An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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2009 APRIL

All about EVE ... The Bochum Team

These are the clever folk who managed to reflect amateur radio signals off the surface of Venus on the 25 March this year. Details can be found on page 4 of this issue. Left to right in the photo are:

Hermann Hagn (DK8CI), Karl Meinzer (DJ4ZC), James Miller (G3RUH), Achim Vollhardt (DH2VA), Max Münich (DJ1CR), Freddy de Guchteneire (ON6UG), Wolfgang Büscher (DL4YHF), Michael Lengrüsser (DD5ER), Hartmut Päsler (DL1YDD)

Photo courtesy of M5AKA and AMSAT UK

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- **Venus bounce replaces moonbounce as the next frontier!**
- **GB3MLE beacons now Silent Keys**
- **GW4DGU makes a “First” with a 10GHz EME QSO to ES land**

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

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From the Editor's Desk

Hello again everyone..

There was a much better response this month for articles and news items. My thanks go to Dave G4HUP and Colin, G8LBS for the two very useful articles that form the main part of this issue. Thanks also to those of you who have sent in news "snippets" and activity news for Robin's column.

On the activity scene there's been a slight improvement recently as the weather has warmed up a little, although the support for the UKuG Lowband Microwave Contest on Sunday 5th April was very poor indeed, some operators tending to favour visits to rallies of all things! While out /P at Merryton Low, your scribe saw only a dozen UK callsigns on the KST screen and fewer than half that figure using 144MHz talkback. Do try to put in a few hours in these events as many of those who do come on have made a real effort, especially the portable stations who usually have to spend much of the previous day getting organised for the outdoors.

March 20th was a very sad day as the long standing GB3MLE series of microwave and UHF beacons were removed from the tall concrete tower at IO93EO. New homes are being considered for the 23 and 3cm beacons. The beacons had been in continuous operation since the early 1990s and I seem to remember that a wideband FM 10GHz GB3MLE was on the air before the narrowband ones took over. The 10GHz nb beacon had been heard in LA and other parts of Western Europe during tropo lifts. Not band for 250mW or so to a horn antenna!

73 from Peter, G3PHO

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

SOUTH YORKSHIRE MICROWAVES

Following on from last year's highly successful "Sheffield Microwaves", this UKuG sponsored event is now to be hosted this year by the Finningley Amateur Radio Club, located just south of the junction of the M18/M180 near Doncaster, South Yorkshire. The event is being organised by Kevin Avery, G3AAF of Finningley ARC and Peter Day, G3PHO (UKuG Committee)

Programme details so far are:
Saturday: ATV workshop
Saturday night: Informal meal at a local pub/hotel
Sunday: Microwave Round Table

The Saturday workshop, will be led by Peter Blakeborough G3PYB (President of BATC), and is designed to prepare operators for the uWave/ATV Marathon on the 26th July) in addition to helping those who may wish to take their first steps into microwave Amateur Television.

Sunday's Round Table meeting will follow the familiar pattern of other UKuG Work-shops with a Bring and Buy (including many useful "goodies" on sale by Finningley ARC), Test Equipment, Antenna Test Range and an afternoon of lectures. If the weather allows, the Bring and Buy/ Fleamarket may be outdoors but, in the case of inclement weather, FARC has a very large shed that will easily accommodate us all!

Microwavers and ATVers in the North and Midlands who may not normally attend Microwave Round Tables in the South of the country should find this event attractive.

Notice of your intention to attend will be appreciated so that we can estimate numbers for catering purposes and for the lecture room, where numbers might have to be limited. By the time you read this, a **registration facility** will have been set up at the Finningley ARC website:

http://www.g0ghk.co.uk/table.php

where you will also find other details concerning access, overnight accommodation, etc. If you have a caravan, mobile home or tent, you may like to camp at the venue itself! There's loads of room, as you can see in the photo above. If you have already emailed G3PHO with your intentions he will put your details on the website for you.

Finningley ARC has excellent facilities including a very supportive team of wives and girlfriends who will be on hand to provide light refreshments during both days. The premises are very comprehensive with a lecture room, radio shack, kitchen-dining room, microwave workshop, radio museum and extensive grounds.

Come along for something different!

Hope to see you there.... Peter G3PHO

UK MICROWAVE GROUP SUBSCRIPTION INFORMATION

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Your personal renewal date is shown at the foot of your address label if you receive Scatterpoint in paper format.

If you are an email subscriber then you will have to make a quick check with the membership secretary if you have forgotten the renewal date. From now please try to renew in good time so that continuity of newsletter issues is maintained. Put a **renewal date reminder** somewhere prominent in your shack (the editor suggests having it tattooed on your forearm!).

Please also note the payment methods and be meticulous with Paypal and cheque details.

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*** Paypal to ukug@microwavers.org**

or

*** a cheque (drawn on a UK bank) payable to 'UK Microwave Group' and sent to the membership secretary** (or as a last resort, by cash sent to the treasurer!)

The standard membership rate for 2009 is:

UK	£6.00
US	$12.00
Europe	€10.00

This basic sum is for **UKuG membership.** For this you receive Scatterpoint for FREE by email. If you want a paper copy **then the higher rates apply.**

EVE !!! - Radio Amateurs Bounce a Signal off Venus

Radio Amateurs have achieved the very first reception of amateur signals bounced off the planet Venus over 50 million km away - EVE (Earth-Venus-Earth).

Peter Guelzow DB2OS, President of AMSAT-DL has provided a description of this landmark achievement.

On March 25th, 2009 a team from the German space organisation AMSAT-DL reached another milestone on its way to an own interplanetary probe towards planet Mars. The ground station at the Bochum observatory transmitted radio signals to Venus. After travelling almost 100 million kilometres and a round trip delay of about 5 minutes, they were clearly received as echoes from the surface of Venus. Receiving these planetary echoes is a first for Germany and Europe. In addition, this is the farthest distance crossed by radio amateurs, over 100 times further than echoes from the moon (EME reflections).

For receiving the EVE signals, an FFT analysis with an integration time of 5 minutes was used. After integrating for 2 minutes only, the reflected signals were clearly visible in the display. Despite the bad weather, signals from Venus could be detected from 1038UT until the planet reached the local horizon.

The 2.4 GHz high power amplifier used for this achievement is described in the current AMSAT-DL journal. This represented a crucial test for a final key component of the planned P5-A Mars mission. By receiving echoes from Venus, the ground and command station for the Mars probe has been cleared for operational use and the AMSAT team is now gearing up for building the P5-A space probe.

For financing the actual construction and launch, AMSAT-DL is currently in negotiation with the DLR (Deutsches Zentrum für Luft- und Raumfahrt) amongst others, to obtain financial support for the remaining budget of 20 Million Euros.

AMSAT-DL wants to show that low-cost interplanetary exploration is possible with its approach.

More information and the link to the official press release [in German]:
http://www.amsat-dl.org//index.php?option=com_content&task=view&id=166&Itemid=97

The EVE experiment was repeated on Thursday, March 26th for several hours with good echoes from Venus. Morse code was used to transmit the well known “HI“ signature known from the AMSAT OSCAR satellites.

73 from DB2OS
Peter Guelzow (President AMSAT-DL)

A video showing P5-A Project Leader Prof. Dr. Karl Meinzer DJ4ZC and Freddy ON6UG with the 2.4 GHz amplifier used for EVE can be seen at: http://tinyurl.com/EVE13cmAmp

Peter DB2OS and other members of the AMSAT-DL team regularly attend the AMSAT-UK International Space Colloquium. This year the Colloquium is being held at the **University of Manchester** from Friday July 24th to Sunday 26th July. Further details at http://www.uk.amsat.org/colloquium

AMSAT-DL has achieved a number of Amateur Radio firsts using the Bochum facility. This was a disused radio telescope restored by volunteers to serve as a ground station for the Amateur Radio mission to Mars P5-A, the first private venture interplanetary spacecraft.

Control Software for the Amateur Radio Bochum Facility:
http://amsat.org/amsat-new/articles/G3RUH/

Voyager 1 received by AMSAT-DL group:
http://www.southgatearc.org/news/april2006/voyager1.htm

AMSAT-UK Colloquium 2006 – Receiving Voyager 1:
http://www.southgatearc.org/news/june2006/receiving_voyager1.htm

AMSAT P5-A ground station successfully receives ESA's MARS-EXPRESS Probe:
http://www.amsat-dl.org/p5a/p5a-bochum-eng.htm

Presentations on P3E and the Mars Orbiter P5-A:
http://www.southgatearc.org/news/july2008/p5a_and_p3e_presentations.htm

GO-Mars with AMSAT-DL's P5A Mission
http://www.ticket-to-mars.org/

Enclosure Painting

by Colin Ranson G8LBS

(revised from first issue 2004)

Having been employed in the Automotive paint supply business for many years and not having seen much literature in the Amateur press on the subject of painting boxes, it occurred to me that the readers of Scatterpoint may not be aware of some of the available materials and processes for painting our project enclosures. These enclosures come in all shapes and sizes and may be made of plain aluminium, die cast aluminium, steel, and plain plastic. Some boxes made of sheet metal come ready "finished" with paint, a textured vinyl or powder coating and even chemical finishes that looks a bit like gun bluing. Almost any finish can be painted, but care needs to be taken. A professional looking enclosure, painted and labelled up, always finishes the job off and will complete your sense of satisfaction, especially after that piece of circuitry you sweated over is working so well.

Since this article was first written in 2004 the situation concerning the supply of paint has changed drastically. Cellulose paint has virtually disappeared from the UK supply chain, being illegal to sell – the exception being specially licensed users connected to the vintage vehicle scene. It is interesting to note that British manufactures are still making it for the Middle & Far Eastern market! The same applies to medium & high solids Isocyanate paint (2k MS/HS) – now defunct, like cellulose it contains too much solvent. The only solvent based car paint still in use is Ultra High Solid (2K UHS). This is no good for our purposes as special hardener and the use of a high temp oven is mandatory.

Further to this, most body shop suppliers will now only supply to professional users. A professional user is someone who is expected to be able to use a product and make a good job of it, and is expected to use it in a safe and responsible manner, especially after reading the Product Data Application notes and the Material Safety Data Sheets that are always available on request. Generally speaking, "trade only" body shop suppliers will no longer supply products to the general public that are designated as **Hazardous** and require a Material Safety Data Sheet. However, some products as described later can be obtained from these sources, especially if you can convince the man behind the counter that you know what you are doing and what you are going to use the product for.

Materials available to the general public usually come from places like large motorist centres and consist mainly of aerosols of primer, clear lacquers and topcoats for cars, Topcoats can be those sparkly metallic basecoats that need a lacquer coating to finish it off, or solid colours that might or might not need a clear lacquer finish. Also available from manufacturers like Hammerite are tins and aerosols of hammered effect. Hammerite also supply a finish called 'Smooth Metal Finish' which is, as I understand it, Hammerite minus the additive that causes it to separate and give that hammered look. Have a look at the Hammerite website for some interesting ideas. Most large D.I.Ys also have a range of specialist paints available and it's worth taking a look at these.

Most paints do not take readily to aluminium and die cast metals due to the immediate oxidisation of the surface during the flatting down and cleaning process, so it is necessary to use a 'self etching primer' at the start of the painting process. This also applies to other non ferrous materials like brass and copper, and also steel to lesser degree, but it is always advisable to use a S.E.P. on most metals as it inhibits corrosion. The exceptions are chrome plating, anodised aluminium and some stainless steels. Who would want to paint these anyway? If you have to paint these materials make sure the surface is well abraded and clean.

Now is the time for a word of warning as prevention is better than cure. Keep all preparatory materials and paints covered up and away from where household aerosols might be used, as a lot of these contain silicon. This wonderful element is the cause of a common paint defect known as

"fish-eying", a condition where the paint separates to reveal a pit of varying width. You cannot expect to let the paint dry and go over it again. The silicon will never dry and has to be removed by either rubbing down and degreasing or by washing the still wet paint away with thinner (drastic, messy and avoidable!).

S.E.P.s traditionally consist of a very thin yellowish/green primer which is usually mixed 50/50 with an acid/thinner solution and has to be applied with a spray gun or aerosol in one or two thin coats. It is very difficult to brush and achieve an even coat as it dries very quickly. Trying to build it up with lots of coats is a waste of the material as the first coat has already done its job – the acid has caused the solids in the primer to form a bond with the first few microns of the metals surface.

Nowadays a few manufacturers are making aerosols of acid etch primer meant for making small repairs to car paintwork where the metal has been exposed and these are ideal to use as the first coat on our metalwork. To achieve maximum adhesion using acid etch primer the metal must be thoroughly flatted and degreased. If the metal is nice and smooth to start with it may require no more that a going over with a new piece of red or grey scotchbrite pad. If this is not to hand then the green domestic variety will do. Always degrease afterwards. If the metal is scratched, start off with 1200 grit WET or DRY abrasive paper and soapy water. Deep scratches must be deburred (1200 grit again) and then filled using a cellulose or acrylic putty, applied using a rubber squeegee. When the putty is hard flat it down with 1200 W & D plus water, allow to dry and if the scratch(es) are perfectly filled then you can think about starting to paint. In a well ventilated area, degrease the surface with a proper panel degreasant using lint free cloth. Also recommended is 3M General Purpose Glue and Adhesive remover; it's a bit over the top for this purpose but it has so many other uses I would never be without it. A word of warning – keep away from plastic parts! Apply the solvent with one piece of cloth and, whilst still wet, remove solvent with another piece of clean cloth .... freshly washed old cotton tee-shirts are ideal for this. Don't be tempted to use paper tissues or toilet paper. These are impregnated during manufacture with all sorts of wonderful contaminants. This process ensures that any contaminants (greasy fingerprints etc) are removed and are not spread about. Dispose of wet cloths in an old paint tin.....the solvent will eat through plastic bin liners and weld itself to plastic dustbins when dry! Make sure the work is free of dust, hairs, bugs, etc and apply a very light first coat of etch – allow to go tacky (only 20 or so seconds) and apply a full coat. The first coat acts as 'glue' for the full coat and helps prevent runs on vertical surfaces. Incidentally this light coat/full coat process applies to virtually all paints when being sprayed.

If possible, arrange for the surfaces to be sprayed to be in the horizontal plane and support it underneath by some means. Never lay a panel directly onto the top of a cardboard box, bench or similar, the disturbance created by the aerosol or spray gun will only blow little bits of muck onto your paint job.

It is assumed that all holes and apertures have been drilled and cut in the work before painting commences, and that all burrs have been removed. Burrs can grab strands of cloth etc during preparation and will look unsightly when painted over. In my opinion the insides of enclosures should also be painted and if you decide to do this then where stand-offs and the like have to be grounded, install nuts and bolts fitted with slightly larger washers through these holes before painting, it saves scraping the paint away later. The same applies to all other grounded components. Remove all nuts, bolts and masking materials before the paint gets too hard, otherwise it may crack away.

As soon as the etch is touch dry, apply a high build primer using two or three coats, allowing the primer to just about become dry before applying the next coat. When a satisfactory build has been applied, leave for several hours to thoroughly dry and then flat with well worn 1200gt W & D. Be patient! A well prepared primer makes for a much better finish. If you do rub through to bare metal, reapply primer and re-flat. Wash all flatting residue away with water and, when thoroughly dry, make sure the surface is dust free and apply the topcoat of your choice. Having got used to applying primers, etc with an aerosol or spray gun, you should now be confident about

applying the topcoat.

A medium grey or black, with just a hint of gloss is nice for covers but, of course, the choice is yours. If you go to an automotive outlet that makes aerosols to order (£10 - £20 each now) ask to see a British Standard or RAL colour chart, you will probably find what you want. Any automotive paint company worth its salt formulates these colours in a material that will go into an aerosol and to a gloss level that will suit you. Since writing this article in 2004, my company now only puts Nexa Autocolour 383 Polyurethane (with varying gloss levels) in aerosols, also a brand of water-borne car colours but these are for the professional refinisher and not really suitable for our purposes.

By now you should be getting good at using an aerosol (or small spray gun if you are lucky). If not, a few tips will not go amiss.

Keep the can or gun a uniform distance away from the job as you make each pass. At the finish of each pass, remove your finger from the nozzle or trigger and reapply pressure before making the next pass. Use only the tip of the finger, as a build up of paint on the fingertip can be suddenly deposited on the job. Only experience will teach you how far away or how close to the job to apply the paint. With metallics, applying the spray further away causes a more sparkly effect and also with these materials you only need to get a uniform colour coat. Building metallics up is a waste; use clear lacquer to get the total paint thickness. When happy with the finish, apply your logos by whatever means – transfers, Letraset, etc and, when complete, apply a couple of coats of clear lacquer.

Always wear a particulate mask when spraying as the spray dust stays in the lungs. Solvent fumes, whilst uncomfortable, dissipate quickly.

While I think of it, some steel sheet has a thin coat of galvanising called Zintec and self etch primer could be used as well as a product called T Wash (Mordant solution). This stuff is brushed or ragged on and it turns the galvanising black. Wash off with water and prime coat when dry.

Because I work where I do, I have (now limited) access to 2 pack isocyanate hardened paints and lacquers and these can produce a far superior finish than aerosols bought in the high street. These products have their own dangers in use so a few words about health and safety, common to all situations, won't go amiss here. When rubbing down any material, whether it is bare metal or painted, a suitable particulate mask should be used, lungs are precious. When using any solvent to degrease metalwork or existing paint, use disposable gloves as all solvents (including petrol which I really don't recommend) will strip the natural oils from your skin and increase the danger of skin complaints. Over the medium to long term, solvent absorption into the blood can cause major organ degeneration. Spray booth operatives are kitted out like spacemen with fume resistant coveralls and fresh air fed helmets. No exposure to harmful solvents and hardening agents is the ultimate aim for these workers. It is best to use latex examination type gloves available from reputable outlets for about £4.50 per 50 pairs .... pay any more than this and you are getting ripped off. Beware of the really cheap ones that might be sold in markets or "under a pound" type shops. These feel a bit greasy and have a high organic protein content that can cause damage to your skin as easily as any solvent.

If you have a big enclosure to paint, e.g. for a big valve linear, it might be worth taking it to a friendly body shop to get it painted with a professional product. There are paint shops that coat industrial products and these could be a good bet, although the products used can vary wildly. Whilst I will endeavour to help my fellow Amateur Radio colleagues, I cannot supply some products because of the law and Health & Safety considerations. Etch primer aerosols, some other types of aerosols like plastic coatings are no problem. Painting plastics is a different matter and will be the subject of a future article.

E-mail me if you need any further advice and I will be pleased to help.

colinranson@sky.com

10MHz Distribution Systems

by Dave Powis, G4HUP

Editor's note: *Since sending this article to Scatterpoint, Dave has found one by Paul Marsh , M0EYT, published in the Backscatter compendium (pp56-57) and containing some technical similarities! Dave genuinely hadn't seen that before he put the following article together but, obviously, there is some overlap. However Dave's article present a number of new/or different pieces of information such as some wider issues of distribution amplifiers in general and test equipment susceptibilities.*

Increasingly, we need a 10MHz reference source in our shacks – a very good OXCO, a GPS controlled source etc – which is used to lock up our transverter LOs, our test equipment (counters, signal generators and spectrum analysers, etc), and in some cases the main transceiver. The single or dual outputs from the 10MHz source will not serve all of those, so the answer is a distribution amplifier (DA) to give a larger number of outputs. See refs [1, 2 and 3] for examples of DAs. Typically, these will give either 4 or 6 outputs from your source, so that should be the answer to everything?

Sometimes it is and you're lucky. But there are factors which may cause you further work – e.g. the output spectrum of the OCXO, whether your DA is analogue or 'digital', and the 'sensitivity' of your 10MHz inputs. Dealing with each of those issues in turn:

OCXO Output Spectrum –the OCXO can be considered as essentially a good quality, low noise crystal oscillator, so it ought to be giving a good sine wave output, with minimal harmonics? Well maybe, but often there is considerable harmonic content, especially odd. Typical levels can be -20dBc at the 3rd harmonic, decreasing with frequency. This may not be a problem, depending on what you are driving with it.

Analogue and 'Digital' DA's – Some designs of DA, including those based on video techniques are analogue, and effectively run in Class A – being therefore relatively power hungry, but reproducing at the output what is presented at the input – harmonics and all, if there is no filtering in the DA. The other class of DA's (mostly home constructed) are based around digital buffers, such as the 74HC04, which is why I have referred to them as 'digital'. They will effectively switch at the lowest input frequency (10MHz), and provide a 10MHz square wave on each output – which, as we know contains the higher order odd harmonics too. So even if your input from your OCXO is clean, a digital DA will have a harmonic rich output.

10MHz inputs – neither of the two previous situations necessarily represent problems by themselves. The problem is usually created in the equipment that is being driven, but action at the earlier stages is required to solve it. Some test equipment especially is designed to operate from a clean 10MHz reference, and does not like to see significant levels of harmonics present. Thus the output of a digital DA will always give it a problem, and the output of an analogue DA may if the input source is not clean.

Getting it sorted

Fortunately, the answer to all of these issues can be found cheaply – old PC network cards! Now that most motherboards have LAN capabilities built in, it's common to find boxes of old PC cards underneath the stands of some surplus traders – a few moment digging can provide a set of useful components for a very small outlay – 50p or £1 is often all that is being asked for the

cards, and the traders will also often be prepared to take offers if you feel that is excessive!

So what can you find?

They may be 10MHz only, or 10/100MHz, and may have a BNC connector and RJ45 ethernet (10MHz cards) or RJ45 only (10/100 cards). They may also have either ISA or PCI connectors for the motherboard. But what the 10MHz cards all have in common is very good packaged isolation transformers and low pass filters optimised for 10MHz, and a packaged DC-DC converter. Some examples of 10MHz cards are shown in Fig 1, below. The 10/100MHz cards (RJ45 only, no BNC connector) have the filter only, so are less useful. Removal from the board requires a bit of care and effort, but it's worth it since the initial outlay is very small, and the quality of the parts is very good. You can also salvage the insulated BNC connector too!

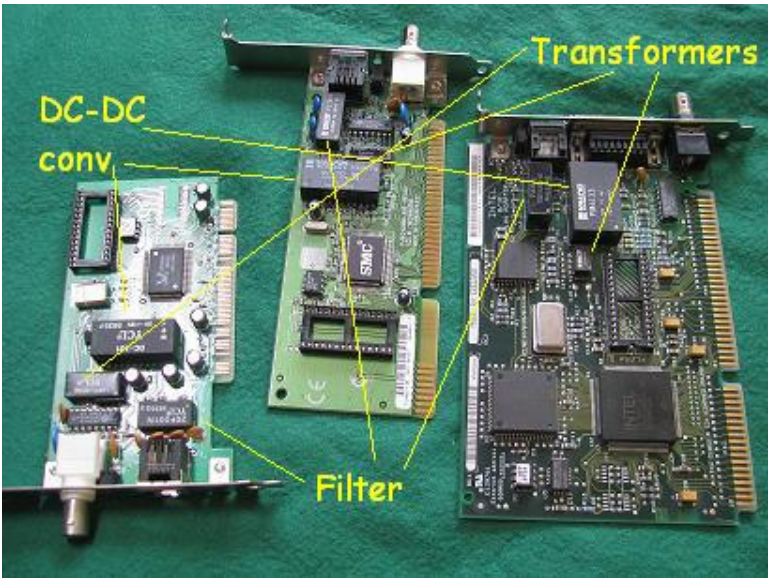


Fig 1 – Typical 10MHz Ethernet cards. At left is a PCI card, the other two are ISA connectors

Filters

The LPF packages contain two filters in a 16 pin DIP outline – one for Tx and one for Rx, associated with the RJ45 ethernet port. The Tx filter is a 7 pole device, and the Rx is 5 poles. Tx loss is approx 1.5dB, while Rx is about 1.3dB on the samples I measured. Attenuation on the odd harmonics is good, with 30MHz being around -30dBc, and increasing for higher orders. Filter sections can be cascaded for increased stop band attenuation, if you have sufficient signal available. The filters also include isolating transformers, with a specified 1500v breakdown. Each transformer is centre tapped on both primary and secondary for creating balanced paths if needed. Fig 2 shows a diagram of a typical filter package, with pin connections, taken from a datasheet, and Fig 3 shows the measured response of a transmit filter portion. See also [4]

Typically, the filter parts will most often have an F in the part number, some examples seen being 20F001N, 78Z1122B-15(this one breaks the 'F rule!), FBC16D001, FL1310, FC518LS, H16101DF – all identical in spec and pin-out.

Schematics:

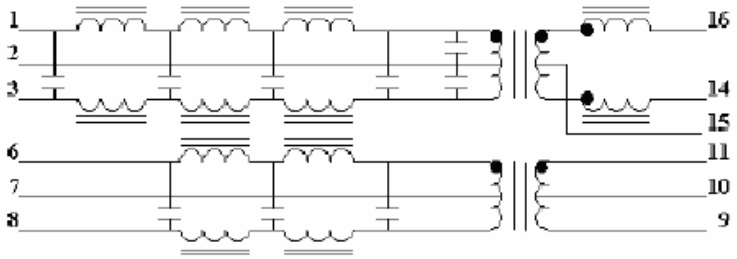


Fig 2 – 10MHz LPF Filter circuit (Tx top, Rx lower)

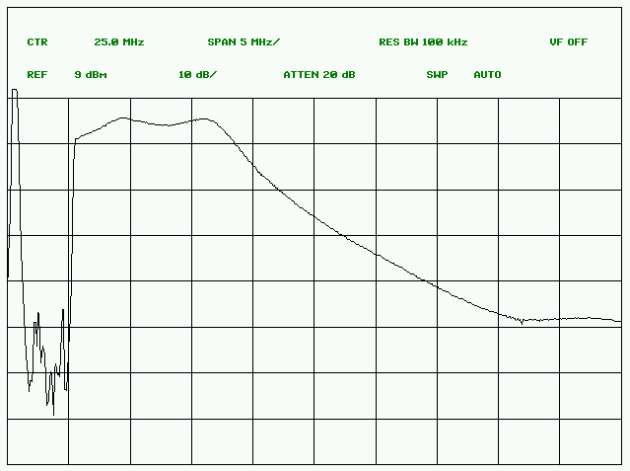


Fig 3 – Frequency response of the Tx filter over the range 5 to 50MHz

Removing the units from the card

Recovering parts in a usable state from commercially assembled PTH (plated through hole) boards is not easy. Of course we are most often concerned about repairing the board and wish to remove a faulty component – however, this time round it is the PCB which can be sacrificed. I find a vice and a hacksaw are the best weapons to start with – simply cut the PCB (unwanted components will yield easily to this combination) to release the component you want with a small piece of PCB attached.

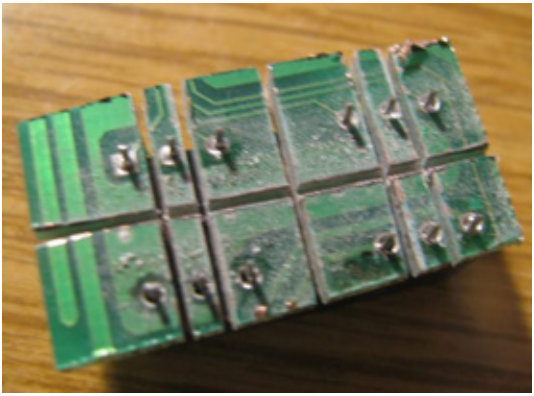


Fig 4 – Prepared PCB section, ready for filter removal

Next hold the component in the vice, PCB side up, and saw through the PCB between each set of adjacent pins, and one final cut along the centre of the module. Don't worry if you go slightly deeper, as the units are potted in epoxy. This should leave you with an independent land of PCB material attached to each pin, as shown in Fig 4, above, and you can remove these individually with a small bench vice, a hot iron and small pliers. The same approach can of course be used to recover any other through-hole mounted parts from commercial boards.

Using the filters and transformers

The recovered packages can be mounted on small pieces of board with short coax leads attached to connectors mounted on the screening box. If these are made up as individual units (a filter or a transformer) they can be used where needed in the system, with the other items in the package ignored (or left for later use in case of failures).

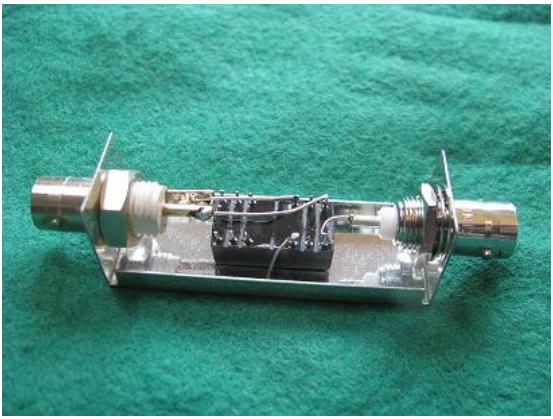


Fig 5 – A recovered filter assembled in a small tin-plate enclosure, with insulated output connector

Fig 5 shows a very simple implementation of an isolating filter, using the Tx portion of a package. The 55 x 20 x 20mm enclosure is one of O Schubert's range, and is available pre-punched for BNC connectors at each end – ideal for making up RF attenuators, filters and bias tees. The frequency response shown in Fig 3 is the measured response of this filter. The isolating BNC connector used is not one recovered from a card, since these will not fit into the small enclosure.

Ground Loops

An additional problem, not mentioned above, can be caused by ground loops. Using isolating transformers alone can solve this, although of course you must ensure that there is no other ground path that compromises the measures you are taking. Here the isolated BNC connector found on the old network card can be useful, since it can be mounted in a screened box without automatically grounding the output connection on one side – it remains fully floating.

Transformers

In the transformer package there are three 1:1 transformers, again in a 16 pin DIP outline. There are also some versions around which use a 16 pin small outline (SO) package, but pin detail is the same for both. Where just isolation is needed these are excellent – 2 packages will provide all the isolation needed for every output port of a 4 or 6 way distribution amplifier for your 10MHz station source. Typical loss through each transformer at 10MHz is around 0.1dB.

Typical part numbers seen are 16PT-005B, ST7033 (SO16), PLC-1000, PT4235 – pin-out connections for all types (DIP and SO) are shown in Fig 6 below.

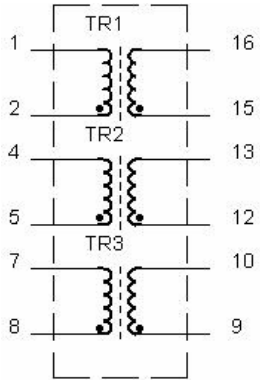


Fig 6 – Pin-out of the transformer package

DC-DC Converters

Although not of interest in the 10MHz application, small packaged DC-DC converters can be very useful for odd jobs around the work bench – and they're there for free if you've salvaged the other bits off the card! These are usually in a 24 pin 'wide' DIP package – ie 0.6" spacing between the rows of pins. They often only have a small number of pins installed, although I have seen the odd one which has most pins present – only 8 pins are actually used for connections. Most converters are 5V to 9V, with a 200mA capability on the output side, which is fully floating – so the output can be 'stacked' on the input, allowing around 14v to be generated. I have also seen some older converters that are 12v in and 9v out, which would allow up to approx 21v in stacked mode – this may be sufficient to operate some of the small 28v SMA relays that are around, directly off your 12v line. Handy when portable, or even for masthead mounted systems.

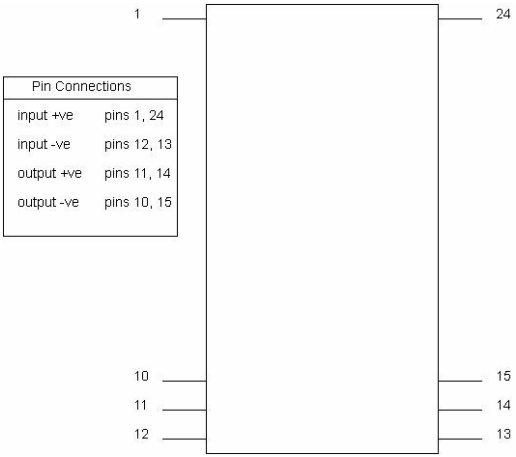


Fig 7 – DC-DC converter pin-outs

Typical part numbers are PM6133, DC-109 (both 12v to 9v), KUS-05090, PM6174 (both 5v to 9v) – connections are given in Fig 7, above.

Conclusions

If you're considering installing (or have already done so) a 10MHz reference source system in your shack, you can find useful parts that can be recovered from old PC network cards at very little cost. Once you begin to use a locked system you'll be surprised at the number of things you start to lock to it – that's when you get into the DAs, filters and isolators!

References

[1] http://g4hup.com/DA/DA1_4.htm

[2] http://www.tapr.org/kits_tadd-1.html

[3] http://www.thinksrs.com/products/FS710.htm

[4] http://www.uhf-satcom.com/misc/10MHz_dist/

BEACON NEWS

EMLEY MOOR BEACON CLOSEDOWN

The long serving 432, 23 and 3cm beacons **GB3MLE**, were shut down and removed from the 851 foot high TV tower at Emley Moor (IO93EO) on March 20th this year. John Denby, G3TSA, was given just the one visit to do the job. It's hardly likely that this location can be used again for amateur beacons since the tower and room in which the beacons were located is being reorganised for digital TV transmission.

For the moment, Peter, G3PHO, has all these beacons in his garage and, with the help of G3PYB and others, is attempting to find new homes for them. All the beacons need some refurbishment, if not a complete rebuild to modern standards, if they are to be put into service under new callsigns at new locations.

A few possible sites are being considered. What is paramount is that the beacons continue to serve the North and East of the country. The new locations will be chosen with that in mind.

The loss of these beacons has already been deeply felt in the North. Peter G3PHO feels as if he has lost old friends as they were so useful for lining up dishes and checking that the portable gear was working but, like a phoenix, they will "rise from the ashes" in the future!

Vale GB3MLE !

Some information on 2320MHz (13cm) Beacon changes

GB3PYS on 2320.925MHz in Newtown has been withdrawn from service by its keeper, as it was too great a burden and unrewarding for relatively few DX reports, ahead of the move to the new Ofcom NoVs. This represents only a modest loss of service compared to some other beacons. Now the good news...

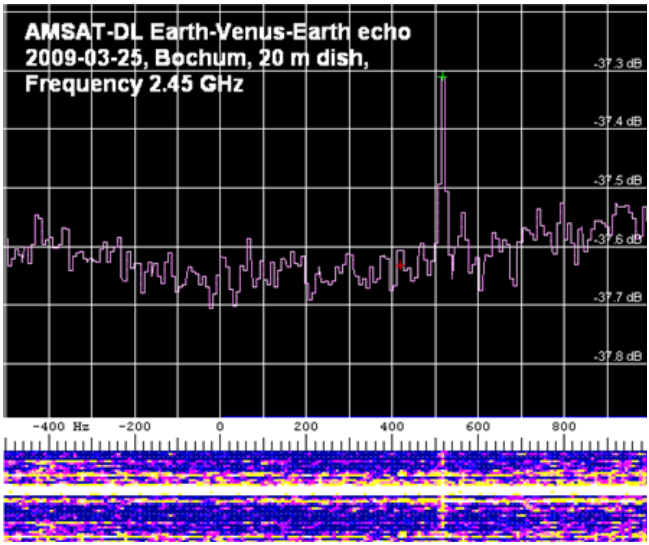
The PYS hardware has been transferred to the care of Martyn G3UKV who is the keeper for the GB3ZME Microwave Beacon cluster at Telford. The intention is to significantly refurbish the kit (inc the PA and a change to an Alford slot antenna) and put it on the new frequency of 2320.910 - the same decimal as other ZME beacons.

Meanwhile UK Microwave Group (as you may hear at the RAL roundtable) is considering a new beacon in the Bristol area which would reuse the original PYS 2320.925 frequency assignment but with a new frequency source and other hardware.

Comments on either of the above are welcome whilst RSGB is in the early stages of coordinating these plans

regards,

Murray G6JYB RSGB Microwave Manager



LEFT:

The received E-V-E echo received on the 25th of March by the AMSAT team at Bochum (see front page photo and article on page 4

OK "FIRSTS" … contacts between OK and the UK

A review by John., G3XDY

I have just received a batch of 6 claims for firsts from OK1KIR for contacts made with the UK. These provide a fascinating glimpse of the development of capability on the microwave bands.

The first claim is for the the first OK - G contact on 1.3GHz, made between OK1KIR/P and G3LQR on 16th October 1977, using CW and tropo propagation. Equipment used at the OK end was quite potent - 200W to a 1.8m dish, but the receiver front end was just a BFR91 (this pre-dates the GaAsFET era of course).

The second is for 2.3GHz for a tropo QSO with G4BYV on 3rd October 1980 on SSB. Equipment used was 20W to a 1.8m dish, and again a BFR91 front end.

The third OK - G claim is for a CW moonbounce contact on 10GHz from OK1KIR to G3WDG, which took place on 17th June 1994. This was using 16W to a 4m dish and an NE35376 front end.

The claimed first OK - GW contact on 1.3GHz is with GW3XYW via EME, which took place on 12th September 1982. By this date OK1KIR were using an MGF1412 front end.

There are two claims for GM - OK firsts. On 1.3GHz the contact was between OK1KIR/P and GM0USI/P on 1st July 1995 on CW via tropo.

The other GM -OK first is much more recent and is for the OK1KIR EME contact with GM4ISM on 3.4GHz on 6th June 2008. They were using 25W to a 4.5m dish and a DB6NT LNA for this contact.

If anyone knows of earlier contacts can they please get in touch with me at g3xdy@btinternet.com . I expect to issue certificates in May if no other claims are forthcoming.

73 from John G3XDY

Microwaves in Ireland

Mainland UK readers will be interested to learn of the growing activity on the microwave bands in Ireland. Recent emails from Tony (EI ???) tell of the following:

Just to let you know there was some **23cm** activity yesterday, Sunday 5th of April, in Ireland. I operated a portable station from IO53IV at 1400ft. Stations worked include EI3IX /P, EI7FAB /P and EI2MRG/P My station comprised of a FT817 with a 2.5w Kuhne transverter and a 35 element Tonna.

There are three of us EI3IX Joe, EI7FAB John and myself are keen to become very active on the microwave bands. I was on 3rd mountain in Dublin yesterday afternoon, Tuesday, 7 April but had no luck on **10GHz**. However I managed to hear G4BAO calling for me on 1296.200MHz CW at 579/599.

SIMPLIFIED BEACON KEYER

I've completely redesigned my beacon keyer to use the more easily obtained, cheaper and smaller 12F629 Pic device It retains all the same functionality of the previous 16F84 based one, including reprogramming via an RS232 interface with text based commands; provision of a Tx line as well as a key line to allow automatic transmissions; the ability to change CW speed within a message, for eg, low and higher priority information and programmable delays with key up or down. Tx or Rx mode contained in 'tokens' embedded within the message.

PCB layouts are included, with two layouts, one for the old DIL packaged PIC device (mounted SMT style) and a smaller one for the more available SOIC packaged device.

See **http://www.g4jnt.com/beacons.htm** and **http://www.g4jnt.com/BCNKEYER.ZIP**

Andy G4JNT

By Robin Lucas, G8APZ

CONTEST and ACTIVITY REMINDER

April

21-Apr 1900 - 2130 1.3/2.3GHz Activity Contest
Arranged by VHFCC (RSGB Contest)
25-26 Apr - 1296MHz and up **(French JA)**
26-Apr 0900 - 2000 All-band Activity Day
(Non competitive) Last Sunday in month

May

2-May 1400 - 2200 10GHz Trophy
Arranged by VHFCC (coincides with IARU)
2-May to 3-May 1400 -1400 432MHz & up
Arranged by VHFCC (RSGB Contest)
3-May 0900 - 1700 1st 24/47/76 GHz Cumulative
Aligned with IARU date
30-31 May - 1296MHz and up **(French JA)**
19-May 1900 - 2130 1.3/2.3GHz Activity Contest
Arranged by VHFCC (RSGB Contest)
31-May 0900 - 2000 1st 5.7GHz Cumulative
31-May 0900 - 2000 1st 10GHz Cumulative
31-May 0900 - 2000 1st 24GHz Cumulative

FRENCH JOURNEES d'ACTIVITE (JA)

20th-21st June - 1296MHz and up
12th July Sunday morning - 5.7GHz and 10GHz
Reflections from Mont Blanc
25-26 July - 1296MHz and up
29th-30th August - 1296MHz and up
26th-27th September - 1296MHz and up
24th-25th October - 1296MHz and up

Duration of all the JAs (except for 12th July) is from 17:00 Saturday to 17:00 Sunday

The winter is over, the clocks have gone forward, the weather should start to improve soon, and with it the activity levels on the microwave bands. The first of the major contests is not far away with the IARU "DC to Daylight" contest over the weekend of 2nd/3rd May. This contest usually produces some very good activity.

There is quite a bit of news this month on the beacons front, though not all of it is good news, I'm sorry to say.

I'll start this month with an email which missed my last deadline.

From: Dave Ackrill, G0DJA, Bolsover

23cm - The band still seems, to me, to be in poor shape compared to what was 'normal' over 12 months or so ago. The signals from **GB3MHL** seem lower and have even nearly disappeared below the noise level at times. I've only heard **PI7QHN** once and most other beacons that I normally hear seem lower in signal level as well.

I have made a plan to remove the piece of UR67 that connects the masthead pre-amp to the 4 way antenna splitter, in case that's part of the problem.

3cm - I've made some real progress on this band now, having ironed out a few problems to do with the change over relay. These were to do with the 12 Volt to 24 Volt circuits that I was trying to use to get the relay to swap over reliably. With the help of **G0EWN** and his **10GHz** power meter we were able to find out that the **DB6NT** transverter and power amplifier were producing a reasonable output. However, when connecting the relay in circuit very little output was being seen and a test of continuity on the relay showed it not changing over properly.

When I got home I went through the 12V to 24V circuit again and changed a couple of 'iffy' components and, hey presto, the relay worked OK!

My next task is mounting it all on the dish and then onto a tripod ready for the **10GHz** Cumulative Contest season. field' in case of problems in the future.

73, Dave

UK BEACON CLOSEDOWNS

The **13cm** beacon **GB3PYS** closed down during the weekend of 14th -15th March and the equipment was removed from the mast.

It is hoped that the beacon hardware could be used as the basis of a new **2.3GHz** beacon at **GB3ZME**. This should mean much better coverage.

On 20th March, the **GB3MLE** Emley Moor beacon complex was shut down, probably permanently. Apparently Arqiva need the space. The 70cm, **23cm** and **10GHz** beacons are now QRT and the beacon hardware has now been removed from the site. I'm sure we'll all miss this flagship beacon and thank the beacon-keeper and others for having kept the complex going for so many years.

Also under threat are the lower band beacons run by the Mid Cornwall Beacon Group, who advise that the electricity costs of running the **GB3MCB** 6m, 4m, 2m, and 70cm beacons exceeds their income, which is derived from donations.

These beacons will close down (possibly by the time you read this) unless the income situation can be improved.

For the moment, the **23cm** beacon and the proposed **10GHz** beacon are not in the close-down plans, since they are less power hungry. Nevertheless, there is still a real cost to beacon groups, some of which cannot rely on "free" energy supplies. For groups which rely on donations, particularly some of the smaller more remote groups, this could be the time for regular beacon users to check if their local group may be in need of assistance. Your donations could make all the difference to retaining or losing the beacons they run.

The Farnborough **23cm** beacon **GB3FRS** is QRT but is expected to return soon. The beacon is currently undergoing tests at **G8ATK**.

NEW BELGIAN BEACONS

A new Belgian **24GHz** beacon **ON0GHZ** (JO20GS) started test transmissions on the same weekend. Christophe, **ON4IY** is the keeper, and the new beacon on its GPS locked frequency **24048.050 MHz.**

Christophe sent a summary of the beacon position in Belgium, and says that things are changing rapidly in **ON**.

23cm ON0VRT on 1296.949MHz is now operational and on test.
13cm ON0GHZ on 2320.975MHz is QRV, and **ON0RUG** is ready - QRV soon.
6cm ON0GHZ 5760.975MHz is off for repairs due to be carried out in April.
10GHz ON0AZ 10368.875MHz should be operational again, but not heard yet in JO20HT. **ON0RUG** 10368.890MHz is QRV again following repairs. **ON0GHZ** on 10368.975MHz will be added this year.
24GHz ON0GHZ .050 (GPS locked, April 2009) and **ON0RUG** will be ready soon.

For the most up to date position, check on **www.beaconspot.eu**

LOW BANDS CONTEST

Mike, **G0JMI** wrote to say that he went out with three bands on Sunday 8th March for the low bands contest. From Holybourne Down (IO91ME), he made the a few contacts (which he found surprising considering the high wind and rain).

On **23cm** he worked **G4LDR** (IO1EC) on SSB with reports 56 sent, 52 received. He also worked **G4LDR** on **13cm** SSB when he gave 56 and received 51. Both QSOs were at a distance of 47km.

Mike also heard the **GB3OHM** beacon on **9cm** at a distance of 151km. Mike adds "My thanks to Neil **G4LDR** for the contacts and to Nigel, **2E0BUF**, for holding the dish down in the high winds and rain without whose help the QSOs would have been impossible.

It might not sound like much activity, but 144.175MHz seemed very quiet, which was not surprising considering the weather."

ACTIVITY CONTESTS

From: Dave Ackrill, G0DJA, Bolsover

I worked **G4BAO** and **G4LDR** in the UKuG lowband event on the 8th March on **23cm**, and on the 17th March in the RSGB 1.3/2.3GHz activity contest worked **G4DEZ**, **G3RIR**, **G8OHM**, **GM0USI**, **G1HLT**, **GM4CXM**, **GW8ASD**, **G4RGK**. I also worked Sam **G4DDK** just after the contest. At least we completed!

WELCOME LIFT IN CONDITIONS

On the 18th March, I logged in to 'KST as I do every morning and noticed there were a few reports of beacons up. **DL7QY** reported "super tropo conditions" to the south when he heard **HB9MPU/B** 24048.054 (254km) for the first time.

F6DKW noted that beacons were strong on **23cm**, and **G4BAO** said conditions were up a little after hearing **GB3MCB** on **23cm** which he normally hears only on aircraft scatter. **DK6JL** reported **GB3MHS** 599 on **9cm** and **GB3MHC** 539 on **6cm**. It looked very promising.

At around lunchtime, John, **G4BAO** was calling Dave, **G4GXL/P** in JO02hv on **3cms** by prior sked but didn't hear him. Half an hour later, Barry, **G8AGN/P** was on the band, and was heard by **G0EWN**. **G4BAO** chased Barry around (Barry appeared to have some drifting problems), but after an hour and a half with **G0EWN** passing on the latest QRG, John had to give up. It seems that although **G4BAO** was hearing Barry at CW strengths, Barry was not hearing John's signals - the power difference being about 3dB.

Meanwhile....Dave, **G0DJA** thought he might be able to hear **G8AGN** from home....

G0DJA 3cm horn from the shack window.

Dave aimed the small horn to waveguide unit which Gordon **G0EWN** had made for him out of the shack window and tuned around for Barry. *[Gordon had a good path to Barry, no matter where Barry pointed his dish, so by monitoring the 'KST chat room Dave knew that he was still out and transmitting.]*

At 15:28UTC he managed a two way contact with Barry **G8AGN/P** for his first ever **10GHz** contact from home - the last time he worked Barry on **10GHz** was in 1988, using WBFM.

After working Barry he moved the gear to the bathroom, which is on the North side of his house, to work **G0EWN** for his first 'home station to home station' contact.

Signal strengths were much better than his initial tests with Richard **G3CWI/P** and Peter **G3LRP** on the 1st of March - given the results of the tests afterwards at Gordon's place, he was surprised they heard anything at all from him at that time!

In the early evening, Guy, **ON4BHM** asked if anyone wanted to be his first **G** on **3cm**. A QSO with John, **G4EAT** quickly followed with good signals both ways. Guy then went on to work Russ **G4PBP** at 457km on SSB with lots of variation in signal strength. A test with **G4BAO** produced nil, but Brian, **G4NNS** was able to copy a signal from Guy, except it was too weak for SSB (Guy is SSB only). Guy then had a QSO with **G3XDY** (very loud!), and **G4FSG** to bring his total up to 4 **G** stations. **ON4BHM** has 20W and an 80cm dish on **3cm**.

RAINSCATTER SEASON

Rising summer temperatures across Europe enable much higher rain clouds to form, and to lengthen the paths workable on rainscatter on the bands above 3GHz.

Rain clouds at a height of 2-4km can produce scatter paths in excess of 200km, with really high clouds producing rainscatter contacts up to 900km. !

PA5DD has an excellent internet tool to show where the rain is. You should be looking for the darker blue, and in particular the red colours on the screen, which indicate very heavy rain. The web page allows stations to work out headings for a common volume of rain, together with distance, just by pointing the mouse. Given a good takeoff, cells as far away as 450km can be useable, and the signal strengths can be very high. The URL of Uffe's site is:

http://home.hccnet.nl/uffe.noucha/weurope.htm

Just because there is a bright sunny day where you are, it doesn't mean that there will not be some heavy rain perhaps 450km away from you, so it is always worth checking. The RS "season" normally extends from late April through to August.

ALL BAND ACTIVITY DAY

From: Bob, G8DTF

I've just returned from a couple of hours on Winter Hill and I thought I would report my activity on **3cm** on the 29th March 2009.

The system I am using is about 1.5W from a Down East Microwave transverter and a 20dB horn. The **GB3XGH** beacon is very strong and audible in most directions on Winter Hill. I took my PC and a "3" wireless internet dongle and used KST. The first attempt was with Richard **G3CWI** who was about 53 and we were able to have an easy SSB contact, despite having a little trouble with an RIT offset on the FT817. I was just finishing with Richard when I heard John **MW1FGQ** calling me. When I turned the horn towards John he was very strong peaking S9+ on my FT817,

not bad for an estimated 60mW.

I then went back on KST to find a message from Neil **G4BRK**. When Neil started calling I found him and peaked the horn but he was still very weak on CW. I had no key or keyer so I had to call on SSB. After some difficulty we managed to exchange information - Neil was 51 with me and he gave me 52. (Richard **G3CWI** noted on KST that this was 231 km.) It was only after returning home I realised where Neil was and that I would have been more than happy with such a contact on **23cm**.

Not bad for 1.5W and a horn. I'll have to get my dish feed sorted out - another 10dB will make a lot of difference.

Regards, Bob G8DTF

EME - DUBUS CONTEST

From: Chris Bartram, GW4DGU, IO72

10GHz during the Dubus contest (28/29 March).

I finally managed to get back on the band after taking a couple of days off to rebuild the tracking system and repair the TWT PSU - which I dropped while setting-up for the ARRL contest back in the autumn. After a certain amount of playing with a shaft encoder which appears not to be what its label says, I have had the system autotracking very nicely. I'm about to update from a system using incremental encoders to a new one using absolute encoders, as that will give me greater certainty when I'm using the dish for astronomy and on the lower frequency bands, where its not as easy to use Moon noise for tracking as on **10GHz** and **24GHz**. The tracking program I use is currently **IN3HER**'s Rotosys32, and I'm working on the interface for his RotosysABS software.

It's a pity that Raimund's approach hasn't been used more widely, but that may be because of misconceptions that the system only works with a specific modified computer mouse. That's not the case, and with a simple PIC interface it can be used with, almost any incremental encoder.

I like the way in which the Rotosys software needs relatively little hardware external to the computer.

Our weather didn't allow operation on Saturday (high winds - F8 Beaufort), since I had the problem with the shaft encoder, but that was easily corrected.

This weekend wasn't optimum for microwave EME. Perhaps in the future EME contest organisers should choose weekends where the Moon is closer to perigee for the higher frequency band sections. Just over a dB makes a lot of difference, and this was reflected in a greater proportion of TMO reports than usual.

Despite that, I worked everybody I heard in the few hours I was able to be QRV: **F2TU** O/O, **G4NNS** O/O, **F5JWF** M/O, **ES5PC** 559/559 (1st **ES-GW** QSO on 10GHz), **OK1KIR** O/O, **IQ4DF** 559/599, and **W5LUA** O/O. **WA6PY,** who I've worked previously, heard me but I didn't hear him - more CQs needed! My results compare well with stations with much larger antennas.

In view of some of the misinformed comments which have recently been made on 'ukmicrowaves', it's worth noting that all of these contacts were 'random' i.e. not scheduled, and there was no talkback of any kind used. All were made using straightforward CW sent in my case using an old fashioned straight key, and were received using Mk.1 ears and the usual wet-ware behind them. Narrow filters don't help me read the 'tuned noise-in-noise' signals characteristic of **10GHz** EME, and so I used a standard 2.4kHz bandwidth SSB receiver. I didn't even turn the SDR on!

The TWTA I used for these contacts puts about 40W into the feed, which is a Skobelev dual-mode horn. That's very well matched to my 2.4m 0.935f/D offset dish, which seems to have an aperture efficiency of around 65%, or maybe slightly more. The receive preamp is home made using an NE32584 and has a noise figure of about 0.7dB, however once the losses in the coax relay and short lengths of RG402 are factored-in, the noise figure rises by about 0.3-0.4dB and the contribution from the dish leads to a system noise temperature of about 110K. Not very good, but I'm working on improving it. A good WG based system should be capable of a noise temperature of about 55 - 60K with my feed/dish or nearly 3dB improvement in threshold.

With the current system I see in excess of 13dB cold sky to Sun, and a little more than 1.5dB cold sky to Moon.

73, Chris GW4DGU

Well done to Chris in achieving the first **ES-GW** on **10GHz**. A lot of work goes into an EME system to achieve such good results.

Brian, **G4NNS** also took part in the **10GHz** section of the Dubus EME contest, and although Brian says the going was slow, he worked **WA7CJO** and **LX1DB, GW4DGU, ES5PC**, **F5JWF** and **F2TU**.

OK1CA was heard, but he wasn't heard calling CQ and didn't go back to any of Brian's calls. **G4NNS** uses a 3.7m solid dish with a modest power output (less than 18W).

... AND FINALLY

My thanks to this month's contributors for the emails, and activity reports. It is always appreciated to have some material to work with!

I have had to close the column a little earlier than usual this month, since I'll be in France for a few weeks. I'll be attending CJ2009 at Seigy, so I hope to have some photographs for the next issue.

73, Robin, G8APZ

Please send your activity news for this column to:

scatterpoint@microwavers.org

FOR SALE AND WANTED

WANTED - 3cm EQUIPMENT

I am looking to get onto 10GHz. Has anyone got any 10GHz equipment for sale? if so please e-mail me at chris.yln@blueyonder.co.uk
Chris GM4YLN

WANTED - HISTORIC PHOTOGRAPHS

OE3WOG is editing the web site microwave page of the "Austrian Amateur Radio Society" (OEVSV), and has asked for pictures or photos from the UK showing portable microwave stations, parts, equipment, or contest activities both recent and historical. If you can help, please contact Wolfgang by email: oe3wog@oevsv.at

FOR SALE - 6cm PREAMP

New and unused DB6NT HEMT 5.7GHz preamp in original packing.
It is the two stage model MKU 572 AF (F means internal filter). The input connector is SMA male (for connection directly onto relay), and the output is SMA female. Manufacturer's NF is 0.8dB and gain 22dB.

Reason for sale? There isn't any room for it in my masthead transverter box!
The new price from Germany (incl post) is €265 but I'll sell it for £175.
(UK insured postage free, Postage outside UK extra).

Please email me at g8apz@g8apz.org.uk
Robin G8APZ

OFCOM LICENSING CHANGES

The latest repeater minutes on the ETCC website have this:-

Transfer of NoV system: Issuing NoVs is being migrated on to the main licensing system at Ofcom. This will permit them to be tied to the holder's licence. A team of six people are being trained to operate the system. It is proposed that ukrepeater.net will be used to give users an indication of the operation status of the all amateur repeaters. This is already an ongoing project being managed by G7UZN and GM8LBC.

With effect from 23rd March 2009, all applications, feasibility requests, NoVs, etc that require processing by Ofcom's Licensing Centre should be emailed to:

radioamateurNOV@ofcom.org.uk

A SATURDAY OUT ..

We are having a build/alignment day for the twenty-five 3cm converter kits that were produced as part of a push to get local Cambridge amateurs onto narrow-band operation. It will be held on Saturday 18th April from 10.30 - 17.00, and anyone in or around the Cambridge area is very welcome to drop in and see what is happening during that time and have a natter. The venue is the NT's Anglesey Abbey site, so have a look round the house and gardens, while you're here. The new complex has a very nice restaurant too...

Details at:

http://www.earf.co.uk/aa.html

Bernie G4HJW