An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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

2006 March

HB9Q ... EME Contest Station par excellence! Shown operating this wonderful installation last year is Conrad Farlow, G0RUZ, a member of UKuG. He's the one in the checked shirt in the right hand photograph.

In this issue ...

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

- **Another New World 134GHz DX record**
- **Renewed Interest in 10GHz Wideband FM**
- **RAL registration open**
- **New GB3VHF Beacon points the way for others to follow**

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

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From the Editor's Desk

It's been a most interesting month ... perhaps not so far as activity is concerned (where **is** everyone these days?) but due to the "rising from the ashes" of a "phoenix" in the form of 10GHz wideband FM! Yes, that's right, good old wide-band is making somewhat of a comeback. Up and down the country people are emailing this desk with requests for information on Solfan modules, LNBs and Penny feeds!! The reason for this is simple... there is a real need for an easy and cheap express route into microwaves that does not entail above average tech-nical skills for the newcomer and, perhaps more importantly, does not need a large financial outlay for something that may not work at the first or second attempt.

Long term readers of this newsletter know my views about encouraging beginners by choosing this old fashioned route that many of us used as our appren-ticeship. Maybe some of you have forgotten that period. It's easy to condemn wbFM as "Stone Age" stuff but to newcomers it's often all they can cope with. Are you, the hi tech narrowbanders, going to scorn their efforts or are you going to help them? **The choice is yours!**

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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.

A warm welcome to the following new members of the UK Microwave Group ...

The following microwave enthusiasts have joined us since the 1st January this year..

Dale	**W0IR**
Ray	**GM4CXM**
Mervyn	**VK6BMT**
Nick	**G4IRX**
Richard	**G3CWI**
Kevin	**G3UNR**
Paul	**G8KFW**

We hope they will gain much pleasure from their membership

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

LETTERS TO THE EDITOR

From G8SHE … 23cm concerns

Now the Galileo test bed satellite is up, I would hope that the UKuG (the de facto voice of UK microwavers) should be able to get a clear statement from Ofcom about the future of 23cm. I know I am not alone in putting on hold my plans for running enough QRO to run EME and serious DX until I know how much of 23 cm we will have left, and what power restrictions will be put upon us.

A lot of the cheap test equipment that comes up on Ebay covers up to 18GHz, making these frequencies ideal for construction. There are no amateur bands between 10.5 GHz and 18 GHz, but lots of 'guard bands' and other sterile frequencies in this range. As amateurs mainly operate using very stable narrowband transmissions, might I suggest that UKuG should put forward a case for several primary allocations, however narrow, in this frequency range?

Propagation in the water absorption band and propagation at 10GHz are completely different. Concerning the bands in between, amateurs could offer a lot to the radio art in studying propagation from our unique viewpoint, i.e there are a lot of us and we are widely scattered, and we are not only interested in 100% known and predictable propagation methods.

Yours, **Richard Shears G8SHE**

Editor's Comment..

As this issue of Scatterpoint was going to press, the UKuG committee was just beginning dialogue with Ofcom regarding the possibility of acquiring some narrow segments of the spectrum for the very purposes Richard suggests above (and for other reasons). The area of spectrum does not coincide with those in Richard's letter but we are hopeful that something may come of our negotiations. For the moment we have to leave it at that but watch this space for further news! I've no doubt that the meeting at RAL will include an update on the situation.

ERRATA

From Sam, G4DDK we have the following important information:

There is a mistake in the 96MHz Direct Frequency Synthesis source circuit published in SCATTERPOINT last month …. **The MAR6 and MAV11 bias resistors** are shown as 39R. This was a hang-over from a previous iteration where the devices ran from the +5v supply. **The correct value should be 100R for an 8V supply as drawn**.

It is worth repeating that the MAR6 used in the DFS96 is the SiGe version. This was missed by at least one reader. You can use the Si version but the bias resistor needs to be increased in value. Using the 8V supply and assuming 15mA at 3.5V then the resistor should be 300R.

For anyone who would like a few MAR6 SiGe devices to play with, please contact me for a strip FOC.

73 Sam, G4DDK <jewell@btinternet.com>

From F9HX

I read with, great interest, the G4DDK article about a DFS in the last Scatterpoint issue. Readers may be also interested in the **F5CAU/ F9HX Direct Frequency Synthesis source**. An English version is available in VHF Communications 2/2003. Up to now, 40 synthesisers are already completed or in progress in several countries: EA, F, HB, ON.

A 20 units batch will be soon available from F9HX at the Seigy (CJ) meeting over the first weekend in April, or by post . For details contact André, **F9HX.**

E-mail: agit@wanadoo.fr.

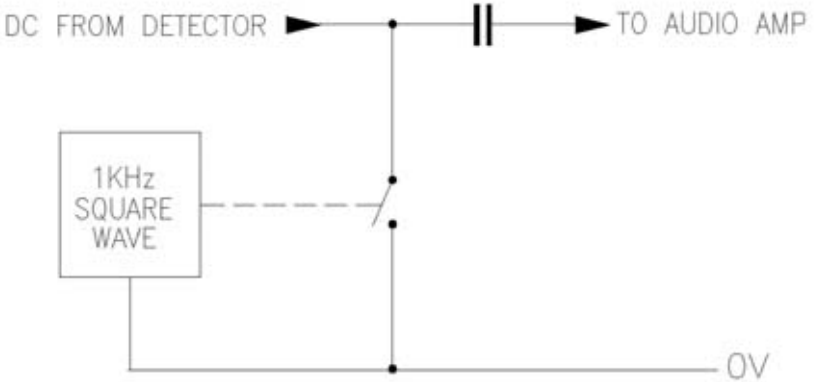
A Simple Amplified RF Detector

… by John Owen,MW1FGQ

This little circuit is intended to provide gain and an audible indication of signal level for any simple diode detector circuit. I think it works quite well - it can easily detect room reflections from a Solfan Gunn source using a waveguide detector with an indifferent diode held behind the emitter; even a Birkett CG91 point contact diode bent into a small dipole gives a useable indication as a near field probe. The audible output gives a useful qualitative indication in circumstances where seeing a meter is difficult or for simple TX checking etc, it may also be useful for demonstrations of reflections, standing waves and dish focus to large groups.

Being a newcomer to microwaves I started by playing with a variety of odd bits picked up at rallies – Gunn sources, waveguide detectors and wavemeters, I soon realised that some gain after the detector would be very useful, simple circuits for DC amplifiers have been published often but I thought this would be a good application for a chopper or instrumentation type DC to AC converter circuit which I haven't seen in the amateur microwave publications. Converting the DC output of the diode to an AC signal at an audio rate allows the use of a simple audio amplifier for further amplification and a loudspeaker allows simple adjustments or assessments (e.g. Tx monitor) to be made without reference to a meter. The amplified audio output can, of course, be metered using a simple rectifier voltmeter or, as on my bench, I use that old AC voltmeter (Levell TM3B) that no one else wanted at the club junk sale! There are a number of other alternatives such as 1KHz VSWR indicators/amplifiers normally used with amplitude modulated sources or Selective Level Meters and the like.

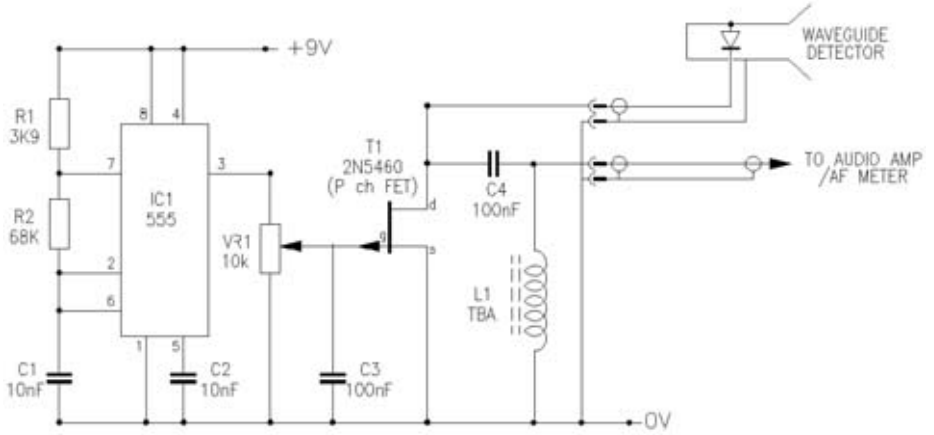
The basic principle is that of a simple shunt switch chopper and needs little explanation, the shunt switching element simply chopping the dc signal at 1KHz which is then AC coupled to the following audio stages.



I have kept the circuit deliberately simple, using only what was to hand. The 555 square wave generator directly controls the gate of the FET. VR1 allows adjustment for best compromise between sensitivity and switching pulse breakthrough with C3 slowing any fast edges. I've shown a general purpose P channel junction FET but a variety of devices such as small signal MOSFETs would work. An N channel JFET such as a 2N3819 needs a negative Vgs for pinch off so a discreet transistor multivibrator is shown as an option ... I tried AC coupling the square wave but results were poor. The overall system is prone to hum and noise because the AF amplifier is directly AC coupled to the probe cabling so some care should be taken in screening and layout, the

size of C4 and L1 simply limit the LF response and could be improved. The circuit is powered from a PP3 battery as it draws little current and this avoids any hum loops or cable pickup.

The final circuit does suffer from a small amount of switching signal breakthrough which, together with hum and noise, limit the minimum discernable signal, I know that proper design would improve the performance but this application doesn't really warrant the complication. I haven't detailed the audio amplifier - the microphone input of my small bench amplifier provides more than adequate gain, a tuned amplifier stage would improve the performance but also add complication.



I hope this little circuit is of interest. The principle is simple and similar to that used in many sensitive RF voltmeters such as my old valve Boonton which uses an electromechanical chopper (Synchroverter) arrangement. I don't think this idea has been shown in this application before but would appreciate any references.

73 from John, MW1FGQ

10GHz Dual Mode horn fittings

From what I can see of their web site, Plumb Center still stock the fittings needed for the G3PHO 10GHz feedhorn, although they seem a lot more expensive than when I built mine about 6 years back. Look at **www.plumbcenter.co.uk** and search for Yorkshire Reducer or Endex Reducer and ditto Coupling, you should find all sizes up to 54mm.

73 John G3XDY

Editor's comment: A quick look at the website mentioned produce the following reducers:
Yorkshire reducer 42mm-22mm cat no. 5125105 price £21.77 + VAT
or: cat no 524819 price £19.40+VAT. Do not use couplers with internal solder rings.

For the 42mm straight coupler it is also important to have a solderless version. The YP1 cat 512004 shown on the website has solder rings ... do not use!

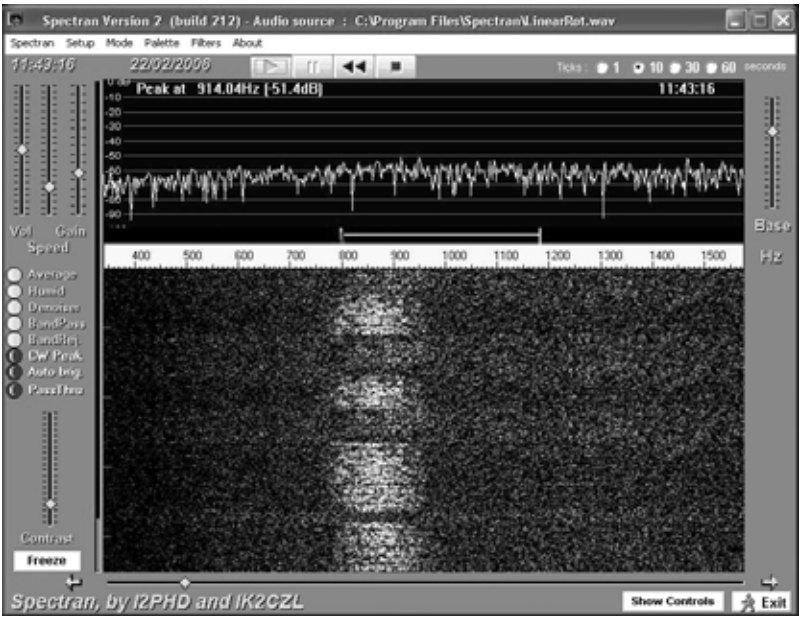
Polarisation Tests on 10GHz EME

... by Brian Coleman, G4NNS

At present, I use linear polarisation on 10GHz and follow the convention that European stations use vertical while US stations use horizontal to allow for the spatial offset. There is a trend for users of the higher microwave bands to follow those of the lower bands and adopt circular polarisation. I have been uncertain of the advantages of this because I suspected that the rough surface of the moon would scatter the polarisation to such an extent at these short wavelengths that circular polarisation might not offer the advantages we assume.

My system has the option to remotely control the polarisation from the shack. A motor rotates the feed and a potentiometer in a bridge circuit provides a display in the shack.

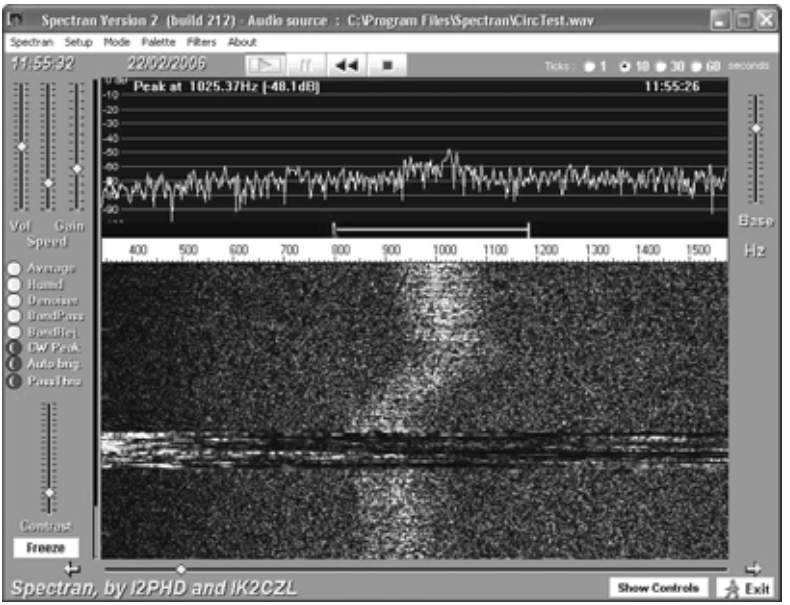
When I heard that Willi, LX1DB, would be doing some tests with linear and circular polarisation on 5th February I thought the opportunity to make some measurements was too good to miss. So with some help from Ronny SM7FWZ who was visiting, we calibrated the shack display so that we could rotate polarisation in 10 degrees steps from vertical to horizontal. Spectran was used to display and record Willi's signals.



The Spectran image above shows some of Willi's signals which have been edited to show the difference when the linear polarisation is cross polarised by 90 degrees. The Bright patches at the top of the lower portion of the screen are with correctly aligned linear polarisation and the darker patches show the signal when cross polarised. Although it was not possible to make precise measurements this test shows that cross polarisation can cost at least 15dB. So my assumption that the returning echoes would have randomised polarisation was quite wrong.

Willi then changed to circular polarisation and Ronny and I made recordings using linear polarisation rotated in 10 degree steps. The screen on the following page shows an edited part of the

recording (top of lower part of screen) with the first section (lower part) recorded with the linear polarisation offset by 90 degrees from the second (upper part). You can see that this second part was stronger than the first. I.e. the returning echo is elliptical not circular. Our estimate was that the ellipticity was of the order of 3dB.



There are a number of possible explanations for this ellipticity and I do not feel qualified to discuss them in depth but they include the possibility that the feed is generating elliptical polarisation or that the reflective properties of the moon are causing it.

These tests were useful because they have given us a clear idea for a protocol to be adopted in future tests. This includes the transmitting station sending a "Key Down" carrier for periods long enough to make quantitative measurements. The Random mark-space ratio of Morse code makes this difficult.

At the receiving end we were monitoring moon noise continuously and are confident that there was no significant fluctuation in signal levels due to tracking problems at either end.

You can find recordings of these tests at: **http://myweb.tiscali.co.uk/g4nns/Poltests1.html**

73 from Brian, G4NNS

Want some nice DSP software ? ....

Then check out **Winrad** by Alberto Di Bene I2PHD. It is a very nice waterfall SDR backend using a soundcard input. This is the first release but it is very nice indeed according to G0RUZ.

Download it from: **http://www.weaksignals.com** and please send any feedback to Alberto!

A Cheap and Easy Microscope Illuminator

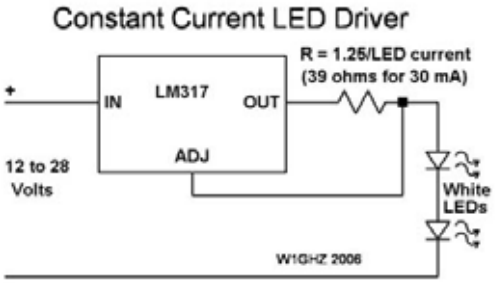
Paul Wade W1GHZ ©2006
w1ghz@arrl.net

Many of us are finding that microwave parts are getting harder to see – and it isn't just that the parts are getting smaller. All sorts of magnifiers are available, and the good ones do help, but a microscope is the real answer for aging eyes. Stereo microscopes made by B&L, American Optical, and others have been used in microelectronics for years, and they frequently show in surplus at reasonable prices.

The other requirement for working on small things is good lighting. Microscope illuminators are harder to find and many don't work very well. I found one with a burned-out bulb, and the replacement was special-order for $25. The best ones have a small circular fluorescent light that mounts around the bottom of the microscope and provides even illumination – but I've never seen one surplus, and they are not cheap.

Now that white LEDs are readily available and cheap enough to use in disposable flashlights, it occurred to me that a ring of them might provide good microscope illumination. I experimented with some and they seemed to do pretty well. The problem was mounting them to the microscope.

I considered cutting a big hole in some perforated board and making a ring of LEDs, but couldn't find a good way to mount it. Finally, I just stuck a bolt and some big washers through the illuminator mounting hole in the microscope stand and used it to attach a hunk of #12 wire. I bent the wire around both sides and crimped the two ends together. Then I used solder, tie-wraps and more wire to hold some LEDs in place. The heavy wire keeps them in place, but everything is flexible enough to bend the leads and get the light centred. I adjust them one at a time, blocking the others with cardboard. Four LEDs in a square seems to be bright and even enough for working comfortably under the scope, even if my hand blocks one. The photo above shows this sophisticated arrangement.



To try and get uniform output from the four LEDs, I drive them with a constant current. This takes the elaborate circuit shown on the left. Each regulator drives two LEDs – three is possible, but not four from 12 volts.

I'm sure you can improve on this illuminator, while keeping it cheap and easy. It should also work fine with other types of magnifiers or whatever you use to help aging eyes.

73 from Paul, W1GHZ

Simple ways into Microwaves ... a few ideas from readers

Making wire elements for 23cm yagis ... by John MW1FGQ

I wanted to make some simple aerial elements for 23cm and had some "meter tail" cable but the things never looked right because such short lengths are difficult to straighten. The method I use is to anchor a length of the copper into a vice and put the other end into the chuck of a slow speed drill then apply a little tension to the wire and start the drill slowly —- you'll see that the wire straightens well and work hardens because of the twisting leaving you with very useful and straight copper rod, you can vary the amount of twist to keep the wire workable or make it very hard although the outside can become very rough if you overdo it. You must be careful to use only a slow speed because there is a danger that the end anchored to the vice might neck and fracture, leaving you with a flailing piece of wire. I wouldn't recommend trying it with very thick wire or tube such as brake pipe because they will fracture and flail very quickly and the drill inevitably speeds up when the load is reduced.

I prepare 2 or 3 metres at a time but longer lengths should be possible.

The Poundshop Radio

Conversion for use as a microwave wideband FM I.F
... by John, MW1FGQ

MINIATURE FM AUTO-SCAN RADIO.
PUSH BUTTON TO AUTO-MATICALLY FIND THE NEXT STATION.
Uses 2 AAA BATTERIES

e-mail: sales@poundshop.co.uk and visit:

http://www.poundshop.co.uk/

This very cheap radio uses a TDA7088T (a more modern version of the TD7000 (which is the RX chip used in the Beginner's 10GHz wideband transceiver on G3PHO's website). The conversion is very easy and just involves removing components and adding the oscillator LC circuit as required - otherwise it's identical to the G3PHO circuit except that the pin-out is different and you don't need to make a PCB or find the components! **Hans Summers** has a useful page on it with a drawing of the original radio circuit and datasheet links etc:

http://www.hanssummers.com/radio/poundshop/index.htm

The Polaplexer Revisited !

As it's already possible to hack LNBs to turn them into WBFM transmitters with outputs of anything up to 250mW, it occurs to me that it might be possible to hack a dual-polarity LNB to turn it into a 10GHz polaplexer transceiver (in a nutshell, keeping one polarity as Rx and reversing the amps on the other for Tx). It might be an easy and very cheap way onto 10GHz for beginners (and others).

Has anyone looked at this possibility before? I guess there are likely to be issues with cross-coupling and too much Tx power being fed into the Rx, etc. I don't want to reinvent the wheel - but are there any comments from anyone? (None about WB vs. NB please - been there!)

73 from Kevin, G1HDQ

A Hybrid 10GHz Portable WB system?

Having an "10GHz LNB" whose LO is QRT, I decided to inject a tuneable Gunn source into the LNB mixer instead. Initial tests seems to indicate that this arrangement performs well as a 10GHz receiver. It might get around the objection of simple wideband systems having a poor Noise Figure. No doubt too, by some judicious switching, the Gunn oscillator could also be used as the source in transmit mode.

While searching the web I also came across this site on converting LNBs to 10GHz operation which might be of interest:-

http://www.bvdavies.org.uk/dvd_03lnb.htm

73 de Chris, G8BKE

More ideas for the newcomer to microwaves are on the following page ...

10GHz portable WB "Traffic Light" Rx in 10mins

With all this WB interes, I was moved to experiment. I never ever had a WB QSO so it might happen yet.

This was a 10minute experiment. I took a Marconi Blue Cap LNB of Astra vintage, drilled out the four rivets and removed the back of the case. Then I cut the printed inductor between ground and the F connector output. I then cut the inductor leading to the 7805 regulator. These are exposed so there's no need to remove the diecast muckite screening cover over the rf parts of the PCB. These inductors are cut to enable lower frequency signals to leave the LNB rather than just in the 1-2 GHz range.

Then I soldered +ve and -ve supply leads to the 7805 regulator

Either connect the F connector out to your scanner/wide tuning range Rx or attach a coax to do the same thing if you don't run to an F connector.

Apply around +14VDC to the LNB. Switch on the Rx tuned to say 70cm. Take a few square inches of metal and wave in front of the LNB horn for noise changes showing your up and running.

The LNB has a 10GHz LO so I set up an FM carrier on 10368 from my narrow band gear and presto I get it at 371 MHz on the Rx. So one might tweak the DRO so that the Rx readout is 368Mc/s for 10368 or, given the expertise, retune the DRO if it will pull far enough for a 70cms IF. Both these suggestions are outside the scope of the 10 minute experiment of course.

Additionally, remember the LNB will switch between polarisations around 15v.

The technically minded will know the internal filter will no doubt be attenuating the out of satellite band signals a little. Adding a 1mm tab to these tracks might be worthwhile but without some test equipment you might be worse off. Now who is going to be the first to Rx Traffic Lights in 100 different Post Code locations?

It will also work as an approximate, low cost prescale, connected to a counter.

73 from John, G8ACE

Tin plate boxes

are available from:
Piper Communications,
4 Severn Road, Didcot, Oxfordshire, OX11 OPW
01235 834328

They stock a range of sizes including 7754 priced at £2.38. Postage & Packing is £1.50

Gordon, G0EWN

Looking for a source for ready-made, divide by 10, prescalers for use at 10GHz?

You might want to take a look at **http://www.dg0ve.de/messtechnik001.htm** - they sell 12GHz divide by 10 versions for €88

Paul M0EYT

People interested in optical comms

might find **www.irpoyser.co.uk** an interesting site to visit.

Apart from making magnificent brass refracting telescopes - at a price - he sells good quality surplus optics, including objective lenses which would make excellent antennas for laser based systems. An optics kit for a 50mm telescope sells for just over £20.

Chris GW4DGU

Interesting Web Site...

One of the many, many web sites I visited while looking for a YIG for my spectrum analyser was **www.tektrotom.de** . Thomas had a couple of suitable oscillators on his site and he also has a lot of useful systems level microwave components such as directional couplers, filters, mixers, and amplifiers.

He stocks HP 10811 OCXOs... and his prices are broadly similar to those of the blessed Pyrojoseph. The site is in German by the way!

Chris GW4DGU

THEY DON'T MAKE 'EM LIKE THEY USED TO !

Recently my 10GHz transceiver, which has been switched on and off, continuously monitoring GB3SCX (and occasionally some operating !) for the last few years, died. It is a G3JVL design and was built in 1991, with several mods in the intervening years. The SRD for generating the LO is driven with 1 Watt of 568MHz from a home brew BLY94 Power Amp (I said it was old!), which in turn is generated from the first stages of a home built DDK001 design of source. The unit had died as the 568MHz signal had failed.

Mixer current had gradually fallen over the years, but it still functioned perfectly as a receiver for beacon monitoring as noise figure is dictated by the LNAs ahead of the 'JVL. I had never re-tweaked the RF stages during any subsequent mods.

I opened it up and found the LO source module, which had been a modified by the addition of a varicap a couple of years ago for 10MHz locking, was only generating about -3dBm at 568MHz instead of the +16dBm the PA needed A quick re-tweak of all the second multiplier stage restored the full output 3mA mixer current. (A cheap and nasty trimmer cap operating at nearly minimum) had shifted with temperature cycling, and all multiplier stages were a a little bit off) and was probably caused when I added the varicap last time and didn't properly soak test/cycle after checking alignment.

Then, once sorted and purely out of interest, thought I'd check to see if the 'JVL itself was still on tune. A gentle touch on the first LO filter screw, and mixer current plummeted to nothing. I'd forgotten just how extremely critical tuning this is! A few VERY careful tuning touches and I was not able get ANY further significant increase in mixer current whatsoever. The 'JVL was still perfectly tuned up and working as it was when built.

Bearing in mind this copper waveguide filter was made with a blowlamp, a hand-held drill and with no great experience of microwaves, 15 years ago, it is amazing the filter is still properly tuned. I had soldered nuts to the top of the waveguide to give extra support to the screws (brass 6BA) with further lock nuts above these. The LO filter is designed for just 20MHz bandwidth at 10224MHz, so loaded Q = 510. I seem to recall a loss of about 2 to 3dB being quoted which suggests an unloaded Q of 2000 - 3000 or so—but in those days was unable to measure things like loss at 10GHz. Now, alignment would be a doddle using a spectrum analyser - building microwave hardware has become almost too straightforward.

It's a tribute to this design that the high Q cavities can stay stable over this period. For the first few years of its life it got taken out portable regularly and never failed to start up, in spite of being thrown about in boots of cars and Landrovers. I wonder how long the single pipe-cap single cavity filter units will stay operational without a re-tweak? Having a considerably lower unloaded Q, they probably will survive too.

Andy G4JNT

SOFTWARE ARCHIVE

I've put a selection of software and a few write-ups of past projects on:

www.scrbg.org/g4jnt

The archive will be updated gradually as time/inclination/list-of-things-done changes.

Andy G4JNT

Amateur Radio Press Release

GB3VHF – A new replacement beacon designed for the 21st century

After several decades of excellent service, the 144.430 MHz beacon located at Wrotham in Kent (JO01DH), was replaced on Sunday 26th February 2006 with a new state of the art beacon incorporating several new RF and digital features.

The beacon which is the result of a year of design and construction by a team of four radio amateurs, provides facilities some of which have never been used in amateur radio beacons before.

At the heart of the beacon is a direct digital synthesiser designed, constructed and programmed by Andy Talbot G4JNT. This generates a signal directly at 72MHz and is L/C and crystal filtered and doubled to 144MHz. before passing to the PA. The DDS clock source will be locked to GPS with a short time-constant phase-locked loop, and will normally maintain an accuracy to within a few parts in 10-9 over a period of a few tens of seconds, and better than 10-12 long term. The frequency of the CW carrier (mark) being exactly on 144.430000MHz.

The most important feature of the new beacon is that by using the DDS, the beacon can be programmed to transmit new modes. As before, the beacon sends its callsign and locator in Morse, but using A1A (on /off) keying rather than FSK.

To enable the beacon to be monitored at extreme ranges, the beacon additionally transmits it's callsign and locator using WSJT JT65B mode.

The GPS also provides for the precise timing of the keying sequence, such that the JT65B sequence will start at every even minute past the hour for 48 seconds duration.

The Morse sequence will commence at the start of each odd minute past the hour and last for 13 seconds.

At the start of each odd minute 30 seconds past the hour, at a precisely timed point, 140 microseconds after the UTC one-second reference as signalled by the GPS receiver, the phase of the carrier is reversed, 28 times in total to fill up the 30 second time slot. The result is a 1 bit/second pattern of 101010..... The BPSK mode has been incorporated to allow users to become familiar with using precise timing methods to assist in experimentation with coherent signal recovery, to measure time of flight information and propagation testing.

In the event of GPS lock being lost, the beacon will suspend the JT65B sequence and replace it with the Morse sequence, until such time as GPS lock is re-established.

The RF section which was designed by Sam Jewell G4DDK, relies on a Mitsubishi RA30H1317 power amplifier module for the PA. The use of extensive RF L/C and crystal filtering throughout, ensures that the beacon complies with the most stringent CEPT regulations for transmitters operating in the VHF frequency range. The beacon has undergone exhaustive tests in this respect. The RF power output of the beacon is 30 Watts.

The power supplies delivering both 12 & 24 volts for the entire beacon, have been designed and built by David Bowman G0MRF who has ensured that generous component under rating and spare current capacity will help to provide the high reliability needed. Over-sized heat sinks mean that no fan cooling is required, whatever the ambient temperature.

Chris Whitmarsh G0FDZ, the beacon keeper, integrated the various modules and units, and produced the metalwork and housing facilities for the beacon. Ease of maintenance was very much in mind when designing the beacon, so as to ensure minimal outage times when any faults occur.

This new beacon hardware is only the fourth to be employed, since the beacon first became operational in 1959 at the end of International Geo-physical Year (IGY).

The beacon antennas which comprise of two 3 element yagis beaming 288 and 348 degrees and located approximately 48 metres AGL are unchanged, and have been employed since the mid 1980's when the current mast replaced the original. The base of the mast is approximately 213 metres ASL.

Software to decode the JT65B is easily obtainable on the Internet at the WSJT website:

http://pulsar.princeton.edu/~joe/K1JT/

To decode the JT65B, tune the carrier to obtain a tone of 1500Hz with the receiver set to USB, and the dial frequency reading 144.4285. The JT65 will then be tuned in correctly.

The group would particularly like to hear of reception reports of the beacon from all corners of the British Isles and from mainland Europe.

This beacon has been financed by the four participants only, but the team gratefully acknowledge the donation of some parts for building the beacon from Russ G4PBP, Derek G3GRO, Dave at Quartslab Ltd and Simon G3LQR.

For details of the beacon DDS please see Andy Talbot's website at: **www.scrbg.org/g4jnt/** and, for more information and photos of the beacon, please see the beacon website at **www.g0afh.com/gb3vhf/**

Chris Whitmarsh G0FDZ (Beacon Keeper GB3VHF)
Andy Talbot G4JNT
Sam Jewell G4DDK
David Bowman G0MRF

ANYONE WITH AN OLD MM 1296MHz TRANSVERTER ?

I have posted some images to the photos section of the UK Microwave Group Internet reflector under ZL1UJG and MMT1296

I had an early MMT1296 which had NE57835 and BFR34a devices and this gave around 4.5 dB RX converter and 5 dB NF going through the RX/TX port. I removed this and used a single Black spot GaAsfet and filter which gave about 1.7 dB RX converter NF and 2.2 dB thru RX/TX port.

The blank PCB's I have here in NZ for the local VHF Group. They are double sided but have no through holes and rely on wires/veropins and copper tape for grounding. Let me know if any of you are interested (off the reflector)

The picture for the amp alone has one unmarked resistor which is 220 ohms. The Zener is 6V2. One should be able to work out what goes where. If there is any queries please contact me.

The NF is adequate but could be reduced further by having a second amplifier stage, however an extra filter would be also required. (running two RF amplifiers without interstage filtering is not recommended due to out of band signals). I think a masthead preamp would provide much greater improvement, however.

I bypassed the second IF amplifier. If anyone wants to see that, let me know and will post that on the internet as well

Kevin ZL1UJG <zl1ujg@yahoo.co.nz>

The Chilbolton 25m dish ... good to 30GHz!

R.A.L MICROWAVE ROUND TABLE

Sunday 30 April 2006

The date for this event is now confirmed and registration of attendance is under way. If you have not yet registered, you should do so before **23 April**, at the latest, by visiting the following website:

http://www.mike-willis.com/RAL2006.html

There you will find a link to **G0MJW's special email address** where you can register**.** If you don't have Internet access then please contact the Scatterpoint editor at the phone number shown on page 2 of this issue.

You an also indicate what kind of **testing facilities** you may need.

A dinner has been arranged by Geoff Grayer, G3NAQ, for the Saturday night, i.e. the night before the meeting. You will have to contact G3NAQ separately regarding the dinner at: <**GeoffGrayer@aol.com**>

Catering facilities at RAL on Sunday may be available. Check Mike's website the day before, just to make sure that you don't need to bring your own "tucker" !

A interesting programme has now been arranged:

1030:	Doors open
1100-1110:	Welcome speech: G3PHO Chairman of UKuG
1110-1155:	Lecture 1: My 10GHz EME exploits and SDR project - Chris Bartram, GW4DGU
1200-1215:	Presentation of Contest certificates and Trophies: G4KNZ presiding
1215-1245:	Lecture 2: The new UKuG Operating Award - John Quarmby, G3XDY
1245-1330:	**LUNCH** (+ UKuG Committee meeting)
1330-1415:	Lecture 3: More on 24GHz - John Wood, G4EAT
1415-1500:	Lecture 4: Microwave Beacons .. the GB3SC series. An Update - Andy Talbot, G4JNT
1500-1545:	Discussion: Beacon planning and design for the future a discusssion presented and chaired by Murray Niman, G6JYB
1545-1600:	General forum:
1600:	Event closes

In addition, there will the usual test gear facilities and "horse trading" tables. If you wish to use the test gear please **remember to bring all the leads and tools you need!**

Let's see many of you there but not before 10.30 am ! (see last month's Scatterpoint)

This month we have several very interesting millimetre wave items and news of a resurgence of 10GHz wideband!

The Millimetre Bands

134GHz

Dave Robinson WW2R (otherwise known as G4FRE) had a flying visit back to the UK recently and didn't waste any time establishing yet another microwave "First" this time on 134GHz ! Here's his report:

From Dave, G4FRE <g4fre@mail.ev1.net>
At 2244GMT on Feb 18, M0FRE, Fixed station in Malvern (IO82UC) worked G4FRE/P Near Bredon (IO82XC) on 134.545GHz CW. Reports were 439/429. Conditions were clear and cold (Temperature was minus 3.5C). Path length was 17.73km (from OS map). **This is claimed as a UK first on the band and consequently a UK distance record**. More details when I get over the jet lag!

(Well done Dave and Meg! Most of us will envy him having an XYL who is also a licenced amateur and interested on microwaves! .. editor)

Our other intrepid millimetre band member of UKuG is Brian Justin, WA1ZMS, who many of you met at Martlesham in November last year. He's been using the winter cold to push the limits even further on the higher mm bands. His latest achievement is described below:

From: <wa1zms@att.net> Tue, 28 Feb 200
Subject: A new 134GHz World DX record claim...
Hi everybody,
I would like to claim what should be a new world DX record of 114.4km for the 134GHz band. The QSO was between W4WWQ/4 and WA1ZMS/4 using FSK-CW copied by ear.

QSO Details are:
Date: Feb 26th, 2006
Time: 23:15z
WA1ZMS/4 36-43-03N 80-19-23W EM96UR
W4WWQ/4 37-31-00N 79-30-35W FM07FM
Distance: 114.4km

WA1ZMS/4 WX:
Temp: -3.5C
Dew Point: -22C
RH: 21%
Baro: 917mb
Atmos Loss: 0.118dB/km

W4WWQ/4 WX:
Temp: -7C
Dew Point: -24C
RH: 25%
Baro: 885mb
Atmos Loss: 0.110dB/km

What was likely to be the last cold weather front of this winter season passed through the mid-Atlantic region of the US and so we thought we would take advantage of it and try for better DX than our former record of 79km.

A rather frustrating fact was that the WX front was so void of water vapour and the resulting atmospheric losses so low, that we had several dB of signal margin on both ends of the QSO but didn't have any more distant sites to take easy advantage of at the time.

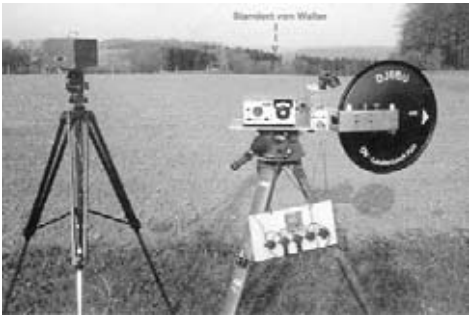
It has been a rather warm winter here in the eastern US and, if "global warming" doesn't limit our future plans, we hope to be back next Fall with even more 134GHz DX! **73, Brian, WA1ZMS/4**

(Many congratulations Brian on yet another wonderful contact ... editor)

122GHz

Over here in Europe, the higher bands are getting some attention in Germany. Via Eene, PA3CEG, we hear of a122GHz contacts being made:

From: Eene de Weerd <pa3ceg@hetnet.nl>
I received the additional info from Philipp DL2AM about his last experience on 122 GHz...
"On Saturday 25-01-06 we tested in detail with my two 122 GHz Transverters with the HCSH-9401 diodes. With a distance of 15 km, the signal was still S9 reciprocal in SSB. We tried it also in FM and it sounds like a local QSO. We wanted to try a substantially larger distance but in between it has begun to snow and we good do nothing more. I think that in SSB, 30 km or more good by possible without problems. I am now waiting, for a changeover in weather forecast.
73 from Philipp DL2AM.
In CQ DL 6-2005, DJ6BU and DH6FAE's 122GHz



expirements made during March that year were reported in some detail**. The photos above show the set up at DJ6BU**. The CW transmitter uses a Russian beam lead varactor diode type 3A 643A-3 with an RF output of 30mW. This feeds what appears to be a 7.5cm horn with a gain of 35dBd. The receiver uses an HSCH 9161 beam lead mixer diode, an IF of 144MHz and a 45cm offset dish (gain 50.3dBd). DH6FAE uses an HSCH beamlead Schottky barrier diode mixer and a 45cm offset dish (50.3dBd gain). On the 2nd of April last year they had a contact over 5.7km with this gear, DH6FAE being S6 on SSB and DJ6BU 569 on CW. Further tests were carried out, during April 2005, over a 10km path in JO40 square and reports were somewhat lower at RS52 SSB and RST539 on CW. We've no doubt that, by now, the stations have greatly exceeded those distances.

LOW MICROWAVE BAND REPORTS

Somehow the following report from Mike, G0JMI, got missed out of the last month's Scatterpoint ... our apologies OM!

From: Mike G0JMI <mike.karen1@tesco.net>
I had the following log entries to submit for the Low Bands Microwave Contest to 20th November 2005. My locator was IO91KA, Beacon Hill, 8km east of Winchester, Hants where I worked as G0JMI/P portable station:

On 1296MHz:

Call	RST Sent	RST Rcvd	His LOC	Distance
G4RFR	59	59	IO90AS	65km
G4LDR	59	59	IO91EC	36km
G0RRJ	59	57	IO91FE	34km
G1JRU	59	59	IO90HU	25km
G3PHO/P	21	51	IO93PW	326km
		(crossband my 2m to his 23cm)		
M0GHZ	59	51	IO81VK	89km

On 13cm:

G4RFR	59	57	IO90AS	65km
G4LDR	59	319	IO91EC	36km
G0RRJ	57	55	IO91FE	34km
G1JRU	59	59	IO90HU	25km

On 9cm:

G4LDR	59	59	IO91EC	36km
G0RRJ	55	41	IO91FE	34km
G1JRU	59	59	IO90HU	25km

I think this represents the best I have ever done with my ageing equipment—all somewhat QRP (23cm 1W, 13cm 100mW, 9cm 70mW). The transceiver systems are all home brewed and some bits of them date back to 1978, so I think its time for a re-think for these bands.

The 13cm QSO with Neil/G4LDR was a bit difficult because his change-over system had jammed.

Possibly this may well be the last time I go in for the low bands contest, until undertaking a rebuild?

73 from Mike/G0JMI

From: John, G3XDY <g3xdy@btinternet.com>
(Hear Ipswich, JO02OB). Date: 18 Feb 2006
A bit late in the day but here is my report of stations worked in the recent (Jan/Feb) tropo lift:

1.3GHz >700km

31/01/2006	DK3WG	JO72GI	908km
31/01/2006	SM6HYG	JO58RG	845
31/01/2006	OZ2OE	JO45VV	704
31/01/2006	OZ1FKZ	JO56AA	724
31/01/2006	SM6ESG	JO67CC	902
01/02/2006	DC7QH	JO62QN	828
01/02/2006	SM7LCB	JO86GH	1100
01/02/2006	SM7GEP	JO77IP	1061
02/02/2006	SM6EAN	JO57WQ	923

2.3GHz >500km

30/01/2006	GM4LBV	IO86RQ	568km
30/01/2006	SM6AFV	JO67GQ	955
31/01/2006	SM6HYG	JO58RG	947
31/01/2006	SM6ESG	JO67CC	902
01/02/2006	DC7QH	JO62QN	828km
02/02/2006	SM6EAN	JO57WQ	923

3.4GHz > 400km

31/01/2006	DK1VC	JO31RG	440km

5.7GHz > 400km

31/01/2006 SM6ESG	JO67CC	902km

10GHz > 400km

31/01/2006 F9OE	IN78QG	591km

Conditions were better on the lower bands during this opening. DK3WG (JO72)provided a new square on 1.3GHz and F9OE (IN78) was a new one on 10GHz.

The radiosonde ascent data shows a very pronounced temperature inversion over the UK during this period, with cold moist air at low level giving way to very dry warmer air above about 500m ASL. I have found a useful site which has lots of met data linked from it:

http://homepage.ntlworld.com/booty.weather/Data_sites.htm

The radiosonde info is at:

http://weather.uwyo.edu/upperair/europe.html

73 from John, G3XDY

From: Dave, G4HUP <powis.dfamilyj@btinternet.com>
Subject: recent large tropo opening

I worked the following stations in the period 30 Jan to 2 Feb 2006 F:

1296MHz: 30 Jan

DK2MN	JO32mc	394 km
SM6EAN	JO57wq	919
DL7VTX	JO62tm*	841
SM6HYG	JO58rg*	942

31 Jan

OZ1CTZ	JO46oe	688
DL1SUN	JO53pn*	693
DK1KR	JO53hw	658
F9OE	IN78qg*	600
G1GEY	IO94fw	367

1 Feb

DK3WG	JO72gi*	904
DB5KN	JO31nb	420
DF9QX	JO42hd	502
SM7LCB	JO86gh*	1097
SM7GEP	JO77ip*	1056

2 Feb

SM7ECM	JO65nq	873 km
F1ANH	IN88mr	482
OZ3ZW	JO54rs*	737
F5PEJ	JN09xt	259

2320MHz: 30 Jan

DK2MN	JO32mc*	394
SM6EAN	JO57wq	919

New Squares marked with *

73, Dave G4HUP/ND8P <g4hup@btinternet.com>
http://www.qsl.net/dl4mup

EME 10GHz GW Activity

From: Stuart Jones GW3XYX <gw3xyw@thersgb.net>

May I congratulate GW4DGU on his 10GHz GW initials with LX1DB and IQ4DF.... also his personal initial with W5LUA. I understand that he has also previously worked WA7CJO

My 10GHz EME activity is slow because it is limited by a home brew dish mount. With my 10ft/3M dish, a light wind can result in my having to go QRT!

For the record, my 10GHz EME initials are: PA3CSG, F2TU, OK1UWA, W5LUA, G4NNS, DK0SK, HB9BHU.

I hope to strengthen the azimuth axis in order to increase QRV level.

Best 73 and good DX from Stuart, GW3XYW

Telford 23cm Activity Net

From: G3UKV,M Vincent <ukv@ukv.me.uk>

We have started a local net up on 1296.200MHz, with QSY to 1296.210 MHz.

Telford & DARS stations active include G8VZT, G3UKV, M1RKH, M0RJS, G4NKC, G8UGL, plus others locally G3MWQ, G8JVM, G1OAR and GW8ASD.

Our net times are Tuesdays, 21:00 local time, plus Fridays around 09:30 (following an 80m net ending).

Callers in are VERY welcome.

73 Martyn, G3UKV

WANT TO OPERATE FROM BUTSER HILL?

From: Ian Lamb, G8KQW <ianlamb@btconnect.com>

If anyone is interested in operating microwave portable from Butser Hill, IO90MX I can help with making the access arrangements.

Under these arrangements it is possible to gain vehicular access to and operate from the mound adjacent to the BT radio station. From this point the visual clearance is totally unobstructed from Chichester to the south east through south and west to north.

This is the exact position from where we worked GW3UKV and GW8VZT on 24GHz over a 184km path in August 2005, 10 different stations were worked on 24GHz that day.The take off towards Harold's (G3UYM) portable site and John (G4EAT) is however not clear.

Let me know .. Ian, G8KQW

French Microwave Activity Days 2006

From: Eric Moutet<f1ghb@cegetel.net>
I am pleased to give you the dates of the French microwave activity days for 2006:

- **29 & 30 of April**
- **20 & 21 of May**
- **17 & 18 of June**
- **29 & 30 of July**
- **19 & 20 of August**
- **23 & 24 of September**
- **28 & 29 of October**

A special event is also planned on 25 & 26 of March for 24GHz and up

For each week end , activity is from 17H PM to 23H PM (French local time) on Saturday and 6 AM to 17 PM on Sunday.
Best 73 Eric, F1GHB

RSGB Microwave Awards 2005

The following awards were claimed last year by microwavers. It's not a big list which is surprising considering the activity on the various bands.

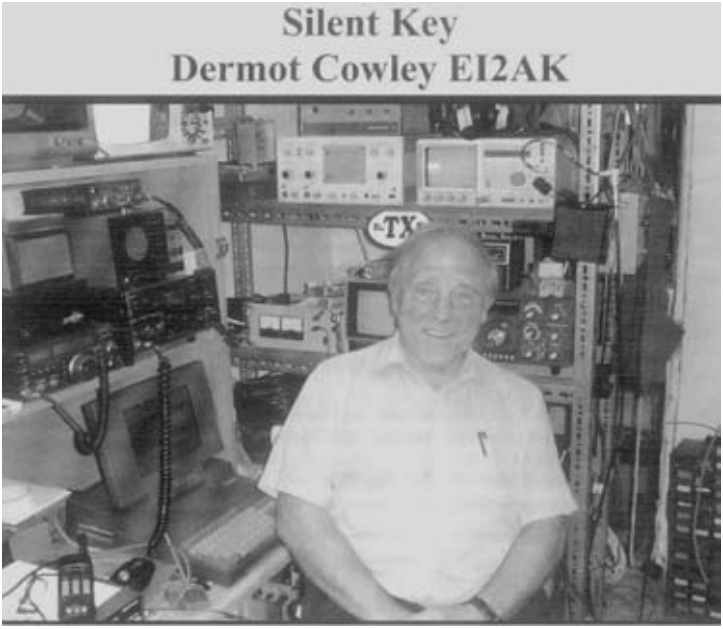
Locator Squares Award

1.3GHz 5 Squares Confirmed: GW3HWR
2.3GHz 35 Squares Confirmed: G3XDY
3.4GHz 10 Squares Confirmed: G3XDY
5.7GHz 15 Squares Confirmed: G3XDY
10GHz 35 Squares Confirmed: G3XDY

Microwave Distance Award

5.7 GHz Over 300Km Confirmed: G0EWN/P
10GHz Over 600Km Confirmed: G0EWN
24 GHz Over 100 Km Confirmed: G0EWN/P

The Current VHF+ Awards manager is Bill Salt, M0CBQ, e-mail vhf.awards@rsgb.org.uk



Scatterpoint wishes to thank Rainer, DF6NA, for supplying the original newspaper clip with the information and photograph shown above.

In the January Scatterpoint, we reported the death of Irish microwaver Dermot, **EI2AK,** last October. The photo on the left appeared in an local Irish publication, the Irish Echo. Apparently Dermot was a talented musician, a father of nine children and grandfather to thirteen. Born in 1936, he was a founder member of the Irish Microwave Society. After years as a professional television service engineer, he bought a pub in Drogheda and ran it until his retirement. He was an able swimmer and sub aqua diver. In 1982, Dermot saved a drowning woman from the River Boyne.

He made friends wherever he went ... truly a man of many facets and a great loss to people in many walks of life.

DOES THIS BRING BACK MEMORIES FOR SOME?

This is a recent account of G3CWI's first steps in to 10GHz wideband FM hilltop operation...

With snow flurries and icy conditions, it took some enthusiasm to do the tests today. Tom ,M1EYP, set up on Cloud while I slummed it in a layby by Gun Hill.

Things started encouragingly with Tom's first words being, "Have you already got the tone on?" I had and he was hearing it.

Then the awful truth dawned - I had forgotten the headphones. Oh well, there was still plenty that could be done. Aerials were peaked. I asked Tom what the S meter was reading. "It's on the endstop", he replied but further investigation showed that he had the radio upside down so it was the wrong endstop!

I switched to voice (I had remembered the microphone) and Tom could hear me. It was rather distorted - in my excitement I was over-deviating a lot! By this stage Tom was frozen and starting to sound a little slurred on 2m FM. I decided to cut to the chase and did one adjustment to see if the dish could be optimised. Success! Several dBs were gained and then it was time for the warmth of the pub.

More ambitious plans for the weekend - but will we remember all the gear (and which way up it goes). Who knows?

73 Richard G3CWI

From: Martin Farmer, G7MRF <martin@g7mrf.co.uk>

HP436APower meter with lead & 8484A Head (+ spare 436 Fault on it): **£350**

Bird 43 Meter, with the following plug ins: (**Offers ... will not split)**

1. 100-250MHz 10W & 25W
2. 200-500MHz 25W
3. 1.1-1.8GHz 25W

47GHz High Power line up:
G8ACE OCXO oscillator -> DDK004 -> WDG009 ->DB6NT Multiplier 23/47GHz : **Offers**

2 off ZL WG22 (24GHz) Waveguide switches: RelComm Technologies RDW-SR002: **Offers**

K5GNA Modified AIDC 3731 2m IF: **£55**

BSC Filter type CB2198 (2485MHz): £25

2 off MCLZA4PD-2: £10 each

Pamtech 55387 WG20 Circulator: £15

Midwest Microwave coupler Model 5015-10: Freq 7-18GHz, 10db: **£15**

Narda Power divider model 25888 : **£15**

Midwest Microwave Step attenuator Model 1044 (0-70dB) DC-18GHz: **£80**

2 x Marconi N type attenuator 10dB**: @£20**

Marconi N type attenuator 20dB
HP N type Attenuator Model 8491A 3dB

HP N type Attenuator Model 8491A 6dB

HP N type Attenuator Model 8491A 40dB

2 x HP N type Attenuator Model 8491B 30dB

M/A-Com brick 18.51-19.09GHz out: (Good for 76 Marker): **£25**

SMA relays: Offers
2 off Sivers Lab PM7551
Dow Key Microwave 401-151
Radiall 0-18GHz
Transco M3928/15-01
6 offSivers Lab 7555
Radiall 0-18GHz transfer relay
Manual Sivers Lab 7560

Racal-Dana 9916 Freq Counter: £50

For further details, telephone: 0777 641 7800
Or email: martin@g7mrf.co.uk
Martin Farmer G7MRF
Newcastle Under Lyme, Staffordshire - UK

Mitsubishi & Toshiba Power FETs

Tim1011-15 x2	**£12 each**
Tim1011-10 x2	**£10 each**
Tim1011-8 x1	**£6**
Tim1101-5 x2	**£5 each**
Tim1101-2 x2	**£3 each**
MGF 34S6471 x6	**£4 each**
MGF35v4045 x2	**£5 each**

Mini circuits splitter zfsc-2-1 SMA(F)**x1 £5**
KDI Triangle Electronics Inc. Quad splitter Model YF2230. SMA, (F) **£10.**

All plus postage.

G8ILD QTHR/ qrz.com/ Tel 0161-430-2010. Email: <roger.g8ild@virgin.net>

IMPORTANT .. PLEASE READ THIS!

As all UKuG members know, Scatterpoint is produced in two formats ... a paper copy (posted to members who opt for it) and an Acrobat PDF version which is sent by email, to over two thirds of the membership.

For the past two years or so, we have maintained an internet FTP download site, on a server belonging to one of our founder members, for a handful of readers who, for various reasons, have had problems receiving the newsletter as an email attachment. The address of this FTP site was given to them in total confidence and it was not expected that details of this would leak out to the general amateur public, ie outside UKuG. Unfortunately the location of the site has been discovered by non UKuG members and it appears that a number of them have been accessing copies of Scatterpoint as they have been published. Since the newsletter is one of the main benefits of membership to UKuG (especially to overseas members) the Committee feels that this situation has to cease .... current editions of Scatterpoint are for members only.

So, members who presently use the FTP site to download their monthly Scatterpoint should be aware that the FTP download facility for the latest editions will cease with this issue, March 2006. From April 2006 onwards, the FTP facility will not be available except for Scatterpoint editions published up to the end of 2004 and these will then be, in effect, in the public domain. In December this year we will release all the 2005 editions and, in December 2007, the 2006 issues will released for general download. **This arrangement will mean that, to receive Scatterpoint for the present year, you need to be a paid up member for that year.**

The Committee regrets having to take this action. It has considered up the arguments for having Scatterpoint in the public domain for the general good of amateur microwave radio and certainly wishes microwavers everywhere to **eventually** have access to our published material. We feel that the above solution is a good one and preserves members' benefits during their subscription period.

We do, of course, realise that some members will continue to pass on their copies of Scatterpoint to friends, maybe on a regular basis. This is not a problem! We also know that some members print out small quantities of Scatterpoint to give away at meetings and club talks. We do not have a problem with this as we hope we get new members this way! However, the wholesale "freeloading" mentioned earlier is not something we wish to see carry on.

For those who presently have to use the FTP site to download their monthly Scatterpoint, we suggest that **between this issue and the April 2006 edition** you set up an internet email account such as one at **Yahoo.co.uk,** such that you can receive the PDF attachment easily and with the minimum of problems. If you have an ISP whose "spam filter" chops off the Scatterpoint attachment from your email then you should contact the ISP and explain the problem. Most will sort it out for you. The PDF file can vary from a few hundred KB to up to 1MB, depending on the numbers of photographs and diagrams in the issue, so please arrange for your email system to cope with that. If all else fails, please contact the Editor at **microwaves@blueyonder.co.uk** or take out a subscription for the paper edition, sent to you by First Class post or Airmail.

Your co-operation in this all this is greatly appreciated. Once this edition is published, Scatterpoints for the whole of 2005 and 2006 will be removed from the FTP download site. What remains will be for general public domain use. Feel free to tell others!

Peter Day, UKuG Chairman and Scatterpoint Editor