An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

Published by the UK Microwave Group

2007 July-August

All our yesterdays …

Does anyone recognise any UKuG members among this merry group of HADRABS contesters several decades ago ?

In this issue …

Latest News …

- **GB3MHK now operational on 24GHz**
- **Poor weather affects microwave contests**
- **Crawley Round Table set foir September 16th**

MANY THANKS TO ALL OUR CONTRIBUTORS THIS MONTH ... WITHOUT YOU THERE WOULD BE NO SCATTERPOINT!

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From the Editor's Desk

Welcome back after the "summer break"... and what a summer! At least twenty gallons of water flowed through my shack (for the second time in ten days) on the day of the "Big Rains" while the rest of my region took on an appearance normally seen in the Ganges delta during a monsoon! I'm typing this on a hot day in early August and you wouldn't think we'd just been through the worse July on record but now we have reports of Foot and Mouth disease in the South East! Lets hope our microwave portable expeditions are not curtailed in the manner they were a few years ago.

You'll notice a distinct overseas flavour in this issue. Several articles are from the USA and Western Europe, while another comes from a non microwaver who just happens to be a pal of the editor! Without them there would have been no Scatterpoint this month. Where have the technical writers of the UK got to? Please folks, let me know what you are doing on the technical side of microwaves. You'd be surprised at what is of interest to others. That little project you are working on at the present time might be just what other readers are looking for.

Finally, can you double check that you have renewed your membership for the coming year. Our Secretary tells me that more than a few of you have forgotten to renew and are having to be reminded several times by email, letter and/or telephone. Thanks in advance for your co-operation.

Enjoy the rest of the Summer..

73 from Peter, G3PHO, Editor

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G3PHO: Peter Day ++44 (0)114 2816701

G3PHO, Peter Day,
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Sheffield, S6 3NU, UK

News, views and articles for this newsletter are always welcome. Please send them to G3PHO (preferably by email) to the address shown lower left. **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.

- **Welcome to new members this month**
- Scatterpoint is produced in both email (PDF) and printed paper versions.
- Approximately 66% of members take the emailed version of Scatterpoint
- The emailed PDF can be sent to you in booklet format, for you to print out as a paper booklet at home, or plain single page format… just ask the editor!
- Scatterpoint is published around the 22nd of the month
- There are 10 issues a year

SUBSCRIPTION ENQUIRIES SHOULD BE SENT TO THE UKuG GROUP SECRETARY AT THE ADDRESS SHOWN AT THE TOP OF THIS PAGE AND NOT TO THE EDITOR OF SCATTERPOINT

Crawley Microwave Round Table
Sunday 16th September 2007

Here is the finalised program for this year's Crawley Microwave Round Table which will be held on Sunday 16th September at the usual C.A.R.C. venue.

For those unfamiliar with the location there are detailed directions to the Crawley club at **http://www.carc.org.uk/find_us/directions.shtml** .

The theme this year is historical microwaves and Allan G8LSD is happy to host and provide the historical microwave equipment web-site. Last year Sam G4DDK brought along a rare example of a parametric amplifier for 23cms that sparked considerable interest and gave rise to the idea of a web based collection that everyone can view.

Chris G0FDZ

The theme this year is historical microwaves. Please bring any item of possible historical interest to be photographed, as we would like to have an 'Exhibition of historical amateur microwave equipment' on the web for everyone to enjoy. It would be much appreciated if you could also supply a brief description of each item so that the web designer's job is made easier. Examples of 'historical' equipment can loosely be described as equipment for frequencies greater than 1GHz that you do not use now, but might have used in the past e.g. old wideband equipment, klystrons, waveguide 'mongery', G3JVL transverters , valve converters, etc. I'm sure that everyone has at least one item in their shack that they can bring along to get the exhibition off to a good start.

We will also be running the **UK Microwave Group annual construction contest for the G3VVB trophy**. Please do bring along your constructed equipment and enter the contest. Entries do not necessarily need to have been constructed during the last year. Last year's winner was Steve G1MPW who was very surprised when he won – this year it might be you that carries away the trophy!

Programme

10:00	Venue opens and photographing of the historical exhibits commences
12:00	Construction contest judging commences
13:00	Lunch
14:00	Opening address by Derek G3GRO and the results of the construction contest
14:30	Historical microwaves - A review of the exhibits by Allan G8LSD
15:00	Synthesisers for microwavers - Grant Hodgson G8UBN
15:45	24GHz EME experiences - Brian Coleman G4NNS
16:30	End of meeting

The online microwave museum, hosted by G8LSD, can be found at:

www.microwave-museum.org

MICROWAVE CONTESTING BELGIAN STYLE

ON4HRT/P

ON4HRT/P during the third sub-regional July contest 2007 at JO20MW
Written by Jan, ON4CO

With near perfect WX, yet relative bad conditions, this time we had less negative experiences with Murphy compared to past editions. Imagine your contest station without any blown up power amplifiers or broken preamps! On **70cm** we were restricted to 15 watts at the antenna, due to a PA still in construction phase. A point of interest during the contest was our new antenna strategy on the **23cm** band. This is illustrated on the right. Our best DX was OL7M at 806Km, which is not bad at all.

On the **13cm** band we again didn't work any F prefixes. When are the French finally going to learn to beam north, hi ? This is in sharp contrast to our 10 GHz station where we worked F prefixes twice.

6cm performed below expectations. Let us correlate this to the bad conditions at the time. We were very pleased with the results on **10GHz**. We doubled the QSO totals compared to prior contents. Furthermore, we worked two new DXCC entities. The proverbial cherry on top was a rainscatter QSO (F6DKW), the last one in the log. It's always motivating having new experiences during a contest especially when the clock is ticking.

The next two pictures show the inside of our 3cm-23cm-70cm contest shack, a.k.a a rental truck. Notice the very low sound isolation between operators!

The 6cm-13cm shack, from where also the online webcam crew was QRV, is shown on the following page. During the setup phase we noticed many mobile homes driving out of the Netherlands on the nearby highway so it's a miracle we even worked a few PAs!

JO20 MegaWatt by night, a panoramic setting which can expect us back for the October VHF/UHF/SHF IARU contest

Our claimed scores during the July contest 2007:

3 cm	claimed score :	3733 pts	21 qsos	Ødx DL0GTH	406km
6 cm	claimed score :	1902 pts	7 qsos	Ødx G3XDY	294km
13 cm	claimed score :	5891 pts	24 qsos	Ødx DF0YY	536km
23 cm	claimed score :	19945 pts	80 qsos	Ødx OL7M	809km
70 cm	claimed score :	13544 pts	52 qsos	Ødx OL3Z	675km

73 from ON4HRT/P

The Contest Team:

ON4EDM, ON4CMT, ON4BMD, ON6BF, ON4CCM, ON4CCL, ON4SH, ON5NV, ON5DM, ON7BV, ON7BRA, ON4TUX, ON4CO, ON3AGM, ON3SWY, SWL Bram, SWL Bart

The Support team :

ON7UN, ON4BCB, ON7BPS, ON5OT

A Simple, Four-Band IF/Transverter Switch

By Jim Aguirre (W7DHC)

This article was first published on the Pacific North West VHF Society's 2005 Proceedings. UKuG wishes to thank Jim, W7DHC for allowing us to reprint his work here in Scatterpoint

The trouble with transverters is that they grow on you...”grow” as in one becomes two, then three or even four. Adding bands by adding transverters is a quick and easy way to expand your presence on the VHF, UHF and microwave bands. It can also complicate your operations by adding complexity to the mix.

Unless you want to use separate IF rigs for each transverter, you'll need a way to switch a single IF between several transverters. I suppose you could take the minimalist route and simply connect and disconnect the coax and PTT line from the transverter and move it to another but this is unduly time-consuming in a contest situation and is certainly prone to operator error.

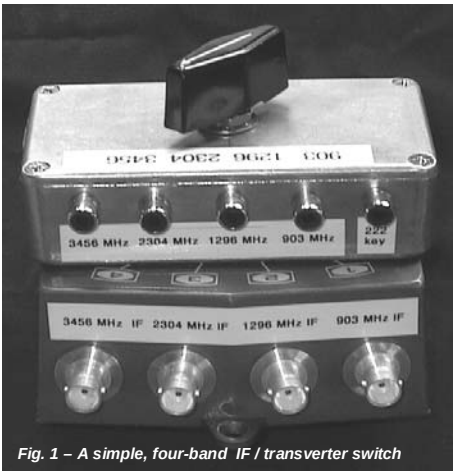

Fig. 1 – A simple, four-band IF / transverter switch

Over the years, I've used several switching schemes for transverters but they all involved separate switching of RF and PTT lines. As a ‘rover’, I frequently found myself with RF going to one transverter, but the PTT tripping a different one. That's not good!

A long-time frien and fellow rover competitor, N7CFO, discovered that a standard ceramic wafer switch and a Daiwa CS-401 four-position coax switch had the same 30 degree rotation between throws. He rigged up a plywood box in his rover truck, using one of each, coupled together to switch both RF and PTT at the same time. I liked that idea but the plywood box concept didn't work for my application. I decided to see if the switches could be combined into one compact unit. The result is shown in **Figure 1** above.

The purpose of the remaining part of this discussion is not to provide a step-by-step instruction on how to duplicate my unit. Rather, it is to provide enough general information to adapt this idea to your specific needs. While switching details differ among the various transceivers used as IF rigs, the general concept can be applied in virtually all cases. See Figure 6 at the end of the article for a suggested parts list.

Coax switches

While I have not conducted an exhaustive search for alternatives to the Daiwa CS-401 coax switch, it's the only one I have found that is suitable for this application. Both MFJ and Alpha Delta offer similar switches but they have two significant differences that make them unsuitable for this project.

First, they do not have the 30-degree throw between positions needed to match them with a standard 4P3T rotary switch. Secondly, both have a center-off position that grounds the input,

adding a potential rig-damaging position if you accidentally transmit into a dead short. For my rover operation, I prefer to keep things as "fool resistant" as possible.


Fig. 2 – Unmodified Daiwa CS-401

Unfortunately, it appears that the Daiwa CS-401 **(Figure 2)** is no longer being carried by amateur radio dealers ... at least that I could find during a web search. That's not surprising, as the last price I saw for a new one was in the $150 range.

The good news is that these switches show up frequently at hamfests and on eBay. While writing this article, I saw one listed on eBay. It eventually went for $32. I have bought them at hamfests for $20 - $40.

Since these switches are pretty "bulletproof," buying one at a hamfest isn't taking much of a chance. If the switch snaps firmly between positions and doesn't show a high resistance through the contacts, it should be OK. I usually carry a small VOM and check for continuity and high resistance just to be sure. Avoid those that have the white screw seals broken or otherwise appear to have been disassembled. That could indicate a problem. Obviously, buying them on eBay doesn't provide an opportunity to check them out.

Wafer switches

Since this switch will only be used to switch the PTT line to the transverter, it doesn't need high-amperage contacts or high-voltage insulation. Ceramic, phenolic or even plastic-based switches should work just fine. There are a couple of other mechanical requirements, however.

First, the switch must have the requisite 30-degree throw between positions. That's pretty easy to verify as there should be a 90-degree rotation in three throws. Three snaps of the switch should produce 90 degrees of shaft rotation. In addition...and this is critical...you need a switch with a shaft that protrudes out the back far enough to take a shaft coupler. Most ceramic switches have a ¼-inch shaft that goes clear through the switch as do some of the phenolic and plastic units. (Some of them may have flats on two sides of the shaft, but that's OK.) **Figure 3** shows a mounted switch.

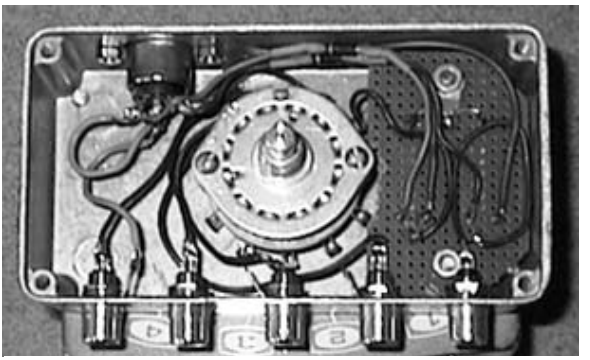
Fig. 3 – Wafer switch inside enclosure; relays are under perf board

While the ¼-inch shaft is more convenient to work with...the CS-401 shaft is nominally ¼-inch...you can use switches with other shaft sizes by finding or making a shaft couple to fit. Alternately, you can wrap some thin hobby brass into a bushing that fits inside the ¼-inch shaft coupler to accommodate smaller shafts. This is a "junkbox project," so some ingenuity may be required.

Enclosures

You will need something to enclose the wafer switch and keep it from rotating when you rotate the switch shaft. I used a 4.4" x 2.4" x 1.1" Hammond die-cast aluminum box (#1590B, Downeast Microwave, $8.50) to contain the wafer switch but any similarly sized sturdy plastic or metal enclosure could be used. Given

Fig. 4 – Enclosure mounted atop Daiwa CS-401switch

a little of the ingenuity I just mentioned, you might also consider just using a flat plate above the wafer switch and mounting that assembly on the CS-401.

On my unit, the bottom of the small box enclosure is drilled to match the holes in the switch mounting ears and a pair of 1.5-inch tapped stand-offs are used to anchor it in position. With the threaded mounting collar on the wafer switch mounted snugly in the enclosure lid, everything stays nicely in place. Again, there are alternatives available for mounting. You could use hollow spacers and longer screws instead of tapped standoffs and short screws on each end. I thought of putting double-sided tape under the enclosure to secure it to the switch body, but have not found it necessary. **Figure 4** shows the box mounted on the CS-401 coax switch. The black Delrin stand-offs I made are barely visible in the lower corners.

Transverter switching schemes

Every transceiver uses a different scheme for switching external devices. In some cases, (mostly older units) no switching capability is provided by the manufacturer and you need to install a relay or transistor to do the job. My unit was built primarily to be used with an Icom IC-706MkII; however, I wired the input side of the PTT switching circuit with a 5-pin mini-DIN receptacle to allow for different input cabling. As a result, I have also made it work with a Yaesu FT-817.

Whatever switching scheme your transceiver offers, I recommend using a separate reed relay to do the actual PTT switching. This isolates the transceiver switching from the actual PTT circuit and avoids the potential for damaging its internal circuitry with a higher-than-anticipated switching. Some transceivers will only tolerate very low switching amperage and/or voltage. You will usually find this information in the operating manual.

I have found that Radio Shack's 275-233 reed relay works well and costs only $2.79. The coil draws less than 10 mA on switching and the contacts will handle .5W…plenty for any transverter PTT. It will operate with as little as 8.4VDC or as much as 19.2VDC. If you need a lower switching voltage, this relay is available in a 5VDC version (RS 275-232). In practice, the transceiver external PTT switching circuitry activates the reed relay, closing the contacts and activating the transverter PTT.

In the IC-706MkII, the VSEND pin in the ACC socket goes to ground on transmit only when the rig is keyed on the 144 MHz or 432 MHz bands. That's perfect for switching a 144 MHz IF rig. You can also pick up a ground line and 12VDC from the accessory socket and that's all you need to make this switch work.

The IC-706MkII also has an HSEND pin in the ACC socket that only goes to ground only when the rig is keyed on one of the HF bands. This is useful for switching a 28 MHz IF transverter.

In some situations…and the IC-706MkII is one of them…a diode is required in the coil lead to prevent a reverse current flow. I have not spent the time to determine why, but I know it is required for the IC-706 series. Other transceivers may not need it.

The reed relay PTT line is routed to the common position on the wafer switch and the four switch outputs are wired to individual RCA jacks to control the four transverters. Certainly, you can use other connectors. As it happens, DEM transverters use RCA jacks for PTT switching, so inexpensive, pre-wired RCA-to-RCA cables can be used without modification.

Conclusion

This switch works very well for me in a rover application and I have used it in the shack as well. In my unit, I also included a dedicated 28 MHz circuit to switch my DEM 222-28 transverter. RF is fed directly to the DEM 222-28 transverter from the HF coax connector on the IC-706MkII. When the rig is keyed on 28 MHz, the HSEND pin activates a second relay I included in the box and feeds an IF signal to the transverter as well as keying the dedicated PTT line.

Good luck in building your own "Simple, four-band IF/transverter switch." If you have questions or need some advice regarding this project, please feel free to contact me at **w7dhc@arrl.net.**

Fig. 6 - Suggested Parts List

- Daiwa CS-401 coax switch
- 4P3T rotary wafer switch with 30° throw
- Knob of choice for ¼" shaft (Daiwa knob won't work)
- ¼-inch shaft coupler
- Small enclosure (Hammond 1590D or equiv; DEM part # 1590B, $8.50)
- 2 ea 12 VDC reed relays (RS 275-233, $2.79 ea)
- 2 ea 1N4001 diodes or similar, if needed (RS 279-1101, $.59 for 2)
- #18 hook-up wire
- 5-pin panel mount DIN jack (Mouser Electronics? Mine was in the "junk box.")
- 4 ea RCA jacks (Mouser Electronics? Mine were in the "junk box.")
- 2 ea #8 FH machine screws & nuts*
- 2 ea 1.5" tubular spacers or tapped standoffs
- * Use ¾" long screws for tapped stand-offs or 2" long screws for tubular stand-offs.

There's a number of interesting microwave papers available at:

http://www.cree.com/products/wireless_docs.htm

73 Trevor M5AKA

BNCs on a Daiwa CS-401 Coax Switch?

Those who are especially observant will note that my completed IF/transverter switch shown in Fig. 1 uses a Daiwa CS-401 coax switch fitted with BNC connectors. They don't come that way from Daiwa!

I modified mine by unsoldering and removing the standard SO-239 connectors from the switch body (they are held in the switch body with set screws), machining bushings to fit the existing holes and installing chassis-mount BNC connectors.

Since DEM transverters use BNC for RF input, I felt it would make sense to modify my switch so that I could use easily obtainable BNC-to-BNC connecting cables. You can accomplish the same thing by using BNC adapters that screw onto the SO-239's. I never seem to do things "the easy way."

ATV contest ...

Look out for increased microwave Amateur TV activity on the weekend of 8/9 September. The IARU International Amateur TV Contest runs from 1800 UTC Saturday until 1200 UTC Sunday. Most activity will be FM ATV on 1255 MHz, but expect to see some on 432 MHz, 2.3 GHz, 3.4 GHz and 10 GHz as well; talkback is generally on 144.750 FM.

The rules are on the **BATC** website**: http://www.batc.org.uk** .

Entries or checklogs are welcome from all - you do not have to be a BATC member.

Details from Dave, G8GKQ, "contests@batc.org.uk".

73 Dave Crump, G8GKQ
BATC Contest Manager
Email: contests@batc.org.uk, or thecrumps@bigfoot.com

Olympics 10GHz 'update'

By Murray, G6JYB
RSGB Microwave Manager

On the first of August this year, Ofcom published an update of its plan for the potentially valuable 2.5-2.69GHz band auction. This band in the past has supported PMSE wireless cameras links, etc, (ie. ideal for sports events coverage).

This document usefully provides us with some updated insight to the Olympics Spectrum issue by how it impacts 2.5 and 10GHz Auctions ahead of further formal statements.

In summary we can learn that:

* There were 2 confidential responses in addition to the three published ones (inc the RSGB one) on the 10GHz Olympics consultation which are at: http://www.ofcom.org.uk/consult/condocs/2012olympics/responses/

* That Ofcom no longer plan to include specific Olympic clauses in their current auctions as it creates additional uncertainty for bidders (but Ofcom still need to fulfil their treaty obligations)

* The principal Consultation on Olympic spectrum issues has slipped to the autumn (having originally been targeted for July)

* In addition, interest was found to be low for bidding for 2290-2300MHz which is adjacent to the IARU 13cms allocation where we had previously lost 10MHz (2300-2310) - so its auction will be deferred.

Regards from Murray, G6JYB, RSGB Microwave Manager

PS: Ofcom has also just published a discussion document on the proposed award of spectrum at 2500-2690 MHz and 2010-2025 MHz. The document can be found at:

http://www.ofcom.org.uk/consult/condocs/2ghzdiscuss/

&

WANTED: 23cm PA

I'm trying to improve my 1296MHz terrestrial system and would like to obtain a 60-100 watt solid state second-hand PA. Has anyone got one surplus to their requirements?

Contact by e-mail is easiest.

Many thanks

73 David, G4YTL

Email: David.HiltonJones@clneuro.ox.ac.uk

Your special tin box requirements

I will be placing another order with Eisch for Shubert tin-plateboxes, see my web page for pics:

http://www.btinternet.com/~alan.melia/componen.htm

This will be a mixture and some small quantities. If you have any needs, requirements, or even desires (that can be met with a tin plate box !!), please email me direct and I will add these to the order so that you can make use of the quantity discount and bulk carriage rate. I expect to order for delivery probably before the Crawley Round Table, so you could avoid inland postage by collecting there as well .... what a bargain ! Unlike many outlets, my terms are payment on delivery or prior to posting, but beware, I have a nasty line in spells and curses that will knot up your waveguide if you default!

If you are not sure of the sizes there is a list on the Eisch-Kafka web site or I have a paper catalogue ....some of the sizes are not on the web site:
http://www.eisch-electronic.com/katalog/index.html?rub=81

Please advise direct to:
alan.melia@btinternet.com

73 from Alan G3NYK

THE SAN DIEGO OPTICAL REPEATER

Editor's note:
Have you "been there, done that and got the T shirt" on microwaves? If so, you might find that frequencies in the THz region of the spectrum could offer you fresh challenges. Though the lightwave frequencies do not, at least in the UK, require an Amateur Radio licence, they are, nevertheless, valid and viable regions for some interesting experiments. Did you know, that contrary to popular opinion, non-line of sight paths are possible and have indeed been worked? Cloud bounce (like 10GHz rainscatter) has been successfully tried out both in Europe and the USA while other reflective media are being discovered, in much the same way as our millimetre bands are beginning to show potential. It's possible to use several modes of transmission by light.... CW, AM, FM, SSB and PSK31 to name a few.

The enterprising San Diego Microwave Society in California has now built a lightwave repeater! The following article, taken from a recent posting on the Laser Reflector details this remarkable achievement. Congratulations to all concerned.

In the UK there is a small group of keen lightwavers that includes G0MRF, G8LSD, G3YJF, G0FDZ (all in the South) and G8AGN, G0EWN and G3PHO in the North of England. How about joining them? The UK record at red light wavelengths stands at around 74km. There are loads of former 10GHz wideband FM LOS paths, greater than that distance, just waiting to be worked!

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From: "Lee Scheppmann" <lee@aps-technology.com>
To: "Laser Reflector" <laser@mailman.qth.net>

Abstract:
On June 24th 2007 a two way contact was made between members of the San Diego Microwave Group: Kerry Banke, N6IZW, and Lee Scheppmann, KD0IF, over a 14km path using a recently installed optical repeater on San Miguel peak near San Diego. PSK31 was used along with 910nm laser diodes and PGP style detectors. The optical repeater was assembled from two LED array beacons, (the type normally used on communications towers), and driven by a prototype detector circuit. The PSK31 base-tone was at 750Hz and the received signal was greater than 43dB above the noise floor.

Background:
Optical communications has been an interest of the San Diego Microwave Group for several years with a broad range of experiments being conducted by group members. Equipment has included home-brew transmitters based on laser pointers, high-powered LEDs and most recently, high-powered laser diodes. On the receiving end various optical arrangements usually driving a version of the PGP detector. Experiments have included very high bandwidth, linear communication, (near 1GHZ), various digital communication modes, long range communications, and most recently the linear optical repeater designed by Kerry N6IZW.

The group maintains a repeater site on San Miguel Mt, (DM12MQ), where San Diego State University and its PBS affiliate, KPBS-TV, has provided the group with mounting and power. The microwave and optical equipment operates under flexible, 450MHz remote control link, provided and maintained by Greg K6QPV. The first optical equipment on the mountain was a simple retro-reflector which is useful for equipment alignment. This was followed by a small, 5 LED, high power array acting as an optical beacon modulated with 750Hz. This provides a signal for scintillation measurements and experiments. This beacon can also be driven from an MP3 player with repeating message and ID. **So far, this small beacon has been received at a distance of 50 miles**.

The Optical Repeater:
Recently, Kerry designed and constructed a first generation repeater with a simple, single lens input coupled to a PGP detector driving two very high power Radio Tower LED arrays. The input signal from the PGP detector is amplified, filtered, run thru an AGC circuit and then coupled to current limiting output drivers for the arrays. The arrays operate at 16VDC with an idle current of 3.6 A, rising to 8 amps on modulation peaks. Each semicircular array is 18" high and 12" in diameter and consists of 324 bright red LEDs with horizontal, cylindrical lens which maintain a narrow horizontal beam. All of this is packaged in a weather-proof enclosure. This configuration does a good job of lighting the San Diego area, but improvements are planned to enable the detector to see a much wider field of view.

An added feature is the ability to turn on the small 5 LED 750Hz beacon which is in sight of the repeater input so that the 750Hz signal is retransmitted thru the large array. Recent experiments with this configuration show a 70dB signal over the noise floor at 8 miles. This is probably a good indication of the LED array output when driven to maximum illumination.

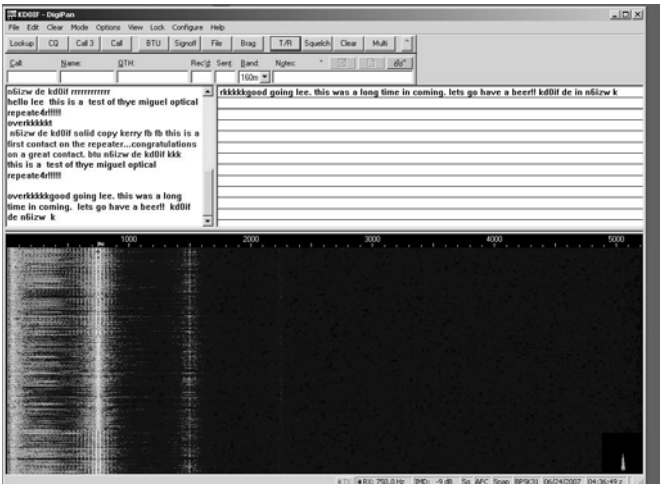
The Contact:
Located at a distance about 7km from the repeater in DM12MS, Kerry N6IZW and Lee KD0IF set up their equipment and initially focused on the beacon for alignment. At that distance the beacon was very strong. Both stations received very solid signals from the 750Hz tone modulation and after Greg K6QPV turned off the tone and opened up the repeater using the 450MHz control link, the first PSK31 contact was made without a hitch. The received signals were greater than 43dB over the optical noise floor.

The Equipment:
From his end, Kerry N6IZW runs a home brew 4", single lens into a PGP detector. On the transmit side he has a 1 watt, 910nm laser diode into a 4" single lens collimator. Lee's equipment consists of a PIN Diode head at the focal point of an 8 inch SC telescope feeding a PGP circuit. On the transmit side is a 4", single lens collimator in front of a 1 watt 910nm laser diode. Laptops were used by both, running PSK31 software under Spectrum Lab on Kerry's end and Digipan on Lee's end. Needless to say, tripods and precise pointing are key ingredients.

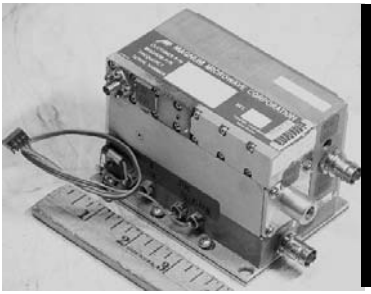
The Next Steps:
Given the high S/N level, and previous experience over a 50 mile path, we expect that this repeater will be good for at least that distance. More work needs to be done on the receive optics before we can operate at more divergent angles. We will also be using the increased output of the beacon for scintillation studies.

The full article with photos is available. Just email me at lee@kd0if.com

Lee, KD0IF



The PSK31 Digipan screen showing the contact between K6IZW and KD0IF on the 24th June 2007



A Quick-turn on for Bricks

By Frank WB6CWN

(Extracted from a recent posting on the USA Microwave Reflector)

This may be old news, given the time “bricks” have been around and in use but I modified a couple 10GHz bricks this week to reduce their warm up time and drift at power up and to improved their frequency stability. This was done by separating and independently switching and regulating the DC power going to the crystal oscillator/oven board.

Both MA/COM bricks were from the early 90s and were electrically and physically identical, except one had MA/COM on the label and the other said Microwave Associates. They required -20V at 10W.

The -20VDC input at the feedthrough cap is wired to a small internal PCB through a high current diode for polarity protection and then through an LC filter. After the filter, the DC signal goes in several directions, but only one wire goes off to the 100MHz range crystal oscillator/oven board. I cut this oscillator supply wire and brought it out externally via its own feedthrough capacitor. Upon powering up the brick, a check of the power output and frequency at 10GHz showed that the oscillator's DC voltage could be reduced down to -12VDC before effecting the 10GHz output level at all, but the frequency changed significantly. In fact, just a few mV change on the DC line made a significant frequency change at 10GHz. After seeing how sensitive the oscillator's frequency was to changes in its supply voltage, I temporarily reconnected the oscillator's DC feed to stock wiring and measured the voltage drop across the input "idiot" diode and input filter as the brick warmed up. Just the heat induced change in the diode's forward voltage drop and the change in the drop across the copper wire wound filter was enough to pull the brick almost a kilohertz at 10GHz!

In a final test, I returned the oscillator voltage to its nominal -20VDC and found that changing the brick's microwave power oscillator's DC voltage line varied the 10GHz output level but had no effect whatsoever on the frequency. All the frequency sensitivity was in the reference oscillator's supply, and all the output level sensitivity was in the microwave power oscillator DC supply.

The brick was then wired into a loaner radio under construction, now with separate switches for the two brick DC supply lines, and with a low dropout negative voltage regulator on the reference oscillator DC feed located very close to the brick. Wired this way, just the oscillator/oven can be left on while driving in the car or while waiting between contacts, and the brick only pulls 2W to keep the oven going. When its time to operate, power to the microwave oscillator section is enabled and the brick comes to life, on frequency and ready to use.

The 2W "standby" consumption of the brick's oven is more than a good OCXO pulls, but it’s still reasonable and much better than waiting 10 minutes for the brick to warm up from a cold start. Finally, with the input diode and filter voltage drop change with heat out of the picture, the brick is also more stable with temperature changes.

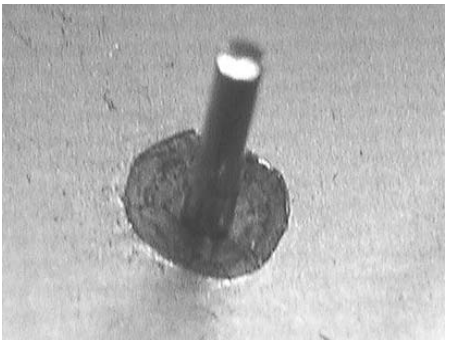
See you on the air, **Frank WB6CWN**

(Editor’s note: Many thanks to Frank for allowing his posting to be published here in Scatterpoint.)

Manhattan Terminal Pins

A simple way to provide anchor points in 'UGLY' construction projects

By Joe McElvenney, G3LLV (2007)



You will need a hobby drill with a 1.0mm bit, a strip-board track cutterand some single-ended terminal pins. Many home-brewers will already have these items to hand.

For single-sided PCB material, drill a 1.0mm hole (0.8mm may be better), use the cutter to countersink it to 3mm diameter (not depth) and push the pin in from the underside; for double-sided material, countersink both sides.

After starting with the cutter, a larger HSS drill (~ 5/8") will furnish a shallower depth of cut. Use pins that have several flukes (not just two) around the bottom, as these are more stable with the resulting thinner board, and ones having the smallest possible pin head diameter. Don't overdo the countersinking especially on double-sided boards. Not pushing the pin completely in gives a slightly larger spacing between it and the copper underneath and a bead of epoxy on the upper side may help stability but is not essential.

Joe McElvenney, G3LLV (2007)

F2CT/ Portable

I thought readers may like to see this photograph of Guy's, F2CT's, portable setup. I really do like the way the French set up the feed points and the equipment right at the focal point to give minimal losses.

The dishes and fittings for them are also excellent. I think they are ex-Alcatel.

Best wishes and 73 Ralph, G4ALY

BEGINNERS' CORNER

Introduction to Microwaves (Beginners' Workshop)

One is now planned for **RSGB HQ, Potters Bar**, for **Saturday, 27th October 2007**. Watch this space for further news. Offers of help would be very much appreciated. Please contact the UKuG Chairman, G4NNS (see page two for address) if you can help in any way

SAFETY… a timely reminder

At the Torbay workshop a question was raised about **safety**. We have produced a slide that will be added to the standard beginners' workshop material for future workshops….

Safety Precautions

Microwave antennas are normally highly directional therefore management of any exclusion zones whilst transmitting in public places is easily achieved by prohibiting any person walking / standing in front of an Antenna

Common sense rules:

- Ensure that all connectors are fitted correctly and securely
- Transmit into dummy co-axial or waveguide loads in your shack
- Do not look directly into waveguide or (dish / horn) antennas
- Do not stand directly in front of any transmitting antenna
- Be cautious of high voltages if not using solid state

Further information can be obtained from:
www.hpa.org.uk/radiation/understand/information_sheets/amateur_radio.htm

73 from Ian, G8KQW

New 24GHz beacon now operational

GB3MHK sited at Martlesham was switched on on the 27th June 2007, at a nominal frequency of **24048.830MHz.** During the first few weeks it was around 5kHzLF of this frequency.

It was initially placed in a temporary location inside the SHF room at Martlesham (on the 10th floor) because of outside maintenance work on the tower.

This location favours the west, with a beam from about 240 to 310 degrees (-3dB).

The beacon stability is quite good, even though it is not locked. Unfortunately, it suffered some jitter and mode jumping (a few tens of Hz) , even after a lengthy period of heat/cold cycling. This is expected to reduce with time.

The keying cycle is optimised for measurements and propagation tests with a callsign every 30 seconds at 12WPM followed by 30 seconds on carrier. No locator or other useless info. Keying is 800Hz shift FSK.

The installation will be monitored by G3LQR, and we hope to let you know the initial QRG as soon after switch on as we can. We do not expect it to move very far in the next few weeks.

Hopefully, it may be heard at a few remote locations during the Sunday 24/47GHz contests.

Ofcom have been informed of its switch on. We will also let you know the power output after switch on. My hand gets noticeably warm if placed near the main lobe of the antenna……. However, it doesn't take much to do that at 24GHz!

73 de Sam, G4DDK

On behalf of G3XDY, Beacon keeper GB3MH* cluster.

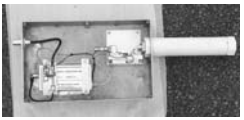
ACTIVITY NEWS FROM THE WORLD ABOVE 1000MHz

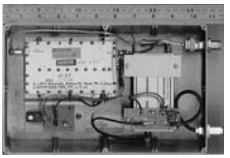
Beacon news:

From Brian, G4NNS (IO91FF) comes the following update on the state of the new Farnham beacons..... The Farnham group are all on test (47GHz, 24GHz, 5.7GHz) on a mast outside the shack as G4NNS/B attended beacons. We do not have an installation date yet but hopefully it will be the end of August. John (G8ACE), Ian (G8KQW) and I have visited the site and know what's involved in the installation.
The following photos may be of interest ...

Left: The 24GHz and 5.7GHz beacons on G4NNS's pump up mast

Right: The two beacons mounted on a common base plate… oscillator and PSU sections only.. these appear to be kept remote from the mast head ODU units shown on the next two photos





Above: Mast head Driver and PA units for the 24GHz and 5.7GHz beacons

GB3CFG –Carrick Fergus, N. Ireland

As of Friday the 20th July at 16:00 hrs **GB3CFG, 1296.905 MHz** was installed at its permanent home in **IO74CR**. Thanks to G4DDK and all others in the UKUG for help. Also thanks to Alan GI0PCU for site access. **Regards from Geoff Pike GI0GDP. Reception reports are welcome: email gi0gdp@yahoo.co.uk**

(Editor's note: I heard the beacon at S9+ on the southern end of the Isle of Arran (IO75KK) over the whole of the IOTA Contest weekend (end of July). However, there were no amateur callsigns heard from that area at the same time.

From Ray, GM4CXM: Very useful indeed....thanks to all involved. The beacon is an average 539 near Glasgow, peaking to 569 with aircraft scatter. The frequency appears to drift between 1296.901 and 902 during my initial monitoring (*agreed.. editor*)

GB3DUN. 24GHz Beacon, Dunstable

From: John Wood, G4EAT <g4eat@yahoo.co.uk>
I'm glad to report I have received the above beacon today, 15 July 2007, for the first time.There was heavy rain close by so I was expecting to have a chance with RS. I was very surprised to hear it T9 (better than some 10G beacons) and the same again this evening, so I have a tropo signal over the obstructed 72km path.

Every third cycle it gives IO91SV10 and ZL08e for those who prefer the old locators!
Frequency to nearest kHz:
5pm 24,048.895MHz
9pm 24,048.891MHz
Strength today S2 but perfectly Q5.

Congrats to Bryan G8DKK and the team that made this beacon possible. It will be very interesting to see the seasonal changes and propagation enhancements.
73 John G4EAT

July 24GHz Contest reports

From Sam, G4DDK (JO02PA)

I think conditions were a little below average on some paths. Signals between Simon, G3LQR, and myself were absolutely normal. Between John, G4EAT, and myself they were a little down, but John was immediately heard on frequency when we tried. It took a long time to find signals from Harold, G3UYM/P, but when they were found the scatter signal was very readable, if weak.

With Peter and Gordon, G3PHO/P and G0EWN and with, Ian, G8KQW/P it was no go at all. Same with John, G4BAO.

My feeling is that with today's typical home station, i.e. 2 - 3W and 2 - 3dB nf, with 30 to 45cm dish, flat band range is around 100km. Well-sited portable stations ought to be workable out to around 150km from the average home station. Maybe a few km could be added to these ranges, but today's blustery conditions with rain showers were obviously not conducive to longer distances. **73 de Sam, G4DDK**

From G3ZME/P (via G3UKV Martyn)

Well, we set a new record today. After about 30 years on microwaves, I (or rather, we) had exactly ZERO QSOs today from both good sites - Sedgley Beacon and Brown Clee on 24GHz.

I've had some poor days out portable, but nothing like this before. I wonder if a one-way QSO with our beacon, GB3ZME, from both sites might count for points? Thanks to those who had a go with us ('EAT, 'MJW, 'DDK, 'UYM).The weather was showery and breezy, but we can live with that. Local 2metre PMR crud was bad at Sedgley, however.

73 from Martyn, Jim & Dave G3ZME/P (Telford DARS)

From Harold, G3UYM/P (IO92XA):

I operated portable from Therfield IO92XA but despite the strong winds and poor conditions had two way contacts with: G4EAT JO01 57Km, G0EWN/P JO03 129Km, G4BAO JO02 33Km G4DDK JO02 91Km. The 24GHz beacon GB3DUN was received at 599.

73 Harold G3UYM

From Peter G3PHO/P JO03AE

Together with Gordon, G0EWN, I operated from a lane side layby in this rare square. It was a very disappointing day indeed as I made no QSOs at all! The path to G4EAT (JO01HR) at over 160km did not work this time (it has done before) and what should have been surefire contacts to G4BAO and G3UYM/P were also unsuccessful. Gordon on the other hand just made it on CW with G4EAT. His 1 metre Andrew dish has just the extra gain over my 60cm offset to make the difference.

Now that there are only two of us in the North (ie Yorkshire) and just two on the Shropshire area with 24GHz, it makes it very difficult to have the numbers and variety of contacts that we were getting some years ago. Unless some of the southern stations drive out of their region for these contests (like I've been doing for many years on all microwave bands) I fear that the old North-South divide will continue to discourage people up here from coming on the band. I can see no point whatsoever in repeating the same old paths month after month.

From Mike Willis, G0MJW/P:

It was a complete waste of time for me. My thanks to those who attempted QSOs but none of them worked. With there being no locals around here, all, apart from one path, were over 130km which yesterday was too far. Peter, G3PYB was only 70k but not along a great path. The next time the weather is like that I will not be going out. Showers were not too bad but the wind was and I had to close down a little after 12 because of the strong gusts. At least there was activity on 144.175MHz, with, as far as I know, only one group "missed" because they were not on 144.175.

From Ian Lamb G8KQW<ianlamb@btconnect.com>

I think that "Challenging" is a better summary for yesterday than "Waste of time". My day started at Dunstable - I was on site for 1.5 hours, had a cup of tea with the warden and then decided to head off south due to the continuous lashing rain. Stopped off at Reigate Hill (GB3SEE QTH) where I worked G4EAT at 77km on 24GHz (signals >10dB down on normal and no scatter) and tested unsuccessfully with G4DDK and G3UYM/P - I agree with Sam's summary on conditions and ~ "rule of thumb" distances. Then on to sunny Butser Hill where I worked G1JRU on 24GHz plus G8ACE/P and G3PYB/P on 24 & 47GHz. I also tested unsuccessfully with G0JMI/P on 24GHz - shorts weather at Butser hi!

It's a great shame that I haven't managed to get my 24GHz TWT QRV yet as the contest day would have been an ideal day for testing with high power on 24GHz. I still need a WG20 switch to complete that line-up if anyone has one they want to part with. I'm sure we all got something out of yesterday even if it was the need to keep the dish still in a gale, waterproofing the gear or, in my case, making 144MHz easier to deploy. I also noticed a totally different elevation setting from normal on the QSO with G4EAT which was obviously due to propagation and not mechanical variations with my equipment - maybe fixed stations should think about running elevation because I can always optimise more on 24 with pan and tilt than simply panning using a 0.6m P-Com j-fed dish. **73 from Ian G8KQW**

JUNE LOWBAND CONTEST REPORTS:

From Martin, GM6VXB

Up here in the North, conditions were very poor. I tried calling CQ on 144 and 1296MHz without KST support 'just to see what would happen'. Nil on the 'contest' bands, but did have a chat with a couple of locals on 144MHz who wondered what I was doing. I did fly the microwave flag so may have a couple of converts.

I heard a few 'pings' via aircraft scatter but not enough to get full callsigns on 1296MHz, nothing on the other bands though.

Lessons learnt:

1: I need more power on 23cm. In hand with a 2 X 3CX100 amp being built.

2: Get the 13cm gear to work for more than 10 minutes at a time. Hand in pocket time I think !!.

3: Need a better antenna than the 80cm dish on 9cm. Will need to think seriously on that one.

4: Use KST as it is the only way anyone will ever point antennas this way.

5: Pray for better conditions and better weather to go portable. Any suggestions besides moving !.

Still, it was good fun playing with the systems, and it showed I need a bigger fan on the 144MHz amp.

Running at 300 Watt out it got quite warm, still I didn't need the central heating on (outside temp 10 C).

I will be out portable when we get warmer weather.

73 from Martin, GM6VXB

From Ian, G8KQW

I operated home, Beacon Hill - IO91OC.

Whilst conditions were average (as ever) the activity level was fantastic, the most stations I have worked in 1 day.

50% of my 23cm QSOs came directly from CQ calls on the band whilst the other 50% came from KST.

1296MHz: 34 QSOs using my IC 910HX + 75W LDMOS SSPA + LNA + 44 ELEMENT WiMo YAGI. BEST DX GM4CXM @ 587km

2320MHz: 22 QSOs using a TR751E + DB6NT TRANSVERTER + 60W SSPA + 67 ELEMENT WiMo YAGI. BEST DX G3RCM/P @ 269km

3400MHz: 17 QSOs using an IC202S + DB6NT TRANSVERTER + 30W FERRANTI SSPA + 1m DISH. BEST DX G3LRP @ 281km

73 .. Ian

From Mike,G0JMI/P

I was out /P at Cheesfoot Head, Winchester, Hants (IO91JB) for the Low Bands Contest with my QRP equipment: 23cm 2W O/P, 13cm 250mW O/P, 9cm 300 mW O/P. The aerial is a 2.5 foot dish.

On 23cm I worked 8 stations as follows: G1JRU, G4SJH/P, G8ACE, G4LDR, G4NNS, G3FYX, G8VOI/P, G8KQW.

On 13cm I worked 7 Stations as follows: G1JRU, G4SJH/P, G8ACE, G4LDR, G4NNS, G3FYX, G8VOI/P.

On 9cm I worked 7 stations as follows: G1JRU, G4SJH/P, G8ACE, G4LDR, G3FYX, G8VOI/P, G8KQW.

The best DX being Roy, G3FYX, at 108km.

Although not that amazing by others' standards, this represents one of the best contests concerning stations worked for me with the QRP home-brewed equipment!

(Continued next page .....)

July 5.7 & 10GHz Cumulatives:

Steve G1MPW + Dave G6KIE worked from their usual site at Firle Beacon JO00AU and found both conditions and activity not as good as usual . 14 QSOs was the tally for the day - 3 attempts with ON4IY resulted in Christof hearing Dave's ident beacon at one point - but they were unable to get any closer than that to a QSO . That wasn't the only disappointment of the day , Steve's sandwiches got left at home in the fridge .It was a good job Dave had a plentiful supply and in true amateur spirit was prepared to share !!

THAT'S THE LOT FOR THIS MONTH FOLKS... PLEASE SEND IN REPORTS FOR NEXT MONTH BY THE END OF THE FIRST WEEK IN SEPTEMBER. Those not used this time will be carried over to September... 73 from Peter, G3PHO

Low-band Microwave Contest: 04 March 2007
Adjudicated scores

Overall results table

	1.3	2.3	3.4	Total (Normalised score)
G3XDY	1000	1000	1000	3000
G4BRK	625	514	419	1558
GW3TKH	71	18	41	130
G4RFR	13	18	42	73
G4FSG	0	0	11	11

Individual Band Tables

1.3GHz	**Best DX**	**Located**	**Distance**	**QSOs**	**Raw Score**
G3XDY	DR6A	JN59FW	689	19	7591
G4BRK	DJ5BV	JO30K I	595	14	4746
GW3TKH	PI4Z	JO11WM	490	2	536
G4RFR	G3FYX	IO81RM	93	2	95

2.3GHz	**Best DX**	**Located**	**Distance**	**QSOs**	**Raw Score**
G3XDY	DF9IC	JN48IW	634	11	3339
G4BRK	ON4HRT/P	JO20MW	453	8	1717
G4RFR	GW3TKH*	IO81JM	120	1	60
GW3TKH	G4RFR*	IO90AS	120	1	60

* One way QSO * One way QSO

3.4GHz	**Best DX**	**Located**	**Distance**	**QSOs**	**Raw Score**
G3XDY	DJ6JJ	JO31LG	407	6	1471
G4BRK	PA6NL	JO21BX	380	3	617
G4RFR	GW3TKH*	IO81JM	120	2	62
GW3TKH	G4RFR*	IO90AS	120	1	60
G4FSG	G4DDK	JO02PA	9	2	16

* One way QSO * One way QSO

Congratulations to John G3XDY, who was the leader on each band, and overall winner by a good margin. On 23cm, John was running 200W to 4x 23 ele Yagis, on 13cm 120W to a 60cm offset fed dish, and on 9cm 20W also to a 60cm dish. John and others commented that conditions were average. There was some good activity in mainland Europe with the microwave contest, which enabled John to amass good scores on each band, but conditions were not good enough for stations further West to take much advantage of this.

73 from Steve, G4KNZ, Adjudicator.

UKuG Low-band Microwave Contest : 01 April 200 Adjudicated scores

Overall results table

	1.3	2.3	3.4	Total (Normalised score)
G3XDY	1000	1000	1000	3000
G3TCU/P	319	640	319	1278
G4RFR	151	294	431	876
GM4CXM	702	0	0	702
GW3TKH	155	117	342	614
G0DJA	208	0	0	208

Individual Band Tables

1.3GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL3IAS	JN49EJ	585	20	5042
GM4CXM	SM6HYG	JO58RG	988	9	3540
G3TCU/P	G3XDY	JO02OB	280	14	1609
G0DJA	GM4CXM	IO73TW	361	7	1050
GW3TKH	G3XDY	JO02OB	308	6	781
G4RFR	G4BEL	JO02BI	228	9	763

2.3GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL3IAS	JN49EJ	585	9	1577
G3TCU/P	G4KIY	IO92WN	254	11	1010
G4RFR	G4BEL	JO02BI	228	6	464
GW3TKH	G3TCU/P	IO80WP	124	2	184

3.4GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL3IAS	JN49EJ	585	6	1070
G4RFR	G4BEL	JO02BI	228	4	461
GW3TKH	G3TCU/P	IO80WP	124	3	366
G3TCU/P	G0MJW	IO91JO	125	4	341

Congratulations again to John G3XDY, who was the leader on each band,and overall winner by a good margin. On 23cm, John was running 200W to 4x 23 ele Yagis, on 13cm 120W to a 80cm offset fed dish, and on 9cm 20W to a 60cm dish. Conditions were generally poor (at the start) to average (later on). Ray GM4CXM put in a good entry on 23cm, with a best DX of 988km across to JO58 in Sweden worked late in the day. **73 from Steve, G4KNZ, Adjudicator.**

3.4GHz Microwave Contest: 05 May 2007

3.4GHz	Best DX	Located	Distance	QSOs	Score
G3ZME/P	GD0EMG	IO74QD	228km	7	1030
G8AIM	PA6NL	JO21BX	388km	3	877
GW3TKH	M0GHZ	IO81VK	70km	1	70

Congratulations to the winners, Telford & DARS, the station operated by Martyn G3UKV and Mike G4NKC from Brown Clee in the Midlands. Their equipment consisted of 50W to a 95cm dish at 5m agl with a horn feed. This event was quite poorly supported, with comments that conditions were poor, and while there was plenty of activity on the other bands in the IARU event, there was little found on 9cm. **73 from Steve, G4KNZ, Adjudicator.**

UKUG June 2007 Lowband Contest Results

Overall Position	Call	1.3GHz	2.3GHz	3.4GHz	Normalised Scores
1	G3XDY	**1000**	942	602	2544
2	G8KQW	506	**1000**	970	2476
3	G4BRK	537	839	536	1912
4	G3RCM/P	402	383	**1000**	1785
5	G4SJH/P	566	599	531	1696
6	G8VOI/P	233	518	510	1261
7	GM4CXM	778	0	0	778
8	M0GHZ	186	248	326	760
9	G8AIM	74	279	370	723
10	GW3TKH	125	299	219	643
11	G0DJA	371	0	0	371
12	G0JMI/P	26	93	107	226

This event was blessed with good weather and high activity with G8KQW reaching serial numbers of 34 on 23cm, 22 on 13cm, and 17 on 9cm. Conditions were generally normal, but good DX was worked by stations taking advantage of aircraft reflections.

On 1.3GHz G3XDY was fortunate to work several German stations plus OK2KKW, thanks to the activity in the coincident continental contest. Runner up GM4CXM also benefited from high average points per contact with many QSOs into the south east of the UK.

The leading stations on **2.3GHz** both lost some points during adjudication but it did not affect their positions, with **G8KQW** taking the honours.

The **Sheffield Amateur Radio Club (G3RCM/P)** with G3PHO and G0RUZ at the helm came out on top on **3.4GHz** with a narrow victory over G8KQW.

G3XDY leads the overall results thanks to a good 1.3GHz score, **G8KQW is the runner up** with high scores on 2.3 and 3.4GHz.

Many entrants commented favourably on the high activity. Some portable stations were particularly concerned that the use of ON4KST Chat reduced “on the air” activity in the event, with stations popping up to “cherry pick” DX and then disappearing again. It appeared that most stations were calling CQ direct on 1.3GHz, with a mix of talkback on 144MHz and ON4KST.

There were few errors in the logs. One had no locators recorded, but as the claimed distances checked out it was accepted this time, and another had no claimed scores.

The results were cross-checked by G4KNZ prior to publication.

John G3XDY, Adjudicator