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

2003 – NOVEMBER/DECEMBER

After a wonderful month's holiday in Australia and New Zealand I realise how lucky, as a microwaver, I am to be living in the UK and Western Europe! Sure, the climate and cost of living "Down Under" are both better than here and the folk are extremely friendly but I'm talking about microwaving, not day to day living conditions! I met up with several microwavers during the trip and each one expressed envy at the level of activity, availability of components and microwave interest over here in Europe. If you were a VK or ZL microwaver the chances are that eventually you might have to build two of everything so that you could lend a transverter to someone in order to have a contact! Compare this to an average 10GHz cumulative Sunday in the UK or check out Convers or the ON4KST chat room and you'll be truly thankful!

Many readers have contacted the editor regarding the future of this newsletter now that the RSGB Microwave Committee is destined to be abolished at the end of this year. This newsletter was introduced as a two sided, pre-contest broadsheet by the Committee in the 1980s. Since then it has grown to what it is today. Rest assured, the newsletter will continue as normal. There may be some changes ahead (see page 9) but if you are already a subscriber there is no reason to think you will not be able to continue to subscribe in the years to come. Please stay with us in this time of change.

Many thanks to all our authors this month for their interesting and useful articles.

The next issue will appear in mid January 2004. Until then we wish you a Very Happy Christmas and a Prosperous and Healthy New Year!

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 ..

Surplus to requirements: DB6NT 10GHz PA type MKU101H. 2W out from 200mW in. Brand new/unused in original packing with data. £180 ono (price new from Kuhne ~ £290).
Email Kevin Ravenhill, G1HDQ at: knr@fireflyuk.net or tel. 01460 220338.

WANTED

Wanted to buy or borrow for copying: Manual for Racal Dana model 3102 Synthesizer. Also, to buy, Weller EC1201A or EC1301A handsets.
Email Brian Coleman G4NNS: briancoleman@compuserve.com or tel 01264 773342

WANTED

Portable Spectrum Analyzer.
Contact Richard G7MFO: tel: 01482 898559
Email: richard@g7mfo.karoo.co.uk

BEACON NEWS

From: Andy Talbot [G4JNT@THERSGB.NET]
Sent: 07 November 2003 20

Subject: GB3SCX and GB3SCK Operational again

The two highest frequency beacons of the South Coast microwave beacon complex, GB3SCX on 10GHz and GB3SCK on 24GHz, are now operational again after a major rebuild of both units.

Both have had their output power increased, raising them by at least 10dB over their previous nominal values. GB3SCK has retuned to transmit on 24048.905MHz in order to comply with the new 24GHz bandplan which will come into force at the beginning of 2004.

GB3SCC on 5760.905MHz has had its keying duty cycle adjusted - it now transmits callsign and location details, followed by plain carrier for a total of 45 seconds, then stops transmitting for 15 seconds to assist thermal management. This keying sequence will be maintained over the winter period and will be reviewed when warmer weather returns in the spring.

As an precautionary measure, the beacon complex will remain operating with its mast at reduced height for a while, until the continued reliable operation of the rebuilt units is assured. This reduced height should only affect propagation in a north west / south east direction due to slight shading from local trees.

Reception reports should be sent to John Fell, G0API QTHR.

Andy, G4JNT

Cable loss at Microwaves

by John A. Share (G3OKA) and John Hakes (G4KWJ)
Geomagnetism Laboratory, University of Liverpool

The importance of cable loss at Microwaves is easily overlooked. It can be very significant and potentially costly to overcome. The experience gained when up grading an 8 GHz system proves the point!

Initial Configuration

Originally the system was designed to produce an output in excess of 700 watts, the signal source was an old Polarad Generator with a maximum output of 0dbM (1mW). This was inadequate to drive the Klystron Amplifier to the required output power so a Hewlett Packard TWT Amplifier with an adjustable gain of up to 30db was used as an intermediate stage. The available 1Watt output was more than sufficient to drive the Klystron with its 43dB gain to its full power output of 1kW.

There was excessive drive available, by lowering the EHT on the Klystron its life expectancy could be increased, this reduced its gain a little, and the TWT Amplifier was set to a gain figure well below its maximum. A compromise value for the EHT and TWT gain was reached and the system worked perfectly well for a number of years. This system has been described in a previous issue of Microwave Newsletter and is shown in outline in **figure 1(a).**

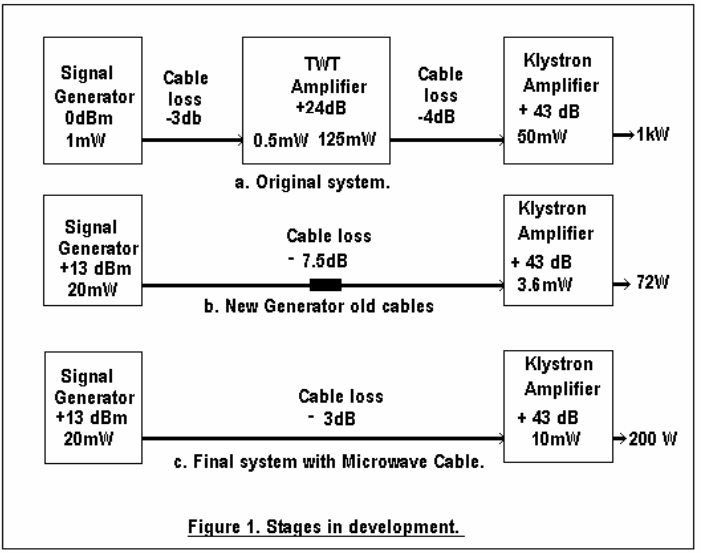


Figure 1. Stages in development.

As experience was gained, so the need for such high power levels diminished and 150Watts became the norm. There was a problem with the original system in that it was "Manual" and the idea of "Computer Controlled" was possible provided the old Polarad was replaced by a newer generation Signal Generator with GPIB remote control facilities.

The replacement Signal Generator was an HP8673D, with a maximum output of +13dbM (20mW) this should have resulted in sufficient drive to the Klystron to achieve well in excess of 200 Watts output without the need for the TWT Amplifier which was replaced by a back to back inline connector, the original cables having been retained (**figure 1(b)).**

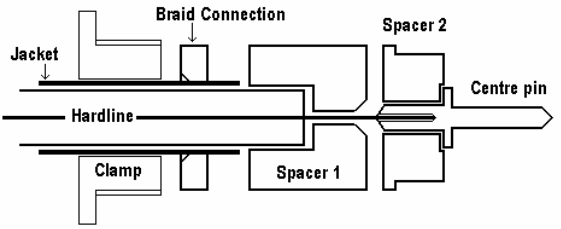


Figure 2. Modification of N Connector to accept Hard Line.

All was not well. The Klystron barely reached 100 Watts of output even at full specification EHT. Assuming no cable losses the output should have been nearer 400 Watts. The figures were recalculated but, inescapably, there was a very significant loss somewhere in the system. The length of the signal cable from the generator to the Klystron was about 1 metre, when measured for loss it proved to be a staggering 7.5 db!

Microwave Cables

The solution was obvious. Replace the signal cable made from RG8U with a correctly specified Microwave Cable (figure 1(c)). It was at this juncture that the second surprise lay in store. These cables are expensive! Off the shelf a 1mtr, N to N, Microwave cable is listed by RS Components at £162 (+VAT). At 8GHz this cable would be expected to have a loss of 1dB, include the connectors losses and this suggested a total value in the region of 1.7dB.Alternative cables are available and 1mtr cable suitable for use at 8GHz with SMA terminations is listed at £41 (+VAT). Add to this the cost of two SMA to N Adaptors and the total rises to somewhere in excess of £60.

There remained one alternative, Hard Line. This is listed by RS Components as “Microwave Cables RG402 and RG405/U”. The loss at 10 GHz for RG402 is 1.37 dB / metre, it is priced at £8 (+VAT) and supplied in 1mtr lengths. Despite a long search an N connector designed to accept RG402 could not be found but they no doubt do exist. In stock were a handful of Gold Plated N plugs bearing the legend “SC 57 007 3702”, these were intended for use with miniature coaxial cable, possibly RG174 or small diameter hard line, and had been obtained at a Rally for a few pence each.

The modifications required for use with RG402 as shown in figure 2. This proved to be a delicate and time consuming procedure, the objective was to disturb the dimensions as little as possible in order to avoid an abrupt impedance discontinuity.

The threaded clamp had to be drilled out to 3.5mm, the original braid connection enlarged to 3.2mm so that it formed a close fit to the RG402 jacket and then soft soldered into position on the jacket. Insulating Spacer 2 had an indentation for the “top hat” that originally slid under the braid, this spacer was counter bored to provide a good fit to the hard line insulator and the “top hat” was discarded. The centre pin bore was found to be too small for the RG402 centre conductor and this too had to be enlarged by a few fractions of a millimetre.

Certainly this modification would inevitably increase the loss in the connectors, the leading question was “by how much?”. When measured the total cable loss, including the two connectors was 2.5 dB at 8.2 GHz, a very acceptable figure for an outlay of less than ten pounds!

Conclusion

Had the new cable loss been 3 dB then we calculated that the Klystron output power would be 200 Watts at reduced EHT. In the event the cable loss was only 2.5 dB and there was a comfortable margin within the system, full output from the Signal Generator resulting in excess of 250 watts of output power. This was very different to the situation into which we had initially blundered.

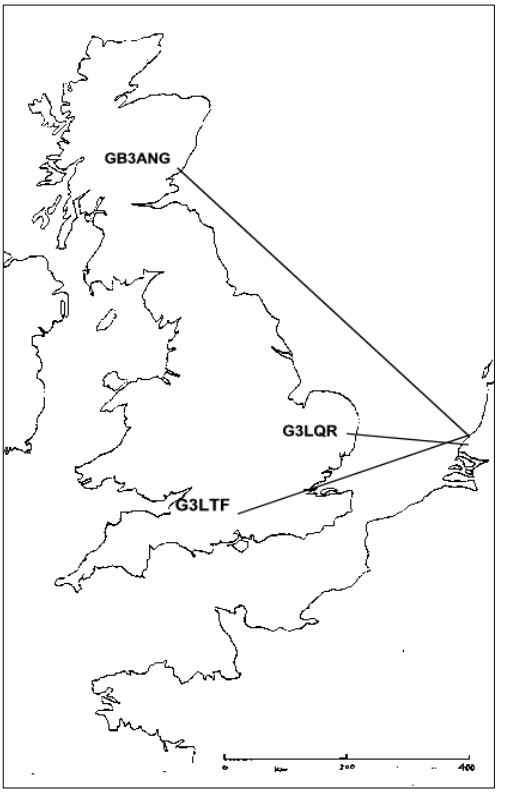
JAS 30/10/03

Seriously Anomalous Propagation!

Peter Blair G3LTF

This note describes measurements on an indirect path propagation event. It is of interest because, although this particular effect in this geographic area have been observed before, this is believed to be the first time that measurements have been made and multi band observations recorded.

On August 5th 2003 there was exceptional tropo in the North Sea area with strong ducting out to 600km. I was making my usual beacon check round at 0900 and heard GB3ANG (IO85) on 1296MHz on a heading of about 80 degrees but when I turned the beam to the North (the direct heading is 355 degrees) the signal was much weaker. Now Simon G3LQR (JO02QF) has, in the past, worked the Faroes on 1296 MHz by beaming East and (we assumed) getting a reflection from the Dutch coast but this was the first time that I had observed the effect and I am a long way from the UK coast line (IO91GG). I next looked for the GB3MHX (Martlesham) beacon on 10368MHz and to my surprise found that I could hear at S8 it on a heading of 78 degrees but it was barely detectable on the direct heading of 62 degrees. I got Simon G3LQR on the band (0919) and we made contact on the direct path at 55/57. I then turned the 60cm dish to 78 degrees and Simon scanned the sector, finding me on a heading of 96 degrees. We exchanged 589/569 and also ssb; the signal was fading but quite coherent.



Finally I looked for the GB3MHS beacon on 2320 MHz and found it on the same heading, 78 degrees, again with very little signal on the direct path.

On the map opposite, I have roughly plotted the various paths on a map of the area and it is clear that the reflection is in the area of the Dutch coastline in the area of The Hague. Is this a reflection from the structure of the coastline, buildings, etc, a classical radar reflection in fact or could it be from a discontinuity in the duct as it passes from sea to land? Whatever the cause it is rather interesting when you realize that the reflection point is about 380km from my location.

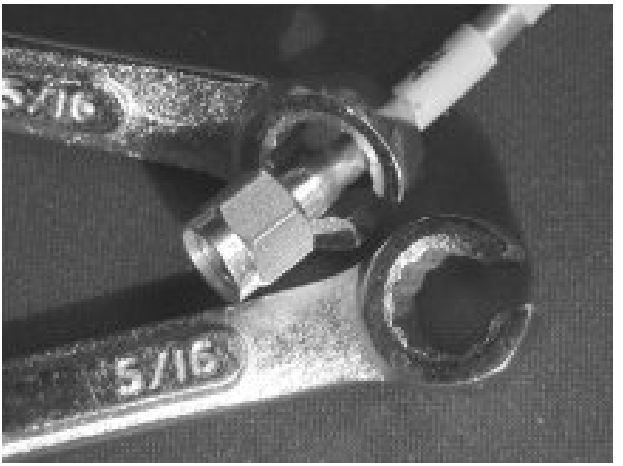
Handy Helpers for SMA Connectors

Paul Wade W1GHZ ©2003
w1ghz@arrl.net

SMA connectors have excellent microwave performance, but they can be hard on the fingers. Today, you can buy a working microwave transverter but making it into an operating system still requires some assembly, usually involving semi-rigid coax and tight spaces. The tool of choice for SMA connectors is a 5/16-inch wrench (spanner) but sometimes we can't locate one and are forced to use an adjustable wrench or even pliers – both of which do a better job of rounding off the nuts than tightening them.

SMA coax relays usually have very close spacing, so there is not even room for an ordinary open-end wrench. Smaller wrenches, called ignition wrenches, are a little smaller and can sometimes squeeze in a tight spot. Most wrenches are combination wrenches, with a box wrench on the far end – the box end works great, but won't go over the cable. I've seen large box wrenches with an opening at the end, but not one as small as 5/16".

So, why not make one? I bought some cheap wrenches and attacked them with a Dremel tool. Saw blades won't cut hardened steel, but a thin abrasive disk zips right through. Two cuts make a slot just wide enough to slip over UT-141 cable; soften the sharp corners and we are ready to go, just like the picture. Slip the slot over a cable, slide it on to the SMA connector and tighten. The box won't slip off as easily, and most box wrenches have 12 points, permitting work in smaller increments where there isn't much room to swing the wrench. If space is really tight, you could even shorten the wrench handle with the Dremel tool. If you can buy wrenches for less than a buck (www.wttool.com), you can afford to customize them.



If you are doing a lot of connecting and disconnecting — measuring noise figure, for instance — using a wrench can be tedious, but the connector alone is too small for most fingers. The first time I went to use the TDR at my current job, I found that someone had attached a wing nut to the SMA connector, making it much quicker and easier to manipulate. I asked who had done it — one of the digital engineers, who knew nothing about precision connectors and torque wrenches, had just gone and done it!

Clearly, this is an idea good enough to copy. I picked up a couple of 3/8-inch wing nuts at the hardware store and attacked them with a triangular file — brass is more expensive but easier to file. Cut three corners in a triangle using the file as a guide, then flip the file over and cut the other three. Eyeball and file to fit over an SMA connector, just like the picture. The wings can spin the connector on and off, and tighten enough for good measurements.

For a more permanent version, drill out the wing nut so it is just slightly smaller than the corners of the SMA connector, and then press it on to the connector.

These are a couple of handy tools that you can make in a few minutes that could save hours of frustration.

LOST AND FOUND AT MARTLESHAM

From: G3XDY [g3xdy@btinternet.com] Sent: 12 November 2003 00

I found a coax-waveguide transition for 24GHz left at the Round Table - please can the owner email me (g3xdy@btinternet.com) with details of the manufacturer so that it can be positively identified and then returned.

Also Adrian G8PSF has reported that he mislaid the 6 way cable that goes between the instrument and head for an HP Power meter, and also a 2m long IEC mains lead. Please email Adrian at: **jonball@globalnet.co.uk** if you have seen either of these items.

73 from John, G3XDY

Crawley Microwave Round Table

Held on the 14th September 2003

At the Crawley event in 2002 there was some discussion that showed that a number of those present were interested in lightwave communication. With that in mind, it was decided that the theme for this year's round table would be lightwave (laser) communications and what a success it turned out to be!

Around twenty five microwavers attended the event at the Crawley Radio club's QTH; attendees included several people who weren't strictly interested in microwaves but came along because they too were interested in laser communications.

During the morning period, the weather being pleasant, a number of lasers systems were set up outside the hut and much testing and short range QSOs resulted. It was extremely pleasing to have the chance to chat and exchange ideas with other 'lightwavers', where previously a number of us had been working in isolation and had never met up before.

Although most of the systems shown used lasers (both solid state and helium/neon), there were some interesting transmitters using stacks of LED's. Discussion also centred on the practicalities of laser alignment over long paths, and also the pros and cons of various modulation methods with a number of ideas presented.

So far, the majority of laser contacts have taken place during the hours of darkness but the use of optical filters allowing possible contacts during daylight were mentioned but these tend to be very expensive with narrow bandwidths giving compatibility problems between different frequencies of red-light solid state and gas lasers. I think that night time operation will continue to be the norm for the foreseeable future.

After lunch, the first talk was by Chris G0FDZ on 'Laser Comms - The simplest approach'. Chris showed his laser system built back in the 80's using a Maplin helium/neon laser. The transmitter uses a beam chopper to create a modulated beam, and a solenoid optical shutter, which could be

keyed to produce a simple CW transmitter. He also incorporated a simple AM modulator for speech that would give low-level modulation at around 10%. On receive, Chris had a choice of two detectors, the first is a simple photo-PIN diode system, and the second uses a photo-multiplier. A four-inch diameter lens provides the light gathering optics.

Allan,G8LSD, followed on with a talk on more advanced systems, one of which he had used earlier in the year to cross the English channel, and also to make the UK record of 49kms. He presented a simple cheap transmitter option using a laser level obtainable from B&Q and other retailers. His main system uses a solid-state laser and beam collimator combination, and pulse width modulation for speech. An 488Hz tone is available for CW keying. On receive, Allan uses an OPT211 detector and a Russian astronomical telescope for the optics. The use of a cheap strobe, directed at the distant station to pinpoint his exact location, allows the time taken for the alignment of the lasers to be greatly shortened, and for receiver checking both locally and at the distant end. Some discussion was made with regard to propagation in various weather conditions, bearing in mind experiences gained when crossing the channel, and the possible usage of DSP techniques such as those already used to great effect on 137kHz.

Just to ensure that microwaves were not forgotten, Derek, G3GRO talked about his new 23cm masthead mounted system that he used successfully during the recent VHF NFD. The system easily produced an impressive 80 watts.

This event has surely to be the largest gathering of UK laser enthusiasts so far, with six lightwave operators with working systems and a number of others who departed the event with various laser and optical components in hand, sufficiently enthused to have a try themselves.

The exchange of ideas generated at Crawley has led to Allan, G8LSD setting up a web site devoted to laser communications. Visit **www.lasercomms.org.uk** to see some of the ideas and equipment used.

Many thanks to Derek G3GRO and the Crawley Radio club for organising this event. Sufficient interest in lightwaves has been generated that the idea of organising a 'Lightwave Round Table' early in the New Year now seems to be likely.

Chris Whitmarsh G0FDZ

UK MICROWAVES …. 2004 and beyond

Not all our readers were at Martlesham this month to take part in the "watershed" discussion held on the future of representation for the UK amateur microwaver. You can read elsewhere in this issue of the important decision taken by the UK Microwave Group to seek to take over many of the important roles held by the RSGB Microwave Committee. At the end of this year the Microwave Committee will cease to exist and thus leave a vacuum that needs to be filled by an external body such as the UKuW Group.

By the time you read this newsletter, negotiations will have already been started between the Group and RSGB management. The Group aims to assume the organisation and running of the former Microwave Committee contests, the production and dissemination of the Microwave Newsletter and other microwave literature, technical developments, development of information packs for beginners, administration of various microwave awards and trophies and representation for the UK microwaver through close liason with the microwave representative on the new RSGB Spectrum Forum.

This can only succeed with the full backing of each and every UK microwaver. The Martlesham meeting gave unanimous support to the Group in this venture. If you are not yet a member of the Group and are interested in joining then contact the Secretary, Martyn Kinder, G0CZD for details. His email address is: martyn@czd.org.uk. His postal address is: 12 Jessop Way, Haslington, Crewe, Cheshire, CW1 5FU

Microwave Round Table Report ~ Martlesham 2003

There's little doubt in the writer's mind that this was one of the best, if not **the** best, Martlesham meeting we have ever had. Attended by well over 100 microwavers, including well known overseas visitors such as DB6NT, DF6NA, DL3YEE, DL4MUP, DG9BDI, DL4PLM ,PA4ZP, WA5VJB, 9H1LO and ON6UG, it shows just how important this annual November meeting has become in Western Europe.

Saturday afternoon saw the test gear already in use by 2pm.This seemed to have a steady stream of folk who wanted to check out their amplifiers, preamps and transverters. The results of these tests can be read elsewhere in this edition of the Newsletter. The Bring and Buy and surplus trade tables were set up that same afternoon. The quantity and quality of the surplus equipment and parts was extremely good, there being some very good items of test gear on sale, including spectrum analysers, noise figure indicators (PANFIs), power meters. The South Birmingham Radio Society table had much of interest, including 3.4GHz Pas and receiver modules. Another table was selling 24GHz half watt amplifiers ... they are becoming very common place these day!

Over 30 amateurs attended the Saturday night dinner, held at the Courtyard Marriott Hotel, just a few minutes drive from Adastral Park (BT Martlesham to you!) and where many of us stayed the night. The meal was very good indeed and the whole atmosphere before, during and afterwards was very convivial to say the least!

Sunday morning was the time to get down to the serious stuff! The opening talk, "Wither UK Microwaves" by Mike Dixon, G3PFR (the RSGB Microwave Spectrum Manager, detailed his many concerns over the possible lack of representation for UK microwavers as a result of the removal of the RSGB spectrum committees (see p.11 of the October 2003 newsletter). He suggested that the UK Microwave Group, already in existence these past three years or so, could usefully take up the reins where the RSGB Microwave Committee had had to leave go, particularly in relation to the day to day "bread and butter" microwave activities such as contest organisation, newsletter production, awards, a component service, helping newcomers to microwaves, etc. The more "political" aspects such as IARU work, spectrum management, beacon approval, etc, would still be best served through the new Spectrum Forum that the RSGB Board were setting up. In such a scenario it would be essential for the microwave representative on the Spectrum Forum to receive maximum support from the UKuW Group, which hopefully would become an affiliated group to RSGB.

A very well attended Open Forum, chaired by Peter, G3PHO, followed the talk. The future of UK microwaves was debated in depth and at some length. Unanimous support was shown for the UK Microwave Group becoming the voice of amateur microwaves in this country. Many microwavers present urged the group to go ahead with plans to assume many of the jobs undertaken by the RSGB Microwave Committee, which is due to become redundant at the end of this year.

The UKuW Group then held its AGM. The election of officers resulted in the following - Chairman: Peter Day, G3PHO. Secretary: Martyn Kinder, G0CZD. Treasurer: Steve Davies, G4KNZ, Ordinary Committee members: G6GXK, G4DDK, GM4PLM, G4KLX, G8OGO, G6JYB, WA5VJB (co-opted). The new committee confirmed its strong commitment to support UK Microwavers at a much higher level than in the past.

Sunday afternoon saw a number of very interesting talks ... Brian, G4NNS, together with G8ACE, shared their experiments on 24GHz EME with us. It was particularly exciting to hear their audio clips of the W5LUA/OK1UWA 24GHz contact. Kent, WA5VJB, gave us an insight into PCB antenna design and the problems of Ultra Wideband transmissions, while Freddie, ON6UG, updated us all on the P3E and P5A space missions. He showed photos of the AMSAT antenna facility in Belgium. Finally, Peter, G3PHO, gave his annual talk on UK microwave activity over the past year and finished with a brief photo diary Microwave Update 2003, held in Seattle, USA, in September.

Martlesham 2003 was a really great weekend. Our thanks go to John, G3XDY and everyone at the Martlesham Amateur Radio Society who helped to organise it.

Be there yourself next year!

Antenna gain measurements at Martlesham 2003

The following table of results is for the 10GHz antennas measured at the Martlesham Microwave Roundtable 2003.

Measurements were made using a short ground reflection range. The source consisted of a Marconi 1kHz modulated Gunn oscillator tuned to 10368MHz and a 20dBi transmit horn antenna.

The receiving system consisted of the antenna under test or a 16.0dBi Sivers Lab standard gain horn, a Marconi SWR indicator similar to the HP 415E and a Marconi broadband detector.

All measurements were made with reference to the standard gain horn. Probable accuracy for the range is +/-0.5dB

Owner	Antenna description	Gain	Comments
G3GRO	85cm elliptical dish with ridged circular horn	34.2dBi	
G3GRO	As above with multiband loop feed	24.5dBi	
G3GRO	As above with W5LUA dual 6/3cm horn feed	29.0dBi	
G8AYY	18” dish with Penny feed	28.5dBi	When optimised
G3WFK	Dielectric feed tubular horn	11.5dBi	
G3WFK	Ex-Bloodhound missile 16” dish with Penny feed	29.0dBi	Deep dish
G3WFK	Rectangular horn	20.0dBi	
G3WFK	Sectoral horn	14.3dBi	
G4LDR	Rectangular horn	20.2dBi	

The purpose of the antenna measurements is to allow participants to check the gain of their antennas, to check how well new designs work and to give confidence that everything is working at the ‘sharp end’ of the system.

My grateful thanks to all the participants without whom there would have been no antennas to measure!

Regards

Sam, G4DDK

NOISE FIGURE RESULTS
MARTLESHAM 2003

Band	Callsign	System	Gain (dB)	NF (dB)
144	G3LQR	ATF54143	23.7	0.29
	G3FYX	MGF1302	14.9	0.75
	DB6NT	Model 144A	26.6	0.33
	G3LTF	ATF54143	26.4	0.22
	G3LTF	ATF54143	21.7	0.70
432	G3LQR	mgf1302	17.9	0.53
	G3LQR	atf54143	21.2	0.48
	G3LQR	atf54143	19.5	0.40
	G3FYX	mgf1302	12.8	1.35
	G3PYB	3sk88	16.5	3.25
	DB6NT	Model 432A Preamp	21.4	0.41
	G0MRF	ATF54143	22.2	0.50
	G0MRF	atf54143	45.5	0.72
	G4RGK	ATF54143	19.6	0.40
	G3LTF	atf54143	21.2	0.34
1296	G3LQR	NE32585 2 stage	25.2	0.34
	G4DDK	NE32585 2 stage	26.5	0.37
	DB6NT	Model 131AH	19.5	0.45
	G3LQR	NE32585 2 stage	24.5	0.45
	G4DZU	ne326/mgf1412	32.8	0.40
	G4DZU	wd5ago-2	32	0.38
	G4DZU	dj9bv	14.7	0.60
	G4DZU	Angle Linear preamp	13	0.94
	DL4MUP	NE38425	16.4	0.40
	G4FSG	db6nt 131ah	20	0.43
	G3LTF	Ne334/atf10136	30.6	0.31
	G3LTF	FHX35LG/Red Spot	38.3	0.40
2400	G3LYP	G3WDG converter	37.81	0.62
	G3LYP	G3WDG converter + INTERDIG Anti 3G filter	35.7	2.07
	G3LYP	GWWDG converter + interdig + LMW preamp	52.48	1.18
	G4BRK	Transverter, DJ9BV 1st stage	20.5	1.07
	G3LTF	FHX35LG/MGA865 2 stage	21.6	0.75
	G3LQR	atf36077/ dj9bv 2 stage	31.3	0.32
3400	G3PHO	DB6NT transverter inc relays	13.1	1.26
	G3XDY	DB6NT transverter inc relays and 2.3GHz trap	19.9	1.45
	G3XDY	DB6NT transverter inc relays without trap	21.8	1.14
	G4BRK	Homebuilt DB6NT Transverter	22.8	0.80
5760	G3XDY	DB6NT transverter & relay	20.2	1.40
10368	G3PHO	DB6NT transverter inc. relays + WG16 to N conn transition	16.22	1.95
	G3XDY	DB6NT transverter inc relays	21.6	1.80
	DB6NT	Model 101-B HEMT Preamp (SMA Connectors)	14.2	0.79
	G3PYB	DB6NT transverter inc relays	17.5	1.79
	DL4MUP	CT1DMK preamp inc WG/SMA transition	23.1	1.23
	DB6NT	Model 102EME preamp WG input inc transition	24.1	0.80
24192	G4DDK	DB6NT tvtr and preamp inc cables and transition	24.4	7.10
	G8PSF	MTI preamp with circulator	15	5.20
	G8PSF	MTI preamp w/o circulator	18	4.75
	DB6NT	243 RX2 Preamp with transition	22.3	2.18

RSGB 2003 Cumulatives

Results of the 10GHz Cumulatives (G3RPE Trophy)

Open Section

		25-May	22-Jun	27-Jul	31-Aug	21-Sep	19-Oct	**Points**	Mult	**Total**
1	G4ZXO/P	4928	6324	5617	5775	5593	1744	**17716**	22	**389,752**
2	G3PHO/P	4219	8210	5604	6402	7312	0	**21924**	17	**372,708**
3	G4BRK	5197	7860	0	311	4345	1671	**17402**	21	**365,442**
4	G4EAT	3957	4971	3512	1197	4217	2529	**13145**	20	**262,900**
5	G8OHM/P	3895	7926	3281	0	0	2503	**15102**	16	**241,632**
6	G4ALY	2223	6224	2081	2813	4666	713	**13703**	17	**232,951**
7	G3LRP	2349	4034	3138	2412	4452	2685	**11624**	16	**185,984**
8	G4RFR/P	3975	5121	3004	0	0	0	**12100**	15	**181,500**
9	G4NNS	2399	4341	1676	1917	2566	1279	**9306**	18	**167,508**
10	G3FYX	2734	4837	1829	1918	2083	1226	**9654**	17	**164,118**
11	GW3ATM/P	26	5217	2963	2720	70	70	**10900**	15	**163,500**
12	G4LDR(/P)	2251	3399	0	1506	0	0	**7156**	16	**114,496**
13	G3JMY	1244	3878	1025	1994	2351	1266	**8223**	13	**106,899**
14	G4KLX/P	1689	2136	0	0	0	0	**3825**	9	**34,425**

Restricted Section

		25-May	22-Jun	27-Jul	31-Aug	21-Sep	19-Oct	**Points**	Mult	**Total**
1	G8LSD/P	0	3672	0	0	3884	1412	**8968**	17	**152,456**
2	G0RRJ	2039	3111	1368	0	1494	52	**6644**	17	**112,948**
3	G1MPW/P	665	1577	742	2746	2530	0	**6853**	15	**102,795**
4	G8VOI/P	0	2903	0	0	3500	0	**6403**	16	**102,448**
5	G6KIE/P	367	1466	742	2499	1854	9	**5819**	15	**87,285**
6	M0GHZ/P	0	1895	1131	1004	1905	0	**4931**	12	**59,172**

Congratulations to the winner of the open section, **Peter G4ZXO/P**, who narrowly beat G3PHO/P and G4BRK to win the cumulatives and the G3RPE Trophy. Peter's 10GHz station comprised a DB6NT transverter, DB6NT 10W PA, and G3WDG preamp, to a 75cm dish mounted 5m above ground. Talkback comprised 150W to a 7 element yagi on 2m. Peter operated from Ditchling beacon and was QRV in all events. Once again the value of the squares multiplier can be seen when you compare the final score with the raw kilometre totals. Congratulations to **Allan G8LSD/P**, winner of the restricted section. Allan only managed 3 operating periods this year, from different sites along the South coast, but this was sufficient! Allan was running just under 1W to an 80cm dish.

A good number of entries was received for both sections, up from 2003 (when there were a total of 15 entries). Many stations commented that the combination with 5.7GHz worked well, and were keen to see this arrangement continue in 2004. There was very good support from Europe, with quite a number of French, Dutch and Belgian stations worked.

The best scores were achieved in the June session, and Neil G4BRK remarked this day provided the best conditions he had ever seen in a 10GHz contest. Some good DX was worked on this day, with a number of contacts over 500km, including a contact of 959km between G8OHM/P and F1DBE. The only poor day in the series was October, when quite a few stations were not QRV, and propagation was markedly poor. The following 55 stations were included in entrants logs for the June period:

Call	Grid	Call	Grid	Call	Grid	Call	Grid
F1GHB/P	IN88	G3ATM/P	IN79	G4ACW/P	IO90	G6KIE/P	IO91
F/GW8AWM/P	IN99	G4ALY	IO70	G8VOI/P	IO90	G8DKK	IO91
F6DKW	JN18	GW3PHO/P	IO72	M0JTT/P	IO90	G3JMB	IO91
F5HRY	JN18	G4UVZ	IO80	G4ZXO/P	IO90	G3YKI	IO92
F1HDF/P	JN18	G8BKE/P	IO80	M0GHZ/P	IO91	G8AYY/P	IO93
F6DWG/P	JN19	G4RFR/P	IO80	G4BRK	IO91	G4KLX/P	IO93
F1PYR/P	JN19	G8LSD/P	IO80	G4LDR	IO91	G7OBR/P	IO93
F1DBE	JN49	G0API	IO80	G0RRJ	IO91	G3LRP	IO93
F5EFD/P	JN88	G3FYX	IO81	G4NNS	IO91	G1SLE	IO93
PA0WWM	JO22	G3JMY	IO81	G3LTF	IO91	G4EZP	JO01
PA5DD	JO22	G3VKV	IO81	G8ACE/P	IO91	G4EAT	JO01
DG1KJG	JO30	G8OHM/P	IO82	G8GTZ	IO91	G3XDY	JO02
PA0BAT	JO31	G1JRU	IO90	G0JMI	IO91	G4DDK	JO02
		G3PYB/P	IO90	G1MPW/P	IO91	G3LQR	JO02

Results of the 5.7GHz Cumulatives (G3KEU Trophy)

		25-May	22-Jun	27-Jul	31-Aug	21-Sep	19-Oct	**Points**	Mult	**Total**
1	G4WYJ/P	1643	3152	3232	0	4008	573	**10392**	16	**166,272**
2	G3PHO/P	2300	2867	2893	2635	4581	0	**10341**	11	**113,751**
3	G4ALY	1752	2799	1935	1696	2610	545	**7344**	11	**80,784**
4	G4BRK	1733	2389	0	122	1596	964	**5718**	14	**80,052**
5	G4NNS	637	2184	1425	1618	1160	337	**5227**	13	**67,951**
6	G8OHM/P	1591	2049	1382	0	0	1433	**5073**	10	**50,730**
7	G3LRP	1003	2110	705	590	1214	769	**4327**	9	**38,943**
8	G8VOI/P	0	1252	0	0	1985	0	**3237**	11	**35,607**
9	G4LDR	0	1345	0	1363	0	0	**2708**	10	**27,080**
10	G4KLX/P	748	603	0	0	0	0	**1351**	7	**9,457**
11	G3RQZ	0	0	0	0	882	0	**882**	4	**3,528**

Congratulations to the winner, **Jim G4WYJ/P**, who won the **G3KEU Trophy** with a significant lead, due in part to the excellent number of squares worked. Jim was using a DB6NT transverter and amplifier mounted at the 80cm dish, running 6W output.

This new contest proved fairly popular, with a number of comments received on how this has stimulated activity on the band. Again, as with 10GHz, our thanks go to a number of regular European stations who have given much support throughout the year. The best activity periods were June and September, while October was the worst, with very poor conditions and low activity.

General

The running of the cumulatives (5/7GHz and 10GHz) in parallel has been very well received. Contrary to earlier fears, activity this year was at a high level on both bands.

The standard of logs received on both bands was fairly good, but a common error being (in a few instances) careless logging of callsigns – especially whether portable or not – and of locators.

The rules omitted to mention that the squares multiplier would be applied, as in previous years on 10GHz, but all entrants did include the multiplier (which was the intention)! One point arose, whether to claim a square multiplier for a one-way contact – this affected several stations. The adjudicator felt there should be some reward, and after some deliberation, the full square was allowed. Whatever the decision, it would not have changed the overall winner for either contest/section.

On 10GHz, 13 out of the 20 logs were received by email in electronic format, while on 5.7GHz, 8 of the 11 logs were by email. Electronic formats varied, the easiest for the adjudicator being Excel or Word, while the output from some contest programs is less convenient (when it is simply printed, along with any odd graphics, etc).

Some issues were raised relating to talkback, which were also discussed at Martlesham round table.

- The use of mobile phones – there was some reservation about their use at all expressed by one entrant – the consensus at the round table was that their use was OK but should only be used to establish initial contact, and not for exchange of contact details.

- The use of the ON4KST.com chat room – this seems to be replacing 144MHz as the preferred talkback for microwave home stations – again, there is no objection to its use to establish initial contact, but bear in mind that portable stations typically will not have access to this.

Other than the clarification already mentioned about the multiplier, the intent is to keep the same rules for 2004, and three out of six sessions seems ideal for scoring on both bands. Please note that you can still enter the contest if you operate in less than 3 sessions – and the more logs received, the better the picture of activity that can be built up (check logs are also welcome).

Steve Davies G4KNZ
Adjudicator, November 2003

USA to CZECHOSLOVAKIA ON 24GHz!

(Thanks to ARRL news service for this extract)

Shooting for the moon yields first-ever US-Czech Republic EME QSO on 24-GHz (Sep 24, 2003) -- Amateur Radio moonbounce (Earth-Moon-Earth, or EME) and microwave history was made September 24 at 1400 UTC when Josef Sveceny, OK1UWA, and Al Ward, W5LUA, completed the first-ever 24-GHz EME QSO between the Czech Republic and the US. "This was Josef's first 24-GHz EME QSO, and he was my third initial on 24 GHz," said Al. "We had tried several times in August but no success. OK1UWA was able to hear me, but I could not hear OK1UWA." Al said the successful effort marked the second scheduled attempt during September. OK1UWA has a 3-meter Prime Focus dish with 35 W at the feed, vertically polarized. W5LUA's station is a 3-meter Prime Focus dish with 70 W at the feed, horizontally polarized to account for the spatial offset between NA and Europe. Previous international 24 GHz EME QSOs have take place between the US and Canada, the US and Russia and Canada and Russia.

UK 24GHz EME TESTS SUCCESSFUL

As briefly mentioned last month, **G4NNS, G8CPJ and G8ACE** have been working together to listen for the 24GHz EME signals of W5LUA and OK1UWA. His two emails describe what they found:
From: Brian Coleman, G4NNS, [BrianColeman@compuserve.com]

Sent: 19 September 2003
Attached is 24GE.WAV a recording of W5LUA calling OK1UWA "OK1UWA de W5LUA" lasting 16 seconds, made this morning. Don't expect armchair copy though. It's keyed "noise on noise". I turned up the imagination control to maximum to read it!) *I had to also! .. Editor*
Perhaps read is an exaggeration but Al W5LUA confirms from the time that it was him! They were using 5 minute windows and this recording is from the first one 09:00-09:05z this morning. I did not hear Josef OK1UWA and he did not hear Al. In the next of Al's transmission windows 09:10 - 09:15 I made some more recordings but they are no better and at 09:14 the Tilt Actuator on my "semi polar" mount (Tilt and Pan) reached it's limit. Another problem is that the polarisation was about 70-80 degrees out by this time. The 24GHz set up is not easily adjustable.
On 10GHz I can control polarisation from the shack but not on 24GHz yet. And like a polar mount polarisation changes with azimuth.

From: Brian Coleman [BrianColeman@compuserve.com]
Sent: 22 September 2003
Attached is a much better recording of 24GHz EME made today. I had been able to set the polarisation more nearly correct (it was probably out by 70 degrees last time !). WX was not so good with overcast and rain showers leaving just 0.5 or less moon noise (down from 1.1dB with clear skies last time).
The difference between the high quality signal sources I have borrowed and cheap (Klove / Quartslab) crystals is striking. Attached are two spectran plots at 24GHz. Both are using a "good" ADRET as the beacon source. The clean one SYNTH.JPG is using a Racal Dana 3001 Synthesiser as the LO source and the wobbly one CHPXTAL.JPG is a cheap and cheerful crystal. As John puts it, we (the people) want Champagne crystals at Beer prices !!! We don't want much do we?
Many thanks Brian, for this info, and the subsequent talk at Martlesham ...now all he needs is a 50 watt TWT for the band! ..editor

NEW RECORDS AT THE MICROWAVE FRONTIER ZONE ...

From: Brian Justin, WA1ZMS, wa1zms@arrl.net
Sent: 14 November 2003
Subject: 241GHz DX.....and a new claimed DX record...
Hi all (again!)-
The cold and dry WX was calling and we just had to try to break our own World DX record of 11.4km on 241GHz. Here are the specifics of the new claimed 34.9km record:
Date: Nov 14th, 2003
Time: 01:57z
WA1ZMS/4 FM07fm37-31-19.3N 79-30-14.4W
W4WWQ/4 FM07ji 37-21-14.1N 79-10-13.6W
Distance: 34.9km

The weather at the time of the QSO at the **WA1ZMS/4 QTH:**
Temp: -3.3C, Dew Point: -14.4C, Relative Humidity:

42% Station pressure: 874mb
The WX conditions result in a total atmospheric loss of 0.673dB per km.

The weather at the time of the QSO at the **W4WWQ/4 QTH:**
Temp: 3.3C Dew Point: -12.2C, Relative Humidity: 31%, Station pressure: 992mb
The WX conditions result in a total atmospheric loss of 0.820dB per km.

The WX conditions being different at each end of the QSO make for some interesting predicted signal margin calculations. The actual measured signal margin on the WA1ZMS/4 end was as high as 13dB. The wind was very strong at both locations and that made for some signal fading. Photos and .wav file will be forthcoming.
73 from Brian, WA1ZMS/4
(Congratulations once more Brian on a remarkable achievement ... editor)

MICROWAVE CONDITIONS IN THE UK

From: G3XDY [g3xdy@btinternet.com]
Sent: 01 November 2003
My QSO with LA6LCA (JO59FE) on 9cm back on 10th Aug was I believe a new EU record for the band at 980km, beating the previous G3LQR to SM6HYG QSO.

Notable QSOs on 14th September included SK7MW (JO65) worked on 1.3/2.3/5.7/10GHz, DK1ZD (JO44) on 10GHz, SK6EI (JO68) on 1.3GHz, and SM7ECM (JO65) at 59 on 10GHz. SK0UX in JO99BM provided a very good DX contact on 1.3GHz CW at 1337km.

On 15th September YL3AG in KO26AW (1561km) was the highlight, worked at 06:13 on 1.3GHz after a contact on 70cm, his signals came up to 54 on SSB after an initial exchange on CW. Vitautis was using 20W to 4x37ele.

The UK September activity contest gave me 39 QSOs on 23cm, 13 on 13cm, 3 on 9cm, 5 on 6cm and 6 on 3cm in the space of 2.5 hours - there was not enough time to work everyone that was audible here. SM7ECM was the best on 23cm.

As already reported, the 17th was the best of the bunch, with two excellent contacts to OK2BFH on 3 and 6cm. In addition I worked DK1ZD (JO44) at 59 both ways on 3cm, DG0RG (JO62)on 23 and 9cm, and DJ6JJ (JO31) on all bands to 3cm prior to heading to work that morning.

On the 20th I worked Dave G0RRJ for the first time on 6cm. I worked Dave again the following day in the cumulative on both 3 and 6cm but did not have much time to spend on the bands that day.

For the UHF contest on the first weekend of October I managed to get a new solid state PA for 13cm completed. This gives around 120W output using a Motorola MRF21120 Push Pull LDMOS FET, running about 300W input with 12-15W of drive. Results on 13cm were good despite flat conditions, with 30 QSOs in the log over the weekend. UK activity was poor and there was a noticeable reduction in activity on 6 and 3cm as there was no coincident microwave contest this year, so there were very few UK portables on for the higher bands.

On 16th/17th October GM4LBV was worked on 23cm, with a QSO also on 13cm on the 17th for a new square and country on the band. John is working towards getting back on all the microwave bands again. His 9cm beacon was a good signal down here at times.

The October cumulative was a bit of a damp squib here, due to other activities getting in the way. I had just two QSOs on each of 3 and 6cm.

We had yet another tropo opening on 6th November with QSOs into Belgium and Germany before moving round to SM. ON4DPX was worked on 10GHz for his first G QSO, and DG1KJG and DB5KN were worked on various bands from 23cm to 6cm with strong signals. From 22:00 SM stations from the West coast were worked on 23cm (SM6DJH JO58, SM6OEW JO67), plus OZ1CTZ in JO46, all with good signals. The band then opened to Eastern Sweden to give QSOs on 23cm with SK0UX (JO99BM) and SM3LBN (JP80IO), both around 1340km from here.

F6DKW (JN18CS) worked SM4DHN (JP60VA) on 3cm at a distance of about 1460km - very fine DX.

Since then the bands have been wide open from OZ and SM deep into Russia/Ukraine so there may be some more DX records to tumble yet.!

NEW 5.7GHz Eu RECORD ?

From: Morgan Larsson SM6ESG [sm6esg@telia.com] Sent: 09 November 2003
On Nov 6th I was lucky to work F6APE at 23.12 GMT on 5760 MHz, **distance 1390 km**! For me this was a new country, new square, new field and my best distance ever made on 6 cm!

SEPTEMBER CUMULATIVES REPORT

From: Bob Reeves. G8VOI,
[bobg8voi@reeves59.freeserve.co.uk]
Sent: 23 September 2003
There were really strange conditions at times ... severe scattering etc. I heard both the GB3CCX and KBQ beacons for the first time, although they dropped in strength as the mist cleared in the distance. The scatter was present on both Roy G3FYX and Ted G3JMY in Bristol, a similar direction to the beacons. Weather on Butser sunny most of the day.
Final totals for the day:
5.7GHz - 13 contacts, 3 new squares, best DX Eric, F1GHB/P IN88IN, 59 signals, 316km
10GHz - 23 contacts, best DX Maurice F6DKW, JN18CS 334km, 4 contacts over 300km.
Pleased to work G4ALY, G6KIE/P, G8JVM, G3LRP and G3YKI all for the first time.

From: Ralph Bird, G4ALY
[Ralph.Bird@btinternet.com]
Sent: 22 September 2003
3cm worked: G4NNS, G4BRK, G3FYX, G3JYM, G8VOI/P, M0VOI/P, G4ZXO/P G8LSD/P G3LTF, M0GHZ/P, G8ACE/P, F1GHB/P,G0RRJ,G1MPW/P G6KIE/P, F6APE, G3LRP, G4EAT.
6cm: G4NNS, G8VOI/P, G4WYJ/P, G4PBP, G8ACE/P, G3BRK, F1GHB/P, GORRJ, G3RQZ, F6APE.
Stations failed but not on above lists. G3PHO 3/6.G4DDK. Station known to be on other than above G3XDY (Problem fitting in when one free the other was always qrl hi) Sorry we missed qso on 3/6 but the 2mtr qso was great on cw. **73 Ralph G4ALY**

THAT'S ALL WE HAVE ROOM FOR... SEE YOU NEXT TIME .. 73 from Peter, G3PHO