An Amateur Radio publication for the Microwave enthusiast

MICROWAVE NEWSLETTER

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

FROM THE EDITOR

2003 – MAY

Two days before this issue was due to be put together, there was just one technical article and a handful of activity reports available to fill sixteen pages! Someone must have sensed the editor's anxiety because, almost miraculously, two more technical items arrived plus a sheet of contest results, a report on a UK "first" and more activity news. Thanks folks ... you saved the day!

Once again we are pleased to publish a most interesting article by John Share, G3OKA, his third in as many months. Though it relates to 14GHz we feel sure you'll see the 10GHz connection. The "French Connection" in this issue is also most welcome ... read and find out! Our UK resident oscillator "guru", G8ACE, shares with us some of his recent experiments in trying to achieve the perfect crystal oscillator for microwave use. If you need a highly stable LO unit then he's the man to approach first.

Our thanks also go to Paul, G8AYY for a timely reminder about the importance of accurate dish feed location.

The contents of this newsletter show that UK microwaves is flourishing in many parts of the country, whether it be experimentation in the workshop or making DX contacts from hill top locations. There's much more going on than some would have us believe, so why not share, with the rest of us, what **you** are doing ? Articles of any shape or size, provided they are of microwave interest, are most welcome.

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 ...

Microwave coaxial relays:

- **HP 33311A RF switch** SPDT with 2x internal 50 ohm loads,DC-4GHz, 24V, SMA connectors, rated 1W CW. **Price £20**.
- **HP 33311B RF switch** SPDT with 2x internal 50 ohm loads,DC-18GHz, 5V, SMA connectors, rated 1W CW. **Price £30**.

Ex-equipment but in excellent condition (& tested), used for limited time in receive application only.

Contact Steve Davies G4KNZ at **steve.davies@nokia.com**

A picture is available by return or email, or discuss on the phone on **01344-484744** (evenings or weekend). Can post at cost.

IF YOU ARE IN AUSTRALIA IN JULY HERE'S SOMETHING FOR YOU ...

From: Peter Freeman, VK3KAI
[Peter.Freeman@sci.monash.edu.au]

The Eastern Zone ARC will be hosting the **GippsTech2003 Technical Conference** in Churchill, Victoria, Australia, on the weekend of July 5 & 6, 2003. This annual event is becoming recognised as THE event in VK for all amateurs interested in weak signal work on VHF, UHF and Microwave bands.

Topics will vary each year but many talks cover microwave activity and techniques.

Details of the event can be found on the VK3BEZ website at: http://www.qsl.net/vk3bez/

Peter VK3KAI
Chair, Organising Committee

THANKS ....

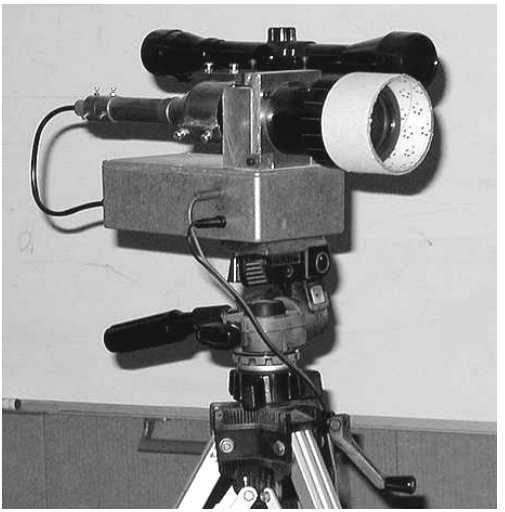
I would be pleased if you could pass on, though the newsletter, the heart felt thank you to all the members of the microwave community for the messages of condolences received on the passing of **Sam, GI8GJX**. It gave the family great comfort at this difficult time to know how well he was thought off within microwave circles and I personally know of the high regard that he in turn held for each and very one of his friends and fellow enthusiasts, some of whom he had never had the pleasure of meeting off-air and to that end the visit to the VHF convention several years ago and, more recently, after many failed attempts to finally attend the round table at Martlesham brought him the greatest of pleasure. His only regret was the baggage weight limit on the flight home which prevented him from bring home even more metalware for his collection!

So again 'THANK YOU' to one and all ... your messages were greatly appreciated and treasured.

Sam Adrain, GI4SQL

THE FRENCH CONNECTION .. BY LASER!

After breaking the UK Lightwave DX record last month, the intrepid English trio have now made the very first lightwave contact from France to England. This is exciting news indeed and highlights the potential of the THz portion of the spectrum for some really interesting experimentation. Our congratulations go to G8LSD, G0MRF and G3GRO, all three established microwavers, for this historic achievement. Anyone else game for "tripping the light fantastic" ? ... ***Editor***



The photograph above shows one of G8LSD's lightwave transceivers as exhibited at the RAL Microwave Table 2001

From: Allan Wyatt [allan@r-type.org]
Sent: 11 May 2003 23:04
Subject: More Laser

David (G0MRP), Derek (G3GRO) and myself (G8LSD) have finally made the first UK to F contacts by Laser. This follows from months of weather watching and several previous attempts where all we could see was fog across the channel. Even when down the channel on the UK side was clear for 50km, it proved impossible to see the French coast.

However, on Monday 5th May, with David on the French coast, west of Calais at Cap Blanc Nez, and Derek and I at Dover, HERE IN THE uk, the visibility was very good. At sunset, with the light shining on Calais, binoculars revealed the sun glinting on the windows of individual buildings ... Spectacular!

Because of the good visibility we could set up early and align the telescopes on the masts on the French coast. As soon as the sun had set, we were able to locate David's red laser beam. It took longer for the reverse set up due to the very bright sky behind us. I had problems at first due to a jolt the laser transmitter had suffered on a pothole whilst looking for a good site. The rifle sight aligned easily on the laser from David but he could not see me. Derek was also transmitting but nothing was received in France. By using a 'mowing the grass' technique of scanning the laser, I was delighted when David said he had seen a flash. In a few minutes we determined that it was indeed my laser he had seen and by feeding the received signal back on 2m I optimised for maximum signal. The path was 33.7 km and the signals were good with little scintillation.

Shortly after the first QSO, David and Derek also had a contact with relative ease. Whilst they were working I had time to pace along the road that we were parked by and judge the with of the visible beam from David's 10mW laser. From just visible through high visibility to just not visible with the naked eye was 170 feet. David then paced out my beam width. I use a beam expander and the beam leaves the transmitter at about 50mm wide by 25mm high (ie a 2 inch by 1 inch cross section). David reported a visible width of just 40 feet, but that I was significantly brighter than Derek's laser. His beamwidth was judged to be about 200 + feet wide.

David sprained his ankle that evening by watching my beam and not seeing a rut in the ground! He is now recovering well, and, like all safe expeditions, he was not alone. David was fit enough to have two laser contacts on the night of 10/05/03 with a South Coast group.

Best regards to all readers

Allan, G8LSD

A Slotted Line for 14GHz Measurements

J.A.Share, C.K. Woolfall, Oliver Lodge Laboratories, University of Liverpool

Editor's note: *This paper, kindly sent to the Newsletter by John Share, G3OKA, , was written initially for more academic circles than our readership but, being microwavers, I feel sure many of us will quickly substitute 10GHz for 14GHz in the article that follows!*

Introduction

The measurement of Standing Wave Ratios (SWR) at high frequency uses techniques that simply do not function at Microwaves where coaxial cable is replaced with Wave Guide and a device known as a "Slotted Line" comes to the fore. The need for one of these devices clearly demonstrated that they are scarce, always of the wrong Wave Guide type and invariably have parts missing. Irrespective of exactitude in meeting ultimate requirements, any slotted line that can be acquired can be pillaged for parts and used as the basis for a new design. Such remnants were rebuilt into a slotted line for use at 14GHz.

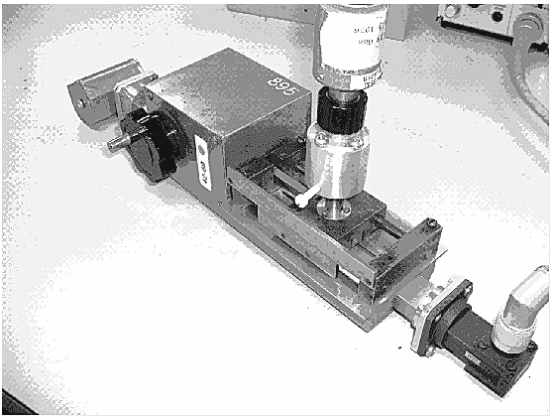


Figure 1. Overall photograph of the completed Slotted Line.

A general view of the finished design is shown in **figure 1**, the WG16 Wave Guide is mounted onto a substantial base plate (10mm x 60mm x 210mm) that also carries the rack and pinion drive to position the trolley. The pair of guide rails ensures that the pick up sensor runs true in a central slot (2.5mm x 90mm). Depth of penetration of the pickup into the Wave Guide is controlled by rotation of the upper part of the pick up assembly, and to prevent movement in use this adjustment is locked by a nylon screw. A cross section along the entire length is shown in **figure 2**. The dimensions in this and subsequent diagrams are somewhat vague because it is unlikely that an identical copy would be made.

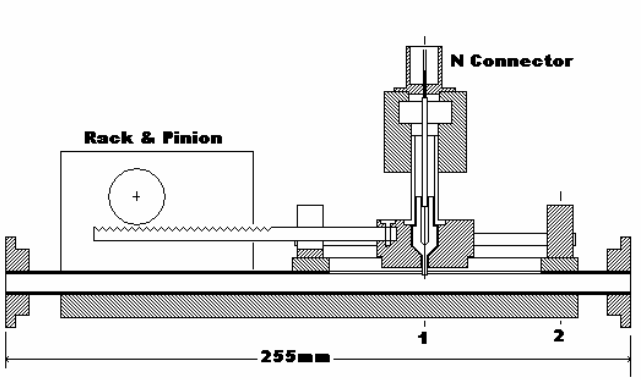


Figure 2. Longitudinal Cross Section.

The majority of the parts were made from brass, all the screws were stainless steel, and the base plate and upper part of the sensor adjuster were made from aluminium. The insulator within the pickup was made from a material known as “Noral”, this has exceptional resistive properties and appears impervious to microwaves. There are other less exotic materials available and Nylon would appear to be a good choice.

The Base plate

The rigidity of the whole assembly is dependent on it being built on a firm base. A length of 10mm aluminium plate was machined with a slot 21.5mm wide and 1mm deep along its length. The WG16 fitted into this groove, exactly, and provided the basis of the alignment of the rack and pinion drive unit. Fixings to this base were made using M4 stainless steel machine head screws that fitted flush to the under surface.

WG16 and slotted plate assembly

The slot position is critical and requires precision in mounting the WG16 and the associated face plate. Two lengths of 15mm x 10mm brass stock and the WG16 were silver soldered to the 2.5mm x 75mm x 125mm face plate as shown in **figure 3**. Notice that the WG16 is slightly thicker than the two lengths of brass stock, this ensures that the WG16 fits into the groove in the base plate for alignment purposes. The actual difference in thickness is not vitally important and 1.5mm is quite adequate.

To prevent distortion during the soldering process the face plate was initially made considerably oversize and clamped. Even so the plate buckled and the upper surface required machining. The six under side fixing holes were tapped M4, the upper side was drilled and tapped to take the guide end plates which were located using 1.5mm spigots (**figure 4**). The guide end plates require exact placement to ensure that the trolley not only runs in the centre of the slot but also the bearings and guide rod are not skewed along their travel.

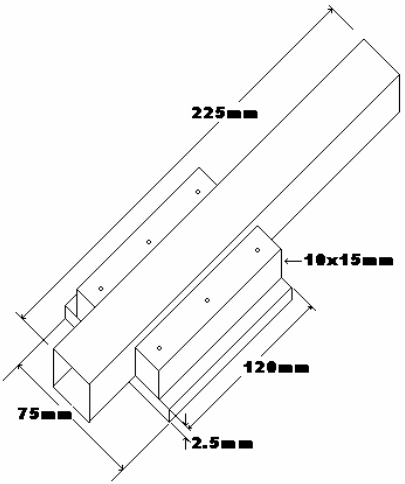


Figure 3. Underside WG16 and slotted plate.

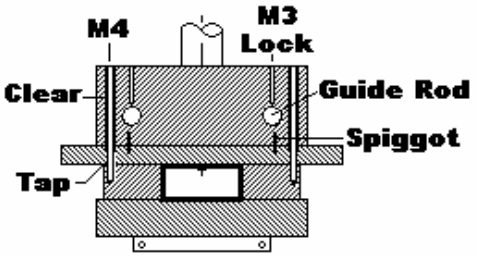


Figure 4. Cross section 2.

The slot itself (2.5mm wide x 90mm long) must be located along the centre of the WG16, it must be parallel and straight and was machined using a precision end mill. It is highly unlikely that it could be successfully cut by hand using a file.

Rack and Pinion

The drive was obtained from a scrap unit but inexpensive alternatives exist. Model makers employ rack and pinion assemblies and Model Maker shops and Maplin Electronics stock suitable items though usually made from plastic mouldings and a little on the short side. It is not impossible to make a rack from 5mm x 7.5mm brass stock with teeth at 1mm pitch, the pinion should be anti back lash (formed by two gear wheels and a spring).

The point of connection between the rack and the trolley is flexible and allows for some misalignment. It is important that the trolley runs smoothly and the rack imparts force along the axis and not at some undefined angle causing the trolley to attempt to skew and therefore bind on the guide rods.

The Trolley

As shown in **figure 5** the trolley has a vane that runs within the slot on the face plate. This vane is 2mm wide and its depth is dependent on the thickness of the face plate and should be flush with the inside of the WG16 when fully assembled. The1.5mm hole at its centre is for the pickup. Two slots (1mm wide, 10mm apart and 10mm deep) form high impedance break points to isolate the pickup from the remainder of the assembly. The trolley does not come into contact with the face plate, there is a constant gap of 0.5mm.

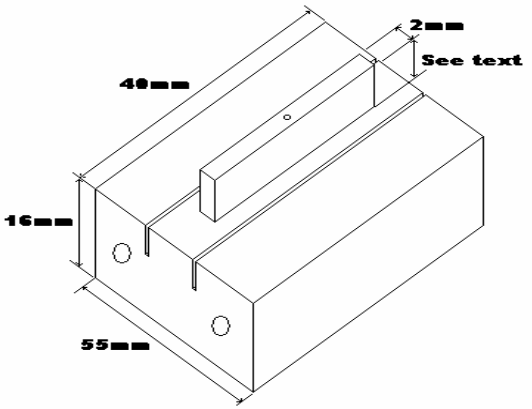


Figure 5. Underside of Trolley.

The pickup assembly mounts onto the top side of the trolley as can be seen from **figure 1** and is shown in detail in the cross section 1 (**figure 6**). The insulator is approximately 10mm in diameter and is clamped in position by the lower part of the penetration adjuster. The three 1.5mm screws that perform this clamping action are visible in the photograph.

Using ground stainless steel guide rods and a brass trolley may suggest a conflict of materials, however most forms of stainless steel are inert and there should be no reaction with the brass trolley. Because the bearing length is 40mm and the guide diameter is 10mm, the l/d ratio is sufficiently high not to warrant using

pillow bearings and no problems have been experienced due to wear or slackness.

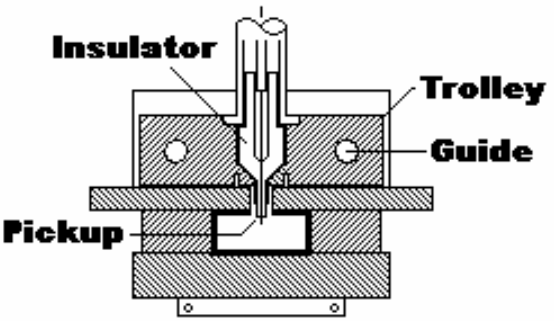


Figure 6. Cross Section 1

The Pickup assembly.

The projection of the pickup into the WG16 is critical and is controlled by rotating the upper part of the pick up assembly which is shown as an exploded diagram in **figure 7**.

The lower part of this item was made from an M12 brass bolt, the head was turned to fit into a recess on the trolley and the centre bored out to 8mm diameter to mate with the upper end of the insulator as shown in section 1 (**figure 6).** The remaining wall of the bolt is quite thin and the boring process tended to stretch the thread. Three attempts were required before the correct technique was learnt.

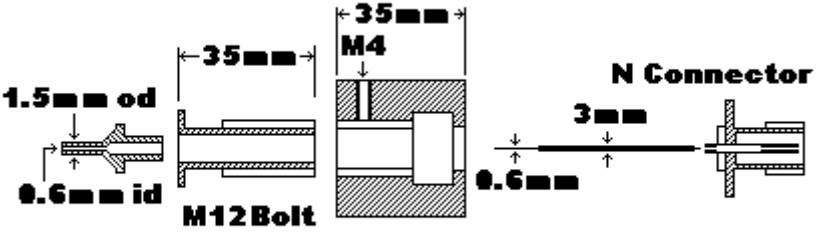


Figure 7. Exploded view of Pick up Assembly.

The upper part is 35mm diameter and 32.5 mm in length, it has an internal M12 thread and an “N” connector mounted on its end. The plunger is made in two parts, the majority of its length is 3mm diameter brass rod, the final length is 0.6mm copper wire that forms the sensor into the WG16. It is important that the internal thread, the connector and the plunger are all coaxial to the adjuster axis. When adjusted the free end of the 0.8mm sensor wire must not describe a loci, it should be a single point implying that it will run freely within the insulator. Failure to meet this specification will pose serious assembly problems with inevitable damage to the 0.6mm wire.

In Operation.

It will be seen from the photograph that an HP432 power meter is used as the signal detector / indicator. This would seem to conflict with established thinking in that the detector should be a high impedance device and not a low impedance Power Meter Head Unit. Experience has shown that when used in conjunction with a +10dbm signal source (HP8673D) reliable results can be obtained with the power meter set to maximum sensitivity (0.01mw), indeed far coarser sensitivity can be used for general investigative work.

Confirmation of operation required a Wave Guide dummy load, the signal was applied and readings made at various intervals along the travel of the trolley. The pickup should be adjusted for minimal insertion into the WG16 consistent with obtaining repeatable readings. These should all be

equal because the SWR should be unity. In practice it was been found that there were one or two quite small variations and these were due to burrs on the slot. Near the ends of the slot the values did not hold so well and these could be simply regarded as no go areas although the vane on the underside of the trolley could have been adjusted relative to the end stops provided by the guide support end plates. A couple of neoprene "O" rings were slid onto the guide rods to act as buffers and prevent the trolley entering these end zones.

It will be seen from the photograph (**figure 1**) that a Vernier Scale has been mounted on the trolley and guide rod end plates. This could be replaced with a clock gauge although currently available digital readout Vernier gauges are so inexpensive that there would be little objection to customising a brand new gauge to fit to the slotted line.

Conclusion

The initial objective was to build a slotted line to measure SWR in WG16 Wave Guide at 14GHz, this has been achieved and the unit has had considerable use. The slot length provides a number of peak and trough values at this frequency and this has enabled attempts to be made using direct measurements to determine stub matching values. Subsequent SWR tests using this slotted line has confirmed that it is probably accurate to 1.03:1 at 14GHz and as such is very acceptable.

This unit was made as part of the on going research into the application of Microwaves to Geomagnetism at the University of Liverpool.

J.A.S. March 2003.

Correction to Microwave Managers' report on the IARU Region 1 Conference, San Marino

There was an error in the report published on pp 43 - 44 of the April 2003 issue of RadCom, for which I must apologise to all readers. This concerns the "preferred" frequencies in the 5.6/5.7GHz ("6cm") band.

It was stated that 5668 – 5670MHz was the preferred narrow-band modes segment. This was the result of an interim recommendation taken at an earlier Conference to accommodate certain of the Scandinavian countries who, at that time, did not have access to the 5760 – 5762MHz segment which had traditionally been used throughout the Region for narrowband modes.

This no longer applies and operators in this band are recommended to use the 5760 – 5762 segment for all narrowband communications modes.

Mike Dixon, G3PFR, Microwave Manager

Since last month's discussion on the proposed 24GHz UK narrowband move to 24.048GHz, only four replies have been received so far. Please air your opinions by emailing or writing to the editor.

Improving Crystal Oscillator Signal Purity

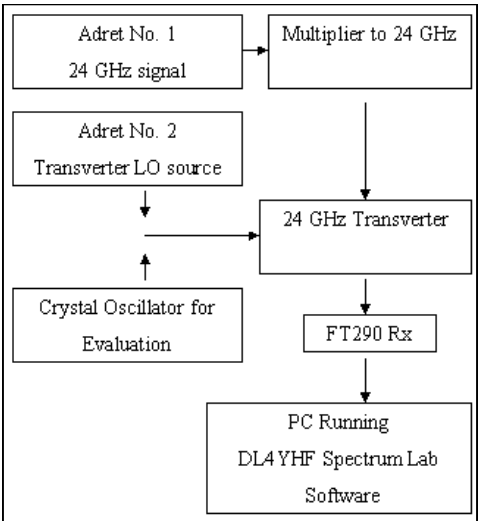
by John Hazell, G8ACE

Many microwavers purchase low cost crystals from providers such as QuartSlab, Klove and Eisch. At 24GHz and above it sometimes happens that the received signal using a new low cost crystal can sound full of LF jitter or perturbations. This makes copying of weaker SSB signals quite difficult.

The blame for this effect can be laid directly at the door of the crystal itself. I have been pursuing a cure for this problem for some time, it being quite difficult to get suppliers to discuss the problem and therefore track down a solution. The crystal blank quality on low cost crystals appears to drop to very poor quality at times, possibly quality that is adequate only for computer crystals. Both G4BRK and myself purchased 100.2 MHz crystals from Klove recently and both these showed large amounts of jitter. Other crystals purchased at the same time from Klove are perfectly good but because the frequency was different they where almost certainly made from different quartz blanks of better quality. So the first unknown is the **crystal blank quality**. It seems likely that once a bad quality crystal frequency appears its likely to persist until all that stock of blanks is exhausted.

Additionally there appears to be a likely hood that variable stresses are contained in the bond wires, the crystal element within the can adding to this jitter problem. QuartSlab suggested some time ago that holding a crystal vertically and using a soldering iron to heat the lead out wire for ten seconds to allow the heat to travel up inside the unit would reduce the jitter. This was tried and an improvement in the amplitude of the jitter of perhaps 2:1 was obtained. I also understood that professional users often store new crystals at around 80º C until they are required. I had kept some crystals under the jacket of my hot water cylinder for several years but on finally using these the jitter was no different to a new crystal. This warm storage may help with ageing though I have no measurements to support this aspect. Another crystal supplier then suggested cycling the troublesome crystals between around +80º C and -10º C for one hour at each temperature for 48 hours.

A simple arrangement to do this cycling was to use my OCXO[1] unit itself to do the crystal heating. A resistor of 4K7 was added from TP1 on the circuit diagram to the +10.5v regulated supply. This allows the upper oven temperature range to be extended. Additionally if the heating is done using the complete OCXO it is important that high temperature Epoxy was used to bond the heater plate to the PCB board. For the low temperature simply placing the bare OCXO module in the freezer was the simplest solution. Only the crystal itself needs to be cycled so if you have a means then it can be done outside the OCXO.



An evaluation method needed to be established to verify any improvements that might be made. The **system diagram** (seen here to the right) shows the arrangement employed. Two Adret 5104 synthesizer units are employed to establish a reasonable quality reference. The Adrets themselves will not be perfect but the results show them to be considerably better than a 'bad' crystal.

The IF output from the transverter is

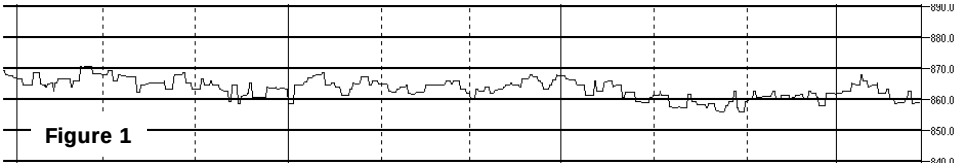


Figure 1

connected to the FT290 Rx and the resulting CW audio note connected to the sound card in the PC and the DL4YHF[2] Spectrum Lab software. **Figure 1, above,** shows the frequency perturbations of the test set-up. Vertical scale is 10Hz/div. Horizontal divisions are 10 seconds. The amplitude of the jitter is around 10-15Hz pp. This amount sounds perfectly satisfactory on CW.

Substituting the test crystal in its OCXO for Adret No. 2 a measurement of that can be made. **Figure 2** shows the new 100.2 MHz crystal as considerably worse than the test setup. Vertical scale is now 25 Hz/div. The jitter amplitude being as high as 300Hz pp. This is very audible as a nasty wobbly note.

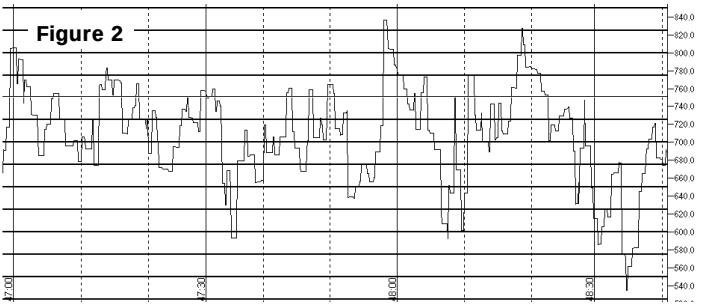


Figure 2

The method of heating and cooling the crystal is rather arduous and was done as time permitted. The crystal being re-measured at intervals for signs of improvement. Temperature cycling during the daytime over a period of around five days gave the result in **Figure 3**. Here the

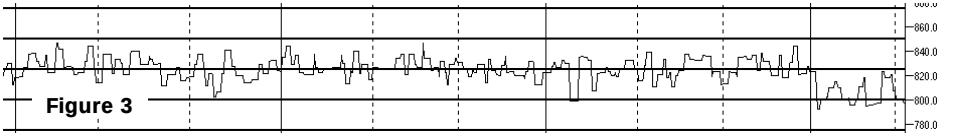


Figure 3

vertical scale is 20 Hz/div. So it's possible to see around 30Hz pp. jitter and a result about 2:1 worse than that of the Adret but an overall improvement of about 10:1 for this particular crystal. Another crystal, for which a graph is not available, improved to match the Adret result so it's possible that the Adret jitter would be the limiting measurement factor for this case.

The improvement is not necessarily as good for all crystals. If you have the jitter problem then only by doing the temperature stressing will you find how good the crystal is capable of becoming. The sharp frequency transitions shown in Fig. 2 are assumed to be stresses in the bonding wires which presumably are annealed in the temperature cycling process along with some stresses within the crystal resonator. Luis Cupido, CT1DMK, on a recent visit suggested increasing the crystal drive level. This I assume will help accelerate the shedding of any rubbish on the crystal itself.

The design drive level in my OCXO is nominally 750uW to the crystal. By shorting R2, the effect of the amplitude limiter diode D1 is removed and by shorting R8 the crystal drive level is raised to 10mW whilst maintaining around +4dbm output level. A really high power oscillator is possibly needed but there is some evidence that running the OCXO for several days at this higher drive level has some improvement effect. The tests have been done at 24GHz because the writer's portable transverter design allows easy testing. Testing at 10GHz would be possible but the amplitude of the measurements would be around 2.3 times smaller. It is assumed from the crystals evaluated so far that this jitter only manifests itself as an operating problem at 10GHz and higher. Regrettably

the degree of improvements that can be obtained can only be found with the extended cycling and re-testing. So far all crystals have improved to a greater or lesser extent. It has been reported and observed that the problem does improve on its own over a very long period but I assume this is due to the slower action of a crystal being heated and cooled in its application at a much lower cycling rate. If you have a problem crystal then testing and cycling should reward you with an improved LO note purity.

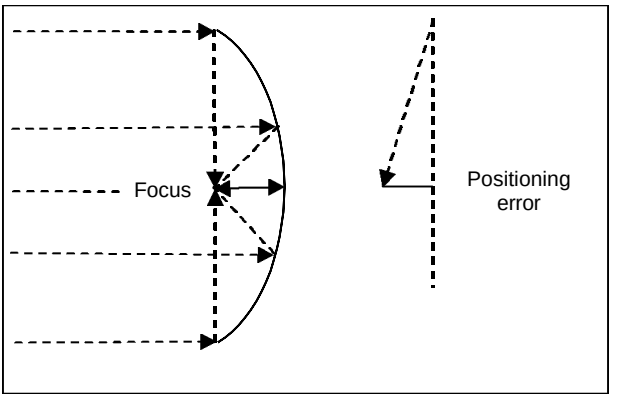
References:

1. http://www.microwaves.dsl.pipex.com/
2. http://www.qsl.net/dl4yhf/spectra1.html

Focussing of Deep Parabolic Dishes
By Paul Gaskin, G8AYY

This note is an attempt to show how accurately a deep parabolic dish needs to be focused. Consider the reception of a plane wave front by a focal plane dish (f/D = 0.25) which is large compared with the wavelength. At the edge of the dish an incoming wave is reflected through 90 degrees which means that the path length to the feed point will not vary significantly with small errors in axial positioning of the feed point.

In order to focus, there have to be equal path lengths from the front of the dish to the feed point and an axial positioning error of the feed point will give the maximum phase angle error between the waves from the centre and the edge of the focal plane dish.



Loss of gain is related to cosine ((phase angle error)/2) and a phase angle error of over 30 degrees will give a noticeable loss of gain.

At 10 GHz a feed point positioning error of 5mm (1/5 inch) with a deep parabolic dish will have a phase angle error of up to 60 degrees and serious loss of gain which confirms measurements made by other people. If the feed point error was 2.5 mm (1/10 inch) or less then the loss of gain would be negligible.

Measurement of the path lengths from the front of my 45 cm PW dish (f/D = 0.28) to the centre of the disc of the G4ALN 'penny' feed gave a positioning error of only 2 mm (2/25 inch). This dish has a fixed feed point position but works well which confirms the accuracy requirement for the feed point position.

Another 45 cm PW dish was available for direct comparison but did not work so well even after adjustment and requires further investigation. There may be a problem with the dimensions of the G4ALN 'penny' feed.

WEBSITE AND EMAIL ADDRESS UPDATES ……

- **G8ACE's** website URL is now **www.microwaves.dsl.pipex.com** This more reliable than his former one. Please use it from now on.
- **G8AYY** has now got online from home (where he is happily now retired!). Add his email address to your lists: **p.gaskin@tiscali.co.uk**

S.O.S S.O.S. S.O.S de G4ALY

Ralph is in urgent need of a crystal for the IC202 transceiver range 144-8 to 145.0MHz. This is xtal number 36-5 in the IC202 manual. His present one seems to "drop off" at the bottom end of the tuning range. Ralph is QTHR but you can email him at:
Ralph.Bird@btinternet.com

CONTEST RESULTS

Low-Band Contest 30 March 2003

Here are the results for the Low-Band MicrowaveContest of 30 March 2003. The full lists are on the next page.

This contest aimed to encourage home station operation on the three lowest bands in the amateur microwave allocation, though portable entries were equally welcome. There were 6 entries, 3 fixed stations and 3 portable. Activity levels were quite good on all bands in the UK … it is a pity more stations did not send in an entry.

John, G3XDY was the leader on all 3 bands, and also the overall winner. John reports good conditions into Germany from his East Coast (JO02) location at the start of the contest, which helped considerably - a number of German stations were worked on all three bands. John was running 250W to 4x23ele on 23cm, 50W to 0.6m dish on 13cm, and 15W to 0.6m dish on 9cm.

Runner up was Neil G4BRK, also operating from home, followed by Peter G3PHO/P operating from Houndkirk Moor. In contrast to the E. Coast, both Neil and Peter report quite flat conditions from Wiltshire and Yorkshire.

There is a similar event scheduled for 30th November - lets hope for good activity again, and this time, please send in your entry!

Regards,

Steve Davies G4KNZ,

RSGB Microwave Committee Contest Adjudicator

Low-band Microwave Contest - 30 March 2003

Adjudicated scores

Individual Band Tables

1.3GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL8OBU	JO42XI	597km	30	8150
G4BRK	DG1KJG	JO30NT	622km	24	4133
G4WYJ/P	PA0WWM	JO22FE	348km	16	3103
G3PHO/P	G4WYJ/P	IO90WV	288km	17	2416
G0UPU	G3PHO/P	IO93EH	150km	6	330

2.3GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL3YEE	JO42GE	501km	15	4100
G4BRK	PA0WWM	JO22FE	428km	14	1639
G4WYJ/P	PA0WWM	JO22FE	348km	8	1219
G4SJH/P	G4BRK	IO91DP	98km	3	213
G0UPU	G4MAP	IO82XH	37km	2	48

3.4GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL3YEE	JO42GE	501km	11	3079
G3PHO/P	G1JRU	IO90HU	275km	11	1787
G4BRK	G3XDY	JO02OB	206km	8	865
G0UPU	G3PHO/P	IO93EH	150km	3	241

Overall results table

	1.3	2.3	3.4	Total
G3XDY	1000	1000	1000	3000
G4BRK	507	400	281	1188
G3PHO/P	296	0	580	876
G4WYJ/P	381	297	0	678
G0UPU	40	12	78	130
G4SJH/P	0	52	0	52

The past month has seen two microwave contests, the first 24GHz on April 13th, followed by the RSGB 432 up contest over the weekend of 3-4th May. Levels of UK participation was not up to what we might expect but, nevertheless, some interesting conditions and contacts were made.

24GHz CUMULATIVE -- 13 APRIL 2003

At least eleven operators came on the air for this event with five of those located north of Birmingham. It was great to hear Dave, G0IVA, back on the microwave bands after a long absence. He has moved home to the south eastern edge of the Lake District and is keen to activate many of the good microwave portable sites up there in IO84. For this contest he was on Birkrigg Common, IO84KD88 and, as a result, had several good distance contacts, including G3PHO/P (IO93AF08 at 125km) and, it is believed, with GW3UKV/P in IO83KB60.

The only emailed activity report on this event is from John, G8ACE (Winchester) who reports the following ...

I decided to go to **Walbury (IO91GI)** and it got very windy. I raised the 2m antenna when I couldn't copy G3PHO/P on 2m and it promptly blew down, missing the 24G rig by a hairs breadth! I decided then to pack up, about 14.00BST, after working G4BRK, G8BKE, G4NNS, G1JRU and then G1JRU again from home.

G4LDR had not come on until I had got home and we tried backscatter but, although Neil heard my signal, it must have been aircraft as did not repeat.

The north/south divide seemed to be with us with a vengeance for this 24G activity. What's happened to all these 0.5w amps in middle England? *(You may well ask!! ... editor).* I could of course blame the uWave Committee for putting the activity on the same day as the Cup semi final! You must avoid these clashes! **73 from G8ACE.**

Peter, G3PHO/P operated from no less than **five** different locations during the contest, attempting to take advantage of the "rover rule". Unfortunately it turned out that not all the moves, and the repeat contacts thus made, were greater than the required 16km ... one being just 600m less!!

He started at **Stanage, IO93EI**, on the NE side of the Peak District with a line of sight contact with G3LRP in IO93HO08.

Then, from the **Cat and Fiddle pub at IO93AF**, on the western edge of the Peak District, he had three contacts ... GW3UKV/P (IO83KB, G7MRF/P (IO83VC69) and G0IVA/P(IO84KD88 at125km). The last contact was via reflection from the TV masts on Winter Hill, only 2 degrees difference in dish heading from the true path! Signals were RS55 on ssb this way but undetectable on the direct path.

A move to **Merryton Low (IO93AD)** saw an RS59 contact with G3LRP in IO93HO and a repeat with GW3UKV/P. By 1400GMT Peter was on top of **Alport Height, IO93FB44** but failed to make contacts with G4BRK, G4LDR and G1JRU as well as G3LRP. The first three stations are at long distances over horrendous profiles!

Finally, from **Beeley Moor, IO93FF**, on the eastern edge of the Peak District, Peter worked G3LRP again for an invalid repeat contact it later turned out!

After nine hours out portable and well over 100 miles of driving, he arrived home tired but quite happy with a good day's microwaving. Why don't more of you try it sometime (operating, I mean!)

GB3SC# Beacon Status

Two of the South Coast microwave beacons are currently off air. The masthead mounted 100mW Power Amplifer of GB3SCX on 10GHz appears to have died and power output is virtually non-existent and was only being heard by very local stations (until the beacon was switched off completely during a
site visit). We will not replace or repair the existing unit but, instead, intend to install a new higher power PA which is currently on order. To do this will necessarily involve lowering the mast to rebuild the top unit. This could take possibly for a couple of weeks which may disrupt operation of all the beacons on site, and **it is hoped to also take the opportunity to retune GB3SCK for the new 24.04 GHz frequency**.

At the moment, the drive unit for GB3SCK is undergoing some modifications to cure an interference problem caused when the 12V power supply line voltage changes due to the other beacons keying.

GB3SCS on 2.3GHz has had its frequency tweaked and is now on the more correct value of 2320.902MHz, plus / minus a few hundred Hz temperature variations.

Andy G4JNT

RSGB 432 and up 24 hour contest -- May 3rd - 4th

(This event also included the 70cm and 10GHz eight hour Trophy contests on the Saturday).

The G4RFR club members had a great time as the following two reports show...

From Paul, M0EYT[pjmarsh@frars.org.uk], operating as G4RFR/P, emails the following report on the club's 10GHz activity **from Bell Hill, IO80UU**, during the weekend:

Saturday 3rd May: 10GHz beacons KBQ and CEM were loud - CEM was particularly strong at some points, but seemed to get weaker throughout the day until it was just audible. The start of the 10GHz contest saw some good contacts - initially, G4MAP/P and G8ACE/P - with solid SSB on 10GHz. Later in the afternoon, GD0EMG (IO74QD) was worked with a 55 report being exchanged each way - not bad for a 396Km contact. Immediately afterwards, F6DKW was worked at 397Km but only with 51 being received - the path to Paris was obstructed by local piles of Hay!

G3PHO and G3LRP were worked on the 2m talkback but no signals were heard on 10GHz either way - very odd indeed.

Sunday 4th May: The CEM beacon was again a fairly good signal in the morning (8am) but disappeared into the noise as the day went on. It was very quiet on 10GHz today, with only 3 stations being worked. Best DX was G4LRT at 187Km with a 57 report being exchanged and good solid SSB.

The **equipment** in use is a DB6NT transverter driving a DL2AM PA generating about 5~ watts feeding a North Region Sky mini dish which is about 60cm X 70cm offset. The dish is fed with waveguide directly from the transverter with only about 5" of semi-rigid between the waveguide transition and the rx input on the DB6NT. An external G8ACE OCXO is also in use and this proved extremely stable despite varying wx conditions and temperatures.

Some pictures of the microwave kit being used during the contest are available online at

http://www.frars.org.uk/cgi-bin/render.pl?pageid=1218

Regards from Paul M0EYT / G7EYT
Flight Refuelling Amateur Radio Society
http://www.frars.org.uk

From: Andy Talbot, G4JNT [ACTALBOT@mail.dstl.gov.uk]

Just a quick report to let you know that Microwave Committee members do go out operating on uW bands occasionally..... Both myself and Julian operated with the Flight Refuelling ARS where we activated Bell Hill IO80UU (the site of the GB3SC# Beacon Cluster) for the May 432 and up contest. The club callsign, **G4RFR/P,** was used on all bands from 432 to 10GHz. It was the first time we had put any activity into many of the middle bands; while 2.3G has been available to the club for some years, a decent 3.4G station was a first, along with a token 5.76G system.

35 stations on **1.3GHz**, with the best Dx PA0WMX at 578km

12 stations on **2.3GHz**, with the best Dx GD0EMG at 397km

I got hold of a 15 Watt **3.4GHz** PA the week before the event and quickly cobbled it into my existing 3.4GHz transverter, then used in conjunction with a 'JVL quad loop antenna. I managed to borrow a very nice exotic 12m length of low loss (3.8dB) flexible armoured coax from work for the feeder, which meant we didn't have to mess about with LDF450 (and turning loops of lossy RG214) and could mount the 3.4 antenna right at the top of a decent height mast. We were rather pleased to make six contacts with the system, the best DX being one obscure /P station *(... who me? Editor*) on Houndkirk Moor at 275km who tried to send me some CW that I couldn't comprehend in the flapping noisy tent, with 1.3 and 2.3 going on at the same time. My CW is OK with preformatted messages like RST, LOC, 'K', '?' and standard callsign formats , but try to say anything else or have a QSO type exchange and I haven't a clue.....! *(You deserve some sort of penance for this... and you a G4 at that!... Editor)*

The **5.76GHz** system was receive only and the antenna was just a 16dB horn made from PCB material handheld inside the tent. The Rx was a breadboard of units put together last year to listen to GB3SCC and we managed a one way QSO on it with G4LDR at 52km.

10GHz was operated by Paul, G7EYT, who also manned a 144MHz talkback station and seemed to spend a lot of his time running across the field with messages and skeds for the intermediate bands. In future we'll have to make sure all microwave band stations are located next to each other, and 432 is the tent banished to the other end of the field.

There was no rain worth speaking of on Saturday although there was a cold wind blowing, and pleasent warm sun for most of Sunday

73 from Andy G4JNT

Peter, G3PHO/P (Houndkirk Moor, IO93EH98) operated five bands single handed on the Saturday only and found the day out a waste of time an effort. Weather conditions were atrocious, with continuous rain from 1400 to 2200GMT and extremely poor conditions on 23cm and 10GHz**. 70cm** seems good however, with an easy best DX contact of the nine achievced, to PA6NL. Peter was using just 20 watts to a 15 element yagi on that band. The **23cm band** was very poor and only 2 stations were worked, an all time low! On **3.4GHz** some solace was found in the shape of a new country and square (GD0EMG) as well as a reasonably good DX contact with G4RFR/P (275km). Just 5 stations were worked on that band.

10GHz wasn't much better, with disappointing conditions and UK activity. Only nine QSOs ensued, the best being G8ACE/P (one way) in IO70PP. In view of

this it seems incredible that the nearer G4RFR/P could not be worked at all ... but that's 10GHz!

24GHz was brought out in the hope of at least one contact and so it proved to be ... G3LRP just a few dozen km away. An attempt at rainscatter with G3OHM in IO92GB failed over the 143km path.

From: Martyn, G3UKV/G3ZME [ukv@globalnet.co.uk] .. Reports on May 3/4

We had a small gang on site (G3UKV, G8VZT, G4NKC, M0FHM, M0UGL and G8UPF) set up early to be QRV by about midday on Brown Clee. All seemed well, except bad audio reports on 1296MHz, which later turned out to be accidental reduction of mains PSU voltage from nominal 13.8V to only 9 volts. It doesn't do much for an FT790 ! The 70cm PA had given problems, and the op Jim (M0UGL) wanted to help more with the higher bands; so we had just 3 QSOs on **432MHz** ! Anyway, the rig is now tested ready for VHF NFD in July. On **1296MHz**, we had 18 QSOs, despite the initial PSU slip-up. We used a 4' dish this time, and the best DX was with PA6NL (JO21BX at 461 Km).

13cm was quiet with just 4 QSOs and the same on **3400MHz**. It was even quieter on **5.7 GHz** with just 3 QSOs, the highlight being to work G4XUM at the GD0EMG site.

On **10GHz** I had 6 QSOs narrowband,but Dave G8VZT stirred up the usual enthusiastic 3cm ATV gang and had 14 more QSOs, including some new multipliers for the 10 GHz Trophy part of the weekend. So wideband is alive and kicking! Dave also had a single QSO on **47GHz** with Martin G7MRF on Merryton Low using about 25mW (QRO!). This was 87km in appalling wet and windy conditions - so quite an achievement we felt.

The party ended prematurely at around 16:30 UTC. Winds gusting about 60 mph, horizontal squalls of rain threatened to remove one or more tents, so discretion took over from valour and we abandoned site at night-fall. We'll be back ! **73 from G3UKV**

From: John, G3XDY [g3xdy@btinternet.com] JO02, Suffolk.

There's not so much to report from JO02 this month, with conditions being normal for much of the time.

A good North Sea duct on the 15th April during the UK Activity Contest brought OZ1FF complaining about my key clicks on 23cm when calling near his frequency! We also had good QSOs on 13 and 3cm.

On the 17th we worked again on 10GHz and I heard a **new beacon - DB0GHZ on 10368.810 MHz.** This beacon has moved to **Heligoland island (JO34WE)** and was 599+ for long periods during the evening. I wouldn't mind a QSO with JO34 on any band but sadly I don't think there is any permanent activity from there. It should be a useful indicator for conditions to the NE from here.

On the 25th April, G4ALY phoned from Cornwall to say he had worked G4NNS on rainscatter. I heard nothing on 10GHz but we were able to QSO via CW on 5.7GHz aircraft scatter, over a period of about 15 minutes. This was a 420km path with tree obstruction at this end.

The **May UHF Contest and 10GHz Trophy** was a 'curate's egg' - Saturday was difficult due to high winds and poor conditions, but things improved on Sunday to give reasonable DX on the lower bands. **10GHz** activity for the Trophy contest appeared limited. Due to TVI on 2m so I did not call CQ on that band, using instead WWConvers and 23cm for most of the talkback. I made 11 QSOs in the Trophy contest, the best DX being DK2MN in JO32. Only 2 QSOs were inside the UK (G4BRK and G4EAT).

On the lower bands I was pleased to work DL0GTH in JO50 on **23cm**, and heard them briefly by aircraft scatter on 13cm. On **13 and 9cm** DL3YEE was the best DX at just over 500km. Results on **6cm** were unexceptional with 10 QSOs, and 3cm eventually produced 15 QSOs over the 24 hours. In amongst the contacts were two new squares on 13cm (G4RFR/P IO80 and ON4CDU/P JN29), and one new one on 6cm (G8IFT/P IO92). **73 from John, G3XDY**

Sadly, we have run out of space and therefore have to hold over reports from G3LTF, G8ACE, G1HDQ and G8AYY until next month...

DO YOU NEED BATTERIES FOR THIS SEASON'S PORTABLE SESSIONS?

If so, you should contact **WCN SUPPLIES** in Southampton**.** Steve, G1MPW, tells us they are presently stocking very good value Sealed Lead Acid types. A visit to their website (**www.wcnsupplies.com)** reveals they have brand new **12V 17Ah sealed gel types** for only £14.95 (RRP £45). They measure 180 x 165 x 75mm. Postage is only £2.25

It might be worth visiting the website and/or contact them for their catalogue, which has a lot more stuff than their webpage lists.

You can email them via their webpage or telephone at 023 8066 0700

Thanks for the tip Steve ...