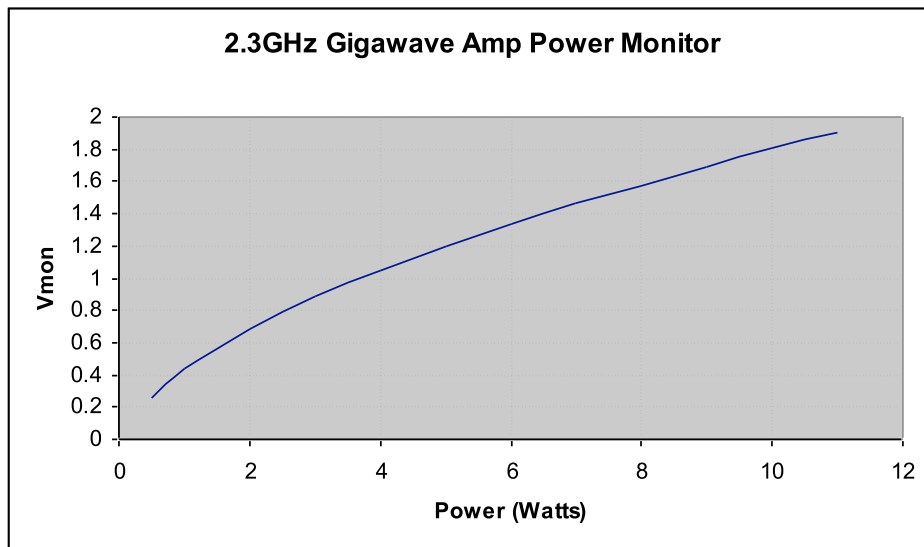


Figure 2

Linearity

Figure 3 shows the input output curve for the 2.3GHz unit, no equivalent test was made on the 5.8GHz one and as that is now built into a transverter a Power curve can no longer be easily measured. However, initial testing did appear to show a similar degree of linearity up to around 8 Watts output.

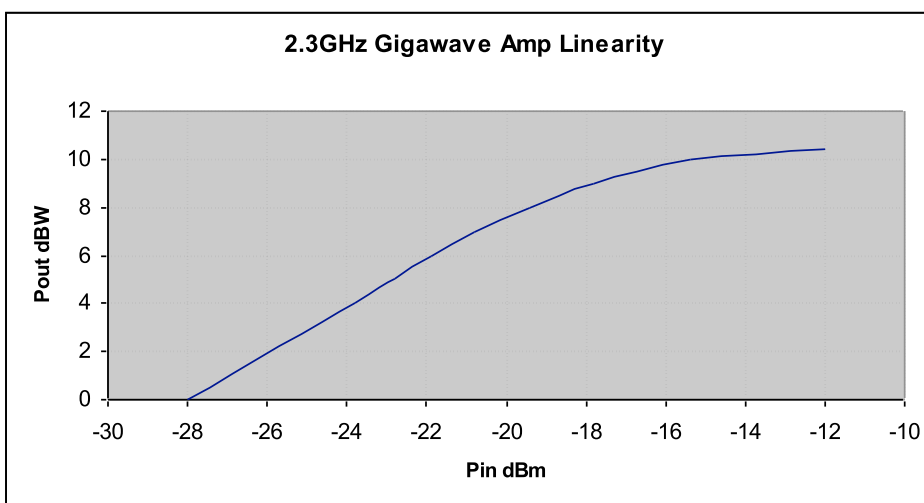


Figure 3

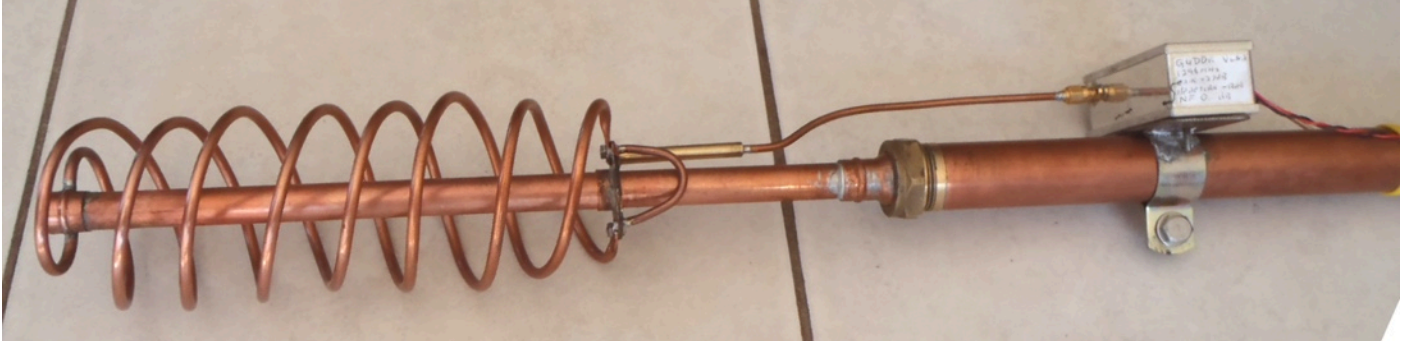
Small dish feed for 23cm EME

Graham Sharples G8HAJ

I've been experimenting with a novel small dish feed for 23cm EME receive use which may be of some interest to readers of Scatterpoint.

The following description is also posted on my website http://g8haj.uk/?page_id=127

Also on the site is an SDR exciter using a DSP chip to generate I/Q SSB and Hellschreiber. It's still beta code but may be of some interest?



Back fire helix feed for 23cm

My experimental receive only 23cm EME setup.

The Dish is 1.7 m with an F/D of 0.35 and a novel bifilar backfire helix feed (more on that below).

LNA – G4DDK design followed by a 3 pole interdigital filter

RX – Fun Cube Dongle

Software – HDSDR and MAP65

Sun noise – consistently measures between 7 & 8 dB , Moon noise is undetectable.



1.7 metre EME receiver

The Backfire Helix Feed

Many of the high performance feed designs for 23cm have relatively large diameters, often between 30 and 40cm. This is a significant aperture blockage when used with small prime focus dishes (my 1.7m dish is near the minimum size usable). Especially when you consider that this blockage occurs in the centre of the beam with a -12 dB edge illumination.

I couldn't find any good small circular polarized feed designs until I came across this declassified US defence paper written by Willard Patton in 1962, PDF [here](#)

Ignoring the maths, the polar diagrams suggested that the backfire helix would make an very good dish feed – Broad bandwidth (ie. dimensionally uncritical), sharp beam cutoff, controllable beamwidth, good front to back ratio and very low blockage – Only 7cm diameter.

Paul Wade, W1GHZ, in his excellent paper on Helical dish feeds [Here](#) gives a couple of examples of Backfire Helix feeds, also suggesting good performance .

Since neither of the above gave any actual designs some experimentation was going to be necessary.....

The backfire helix is a traveling wave antenna (ie. non resonant) and therefore, a wide bandwidth (+/- 30%). It may be implemented with one or more inter wound 'arms'. The simplest monofilar version requires a small ground plane (<0.3 wave lengths diameter) and gives an axially offset radiation cone, but is the easiest to construct and feed. The bifilar variant is axially aligned, does not need a ground plane but requires a balance drive.

Before I go any further, it has to be said that the Helix feed does have one major problem – there seems to be no way to obtain both LH and RH circular polarization from a single feed , not a problem for a receive only system but I shall need both polarization's for an EME transceiver.

Also, being an unscreened structure with a wide frequency response, it is more susceptible to off frequency terrestrial signals, especially 900MHz mobile phones, a good interdigital filter is advisable after the LNA, especially if the receiver has poor filtering/dynamic range (ie RTL's & Funcube's).

Intuitive theory of operation

Consider a bifilar wound helix of several turns with a circumference of one wavelength, the two arms being fed at one end with a balanced RF drive. It may be thought of as having two regions – the unbounded region being the first half turn of the arms after the feed point and the bounded region being the remainder of the helix.

In the bounded region every point on the axis of the helix has an adjacent turn both before and after it. At the operating frequency, the RF will be in phase at all adjacent points, ie. there is no potential difference between adjacent turns and therefor no incentive for current to flow. thus, this region acts as an RF choke, the far end being 'RF dead'.

In the unbounded region near the feed points the situation is different, Having an 'in phase' adjacent turn on only one side, it radiates freely a broad cone of circularly polarized radiation in the direction of the point of feed.

In practice the transition between the two regions is not abrupt but a progressive exponential decay of the RF current (and therefor the radiation) after the first half turn. This progressive decay sharpens the cutoff of the radiation cone, minimizing overspill and side lobe radiation. 4 turns being sufficient to ensure proper operation, increasing the number of turns further, provides only marginal improvement in side and back lobe reduction.

The beam width may be optimized by changing the pitch of the helix, reducing the pitch will narrow the beam. Backfire helix feeds are best suited to deep dishes with F/D's between 0.3 and 0.4 .

Construction and Matching

The helix was formed from 3/16 inch (4.8mm o/d) copper brake pipe, (ebay in 10m roll) on a 68mm former (UK guttering down pipe). The central support is 15mm copper water pipe. The feed point is a 40mm disk of 1.6mm FR4 pcb material which can slide on the 15mm tube. This allows the pitch of the helix to be altered to suit the dish during final setup. The helix arms were flattened at the feed end and drilled with 3mm holes to enable them to be bolted to the PCB disk. The dead end may be a short or open circuit or even used to a feed dc bias to the LNA.

The Bifilar Helix requires a balanced drive estimated to be around 200 to 300 ohm impedance. Thus a 4:1 balun was used to provide a moderate match to 50ohm RG402 semi rigid coax, measure at -15dB return loss. The half wave section is 80mm of RG402 bent in a hairpin with the outer soldered at both ends to the ground plane on the 40mm disk. Experiments with a 1/4 wave matching section (the brass tube in the first picture) didn't improve the match.

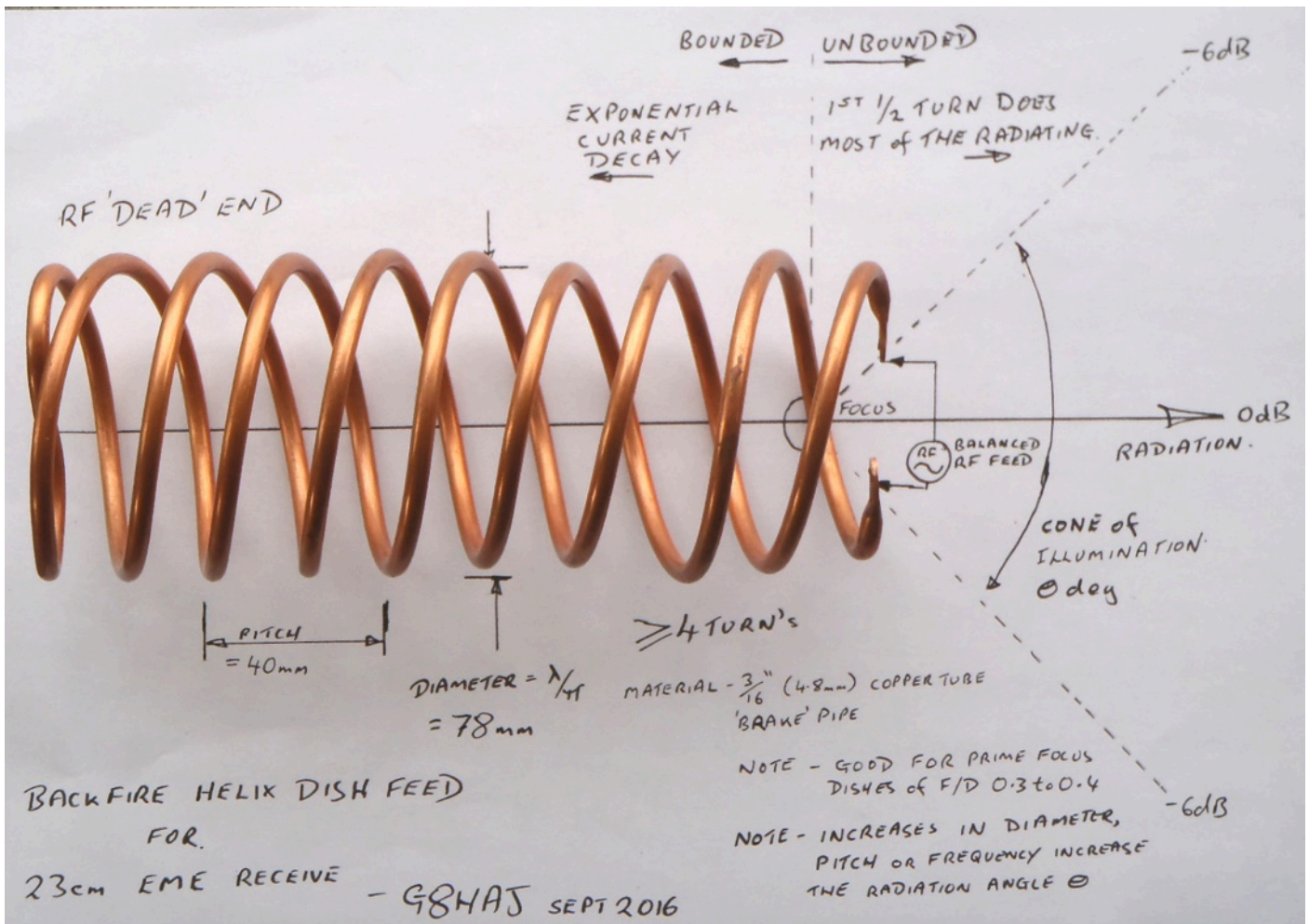
It is also possible to make the helix from RG402, feed the RF in at the cold end, down one of the arms and simply put a break in the outer at the fed point. Thus using the Helix itself as an infinite balun. This was not tried as one arm is about a metre long and would have a loss of around 0.4dB @ 23cm in RG402.

Final adjustment of the pitch of the helix (beam width) was done on the dish with a dipole probe 1/4 wave above the dish surface to obtain -12dB edge illumination.

It was noted by Patton (1st reference above) that placing tubes of surprisingly large diameter inside the helix had little effect on it's performance, I also found this to be true, thus there is the possibility of placing the pre-amp right at the fed point or perhaps a second feed for a higher band (3 cm horn for Es'hail2).

Footnote – A fine pitch backfire helix should also make a good 'exciter' for a circularly polarized loop yagi, I have not tried this.

Feedback & Questions welcome.



23cm Backfire Helix Feed

For the future

The current system is a simple receive-only 1.7m dish. I'm hoping to achieve a full transceive system on the large 3.6 m dish here and to experiment with EME Hellschreiber in the future.

My experiments with 2 counter-wound helix, one inside the other, to achieve TX/RX showed this to be not possible. The inter reaction completely destroyed the beam patterns. I am considering a mechanical (pneumatic operated) end over end change over between a TX & RX Helix which holds the possibility of eliminating the change over relay and would allow separate optimization for maximum gain on the TX and best G/T for the RX.

The Es'hail 2 geostationary satellite due for launch in late 2017/early 2018 will carry a 13 cm to 3 cm transponder and should be workable using quite modest power levels (<10 watts) and a < 90cm dish. A suitable dual band dish feed is required. A backfire helix could provide the circular polarized TX feed on 13cm and would allow a 3 cm RX feedhorn to be mounted internally without interfering with the operation of the helix – just a thought.

April 2017 Lowband Contest Results

Activity improved over last year's low to regain previous levels on 1296MHz, with 2320MHz entries up a little too but 3400MHz down. Stations with 2300MHz as well as 2320MHz benefit from a lot of extra points in the overall table, so more activity on this segment would be welcomed.

With little or no continental activity on this occasion, DX distances were generally rather down. Few commented on the conditions.

On 1296MHz M0HNA/P were the winners with a substantial lead over runner-up Gordon G16ATZ. The best DX reported on this band, 578km to F6DKW, fell to Graham G3YJR, who was running the least power in this section.

2300MHz saw just a single entrant, M0HNA/P with 1 QSO.

2320MHz saw more competition but the same leading station, with M0HNA/P taking the honours and Martyn G3UKV as runner up. DX distances were relatively low this time.

To complete the across the board win, M0HNA/p comfortably took the top spot on 3.4GHz, with Neil G4LDR as runner-up.

The overall winner was the Combe Gibberlets group M0HNA/P consisting of G3TCU, G4SJH, and G1EHF, who won all four bands. Overall runner up and leading fixed station is Neil G4LDR.

Certificates go to the overall Winner M0HNA/P and Runner-up G4LDR and to the following winners:

1296MHz	M0HNA/P, G16ATZ, G3YJR (Low Power)
2300MHz	M0HNA/P
2320MHz	M0HNA/P, G3UKV, G0LGS/P (Low Power)
3400MHz	M0HNA/P, G4LDR

John G3XDY

UKuG Contest Manager

April 2017 Low Band Results

Overall						
Pos	Callsign	1296MHz	2300MHz	2320MHz	3400MHz	Overall
1	M0HNA/P	1000	1000	1000	1000	4000
2	G4LDR	488		695	665	1848
3	G3UKV	376		770	627	1773
4	G8EOP	259		692		951
5	G0LGS/P	294		544		838
6	G3YJR	337		379		716
7	G16ATZ	695				695
8	G4ZTR	688				688
9	GM4BYF	205		46		251
10	G3WJG			159		159
11	G6KWA	154				154
12	GU6EFB	152				152
13	G1DFL	61		41		102
14	GM8IEM	66				66
15	M0XIG/P	12				12
16	GM7GDE	9				9
17	M0GDX/P	1				1

1296MHz						
Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	M0HNA/P	IO91RF	30	6442	GM0USI	575
2	GI6ATZ	IO74AJ	11	4478	G3XDY	543
3	G4ZTR	JO01KW	20	4435	GI6ATZ	531
4	G4LDR	IO91EC	16	3143	F6DKW	378
5	G3UKV	IO82RR	13	2419	GI6ATZ	292
6	G3YJR	IO93FJ	13	2173	F6DKW	577
7	G0LGS/P	IO81XW	13	1893	GI6ATZ	378
8	G8EOP	IO93EQ	10	1668	GI6ATZ	294
9	GM4BYF	IO85JV	3	1322	M0HNA/P	548
10	G6KWA	JO02AD	7	992	G4KCT	212
11	GU6EFB	IN89RK	4	977	G4ZTR	368
12	GM8IEM	IO78HF	1	428	GI6ATZ	428
13	G1DFL	IO91NL	4	393	G3XDY	158
14	M0XIG/P	IO90MX	2	75	G4LDR	49
15	GM7GDE	IO75VS	2	61	GM0OIN	46
16	M0GDY/P	IO93FI	1	5	G3YJR	5
2300MHz						
Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	M0HNA/P	IO91RF	1	174	G4ODA	174
2320MHz						
Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	M0HNA/P	IO91RF	15	2561	G4KCT	304
2	G3UKV	IO82RR	12	1973	G4ALY	276
3	G4LDR	IO91EC	10	1780	G4KCT	318
4	G8EOP	IO93EQ	11	1773	G4LDR	288
5	G0LGS/P	IO81XW	11	1393	G4KCT	233
6	G3YJR	IO93FJ	9	970	G0JBA	305
7	G3WJG	IO91RP	4	407	G0JBA	134
8	GM4BYF	IO85JV	2	119	GM4JTJ	94
9	G1DFL	IO91NL	2	104	G4LDR	67
3400MHz						
Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	M0HNA/P	IO91RF	8	1351	G4ALY	271
2	G4LDR	IO91EC	5	899	G3XDY	223
3	G3UKV	IO82RR	4	847	G4ALY	276

Overall				
Pos	Callsign	5/3/17	23/4/17	TOTAL
1	M0HNA/P	3646	4000	7646
2	G3UKV	1219	1773	2992
3	G4LDR	446	1848	2294
4	G4ZTR	1000	688	1688
5	G4BRK	1251		1251
6	G8EOP	57	951	1008
7	G0LGS/P		838	838
8	G3YJR		716	716
9	G16ATZ		695	695
10	GM4BYF	385	251	636
11	G4BAO	492		492
12	G1DFL	147	102	249
13	G3WJG		159	159
14	G6KWA		154	154
15	GU6EFB		152	152
16	GM8IEM		66	66
17	M0XIG/P		12	12
18	GM7GDE		9	9
19	GM4DIJ/A	8		8
20	M0GDX/P		1	1

1296MHz				
Pos	Callsign	5/3/17	23/4/17	Total
1	G4ZTR	1000	688	1688
2	M0HNA/P	646	1000	1646
3	G16ATZ		695	695
4	G4LDR	113	488	601
5	GM4BYF	385	205	590
6	G3UKV	206	376	582
7	G3YJR		337	337
8	G4BRK	314		314
9	G4BAO	308		308
10	G0LGS/P		294	294
11	G8EOP		259	259
12	G1DFL	113	61	174
13	G6KWA		154	154
14	GU6EFB		152	152
15	GM8IEM		66	66
16	M0XIG/P		12	12
17	GM7GDE		9	9
18	GM4DIJ/A	8		8
19	M0GDX/P		1	1

2300MHz				
Pos	Callsign	5/3/17	23/4/17	Total
1	M0HNA/P	1000	1000	2000
2320MHz				
Pos	Callsign	3/5/17	23/4/17	Total
1	M0HNA/P	1000	1000	2000
2	G3UKV	615	770	1385
3	G4LDR	333	695	1028
4	G8EOP	57	692	749
5	G4BRK	615		615
6	G0LGS/P		544	544
7	G3YJR		379	379
8	G3WJG		159	159
9	G1DFL	34	41	75
10	G4BAO	74		74
11	GM4BYF		46	46
3400MHz				
Pos	Callsign	5/3/17	23/4/17	Total
1	M0HNA/P	1000	1000	2000
2	G3UKV	398	627	1025
3	G4LDR		665	665
4	G4BRK	322		322
5	G4BAO	110		110

UKuG Microwave Contest Calendar 2017

Dates	Time UTC	Contest name	Certificates
21-May	0900 – 1700	1st 24GHz Contest	
21-May	0900 – 1700	1st 47GHz Contest	
21-May	0900 – 1700	1st 76GHz Contest	
28-May	0600 - 1800	1st 5.7GHz Contest	F, P,L
28-May	0600 - 1800	1st 10GHz Contest	F, P,L
4-Jun	1000 - 1600	4th Low band 1.3/2.3/3.4GHz	F, P,L
18-Jun	0900 - 1700	24/47GHz Trophy / 76/122-248 GHz	
25-Jun	0600 - 1800	2nd 5.7GHz Contest	F, P,L
25-Jun	0600 - 1800	2nd 10GHz Contest	F, P,L
30 -Jul	0600 - 1800	3rd 5.7GHz Contest	F, P,L
30 -Jul	0600 - 1800	3rd 10GHz Contest	F, P,L
27-Aug	0600 - 1800	4th 5.7GHz Contest	F, P,L
27-Aug	0600 - 1800	4th 10GHz Contest	F, P,L
17- Sep	0900 - 1700	3rd 24GHz Contest	
17- Sep	0900 - 1700	3rd 47GHz Contest	
17- Sep	0900 – 1700	3rd 76GHz Contest	
24 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
24 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
22 -Oct	0900 - 1700	4th 24GHz Contest	
22 -Oct	0900 - 1700	4th 47GHz Contest	
22 -Oct	0900 – 1700	4th 76GHz Contest	
19 -Nov	1000 - 1400	5th Low band 1.3/2.3/3.4GHz	F, P,L
Key:	F	Fixed / home station	
	P	Portable	
	L	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)	

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

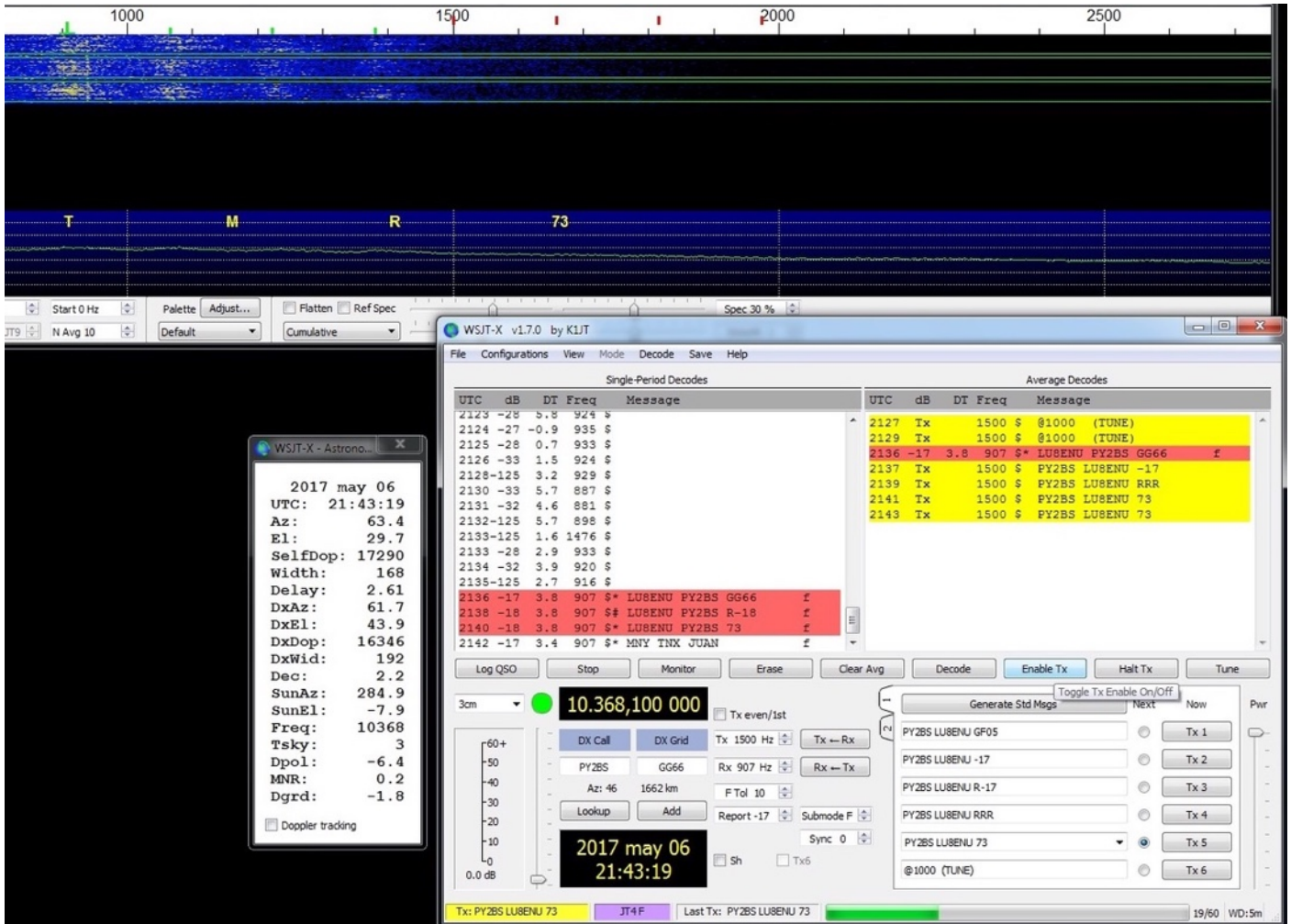
73 Martyn Vincent G3UKV

First intra-South American EME QSO

Bruce Halasz PY2BS

On the 6th of May this year, Juan LU8EN and Bruce PY2BS made the first 3cm EME QSO between two South American stations. LU8ENU used a 2.3m solid dish with a VE4MA linear feed and 25W. PY2BS used a 3.7m Andrew dish with a linear rotary feed and 40 Watts. The mode used was JT4F and signals were -17 dB at LU8ENU and -18 dB at PY2BS.

Apparently, Juan did a great job doing manual moon tracking, not easy at 10 GHz!

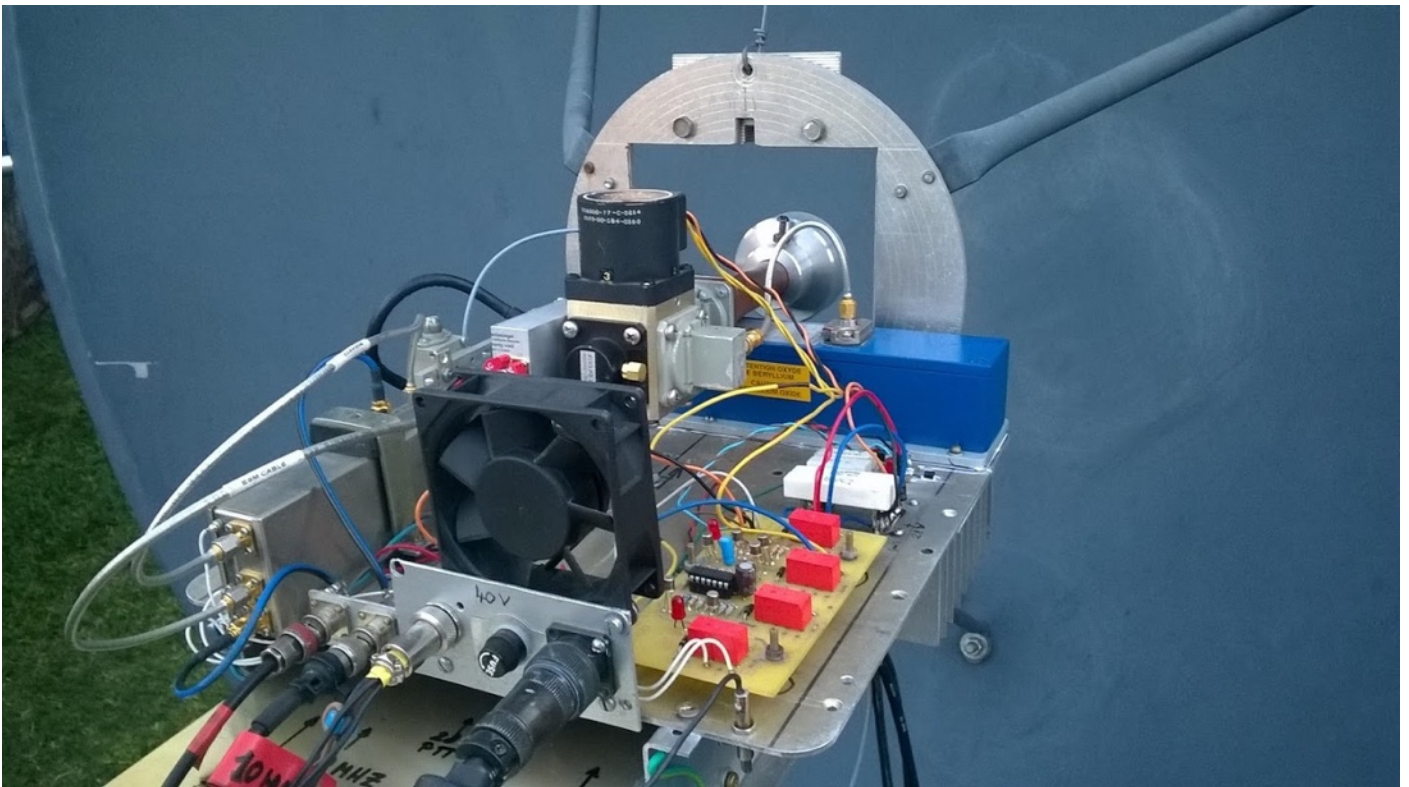


Screen at LU8ENU side.

LU8ENU setup

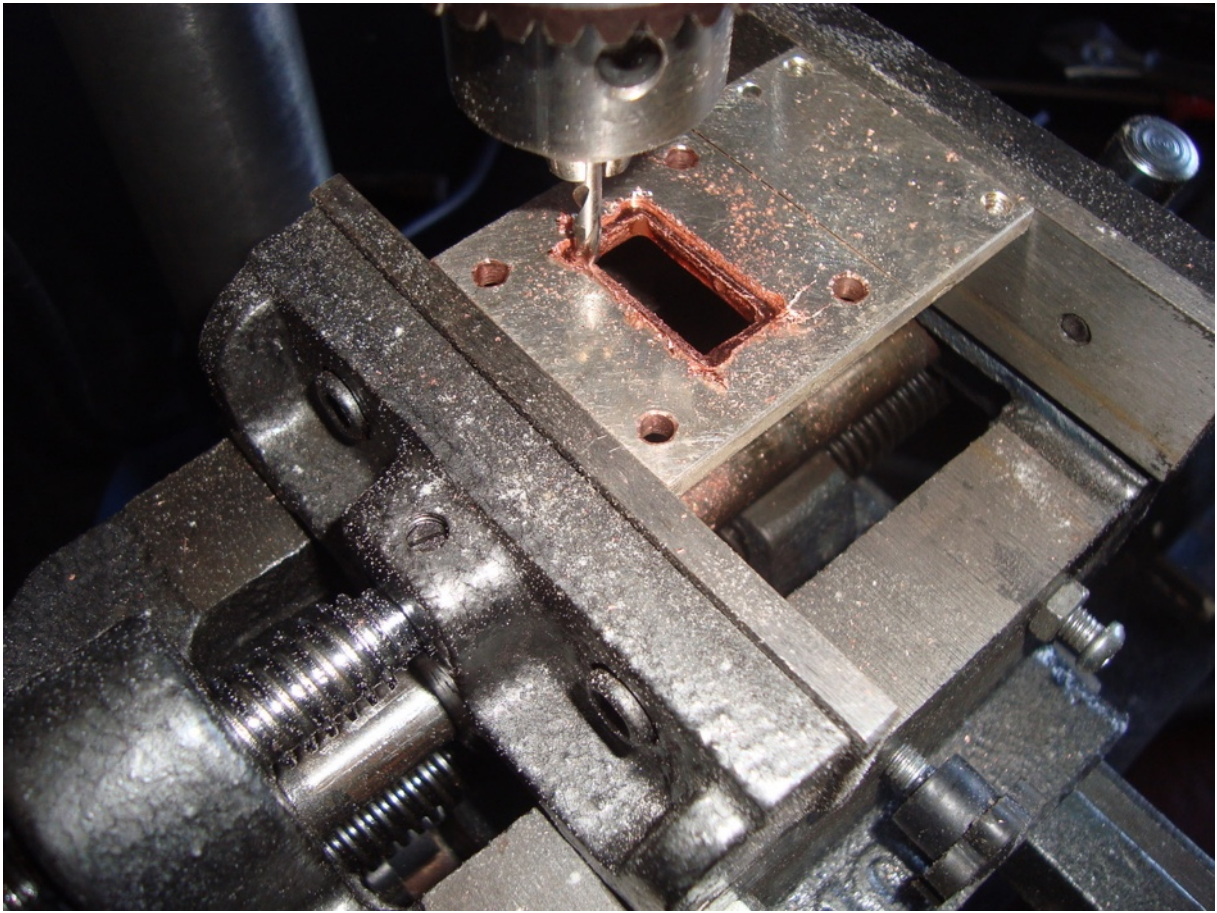


2.3m solid dish.

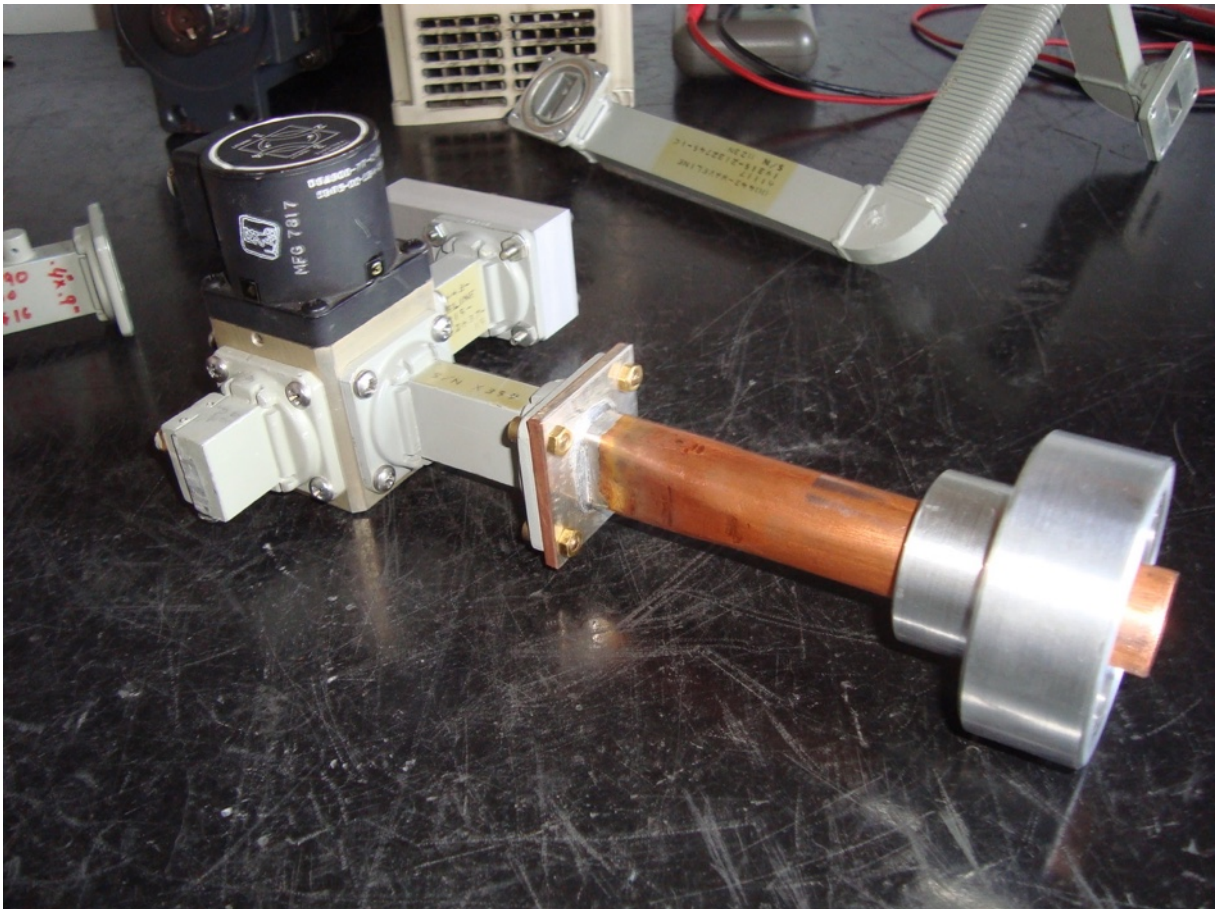


VE4MA VE4MA feed system with horizontal linear polarization.

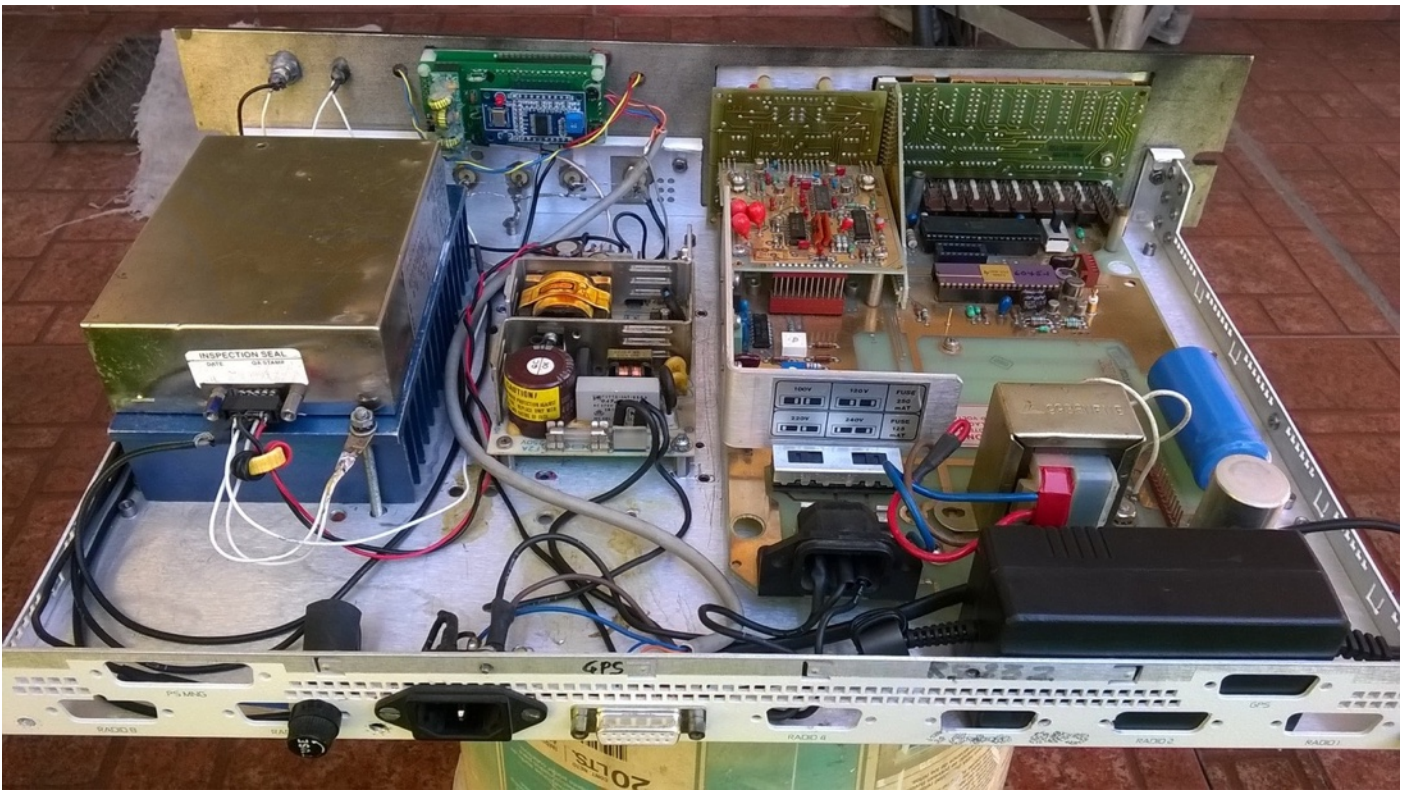
TWT rw 1127. RF power approximate 25W feeder. At the moment, slow manual moon tracking.



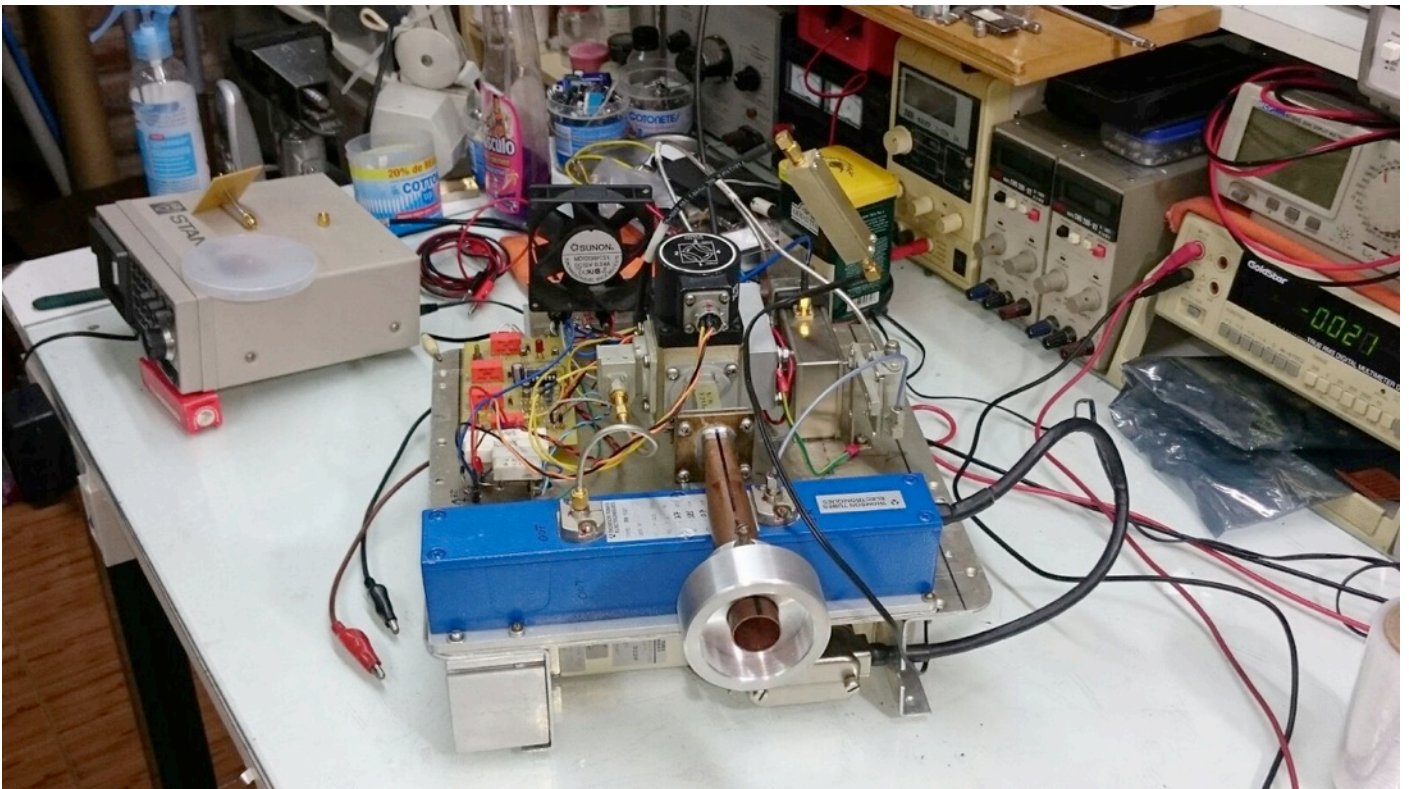
Machining for the feed



TX / RX waveguide switch WR90 (four ports)



10 MHz rubidium - GPS reference.

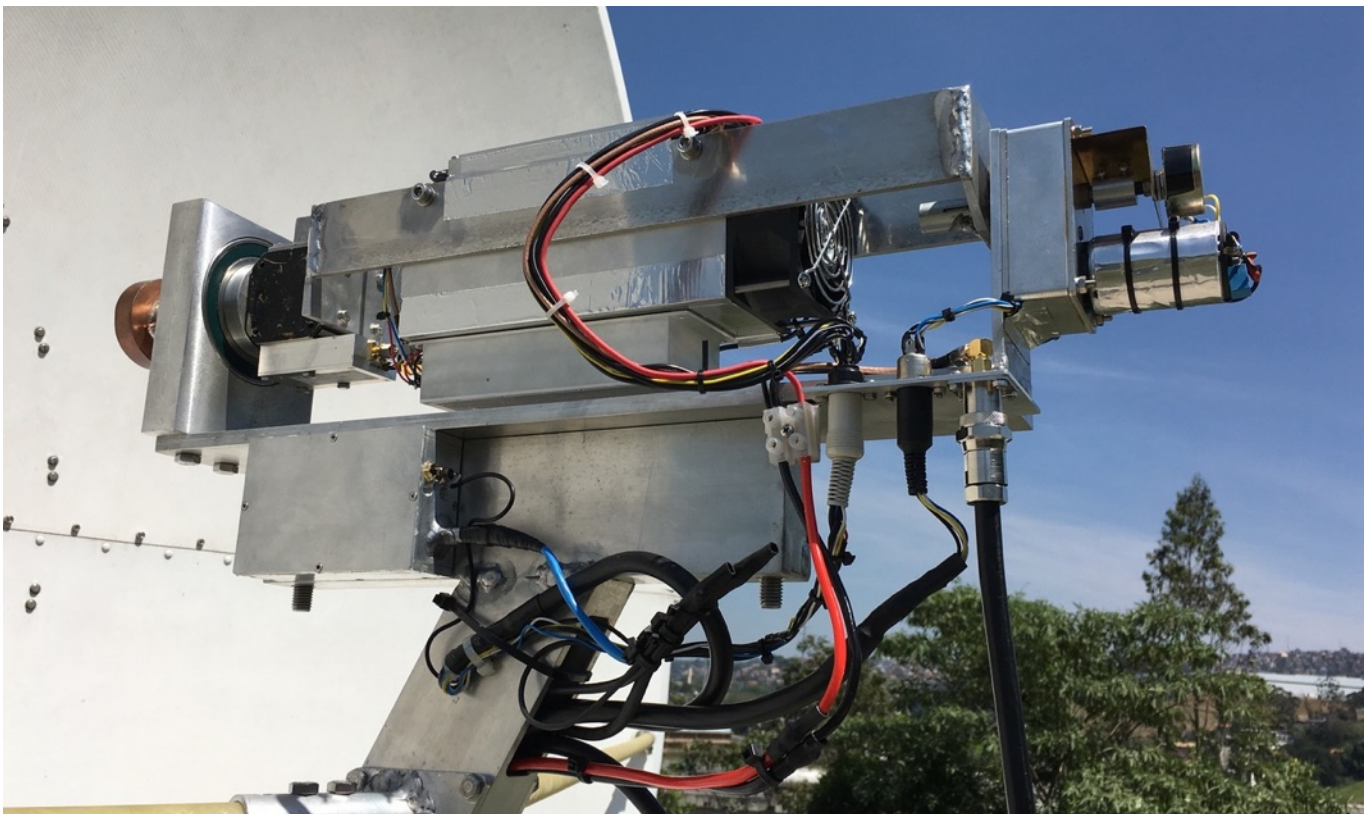


First test

PY2BS setup:



3.7m Andrew dish



Linear rotary feeder, SSPA ~ 40 W at feeder, OE5JFL pwm slow start-stop tracking



Left to right: sequencer, polarization controller, K3 (w/ SDR-IQ above it),
OE5JFL controller (with remote SSPA power monitor above it)



Activity News : April 2017

By Neil Underwood G4LDR

Please send your activity news to:

scatterpoint@microwavers.org

Introduction

Still not a lot of activity to report despite the UKuW Low Bands contest and the usual RSGB UKAC microwave contests. I am not aware of any significant enhancement in conditions during April but that might be because I missed them!

cm Bands

From Graham G3YJR IO83.

My blog has moved again to: <https://g3yjr.wordpress.com/> I'll keep the Livejournal blog as a back-up.

The transmit side of my 10GHz transverter continued to work fine, but the receive side had gone rather deaf. The ever useful Finningley beacon GB3FNY had become very hard to hear.

I took the dish down & retrieved the DB6NT transverter from the protective box.

I wondered whether I had accidentally blown up the schottky diode pair which protects the receiver output, so I removed it, but it tested OK.

I didn't feel confident to delve further, so I sent the transverter back to Kuhne Electronics, asking for a quote for a repair.

A week later I had it back, fixed and no charge. It was fixed "under guarantee". Perhaps this is a German type of guarantee that I am not familiar with? I think I had had the transverter about 3 years. Also I had modified it to give me an output to indicate reference oscillator lock. And removed the schottky diode pair! Anyway, this is *excellent customer service*.

Apparently a helical filter had lost a connection. Perhaps a dry joint? I don't understand the cause of the fault, really. I've replaced the schottky diode pair.

I'll take the opportunity to put up a sturdier, manually-turnable pole for the dish and add a linear amplifier, so I may be off 3cm for a while.

On 2320MHz I'm experimenting with an [SG-Labs](#) transverter from Hristiyan LZ5HP, Bulgaria. The IF for this is 70cm & the local oscillator may be set to 1870, 1886, 1888 or 1968 MHz by jumpers 1 and 2. I've selected 1888 MHz, so $1888 + 432 = 2320\text{MHz}$.

It defaults to VOX mode, so when power is sensed, it automatically switches to transmit. It has a built-in antenna relay, but this may be switched out in order to add an external relay for a pre-amp and/or linear amp.

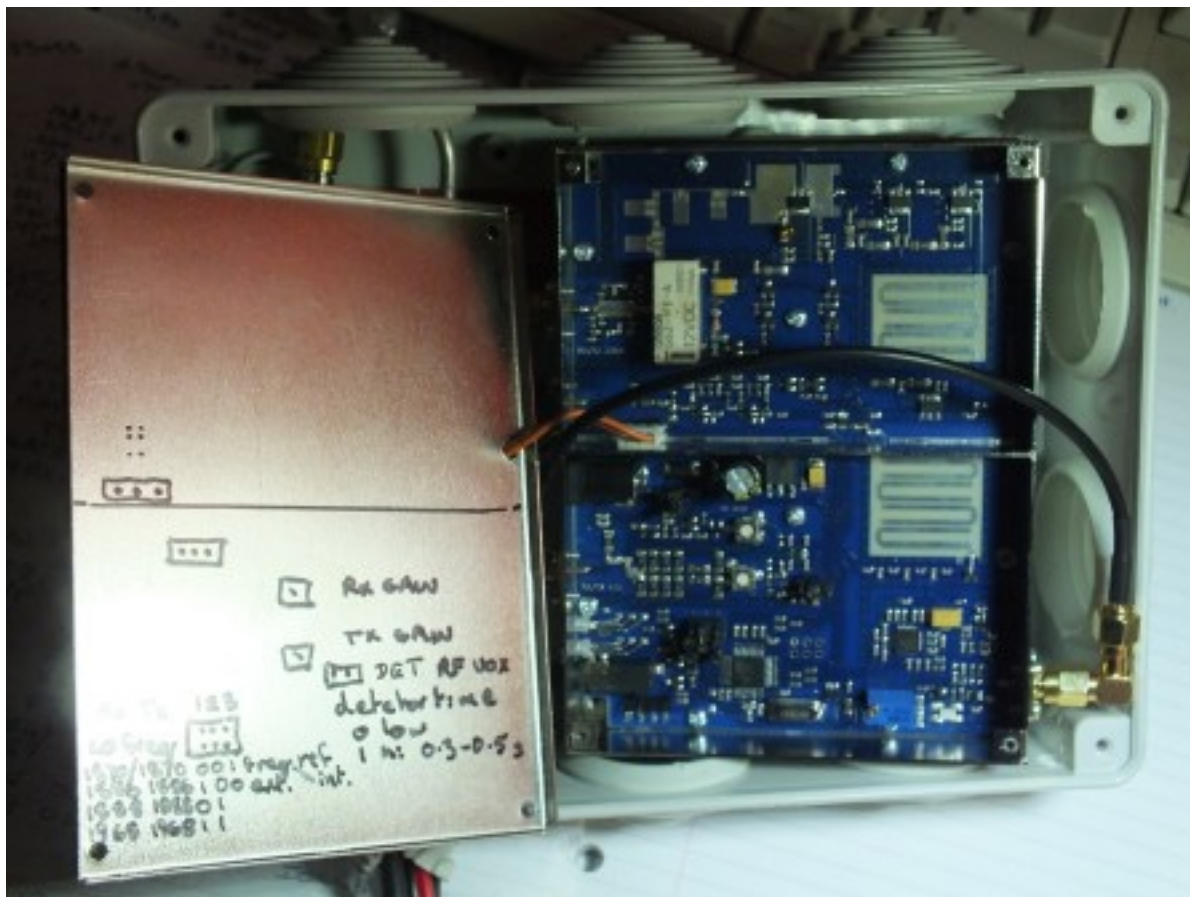
I've set the transverter's power pot to accept 2.5W from the FT-817.

In order to be able to mount the transverter on the aerial pole, I've added some monitor wires to permit remote control/monitoring from the operating position:

"I/P" red LED	shows I/P power too high, off when power I/P is OK, blinking when external reference oscillator is unlocked on for 3s on switch-on
"I/P" green LED	shows green when power I/P is correct
"FWD" SWR	to feed a high-impedance meter
"REV" SWR	similar, but for reverse power
PTT	via the phono jack
SEQ	to give an indication of when transmitting

The other cables up to the transverter supply 13.8V DC, 10 MHz reference and the 70cm IF. I've used double-screened RG223U coax for the IF. The cable umbilical is covered in insulating tape to protect it from UV light damage. 1.5 m of Westflex 103 (from [WH Westlake](#)) coax connects to the 34 element [Wimo](#) yagi. The yagi is

usually mounted behind the reflector, but I've mounted it from underneath in order to better physically balance it.



Photograph shows SG Labs 2320MHz Transverter mounted in protective box

The protective box is from Toolstation. This and the Wimo yagi are mounted to a "jockey" fibreglass pole which is strapped to the existing pole with Shelley clamps from [Blake UK](#), Rutland Road, Sheffield. So the 13cm antenna sits right on the top; the transverter box sits a little way down the pole where I can get at it. I'm hoping the coax doesn't upset the 23cm Wimo which it passes through.

So far, I haven't heard any beacons from here on 13cm (except GB3ZME occasionally via aircraft scatter), so thanks go to Trevor M0TWS for his help in testing across town.

Several other Sheffield & District Wireless Society members are intending to try the SG-Labs 13cm transverters, so there could be a mini-explosion of activity on this band!

Graham has also been active in the Tuesday evening UKAC events as well as the UKuW Group April low bands contest as he reports.

This was the first contest for the SG-labs transverter, blasting out its 2W. I was pleasantly surprised to get over 300km into JO01 square to reach Phil G0JBA.

Usually I can work Jon GM4JTJ on 23cm, but I could not hear him on 13cm, nor any other Scottish stations.

Martyn G3UKV is a difficult direction for me, but we completed a contact using CW/morse code.

I am impressed with the SG-labs transverter. It is a good route onto the 13cm band.

On 23cm, my best DX was Maurice F6DKW, SW of Paris. I don't seem to have upset the 23cm yagi by running a coax cable through it.

Shack activities

From Ed Harland, G3VPF

With the weather improving at the end of February and early March it was time to reorganise the home station aerials. The 3cm dish has gone (1 qso in three years is not good!) and it's time to improve the 23cm station and see if I can do better on that band. My QTH is at the bottom of a valley on the seaward side of the Dorset Ridgeway so super DX is never going to happen. Most of my operation is portable but it would be good to be able to work at least one microwave band from home.

So, with the dish out the way I now have a 14 ele Flexayagi at 4.2 metres with an SHF Electronics preamplifier. To keep the aerial cable run short the transverter is in the garden shed at the bottom of the mast. The shed is solar-powered as its a long way from the shack. The transverter IF is 28 MHz. The main transceiver is a TS50 located in a warm comfortable shack. The transverter is a Kuhne G3 unit giving about 1 Watt output. At present the aerials are manual rotation only.

This was finished just in time for the March low-bands contest. Was pleased to hear two stations strong enough to be identifiable and two more very weak stations. More of a surprise was that the IOW beacon is audible most of the time. The path is over the highest part of the Purbecks. While monitoring, two other beacons were heard via an AS path. The bursts were too short to confirm identity but they were believed to be GB3USK and GB3MHZ. Aim now is to add a rotator and up the power to 30 Watts.

A new portable station is coming together for 23cm. Until the National Trust see the light and open up the [Hardy Monument](#) [no relation! Ed.] car park for more than 6 hours a day 4 days a week and summer only, I need a hand-carryable station to take up the hill. Station will be an FT817 with SG Labs transverter and 14 ele Flexayagi. Hope to be on for a number of contests this year, WX permitting!

EME DXpedition to Morocco 4–11 October 2017

From Zdenek OK1DFC

7 Bands 144MHz – 10 GHz. More details here http://www.ok1dfc.com/peditions/morocco/cn_2017.htm

Equipment

Band MHz	Unit	Antenna
144	TS2000 + SSPA 1,5 kW	4x8el. - ATF54143 - 0,3dB N/F
432	IC9100 + SSPA 1,2 kW + GPS locked	3,2m dish V/H pol. - 0,4dB N/F OK1DFC - OE5JFL control
1296	IC9100 + SSPA 1 kW + GPS locked	3,2m dish - 0,2dB N/F HB9BBD - OE5JFL control
2302 - 2304 - 2320 - 2400	IC9100 + TRV + SSPA 250 W + GPS locked	3,2m dish - 0,4dB N/F G4DDK OE5JFL control
3400	IC9100 + TRV + SSPA 50 W + GPS locked	1,8m solid dish - 0,7dB N/F - DB6NT - OE5JFL control
5760	IC9100 + TRV + SSPA 110 W + GPS locked	1,8m solid dish - 0,9dB N/F DB6NT - OE5JFL control
10368	IC9100 + TRV + SSPA 50 W + GPS locked V-pol	1,8m solid dish - 0,5dB N/F DU3BC - OE5JFL control

Timetable - first draft (may be changed according local conditions)

Date in October:	Band	Remarks
1st - 3 rd	Trip OK - CN 3685 km	
4th	Building station - calibration, measuring possible test traffic if all OK	
5th - 6th full orbit	144 + 2320 MHz	RX on 2302, 2304, 2320 and 2400 MHz - TX 2320 MHz
6th - 7th full orbit	144 + 3400 MHz	
7th - 8th full orbit	ARRL EME 144 - 432 MHz	full Moon pass 432 MHz
8th - 9th full orbit	ARRL EME 144 - 1296 MHz	full Moon pass 1296 MHz
9th - 10th full orbit	144 + 10368 MHz	RX 10450 MHz courtesy of Yoshiro JA4BLC possible
10th - 11th full orbit	144 + 5760 MHz	
11th - 13th	Wrap up and return home CN - OK 3685 km	

Traffic and frequency can to be changed according local conditions and unexpected problems, check every day HB9Q chat

Operation:

We expect to announce all details or changes on [Miles and more](#), [HB9Q](#), [NOUK](#) and [here on web](#).

In the main time we will work first all stations by CW, then when CW traffic slow down, we will be switching also to WSJT for all stations interested to work us in that mode too. We are able to switch between CW and JT according request if not so busy in QSOs.

During [ARRL EME contest](#), first Moon pass we will be QRV 432 MHz ! Means that not only from 00:00 UT on Saturday, but from our Moonrise in Friday around 19:00 UT. We expect to have clear horizon for East and West and will work in maximum length of our Moon window. Than we exchange feed for 1296 MHz and will be QRV next Moon pass in contest on 23cm. Sunday we will change feed and TRV and will be QRV on 3cm again full Moon pass, even on lower bands will follow up ARRL contest till 00:00 UT from Moonrise.

Parallel in all those bands we will be QRV 144 MHz CW and JT65. We will be also available on HB9Q Moon chat and N0UK, for possible sked or special requests for tests, exchanging modes etc.

2,3 GHz - With RX band we will cover all existing ham radio frequency on EME and expect to work everybody from Australia, Japan, EU and USA. We will TX only 2320,100 and 2304,100 !!!

10 GHz - courtesy of Yoshiro JA4BLC we will be able to RX on 10450 MHz, on TX thanks to Mirek OK2AQ we will have 52W RF and new very precise 180cm dish thanks to Eddy ON7UN.

We prefer QRG xxxx.100 on all bands.

On MW bands we will use WSJT .10 and WSJT.X with Doppler shift compensation. Do not forget to put our call sign to the WSJT data base. Check WSJT work condition described by Rene PE1L

.....and finally

The deadline for activity reports to be included in the next issue is Thursday 1st June 2017.

17th Microwave Technical Meeting in Bydgoszcz (JO83WR)

21th-23rd of April 2017 - Fojutowo near Bydgoszcz.

Tomasz Babut SP5XMU

Over 40 microwave and VHF enthusiast participated in 3 days long event full of presentations, measuring lab and flea market. This meeting was organised by Maciej SP2RXX and Andy SP2FRY over Polish Microwave Discussion Group <http://www.mikrofale.iq24.pl/>

Presentations

History of Polish VHF part. 1	Tom SP5CCC
Multiband beacon 28MHz-10GHz history of SR5TDM	Tom SP5XMU
13cm PA – Conversion of HUAWEI UMTS module	Andy SP8XXN
DJ9BV for 23cm band in practise	Janusz SP2CNW
Reference source 10MHz with GPS	Andy SQ1GU
Concept of advanced VHF sequencer	Jacek SP1CNV

Measurement instruments available during weekend

- Noise Figure
- Spectrum analyser up to 26GHz
- VNA up to 6GHz and 18GHz
- Power up to 26GHz
- Frequency up to 26GHz
- Measurement leaders : Pawel SQ1GQC, Jakub SP2IPT, Kaz SP7CKH, Andy SP2FRY and Andy SP8XXN

Photo gallery: mikrofale-fotki.blogspot.com/2017/

Next meeting

56th Convention of SP-VHF-Club & 19th VHF Technical Meeting will be held 18–21st August in MORAWA (JO80KG)

More info: pk-ukf.org.pl/ or www.mikrofale.iq24.pl/default.asp?grupa=160446&temat=447382

Events calendar

2017

May 19 – 21	Hamvention, Dayton	www.hamvention.org/
June 11	RAL @ Chiltern Village Hall OX11 0SH	www.microwavers.org/ral-2017.htm
	Registration via Ann Stevens g8nvi@microwavers.org	
July 14 – 16	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
July 8 – 9	Finningley Roundtable	www.g0ghk.com/
August 18 – 20	SP VHF Convention and Technical Meeting - Poland	www.mikrofaie.iq24.pl
Sept 8 – 10	62.UKW Tagung Weinheim	www.ukw-tagung.de/
Sept 10	Crawley Roundtable	carc.org.uk
Sept 17–21	IARU-R1 Conference, Landshut, Germany	www.iaru2017.org/
Sept 29–30	National Hamfest	www.nationalhamfest.org.uk/
Oct 13 – 15	RSGB Convention, Kents Hill Park Conference Centre, Milton Keynes	rsgb.org/convention/
Oct 14 – 15	Amsat-UK International Space Colloquium, Kents Hill Park Conference Centre, Milton Keynes	https://amsat-uk.org
Oct 8 – 13	European Microwave Week, Nürnberg	www.eumweek.com/
Nov 4 (tbc)	Scottish Round Table	www.gmroundtable.org.uk/
Oct 26 – 29	Microwave Update, Santa Clara, California	www.microwaveupdate.org

2018

February 9–11	Hamcation, Orlando, Florida	www.hamcation.com
June 22–24	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
August 17–19	EME2018, Egmond aan Zee,NL	https://www.eme2018.nl
Sept 23–28	European Microwave Week, Madrid	www.eumweek.com/

2019

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

NB Some of the 2018/19 event links may not be working/updated yet.

EME 2018

The website <http://eme2018.nl/> is online. Only very basic info yet. More soon! Email info@eme2018.nl to register interest and for updates

There's also a Facebook page: <https://www.facebook.com/EME2018/>

73!

Jan

PA3FXB (team PI9CAM)

team EME 2018