An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

August 2011

Published by the UK Microwave Group

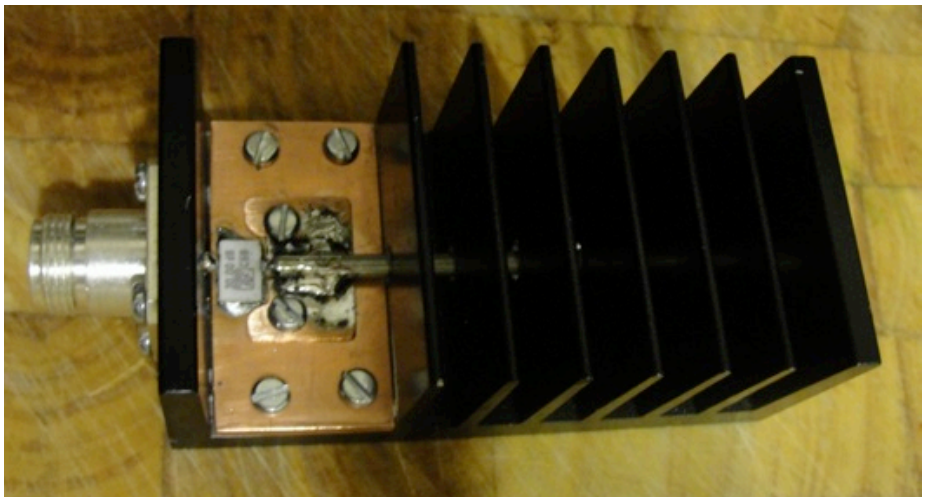
30dB attenuator using a Florida Labs C6B Chip.

by

Colin Ransom

G8LBS

See page 6



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Latest News

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

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Editor's bit

Another bumper edition, and a summer special extra (you don't normally get an August edition). Thank you to all contributers.

Readers, please let me have your ideas for topics, even if you don't feel able to write an article yourself.

Don't feel held back at producing an article because your command of English isn't too good (I only got a Grade 5 Eng. Lit.) as I will do the necessary to massage the words.

73 de Martin G8BHC

Articles for Scatterpoint

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

Please send them to

editor@microwavers.org

The CLOSING date is the FIRST day of the month

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

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

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

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

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

Thank you for you co-operation.

Martin G8BHC

UK MICROWAVE GROUP

SUBSCRIPTION INFORMATION

The following subscription rates now apply.

UK £6.00 US $12.00 Europe €10.00

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

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

You will have to make a quick check with the membership secretary if you have forgotten the renewal date. 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.

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

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Optical (nanowaves) comms and definitions

21st July 2011, Stuart, G8CYW, Brian, G8KPD, and Gordon, G8PNN assisted by Peter, G8POG made contact over a 46.2km path using red LEDs in daylight. Stuart was located on Hisehope Head County Durham, IO94AT12, and Brian and Gordon were at Winter's Gibbet, Northumberland, IO85XF31. A two-way QSO was established at 8.45pm BST after hours of effort lining up, recalibrating, and Brian, Gordon and Peter having to retreat to their cars due to an invasion of midges appearing from Harwood Fores.

QSOs were made between Stuart and Brian on FM and SSB, signals were 59+ despite the receiver noise of S7 due to the light. Contact was then made between Stuart and Gordon (using his own rig) also on FM and SSB at the same signal strength, we actually used optical FM between myself and Brian as talkback while Gordon lined his rig up and joined in. I was reported to be booming out of both receivers when this was completed. All contacts were made using LED transceivers using the same LED on both receive and transmit, no photodiodes were brought by any of the three stations.

There has been some discussion over what constitutes a “daylight QSO”. The NE group use the astronomical definition of sunrise to sunset. On this day, sunset was at 9.31 BST so the sun was in the sky, and although there was patchy cloud, much of the ground was in obvious sunshine, indeed at one time Peter made an effort to use a mirror as a heliograph to signal me since he had forgotten to bring the lead for his strobe and we had to manage without it (I could not see the heliograph signal). I used a 200mW laser attached to a theodolite as a marker as well as the extreme beacon. The extreme beacon was seen straight away by the Northumberland group but the laser was far more difficult to aim, even with the micrometer-style adjustment but much brighter when seen at the far end, unsurprisingly. Full safety precautions were in place for the brief use of the laser, brought with me due to my position being unseen at the last attempt. This time the visibility was much better.

The main point of the expedition was to try our separate IR (850nm and 940nm) gear, which was unsuccessful, we only took the red (630nm) gear due to Barry and Gordon's recent sucess, yes it it easier when you can see the beam from the other end!

Stuart, G8CYW

What is “Daylight”?

From: Gordon Fiander, G0EWN

A number of people are now experimenting with optical as well as IR frequencies during daylight. Despite references in the literature to 'daylight receivers' no references could be found to distances worked. G8AGN and G0EWN decided to investigate possibilities and have made 3 'daylight' contacts; 600m at 59+, 10km at 59 and a 20.7km path from Emley to Edgemount with signals of 52 both ways in bright summer sun (a UK daylight record?).

At the moment G8AGN and G0EWN have chosen to define a daylight contact as being local noon +/- 2 hours, rather than a much less stringent dawn-to-dusk definition. (In fact some paths worked in the past would have possibly counted as daylight, under a dawn-dusk definition, as signals were heard just as the sun went down).

As usual, since starting these tests we have now become aware of a daylight 21.5km path having been worked in the USA. This may be the current world record for a daylight contact with visible

light/red LED. However this should be capable of being exceeded and, unlike night time contacts where high mountains and deserts feature in the very long distance records, there should be a much more level playing field with daylight contacts.

Whilst the work you report here is interesting I feel it doesn't constitute a “daylight record”. Going by the astronomical definition of sunrise sunset, the contact between Roper Hill and Harpswell at 66km that Barry and I made earlier this year would have qualified as a 'daylight’ contact.(The sun was also above the horizon). It was precisely to avoid blurring the distinction between between night and day time contacts we chose to call a daytime contact as occurring a couple of hours either side of noon – i.e. when the sun is at its highest parts of its daily transit. Unless we have a fairly rigid definition of what really constitutes a 'daylight' contact we will devalue any claims made. If you can repeat the distance during the more exacting definition of daylight I would be happy to accept it as a record. If not then I think Barry and I would claim 66km. There has been some correspondence with nanowavers in the States and Australia – both groups seem to have accepted the stricter definition as the basis for 'daylight' contacts. If we don't apply the narrower definition then the only claims that will make a difference will be night time contacts – everything else will just be of general interest.

Best wishes, Gordon, G0EWN

Crawley Microwave Round Table – 11 Sept

Location: Hut 18, Tilgate Recreational Centre, Tilgate Forest, Crawley

The programme on the day will be similar to past years and include talks by Mike G3LYP on the work he's been doing on LOs for 3.4GHz, inspired by Paul Wade's talk at Martlesham, and Chris Bartram GW4DGU, who suggested that he do a talk on phase noise in local oscillators and what it means.

If there is time, we are also proposing an in-house presentation of some current "work in progress" on a simple diode RF milliwatt power meter usable up to 6GHz with a dynamic range of at least 40dB from -25dBm to +15dBm based on some work reported by DL5NEG. We are also hoping that we may have printed circuits and chip components available on the day for the RF head. The presenter will be Peter Head G4FYY plus myself.

Provisional times:–

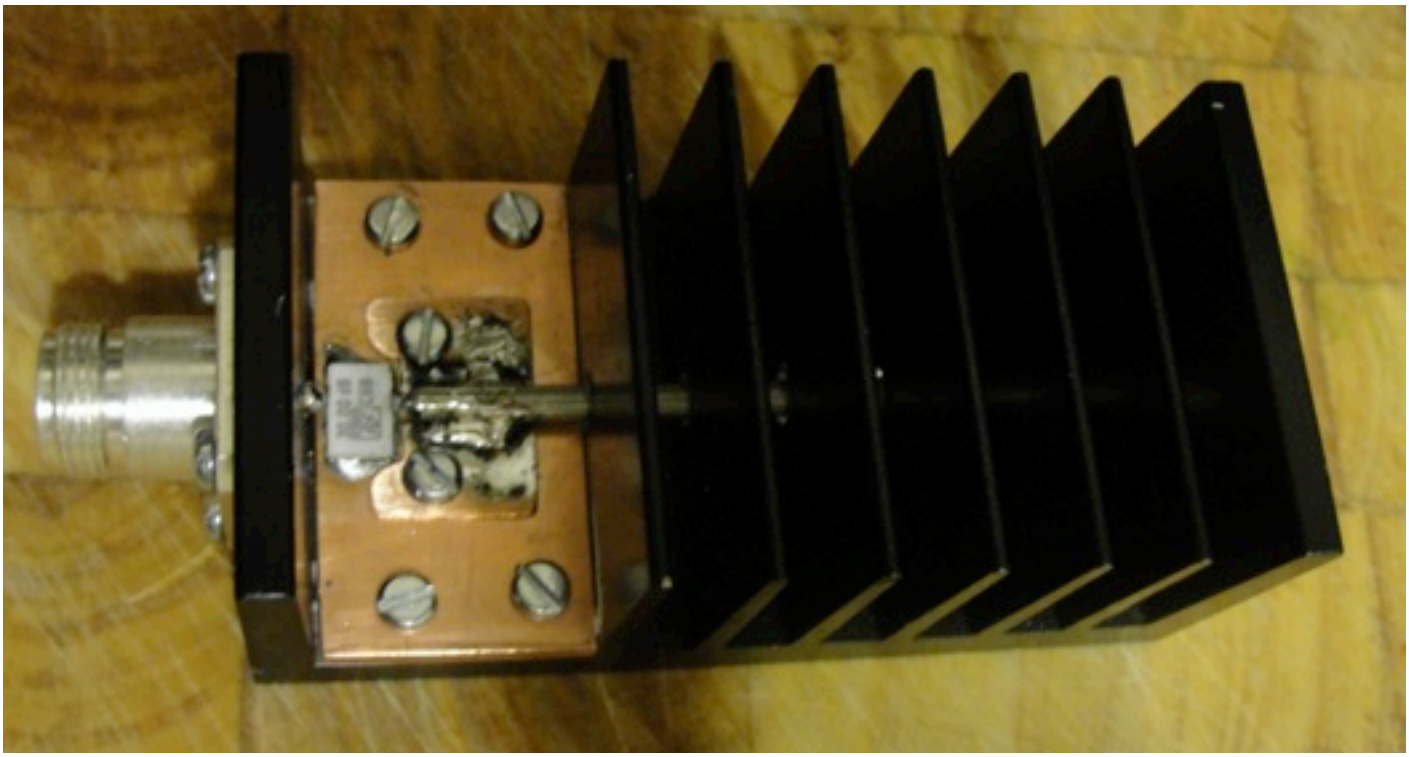
10-00	Doors Open
10-30	Official Start Time – Tea Bar Open
10-30 – 12-30	Informal Session, Bring & Buy, Display of entries in Constructional Contest.
12-00	Judging of constructional competition starts
12-30 – 13-30	Lunch Break. - Tea, Coffee, Bacon "butties" etc. Rolls etc.on sale as usual.
13-30 – 13-45	Chairman's Opening Address & Presentation of G3VVB trophy
13-45 – 14-25	Talk No.1
14-30 – 15-15	Talk No.2
15-15 – 15-30	Tea Break
15-35 – 16-15	Talk No.3
16-15 – 16-50	Talk No.4.
17-00	Official Close

73, Derek Atter, G3GRO, Hon. President, CARC

A 30db Power Attenuator

using a Florida LABS C6B Chip

By Colin Ransom G8LBS

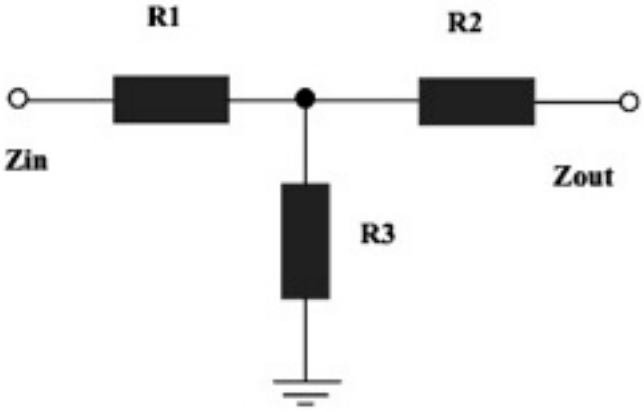


Introduction

A while ago I purchased on e-bay a couple of Florida Labs 30db attenuators with a rating of 100Watts with a response up to at least 3GHz. My immediate thought was to use one of these to construct part of an accurate power meter for use up to at 2.3GHz and possibly beyond. The following is how I went about the project; other constructors will, undoubtedly, have different ideas and methods that will achieve the required end result.

Theory

The Florida Labs C6B attenuator package measures approx 6.5mm x 9.5mm x 2.2mm thick with a tab width of 1mm. A ceramic cover protects the substrate, the bottom of the package is tinned and acts as a large ground connection. A measured value of 94.4Ω between tabs suggests an internal **T** configuration, with an equivalent schematic:



Where Z1=Z2=50Ω, R1 = R2 = 47.2Ω and R3 ~ 3.2Ω.

The useful 30dB attenuation factor equates to a 1000x power reduction, so 1W in gives 1mW out, 100W in gives 100mW out, etc. To handle high amounts of power the heat sinking must be adequate. To handle full power (100W) the device must remain below

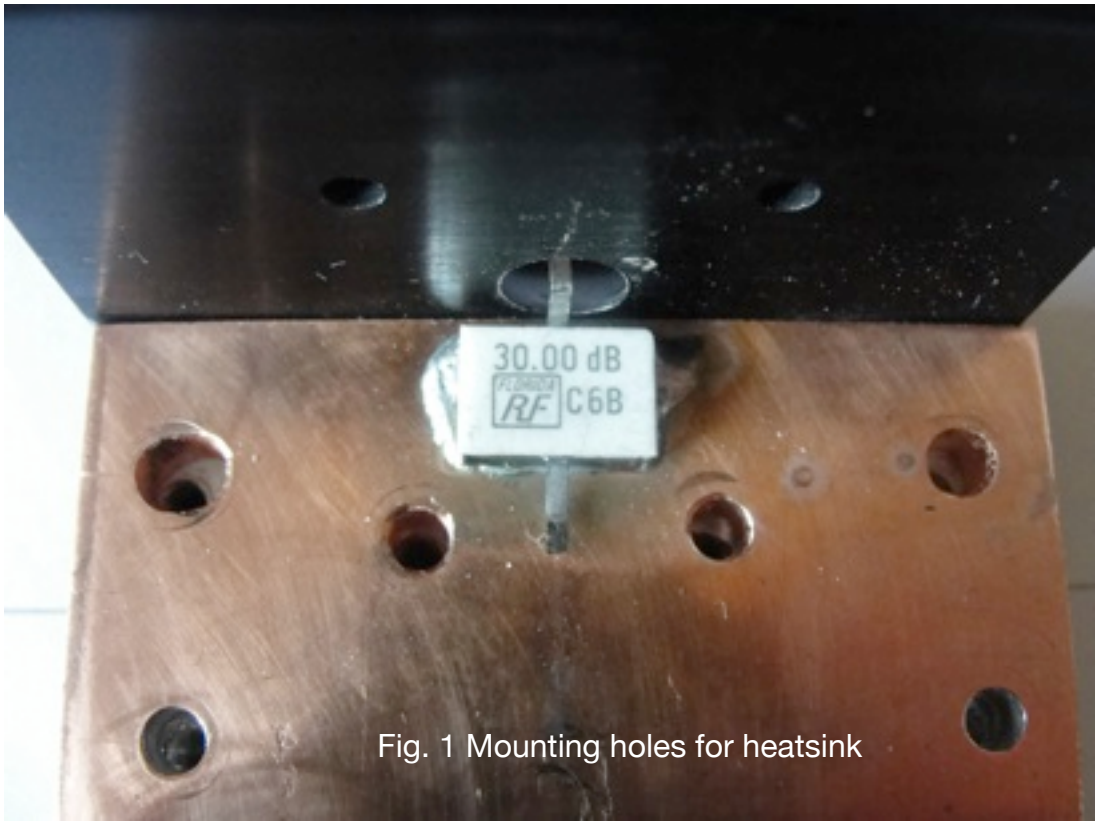


Fig. 1 Mounting holes for heatsink

85C. The datasheet shows the de-rating to be accounted for as the case temperature rises to its maximum of 150C.

Construction

An unused heat sink measuring 100mm x 50mm x 40mm was found and although probably not ideal for protracted 'burns' it will suffice for short test purposes at high power. The 2nd & 3rd fins from one end were removed. Fin 1 was about 5mm thick and was later drilled for an N-type 4-hole fixing socket. The resultant cleaned out area, about 26mm x 50mm, was first filed reasonably flat, then further flatted using 600 grade Wet or Dry abrasive paper glued to a one inch wide milled aluminium bar. Those with access to milling facilities will find the job much easier and more accurate. A piece of 4mm copper plate for the heat spreader was to hand so this was then cut and filed to size. 6mm would be better if you can find it, but remember it will take more heating to solder the device. To facilitate mounting this to the heat sink, two 3mm clearance holes were drilled each side and a further two either side and to the rear of the device (Fig 1). Using the copper plate as a template, mark off and drill the corresponding holes in the heat sink. I chose to tap these holes for 3mm screws. Both sides of the heat spreader were then wet ground against 1200 grade Wet or Dry to ensure perfect flatness. I use a piece of 6mm plate glass under the abrasive paper as a flat surface.

Make sure the heat spreader sits flat against the heat sink. Make sure everything is free of swarf and burrs. Test the integrity of the hole positioning with the mounting hardware, then lightly mark the topside with a marker pen to ensure future correct repositioning. Little or no daylight should be visible between the mating surfaces. If you are happy all is in order proceed to mounting the device. First clean the underbelly of the device (I used a well-worn washing up pad and soap). Although the tech sheet says it's tinned, I wasn't going to take any chances so I smeared the underside with the merest trace of SMD flux and lightly re-tinned it using a 25W iron. Fix the heat spreader in a vice using card between the vice and the copper to help stop heat transfer.

Make sure you have easy access to the underside for the big soldering iron or small blow torch.

Cut the input tab to a length of 2mm. Leave the output tab uncut. Position the device in the middle of the spreader leaving about a 1mm gap between the body and the edge of the copper. With a piece of thin aluminium sheet and a bit of dexterity I used the existing screw holes to clamp down the output lead. This will cause the device to spring upwards leaving a gap underneath. Having checked the device will press down into its final position I smeared a tiny amount of flux on the copper. A 5mm length of 22swg flux cored solder was then placed under the device. Using a 250W soldering iron on the underside of the heat spreader melted the solder fairly quickly. A piece of wood was then used to hold down the device as firmly as possible until it was certain the device was bonded. A small amount of solder will probably squeeze out. The heat was removed and the pressure maintained until the solder solidified.

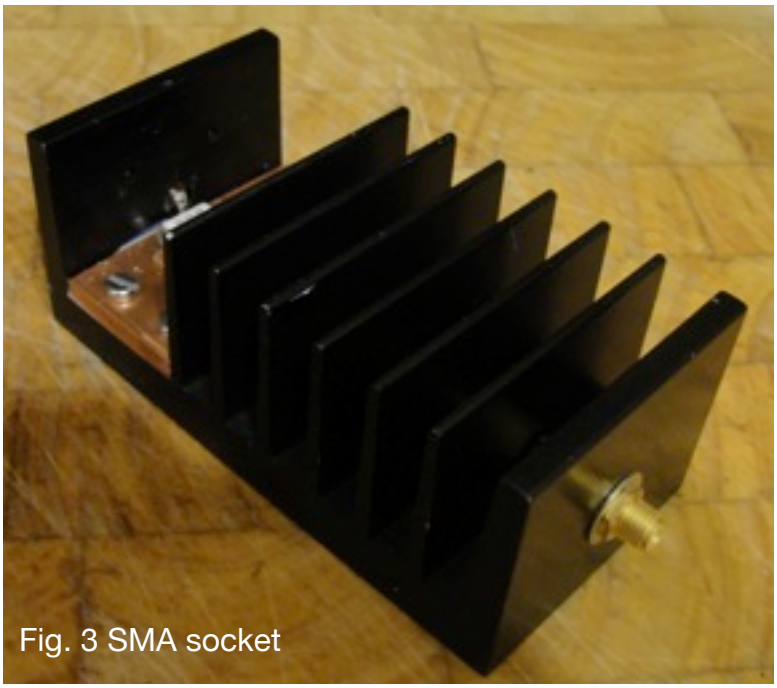


Fig. 3 SMA socket

With the assembly temporarily in place on the heat sink the position for the exact centre of the N type socket was measured. A pilot hole was drilled and, as luck would have it, the hole was dead centre to the lead on the device. A centre punch dot in exactly the same position was then marked on the other end of the heat sink. A 6mm hole was finally drilled, countersunk with a larger drill to accommodate the socket's shoulder, finally the four holes for the screws were drilled. Again I drilled and tapped these for 3mm.

Fig. 4 coax termination at device

The heat sink was then taken to a friend who owns a large pillar for the rest of the drilling. The heat sink was accurately positioned and a 6mm drill was run through the fins from the rear. You may of course have your own ideas about connecting to the output tab. In my case I used a length of 3.5mm metal clad PTFE dielectric coax and an SMA bulkhead socket. (Fig 3) The end fin was opened out to 8mm to allow the whole of the SMA body to fit in the gap between the fins leaving just the threaded portion protruding. The outer of the end connected to the output tab was soldered to a thin piece of shaped copper sheet (Fig. 4), this was only loosely secured down and a piece of paper slipped underneath to prevent heat transfer. I

never tried soldering the shield directly to the heat spreader as the heat would probably have re-melted the solder under the device. When a nice large fillet had been achieved each side the paper was removed and the thin copper piece was finally tightened down. Make sure all surfaces are nice and bright to ensure connectivity. Cut the spill on the N type so that it is flush with the inside of the 1st fin. Mount the N type socket on the end of the heat sink, making sure the input tab of the device just fits inside. If the spill is solid after trimming, run a 1.5mm drill in just enough to take the tab. Secure the socket with the screws and finally solder the tab into the spill. A pointed bit in a 25W iron will easily do this. Last job is to connect the inner of the coax to the attenuator chip. (Fig 4) .The fixing detail is also shown. A bit of a fiddly job, a case of measure and cut, measure and cut to get the exact length. Suffice to say, keep the tabs as short as possible. Don't forget a smear of heat sink compound on the underside of the heat spreader before final assembly. Also check the underside for any attached solder nibs from the device fixing process and check again for swarf between the mating surfaces. A tinplate cover for the whole of the device/ heat spreader area will probably be fabricated at a later date.

A quick test using my IC-746 on 144MHz showed a ballpark figure of 100mW for 100W input, bearing in mind my 30 year old Hanson FS7 VHF/UHF power meter is not spot on.

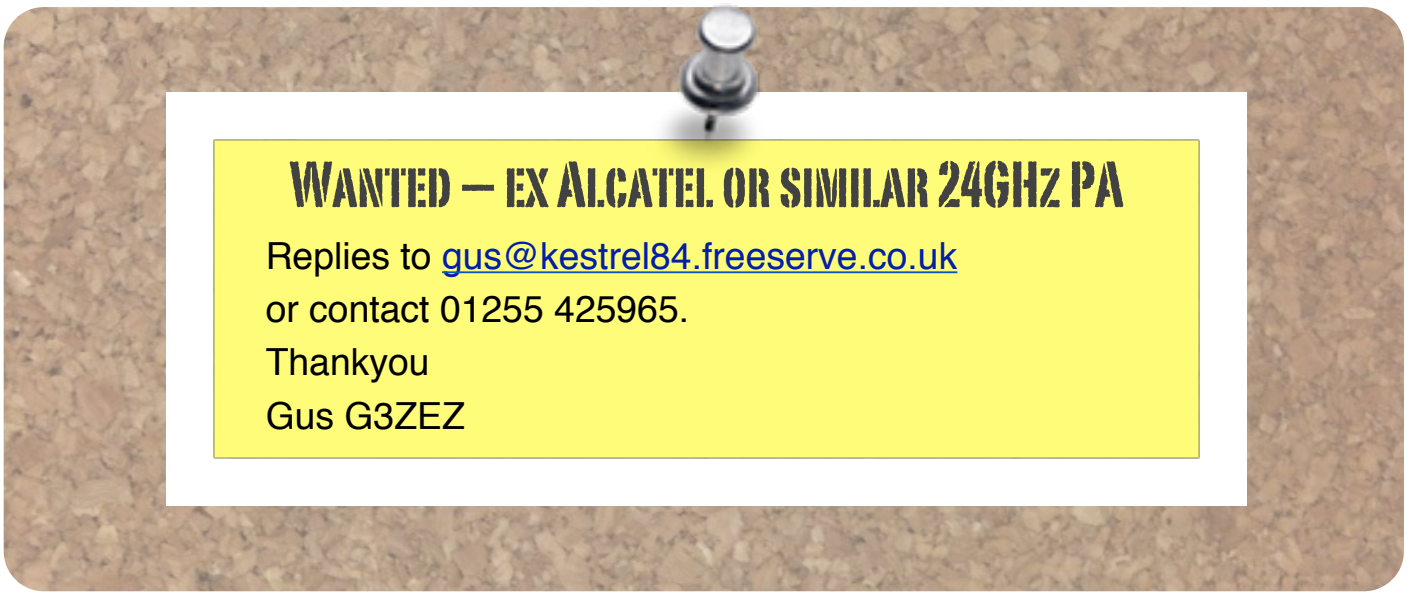
The Power Head

I am hoping to get a power head / digital display finished by, and hopefully published in, the next Scatterpoint. I intend to use an AD8362 Tru-Power Detector (DJ8ES circuit) in the power head driving a 16F88-1/P PIC which will in turn drive a 16 x 2 large digit LCD readout. This and the PIC was acquired from Rapid for less than £12. The original article for the power meter was published in the December 2010 issue of Everyday Practical Electronics, the main PCB and firmware for the PIC was (with thanks) downloaded from that source.

Colin Ransom G8LBS

Reference

http://www.emc-rflabs.com/IMG/pdf/83-7006TC%20EDD.pdf



The Bodger's Guide to..
A high-side/low side 432MHz Receiver downconverter for use with the SDR-IQ and similar 28MHz receivers

By Dr John Worsnop G4BAO

Introduction

I have "got used" to using my SDR-IQ receiver on the microwave bands, and I have a switching box with a 144MHz – 28MHz downconverter that enables me to use it as a separate receiver on all bands.

This articles describes a 432MHz receive downconverter that uses the SDR kits QRP2000 USB-synthesiser (Reference 1) as an external local oscillator. This allows it to operate with the LO either 28MHz above or below the 432MHz band.

> *Note that you need to order the version of the QRP2000 with the Si570BBB000141DG device covering up to 810 MHz. See Reference 1 for details*

So why no Bodger's LO design then?

Three things drove this converter and its slightly unusual approach:–

1. I recently set up to operate on 70cm and, quite frankly, missed the SDR facility!
2. My latest 24GHz system uses a Thales Module with a 432MHz IF, but with high side LO injection, meaning that with a conventional 432MHz converter, the SDR-IQ would have to tune backwards, 28-26MHz and be switched to LSB.
3. I could see no reason to "reinvent the wheel" when such a good LO was available as a kit.

Using a synthesised LO means that I can operate it at 404MHz directly from the 70cms antenna or at 460MHz to down convert the 24GHz to 432MHz high side IF and tune 28-30MHz USB as normal.

You may wish to simply use this downconverter design with your own LO and switchable crystals or synthesiser, but I have used the USB-synth as an LO source multiplied up 192 times as a 24GHz source and it is really excellent.

Circuit description

The circuit design is very straightforward.

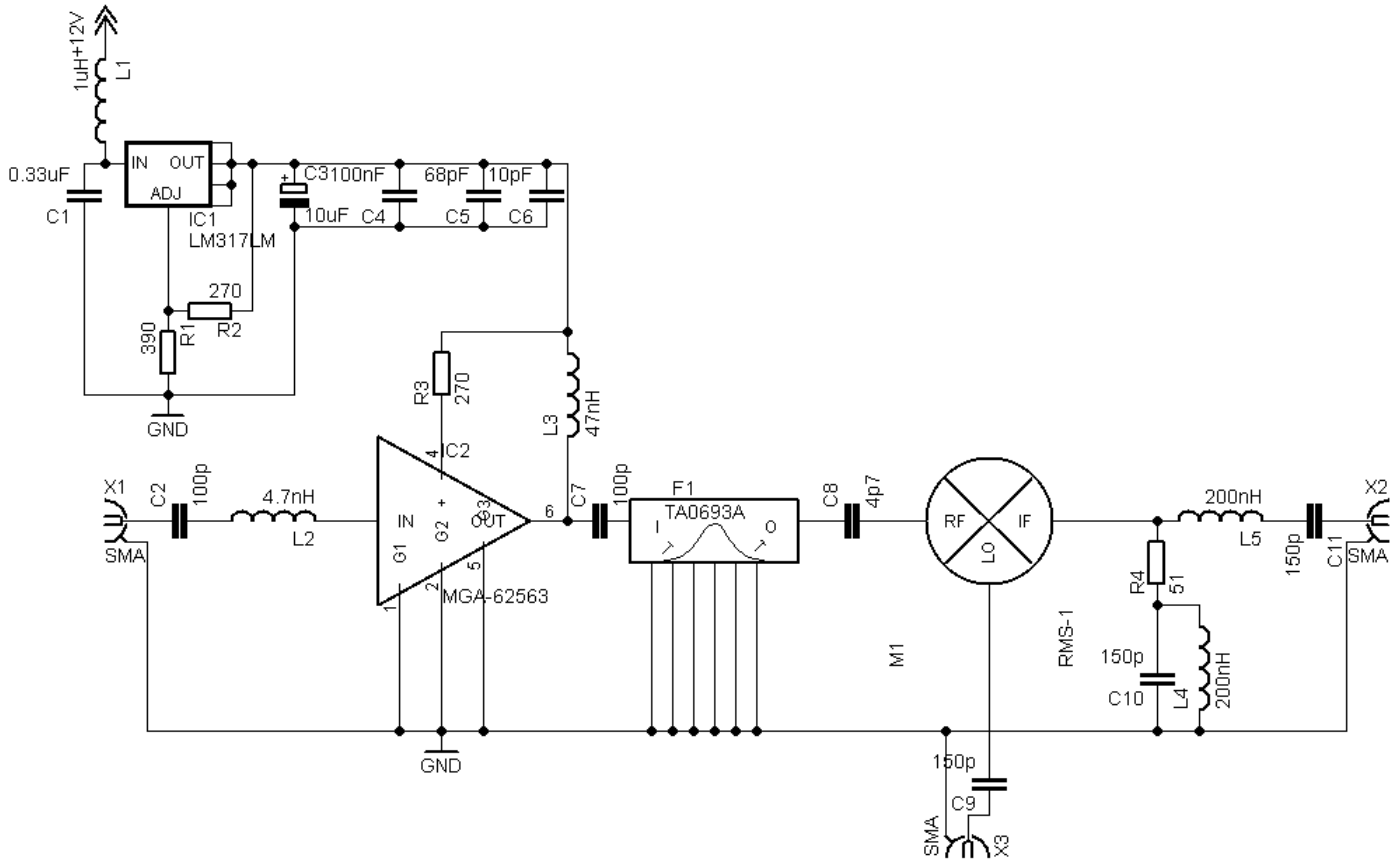
IC1 is a voltage regulator allowing the circuit to operate from a raw supply up to 27 volts.

IC2 is a MGA-62560 pHEMT gain block matched to the 70cms band with C2 and L2.

The IF filter F1 is a TA0693A 10MHz wide SAW filter, centred on 435MHz.

The diode mixer M1 is a 500MHz, +7dBm LO mixer from Mini-Circuits. The IF output is terminated with a diplexer designed to pass 28MHz and remove other signals from the mixer output.

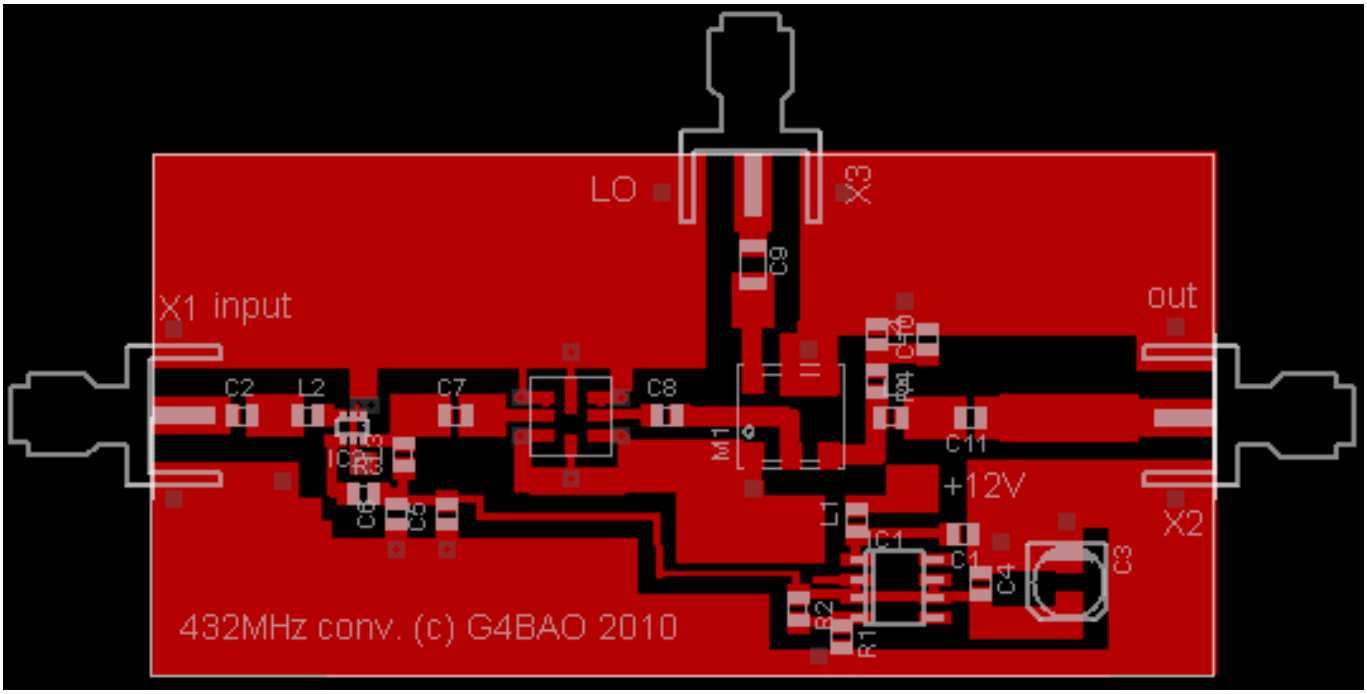
Circuit diagram

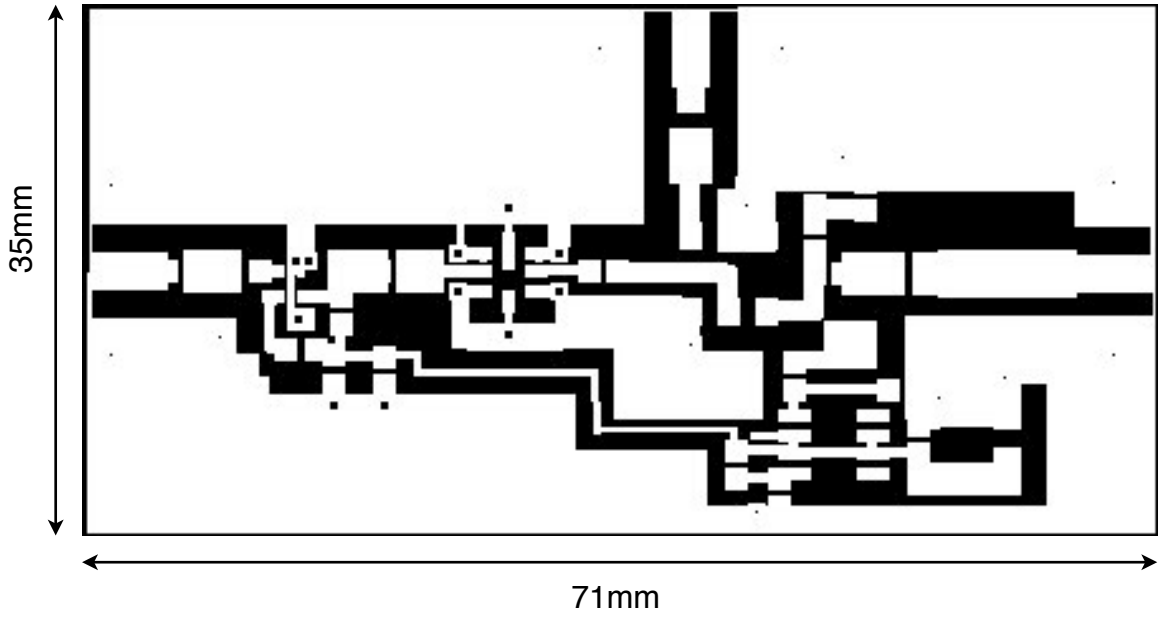


PCB layout

The PCB is made from 1.6mm FR4 material, is designed to fit in a standard tinplate box and can be terminated on the box with the connectors of your choice. A standard size preamp box from Alan G3NYK 37 x 74 x 30mm. The 71mm dimension is correct to scale the PCB, just cut oversize (74mm) to fit the box

Eagle files for the PCB can be downloaded from www.g4bao.com





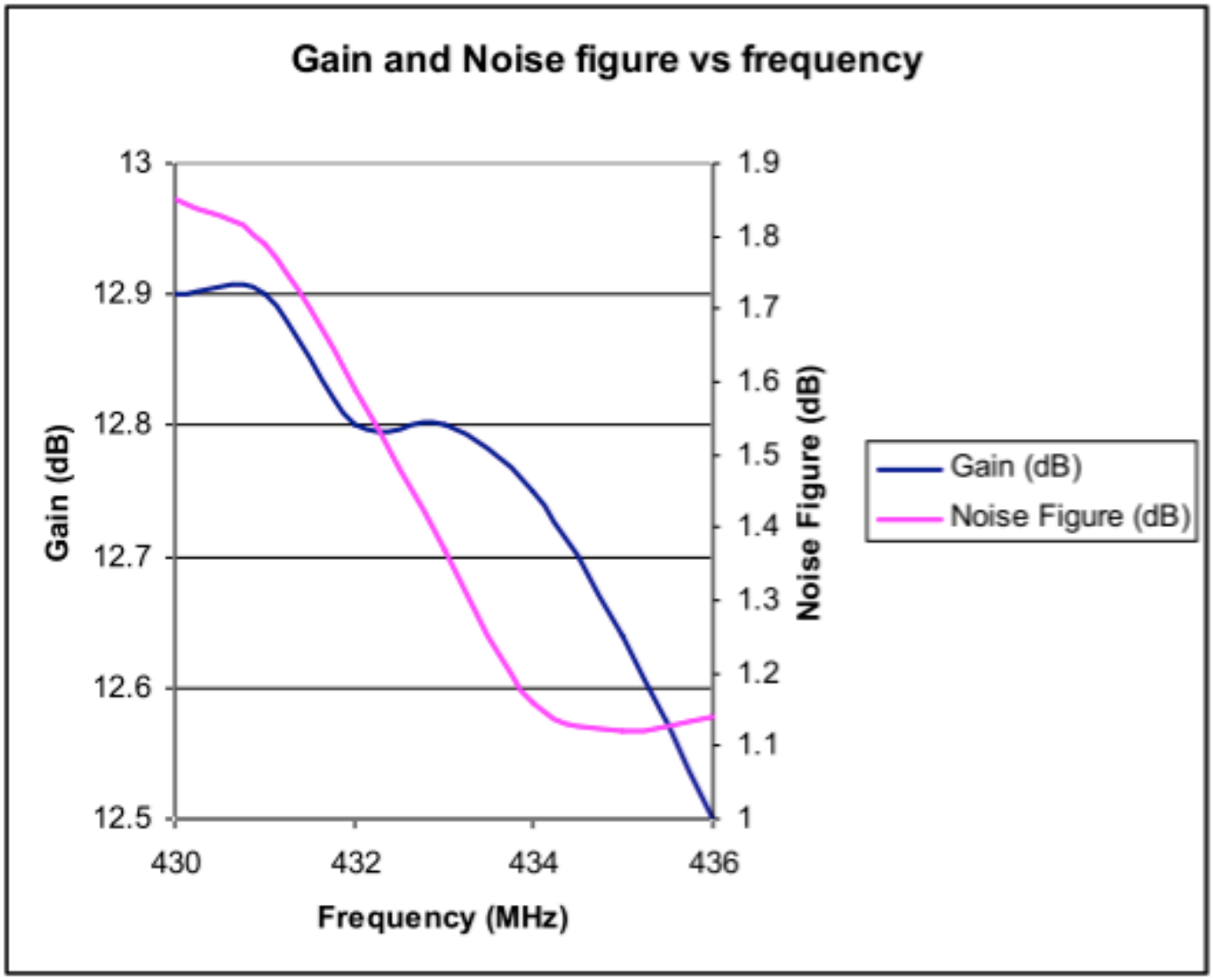
Component list

Component	Value	Type
C1	0.33uF	SMD X7R ceramic
C2, C7	100pF	SMD 0805 NPO ceramic
C3	10uF	SMD aluminium electrolytic
C4	100nF	SMD 0805 NPO ceramic
C5	68pF	SMD 0805 NPO ceramic
C6	10pF	SMD 0805 NPO ceramic
C8	4p7	SMD 0805 NPO ceramic
C9, C10, C11	150pF	SMD 0805 NPO ceramic
R1	390Ω	SMD 0805
R2	270Ω	SMD 0805
L1	1uH	SMD 0805
L2	4.7nH	SMD 0805
L3	47nH	SMD 0805
L4	200nH	SMD 0805
L5	200nH	0805
IC1	LM317M	8 pin SMD package Farnell 1652326
IC2	MGA-62563	Farnell 7820453
F1	TA6093A	Golledge 435MHz, 10MHz wide SAW filter www.golledge.com/pdf/products/saw/gsrf.pdf
M1	RMS-1 or similar 500MHz level 7 mixer	Mini circuits. www.minicircuits.com/pdfs/RMS-1.pdf look on EBay for similar devices

Representative test results

These figures show the results measured with a high side LO at 460MHz.

N.B they are measured on Amateur test equipment which does not have a current calibration certificate. They should be treated as a guideline only, and no performance guarantees are given or implied.



References

1. USB Synth kits http://sdr-kits.net/QRP2000_Description.html
2. Eagle files can be downloaded at www.g4bao.com
3. Free “Eagle” PCB Software from CADsoft http://www.cadsoft.de/

Copyright notice

John Worsnop G4BAO

RDDS Locking 3 x G8ACE Oscillators
to a 10 MHz Rubidium Standard in a LO and IF router for transverter use

By Richard Bown G8JVM

The purpose for building this was to simplify operation on the microwave bands I use, 23, 13 , 6 & 3 cm, so that changing from one band to another is accomplished by pressing a button on the front panel of the dedicated HB rig. This has a DDS LO and the frequency of the band in used is displayed when changing bands.

This was going to be locked to GPS, however, in the construction of this unit the Rockwell Jupiter GPS receiver died.

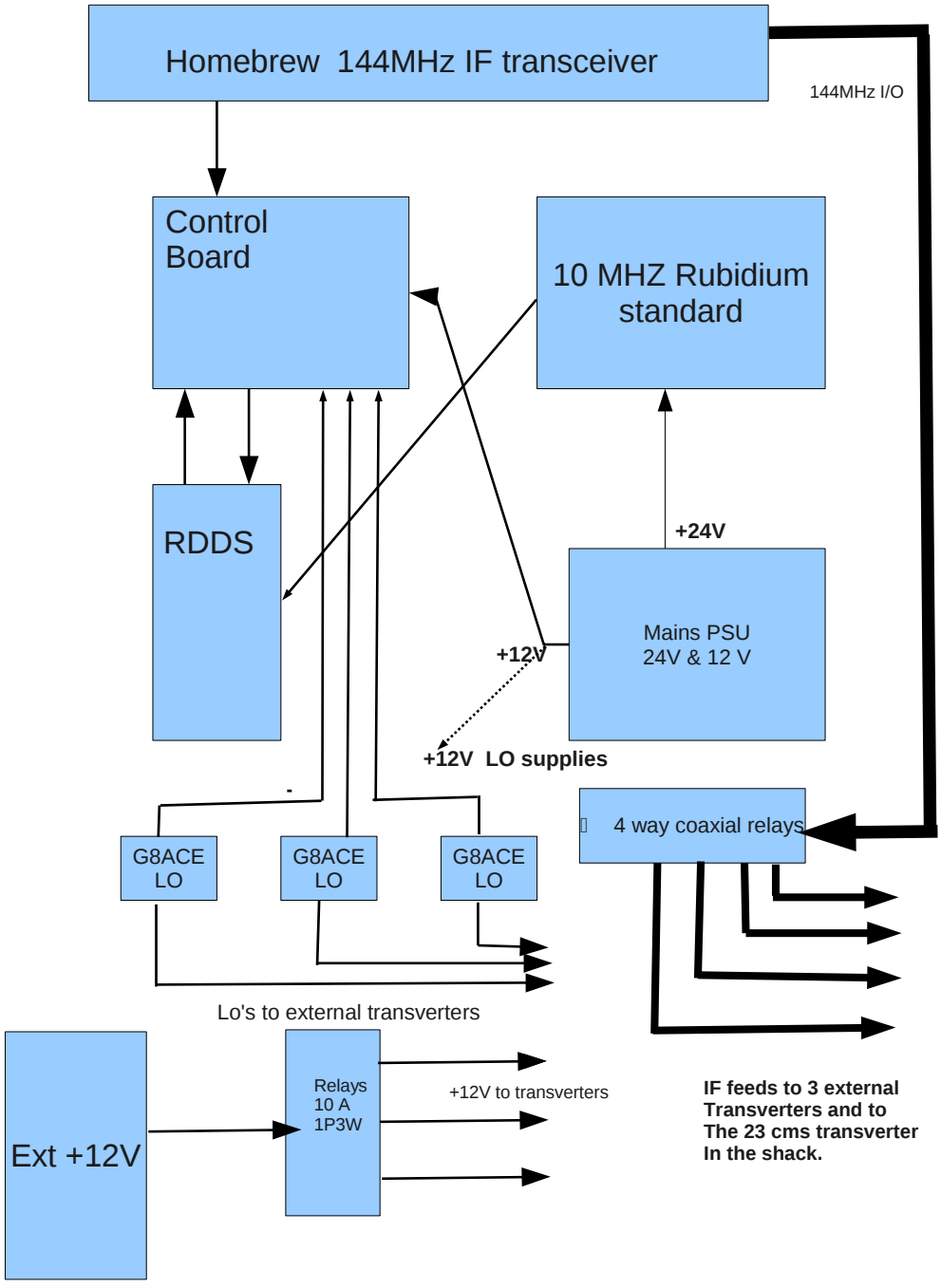
On hand was a 10 MHz LRPO so it was decided to use that instead.

The whole unit is housed in a 550 x 450 x 100mm die-cast box. The 24V and 12V supplies are internal.

The 24V supply was something acquired many moons ago as part of a 9GHz down link, modified from 28V. The original mains transformer was too large physically and a 100VA toroidal mains transformer used, with a lower secondary voltage to help with the generated heat.

The assembly requires gentle blowing to keep cool – a 120mm fan above the heat sink running on half of its rated supply to reduce noise.

This unit also supplies the routing of the IF signals at 144 MHz to



the three transverters (3, 6 &13cm) which are mounted either on the tower or chimney, and also to the 23 cm transverter which is in the shack.

The unit is controlled by a 5-wire interface from my homebrew transceiver, 4-wire to select which band and a conditioned signal from the o/p detectors on each transverter, so I have an indication of output power on the front panel display.

A UKμWG RDDS board is used to lock all of the G8ACE oscillators to the 10MHz.

At any time only one G8ACE LO can be locked to the 10 MHz standard, but as I only use one band at a time this is not a problem. My 23 cms system can be switched between the two transceivers if required.

Modification and control of the RDDS board

As there is a Stable 10MHz signal available from the Rubidium source, this is used to clock the PIC controller, this reduces close-in spurious signals from the mix of the generated 10 MHz DDS and the onboard 10MHz clock.

Four control lines are taken out of the unit to select which of the three frequencies are to be locked. The 23cm oscillator is in the transverter in the shack and does not require locking.

The control interface is very simple; the four control lines in are buffered in one half of an octal tristate buffer, enabled at all times; another 74AC244 is used to select a 4-bit word to send to the RDDS when the band is changed. There are three 4-bit tristate buffers used to select the RDDS control word.

The input of each 4-bit section of the 74AC244s are hardwired to select the frequency control word on the RDDS and all the outputs are tied so that the required word is place on the bus when the output is enabled.

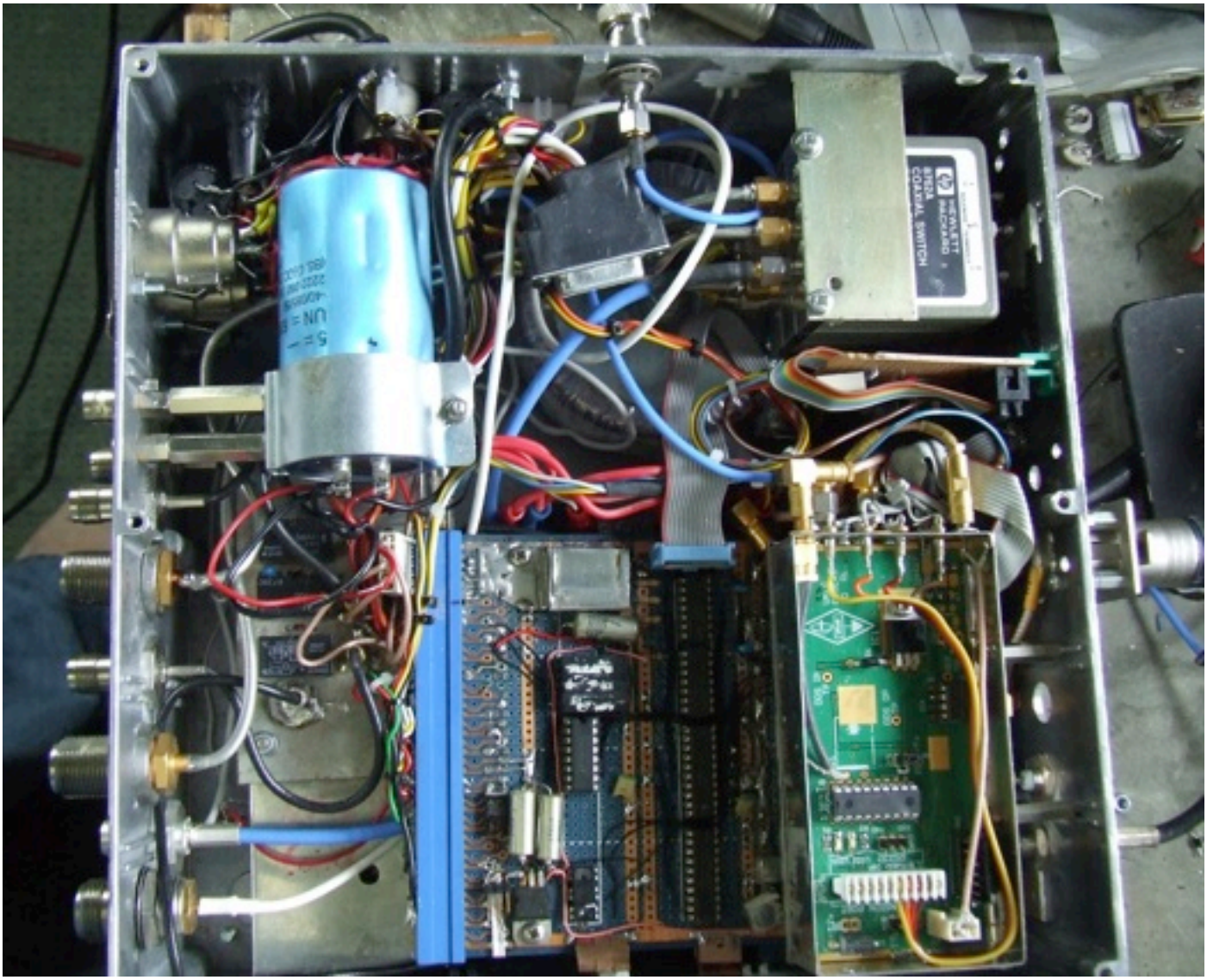
The RDDS is NOT used in loop-through – the loop is terminated at the out side of this controller so a counter can be attached if need be.

The LO input to the RDDS is fed via a 20dB isolation amplifier. I used a WJ CA18, only as I had one.

The LO interface to the RDDS

This a small PCB with three ONROM GY6 coaxial reed relays. When one of the G8ACE oscillators is selected to be locked, a 220Ω resistor is switched on to the selected oscillator which feeds the 20dB isolation amps to the RDDS.

This form of tapping the output of each of the oscillators does introduce some crosstalk but it's about -50dBC and, as there is multiplication and filtering on each transverter, any addition to the spurious content at the final frequency is minimal.



The system control

On the control path, voltage control to each of the G8ACE oscillators is switched with reed relays to the selected oscillator.

The buffered 4-bit transverter controls line are taken from the 74AC244 buffer and used to drive several ULN2004 relay drivers, as well as three MOSFETs to switch the relays that control the 10A relays.

These switch the IF signals from the transceiver to the selected transverter.

I did originally try a SP4W coaxial relay, acquired at a rally a long time ago, but the isolation between ports (transverters) was only 40dB, which was unacceptable.

The final RF switching is done with three HP8762A relays configured as a 1P4W switch. These are very useful latching relays as the coil is disconnected once thrown. Reed relays are used to control the HP switches, again from the 4-bit bus, driven with ULN2004 (7 x Darlington drivers).

The ULN2004 is a much better driver than the much-used ULN2003; the input resistance is much higher and makes the use of CMOS easy.

As with my system, I switch 12V to each transverter when in use. This is switched by 10A relays in the enclosure, but the 12V is externally supplied as there was no room left to build one in.

However, the 24V generated for the Rubidium source is fed to each transverter, as I use 28V coaxial relays. On 13cm the 24V is also switched as the receive path has another relay in series which connects the antenna directly to a down converter to somewhere around 1.2GHz for a satellite receiver to be connected for 13cm DATV.

The overall case temperature of this unit is about 30C, which keeps the outside case temperature of the G8ACE oscillators stable.

The external 12V 120mm fan is supplied by a LM317 attached to the PSU heatsink and is set nominally for 5.5V. At this voltage the fan is very quiet; a NTC thermistor is in thermal contact with the heatsink and wired between the output pin and the adjust pin of the LM317.

The result being that, as the heat sink temperature raises, the fan speed increases and the unit is bought back down to temperature.

Problems

The G8ACE oscillators will pull with a change in load impedance, so you can set the frequency so that its centred for easy locking with a 50Ω termination and find that the input impedance of the DB6NT transverters is not 50Ω so readjustment is needed.

The pull-in range on the RDDS needs to be increased. If the Vc line is lower than needed on the next oscillator to be locked, it will lock when the next LO is selected. I'm finding that if the Vc line is higher than needed for the next LO selection, sometimes it won't lock. Selecting another LO first that meets the criteria will allow locking.

I may use a small mosfet to pull the tune line, Vc, low when the loop is out of lock so that Vc is pulled over to the required locking voltage.

The DDS requires 1V rms of LO at the test point on the board; below this the DDS does not clock well, causing a chirp on the 10MHz. As the sampling source is one of three ONROM G5Y series, with a series resistor between the relay and isolation amplifier, the series resistor can be adjusted so that 1V rms appears at the LO test point on the RDS board.

Switching the IF feed at 144 MHz to the individual transverters does require the use of high isolation relays and good quality cable to the N type connectors – conformable UT141 meets this requirement.

The control pcb really needs to be designed and laid out on FR4. I used an old piece of proto-board (so old it had 43w edge connectors on it) and Kynar wire. It served its purpose but, its very easy to scorch Kynar wire if anything hot is near it. In my case, the power supply had a couple of wire wound resistors which had only a 3mm clearance. This was protected electrically with a sheet of PTFE.

As this is a modular unit, make sure there is enough length in each loom of wire/coax to be able to work on each module as and when required.

Not a project for beginners, it sounds a very simple concept. Should anyone want to build a similar beast please contact me for further information.

Richard Bown G8JVM
E-mail richard@g8jvm.com

Scottish Microwave Round Table

Saturday 5th November 2011

You are invited to attend the first Scottish Microwave Round Table.

A full programme of talks will be published in due course and will include technical and operational subjects of interest to all microwave operators.

There will be plenty time for socialising during the day, meeting friends old and new as well as putting faces to a lot of callsigns. This will continue later in the nearby Burntisland Sands Hotel for evening dinner.

The Museum of Communication venue will also be well worth a good look around.

There will be a small admission charge of £8 for the day event to cover the room hire, refreshments and a sandwich and finger buffet lunch.

Provisional programme

Talk & refreshment times subject to change

10:00	Doors open
10:30	Introduction and welcome
	Guest speakers, lunch and refreshments
16:00	Close RT
18:00	Pre-dinner drinks at the Burntisland Sands Hotel
19:00	Evening Dinner at the Burntisland Sands Hotel

Keep en eye on the web site for updates

The venue has a limit on numbers, so PLEASE REGISTER NOW to avoid disappointment!

www.rayjames.biz/microwavert/index.html

Finningley Round Table Weekend

By Bernie Wright G4HJW

Three years in and this RT has already got the feel of an established event, complete with regular overnight stayers in campervans, caravans or tents, some of whom had pitched up on the Friday night. About 50 people had registered this year.

As usual, there were activities going on in parallel throughout the weekend, with eight talks, a well stocked fleamarket, 3cm converter build session, Andy's talk and companion PIC demonstration, Martyn and Val's noise figure measurement set-up and David's antenna test range, for which the weather remained reasonably kind.

Martin G8FEK is a Finningley local who produces noise sources, amongst other things, as can be seen here [1]

The Saturday talks included the intriguing lightwave-comms contrast of the current *'Yorkshire'* G0EWN/G8AGN baseband experiences with those of the *'North Easts'* 20 KHz sub-carrier derived alternative. Of the later talk, Stuart's non line-of-sight path plot of their current UK record 117km QSO was followed by a fascinating series of pictures demonstrating this same effect, showing photographs taken from the same place, that clearly showed more or less of a distant tall chimney, dependant on the amount of refraction occurring on that particular day. It's quite clear that there is lots of interesting new work still to be achieved in this area (and there is now a Yahoo reflector instigated by Barry – UKNanowaves@yahoogroups.com)

Following Peter G3PHO's opening microwave introductory talk, Bryan G8DKK discussed the accuracy of most of the various surplus power meters on the market today, this being something of an eye opener.

Prior to the evening meal (just a short walk away at the Reindeer pub), Gordon and Stewart gave a light-comm demo across the club site, a Youtube video of which can be found here [2]

Regarding the Reindeer pub venue, it was quite remarkable that they were able to seat us all at one table (or row, I suppose it must have been).

As one of the campers on site, I can testify that Sat night/Sun morning was particularly cold – a second duvet will be a must for future visits.

There was an early start Sunday morning at the 3cm converter build bench. In all, four converters were built over the weekend, with the remaining three kits being taken for a more leisurely construction elsewhere. We were also able to assist in the alignment of a kit that had been assembled prior the weekend. In this respect, having the G0GHK/B beacon running some three metres away was quite useful...

A slightly revised title had to given for the first talk on Sunday, given that initial results on a ground sunk TCXO for GB3FNY (as the G0GHK/B 3cm beacon will shortly become) have been a little wanting. Interesting, given that the same type of TCXO is used in the standby transmitter currently in use at G0GHK/B, and it has only moved 4kHz in the 9 months that it has been in use, and the ambient temperature in that period will have had a spread of 30C or so over this period.

Andy G4JNT's work on PIC-based projects was the subject of a comprehensive talk on pic theory and practice, followed by a demonstration of boards in the workshop. This seemed to be generating interest all through the weekend. The powerpoint file is available from Andy's web-site [3]

Likewise, I overheard several eager conversations on aircraft scatter following Ray GM4CXM's talk on this topic.

The closing talk was given by Kevin G3AAF, one of the event organisers, on SMD soldering techniques. Given the sheer number of photos showing different types of faulty joints that can occur, you had to feel sorry for the experiences the company that he works for had had over the years! Perhaps one of the conclusions for us amateurs is to keep well stocked-up with leaded solder and leave the lead-free stuff alone.

I'm told that Sam G4DDK also gave an impromptu talk on his SPF5043Z-based amplifier that appeared in the July edition of Scatterpoint (see here [4]

It is nice to see the Finningley RT continuing in its own unique style, and many thanks to the Finningley club for their hospitality again this year, and their enviable site. I hope we will be invited back.

Links

1. www.rfdesignuk.com/products.htm
2. www.youtube.com/watch?v=gROvq_tnskM
3. www.g4jnt.com/Publications.htm
4. www.g4ddk.com/SPFAMP.pdf

Bernie Wright G4HJW

Finningley – from a happy camper

By Ray James GM4CXM

I'm just back from a two week caravanning trip which took in areas my wife and I hadn't visited previously, like the North Yorkshire Moors and Lincolnshire.

An invitation from Kevin G3AAF for me to give a talk at the Finningley RT gave me a welcome excuse to include a bit of radio into the holiday.

An added bonus was that caravans, motor-homes and tents could be accommodated in the field within the club premises.

We arrived Friday afternoon and were met by Kevin.

I noted the availability of an external water supply, which negated the need to have carried fully-laden water containers and pop bottles all the way from our previous stop in North Yorkshire!

An external portaloo was also provided by the club.

I used an invertor to supply mains via my spare leisure battery so the better half could view sattv whenever I was pre-occupied.

The club is located at Sandtoft in Lincolnshire, nestled between Doncaster and Scunthorpe and with very good motorway access.

For those who have never been, the site is just jaw-dropping.

Imagine a very large field and a flat horizon in all directions.

Within the field you note an 80' tower holding VHF/UHF antennas, a 60' tower with a HF beam atop and in the distance an insulated vertical supporting a top wire to the 60' tower for the LF bands. There is room for a 4 square on 80m and another 4 square on 40m.

Then there are two buildings.

Number 1 building is like a warehouse and used for the fleamarket, though it is kind of full already.

Building Nr 2 is the main meeting venue and includes a very good sized room for talks plus separate rooms hosting a HF shack, VHF/UHF shack and at least 3 rooms (one of which is very large) holding all forms of measuring and construction facilities. Another room has a PC and was also used for measurement tests. In addition there is a large area for social meeting, kitchen and enjoying the buffet on offer plus tea/coffee on request to the many FARS volunteers.

As Kevin mentioned to me during a tour, "it's the best kept secret of the North"!

John G3WFK arrived later with his caravan and Tony GW8ASD with his motorhome. Though Kevin was the only tent-user Friday night, a tent village did appear on Saturday.

Friday evening we got together at the local Reindeer Inn, a very short walk along the road from the club premises and also the venue of the Saturday evening meal which almost 30 attended.

The quality of the beer, food and service was excellent.

The RT event itself was really well organised by Kevin G3AAF and members of the FARS. Great talks, demonstrations and testing. A really good opportunity to meet friends old and new. Good bargains to be had outside at the fleamarket as well. Most of what was for sale was located by building Nr 1 but I was interested to see David G6GXK putting out bits and pieces slightly further away. I went over to look what he had for sale and was impressed with a tripod, perfect for mounting a dish. "How much?" was an obvious question to which David almost doubled over on telling me it was the antenna test range he was setting up!!!!!

As Peter, Sam and others have mentioned already, this is not an RT to miss and I hope this rather extended appreciation whets the appetite of those who have not been able to attend and give you a reason to pencil it in for next year. I certainly will after my first visit.

73 Ray GM4CXM

Cumulative Contest Times

By Brian Colman G4NNS

I can understand why some portable stations might like an 11:00 start but for fixed stations and, perhaps, the keenest of portable stations, it means that any early morning lift in conditions are well and truly over before we start. Also, our continental cousins whose clocks are an hour ahead of us and are often QRV another hour or two before us and are off to lunch before we get started.

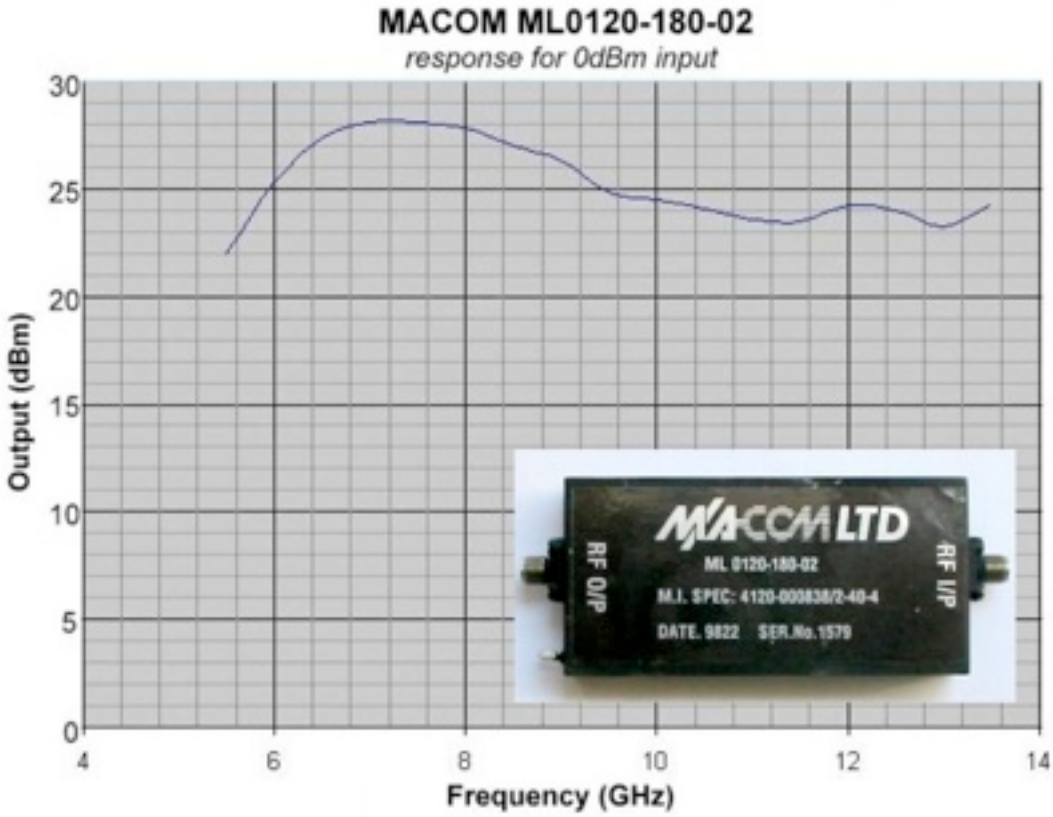
It seems to me that, for most of us, the cumulative contests are an opportunity to get on and take advantage of activity. If the portable stations want a competitive session geared to their type of operation then why not give them an option of an alternative section with times that suit them. Although the dearth of portable activity in the south lately would suggest that even the 11:00 start doesn't appeal enough for them to go out. How about an Open section that starts at 08:00 to take advantage of any lift in conditions and continues to 20:00 when conditions may have improved again? We could impose a minimum break of for example 4 hours if that were popular but, as the main objective for most of us is ACTIVITY rather than points, why not let the individual choose? A restricted or Portable section of the contest could start later and end earlier. But one has to ask "*Why favour those that are not prepared to make an early start?*"

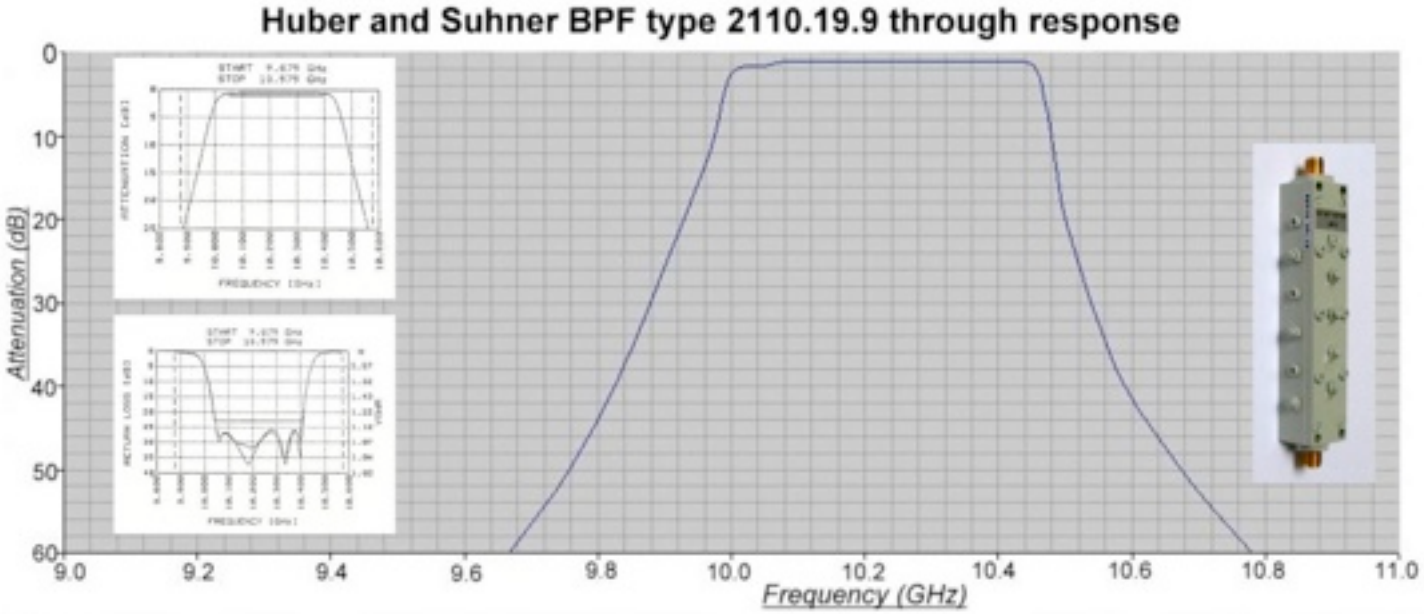
[Your views, please. Ed]

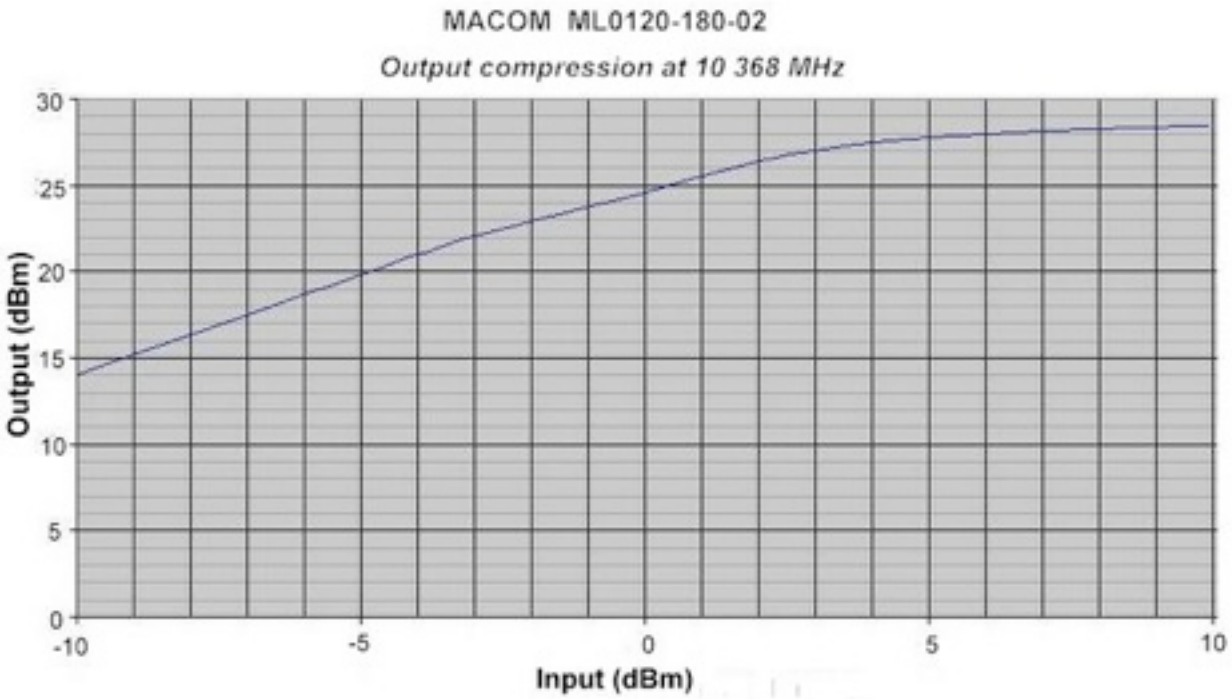
Surplus 3cm amplifier and filter

By Bernie Wright G4HJW

A number of amateurs were seen coming away from this years Luton and Dunstable ARC rally with surplus MACOMM X band power modules. The 10GHz ones had soon disappeared, but those slower people like myself were still able to buy versions rated to 9GHz or so. The price was very reasonable, so one was bought together with a Huber and Suhner 10GHz band pass filter. Both proved to be good buys as the accompanying graphs indicate.







View from the Drey

Reflections on a Reflector

By Secret Squirrel

With the increased daylight hours, I've been rather busy protecting my potential winter supply of nuts from the 60cm Magpie (or was it a Raven?) that keeps appearing in the garden.

The little fella has been getting very excited recently because he's heard that there're some medium speckled crystals to be had. He'd better watch it though in case he falls foul of the Alternative Gun system that him indoors is working on.

Haven't seen much of him indoors this month, but I did catch him last week trying to get over the hedge with some lighting rig trussing and a tripod. Looked very painful to me!

On the subject of lighting, I have noticed that some folk seem to worry about what constitutes daylight. Doesn't seem to worry my bloke, who is more concerned about the barometer, the humidity and whether he'll get enough lift (must be his age...) As far as I'm concerned, if I can see it, I'll gather it. Doesn't matter if it's cloudy at mid-day....and what about the difference in sunshine between summer and winter? Therein lies a tail (.....yes it's still magnificent)

Some humans do seem to have a problem getting up early, especially for what they call "contests". Perhaps that's why they only consider daylight around mid-day.

I never know What To Expect next from him indoors, one minute he's ok then he has an S-parameter conversion brought on by vanishing beacons. Oh well, back to the nuts.....

Activity News

from the world above 1000MHz

By Robin Lucas G8APZ

Please send your activity news to:

scatterpoint@microwavers.org

The first four weeks of my time in France has been a little disappointing on the radio front, apart from an EA8 on 2m E's and UAE and Bahrein on 6m E's.

The excellent rainscatter event in France on 3cm on the 28th June, happened the day before I arrived! On that occasion, there were DX contacts reported of over 850km.

A few weeks of poor weather in July has reduced the radio activity here, but I am hoping for some good tropo soon. As I finalised this column in early August, there was a decent day for rainscatter, which I mention at the end of this column.

June SHF UKAC 13cm

From: Ray James, GM4CXM, Glasgow, IO75TW

Early indications looked very promising with 6 contacts logged in the first 51 minutes but absolutely nothing for the remaining hour and a half.

Mike G0MJW running just 10W from deepest Oxfordshire was first in the log and quickly followed by Jim GM3UAG north of Aberdeen for only our second 13cm contact over the mountain ranges between us.

Tony G4CBW was an easy tropo contact into IO83 though signals were not as strong as we've experienced in the past. A "tail-end QSO" followed with Neil G4BRK who had been waiting in the wings.

As usual I was keeping a close eye on Planefinder to see if any opportunities would arise to contact Kjeld OZ1FF, 782km away in JO45BO. As luck would have it, two aircraft flying in opposite directions looked like arriving within our mid-point circle at the same time. Our 23cm experience is typically a completely audible signal which gradually builds up, peaks and gradually disappears, leaving loads of time for Kjeld to call CQ after we've completed. 13cm on the other hand seems to always consist of bite sized chunks of communication with the signal coming and going constantly, leading to a few moments of anxiety until it reappears again!

Ralph G4ALY tells me he finds 13cm aircraft reflection much more difficult than all the other microwave bands he operates the mode on, so I'm not alone.

With Alan GM0USI/p away at Cumbrae playing 3cm, I thought it unlikely I'd get my own square as a multiplier so it came as a relief to get IO75 in the log thanks to Andy GM7GDE running 700mw to an antenna fixed on the GB3CSB beacon.

Nothing was heard of anyone else whilst tuning around and schedules with G8OHM and John G3XDY produced nothing despite aircraft being in a favourable location. It's a good job I enjoy a challenge as 13cm certainly presents one!

73 Ray GM4CXM IO75TW (60W 67el.)

24GHz UP ACTIVITY DAY

From: Gus G3ZEZ, Clacton on Sea

On the 17th July 24GHz activity day, at long last after four tries I managed to work G4EAT two way on 24GHz at 35.6km with reports of 59 for John and 55 for myself.

I then worked Chris G0FDZ/p at 47.6km with reports of 549 and 559. Unfortunately Roger G8CUB/p did not hear me, and due to the wet WX did not send to me.

These efforts increased my best "DX" with M1CRO/p earlier this year (12.35km) by almost four times so I am very pleased.

From: Roger Ray, G8CUB, Brentwood

I went to two sites on the Essex side of the Thames, in an attempt to work Chris G0FDZ/p who was on the Isle of Sheppey.

From *One Tree Hill* Basildon we worked on 24GHz at 59, but not as strong as we had expected due to obstructions on Sheppey.

The second site at Canewdon proved better, with end stop signals on 24GHz from G0FDZ & G4EAT. Later a local storm produced S9 rain-scatter signals from both stations over a 270 degree arc.

However tests on 47 & 76GHz with Chris, and 76Ghz with John both failed, mainly due to a gust of wind appearing from nowhere and blowing over the 47/76 transverter before I started, and I found significant internal damage subsequently!

The 76GHz has been repaired, and I had a one way contact with John G4EAT on Thursday 28/7 at 4.5km, to prove the system. He gave me a report of 52 on SSB, so there is more work to be done.

Just to prove that some of us braved the weather in the millimetre band contest and tried the higher bands!

EME 24GHz FIRST F – DL

On 8th June, 2011 Guy F2CT had an EME QSO on 24 GHz with DF1OI (JO42TF) with signal peaks 10dB/n. Guy says that he had to wait until the clouds cleared!

It is believed that this QSO is a first EME on 24GHz between France and Germany. Well done to both stations.

EME 13cm

Some while ago, a friend of Eric, ON5TA made a generous gift in the form of an old mesh reflector dish 3.65m in diameter, originally designed for the reception of C-band satellites.

After a painstaking restoration, the dish was reassembled and installed on an accessible part of the roof. Given the size of the mesh, he thought that the best band to try with the dish was 13cm.

A circularly polarized "septum" feed was mounted, but because of some doubts about the exact location of the phase center, a small electric jack has been installed to optimize the position of the feed based on the solar noise.

The 13cm tropo transverter tropo was installed just behind the reflector to limit the length of coax to about 5m and limit losses as much as possible. Eric thinks that he has a little over 20W at the feed.

Once fully assembled, a sked was made with Philippe F2TU for a test. At the sked time Eric was surprised to hear Philippe's signal in the loudspeaker.

For a short time, whilst seeing the S-meter moving, Eric thought that it may be tropo or A/S since it was so strong, but it was really EME! He replied with his QRP 20W and the QSO was completed in a few minutes.

Philippe's installation is very good, but Eric was really surprised at the signal level, which he thinks could be workable by some good tropo installations.

The day after the QSO with F2TU, Eric contacted CT1DMK, and DL4MEA without any difficulty and still with 20W!

After these contacts, Eric dismantled the 13cm, and hastily installed a 5.7GHz

transverter, in order to make a QSO with SK6OSO, the radio telescope in Onsala which was activated during the weekend.

The QSO was very easy, but the Onsala dish *is* 25 metres in diameter!

Before remounting the 13cm, Eric intends to change the feed, which is expected to bring one or two dB more by reducing parasitic lobes.

EME 6cm

From: Peter Blair, G3LTF, Andover

There has been a lot of 6cm activity in the last month. On July 2/3 the SM6 gang activated the Onsala 25m dish on 5760MHz with the call SK6OSO and worked about 25 stations including G3LTF (CW and SSB) and G3LQR.

Due to the narrow beam-width only illuminating about $^1/_3$ of the moon, the libration (and hence the Doppler spreading) was low throughout the moon pass and the signal was close to T8. On the 3rd I also worked PA0EHG. My activity was made possible by the kind help of G4NNS in fitting the 6cm feed to the dish as I am recovering from back surgery and restricted in climbing steps and weight lifting!

We returned to the moon on 6cm on the 30/31July for the annual activity weekend. Many QSOs were made by the 17 or so stations active.

I was using a new feed, a W2IMU dual mode horn with a septum polariser, which was only finished on the Friday afternoon before the tests. It gives me a 1.5dB improvement in system performance over the previous feed. Over the weekend I worked SV1BTR, OK1KIR, G3LQR, SQ6OPG, G4NNS, PA7JB, LX1DB, SV3AAF and CT1DMK. I heard and called SP6GWN and also heard JA6CZD.

More on the SK6OSO operation here

73 Peter G3LTF

1.3GHz UKAC July

Ray James, GM4CXM, had just got back from a holiday within hours of the start of the Activity contest on Tuesday 19th July and managed to rush to the shack with just 15 minutes to go!

On this occasion, the long distance aircraft scatter stalwarts, OZ1FF and PA0EHG did not appear to be around, which spoiled hopes many (or any) 700km+ contacts this month.

The first thirty minutes generated nine contacts – mainly local GM with a few in IO83 plus IO95 and an above average signal from G4RGK in IO91, which is normally a struggle or a fail, so conditions didn't appear to be too bad.

The next half hour produced produced seven more contacts but the QSB which everyone else had reported became evident.

Semi-local contacts with Andy GM4JR, Dick GM4PPT and Stuart G8CYW (IO94) went well, as did those with Tony GW8ASD and Mike G0MJW, but those with Graham G3VKV (IO81) and Tim M0AFJ (IO92) were a bit of a struggle. Tim's 9W on CW eventually got through, but in Graham's case it was a matter of having to wait for another suitable aircraft to reach the mid point before the contact was completed.

The last 90 minutes was composed of periods when one contact would follow another, or nothing was heard for five or ten minutes.

It was steady progress until the finish, with Ray covering all areas from GM8IEM in the far north west to a new initial with Kevin G8XIR who was a superb signal on SSB from Gravesend JO01EK running 40W and 4x23.

Beacon news

The new GB3CSB beacon (3400.985) in the Kilsyth Hills is now in service. It is GPS locked, and runs about 25W erp into a flat panel antenna. The keeper is GM6BIG, who will be pleased to receive reception reports via the DX cluster or www.beaconspot.eu

SHF UKAC July

GM4CXM's report on the SHF UKAC relates to 13cm on Tuesday 26th July when Ray made eight contacts in eight different squares! There was also a little tropo in evidence across the North Sea.

At least 6 GM stations were QRV, but David GM6BIG was the only one not worked. Ray was unable to hear his 1mW to an indoor antenna (although David heard Ray).

With the exception of Tony G4CBW and Ian at G8OHM, long haul signals were not very strong at all and QSB didn't help, but Jim GM3UAG was worked over the mountains again on a path that, despite the terrain, appears to give fairly consistent results.

Mike G0MJW was worked as normal but IO81 remains an elusive square, despite tests with Graham G3VKV and David M0GHZ.

Kjeld OZ1FF alerted Ray to a suitable aircraft approaching the mid-point and as soon as the antenna was pointing in the correct direction, Ray heard Kjeld calling straight away. The contact was completed and Kjeld continued to call CQ. Kjeld's calls just went on and on until it became obvious this was no aircraft enabled reception but a very weak tropo signal.

DXpedition to Guernsey

Paul M0PNN informs us that about 14 members of the Telford and District Amateur Society will be visiting the Island of Guernsey and will be operating on HF (80ms to 10m), VHF 50MHz and 144MHz, and the microwave bands 2.3GHz, 3.4GHz, 5.7GHz, 10GHz and 24GHz. (What, no 23cm??!!) They will be using the club's callsign with the Guernsey club licence prefix GP3ZME/p.

You may follow the DX Expedition on Twitter – 2W0ZJA will be tweeting updates, frequencies, etc. on this link

VHF talk back and ON4KST chat may also be used.

The locator square of the camping site is IO89QK but members of the group may well move around the island looking for the best paths to the UK and EU and the club intends to be QRV during these UKuG Contests:

Aug 21st	5.7GHz Cumulative
Aug 21st	10GHz Cumulative
Aug 21st	24GHz Cumulative
Aug 23rd	2.3GHz+ Activity Contest

The main objective of the expedition is to have some fun, especially on SHF.

Snippets

During the evening of Saturday 30th July, Jan LA3EQ spotted the GB3MHL beacon at 559, and G3XDY quickly arranged a 23cm test with Jan.

A CW contact produced a 529 report for Jan, who was (unusually) operating from his home QTH which is behind a hill.

On Saturday 29th July, during the French JA (activity day), the 144.390 VdS (voie de service) talkback frequency became a hot spot for DX! There was a sporadic E opening to Russia, Ukraine and Romania. Microwave contacts took a back seat for a short while whilst the DX was worked!

Rainscatter on 3cm

I was awakened on 2nd August by a heavy thunderstorm, so I went to the “shack”.

From 07:30z on SSB I worked F5NXU (IN97) 250km, F5BUU (JN03) 266km, F6CXO (JN03) 289km, and F6CBC (IN94). Reports were from 57s to 59s. Later on, I worked F6DKW (JN18) 430km at 55s.

...AND FINALLY

On 3rd August, Christophe ON4IY (operating ON4SHF) was testing on 24GHz with Norbert DC6UW. Norbert was 55s over a 533km path but received nil from ON4SHF. Norbert runs 20W and a 2m dish on 24GHz! It must surely work at some point in the future.

73, Robin, G8APZ

Events calendar

Aug 13-17	IARU Region-1 Conference, Sun City, South Africa	www.iaru2011.org.za/
Aug-21	RAL Roundtable	10:00 AM Natter and testing; Lectures from 1pm to 4pm
	Rec Soc building as 2010. We will not be using the RAL site so there is no need to register for security but Mike Willlis would like to know how many people to expect. http://www.g3pia.org.uk/	
Sept 10	56.UKW Tagung Weinheim	www.ukw-tagung.de/
Sept 11	Crawley Roundtable	See page 5
Sept 24–25	ARI EME Contest 18 CW / SSB Bands: 144 MHz & up,UTC 00:00-24:00	
		www.contestvhf.net/ Enrico Baldacci
Sept 30 – Oct 1	National Hamfest	www.nationalhamfest.org.uk/
Oct 7-9	RSGB Convention, Horwood House, Milton Keynes	www.rsgb.org/rsgbconvention/
Oct 9-14	European Microwave Week, Manchester	www.eumweek.com/
Oct 13-16	Microwave Update, Enfield, Connecticut, USA	www.microwaveupdate.org/
	Crowne Plaza Hotel, 1 Bright Meadow Boulevard, Enfield, CT 06082,. Rooms $99. Sponsored by N.E.W.S. Group. This is where the Eastern VHF/UHF Conference has been held for the past 10 years. Additional info email n2liv@arrl.net and w1ghz@arrl.net for details.	
Nov 5	Scottish Microwave Round Table	www.rayjames.biz/microwavert/
2012		
Aug 16-19	15th International EME Conference, Cambridge, UK	eme2012.com
Oct 29 – Nov 2	European Microwave Week, Amsterdam	www.eumweek.com/

Contests & Activity Dates

August

7-Aug	0900 – 1700 Microwave Field Day New Event
16-Aug	1900 – 2130 1.3GHz Activity Contest
	Arranged by VHFCC (RSGB Contest)
21-Aug	1000 – 1600 4th 5.7GHz Cumulative
21-Aug	1000 – 1600 4th 10GHz Cumulative
21-Aug	1000 – 1600 4th 24GHz Cumulative
23-Aug	1900 – 2100 2.3GHz+ Activity Contest
	Arranged by VHFCC (RSGB Contest)

September

20-Sep	1900 – 2130 1.3GHz Activity Contest
	Arranged by VHFCC (RSGB Contest)
25-Sep	1000 – 1600 5th 5.7GHz Cumulative
25-Sep	1000 – 1600 5th 10GHz Cumulative
25-Sep	1000 – 1600 5th 24GHz Cumulative
27-Sep	1900 – 2100 2.3GHz+ Activity Contest
	Arranged by VHFCC (RSGB Contest)

French Journées d'Activité (JA)

Activity dates cover all bands from **23cm** up.

27-28 Aug	Activity weekend
24-25 Sept	Activity weekend 25th matches UKuG
29-30 Oct	Activity weekend

Duration of all JA is 1700 Saturday - 1700 Sunday

EME Activity weekends

24/25-Sep	ARRL Microwave EME (Arranged by ARRL)
22/23-Oct	ARRL EME (Arranged by ARRL)

The RSGB 2011 VHF+ Contest Calendar is available at www.rsgbcc.org