An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

Formerly the RSGB Microwave Newsletter and now published by the UK Microwave Group

2005 JUNE

G4DDK and honorary "Brit" WA5VJB set out their stall at this year's Dayton Hamfest.

A good time was had by all!

In this issue ...

- ***Latest News ...***

- **Amateur Microwaves says goodbye to one of its early pioneers**
- **Controversy reigns in the KST debate!**
- **G3XDY has landslide victory in the Low Band contest**

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

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From the Editor's Desk

Well the dust hardly settled over last month's controversial Scatterpoint which contained the ON4KST discussion when another started on the UK Microwave reflector! This month we present readers' input on the subject. Please consider the views (both sides given!) and then make up your own mind. Some changes to the contest rules will have to be made for next year and must be decided by the Martlesham roundtable in November… at the latest! The Contest Adjudicator is Steve Davies, G4KNZ, whose contact information is shown at the top of this page. Please let him know your views on the subject.

The next issue of Scatterpoint will appear around the first week of August as the July/ August edition. By then we hope that you have all renewed your UKuG subscriptions, where necessary, so that you can continue to receive the most up-to-date amateur microwave news available outside the internet!

73 from Peter, G3PHO, Editor

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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.

PROCEEDINGS OF THE UK MICROWAVE GROUP 2004-5

Just 10 copies left! Be quick or you could miss yours!

Full details of prices, etc can be found on the back page of last month's Scatterpoint.

Before ordering, please contact the Scatterpoint Editor, G3PHO, to confirm they are still available. You can reserve one by email or telephone.

SUBSCRIPTION ENQUIRIES SHOULD BE SENT TO THE UKuG GROUP SECRETARY AT THE ADDRESS SHOWN AT THE TOP OF THIS PAGE

VK5ZO – SILENT KEY

All microwavers will be saddened at the news of the passing of Des Clift, VK5ZO, on the 6th June, just as this edition of Scatterpoint was being assembled. I've just heard the news via Des's long time microwave pal, Lyle Patison, VK6ALU (formerlyVK2ALU) and also directly from Des's wife Marjorie. He died in an Adelaide hospital in South Australia, following a heart attack. I believe he was either just in his eighties or approaching that age.

Des was an **amateur microwave pioneer**, making the very **first 10GHz contacts in the UK** during the late 1940s/early 50s when he was **G3BAK**. By that time there were a few UK amateurs taking an interest in microwaves. Two of them, Des and G3LZ, began experimenting in 1949 and, in January 1950, were rewarded with the first UK two-way contact on the 10GHz band. Des eventually moved to Australia where he carried on his microwave activities, mainly on the 5.6GHz band, first as VK2AHC in New South Wales and later as VK5ZO in South Australia.

His 10GHz equipment for that 1950 contact with G3LZ consisted of a mains powered klystron transmitter/receiver and the path was just a "few miles" (actually about 1.75 miles) across the Manchester Ship Canal in North West England. Of just as much interest was his use of 70cm for talkback. At that time, even the 432MHz band was for radio pioneers!

In the past couple of years I have had the pleasure of keeping in touch with Des over the internet Echolink system. Des did not have HF facilities and this most useful internet resource enabled him to chat to microwave friends around Australia and overseas. I never actually met him but our Echolink chats, letters and emails made me feel I had known him as a true friend for a very long time.

I know everyone will join with me in passing their condolences to his wife Marjorie and the family.

Peter, G3PHO

From Sam Jewell, G4DDK:
I'm really sorry to hear of the passing of Des.
I was fortunate to visit with Des and Marjorie twice in the last few years, the last time being in February of 2004. He was a fine gentleman who always had time to talk and explain and who was, when I visited him in 2004, re-building his 3cm gear.

As G3BAK, Des published many fine articles including a 70cm converter. It used the well known two-stage Butler oscillator! This was in the 1960's, when the converter design was well ahead of its time.

I will miss not being able to visit him again. Rest well, friend.

From Dale Cavies, VK5DC:
I am saddened to hear of Des's passing.
I live in Mt Barker where he resided and spent some time over the last 15 years or so helping make loop yagis and being fascinated by all the experimenting he carried out.

From Mike Dixon, G3PFR:
My sincerest commiserations. Des started his microwave (10GHz) experiments (using QRP klystrons) not 20 miles away from my present QTH (see the now defunct RSGB Microwave Manual, Volume 3, Chapter 18) in 1949 - that's some record of achievement!

Vale. Rest in Peace, knowing that you've achieved much!

A Single LED Battery Status Indicator for the Rover

Paul Wade W1GHZ ©2005

w1ghz@arrl.net

Fading batteries are an all too frequent part of rover operation. Battery voltage fades slowly and silently, usually unnoticed until something doesn't work quite right, and then the problem is still sometimes overlooked. A simple warning device that doesn't distract from normal operation would help.

Battery status is easily monitored by the battery voltage – a "12 volt" battery, like a car battery, delivers around 13 volts when fully charged, dropping to below 12 volts when nearly discharged. A rover operator could check this periodically, but there are periods of attention overload: simultaneously digging out weak signals, maintaining liaison, doing PR with onlookers, and keeping antennas from blowing over in the wind can fully occupy most of us. So, while we could easily read a DVM, or just push the right button sequence on an FT-817 to measure the voltage, it may get neglected until something doesn't seem right.

A simple indicator, like an LED, is much easier to notice without being a distraction. It occurred to me that a multi-colored LED could be used as a status indicator. The most common combination is red and green; obviously, green for good and red for bad. When both colors are lit, the output is yellow, which could be a warning state. Thus the simple display would be green if the battery is good, yellow when the battery is getting low, and red when it is dying.

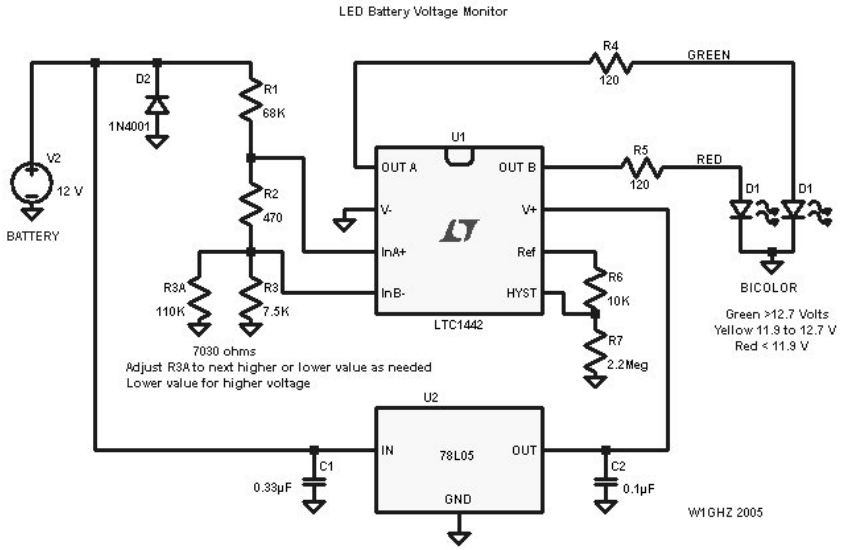
Now we need a simple circuit to detect the voltage and drive the LED. Integrated circuit comparators are cheap, but the difference between a good battery and a dead one isn't large, so the voltage must be reasonably accurate. The comparison voltage, reasonably accurate over time and temperature, may be obtained from an integrated circuit voltage reference at a modest price.

A comparator has two output states: high when the "+" input is at a higher voltage than the "—" input, and low when the "+" input is at a lower voltage. To drive the bi-color LED, one comparator should turn off the green light when battery is nearly dead and another comparator should turn off the red light when the battery is near full charge. In between, both lights are on, so the display will be yellow.

I have some LM393 comparators, the cheapest one available, in the junk box. However, all the available bi-color LEDs have a common cathode lead and separate anodes, so the open-collector outputs of the LM393 would not drive the LED without external transistors – too many parts for a simple circuit. A bit of research located a dual comparator with a built-in voltage reference, the LTC1441 (**www.linear.com**), with a price comparable to a voltage reference alone. The only drawback was that this comparator will not operate at 12 volts, so a 5-volt three-terminal regulator is necessary to reduce the voltage.

The complete circuit is shown in the schematic, **Figure 1**. The voltage divider R1, R2, and R3 sets the voltage trip points for the comparators in U1, so that the red light goes out at voltages above about 12.7 volts and the green light goes on at voltages above 11.8 volts. Since I used ordinary 5% resistors, the necessary adjustment for tolerances is provided by R3a. If the trip points are too low, R3 is decreased by replacing the nominal value of R3a, 110K, with the next lower standard value, 100K, or 91K if necessary. If the trip points are too high, R3a is increased to 120K or 130K. Once the adjustment is made, the resistors will probably drift and age together to maintain the desired ratio.

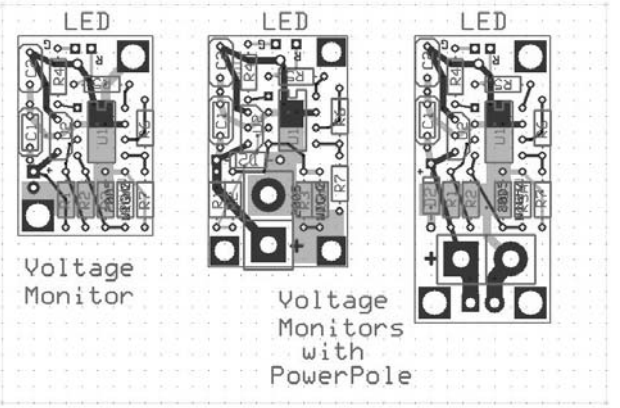
When I breadboarded this circuit, it appeared to work fine, with the color changing as planned. However, when the voltage was set exactly at the trip point, thermal noise switched the comparator on and off randomly at a rate invisible to the eye but visible on an oscilloscope. The comparators are too sensitive! The solution is to add some hysteresis, so that there is a slight difference



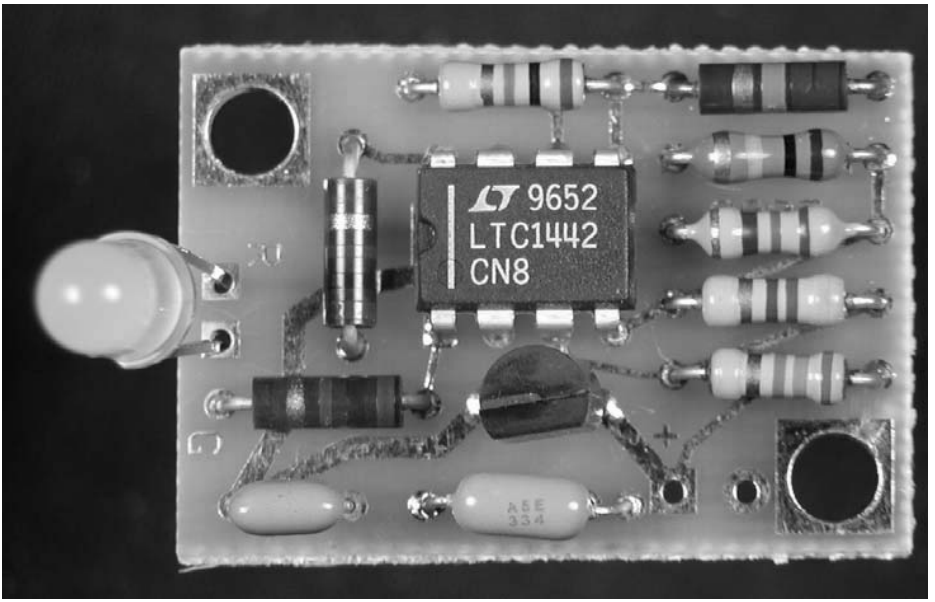
between the on and off trip points. The LTC1441 has a pin for adding hysteresis, by adding R6 and R7. The values shown provide about 0.1 volts difference between the on and off voltages.

My breadboard didn't look robust enough for rover use, and I had a bit of spare area on a PCB for another project, so I made a quick layout of Figure 1 and added it to the board, piggybacking on a $59 Miniboard with ExpressPCB (**www.expresspcb.com**). **Figure 2** is the PCB layout for use with the free ExpressPCB software – the plain version I built and two others with PowerPole connectors on the board, to monitor voltage as it enters a box. The file is available at **www.w1ghz.org** .

A photo of the complete battery status indicator is shown in **Figure 3.** Small and simple, with one LED, two ICs, eight resistors, and two capacitors. Total parts cost, new from DigiKey (**www.digikey.com**), is about $3. I found three choices for bi-color LEDs in the catalog: the 160-1057-ND had the best three color combination, the 67-1124-ND was pretty good, but the 160-1715-ND had a very greenish color when both are lit so the yellow state is harder to discern. Any of the three LEDs run about $0.30, so choosing the best colour doesn't cost extra.



I included the unit in Figure 3 inside my Battery-Sharing Switch, so I now have one box to control my batteries with just one light to keep an eye on.



WANTED

23cms Transverter… need not be state of the art, just something to get me on the air. The beam is up ready to go.

Geoff Day, G4DED, QTHR and at: <g4ded@ukonline.co.uk>

GALILEO

A fairly detailed news release on BBC Science News has appeared on the Galileo Test Bed satellites and their payloads

http://news.bbc.co.uk/1/hi/sci/tech/4588139.stm

Murray, G6JYB

CT1DMK REFLOCK BOARD … AN UPDATE

Darrell VE1ALQ and Luis CT1DMK have gotten all the bugs out of the reflock circuit, as far as I can tell. The latest circuit is on Darrell's webpage:

http://www.ve1alq.com/clpd_pll/clpd_pll.htm

I built a couple of these and they are now easy to get working. I phase-locked a 94.75 MHz and a 90 MHz VCXO with the new circuit and had no problems using the XOR output of the CPLD.

Darrell is selling boards and/or kits for this new reflock circuit at very reasonable prices. If you tried the earlier versions of the reflock and didn't have any luck with it, try out the new circuit. It looks like a winner!

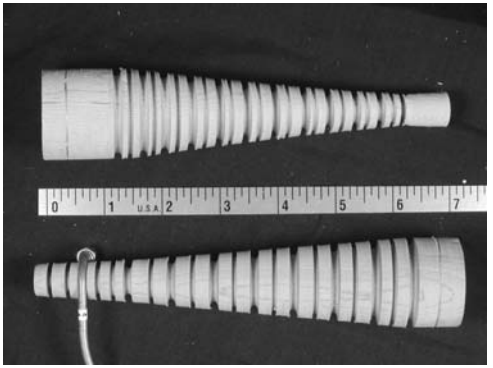
73, Zack W9SZ

A small hardline bender

From: Paul Wade W1GHZ

I've been thinking about making a mandrel-type bender for semi-rigid coax, but hadn't figured out a convenient way of making different radii. thanks to Charles,K4CSO, a taper seems like a good idea.

I couldn't find any convenient nylon lying around but found a big bag of short maple dowels, 1.5" diameter -- I had found them being sold as fire-wood at a gas station and couldn't pass them up. I turned a taper in one, then took a drill bit of 0.140 diameter and ground the butt end into a half-round tool. Then I put the tool into a pin vise for a handle and then turned a series of grooves into the taper. A quick test showed that UT-141 bends very nicely using the grooves as mandrels.



I repeated with a 0.086 diameter drill bit for UT-085, placing these grooves between the others.

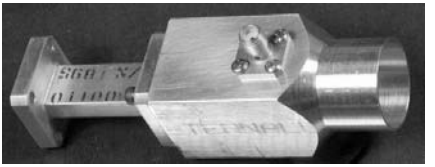
I made a second one, the top one in the picture, with the mandrel grooves spaced a little more evenly so the steps might more more even (everything was done by eye). I'll be sending the first one to Tom, WA1MBA, so he can provide a second opinion on how well itworks.

I'm not going into production. If you don't have a lathe, you probably know someone thathas a wood lathe, which is what I used. Or, if someone likes to turn and wants to make up some, please go for it.

I'm sure improvements can be made -- I just wanted to see if a quick job would work.

73 Paul

DUALBAND 10GHZ/24GHz FEED HORNS

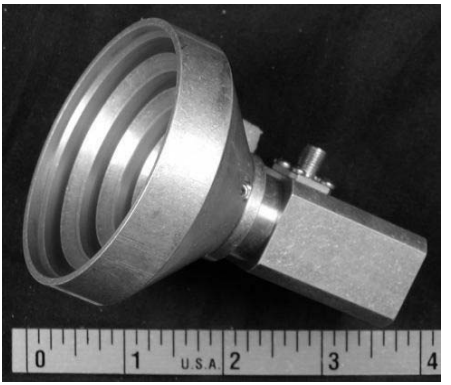


These excellent feedhorns (see photos above and below) are available from Paul Wade, W1GHZ. He will post world wide ….just email him for details at:

w1ghz@arrl.net

The Scatterpoint editor purchased the one shown in the first photo at last year's Microwave Update in Dallas, Texas and a recent test on 24GHz, where it is a dual mode horn feeding a 60cm offset dish, showed it to work fine. Since it has been milled out of a solid aluminium block, it is very robust and will stand a lot of portable operation in the years ahead. The top photo shows the rear WG20 feed for 24GHz and the SMA connector for the 10GHz transverter.

Of course, you can use the horn as a single band feed if you like… the editor does so on 24GHz.



THE FUTURE OF MSF

Some information via Alan, G3NYK ...

I know several members use MSF clocks and frequency standard distribution. The following was received in an NPL Time & Frequency Newsletter recently:

The Future of the MSF Radio Time Signal

The MSF standard-frequency and time signal is one of the most widely used sources of time in the UK. It is transmitted on behalf of the NPL by BT plc from its Rugby Radio Station on a frequency of 60kHz.

The current contract to broadcast the signal finishes at the end of March 2007, and recently the Department of Trade and Industry has commissioned studies to consider the longer-term future of the signal. As a result of this work, DTI has given the go-ahead for NPL to procure the MSF broadcast for a further 10 years.

It is anticipated that there will be no interruption to the MSF service, whatever the outcome of the contract negotiations. It is possible that MSF operation will need to be tranferred to another site within the UK, but if that proves to be the case, a key aim will be to ensure that the reception of the signal is the same or better than it is at present over the whole of the UK.

There may eventually be more information on the web site:
www.npl.co.uk/time

73 from Alan, G3NYK

An idea for contest rules

– by Steve G1MPW

Anything to even out the playing field for the /P stations is a good idea but then again I must declare an interest !

It seems a little harsh to deny the use of modern technology just because it is not widely available to everyone . If no one is trying any new techniques we will never have any progress -- my current preferred option would be to split the results into 4 groups

1) QRO from home
2) QRO portable
3) QRP from home (but I doubt there will be many takers)
4) QRP portable.

Another suggestion -- Instead of adding up the number of squares worked throughout the year -- why not count the total of different paths worked?

My thinking behind that is that if I at JO00BU work you when you are in IO93EH then we both get 298 points and one square.

If the next month you go to IO83RO and we have another contact when I am JOOBU again, we both get 355 points i.e we both get 653 points.(298+355)

If they were the only two contacts we had all season then you would have 653 points but I would have 653 x 2 squares = 1306 points. It seems a bit unfair that you have made the effort to activate another square but go on to be beaten by someone who has stayed at the same location and worked you twice to claim 2 multiplier squares --- surely we should end up with the same scores .

Hope it makes sense but I think it would encourage those that do go out portable to try out different sites.

73 Steve G1MPW

UKuG LAPEL BADGES ANYONE?

Adrian, G8PSF writes: have there ever been any lapel badges for UKuG members to sport on their apparel? A feeler for feedback for such in a future UKuG issue (*like this one ...editor*) would prove the viability for costing. What do you think? Maybe its on the agenda for consideration already? **73 Adrian**

Editor: The idea hasn't come up before but maybe we can discuss it. I think you mean something about the size of the RSGB badges. Also, what about sweat shirts and T shirts with the UKuG logo? Readers's comments are most welcome. (p.s. I have a "tame" T shirt maker local to me!). There is a badge maker in N. Wales who has done this for a number of clubs. Does anyone have his address?

SUBSCRIPTION RENEWAL ….
A FURTHER REMINDER !

Many of you reading this will have joined the UK Microwave Group this time last year so you'll already be aware that the annual subscription end with this issue of Scatterpoint (June 2005). If this applies to you please contact the secretary, G0CZD (see page 2) and renew your subscription for another year (well, we sincerely hope you will!). Those of you who receive Scatterpoint in a paper format will see your renewal month on the address label. Please try to renew as soon as possible. A proportion of the membership renew at other dates, dependant on when they first joined UKuG. In all these cases you will be sent an individual reminder.

GB3IOW 23cm Beacon

From: Bob Williams <bob.f.williams@amsjv.com>

The Beacon was put back on Friday night, 3rd June. I monitored it over the weekend and it seems to be fine. Has anyone been able hear it? A report would appreciated when you have time ….

Thanks and 73, Bob

GB3CLE 23cm Beacon

Don, G3UQH, died several years ago but the NoV has been taken over by Salop ARS, with Ken Walker G8DIR holding the NoV.

He has been informed about the 23cm beacon which, incidentally, now beams approximately NW from Brown Clee. The original aerials are no longer used and a redundant antenna, not tuned to 23cm, was connected - hence the signal is a lot weaker than it used to be in the 1980s ! There was little choice due to mast ownership, etc.

Hopefully Ken will get up to the site shortly.

73 Martyn, G3UKV (Telford &DARS)

GB3SC# Beacon series

Further to earlier postings re mods to GB3SCF, (Bell Hill, IO80UU59 , 3400905kHz), the programme has slipped and I won't be taking it off air until after 5 June.

With the now-increased availability of 5.7GHz hardware to make repairs to it and, after hearing some operators' mutterings ('IFT take note!), I'm tempted to change the keying on GB3SCC to transmit continuously and let the thermal situation cope as it will. The on-off cycling was designed to limit PA temperature in the head unit, but the timing was changed from 45s on / 45s off to 45/15 last year. The unit survived last summer's heat, although this was not as bad as the year before.

What do any regular listeners to 'SCC think? Is it worth going to 100% duty cycle with the (probably now lower) risk of destroying the head unit PA if the weather gets too hot suddenly. Please bear in mind that getting the mast down to do repairs is not trivial and would mean an outtage of that beacon for several months, as well as a period of reduced height operation for ALL the beacons.

If only we'd built in a thermal switch to self-protect if the heatsink temp rises above 70C, as we did for GB3SCX !

Andy, G4JNT

MAXIMUM DISH EFFICIENCY AND THE BEST ANTENNA SIDELOBE LEVELS

… by Dick Knadle, K2RIW 6/04/05

This article by Dick Nadle appeared on the USA Microwave reflector during the first week on June.It's so informative that we thought we would preserve it for posterity by publishing nit in this newsletter. Dick often comes up with informative contributions like this one … he's a virtual microwave "guru"! Our thanks go to Dick for yet another though provoking item...editor.

INTRODUCTION -- What follows is long winded but it is intended as a mini-tutorial that I hope will give some microwavers a better understanding about the highly misunderstood area of Maximizing Gain, Aperture Efficiency, Properly Feeding Parabolas, and the Proper Sidelobe Levels that must be present in a properly operating, high efficiency, aperture-type antenna.

THE FORMULA -- The most important factor that determines the achievable Gain of a microwave antenna is it's area. The formula that is the bedrock of the antenna measuring/designing industry and science is:

Gain = (4*Pi*Ae) / (Lambda2)

Where:
Ae = Effective Area, often 55% of the Physical Area
Pi = 3.1416
Lambda = Wavelength in the same units as Ae

GAIN EQUALS AREA -- When you study that formula you can come to an interesting Conclusion; at a fixed frequency everything is a constant except the Ae. Therefore Gain equals a Constant x Area. If you want to double the Gain of your antenna (that's a +3.01 dB Gain increase) you have to double it's effective area.

ILLUMINATION -- All of the above assumes that you are properly illuminating that new area you added. In most Parabolic Dish situations (offset and center fed) that Gain is maximized when you choose a feed horn that has the -10 dB pattern fall at the edge of the illuminated surface (including the extra path length to the edge). That will usually give you a Dish with an Aperture Efficiency of about 55 - 60%.

100% EFFICIENCY? -- You can almost achieve a 100% Aperture Efficiency. All you have to do is design a feed horn that illuminates every square inch of the dish with the same power and have that power abruptly fall off to zero at the edge of the dish (no spill over). To have that much control of the feeds Primary Pattern will require a properly-fed, Cluster Feed, Phased Array of about 1,000 elements, and that feed assembly will be about 30 wavelengths in diameter. If you are working with a Dish that is 120 wavelengths in diameter, this is almost 'doable' !

A REAL DISH -- Since many of our antennas are only 20 wavelengths in diameter, that approach is not practical. You would end up with more gain in the feed horn assembly than in the whole Dish antenna system. You would be better off just aiming the feed at the target and eliminating the Dish reflector.

APERTURE EFFICIENCY -- The subject of Dish aperture efficiency is highly misunderstood. Most

amateurs (and engineers) believe that the lack of 100% Aperture Efficiency, or 100% Main Lobe Efficiency, represents a true Power Loss (it does not), and that the "lost power" is in the sidelobes (it is not).

THERE IS NO LOSS -- In a reasonably-constructed 55% aperture efficiency Parabolic Dish antenna system, if you apply 100 watts to that antenna, 99.9 watts will be radiated into space. Aperture Efficiency (surface efficiency) is a measure of the True Gain of your antenna versus the theoretically achievable Gain of an antenna of equal area. The desirable 100% aperture efficiency will only be achieved when:

1. The complete surface is illuminated with the exact same number of watts per square inch.
2. There is no phase error on any of those square inches -- this means no bumps in the reflector and no feed horn phase errors in the Primary Pattern.
3. And there is no spill-over energy being wasted.

WHAT'S PRACTICAL -- We can either loose a lot of sleep fretting over how you are going to make your aperture efficiency go from 55% up to 65%, or you can simply add another foot to the diameter to the Parabolic Reflector (and properly illuminate it) -- both may yield the same gain increase. The second approach is much faster, cheaper, and practical.

MANY ANTENNAS HAVE 100% ? -- The world is filled up with Parabolic Antennas that have an aperture efficiency of about 98% -- they are called "Diffraction Limited" Telescopes. My 8 inch diameter telescope has about that aperture efficiency. It achieves this because the Parabolic Reflector is 370,000 wavelengths in diameter, and the Feed Horn (the Eye Piece) does create the desirable Primary Pattern (it is 9,000 wavelengths in diameter) that allows it to do that.

SIDELOBES vs EFFICIENCY -- Here is the real kicker concerning sidelobes and sidelobe "wasted" energy. A Diffraction Limited telescope could be described as one where the Parabolic Reflector has about 1/20 wavelength accuracy, and the rest of the optical system is working properly. That telescope could easily have an Aperture Efficiency of 98%. That's the highest Gain you are ever going to get out of that available area. But now, lets see what it is really doing.

THE AIRY DISC -- As all astronomers know, every Diffraction Limited telescope creates a "picture" (the antenna pattern) that contains an Airy Disc. That means that around every star in the image you will see some dim rings (the sidelobes). The Airy Disk is present in all diffraction limited optics systems (and in all antenna patterns). A proper Airy Disk does not represent a system error. However, if a system error is present, the Airy Disk will change in a characteristic way that's beautifully pictured in Suiter's book, "Star Testing Astronomical Telescopes: A Manual for Optical Evaluation and Adjustment" by Harold Richard Suiter, $29.95 at Amazon.com.

HOW MUCH POWER IN THOSE SIDELOBES? -- From my Melles Griot "Optics Guide 5" catalogue, in the section entitled Fundamental Optics, they say that the Diffraction Limited Airy disc will have a Central Maximum region relative intensity of 1.0 (that's the antenna's main lobe at boresight), and 83.8% of the energy is located there. The first ring (I call this the 1st sidelobe), will have a relative intensity of 0.0175 (I call this -17.57 dB), and will contain 7.2% of the energy. The second ring relative intensity will be 0.0042 (I call this -23.77 dB), and will contain 2.8% of the energy. The 3rd ring intensity is 0.0016 (I call this -27.96 dB), containing 1.5% energy. The 4th ring is 0.0008 (I call this -30.97 dB), containing 1.0% energy, and a bunch more dimmer rings with less and less energy (the remaining 3.7%).

100% APERTURE EFFICIENCY CHARACTERISTICS -- Now let's review those last state-

ments. A Diffraction Limited 100% aperture efficient telescope has 83.8 % of the received energy located in the main lobe, 7.2% of the received energy located in the first sidelobe, 2.8% of the received energy is located in the second sidelobe, and 1.5% of the received energy is located in the 3rd sidelobe, etc. These are the best numbers you are ever going to get from a perfect, round aperture, that is not an infinite number of wavelengths in diameter.

REMOVE THE SIDELOBES, NO WAY! -- There is an amazing number of amateurs and engineers out there who are dreaming about getting rid of ALL of those side lobes and their "wasted" energy. This is a VERY FUTILE EFFORT. When a circular aperture HAS 100% aperture efficiency, it WILL HAVE sidelobes that are exactly that strong (-17.57 dB [1st sidelobe], -23.77 dB [2nd sidelobe], -27.96 dB [3rd sidelobe], etc.) and the amount of energy in each of those sidelobes WILL BE exactly the numbers indicated (7.2%, 2.8%, 1.5%, etc.).

REAL DESIGNS -- You can definitely design an antenna with weaker sidelobes; but it WILL HAVE less Gain. You can design an antenna with stronger sidelobes; and it also WILL HAVE less Gain. You can then design a low loss (no pads) circular aperture antenna with exactly those magic sidelobe levels; and it will have the MAXIMUM GAIN for that size aperture.

IS THIS REASONABLE? -- Of course this doesn't seem to make sense, but that's the way "Mother Nature" and Diffraction Limiter 100% aperture efficiency antennas (and telescopes) behave. Those sidelobes are the result of the abrupt change in the illumination taper at the edge of the aperture -- Mother Nature reacts to them by creating sidelobes. You could slowly taper the energy as you approach the edge of the aperture; that will decrease the abruptness of the illumination taper and it will lower the sidelobes but the available Gain will decrease when you do this. You can't have it both ways (maximum Gain and no sidelobes).

SO LET'S STOP THE INSANITY -- It's time we microwavers, amateurs, engineers, and interested scientists stopped seeking Maximum Gain antennas that have miniscule sidelobes; it ain't going to happen! At least I can say, it's not going to happen in THIS universe, that operates with THIS SET of the Laws of Physics that determine our antenna patterns by using what the mathematicians call Window Functions -- that's the way you feed an aperture.

THE YAGI CONNECTION -- A well-tuned, long Yagi antenna has a nearly circular aperture with a nearly uniform aperture distribution. It is interesting to note that such a Yagi usually has a set of sidelobes that are very nearly -17.5, -23.8, -27.9, and -30.9 dB. I think we have been looking at the Yagi antenna's "Airy disc" for a long time, we just didn't give that name.

DISH COMPARISON -- A well tuned Parabolic Dish antenna has weaker sidelobes than these, simply because the best available feed horns need to use an Amplitude Taper of -10 dB at the Dish perimeter.

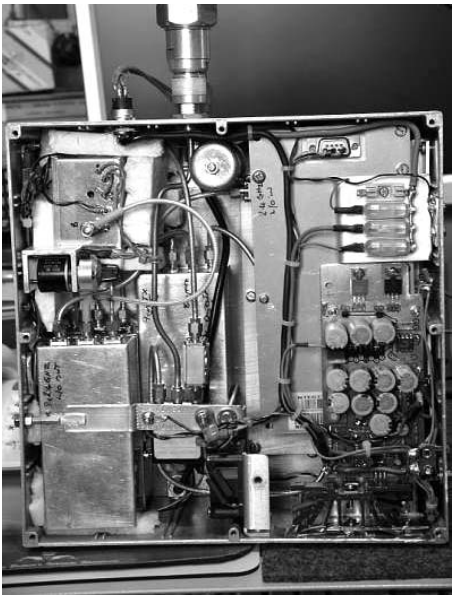
GOOD OPTICS BOOKS -- For those microwavers who wish to dig deeper and try to understand this material I recommend reading some of the better optics books. I soon recognized that the guys who have gotten the subject of High Aperture Efficiency down to a science are the optics people. They can easily do this because their "parabolic antennas" frequently are more than 100,000 wavelengths in diameter. Their "feed horn" is called the eyepiece. Their books can give us a lot of insight into what is really achievable with our microwave antennas.

THE REFERENCE -- Here is what I believe is one of the best books on optics. It's modern, well illustrated with computer-generated graphics and photos, and it's in it's 3rd edition: Eugene Hecht, "Optics", Addison-Wesley, 3rd edition, 1998. It's much nicer than the classic, Born and

Wolfe, "Principles of Optics", Cambridge University Press, seventh edition, 1999.

AIRY DISC DEFINITION -- Chapter 5, page 228 of Hecht says: "Because an instrument can only collect a portion of the incident wave front to be reformed into an image, there will always be diffraction: the light will deviate from straight-line propagation and spread out somewhat in the image plane. When an optical system with a circular aperture receives plane waves, rather than there being an image "point", the light actually spreads out into a tiny circular spot (called the Airy disc, containing about 84% of the energy), surrounded by very faint rings. The radius of the Airy disc determines the overlapping of neighboring images and therefore the resolution. That's why an imaging system that is as perfect as possible is referred to as Diffraction Limited. For a perfect instrument, the ideal theoretical angular resolution is given by the radius of the Airy disc, which is [1.22 x Lambda / D] radians (this is the Rayleigh criteria). Another way to present the angular resolution is [2.52 x 105 x Lambda / D] arc-seconds." I added the parenthesis.

73 and Good VHF/UHF/SHF/EHF DX,
Dick, K2RIW



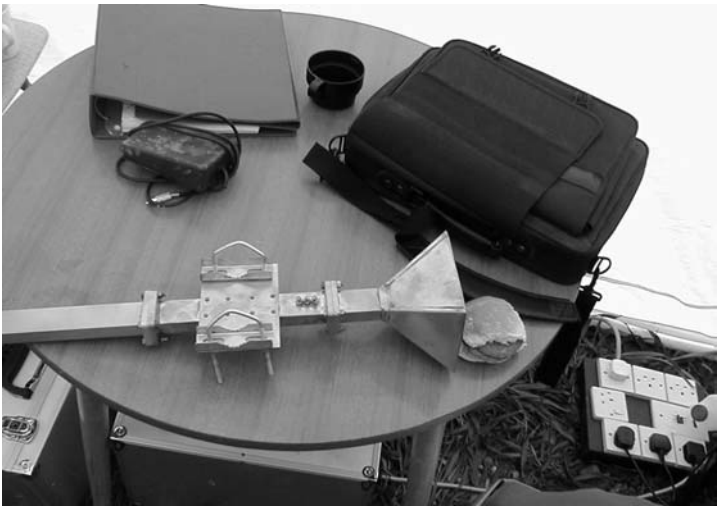
The photo above shows G4ALY's latest homebrew transverter for 3.4GHz. It's based around a surplus Ionica receiver module and a 15 watt Ionica PA. Please look for Ralph on the band during the contests this season. He's in IO70VL.

Photo right:

G4JNT's toasted sandwich experiment! Someone should to tell him that you can't cook with 5.7GHz (No matter how accurate it is!)

Or is that the original Microwave 'Round Table' ? (Actually Andy just put the sandwich down on a bit of spare table, next to the 6cm feed. I just couldn't resist the picky, taken at the FRARS UHF and up contest weekend.)

73 from Jules G0NZO



MICROWAVE CONTEST ISSUES (Part 2)

… to "KST" or not to "KST", that is the question!

Whew! What a furore this thorny topic has created! The Internet reflector has been really humming since the subject was introduced a few weeks ago. Sadly, in two cases, it resulted in some pretty nasty personal attacks but these are being taken care of as I write this column. Before I present a précis of the many emails received from readers please let me emphasise once again that I have tried to create a forum of discussion so that the contest manager, G4KNZ, has something "concrete" to work on when he and the UKuG Committee revise the contest rules for next year. The present rules were written before the advent of KST! Also I am not advocating the outlawing of the KST chat room… far from it … I use it myself. However I put forward my own point of view last month in order to initiate what I hope will be a fruitful debate which will lead to some good contest rules for next year. There have been so many excellent emails on this subject that I could fill several issues of Scatterpoint with them! So all we can do here is to pick out the main points from as many as we can space in these two pages. **Be forewarned, some are very controversial!**

Richard G8JVM: The use of artificial satellites(ON4KST CHAT ROOM), has always been banned in all contests. The UKuG contest rules state to operate within the spirit of the rules, so the use of ON4KST Chat is not within the spirit of the contest rules. It is really CHEATING, it provides an unfair advantage over portable and fixed stations; moreover it depleats the activity level. I have nothing against the use of ON4KST, but not in a contest, and definitely not to exchange reports ! Yes, I have a print out showing it [exchange of reports].

If you really must use ON4KST why not just put your talk back frequency on it and not all sit on 144.175MHz? Spread out between 144.150 -144.200. That way it avoids QSYing and you know where to find someone. The microwave side of this hobby is the last bastion of technical excellence. The Internet has killed datacomms.

If I were the contest adjudicator, I would limit the score of QSOs set up on ON4KST to 50 points, and put a multiplier on the talk back frequency. This would satisfy the stations who just want to work new squares and make the contest playing field fair.

Remember, without contests, there is very little incentive for portable stations to sit on top of hills in foul weather conditions,and without them you wreck the future for new people on the band who will never have the chance to work some of the rarer locations in the UK.

Without the talk back being heard by other band users, you won't get the enquiries as to what are you doing and hopefully subsequent interest being shown.

Roger, G0UPU: I have found that the level of activity on 144MHz talkback is down a lot this year. As I am not a serious contest operator, especially with my poor QTH, I am not out to gain a high score but come on to give people points and for the fun of it. I am not bothered if they want to use KST or computers to set up the contacts but if they want the points from me then they will have to use 144MHz talkback as that is all I have here. I don't have a computer in the shack as I don't have room for even a laptop. I did try to make sense of KST from my house computer but gave up as I could not get it to give me anything useful.

John, GI7UGV: There is the option of using KST via a mobile phone, with GPRS and with a fancy enough phone it is easily accessible.There are requests on KST at the moment for information regarding peoples GSM models to further extend this method of access. I have found it to work fine and the cost of GPRS usage is very low… portable Internet in your pocket without the need for WLAN links/computers which would be laughably impractical for me. I will be operating from a location that requires me to lug the lot on my back up a hill that tires you out walking up, carrying just your shorts and T-shirt! Then I park myself out of sight from the tourists (next to a tower people visit) and stay as inconspicuous as a dish and tripod will allow me. As much as I would like to, lugging up decent 2m equipment would be the straw that would break my back, I just couldn't do it ... It's one or the other.

Dave, G4BUO: I have given Chris, G0FDZ, some assistance in recent times, including operation from the Isles of Scilly last July. Our attempts to use GPRS for cluster access were only partially successful and the KST chat room would not have been an option.

The problem I can see with option 3 in your articlelast month is that, over time, more portable groups are likely to be able to access KST. They will then have an 'unfair' advantage over the other portables who cannot access the internet.

As a long-time member of the RSGB HF Contests Committee I'm generally against rules that cannot be easily enforced, but sometimes this is inevitable. Perhaps the culture on microwaves means that abuse is less likely to occur? I think option 5 is your only practical course of action. You could perhaps ask ON4KST to make available logs of all traffic during the contest period. Even if different callsigns were used to protect the guilty, the nature of the communication would tend to give the game away. Of course it doesn't stop people using other chat facilities but that would hardly be worth it since most 'activity' would be on KST.

If you don't feel option 5 to be viable then you should perhaps give serious consideration to option 1 though this may be seen as limiting participation from new or casual home-station operators.

Chris, GW4DGU: I'm a supporter of the use of the Internet to set-up QSOs. Apart from anything else, it brings us all a

lot closer together. I do have reservations about the passing of QSO information over non-radio channels - and I saw it happen on Sunday morning but I don't have the burning need to win contests. Having said that, I would never deny people the chance to compete.

Putting my case rather bluntly, we've become too fond of sitting in front of computers talking about microwaves, rather than getting on the air and trying to make QSOs! I've been back on the microwave bands for about three years and it seems that, even in that time, people have become less and less keen to transmit and more and more keen to talk about it! There's a word that encapsulates this situation beautifully, but I won't use it ...

We should also think about the implications that this attitude brings regarding the generation of new interest and activity.

Chris, G3WIE: I have to say that I believe contests ARE primarily about generating activity on the microwave bands. They just happen to do this by creating an incentive for the serious operators to compete and be rewarded by fame, glory and the sense of achievement. How microwave contacts are set up should not be a barrier and so any means which is reasonably available to all should be permitted. In my opinion, mandating high power 2m talkback creates a less level playing field than allowing KST. *(no one has **ever** "mandated" QRO 2m talkback Chris, or ever intends to do so ...editor)*

Changing the scoring rules will not make much difference to the activity level which is what supports our case for keeping the frequency allocations we have. Far better is to encourage more folk on to the microwave bands by lowering the barrier to entry. Mandating 2m talkback is such a barrier to some. So my vote is that we should encourage KST for ALL operating as a way of increasing activity. As far as a choice from your list of scoring rules is concerned, I agree that 3 or 4 are quite reasonable but this is because given /P access to KST the /P stations have the advantage again and we should encourage fixed stations as well!

I use both a mobile phone to connect to the internet/KST and a modest 2m rig when out /P. Access to KST via mobile phone is both possible and affordable: Most modern (<3 years old) phones support GPRS which enables internet connectivity. They usually have an internal modem and a USB/serial/infrared port that you can use to connect a PC or PDA. The volumes of data whilst accessing KST are relatively small. I connected to KST using a web browser and measured the traffic on Sunday 30th May from 0900 to 1900. Activity on KST was pretty continuous with up to 3 posts per minute. Each page refresh used about 1.4 Kbytes, and 550Kbytes were transferred in the entire 10-hour interval. This is likely to cost under £2 (two pounds) if you pay by the Mbyte.

Roy, G3FYX and Ted, G3JMY: As far as I'm concerned it's a Radio contest and as such all communication should be by Radio. I can't see how your choice of of 3 or 4 will help. Why should home stations have to compete with the internet whilst /p wouldn't?

Why not 2 sections, one for stations using artificial means for t/back & one for stations using real radio with no assistance, in the real spirit of the contest? Taking Sunday as an example, when you had difficulty on 144 T/B i could have phoned you and thus gained another 300 points (but thats the very thing I'm saying, its not fair in a contest).

As far as KST is concerned its obviously here to stay and it's of use but its use in contests is not to be encouraged.
As an alternative why not two thirds points for non radio T/B contacts? This would take care of the interests of both parties.

John, G3XDY: There is no doubt that KST and WWC10368 make contacts possible that would never be practical using 2m talkback. 23cm ranges on aircraft scatter can exceed those that can be worked using big systems on 2m.

The question is - can you put this genie back in the bottle? I personally would still carry on using these tools to make the QSOs even if the rules banned them. I would rather make the contacts, generate activity and work the DX, than enter the contest. Like many fixed operators, intensive high power operation on 2m here is a no go area due to TVI and the high level of computer QRM on receive. I usually listen for stations on 144.175 but I rarely call CQ there myself for these reasons.

In my view the simplest solution would be to have separate sections for portable and fixed stations. There may be a few stations that can manage Internet access whilst /P and that may give some advantage, and equally there will be some fixed stations without the internet, but following the 80/20 rule of thumb it should be more equitable.

Jules, G0NZO: How about collating some stats on the use of various talkback facilities during contests? I propose a voluntary entry in the contest logs, listing the talkback used to initiate the contacts, be it KST, mobile phone, 2mtr or CQ calling on the band in question (arranged or blind). That would give some quantitive data on the actual use of each method.

As for contests being organised for "Real Contesters", I would think that anyone taking part is a real contester. If only those who were playing to win were out on contest days, I think it would be very quiet out there!

In the last UHF and up contest, KST initiated contacts probably accounted for less than half of the total. It was surprising how many contacts were derived from 23cms CQ calling, leading QSO's on the higher bands. So much so, I will be taking a voice keyer for 23 on the next contest to save my voice!

Paul, M0EYT: We did at least two contests from Bell Hill before we had the internet access available via WLAN - using a vodaphone GPRS card - I think for the May contest it cost about £8 for Sat/Sun data with KST, DX cluster and email running for the whole time, so pretty cheap. The fact we have WLAN there just makes it easier for us to get Internet connectivity without having to use the GPRS card. Typically the GPRS card will work where you have cellphone coverage, so most of the UK should be covered. I think in every contest we have done we have taken both 144MHz and KST talkback, as the point is to prove the equipment / operators over the microwave paths, and not the 2m or 70cm paths.

Grant, G8UBN: I agree with G3PHO about KST and I especially don't like using mobile phones for talkback. I think using the DX cluster is OK but this needs to be discussed as well.

THAT'S ALL WE HAVE ROOM FOR! PLEASE CAST YOUR VOTE VIA THE UKuG REFLECTOR ... you'll need to visit the UKuG Yahoogroups website to do this. Look for "Poll" and follow the advice.

May 10 and 5.7GHz Cumulative Contest

This proved to be a real test of stamina for some, with rather poor band conditions and violent rainstorms (which then produced good rainscatter for some people but QRT for others) … just read the following reports!

From GW3TKH, IO81JM, North Cardiff.
Running 1W to a 60cm dish on 3cm & 250mW to the same dish on 6cm I worked the following in the May 3 & 6cm cumulatives.
3cm: G4ALY IO70, G0API IO80, G8ACE/P IO91,M0EYT/P IO80, G3FYX & G3JMY IO81, G4EAT JO01, G4UVZ IO80, G0RRJ IO91, G4NNS IO91 & G4ZXO/P IO90.
6cm: G8ACE/P IO91, M0EYT/P IO80, G0RRJ IO91, G4NNS IO91 & G4WYJ/P IO90.
The majority of signals were strong enough for ssb and all bar two, were initiated by 2m talkback.

My 3cm contact with Roy, G3FYX was our first, despite the short distance between us, the direct path won't work. This contact was calculated to be via a downpour over Trowbridge, Wiltshire!

I have been busy with construction; the 6cm transverter and amplifier is nearly complete. Testing and fitting into a suitable enclosure needs to be done, then Phil (GW3PPF) will be able to have his gear back!

Thanks to everyone for the contacts. **73 Keith, GW3TKH**

Steve G1MPW and Dave G6KIE worked from a slightly different site, **JO00AU,** near Firle Beacon, for the May contest -- it has a better take off to the west: After the usual teething problems for the first outing of the year (faulty 2m feeder , dish alignment and duff battery !) We managed to work 13 stations -- the best Dx was a very hard fought 302 Km QSO with Ralph G4ALY. This must have tried his patience to the limit due to very weak signals and very poor CW from our end but we completed in the end -- TNX OM. We were called upon to help one of the sheep in the field that had rolled onto it's back. Apparently they can't get back up on their own -- we had to tip it onto its side whereupon it was able to stand up by itself and run off -- you learn something every day! According to the farmer, sheep only last a matter of hours on a hot day if they do end up on their back. So if you are in a field and see four legs pointing into the air , do both the sheep and the farmer a favour and roll it onto it's side !!! **73 Steve G1MPW**.

From G4BAO<g4bao@ntlworld.com>:
G3PHO/P(Winter Hill) was 539 down here calling CQ during the contest at about 1655 on RS for about 10 minutes or so . Beam heading due West.
I called..... and called..... and called..... :-(

But my 250 mW could make the grade and I had similar frustrations here with many other stations today ..... I need a PA! **73 from John**

From Chris, G8BKE <ctowns@care4free.net>:
With virtually constant heavy static rain, high wind and a QRT 10GHz system I saw little point in staying out, so packed up about 1pm. Needless to say when I got off the hill it was dry but cloudy and when I got back home it was blue sky and sunshine, although the site I'd been on remained shrouded in cloud 'til late.
73 from Chris

From Paul, M0EYT/P (aka G4RFR/P): Bell Hill, 22nd May 2005.
This was the 2nd time out this year for the M0EYT 10/5.7GHz transverters, and they certainly seemed to enjoy it. From Bell Hill, we had a reasonable number of contacts, ODX being F6DKW on 10GHz @ 398Km, and F1PYR/P on 5.7GHz @ 372Km, with good signals being exchanged in SSB with both stations. Paul M0EYT was operating the microwave stations, whilst Tony G3PFM was operating 2m talkback, and working eS on 4m!

The 10GHz system is awaiting a DEMI PA (*aren't we all?! ..editor*) which should give an increase in output in the order of 3 to 4 dB, and the 5.7GHz system is awaiting a 20W device which will increase output by at least 6dB. The Keying of the local GB3SCC beacon caused the noise floor to bounce up and down on 6cm, which made for some difficult listening at times. On 10GHz, the prime mover was an FT897, and on 5.7GHz an old but good FT221R was used.

The WX was variable, starting off with brilliant sunshine. This then turned to stair-rod type rain for a couple of hours, then back to an overcast state. The dish system in use is completely remote controlled for both azimuth and elevation, with only the 2m beam being controlled with the armstrong method.
Accomodation for the stations was in the back

of a land rover, with sufficient room for both the 2m and microwave operators to work comfortably.

Overall, 24 stations were worked on 10GHz, and 11 worked on 5.7GHz. 2m was used to co-ordinate with 13 stations, ON4KST with 10 stations, and mobile phone with 1 station. Only G4BAO was not worked despite trying a couple of times. Photos can be found at: **http://pjm.dyndns.orgcontest/2005_cumulatives/**

From: Neil, G4LDR <g4ldr@btinternet.com>
IO91EC:
I was late on for the 6 & 3 cm cumulative last Sunday, not get going until 1715. I was pleased to work 11 stations on 3cm and 6 on 6cm during the early evening.

Some improvements to the 3400MHz station have been made. I finally completed the installation of the 15W PA. I am also using one of Brian's (G4NNS) excellent feed horns for this band in conjunction with my 0.8 m dish.

On 2320MHz, my loop yagi appeared to have very low gain (as measured by G4NNS). I am currently using a bow-tie feed for the 0.8m dish. I also had a switching problem on this band (TX and RX at the same time which didn't do the front end much good).

I've finally installed a mast head pre-amp on 1296MHz and changed back to a 55 element yagi (instead on the loop yagi). The regular yagi seems much sharper than the loop yagi despite the fact that the later is supposed to have slightly more gain. I've also upped the output power to 200W from 10W which now means when I call a station they can hear me because where I live seems to be a dead spot for 23cm; everyone in the UK seems to beam away from here and the continentals seem to beam towards the Midlands.

John's first day on microwaves...

From John, M0ELS <m0els@yahoo.co.uk>
23.May.05
My first forage into microwaves ended with me sitting down and having a stiff vodka on the rocks, after some tense days of trying to fathom out why I could not receive anything on 23cm.

I have an FT726R running into a mmt1286 transverter with cellflex lcf 12-50 cable to a 23 ele 10 wavelength homebrew yagi on the roof. The big day finally came when I decided to venture forth into this new world of microwaves and after carefully setting up everthing, I called cq on 1296.200.....nothing, so I called several more times, and still nothing.

I eventually had a call from G4EAT who gave me 5/9+, but I could barely hear him, even with my yagi pointing in his direction. After a couple of phone calls to him, he advised me to contact G4DDK and see if he had any ideas as to what was going wrong. I then connected up my 20w amp and gave Sam several calls, and .... Nothing!

Well, after chatting to Sam for a while, I happened to gaze down at the amp and it suddenly hit me smack bang between the eyes! I was trying to receive through the amp, without any relays to give me a direct bypass path back and a 15dB attenuator to the amp input as well. I shook my head in disbelief that I could have been so stupid. I hurriedly took the amp and attenuator out of line and again tested with Sam....nothing. No Martlesham beacon....just white noise.

Well, I eventually gave up for the evening and decided on another stiff vodka to settle my nerves. Much later that evening, I again looked intently at my 23cm setup, when I again was hit in between the eyes. I had put a 15dB attenuator between the 2m rig and the transverter. Stupid clot, was the least verbal expression I muttered to myself. Having removed the attenuator, I heard the beacon just above the noise.I readjusted the beam heading and up came the signal ... not wonderfully strong, but it was there.

Sam has kindly invited me up to his qth to test the transverter for deafness and I am awaiting some relays in the post.

Hope this little saga has brought a smile on all ye olde hands out there. **73 de M0ELS**

CRAWLEY MICROWAVE ROUND TABLE MEETING

This year's meeting is scheduled for the 18th September 2005 and has a theme entitled " Homebrew" ....of the equipment (not beer) kind of course! Attendees are invited to bring along one of their items of home constructed equipment for others to look at. You might be asked to either say a few words about it or at least provide a short written description that could be included with it's presentation. There is also talk of a construction competition and a trophy ... more news later.

For further details of the event please contact Derek, G3GRO at: derek.atter@btinternet.com

CORRECTION

Regarding the French Dxpedition to IO51 in September 2005, both I and F1BZG I am not involved with this expedition. The 2 persons concerned are F1HDF Jean Claude and F6DPH Philippe.
73 from André F1PYR

THAT'S THE LOT FOR THIS MONTH FOLKS. UNUSED ACTIVITY REPORTS WILL APPEAR NEXT TIME ... BEST WISHES FOR A NICE SUMMER .

APRIL 2005 LOW BAND MICROWAVE CONTEST RESULTS

There were 13 entries, 6 fixed stations and 7 portable, which is a little up on 2004. The numbers of contacts and scores were also significantly higher than last year. The event was moved to a few weeks than in 2004 and the extra daylight perhaps helped the portable stations.

Conditions were variable, with reports of mainly average to poor but there were some reports of better conditions to the East and South East later in the day.

The result was a very **convincing win on all three bands for John G3XDY**, operating from home. Quite a few DL, F and PA stations were worked on all three bands, which pushed John's average score per QSO to the range 250 to 300 in each case. John was running 250W on 23cm to 4x23 element F9FT Yagis, 120W on 13cm & 15W on 9cm, both to a 60cm offset-fed dish.

On **23cm, G4EAT was runner-up**, also with a good number of continental stations worked. On **13cm, G4RFR/P was runner-up** and on **9cm, G3PHO/P was runner-up**.

One or two stations commented that although there was a fair amount of activity, especially on 23cm, 2m talkback was not used very much, with ON4KST favoured, especially by many European stations, and this gives an advantage to home stations (since it is perceived by many to be too difficult to take internet access out portable). There have also been comments on the 'UK Microwaves' reflector about this.

I'm not sure what the answer is. If mainland Europe is favouring the KST route, to maximize the microwave contacts and distances worked, perhaps it makes sense to try and look for ways to make KST more accessible at low cost, rather than introduce rules to ban it. One pragmatic suggestion made is to just have separate result tablesfor portable and fixed sections, since KST will mostly not be used /P. Comments on this subject would be welcome from entrants to the other contests, as you send in your logs.

Thanks to everyone who sent in an entry. Similar events are scheduled this year for June and November - lets hope for plenty of activity again - and do please send in your entry, however small!

Regards,Steve Davies G4KNZ.

Overall Results Table

	1.3	2.3	3.4	Total
G3XDY	1000	1000	1000	3000
G3PHO/P	288	0	830	1118
G4EAT	809	43	0	852
G4RFR/P	121	328	354	803
G4SJH/P	236	173	272	681
M0GHZ	191	185	302	678
G4BRK	318	245	91	654
G3UKV/P	0	0	517	517
G8BKE/P	67	116	312	496
G4LDR	67	155	217	439
G8ACE/P	0	0	308	308
G0JMI/P	13	30	41	84
G4HUP	71	0	0	71

Individual Band Results

1.3GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DF6NA	JN49XS	664	39	11170
G4EAT	DF6NA	JN49XS	692	30	9033
G4BRK	DJ5BV	JO30KI	618	15	3549
G3PHO/P	G4ALY	JO70VL	454	16	3214
G4SJH/P	F1ANH	IN88MR	331	17	2639
M0GHZ	PA5DD	JO22IC	482	13	2132
G4RFR/P	G3XDY	JO02OB	277	11	1355
G4HUP	DJ5BV	JO30KI	436	3	789
G4LDR	G3XDY	JO02OB	223	9	751
G8BKE/P	G4ALY	IO70VL	149	9	744
G0JMI/P	G8BKE/P	IO80WP	82	3	143

2.3GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL3YEE	JO42GE	501	19	4831
G4RFR/P	G4DDK	JO02PA	281	12	1585
G4BRK	ON4IY	JO20IV	454	6	1182
M0GHZ	G3XDY	JO02OB	246	8	895
G4SJH/P	G4DDK	JO02PA	150	7	836
G4LDR	G3XDY	JO02OB	223	9	751
G8BKE/P	G4ALY	IO70VL	149	7	562
G4EAT	G4SJH/P	IO91SF	94	3	206
G0JMI/P	G8BKE/P	IO80WP	82	3	143

3.4GHz	Best DX	Located	Distance	QSOs	Score
G3XDY	DL3YEE	JO42GE	501	13	3477
G3PHO/P	G8BKE/P	IO80WP	382	10	2887
G3UKV/P	G3XDY	JO02OB	263	10	1799
G4RFR/P	G3PHO/P	IO93PW	360	10	1230
G8BKE/P	G3PHO/P	IO93PW	378	8	1086
G8ACE/P	G3PHO/P	IO93PW	327	9	1072
M0GHZ	G3PHO/P	IO93PW	296	9	1050
G4SJH/P	G3PHO/P	IO93PW	302	7	945
G4LDR	G3XDY	JO02OB	223	10	756
G4BRK	G3XDY	JO02OB	211	2	316
G0JMI/P	G8BKE/P	IO80WP	82	3	143

The photograph right shows Andre, F1PYR/P, JN19, standing on the trailer in the background during a recent microwave contest. He is able to be operational quite quickly as the trailer is always in readiness. Andre is a consistent signal on 5.7GHz and 10GHz in the UK and is always on the lookout for new Locator squares. His best DX into the UK so far has been with G3PHO/P in IO94MI, on both 10GHz and 5.7GHz cw at 620km.

SSETI Express Launch Date Announced

The launch date for **SSETI Express** and the three cubesats UWE-1, Xi-V and NCube II has now been confirmed as **Thursday August 25th 2005** with the next day 26th as a back-up.

Pre-launch keps are expected to become available within the next few weeks and will published as soon as possible.

The satellite has now completed all its pre-launch tests and is presently back in the clean room where everything is having a final checkout and where the cubesats are currently being loaded into their T-POD launchers.

Current plans show that the satellite will be packed and ready for despatch to the launch site during the last week of June.

The webcam http://sseti.gte.tuwien.ac.at/WSW4/webcam.htm remains available and other photos and the integration logbook (27+MB) can be found at **http://sseti.gte.tuwien.ac.at/WSW4/express_downloads.htm**

SSETI Express will automatically downlink general telemetry at 9k6 on 70cm and it will also be possible for radio amateurs to request specific downloads. In addition it is planned that the 38k4 telemetry transmitter on 2.4GHz will also be available for amateur voice operation as a Mode U/S transponder after initial tests on the satellite have been completed.

AMSAT-UK provided the 2.4 GHz transmitter for the satellite and a presentation on SSETI Express will be given at the **AMSAT-UK Space Colloquium to be held 29th-31st July** at the University of Surrey in Guildford. All Amateurs and SWL's are welcome to attend.

Day passes for the event or 2/3 day packages covering meals and accommodation are available. Contact Sophie Haigh Tel: 01483 689888 Email: s.haigh@sstl.co.uk

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