An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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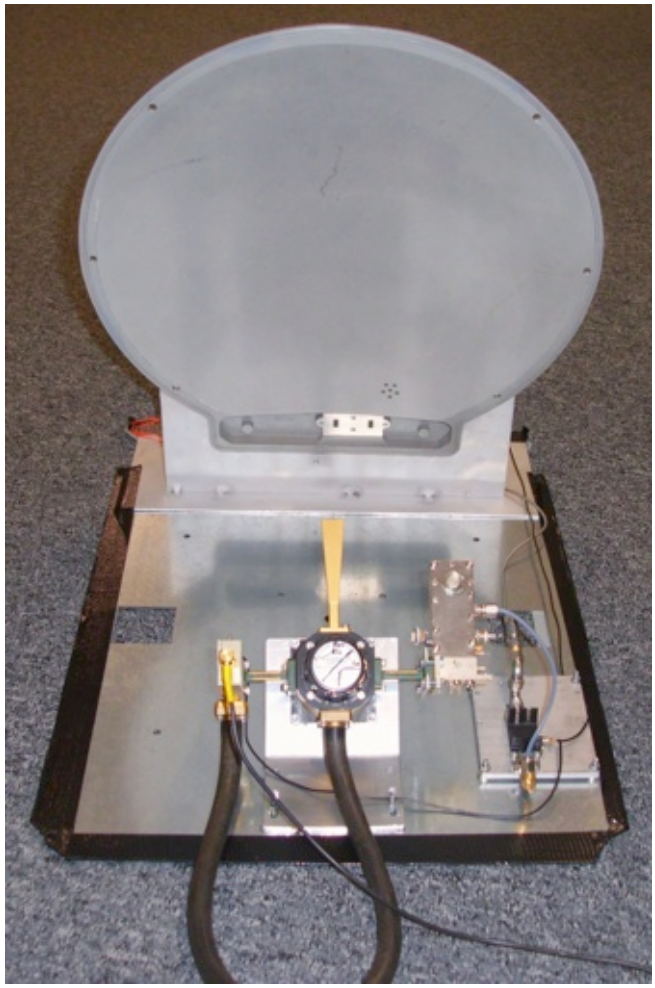
A simple 47GHz transverter

By Roger Ray G8CUB



In this Issue

Many thanks to all our contributors this month, without whom there would be no Scatterpoint!

STOP PRESS!

That well-known EMEer, **John Regnault G4SWX**, has been appointed as the RSGB's new VHF Manager.

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Editor's corner

From January **John G4BAO** is taking on the *RadCom* **GHz** column from **Sam G4DDK** and is handing on the **Activity column** baton to **Bob Price G8DTF.**

Bob was licensed in 1970 as G8DTF, with first operations on 2m, then 70cm in 1973 followed by 10GHz WBFM in 1978. Other microwave bands followed in the early 80s with 23cm, 13cm, 9cm and 3cm narrowband.

Professionally Bob worked in the Telecoms industry from 1974 until 2010 and worked on the development of Data Communications, Packet Switching, Voice Mail, Computer Telephony Integration, Intelligent Networks and Prepaid Cellular.

Family and work pressures eased after 2001 and Bob retuned to Amateur Radio and his interest in microwaves. Bob is currently active on the 23cm, 13cm, 9cm and 3cm bands and is a committee member at Bolton Wireless Club.

Welcome, Bob! **73 de Martin G8BHC**

Articles for Scatterpoint

News, views and articles for this newsletter are always welcome.

Please send them to

editor@microwavers.org

The CLOSING date is the FIRST day of the month

if you want your material to be published in the next issue.

Please submit your articles in any of the following formats:–

Text: txt, rtf, rtfd, doc, docx, odt, Pages

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

I can extract text and pictures from pdf files but tables can be a bit of a problem so please send these as separate files in one of the above formats.

Thank you for you co-operation.

Martin G8BHC

UK MICROWAVE GROUP SUBSCRIPTION INFORMATION

The following subscription rates now apply.

UK £6.00 US $12.00 Europe €10.00

This basic sum is for **UKuG membership.** For this you receive Scatterpoint for **FREE** by electronic means (now internet only) via the Yahoo group.

Please make sure that you pay the stated amounts when you renew your subs next time. If the amount is not correct your subs will be allocated on a pro-rata basis and you could miss out on a newsletter or two!

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Colour codes

Editorial & Events

Activity & Contests

Technical

Nanowaves (optical)

Commentary

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Scottish Round Table

By John Worsnop G4BAO

This was my first visit to the Scottish Round Table at Burntisland in the Kingdom of Fife. It most certainly will not be my last. The RT was held in the Museum of Communications, full of fascinating artefacts for those of you who are in to the historical side of technology.

As well as the main exhibition, the back room was full of racks of Bakelite radios, war surplus, and old radio and audio equipment. I am ashamed to admit that one of the units in the back room was an example of the Pye L700 Broadband SHF link, the first project I worked on back in the late 1970s and my introduction to RF design!

The round table had plenty of good "junk" of its own, with a well-supported flea market as well as good selection of talks ranging from the Bolton Wireless Club's guide to success in the UKACs, surplus PA modification and a new range of 10GHz building blocks from Chris GW4DGU.

The test equipment bench provided by Agilent

Kevin G3AAF with his usual well-equipped stand

10GHz record-breaker Alan GM0USI showing us how it's done

While not even close in size to MUD, there was an excellent turnout from GM, GI, GW and G, with Stuart, G8CYW claiming the longest trip having just landed from his recent holiday in EA8!

The evening meal in the small and friendly Burntisland Sands hotel was excellent with the added surprise bonus of after – dinner musical entertainment from the "Microwave Quartet" consisting of Ian, GM3SEK on melodeon, Nadine MM0WNW on Autoharp, Chris GW4DGU on fiddle and David G4ASR on harmonica. Chat then continued way in to the evening, with, plenty of tech talk; interspersed with Nick G4KUX regaling is with his stories of "When I was in Afghanistan." Excellent stuff and well worth a visit.

John G4BAO

Chris GW4DGU explaining details of his new 10GHz system components to Martin GM8IEM

On a beautiful crisp autumn morning about 120 actual or budding radio astronomers gathered at the National Space Centre. The day was filled with a fascinating range of topics, speakers and demonstrations.

Dr David Morgan spoke about detecting the signals from Virgo A and the Crab nebula on 406.6MHz using interferometry and went on to discuss the use of interferometry in professional telescopes such as the Square Kilometer Array (SKA) and LOFAR for observations in the 10–250MHz range.

Dr Chris North (he of *The Sky At Night*) spoke about detecting radiation from interstellar gas and dust in the far infrared in relation to a number of instruments:–

The Planck satellite operates 30–900GHz

Herschel has 3 instruments:–

- SPIRE 0.5 – 1 THz
- PACS 2–5 THz
- HIFI 0.5–2 THz

The instruments are described here

James Clerk Maxwell Telescope (JCMT) has

- SCUBA 2 0.3–0.6 THz

Some investigations include:–

- detecting anomalous microwave radiation from spinning PHC (polyhydrocarbon) dust.
- Star Fomalhaut, suspected of having 2 planets (see here), contained within a ring of dust surrounding the star.

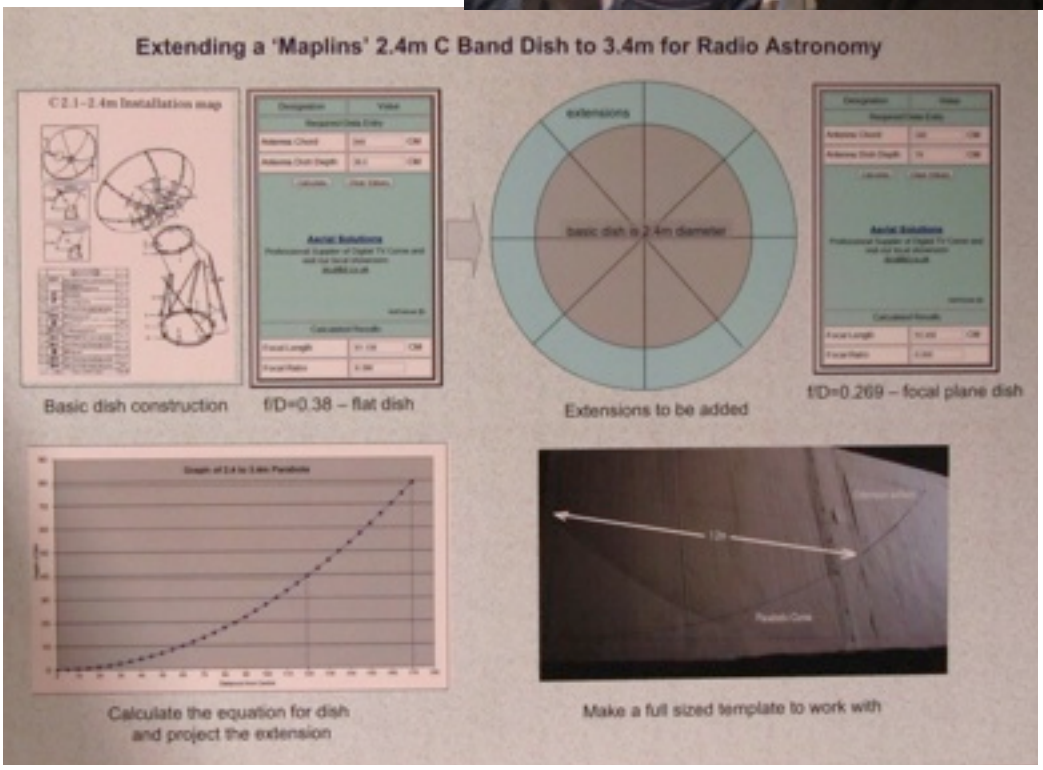
John Cook presented results of solar observations of disturbances to the ionosphere and magnetosphere during the past year.

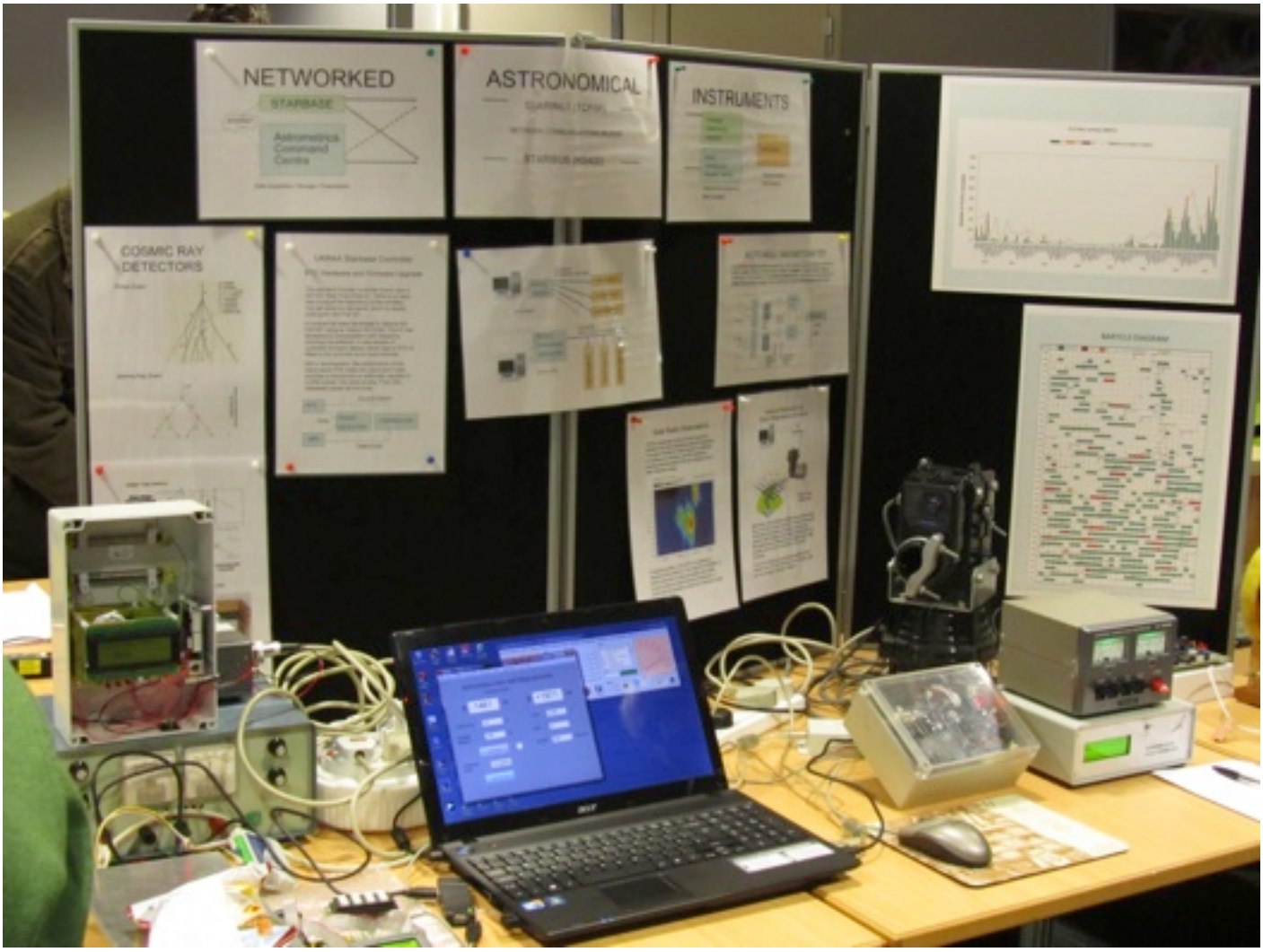
Exhibits

There was considerable interest in the exhibition area.

Mark Byrne

showed a 2.4m FortecStar dish with his own design mounting and drive, with suggestions for enlarging the dish to 3.4m. The dish seems no longer in Maplins online catalogue but is still available elsewhere.





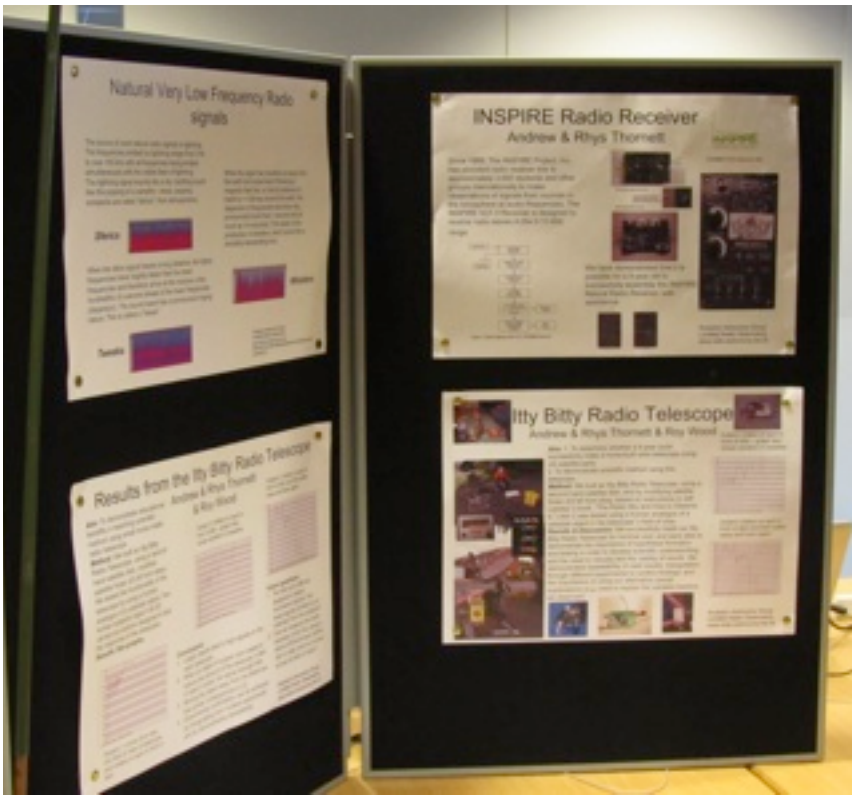
David Farn: Nulling magnetometer / dish pointing / Cosmic ray detector

UKRAA:UKRAA range of products such as their VLF receiver, magnetometer and Starbase java-based software (developed by a team under the direction of Dr Laurence Newell).

Andy Thornett:

Some education-inspired projects:–

- Super SID/Radio Jove
- The INSPIRE radio receiver (0–10kHz)
- The Itty Bitty RadioTelescope for solar observation at 10GHz



Norman Pomfret: Jam Jar Magnetometer (bottom left of picture).

John Cook: Magnetometer alignment

Paul Hyde:
Meteor Scatter / Solar spectrometer / e-CALLISTO

Brian Coleman: 21 cm Feed and logger system

Tony Abbey: Budget Dongles

Jeff Lashley: Microcontrollers and Spectracyber

David Morgan: VLF/Natural Radio

Back to the talks…

Noah Hardwicke, a student from Monmouth School, involved in the Monmouth Science Initiative Project, presented results of solar flare detections and explained how the new Solar Terrestrial Environment Physics project will allow students to make observations of the Sun and Moon at ~10GHz.

Matt Earnshaw M3MNH gave an overview of the advantages and limitations of Spectrum Lab, Radio Skypipe, RMOB Colorgramme. None of these had the desired features of lossless data recording, metadata, openness and crowd-sourced development. Matt was soliciting support for SW people to work with him on a new data recording system. Clearly there is some synergy with Starbase.

Peter Blair G3LTF discussed the optimisation of G/T_{sys} for improving the performance of parabolic reflector antennas through the use of feed designs to improve illumination and minimise spill-over.

Prof Andrew Lyne gave a fascinating talk on the use of pulsars as cosmic clocks in the study of gravitational theories. Earth-based clocks vary by ±1.6ms due to the Earth's orbital eccentricity. In contrast double pulsar J0737-3039A has a periodicity of 44.5Hz and a stability of 1 second in $3x10^7$ years. The binary pulsars PSR1913+16 (discovered by Russel Hulse and Joseph Taylor K1JT in 1973 for which they were awarded the Nobel Prize in 1993) have an 8hr orbit, decreasing by 1cm/day and whose position can be measured within 30m.

Brian Coleman G4NNS described how to measure the structure of our galaxy by observing Hydrogen emissions at 1420MHz using a 3.7m dish antenna. Details here.

Tony Abbey compared the FUNcube Dongle software defined radio (SDR) with other usb-based TV receivers.

Jeff Lashley discussed data processing and control, referring to his article in RadCom Jan 2007. He stressed the importance of iteratively defining the process and data structure, data visualization, analysis and adapting the process. He recommended the €30 Olimex DuinoMite-Mega – a Maximite BASIC computer with Arduino-like LAYOUT. DuinoMite allow you to program in BASIC language and have VGA and Keyboard interface, so you can develop and write your code in Basic without need of any computer. You can store your code on the SD-CARD and to execute it on power up through autoexec.bas main code.

Finally, **Paul Hyde G4CSD** discussed observing forward scatter signals from meteors using either traditional short wave receivers or the FUNcube Dongle SDR. Transmitter sources include the BRAMS (Belgian RAdio Meteor Stations) beacon on 49.97MHz (Britastro document here)and the French Graves radar on 143.050MHz.

An excellent day, rounded off with a delicious Indian meal at the Feast India restaurant.

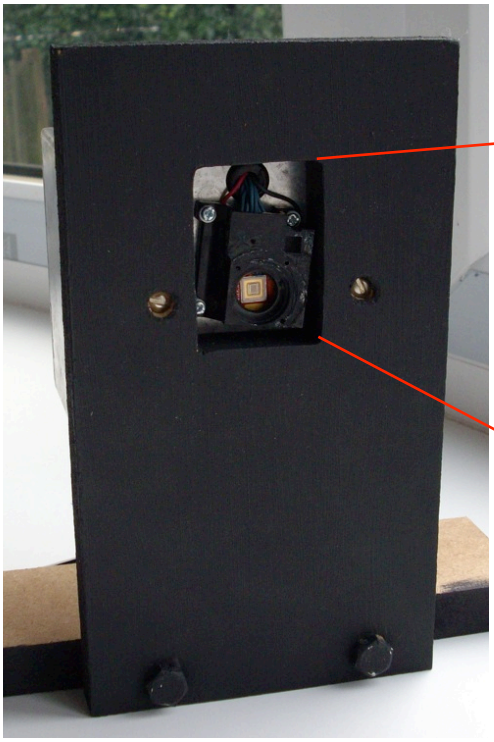
Congratulations to the organisers!

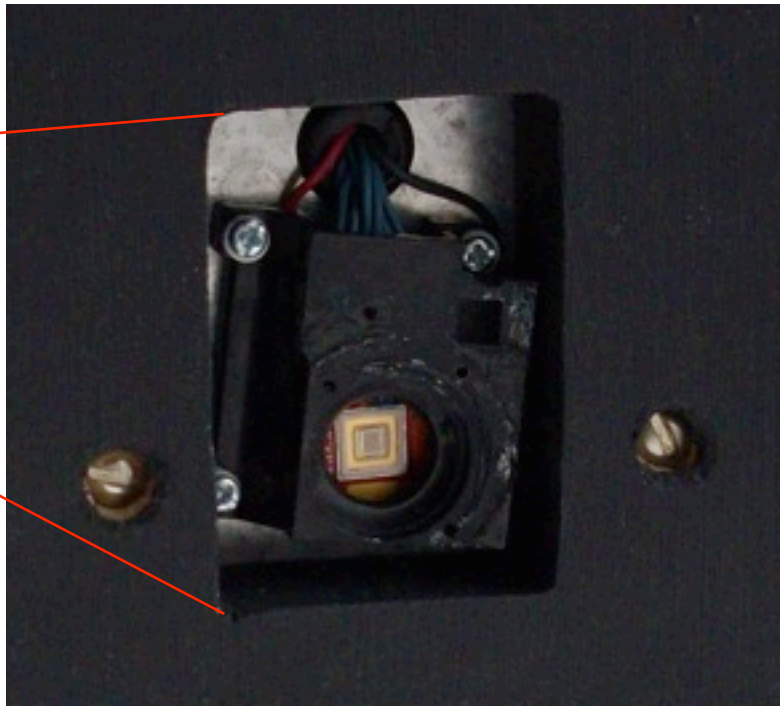
Martin Richmond-Hardy G8BHC

Nanowaves

A simple Phlatlight LED driver for optical communications

By Stuart Wisher G8CYW

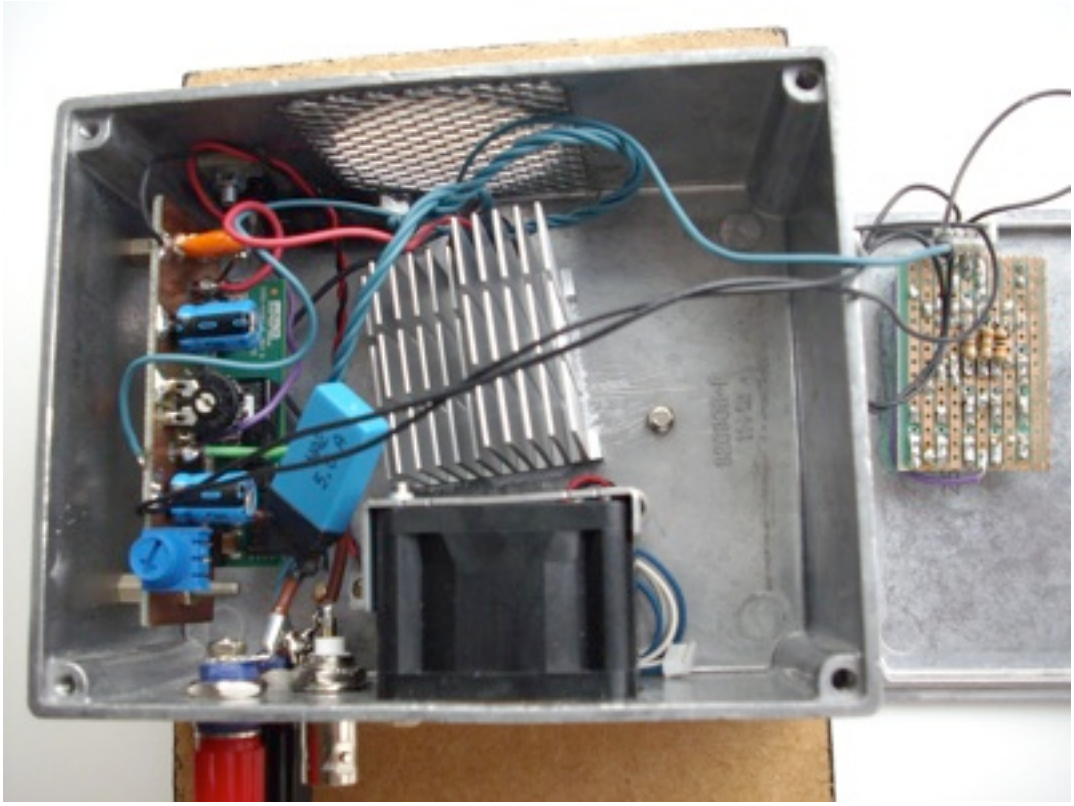




A number of Nanowavers have recently obtained a very powerful LED, heatsink, Peltier effect cooler and even also a suitable fan from sellers on e-bay. The LED, a Phlatlight (photonic lattice) CBT-54 can run at up to 9.1A continuous and 13.5A at 50% duty cycle according to its data sheet. Startling for an LED! Even more interesting was the news from Clint Turner, KA7OEI, in the US who has been using these for some time that the LED will actually survive at over 20A for a few seconds! This article details how I have implemented a simple design to run my CBT-54 for all its worth. Some of this that follows is rather idiosyncratic and other bits are simply "because I can", but I have ended up with a design that simply connects straight to my transverter with no modification to the transverter itself required (thanks for this Russ, G4PBP), and will run the LED at up to 20A peak current. Whilst designed for sub-carrier operation, the design is equally suited to baseband AM with an easy adjustment of FET bias as this circuit will operate in class A for AM as well as class B for SSB.

Basically, the design uses a Murata dc-dc converter to efficiently obtain a low voltage for the LED from the more usual 12V vehicle supply or gel battery. The advantage here is that 5A at 12V from the battery is converted into 12A at 5V for the LED, and the Murata chip is rated at 16A maximum output with no heatsink required due to its greater than 90% efficiency. A low ESR capacitor is used to comfortably obtain peak output currents for SSB use in excess of this current level.

The next element of the design uses a suitably rated MOSFET to drive the LED in a source-follower circuit. One feels a little strange using a series resistor of just 0.05 Ohms to limit the LED current, but it is all a matter of proportion and working at the level of current involved. This is a simple circuit that uses the properties of the MOSFET to bias the LED to provide whatever standing current is decided upon by the user and a modulating signal is capacitively coupled to the gate which then appears superimposed on the source. The proof of the pudding it is often said is in the eating. In this case a spectrum analysis is rather more useful, and the distortion products, even in class B, second and third harmonics are well below significance at minus 30dB or (much) better. Since this test was done by



analysing emitted light from the LED, the linearity of the LED output with current is also in the loop, and indicates the suitability of the whole system for communication, not that the band is occupied very much by other users! The MOSFET is bolted and thermally well connected to the diecast box, the low value resistor is Araldited in to a corner of the box giving it plenty of thermal contact. Lead lengths are intentionally short in this area so as not to lose too much voltage at high currents. The bias arrangement makes use of a 78L08 regulator to make sure the MOSFET bias is stabilised against variations in battery voltage, the 5V output of the Murata device is insufficient here. The net result is that this system will keep going at a stable level until the nominal 12V supply is well exhausted at below 11V. It is interesting to see the current demand going up as the battery voltage reduces, as the Murata device compensates for the drop in input voltage

It could well be argued that the overall thermal aspect of my design is rather “belt and braces” with the Peltier effect cooler, heatsink and fan, but there is a point to this. The LED seems to be characterised for light output at 40 degrees Celsius and the light output increases slightly as the temperature is reduced, this effect is particularly noticeable for red leds rather than blue or green. The implication is that up to another 20% light output is obtained by running at 20 degrees rather than 40 degrees. The Peltier device is run from the 5V supply and consumes 1.5A at this level. This translates to about an extra half amp from the 12V battery, and since my favourite mode of operating is from the back of a vehicle with its 100Ah battery, of no consequence. There are no markings on the Peltier device and it has proved hard to obtain any information on it, but it is likely that it was run at this level in the equipment the LEDs were intended for. This could be missed out if you wish but as I said, part of this project is “because I can”! The result of my efforts in cooling is that when tested in a room at

just over 20 degrees, the LED temperature as indicated by its integrated thermistor, is minus 6 degrees when the LED runs at the 1A quiescent level I run for class B SSB, and when "talked up", the temperature hardly goes over 10 degrees.

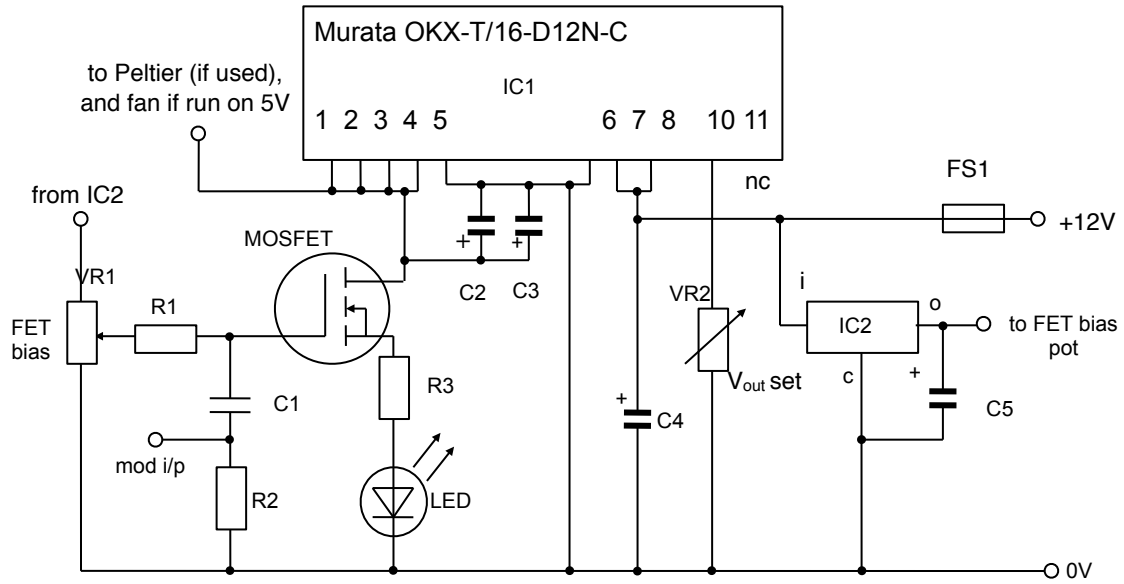
I am aware that this design runs somewhat "on the edge", but to date, my spare Phlatlight remains unused. A 5A resettable circuit breaker limits the total input power to the whole driver to 60-odd watts averaged by another low ESR capacitor on the 12V side of the circuit. And anyway, what is the point of using such a high power device without utilising it to the max? It might equally be said that I am using the Phlatlight "phlat out!"

The third element in my design is also rather idiosyncratic, rather grandly termed a "thermo chromic indicator", the integrated thermistor on the Phlatlight mentioned earlier is coupled to a quad op-amp circuit that illuminates one of 5 small leds that convey information about the large LED chip temperature by effectively changing the colour of a little dot visible in the dark when out in the countryside at the top of a hill. It seems somehow natural that we associate blue with cold and red with hot, and so a line of 3mm leds is used with blue, green, yellow, orange and red used to indicate below 10 deg, between 10 and 20, between 20 and 30, between 30 and 40, and finally above 40 degrees respectively. The final state of the indicator can also be easily used to switch the Phlatlight off if required via an interlock wire link that needs simply connecting up. I demonstrated this in my recent talk at the RSGB Convention and it seemed to generate as much interest as my attempts not to blind the audience with copious quantities of red light. This circuit on its own may be of interest to anyone wanting an easy way to interpret temperature for any high power device. The interlink would also work by simply grounding any gate/base bias at the final temperature threshold and thereby prolonging the working lifetime of the device.

In starting the design of the indicator, I first of all noticed a simple mathematical relationship between the Phlatlight thermistor resistance and temperature (available on the UKNanowaves Yahoo Group), at the previously mentioned threshold levels, and designed a sort of cascade window comparator that amused me. The circuit is about the nearest electronics ever gets to poetry it has been observed. No setting up is necessary providing the resistor values specified are adhered to and you don't go searching in the junk box for "something that will do" as one of my pals did! It is pleasing on switch-on to hear the fan start up (although rated for 12V, it is run on the 5V supply consuming a negligible 100mA), see the yellow led light initially, rapidly switching to green, and finally after a few more seconds, the blue led comes on, cool!

It will be seen that I have chosen to mount the LED in its original black plastic holder that forms a sort of clamp to hold the LED and cooler tightly together on the outside of a die cast box. Inside the box after removing the little Eddystone lighthouse logo (just my luck, it was exactly where I wanted to locate the heatsink), the heatsink is located inside the box with the fan blowing through the fins, (see photo). Very small amounts of heatsink paste were used just to fill in the valleys in the metal-to-metal contact. The logic of this arrangement is, I know, questionable, but it works, and the spare air from the fan circulates in the box cooling all the other high dissipation components before being vented to outside. It reminds me of the old days with 2C39As in blown cavities (thank heavens for brick amplifiers and LDMOSFETs!).

Optically (or should I refer to the dish feed?) I have removed the two lenses the LED came with as they rather under-illuminate the main reflector (make that refractor, the parallels between microwaves and nanowaves have never been more obvious to me). Here was a piece of luck, the dimensions of the black plastic mount supplied with the LED, after trimming off some projections and filing flat, is close enough to the best distance for mounting the meniscus lens used for optimally illuminating the A4 page magnifier Fresnel lens (sorry, 46 dB gain antenna!). The 28mm focal length 29mm diameter PMN lens from Surplus Shed is glued flat on to the black plastic. Do not use super glue as I did at first, it fell off after the Convention talk, get the Araldite out again. The resultant circular patch of red light produced by the meniscus lens just touches the short sides of the Fresnel lens leaving the corners dark. (Thanks Clint and Barry, G8AGN). It should be added that using no lens at all here over-illuminates the Fresnel and results in some 10dB less focussed output. Another important issue is the size of the resultant LED image at distance, in this case the correct secondary lens keeps this (and the beamwidth) to a minimum of just less than a degree which is what we Nanowavers are used to!



Voltage converter, MOSFET driver, and LED circuit

Component list

R1	10kΩ
R2	1kΩ, only required if connecting to my transverter design (it completes the output circuit in the transverter)
R3	0.05Ω 5W (in addition, the original LED leads add to this)
VR1	100kΩ pot, (MOSFET bias, set to 0V initially)
VR2	10kΩ pot, set output volts
C1	0.1µF modulation coupling capacitor
C2	2.2 µF tantalum (decoupling for IC1, its switching frequency is around 300kHz)
C3	100 µF low ESR (increase this to 1000 µF for baseband use)
C4	100 µF low ESR (increase this to 1000 µF for baseband use)
C5	2.2 µF tantalum (decoupling for IC2)
MOSFET:	I used a HUF 75337P3, but an IRF540 or similar would be ok, just bear in mind I_D max and R_{DS}(on).
IC1	Murata OKX-T/16-D12N-C
IC2	78L08
FS1	5A resettable fuse
LED	CBT54

Construction notes:

Make very solid connections to the voltage converter pins, bearing in mind the current levels increase considerably at its output. The sense input pin 3 is wired directly to the output pins as I used only 1cm of thick wire to the MOSFET drain.

Make sure the MOSFET bias pot is set to 0V before you connect up to the power supply. The original LED leads are used as part of the LED series resistance, do not shorten them (there are three wires in parallel for each LED connection, cut off the wires directly at the plug, strip and twist together before connecting to the resistor and use a common earth point for the LED cathode and all other 0V connections. Wire the MOSFET source directly to the resistor using short direct wiring (I managed a 1cm distance here, cut off the thinner part of the MOSFET leads and connect close to the MOSFET body).

Setting up

Make sure that MOSFET pot is at the 0V end of the track, you have been warned! (again!).

Connect a nominal 12V-13.8V power supply unit via a 10A meter and switch on.

Adjust VR2 until you measure 5V on ICI output (you could be cautious and use 4.5V to start with….).

Check the 78L08 output voltage; it should give its 8V output even when the supply drops to 11V.

Slowly advance the MOSFET bias pot (use one of the nice new enclosed ones with a smooth action) to the point where the LED just lights.

Take a breather here, and just touch the MOSFET gate capacitor with a screwdriver in contact with your hand (the “hum test” for a newly constructed audio amplifier), you should see the LED spring into life and brighten up just on the induced mains hum.

If you have the same Peltier cooler and fan on the 5V side as I have, increase the bias pot for sub-carrier SSB until you get an input current of 1A total, this will result in about 1A or so standing current through the LED. Or for other arrangements, monitor the voltage across the LED series resistor to achieve the same current through the LED.

Operating from the transverter will see the current peak up on speech peaks on SSB. Be aware that you get more drive the lower the sub-carrier frequency. Test on 20 kHz or so, go lower in frequency to increase power, after all, you have the whole band to yourself! At 13 kHz LSB I see 5A into the whole unit (this is averaged by the low ESR capacitors, now go and work out the current that must be coming out of the converter chip and then guess at the peak current through the LED!).

For baseband operations, having fitted the larger capacitors, decide for yourself where you want the "half current" level for class A operation, to be, try 5A if you dare! A volt or so of audio from an op-amp will drive the LED to 10A peak; so I would at least fit a pot on the drive to control it, and probably use a compressor/limiter as well.

If you have a variable supply, you should note that the input current to the whole system goes up as the input voltage goes down, showing the Murata chip is doing its job. This is quite useful when out portable, as the LED output is virtually constant over a battery voltage range from 13.8V down to 11V.

The Murata converter is so efficient that it does not need to be connected to a heatsink, there is no provision for doing so, and it is simply cooled by the circulating air in the box as mentioned earlier. The MOSFET and series resistor are thermally well coupled to the box. Very special cooling arrangements are made for the LED as stated before.

LED temperature indicator

This is driven from the thermistor on the Phlatlight LED substrate. There are eight wires from the substrate, three each for the LED anode and cathode and two for the thermistor that is isolated from the LED.

The thermistor has a resistance close to 6kΩ at 40 degrees Celsius, 8kΩ at 30 degrees Celsius, 12kΩ at 20 degrees Celsius, and 18kΩ at 10 degrees Celsius, it is placed in a voltage divider circuit with a 12kΩ resistor connected between the thermistor and earth which gives a voltage across the fixed resistor of 0.67 (two-thirds), 0.6, 0.5 and 0.4 of the supply voltage at the temperatures given above.

An investigation into values of resistance for a reference voltage chain revealed that a series combination of 33kΩ, 6.8kΩ, 10kΩ, 10kΩ, and 39kΩ would give the required threshold voltages to within a small margin of error for the comparators. By running both divider chains from the same supply neatly gives independence from the actual power supply voltage as the whole thing works in proportion. If you want to be fussy, the 33kΩ should be 33.333kΩ, the 6.8kΩ should be 6.666kΩ and the 39kΩ should be 40kΩ.

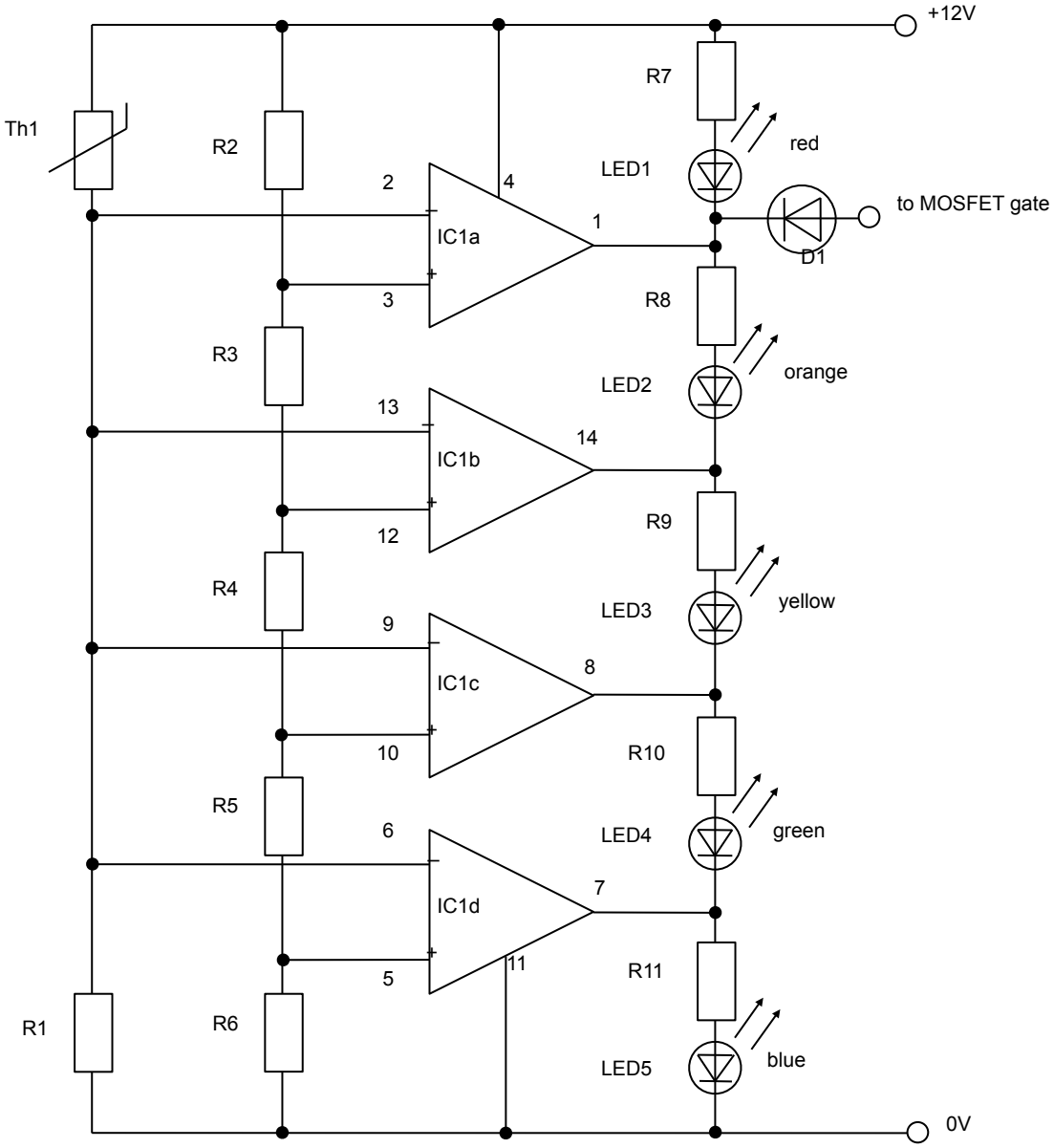
Finally, the comparators (4 of them in a single LM324N IC) are connected so their outputs go low at the set temperatures which mean that if the +40 degree Celsius limit is reached, the action of the relevant comparator going low can be used to steal the bias on the MOSFET and switch off the LED until things cool down.

I spaced the five small 3mm leds at 0.2 inch centres to match the holes drilled in the back of the box, using a piece of stripboard as a template to get the holes spaced correctly and in a straight line. Stripboard was also used also for the construction of the circuit, unconventionally (surprise surprise!) using both sides of the board to obtain a very compact layout, about the same size as a large postage stamp. The symmetrical pin-out of the LM324N was a help here.

Component list

Th1	on-LED thermistor
R1	12kΩ
R2	33kΩ
R3	6.8kΩ
R4	10kΩ
R5	10kΩ
R6	39kΩ
R7 – 11	all 1kΩ, LED series resistors
IC1	LM324N, pin numbers on circuit diagram
LED1	3mm red
LED2	3mm orange
LED3	3mm yellow
LED4	3mm green
LED5	3mm blue
D1	1N4148 or 1N4001 type

Stuart Wisher G8CYW



LED temperature indicator

First picture from FITSAT-1 on 5840.0 MHz

Trevor M5AKA

When the FITSAT-1 CubeSat was deployed from the International Space Station on October 4 it took a picture using the on-board camera. On Friday, October 19 UT, the team successfully downloaded the picture using the high-speed 115.2 kbps data transmitter on 5840.0 MHz.

See http://www.uk.amsat.org/?p=11151

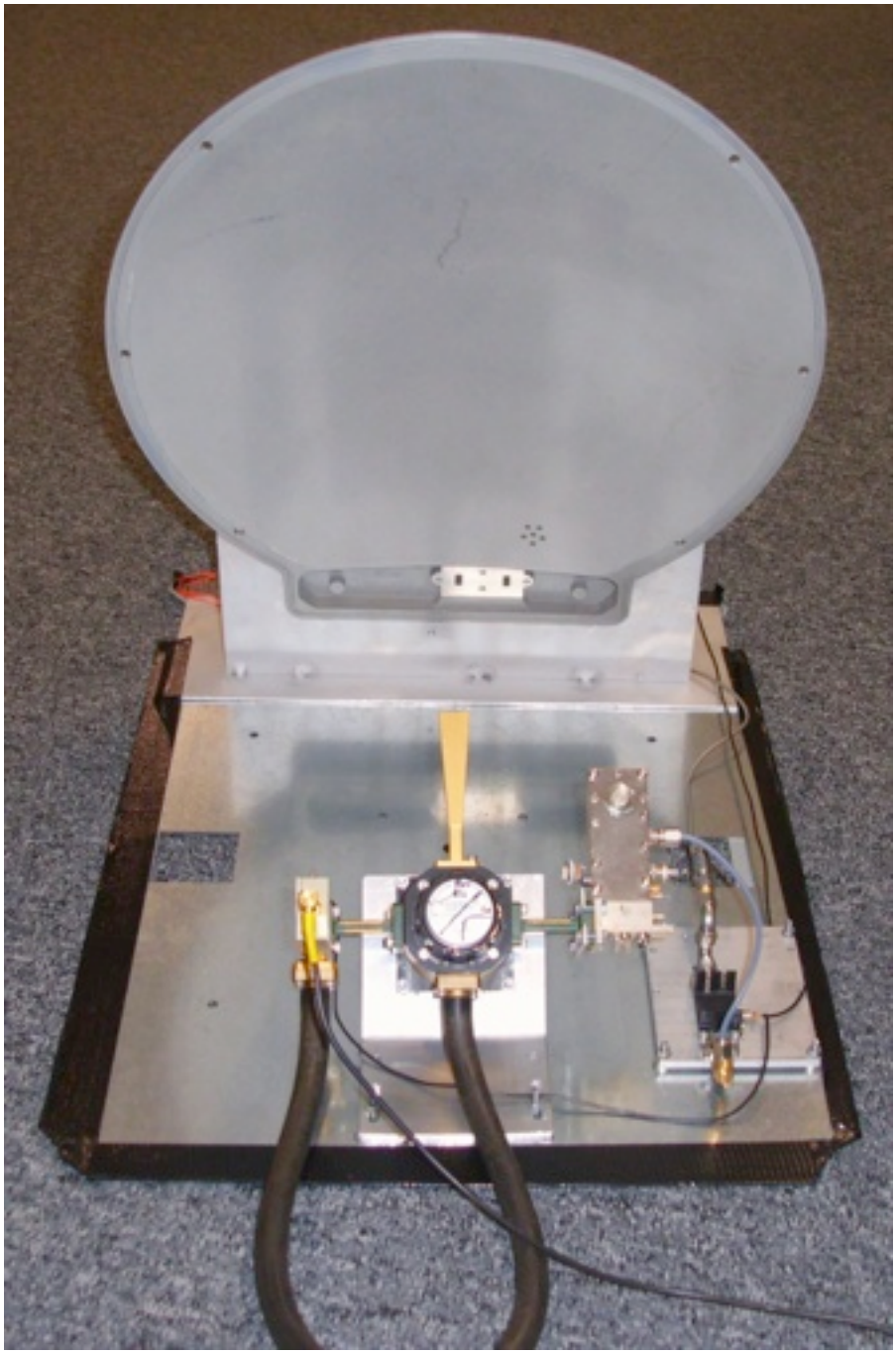
AMSAT-UK http://www.amsat-uk.org/

FITSAT-1 5840.0 MHz downlink received with FUNcube Dongle http://www.uk.amsat.org/?p=11100

73 Trevor M5AKA

Simple 47GHz Transverter

By Roger Ray G8CUB



The idea of putting together a quick transverter for 47GHz came to me after 2012 RAL. Having come away with an offset dish (thanks Peter), and a WR-28 four port waveguide switch. It was decided to try and put something together in 4 hours, and have it ready for the '76th' August tests. Of course it took 6 – 7 hours to build, but was finished in time!

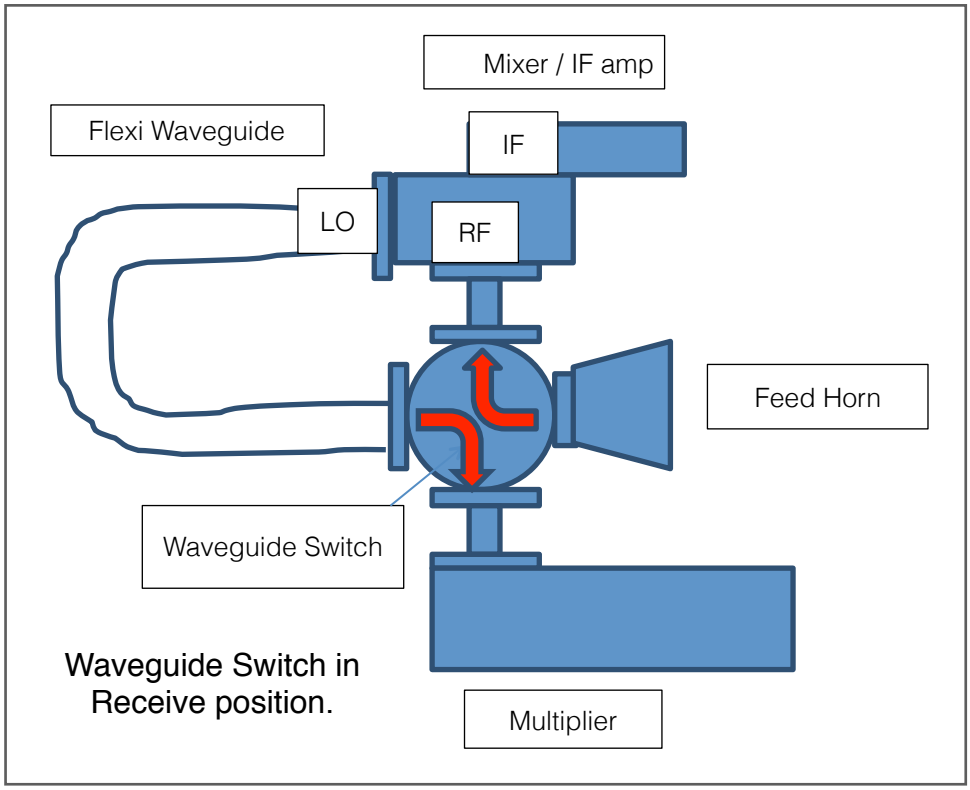
The other component that I needed had come from EBay - A Honeywell WR-28 mixer, with IF amplifier attached. I had previously removed the IF amp, and was using it as a X2 multiplier 38 / 76GHz. It worked pretty well in that role giving 1.2mW out for 80mW drive. Hopefully it would work well in its original role as a mixer, but at 47GHz.

From my original Pasolink transverter, I was retaining just the X4 multiplier. This was to be driven at 11.7 GHz from an Elcom synthesiser via an amplifier to achieve sufficient drive. The same synthesiser to be used as LO for the mixer, and TX output.

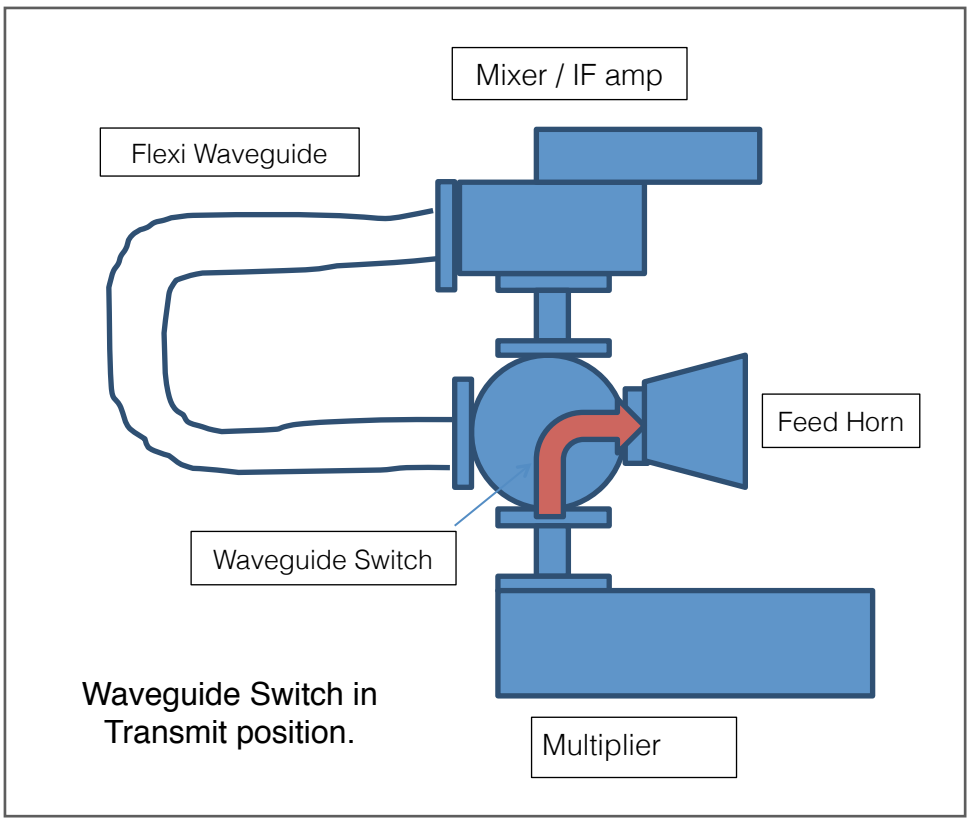
The constraints of the 3.33MHz steps with the Elcom, meant using an odd IF of 434.66 – 436.66 MHz, as I wanted to keep the LO on the low side of the RF. Although that was not a problem using the FT817 as IF receiver. The biggest problem was getting a TX signal between 47,088 and 47,089MHz. The nearest synthesiser output was several MHz away. My solution was to use an offset synthesiser reference of 9.999 MHz for TX, while keeping 10MHz for RX. The synthesiser was programmed for 11.663333 for receive, and 11.773333 for transmit. The transmit frequency is then (11.773333 x 4) x 9.999/10 = 47.088624 GHz.

An old crystal oscillator with a heater was to hand, being part of a paging transmitter. The Ovenaire heater was for 85 deg.C I had a Quartz Lab crystal for 9.9921MHz 70 deg.C, but it was of the right order, and near enough in frequency to be pulled.

The oscillator had a varicap which might allow FM, if the FM would pass the pass through the synthesiser OK. A quick previous trial with a TCXO was unsuccessful, as the frequency shift was limited, and it refused to FM, probably due to internal decoupling.



Waveguide Switch in Receive position.



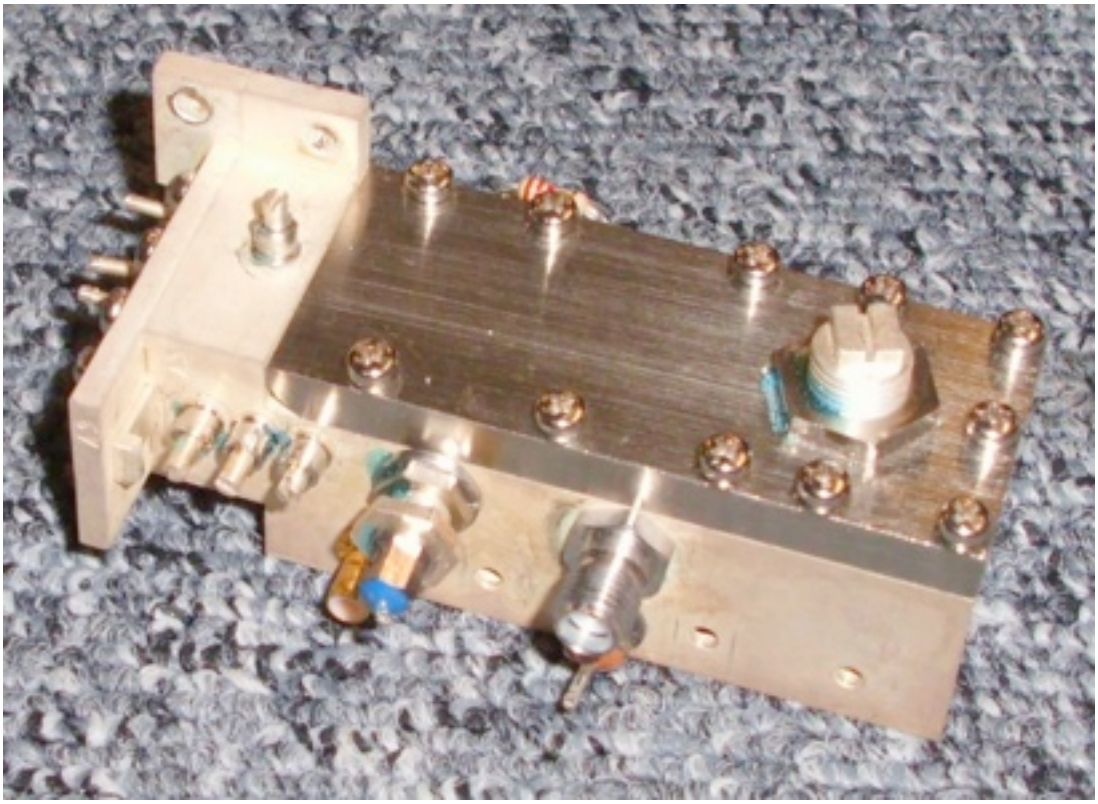
Waveguide Switch in Transmit position.

The first stage of the build process was to program the PIC for the two frequencies, and modify the Elcom for external reference. The synthesiser that I had, came with reference in / out connections on the side, ideal I thought. However I could find no way of making it change to external reference input. I concluded that it must be a software command. In the end I just used one of the connections to give a wired reference input connection. Any attempt to keep the internal 10MHz reference running produced a signal like a Christmas tree, when external ref. was used. So in the end I reluctantly used an external 10MHz reference and the 9.999MHz offset ref. switched with a pcb coax relay. To drive the Pasolink multiplier I needed 100mW or so. To get this level I attenuated down the Elcom output and used an Avantek amplifier that would give the power.

Dave G4FRE has an article on his web page about modifying the Pasolink

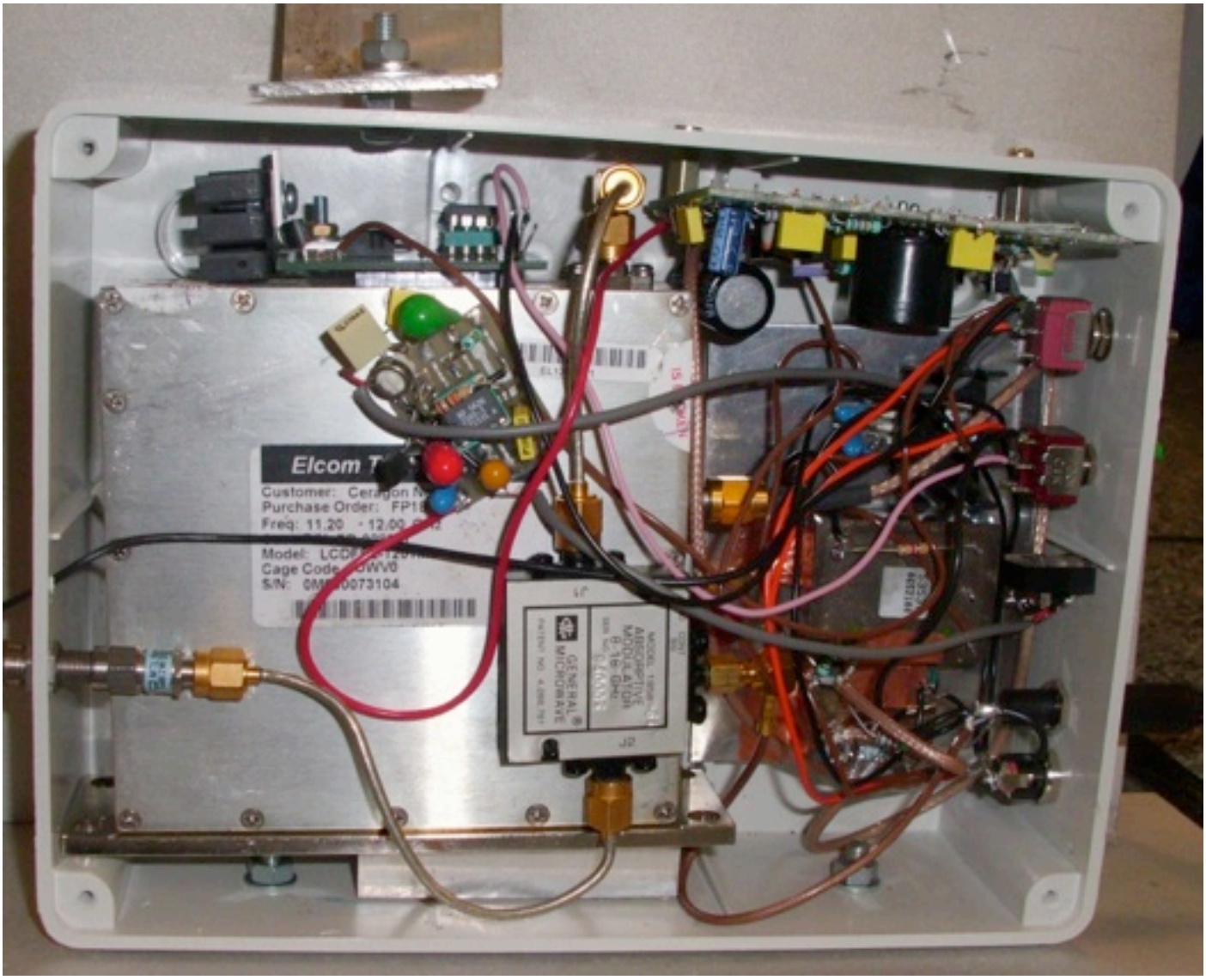
http://www.g4fre.com/pasolink2.pdf

In this case I was just using the x4 multiplier, so alignment was straightforward compared to the multitude of small tuning screws on the whole system! To connect to the output I butted up a WR-28 waveguide flange, and made up a couple of metal strips to hold it in place. Modification is, remove the SMA monitor connector, and remove the spacer below it and screw it back in. Once this is soldered, and the original resonator removed, the SMA becomes the 11GHz input.



Pasolink multiplier from 50GHz unit.

Tuning is by the 4 large screws, and the 3 small ones. However most significant is the slider, under the over-hanging top. This can easily be missed. The screw above it locks it in place. The bias pot is set for maximum output, I measured 5.6V across the resistor.



I have always struggled to get the claimed output from these multipliers. In this case by upping the drive to +22dBm, I achieved an output of +6dBm (4mW). There is a good rejection of the 23 & 35GHz harmonics, but it may be best not to look too closely at the 58GHz component.

To allow for CW keying, I used an inline 'modulator' which switches the synth. output. FM was very last minute. I wanted some audio amplification and limiting. The only thing I found was a compressor chip, that I had never got around to using. This was stuck on the synth. and bias provided for an electret microphone.

The synthesiser and references were crammed into a plastic box – not pretty but it works. The dish, in-line amplifier and waveguide switch were mounted on a base plate as can be seen in the pictures.

The feed horn was hack sawed through to give the right spacing to the dish. It is likely this under illuminates the dish, but time was running out.

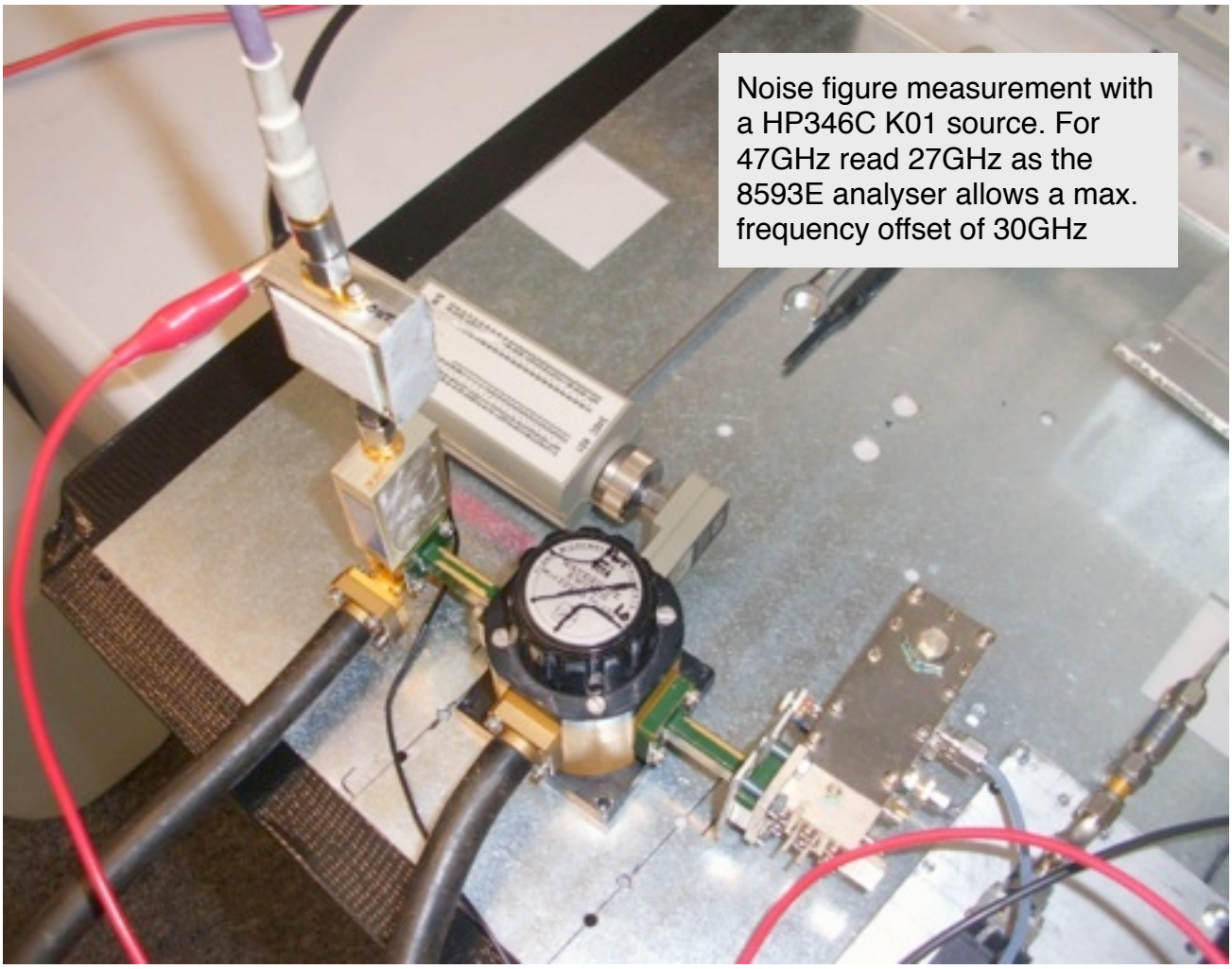
I had previously only had one QSO on the band, with Harold G3UYM/P using a Pasolink system, at the great distance of 100 metres.

The first contact with the transverter was at Bignor Hill, both Peter G3PYB and Ian G8KQW were 59+ at 53km on the Isle of White, with similar reports in the other direction using FM. It was great to know all was working. Dish alignment was not that critical, which probably meant that the feed position was not optimised. Also Ian's comment on the CW when in beacon mode, suggested frequency pulling when in CW mode. Not surprising in that the oscillator had a basic zener 10V regulator, and the keying was causing a significant shift in amplifier current.

58 / 59 FM reports at Ditchling Beacon @ 83km showed the transverter to be working well.

Later noise figure measurement, showed that the WR-28 flexi-waveguide was poor or damaged. When replaced a noise figure of 8.8dB was measured at the input to the waveguide switch, showing the mixer to be working pretty well at 47GHz.

Roger Ray G8CUB



Noise figure measurement with a HP346C K01 source. For 47GHz read 27GHz as the 8593E analyser allows a max. frequency offset of 30GHz

Microwave Field Day 2012 Results

Despite some good publicity in G3ZVW's regular column in RadCom, support for the second Microwave Field Day contest was disappointing. Several entrants commented on the sparse activity.

Conditions did not seem too bad, with 1.3GHz entrants running 10W or less able to work over the whole of the UK, and some very good contacts made on 10GHz with the help of some rain scatter.

1.3GHz

For the second year GM3SEK/P, operated by GM3SEK and GM4CXM from near Whithorn, was the winner by a considerable margin, but this time in the Restricted section. Runner up was the NE Surrey Contest Group G0SAC/P, operating from Ashdown Forest, with G4WGE, G4WYJ and G0OLX at the helm.

Surprisingly there were no entries for the Open section this time.

G7LRQ submitted an entry but this was treated as a checklog as this event is for portable entrants only.

10GHz

Activity was evident from GM and GI in the North to Cornwall in the West and East Sussex in the South East. Distances over 500km were worked by the leading stations in both sections. F1NPX/P and F6DKW provided some continental DX for those near the South coast.

In the Open section congratulations go to Alan Dimmick GM0USI/P with a substantial lead over Bob Price G8DTF/P the runner-up.

The Restricted Section was won by the North East Surrey Contest Group G3WIM/P, operated by G4WYJ and G0OLX. They operated from Ashdown Forest. Runner up was Bolton Wireless Club, operated by Ross Wilkinson as G6GVI/P from Winter Hill.

Overall

The overall winner of the Restricted section was the North East Surrey Contest Group G0SAC/P & G3WIM/P who were runners up on 1.3GHz and winners on 10GHz. Overall runner up was GM3SEK/P, the 1.3GHz winner.

The absence of Open section entries on 1.3GHz means that the overall placings mirror the 10GHz table, with GM0USI/P as leader and G8DTF/P as runner up.

Congratulations to the winners and runners-up, who will all receive certificates.

73 John G3XDY,
UKuG Contest Manager

24/47/76GHz Trophy 2012

For the first time in several years there was activity above 24GHz in this event, with welcome entries from G8CUB/P and G4EAT on 76GHz, who managed a best contact of 52km on this band, with Roger G8CUB/P activating a total of three sites during the contest.

24GHz saw a welcome increase in the number of entrants over last year, with activity from a group of stations in Shropshire, Peak district and South Wales, and G4EAT and C8CUB/P in the South East. The winner was Peter Day G3PHO/P, operating from two sites in the southern Peak district. Second place is shared by G3ZME/P and G8UGL/P who were co-sited in the Shropshire hills, again activating two sites during the contest.

The 24GHz Trophy goes to G3PHO/P and the 76GHz award jointly to G8CUB/P and G4EAT, with certificates for the runners-up.

John Quarmby G3XDY
UKuG Contest Manager

August 2012 Microwave Field Day Results

Restricted Section

Overall

Pos	Callsign	1.3GHz	10GHz	Total
1	G3WIM/P & G0SAC/P	424	1000	1424
2	GM3SEK/P	1000	0	1000
3	G0BWC/P & G6GVI/P	214	31	245
4	G8CQA/P	117	0	117

1.3GHz

Pos	Callsign	Locator	QSOs	Best DX	Points
1	GM3SEK/P	IO74TQ	15	G0SAC/P 504km	4238
2	G0SAC/P	JO01BB	12	GM3SEK/P 504km	1795
3	G0BWC/P	IO83RO	8	G3VKV 193km	908
4	G8CQA/P	IO81XV	6	G0BWC/P 193km	495

10GHz

Pos	Callsign	Locator	QSOs	Best DX	Points
1	G3WIM/P	JO00BB	9	GM0USI/P 504km	1589
2	G6GVI/P	IO83RO	2	MW1FGQ 62km	49

Open Section

Overall

Pos	Callsign	1.3GHz	10GHz	Total
1	GM0USI/P	0	1000	1000
2	G8DTF/P	0	158	158
3	G8CUB/P		156	
4	G8CQA/P	0	1	1

10GHz

Pos	Callsign	Locator	QSOs	Best DX	Points
1	GM0USI/P	IO74TQ	12	G3WIM/P 504km	3536
2	G8DTF/P	IO83SM	4	G3VKV 183km	558
3	G8CUB/P	IO92XA	5	GM0USI/P 413km	550
4	G8CQA/P	IO81XV	1	G3VKV 1km	1

Checklogs

1.3GHz G7LRQ

24/47/76GHz Trophy Results 2012

24GHz

Pos	Callsign	Locator	Total QSOs	Best DX	km	Overall Score
1	G3PHO/P	IO93AD/IO93FB	4	G3ZME/P	87	336
2=	G3ZME/P	IO82QL/IO82QR	3	G3PHO/P	87	255
2=	G8UGL/P	IO82QL/IO82QR	3	G3PHO/P	87	255
4	GW3TKH/P	IO81LS	2	G3ZME/P	84	168
5=	G8CUB/P	JO01DH/JO01LE	2	G4EAT	65	117
5=	G4EAT	JO01HR	2	G8CUB/P	65	117

47GHz *No entries*

76GHz

Pos	Callsign	Locator	Total QSOs	Best DX	km	Overall Score
1=	G8CUB/P	JO01DH/JO01GP	2	G4EAT	52	63
1=	G4EAT	JO01HR	2	G8CUB/P	52	63

Cumulative Contest Results 2012

5.7GHz Cumulatives 2012 (p24)

Entry numbers were similar to last year, but activity and conditions seemed down. GP3ZME/P went to Guernsey again in June and made a few DX contacts, but August was their best session from Brown Clee Hill. G4LDR made one of the few contacts outside the UK with F5LWX/P in IN87KM for the best DX in the whole contest.

Congratulations to Telford & DARS G(P)3ZME/P, who again win the G3KEU Trophy.

Runner up was Roger Ray G8CUB/P who will receive a certificate. Jim Gale G4WYJ/P receives a certificate as the leading low power entrant and leading station using radio talkback only.

The leading fixed station was Ian Lamb G8KQW with a narrow margin of victory over Neil Underwood G4LDR, both were only on for the last session.

10 GHz Cumulatives 2012 (p25)

Entry levels stayed at around the same level overall as 2011 but some well-known callsigns in the Restricted section were missing, and the balance between the sections has shifted, with more fixed stations taking part in the Open section. As last year there appear to have been one or two stations that submitted logs for just a few of the sessions they were active in, despite having respectable numbers of contacts in other sessions.

There were fewer logging errors this year but still there were missing and added /P suffixes, and anagrams of well-known callsigns. The online log entry system appeared to work well this year with timely submission of logs after each session.

This year the July event had good rainscatter conditions, and some RS was also evident in August. By contrast the June event was windy and damp, and not particularly well supported. The best DX reported was the contact between G8CUB/P and GM0USI/P near Glasgow, at 524km. G3ZME/P reported a near miss with F1NPX/P in JN29 at over 600km, but failed for lack of a CW operator at the French end. PA/ON7BV/P appeared in a few logs in the first session, and F6DKW was worked by several in the south across most sessions. At the other end of the country, in addition to GM0USI/P, GI6ATZ and GM4ISM also made an appearance.

This year the Restricted Section was won by Jim Gale, G4WYJ/P, operating from Ashdown Forest and Ditchling Beacon. Runner up was Keith Winnard GW3TKH/P who also made an appearance as GJ3TKH/P. G4WYJ/P will receive the G3JMB Memorial Trophy and a certificate as the leading station using radio talkback only. The leading fixed station in the Restricted section was Dave Dibley G4RGK, who also receives a certificate.

Last year's Open section winners Telford & DARS G3ZME/P were relegated to runners up this year by Roger Ray G8CUB/P, who takes the G3RPE Memorial Trophy. Roger achieved consistent results through the four sessions he took part in from sites at Sparsholt Firs and and Therfield, and took advantage of the rainscatter in the July session. The leading fixed station is Nick Peckett G4KUX who also made good use of the conditions in July and August.

George Tarver G8AIM receives a certificate as the only station in the Open section exclusively using radio talkback.

24GHz G0RRJ Cumulatives 2012 (p25)

Entries were down this year, with just 8 stations appearing in the logs. G8CUB/P and G4WYJ/P recorded the best DX in the contest at 124km.

The winner of the G0RRJ Memorial Trophy is Jim Gale G4WYJ/P with a narrow win over Roger Ray G8CUB/P. Jim also used radio talkback only. Both stations will receive certificates.

73

John G3XDY

UKUG Contest Adjudicator

Activity News

By John Worsnop G4BAO

Please send your activity news to:

scatterpoint@microwavers.org

Moving on

This will be my last Activity Column in Scatterpoint, as I've been invited to take over the RadCom ***GHz Bands*** column from Sam, G4DDK as from the January edition. I felt I could not turn such an opportunity down and that it would not be sensible for me to do both. In future this column will be written by **Bob G8DTF**; a very active microwaver who, I am sure will do a fine job and put his own perspective on the month's activity. I've enjoyed the short time I've written Scatterpoint Activity and will continue to contribute articles to our fine e-magazine.

As I write this I have just repaired my 10GHz system so am QRV on that band again. I still have a problem with 24GHz that I need to investigate. Currently I can receive OK, but only transmit NBFM! 24GHz from home is HARD! Down with the mast again!

Microwave Update 2012

First this month a brief report from the 27th Annual Microwave Update Conference (MUD) held in Santa Clara, California in October 2012 sent in to us by Tony KC6QHP of Reactance Labs. This is the premier venue for Amateur Microwave Radio in the USA.

The Keynote talk "Wireless and Geeks" was given by Professor Thomas Lee of Stanford University, author of "The Design of CMOS Radio-Frequency Integrated Circuits". Dr. Lee gave a great talk on the history of radio communications and the impact of innovations made along the way by amateur radio operators. There was the usual full programme of talks, including a description of simple 78–135 GHz equipment by Alan VK3XPD. Rex KK6MK and Lars AA6IW described a board they have put together for enabling 10 and 24 GHz dual band radios, and Tom WA1MBA gave an entertaining talk on the culmin-ation of a five year

Continued p26

Thomas Lee giving his talk on radio history and the influence of radio Amateurs.

Cumulative Contest Results 2012 5.7GHz

5.7GHz Cumulative Results 2012

Pos	Callsign	Overall Score	Total QSOs	Scores					Best DX	km	Category Winner
				Session #1	Session #2	Session #3	Session #4	Session #5			
1	G(P)3ZME/P	3841	26	1030	1040	0	1771	396	G4EAT	343	Portable & Unlimited TB
2	G8CUB/P	1667	14	565	0	465	637	0	G4ALY	227	
3	G4WYJ/P	1411	13	630	349	432	0	341	GP3ZME/P	267	Low Power & Radio TB
4	G8KQW	880	7	0	0	0	0	880	G4ALY	250	Fixed Station
5	G4LDR	862	6	0	0	0	0	862	F5LWX/P	414	
5	G4WGE/P	349	2	0	349	0	0	0	GP3ZME/P	267	
6	G8AIM	185	3	0	0	0	185	0	G8CUB/P	108	
7	G3VKV	154	2	0	0	0	77	77	G3ZME/P	77	
8	G0JMI/P	108	2	108	0	0	0	0	G4WYJ/P	67	
9	GW3TKH/P	84	1	0	0	0	84	0	G3ZME/P	84	

10GHz Cumulative Results 2012

Open Section

Pos	Callsign	Overall Score	Total QSOs	Scores					Best DX	km	Category Winner
				Session #1	Session #2	Session #3	Session #4	Session #5			
1	G8CUB/P	6831	60	2395	0	2917	1494	1519	GM0USI/P	524	Portable & Unlimited TB
2	G(P)3ZME/P	5585	39	2654	366	0	2140	791	PA/ON7BV/P	430	
3	G4KUX	5199	23	948	0	2240	2011	0	G4EAT	365	Fixed Station
4	G4LDR	4493	29	0	0	0	2342	2151	F5LWX/P	414	
5	G8DTF	3207	22	0	0	802	1168	1237	G8KQW	292	
6	G8CQA/P	3108	25	0	0	0	1646	1462	G4KUX	311	
7	G8KMH/P	2317	19	1124	1193	0	0	0	M0DTS/P	376	
8	G3VKV	2221	20	0	0	1245	522	454	G4KUX	307	
9	G8KQW	1532	13	0	0	0	0	1532	G8DTF	292	
10	G8GTZ	575	2	575	0	0	0	0	PA/ON7BV/P	319	
11	G8AIM	442	5	0	0	0	442	0	G4LDR	135	Radio Talkback only

Restricted Section

Pos	Callsign	Overall Score	Total QSOs	Scores					Best DX	km	Category Winner
				Session #1	Session #2	Session #3	Session #4	Session #5			
1	G4WYJ/P	5209	41	1647	676	2030	0	1532	G4ALY	312	Portable & Radio TB
2	GW(J)3TKH/P	3825	22	1998	0	1577	250	0	F6DKW	321	
3	GW4HQX/P	1666	12	1666	0	0	0	0	G4ZXO/P	225	
4	G4RGK	539	4	0	0	539	0	0	G3UKV	177	Fixed Station
5	G4WGE/P	485	6	0	485	0	0	0	G3FYX	193	
6	G0JMI/P	360	6	360	0	0	0	0	GW4HQX/P	159	

24GHz Cumulative Results 2012

Pos	Callsign	Overall Score	Total QSOs	Scores					Best DX	km	Category Winner
				Session #1	Session #2	Session #3	Session #4	Session #5			
1	G4WYJ/P	324	3	82	118	0	0	124	G8CUB/P	124	Portable & Radio TB
2	G8CUB/P	320	6	100	0	38	96	124	G4WYJ/P	124	Unlimited TB
3=	G3ZME/P	126	2	42	0	0	84	0	GW3TKH/P	84	
3=	GW3TKH/P	126	2	42	0	0	84	0	G3ZME/P	84	

project designing a 78 GHz LNA for mass (a few dozen) production for amateur use.

One highlight of MUD is always the sponsored hospitality suite, and the auction that helps fund the conference was again hosted in inimitable style by Kent Britain WA5VJB / G8EMY.

The test equipment, bench included the latest and greatest spectrum and network analyzers from Anritsu covering up to 125 GHz, and in the vendor room, a number of delegates set up shop to sell their stuff.

No Ham Radio conference would be complete without a swap meet, so at MUD there were two! Friday night was an indoor affair and on Sunday morning was outdoors in the California sunshine, with more great gear!

As usual MUD seems to have been the usual splendid affair; our US colleagues always welcome visitors with great hospitality so how about trying to get to next year's organised by Jeff Kruth WA3ZKR at Morehead State University in Kentucky?

Kent, WA5VJB/G8EMY auctioning off a chip cap kit.


Indoor swap meet at Microwave Update

Activity reports from our correspondents and the web

This month's activity reports come from opposite ends of the UK. It covers the IARU contest at the beginning and the UKAC towards the end of October.

Firstly, **Bob, G8DTF** (IO83), gives us the Northern English perspective.

"For the IARU contest at the beginning of October I was only able to be on Winter Hill (IO83RO) for a couple of hours. On 13cm I worked G1SWH (IO83), G0BWC/P (IO83), G3VKV (IO81), G8OHM/P (IO92), G8CUL (IO91) and G3CKR/P (IO93). On 3cm G3VKV (IO81), G8CQA/P (IO81) and for the very first time GI6ATZ (IO74).

For the SHF UKAC in October conditions seemed much better to the South than previous UKACs. On 13cm I worked six stations in IO83 and had a difficult QSO with Gordon G8PNN (IO95). My first attempt with Ray GM4CXM (IO75) started well, but QSB ended the attempt incomplete. A later second attempt was completed. Stations to the South seemed much stronger than usual including G3VKV (IO81), G4LDR (IO91), G8CUL (IO91), G4BRK (IO91), G4NBS (JO02), G8OHM (IO92), M0GHZ (IO81) and G8NVI (IO91). This month represents a record number of QSOs (16) on 13cm for me. It also appears that I may have missed a

couple of possible QSOs. On 3cm conditions seemed closer to normal with just 4 QSOs G3VKV (IO81), G4LDR (IO91), G3UKV (IO82) and G4CBW (IO83).

For a view from East Anglia, **John G3XDY** reports from JO02 on the Suffolk Coast.

"The October UHF Contest on the first weekend of the month gives a good opportunity to work some DX, and this year was no exception, although nowhere near as good as 2011.

On 1.3GHz contacts over 600km included DK6AS (JO52), DF4IAO (JN48), TM2W (JN37), DL0GTH (JO50), DH9NFM (JO50), DH1FM (JO60), DK2ZF/P (JO43) DF5GZ/P (JN47), DH2SAV (JN48), and HB9XC (JN37). On 2.3GHz the best contacts were DL3IAS (JN49), DL0GTH (JO50), DJ5AR (JN49), DK2ZF/P (JO43), and DF5GZ/P (JN47). 3.4GHz yielded just 7 QSOs of which the best were DK2MN (JO32) and DK1VC (JO31). Out of 11 QSOs on 5.7GHz, the notable ones were F8BRK (IN99), F5REF/P (JN19), F6DWG/P (JN19) and DF0MU (JO32). 10GHz gave 14 QSOs, the best were PI4TUE (JO21) PA0WMX (JO21), DF0HS/P (JO31), F8BRK (IN99), G4KUX (IO94), F6DWG/P (JN19) and DF0MU (JO32)."

John's participation in the NAC/UKAC on 1.3GHz in mid October was cut short by a VSWR problem that tripped the PA every time – it turned out that an N connector on the masthead preamp had slowly unscrewed itself over a period of months and had chosen that moment to end up dangling in mid air!

There was good tropo opening in the period from 22 to 24th October. Up to the 22nd the opening was East of the UK, but by the afternoon of the 22nd it had just about reached the East Coast. John had a scratchy QSO on 1.3GHz with OE5VRL/5 (JN78). The following morning OE5VRL/5 was up to 57 on 23cm and he was also able to work on 13 and 6cm, but 3cm failed. Then followed a 1.3GHz QSO with HB9ASB in JN36, down behind the Jura Mountains. At this stage the HB9EME beacon was S9+. This was followed by contacts with OK1YA (JN79) on 1.3 and 2.3GHz, but nothing was heard on 3.4GHz from him. The morning closed with a 10GHz tropo QSO with DK7QX in JO42 at over 500km. By late afternoon another test with OE5VRL/5 yielded 559 signals on 10GHz and 579 on 5.7GHz at over 1000km.

That evening was the NAC/UKAC contest on the bands from 2.3GHz upwards, John worked OZ1FF on 2.3GHz by aircraft reflection, then moved the dish round more to the South to work DB6NT (JO50) on 13, 9,6 and 3cm, with the 3cm contact tail ended by DL6NAA also in JO50. OK1MAC (JN79) was next in the log, also on four bands from 13 to 3cm, with 3cm better than 6cm. After a couple of PAs on 13cm, DL1HTT in JO61 was the next DX in the log. DF9IC (JN48) was the last continental DX worked, the best UK contacts made were G8PNN (IO95) on 13cm, G4CBW (IO83) on 9cm, M0GHZ (IO81) on 6cm, and G4CBW (IO83) on 3cm. The contacts with JN79 were all time new squares on 2.3, 3.4, 5.7 and 10GHz. By the 24th the opening had moved to the South West, the only QSO of note was F9OE (IN78) on 1.3GHz.

John GM8OTI recently became QRV on 10GHz and has been testing with UK 10GHz record holder, Alan GM0USI. His system is home brew, and quite novel, with a VCO - PLL synthesised LO source at 2.5GHz, multiplied up for a 432MHz IF. The receiver is part of a LNB, and the transmit side is a couple of NE32584 amplifiers hacked out of a Franco Rota surplus board. His antenna is a home brew horn feeding a 40cm offset dish.

His first 10GHz QSO was on 4 October from Cairnpapple Hill (south of Linlithgow), only 25km and line of sight to Alan's /P site in the Kilsyth hills. They exchanged 59/59. John comments that they had a long chat and was astonished that it all worked and he could work Alan on SSB with just a few mW. John got good reports of signal strength, audio, and stability, which validates his TCXO based LO design. (*How about a write up for Scatterpoint, John? Ed*)

This first test was followed up when Alan GM0USI went to an escarpment above Paisley, apparently known as "the car park in the sky!" The path from there to Cairnpapple is 54km and obstructed, but despite this and the fact that at Alan's end the bushes and trees visible on Google Earth had grown, they managed to exchange 59+ from Alan and up to 57 the other way. They later worked a longer path, 87km line of from the Kilsyth Hills to an escarpment above Gifford in East Lothian, and John heard Ed GM3SBC's beacon, near Kirkcaldy.

John checked what his system was putting out at the GM Microwave Round Table in Burntisland two days later. He had been optimistic - the output measured not a few mW, but 0.7mW! Pretty impressive with such low power! He now plans to build a little PA, with some better filtering, and looks forward to seeing what can be done next.

Cluster reports

A couple of other extended QSOs reported on 10GHz. in the 22nd/23rd of October opening as reported earlier by G3XDY, F5HRY (JN18EQ) worked OK2POI (JN99AJ) 529/519 at 1143km, while F6DWG (JN19AJ) worked OE5VRL (JN78DK) at 900km. The ODX reported was the 1180km QSO between OK1YA (JO70GC) and LX1DB (JO39CO) who report completing on all bands from 1.3 to 10GHz

73 and Good DXing on the microwave bands.
John G4BAO
www.g4bao.com Twitter @g4bao

Contests & Activity Dates 2012

Source: http://www.microwavers.org/?contesting.htm

November

ARRL EME 50-1296MHz	Arranged by ARRL	3–4 Nov		
1.3GHz Activity Contest	Arranged by VHFCC	20 Nov	2000 - 2230	RSGB Contest
Low band 1.3/2.3/3.4GHz 4	F, P,U,R,L	25 Nov	1000 - 1400	
2.3GHz+ Activity Contest	Arranged by VHFCC	27 Nov	2000 - 2230	

December

ARRL EME 50-1296MHz	Arranged by ARRL	1–2 Dec		
1.3GHz Activity Contest	Arranged by VHFCC	18 Dec	2000 - 2230	RSGB Contest
2.3GHz+ Activity Contest	Arranged by VHFCC	25 Dec	2000 - 2230	RSGB Contest

January 2013

TBA

73 John G3XDY, UKUG Contest Adjudicator

UKµG Contest Portal

Key:	F	Fixed / home station
	P	Portable
	L	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)
	R	Radio talkback
	U	Unlimited talkback

Don't forget that

Every Monday evening is Microwave Activity Evening

The latest EME calendar is available from DL7APV's website

Events calendar 2013

2013

Jan 19	Heelweg	www.pamicrowaves.nl/
Feb 16	Tagung Dorsten	www.ghz-tagung.de/
April 6	CJ-2013, Seigy	cj.ref-union.org/
April 27-28	Provisional date for Martlesham Microwave Round Table and UK*µ*G AGM	
May 17-19	Hamvention, Dayton	www.hamvention.org/
June 28-30	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
July	Amsat-UK Colloquium, Holiday Inn, Guildford, Surrey	www.uk.amsat.org/Colloquium/
Sep 13-15	58.UKW Tagung Weinheim	www.ukw-tagung.de/
Sept 27-28	National Hamfest	www.nationalhamfest.org.uk/
Oct 8-10	European Microwave Week, Nuremberg	www.eumweek.com/
Oct 11-13	RSGB Convention	www.rsgb.org/rsgbconvention/

2014

August	EME2014, Pleumeur-Bodou near Lannion