An Amateur Radio publication for the Microwave enthusiast

MICROWAVE NEWSLETTER

Published by the Radio Society of Great Britain and edited by G3PHO and G8AGN.

Lambda House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE

FROM THE EDITOR

2004 – MARCH

As this issue is being put together, the UK amateur microwave scene is hopefully entering a new era. The UK Microwave Group is slowly making its presence known where it matters and spectrum changes, announced in previous issues of the Newsletter, are now in full effect. However, there are still a few folk who haven't yet done their bit and complied. Don't be left behind and certainly don't lose interest ... we need you!

In this vein, Mike Dixon's views on page 9 this month should be a wake up call for many readers. Complacency is the easiest way out and we are all guilty of it times. It takes some determination to get out there and preach the microwave gospel to others.

Our thanks, as ever, go to our contributors this month. Another valuable article from Andy, G4JNT backs up last month's technical offering by him. Peter, G3LTF, provides us with a very useful dual band antenna feed and Mike, G3PFR, the stimulating comments already referred to. John Jaminet, W3HMS, sends us an nice idea for an RF sniffer .. many thanks John!

However, we still sadly lacking activity news! Has there been much activity recently? If Brian, WA1ZMS, can go out portable in minus 8 degrees Celcius (page 14), then surely some of the UK microwavers can come on the air!

Finally, you will find an update to the UK Microwave Group developments. This includes some important news about this newsletter. Please read!

The first UK Microwave Contest of the "season" is the Lowband (23/139cm)Contest on 28 March. We hope to hear many of you on one or more bands.

In this issue ...

News, views and articles for this newsletter are always welcome. Please send them to G3PHO (preferably by email) to the address shown below. The closing date is the Friday at the end of the first full week of the month if you want your material to be published in the next issue.

G3PHO: Peter Day 0114 2816701

G3PHO, Peter Day,
146 Springvale Road,
Sheffield, S6 3NU, UK

G3PHO: Email: microwaves@blueyonder.co.uk

SUBSCRIPTION ENQUIRIES SHOULD BE SENT TO RSGB HEADQUARTERS AT THE ADDRESS SHOWN AT THE TOP OF THIS PAGE AND NOT TO THE EDITOR ..

COMPLETE 10GHz PORTABLE NARROWBAND STATION

Allan Wyatt, G8LSD <allan@r-type.org> is handling the sale of the 10GHz equipment of the recently deceased Jack Brooker, G3JMB. Jack's narrowband gear is offered as a complete, ready-to-go portable station for which **sensible offers** are invited.

It is hoped that this equipment will enable someone not yet on 10GHz to become as active on the band as Jack was before his illness.

The equipment is in full working order and consists of a microwave head in a heavy duty diecast box, with a separate, remote control box. The head unit contains an SSB Electronics low-drift oscillator, TX unit with 144MHz IF input at up to 3 watts. This is followed by a WDG006 TX amp to 200mW and this drives a WDG007 to 1 watt output. The SSB Electronics RX is fronted by a two stage WDG005 preamp and filter, which is in turn fronted by a 0.9dB NF HEMT preamp. A power sequencer and a 12 to 24V relay supply also fits in the same box.

The microwave head is independent but fits onto a homebrew rotator which is very well made, employing aircraft gear wheels as bearings. The centre shaft is 20mm diameter. The motive power for the rotator is a DC motor from a professional 0.25 inch computer tape drive. The position sensor is a high quality pot. The whole assembly stands on a strong wooden tripod.

The separate remote control box runs on 13.8V and houses the rotator LCD readout, 144MHz IF TX/RX and external speaker. The meter reads directly in degrees of the compass and has separate pots to adjust each end of the scale. The 144MHz IF is an FT290, in immaculate condition.

For hilltop use a constant 13.8V is essential. Jack built a 24 to 13.8V PSU using a commercial switched mode module. This is included.

Several dishes come with the transverter: an 18 inch diameter PW type and a 24 inch (f/D = 0.5).

The two metre talkback transceiver is available separately. This is an Icom 275E running 20W output, complete with antenna and mast.

Also for sale, if a reasonable offer is made, is a 70cm **FT790**, in perfect condition.

All enquiries and offers should be made directly to Allen, G8LSD, who is Jack's son-in-law, at the email address shown above. Failing that he is QTHR in any recent Callbook.

SOS SOS SOS

From: Kenneth Ferguson, G0HYP
[kenneth@band4.freeserve.co.uk]

This is a plea for help! I have a two valve cavity and two 2c39 valves for a 1296MHz (23cm) amp. Is there anyone UK based that could put together a fully working amp if I could get some parts to them some time this year? All help would be very welcome and appreciated. Thank you for your time and consideration.

Ken Ferguson, G0HYP
CUMBRIA /UK

WANTED

Circulator for 23cm

I'm building a new driver for the 23 cm band and need a circulator, rated for the 80W output. Does anyone have one to sell? Please contact me via email quoting price and details.

Philippe PIERRAT - F2TU
<f2tu.om@guideo.fr>

FREE MAST !

From: Alan WALMSLEY, G2HIO
[g2hio@brookside12.fsnet.co.uk]
Ex RAF mast, winds up to 60ft, going for FREE. Easily erected with cross boom and rotator plus cables and pivot at the base etc.
The only requirement is to take it away. It's heavy but of extremely good non-ferrous construction with stainless wire for height variation. Includes four helices for 2.4GHz (used on AO13 and AO40, two 70cm cross yagis and preamp, one 2m beam with preamp, HS100 coax etc
Available anytime (N. of Derby)
73 Alan, G2HIO

Probably the Simplest GPS Disciplined Oscillator possible ! ... by Andy Talbot, G4JNT

GPSDOs

Using the GPS Satellite system offers the advantage of very accurate timing and by extension, frequency control. The long term error is to all intents and purposes zero, with time and frequency accuracy being comparable to the international standard. The traditional route is to use a relatively low cost GPS receiver module which outputs a 1 Pulse per second signal (1 PPS) aligned to UTC. Basic GPS modules such as the Garmin GPS25 and Motorola Oncore have been around for some years and are available at low cost. It is possible to phase lock a divided down crystal oscillator to this 1 PPS signal and transfer its long term stability to, say, a 10MHz reference which is subsequently used for deriving any LO and beacon frequencies. The subsequent PLL system is usually described as a GPS Disciplined Oscillator rather than locked, since it is not, strictly speaking, actually 'locked' to the GPS system at all; just controlled by it via the 1 PPS generated by software in the receiver module.

The first GPSDO to appear in the amateur press was by Brooks Sheera W5OJM, described in QST July 1998. A lower stability, simpler version, suitable only for low data rate signalling on the LF bands, was published by myself in Radio Communication October 2002. Both of these, in different ways, demonstrates the problem with using the 1 PPS signal. On all these receiver modules the 1 PPS signal can have up to 1us variation from pulse to pulse, and this varies randomly. Later modules reduce to a few 100ns, but it is still there. Consequently, for a frequency standard with a short term stability measured over a few tens of seconds, this 1 PPS jitter has to be averaged out over many hundreds or thousands of seconds - so giving very long lock up times and loop tracking constant. Now, as the PLL has a time constant of many tens of minutes or hours, the voltage controlled crystal oscillator has to be stable over this loop time constant - particularly if it is to be multiplied up to GHz where a short term wander of a few Hz (parts in 10^-10) is noticeable. So a good quality oscillator has to be used here - typically an ovened high spec standard in its own right. This was the approach taken by W5OJM with a microcontroller based digital PLL and loop time constant of hours. My design went the other way, and accepted a poor short term stability for LF use only, where the phase wander over a few seconds was inherently averaged by the LF signalling interval. Many manufacturers now offer off-the-shelf GPSDO modules with varying specifications between these , ranging in price from a few hundred pounds, to thousands.

The Jupiter-T Solution

Which brings me onto a new GPS module that makes a homebrew solution very much easier. The Jupiter-T module made by Navman (originally Conexant) has an output at 10kHz 'locked' to GPS time. Initially I was sceptical, thinking it probably only consisted of 10000 pulses per second - which could have been no better than the 1 PPS signal itself in the short term. However, after making extensive measurements, I came to the conclusion that it really was quite a respectable signal. In particular, I could not detect any discrete sidebands at sub Hz frequencies. This suggested a simple GPSDO solution. By taking a simple, low cost 5MHz voltage controlled TCXO (VTCXO) module and dividing down to 10kHz, this can be phase locked to the output from the Jupiter in an analogue PLL with a time constant of a few tens of seconds.

The circuit diagram **Figure1** (page 5) shows how simple this can be. Obviously, without the ability to be able to tell if the GPS receiver has locked up by reading the NMEA or binary data it sends from its communication port, there is no way of knowing if the system is functioning properly. The Jupiter module does output its 1 PPS signal and a nominal 10kHz immediately after switch on, but the timing of these is way off and the initial case of no GPS lock can be inferred from the large frequency error. In fact this is so large that the PLL is out of lock range and the resulting frequency is sweeping so wildly that it is obvious. When the module does lock up to GPS after a few minutes, the frequency and phase of the 1 PPS jump immediately and abruptly to their correct values, with

the PLL taking a short time after this to stabilise. Although not shown in the diagram, an LED connected to the phase pulse output of the 4046 chip will slowly change brightness over a few seconds during the GPS lockup, and then much more slowly as the PLL locks, eventually settling to a stable half-maximum brightness

The R/C values forming the PLL filter are optimised to my particular VTCXO which has a sensitivity of 125 Hz/V at 5MHz, and a required tuning voltage in the 0 to 1.5 Volt region. As the bandwidth and tracking performance of the PLL depends on this filter, it is worth spending a bit of time optimising the values in this area.

Some Test Results

The 200th harmonic of the 5MHz output, at 1GHz, was monitored on a UHF communications receiver in CW mode and the output at 1kHz monitored with Argo to show short to medium term frequency shifts. All the local oscillators in the receiver were locked to a Rubidium frequency standard that has been calibrated to an accuracy of a few parts in 10^{-11}. At 1GHz, a frequency shift of 1Hz corresponds to 10^{-9} frequency error.

Figure 2 shows the plot after the system has locked up and been running for about 30 minutes. It can be seen that the frequency is maintained usually within a couple of Hz, and randomly wanders over a mean period of something like 20 - 30 seconds - this being a function of the PLL bandwidth. The breadboard which produced these results was lying open on the bench, and susceptible to perturbations when I touched it - it is quite possible this trace would be cleaner still if the unit was packaged in a screened metal box.

Figure 3 shows the effect of disconnecting and then reconnecting the GPS antenna. Presumably, the quite fast variation during the period of no GPS signal is the GPS receiver going through its search routine to find the satellites. The faint line that remains fixed at 1kHz exactly is caused by leakage from the Rubidium source controlling the communications Rx.

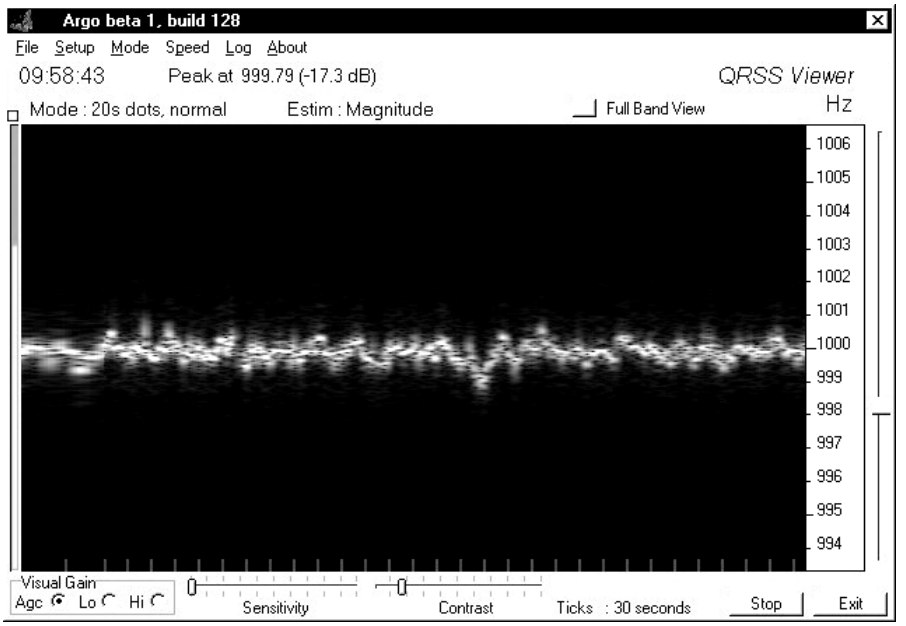


Figure 2 Frequency tracking performance when locked, VCXO output multiplied to 1GHz

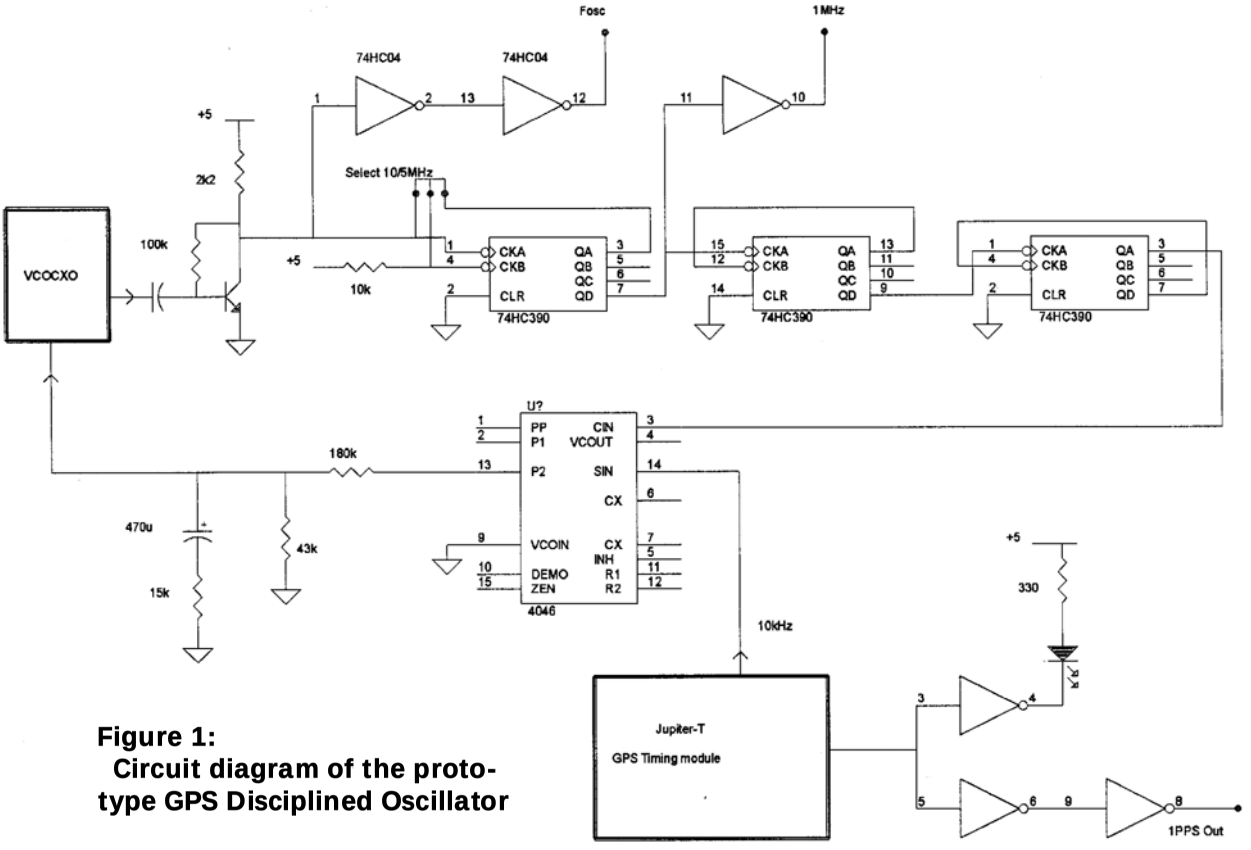


Figure 1:
Circuit diagram of the prototype GPS Disciplined Oscillator

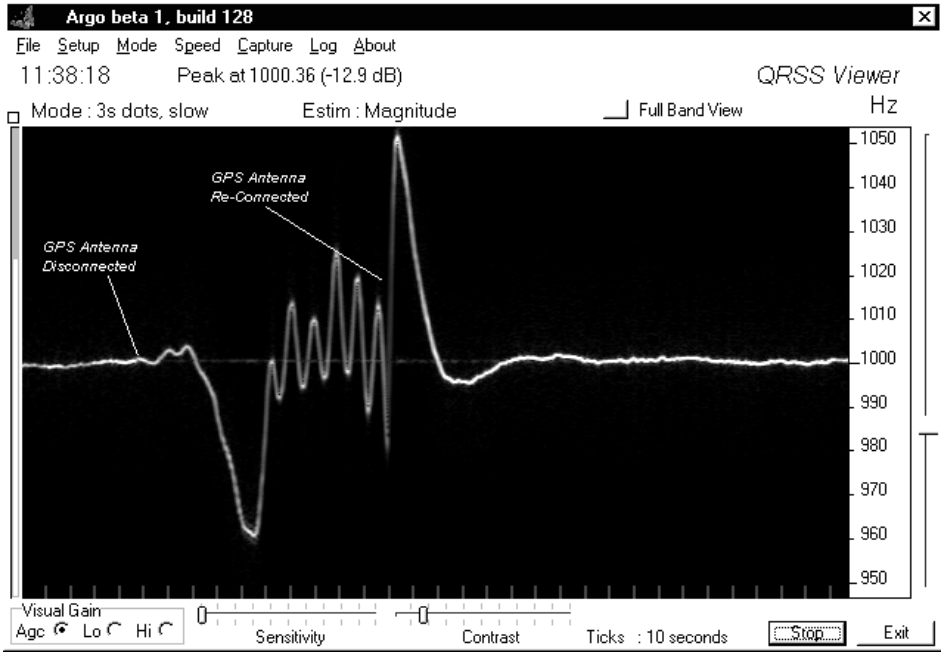


Figure 3 Frequency tracking with loss and re-acquisition of GPS signal - multiplied to 1GHz.

Jupiter-T availability

This design is based around one specific GPS receiver - others with a 10kHz output may be available, but I don't know of any. This is the Jupiter T GPS Timing Board. In the UK it is available from TDC Ltd in Basingstoke, www.tdc.co.uk, telephone +44 (0) 1256 332800. Their Stock number is TU6-D120-041 The cost is around £86 which is significantly higher than a navigation only receiver module, but worth it for the frequency tracking capability.

The board is available with a variety of GPS antenna connectors, but they are all fixed by a standard 5 hole fitting and can easily be replaced by SMA, SMC etc.

Full data sheets are available from the TDC website.

FURTHER COMMENTS FROM THE AUTHOR...

The full article is already hosted on I2PHD's web site at **http://gpsdo.i2phd.com** on behalf of the LF community and includes several useful links. The Long Wave Club of America are also printing this design in their newsletter. The unit is quite useable at microwave frequencies as the performance curves show.

It also has to be said that several people have also made very similar designs and, in fact, Jim Miller, G3RUH, has a few samples of a small PCB available for anyone who is interested - the similarity to my design is uncanny. Contact him on **http://www.jrmiller.demon.co.uk/** for details.

John G8ACE has also built something similar and points at **http://www.gpskit.nl/index-en.htm** for some lower priced versions of the GPS module.

73 Andy, G4JNT

A DUAL DISH FEED for 23cm and 13cm

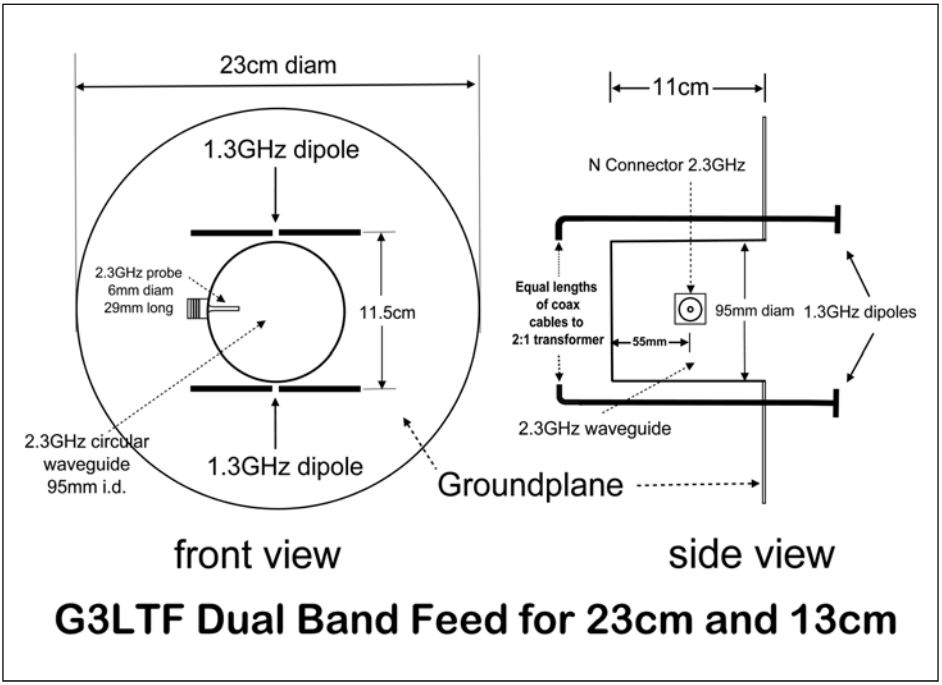
… by Peter Blair, G3LTF

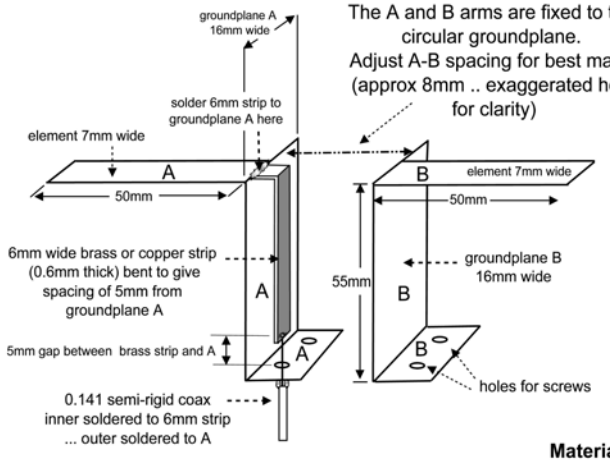
The diagrams that follow are self-explanatory. A copper or brass disc, 23cm diameter, is soldered to the outer lip of a 95mm i.d. copper or brass tube *(or suitable soup can!…editor).* The tube forms a waveguide feed for the 2.3GHz amateur band while the disc becomes the reflector for a pair of 1296MHz dipoles. The rear of the copper tube is, of course, blanked off. A 29mm long probe made from 6mm brass rod or tube is soldered over the end of an N socket centre conductor and the resultant assembly is fixed to the 2.3GHz feed horn so that the probe is 55mm from the horn's backplate and in the horizontal polarised position as shown in the first diagram. That is the 2.3GHz (13cm) section of the dual feed completed.

The 1296MHz feed consists of a pair of stacked dipoles, each made as shown in the second diagram on the next page. They are mounted so that they are in front of the 2.3GHz feedhorn and critically spaced from the circular reflector or groundplane. **Identical** lengths of UT141 semi rigid coax, terminated in sma connectors and fed from the main 1296MHz feedline (eg heliax or similar) via a 2:1 transformer (see final diagram), are fixed through the groundplane and rigidly mounted to it. By varying the centre spacing between each arm of each dipole, as shown in the third diagram, a good match can be obtained.

This feed has been very successfully used for several years on a 2m diameter dish whose f/D is 0.5.

The feed can be suitably protected from the weather by the judicious use of plastic boxes and sealing compound.





23cm dipole assembly

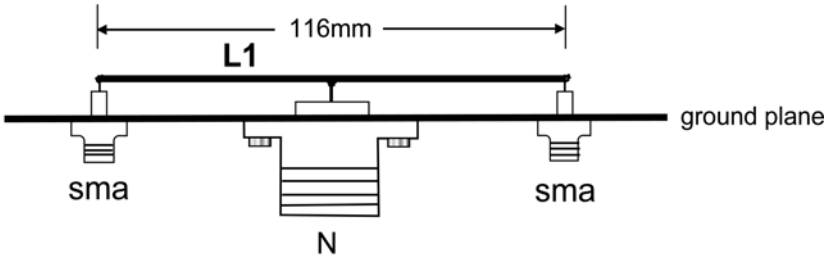
Materials:

Element and groundplane is 0.6mm brass or copper sheet cut and bent as shown in "one piece construction". Note the vertical sections are 16mm wide and the horizontal dipole sections are 7mm wide

2:1 transformer

(enclose in suitable waterproof box)

L1 : 13mm wide copper or brass strip spaced 5mm over ground plane



The Importance of Microwaves to Amateur Radio ... by Mike Dixon, G3PFR, RSGB Microwave Manager

There is no doubt in my mind that this is the only area of the spectrum where the amateur movement can be seen to be making any technical advances

Background:

Several factors have discouraged the use of the VHF/UHF bands by "Novice" licensees in the UK (now re-defined as Foundation and Intermediate Licences).

The first is the ready accessibility of most, or all, of the HF bands under the new UK Foundation and Intermediate Licences, together with the ready availability of commercial multiband/ multimode transceivers.

The second is the relatively high cost of installing steerable VHF/UHF beams, at least in urban areas (where there can be serious domestic, neighbour objections, or planning permission problems), compared to the "invisible half-sized G5RV or W3DZZ" approach possible at HF in even small gardens.

Foundation licences allow 10W access to all the bands up to 440MHz with the exception of the 10m band, and with the use of transmitting equipment which either conforms to EC standards or is available as approved commercially available kits, although receivers and antennas may be self-built.

The Intermediate licence allows full access to all the bands up to 440MHz at the 50W level.

The Full Licence (which incorporates the old "Class A" and "Class B" licences) allows access to all bands, including microwaves, at the 400W level.

The current UK "Novice" licence framework will not allow the use of the bands above 440MHz,

Further factors that discourage Novice experimentation at UHF and into microwaves are:

- The high cost of commercial equipment (if available) and kits (and the skills to build them)
- The education/experience/learning level of the Foundation and Intermediate licences is often insufficient (with the exception of a minority of experienced or professionally qualified persons) to support the technology and skills necessary for operation in the Amateur/ Amateur Satellite Secondary Shared bands.

There is a relative lack of support for amateur UHF/microwave operation by both the national societies and the regulatory authorities, both of whom seem to view these activities as very much a "minority" activity.

The art of home construction is largely dead, for the same reasons as above.

I recently questioned some 20 - odd "novice" members of my local radio club and found that most of them, if operating on the VHF/UHF bands, used only FM and repeaters, with vertically polarised no-gain, or low-gain, antennas! Almost without exception, they preferred to use 80m or 40m SSB to get better coverage than was possible at VHF or UHF. "Proper" VHF/UHF operation seemed to be regarded as something of a "black art". None of them had undertaken, or appeared interested in, any serious home construction!

I believe that only "education" at local club and individual level ("Elmers") can correct this situation, and it is a process that will take a long time to achieve.

Editor's Comment…

The article on by G3PFR, on the previous page, was originally written as a briefing for the RSGB's representative at the February 2004 IARU Region 1 conference. We will publish details of what happened at that meeting in a future issue of the Newsletter. Mike Dixon's comments, I'm sure, will be echoed throughout the amateur microwave scene. Indeed, these sentiments have been the subject of much heated discussion both on the Internet, at various microwave meetings and on the 80m Microwave Net! **While a great deal is said, very little seems to be done about the situation**. The average age of an amateur microwaver seems to be over 50 years, with many of us already in the Senior Citizen category! This is repeated around the world, from the UK to Europe and from Australasia to North America. When we have departed this life who is going to carry the 'microwave torch' into the rest of this century?

If, like I do, you want amateur microwave radio to flourish long after you have left for the "ultimate microwave site in the sky" then you and I must do what we can to encourage younger people into our side of the hobby. If we don't, Amateur Radio will continue to degenerate into a 100% black box activity where little or no original experimentation is being done, where no boundaries are being pushed and where its very existence is under threat as the authorities finally come to realise that the so-called training ground for a pool of skilled technicians is a myth and that its participants are merely playing with their toys, the shiny black boxes. They could then take away our underused frequency allocations and give (sell?) them to more appropriate bodies.

If you have any interest in preserving the traditions of amateur radio and especially those of the microwave fraternity then there are a few things you can do to help …

- **Attend your local amateur radio club meetings** where you can chat among the newcomers and slowly "indoctrinate" them with the idea of finding challenging things to do in their new hobby, microwaving being one of several examples.
- **Give one or more talks** on microwaves to your local club. Offer the same talk to neighbouring clubs … addresses of club secretaries (who are always desperate for offers like this) can be found in RadCom and in the RSGB Year Book.
- If you are a portable microwave operator then **let the members of your club know when you are due to be out in an activity day or microwave contest**. Invite them to pay a visit during the day. You'd be surprised at the interest that is often shown. Follow up this interest afterwards by offering to help with testing and even construction.
- **Be prepared** with a sound argument as to why it's more fun and more valuable to build equipment than buy it ready made … and why it's just as exciting making a 400km contact on 10GHz as it is working Australia on 20 metres.
- **Do not be aloof** and think that your version of microwaving is the only way to go. There are simple techniques, using modes other than narrowband ssb/cw, that are ideal for the raw beginner. After all, you too perhaps started like me with zero knowledge of anything above 144MHz until "switched", by a local microwaver, on to the most absorbing hobby I could hope to have.
- Finally, as we say every month, **USE THE BANDS … BE ACTIVE … OPERATE !**

NEW DATES FOR THIS YEAR'S AMATEUR RADIO SHOW AT DONINGTON PARK

FRIDAY & SATURDAY
1st & 2nd OCTOBER 2004

UK MICROWAVE GROUP -an update

The UK Microwave Group committee has been working recently in the following areas:

- Liason with the RSGB Spectrum Forum, via Mike Dixon, G3PFR, the Microwave Manager
- Negotiations with the RSGB Manager and Board regarding the transfer of the Microwave Newsletter, Contests and Microwave trophies and awards to the UK Microwave Group
- Affiliation of the Group to RSGB.

The Group is now recognised by RSGB as the representative body of the UK Microwaver. The Group appears on the RSGB's Spectrum Forum organisational "tree" as the liasing group for your interests. If you have any problems or issues which you wish to be considered at this level then please contact the Group chairman, G3PHO.

Almost all of this work is being done by email at the present time as the Group's committee members are widely distributed around the UK and Europe (GM4PLM being in Germany!). The committee has set up a secure Internet reflector which allows a more speedy exchange and posting of important documents. Ordinary members of the UK Microwave Group are most welcome on the **ukmicrowaves@yahoogroups.com** reflector. If you have not already done so, we would advise you to visit yahoo groups and sign up.

The UKuWG chairman and secretary receive a steady stream of enquiries regarding membership. At this stage we ask you just to register with the club secretary, Martyn Kinder, G0CZD. When the time comes (most likely during the summer of this year) to pay a subscription you will then be contacted.

We have not set a subscription as the exact nature and quality of the Group's services have yet to be finalised. However, we have very recently been given the go-ahead by RSGB to plan the transfer of the Microwave Newsletter to the Group. This means the present Newsletter readership will continue to receive their paper copies until their present subscriptions expire, after which they will be give the option to carry on receiving the Newsletter, under its new logo, as full members if the UK Microwave Group.

We expect this transfer to be completed mid-2004. Ideally, present readers will only be aware of the change when they see the new logo on the front page! This change over will take several months, until the last subscription under the RSGB system has expired.

The Group hopes to have arranged printing and distribution facilities by the time you receive the next Newsletter.

The position of the Group vis-a-vis contests, trophies and awards has not yet been finalised but we expect an outcome just as favourable as the newsletter. In any case, the contest programme for this and future years is still in the capable hands of its previous organiser, Steve, G4KNZ.

The Group is presently working with G0MJW at RAL with a view to putting on a **Microwave Round Table** meeting on **April 25th** this year. Further details will be emailed around the UK and put on both the UK Microwave Group and the G3PHO websites.

The committee has just begun the job of developing a CD and information pack for those interested in or new to amateur microwaves. It could be eventually become available (at low cost) at general radio meetings, offered to radio clubs and advertised in the radio press. One committee member has volunteered to put it together but much will depend on contributions of material and ideas from others. If you are interested in being involved in this venture then please contact the UKuG chairman, Peter, G3PHO.

An enormous backlog of contest certificates has just been completed to by our secretary, Martyn, G0CZD. Some of you will have heard the thud on your hall floor as the postman delivered the certificates owing to you for your past achievements in the cumulatives and other microwave contests! Many thanks Martyn. If the Group takes over the microwave awards this year, we have some ideas for making the system easier to operate, quicker to initiate and more interesting for the recipient!

Contact details:

Chairman: microwaves@blueyonder.co.uk
Secretary: martyn@czd.org.uk

MICROWAVE ROUND TABLE MEETING
RUTHERFORD APPLETON LABORATORIES
DIDCOT, OXON.

Sunday 25 April 2004

The UK Microwave Group, with the co-operation of Mike Willis, G0MJW, has organised a Microwave Round Table Meeting for Sunday the 25th April, at the Rutherford Appleton Laboratory (RAL), near Didcot, SW of Oxford. We apologise for this late announcement but the permission to hold the event has only just been granted.

Details of the programme for the day are still being worked out but we can assure you that there will be interesting talks (up to three), a trophy presentation, test gear facilities and the usual "horse trading table". It's a one day event starting at 10am and finishing sometime between 3.30 and 4pm. This is a grand opportunity to meet your microwave pals and test out your winter projects.

RAL has an excellent reputation for its "in house" restaurant! If you wish to avail yourself of its facilities you must say so when you register for the event.

This year, because of the security arrangements needed these days, every RAL attendee will need to register their intention to come to the meeting by the Tuesday preceding the meeting (ie by 20th April 2004). **Registration is mandatory** and anyone who turns up "out of the blue" will, I'm afraid, be refused entry. You will shortly be able to register on line at the UK uWave Group's website **at www.microwavers.org**.

Please pass this information around to other microwavers. If anyone cannot register online they can send in a "snailmail" application to myself. My address is shown on the front of this Newsletter. Once again, registrations will close at midnight on the 20th April!

More information will appear on the Internet later .. check the UKuW Group website.

73 from Peter, G3PHO

IT'S YOUR SAY ..... READERS' COMMENTS

From: G8BKE, Chris Towns [ctowns@tesco.net] Sent: 04 March 2004

I read with interest G3VZV's comments on DATV QPSK on 2440MHz and the possible QRM from other sources in the band. However not all are QRP as Graham seemed to indicate.

For some 18 months now, I have been occasionally using Oscar 40 until its recent demise. On the 2401.34Mhz downlink I have been plagued with QRM on or around that frequency on some dish headings. Investigations have shown it to be possibly some sort of fixed wireless access sharing a Tetra mast some 2 miles north of me. Although the signal seems to be centred on or around 2400MHz, the spectrum spreading is such as to reach the Oscar downlink frequency on 2401.34MHz. Luckily, with the mast being north of me, my dish provides some discrimination from the signal when beaming towards the satellite. G3FYX in the Bristol area, suffers similar QRM, no doubt from a similar source.

If this sort of QRM were to venture to 2320MHz it would make weak signal work impossible. It seems that, although we may not lose our allocations outright, their use may become severely limited by the steady encroachment of devices like this, making the allocations almost unusable. Let's hope not!

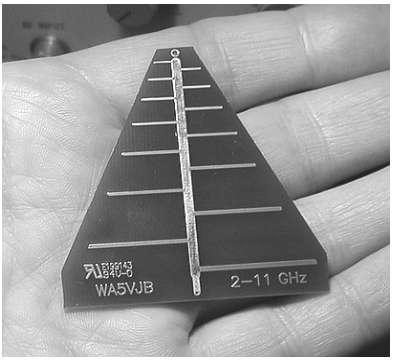
73 from Chris G8BKE

An RF Microwave Signal Sniffer
… by John A. Jaminet, W3HMS

Often, I like to know immediately if my transverter or amplifier is QRV... 100% ...YES or NO ! In the past, I have found that it's possible to see a signal on a voltmeter from the MON jack on my DB6NT transceivers .... without in fact having an emitted signal. The fault was my antenna relay!

Thus I made a promise to myself that I would eliminate this circumstance once and for all. The means which I used is simple, effective and quite old in the history of radio. It is a field strength meter which works in the RF field close to the antenna, e.g., a few feet, and it operates without need of batteries, a power supply, or a resonant circuit.

In use, start a few feet from the feed and come closer to the feed. The circuit uses just 4 parts plus a radome. The most important part is the log-periodic antenna (LPD) imprinted on a piece of PCB and available in the USA and in England. The frequency range is 2-11GHz..



I spoke in February 2004 by EMAIL with the inventor/fabricator, Kent, WA5VJB, who told me that his model for 2-11GHz is ideal for an RF sniffer . The LPD is available by mail for US $5.00 in the USA. Outside the USA, Kent told me he will accept 5 Euros per LPD in an envelope with a brief note indicating the quantity needed, your name, call, address, and of course your cash .. HI !

The circuit is so very simple: the center conductor of a piece of semi-rigid .085 coaxial line connects to a diode with output to a 25 (or so) micro-amp meter. A capacitor of about .001uF is connected between the 2 terminals of the meter and the outer conductor of the cable is connected to the other terminal of the meter. Meters of 50 or 100 microamps should be acceptable but less sensitive.

A simple radome for protection against poor usage of this sniffer is an old plastic peanut can which I emptied myself. This is hard but essential work ... if it is too tough for you, you may mail the peanut cans to me for emptying , HI! There is no attenuation according to my test on my 10GHz beacon where the same radome covers the slot antenna.

The sniffer is so simple to operate: start in front of your parabola at a distance of about 15 feet if you have some power (like 40 watts) or at a few feet with QRP and meander slowly towards your antenna with the polarization like your RF source. With 40 watts, I tend to back into the dish as I can avoid looking into the feed. You will know by meter movement when your signal is strong enough or you will have a clear sign that some work is needed on your MW gear!

There are two sources for the LPD : The UK Microwave Group and WA5VJB. His address is Mr. Kent Britain, WA5VJB, 1626 Vineyard , Grand Prairie, Texas, 75052-1405, USA. (or email him at wa5vjb@flash.net)

If you would like to talk with me on the topic, I am on EMAIL at W3HMS@aol.com .

73 and happy building, John, W3HMS

241GHz WORLD RECORD BROKEN ONCE MORE

The area of amateur spectrum above 200GHz has become synonymous with the callsign of Brian Justin, WA1ZMS. Your editor had the pleasure of meeting up with him once more at last year's Microwave Update in Seattle. Brian approaches his microwaves with a dedication and precision that I have not found anywhere else! The results of his work can be clearly seen in this latest report, emailed to us in mid-February. Using very slow speed Morse, a technique we are more used to seeing on the LF bands of 73 and 136kHz, Brian and his radio partner Pete, W4WWQ, have pushed the outer limits of microwaves yet again. The new world record is at a distance many of us would be delighted with at the lower frequencies of 76GHz and 47GHz. Also, you might take note of the weather conditions at the time this QSO was made .... Minus 8 degrees Celcius is not a pleasant temperature in which to be out portable ! However, it is the very kind of weather that facilitates long distance contacts on the millimetre and sub-millimetre bands. We in the UK who are active on these bands should take a leaf out of Brian's book and make the effort to go out in the winter, away from the usual contest and activity days. The results could be much more rewarding.

By the way, just take note of the fantastic frequency stability these two have achieved on such a high frequency....

From:Brian Justin, WA1ZMS [wa1zms@att.net]
Sent: Tuesday, February 17, 2004

I'd like to claim what should be a new World and North American DX record for the 241GHz band.
W2SZ/4 worked WA1ZMS/4 on 241GHz at a **distance of 79.6km** using slow speed CW (QRSS).
Details of the QSO are as follows .....
Date: Feb 17th, 2004
Time: 00:15z
W2SZ/4 in FM07fm (37-31-00N 79-30-35W)
WA1ZMS/4 in EM96wx (37-59-28N 80-07-17W)
Distance: 79.6km

The weather at the W2SZ/4 QTH was:
Temp: -8C
Dew Point: -26C
Relative Humidity: 22%
Station pressure: 884mb
Atmospheric loss: 0.273dB/km

The weather at the WA1ZMS/4 QTH was:
Temp: -8C
Dew Point: -16.1C
Relative Humidity: 53%
Station pressure: 932mb
Atmospheric loss: 0.681dB/km

Pete, W4WWQ was the CW op at W2SZ/4. WA1ZMS/4 was the op of his own station at the EM96 QTH. Both ends of the QSO used Spectran software to aid in receiving the slow speed CW at a rate of approximately 1 second per "dot", 3 seconds per "dash".

The entire QSO took well over an hour to complete with both stations having to send the exchanges several times. Some portions of the CW were copied by ear, but the DSP software came through in the end to help make the QSO happen.

Both stations used new Wenzel Ultra-Low-Noise 5MHz reference oscillators as the phase-locking frequency references. **Short-term stability on the order of 4 x 10-13 is required to keep the signals within a 1Hz filter bandwidth of the demodulating software.**

The stations were keyed using Island Keyers with custom QRSS firmware from Charles Olsen, WB9KZY.

This QSO is also the 5th grid needed for the ARRL VUCC award for the 241GHz band for W2SZ. This claim should be the very first VUCC for that band and has taken many months of hard work and many VERY cold-night DXpeditions to make it all happen.

This latest DX record of 79.6km occurred on our fourth attempt, so we were not without our failures.

More information with photos is posted at **www.mgef.org**.

Several people have asked me about the 110.2MHz direct synthesizer that was used in my 241GHz gear. A simple schematic as well as some Spectran screen shots of the QSO are now posted at: http://www.mgef.org/ . Please follow the link on the main page for the information.

Thanks to John, K2JJB our webmaster for making the posting.

73, Brian Justin, WA1ZMS

NEWS FROM OUR MAN IN THE MIDDLE EAST....

From: Neil, G4LDR<g4ldr@btinternet.com>
Sent: 09 March 2004
Subject: Update from G4LDR/YI LM23CF

Following the mishap I had with the tower in November, when I thought it would be some time before I would be operational again, the damage to the tower was not as bad as I first thought. The main damage was to the 90cm dish, which can't be repaired.

A local agricultural engineer repaired the head unit (charged me £5 - I gave him more). I got the 3, 6, 23, 70cm and 2 metre antennas reinstalled over Christmas. The dish on 3cm and 6cm is now a 60cm so there're a few dBs of loss in antenna gain until I can find a bigger dish. I was operational for the December activity day (but no one else was!).

I've resumed regular Monday night activities with G4ALY, G4NNS, G1JRU and G8ACE. We have been exploring a number of scatter points to see how many people can join in a qso on 3cm or 6cm at the same.

I QSYd to 24.048GHz at the end of the year. The GB3SCK beacon (since its increase in power) can be heard whilst mobile between Salisbury and Blandford in quite a few locations and not just the hill tops. I haven't put the 24GHz gear on the tower yet (re-building to incorporate the new wave guide switch from NZ).

I should be back in the UK sometime in April, just in time to get ready for the early May contest. There's not much chance of any contacts from my current location unless I can get the signals guys to to lend me a satellite dish to try some EME!

73 from Neil G4LDR/YI (LM23CF)

ANOTHER NEW BEACON FOR BELL HILL

From: Andrew Talbot, G4JNT [ACTALBOT@mail.dstl.gov.uk]
Sent: 23 February 2004

On Thursday 19 February a 47GHz personal beacon with the callsign G8BKE/P began operating from the site of the GB3SC# complex on Bell Hill in Dorset, IO80UU59.

It is a self contained beacon, constructed by G8ACE and generating around 10mW of RF to a 20dB horn, the whole unit being built into a sealed box mounted at the top of the beacon mast. The frequency source is derived from a stable locked oscillator and should remain accurate to within a few hundred Hz of its **nominal operating frequency of 47088.905 MHz**. The antenna is pointed on a bearing of around 80 degrees from the site - it is targetted at G8ACE's Winchester QTH and surrounding high spots such as Cheesefoot Head, at 75km. Antenna beamwidth is in the region of 20 degrees

Chris, G8BKE, has access to the secure remote control link for the complex to comply with turn off requirements.

This brings the total of beacons operating from Bell Hill to seven. Apart from the five forming the GB3SC# complex, a low power personal beacon signing G4JNT/P on 70.031MHz has been running for 18 months and now G8BKE/P. Is this a record ? There is now room for only one more unit before the remote turn off capacity is saturated.

73 from Andy, G4JNT

From: Mike, G0JMI
[mike.karen1@tesco.net]
On the 12th February this year, I had two-way contacts on 5.7601GHz with both Brian, G4NNS (Andover, IO91FF), and John, G8ACE (Winchester, IO91IB), from my home QTH (Alton, IO91MD) under Rain Scatter conditions:
G8ACE: 25km my report 4/7, gave 5/9 SSB
G4NNS: 42km my report 5/5, gave 5/8-9 SSB

These two QSOs represent the first using my **Flyswatter antenna on 6cm**. The system is 2 watts to an 18 inch dish illuminating a 2x3 foot mesh flyswatter at about 25 feet.

The Rx/Tx is a mix of WG14 balanced-mixers and multipliers with an Rx front end using the two-stage GASFET amplifier cut from a Blue-Cap LMB and tuned for 6cm. The same LNB -based circuit has also been used to amplify the TX signal, with 60-65mW being obtained (not bad from a scrap LMB purchased for 50p from a Rally!). This then drives a TWT to provide 2W output. **73 from Mike Parkin, G0JMI.**

DUTCH 24GHz BEACON UPDATE

From: Hans v Alphen, PA0EHG
[pa0ehg@amsat.org]
Sent: 01 March 2004
This is to inform you that the 24 GHz beacon at Schiphol is now QRV once more and on the new frequency of **24048.200 MHz**. Power output is 150 mW into a 24cm dish beamed towards G3LQR and 800 mW into an omni antenna. Both outputs have the same frequency.

On my website, there is further info including pictures.

The beacon is in fact almost completely new, with an OCXO designed by G8ACE and a new multiplier from 12 to 24GHz giving 150 mW. Then a directional coupler of 20dB is followed by a amplifier with 800mW output.
I would welcome any RX reports.

Best 73 Hans PA0EHG
(www.pa0ehg.com)

A BIG THANK YOU ....

has been forwarded to the editor from Margaret Brooker, the wife of the late Jack, G3JMB. We have asked to pass on her very sincere thanks to all who sent messages of sympathy following Jack's passing.

Margaret is very proud of the fact that so many microwavers held Jack in such high regard.

FINALLY SOME FOOD FOR THOUGHT...
From Brian Justin, WA1ZMS
< wa1zms@att.net> Sent: 03 March 2004

The bands at 120GHz and 142GHz will be changing in the US to keep up with WARC-2000 guidelines. We lose the band at 120GHz and pick up 122.25 to 123GHz. We also lose 142GHz to 148GHz and get 134GHz to 141GHz.

Now the obvious question(s). Do we keep the DX records for the bands or toss them out and start fresh?

For me, I'd love to keep my VUCC on 142GHz and just re-label the band. My gear won't shift so easy to 134GHz so it's a full reset for me. The atmospheric losses change nil from 142GHz to 134GHz. So DX work is just as hard.

My 120GHz gear will move easy, but since the atmospheric losses on 122GHz are so much better than on 120GHz, it acts like a whole new band anyway with VUCC and better DX both possible.

I've asked Peter, G3PHO, what his plans in the UK are.*(not really thought hard about this one ! .. editor).* Whatever we do in the US should follow what Europe will do since they changed first and now all the bands align worldwide.

Your thoughts?

Brian, WA1ZMS

That's the lot for now ... see you all next month. 73 from Peter, G3PHO