An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

September 2017

Published by the UK Microwave Group

Experiment with circular waveguide to an off-set dish

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In this Issue

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Loan Equipment

Don't forget, UKµG has loan kit in the form of portable transceivers available to members for use on the following bands:

5. 7GHz 10GHz 24GHz 76GHz

Would someone like to build a second 76GHz system?

Contact John G4BAO for more information.

Subscription Information

The following subscription rates apply.
UK £6.00 US $12.00 Europe €10.00

This basic sum is for **UKuG membership**. For this you receive Scatterpoint for **FREE** by electronic means (now internet only) via the Yahoo group and/or Dropbox. Also, free access to the Chip Bank.

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.

PLEASE QUOTE YOUR CALLSIGN!

Payment can be made by: 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!)

Articles for Scatterpoint

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

Please send them to

editor@microwavers.org

The CLOSING date is
the FIRST day of the month

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

Please submit your articles in any of the following formats:

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

Spreadsheets: Excel, OpenOffice, Numbers

Images: tiff, png, jpg

Schematics: sch (Eagle preferred)

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

Thank you for you co-operation.

Martin G8BHC

Reproducing articles from Scatterpoint

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UKµG Project support

The UK Microwave Group is pleased to encourage and support microwave projects such as Beacons, Synthesiser development, etc. Collectively UKuG has a considerable pool of knowledge and experience available, and now we can financially support worthy projects to a modest degree.

Note that this is essentially a small scale grant scheme, based on 'cash-on-results'. We are unable to provide ongoing financial support for running costs – it is important that such issues are understood at the early stages along with site clearances/licensing, etc.

The application form has a number of guidance tips on it – or just ask us if in doubt! In summary:-

- Please apply in advance of your project
- We effectively reimburse costs - cash on results (eg Beacon on air)
- We regret we are unable to support running costs

Application forms below should be submitted to the UKuG Secretary, after which they are reviewed/ agreed by the committee

www. microwavers. org/proj-support. htm

UKµG Technical support

One of the great things about our hobby is the idea that we give our time freely to help and encourage others, and within the UKuG there are a number of people who are prepared to (within sensible limits!) share their knowledge and, what is more important, test equipment. Our friends in America refer to such amateurs as “Elmers” but that term tends to remind me too much of that rather bumbling nemesis of Bugs Bunny, Elmer Fudd, so let’s call them Tech Support volunteers.

While this is described as a “service to members” it is not a “right of membership!”

Please understand that you, as a user of this service, must expect to fit in with the timetable and lives of the volunteers. Without a doubt, the best way to make people withdraw the service is to hassle them and complain if they cannot fit in with YOUR timetable!

Please remember that a service like our support people can provide would cost lots of money per hour professionally and it’s costing you nothing and will probably include tea and biscuits!

If anyone would like to step forward and volunteer, especially in the regions where we have no representative, please email john@g4bao. com

The current list is available at

www. microwavers. org/tech-support. htm

UKµG Chip Bank – A free service for members

Interim Chipbank Update

By Mike Scott, G3LYP

ADD CHANGES

Since the Martlesham Roundtable, I have received a number of donations to the Chipbank which will be included in the next catalogue update sometime after the Finningley Roundtable. Included are a considerable number of MMICs from G4HUP’s estate including MARs and the Agilent MSA equivalents. We also have a further supply of Kent’s “Funny” MAR-6s (Thanks Kent!).

Paul Nickalls G8AQA donated 48 pcb mounting SMA sockets (through hole) and Paul Entwistle G8AFC, two large bags of BZX85C5v1 and BZX85C11v 1watt Zener diodes.

John, G8ACE, presented me with a large box of reeled components which has added to our range of SM Rs and Cs. If you need a value not listed in the current catalogue, ask as it may now be available.

Finally, as a result of a posting I made on the Reflector just before Martlesham, Bill,N6GHZ, kindly sent me a large collection of microwave components from California. These are mainly diodes, including Gunn and varactor as well as some transistors. These are listed on the next page. In many cases Google produced full or abbreviated data sheets, some appear to be specials as I could find no data. The quantity available is listed after the item. If you want any items(s) please use the usual Chipbank order form on the website.

The catalogue is on the UKµG web site at www. microwavers. org/chipbank. htm

Chairman's thoughts

.

73 de Sam, chairman UKuG

RSGB Convention

There are a number of microwave related talks on ATV, amateur satellites, deep space reception, etc.

Draft programme is at: http://rsgb.org/main/about-us/rsgb-convention/rsgb-convention-programme/

From moon-net

Gin pole to raise all system at a time

The I0NNA dish is very well demonstrated in this video:

http://www.eme2016.org/wp-content/uploads/2016/08/I0NAA-Video.mp4

73,

Ton PA0TBR

Getting going again

Tony Frazer G8DMU (/p)

Having been out of radio for 30 years and having "retired" to some extent I had the "bug" for radio again in 2013 and tried to start where I left off – with a liner 2 on 144MHz – I was horrified that the Liner 2 had long gone. However I was pleased to see the Yaesu FT736R had now become affordable and was still available – so I bought one c/w the 50 and 1296 modules and hey !.....I was on the air again (almost).

The next major change was my current QTH which to all intends and purposes seems to be subterranean as far as RF is concerned …….. not good. However, browsing through RadCom, I saw the answer – a fully kitted out van with a Clarke 26m mast, batteries, inverters, heat, TV, etc – So a trip down to Derbyshire and I bought it from Dave Ingledow, whose call sign escapes me.

After a few months on 2m, which I thoroughly enjoyed, I started to use the other bands which the FT736 gave me access to and so started to migrate to 70cms, then 23cms, 13 and finally arrived at 10GHz when I joined Scatterpoint and became aware of the loan equipment for 10Ghz. I contacted John, G4BAO and arranged to borrow the 10GHz equipment. Thanks to Nick G4KUX I picked the equipment up in 2016 at Knaresborough and started to work out the details, this included sourcing an FT817 from ebay to use as an IF (which is what the loan equipment was designed for) and as It was made clear I shouldn't modify the loan equipment in any way to suit my FT736 (fair enough). During my graduation thru the VHF/UHF/SHF bands I had joined the of the "Osset" (now 807) group and competed in the Tuesday

night UKAC contests /P from any high ground I could find and so started contribute to the group with a few contacts on 10GHz with the Scatterpoint equipment.

After several months of using the kit the next situation was the inevitable return of the loan equipment to Scatterpoint and what to do for the future?.....

I obtained a DB6NT pro txverter with their 8 Watt PA and started to look at how to put it together. With help from Kevin at Finningley Amateur Radio Society and valuable input from G3XDY, G4KUX and many others I managed to incorporate the equipment into a mast head box together with a sequencer, relays and suitable switching (see pics). This is then attached to the base unit with heavy duty 7 core cable to bring the 13v DC, PTT, power monitor etc to the mast head. I incorporated a further sequencer in the base unit with a meter to monitor the power, a linear PSU and some further switching (I like sequencers as I can understand them).

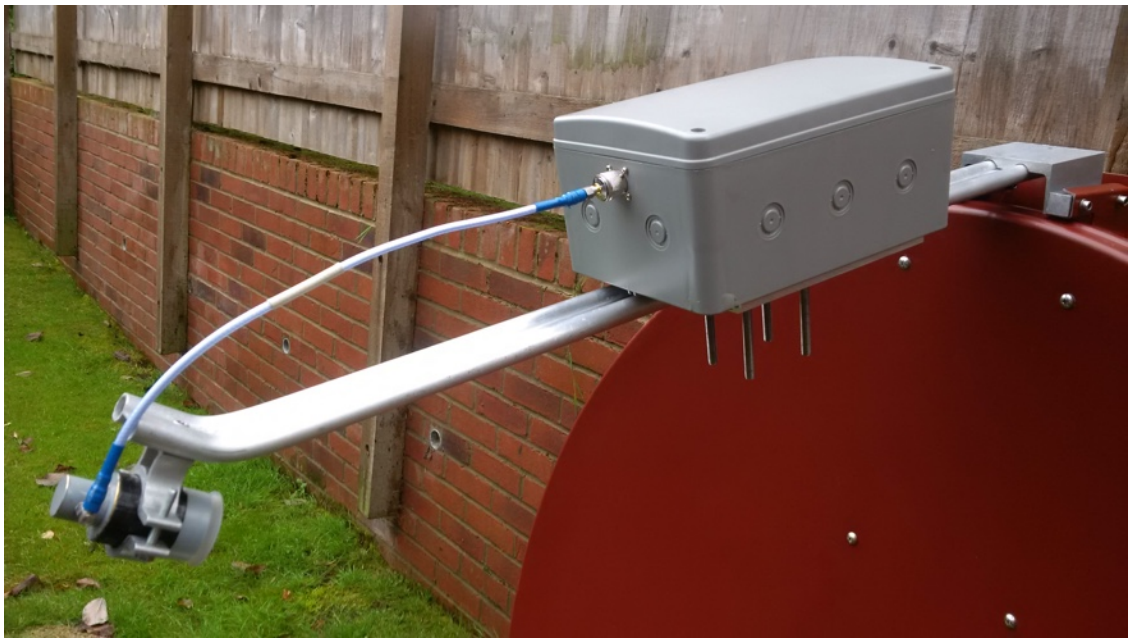
So far so good!

Next I needed a linear feed which proved more difficult but a chance email to Chris Bartram - ex Mutek (who designed to loan equipment) revealed he still has the small linear feed available at reasonable costs – problem solved.

Next was an antenna – bigger is best right?.....ermm…….wrong. I had acquired a 2.4 m dish for 23cms and so obtained a matching feed from RFham Design to suit the 2.4m p/f dish…….THEN I looked at the beam width which would be 1 degree or less, so that wasn't going to work for me as it would be far too narrow with my primitive set up.

Eventually I found a 1.2m dish on ebay (see below) and hey presto it works, albeit still very narrow, but it's tolerable. I do find that in the contests it's better the other station sends me a beacon that I can lock on to by wafting the dish generally in their direction. This has further been supplemented by a compass (of sorts) stuck to the tripod (opposite)

As you see the dish is inverted and the feed on top, this is mechanically not the best but the dish manufacturer didn't anticipate anyone would use their dish for terrestrial work so inversion was necessary so the mast didn't foul the dish. I also had to move the long locking bolt location for the same reason.

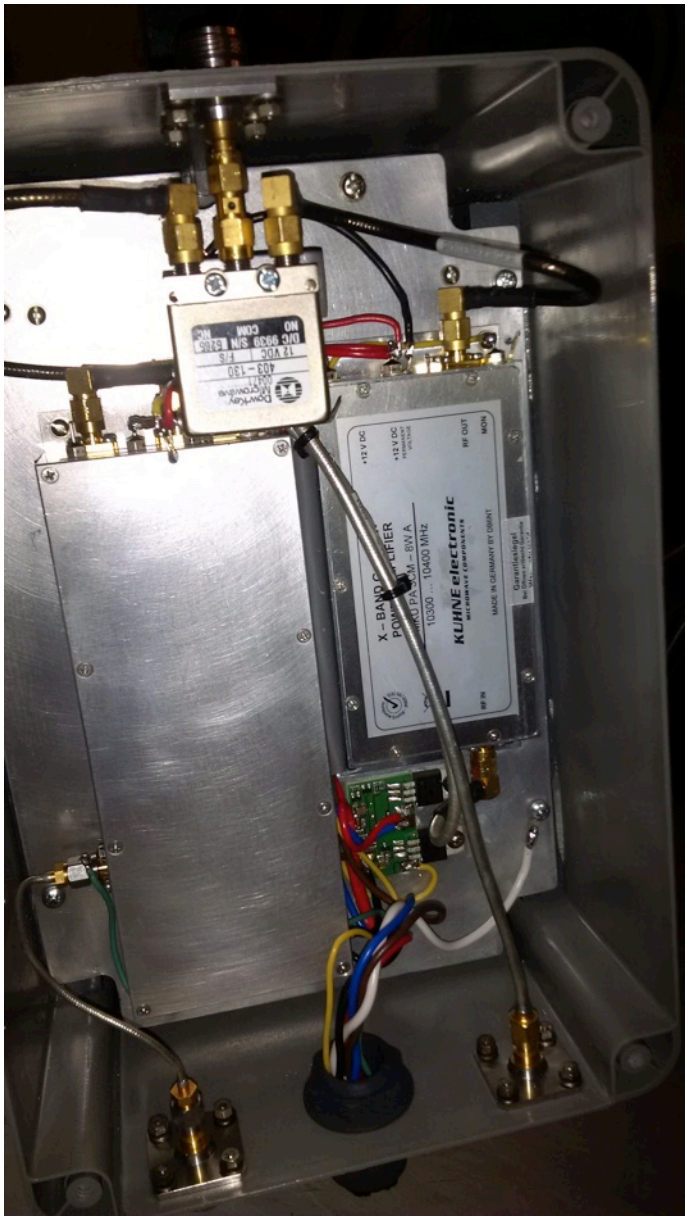


The mast head assembly JUST avoids compromising the signal path
and is a connected to the feed with some decent Huber and Suhner cable (0.5dB loss).

Kevin, G3AAF, and I spend many hours trying different types and lengths of coax for this with very variable results but the H and S worked best for me.

If I have a rush of blood to the head I may try the dish on the van mast, but I suspect it will not be worth the effort, but worth a try?

I have enclosed a few extra photos which I am sure our more educated readers will cringe at but I'm still developing and learning. I am not sure if a pre-amp at the mast head would work or not? a smaller dish? But I will continue to try and improve. If any readers have ANY comments (good or bad) I would appreciate input and in the same context if I can help any other prospective 3cms operators, just email me.



Compass dial

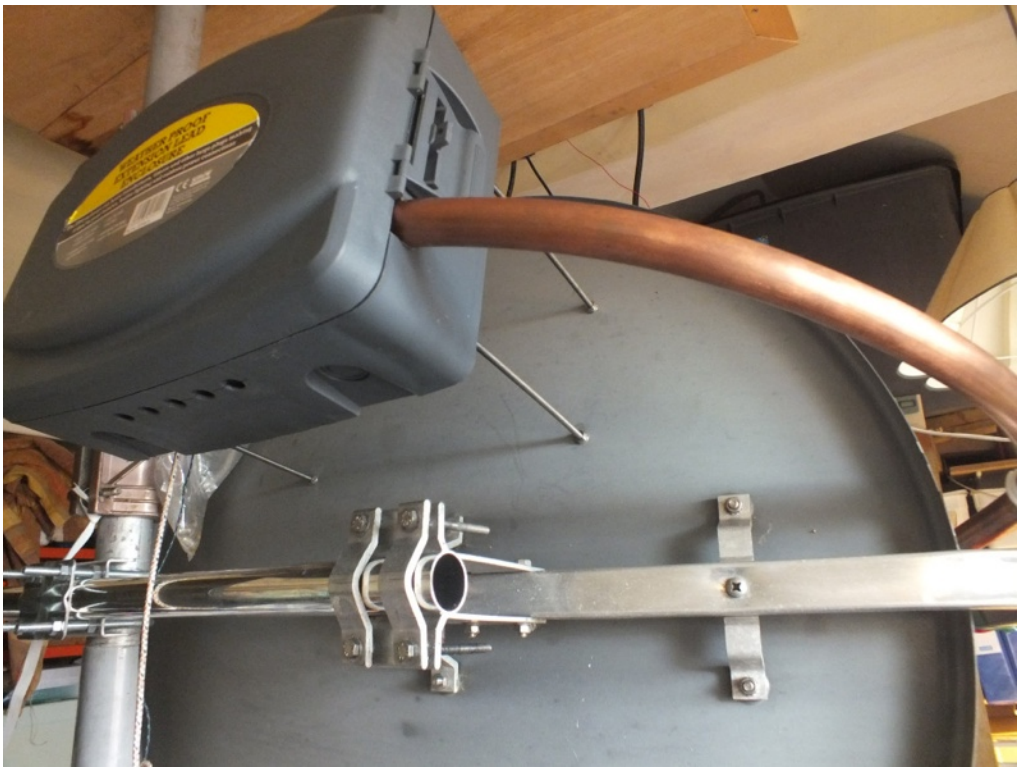
Experiment with circular waveguide to an off-set dish:

Graham Gray G3YJR

Source: https://g3yjr.wordpress.com/2017/08/17/experiment-with-g3yjr-crook-feedwaveguide-for-3cm/

I have loosely assembled a copy of Peter's G3PHO's plumbing fittings implementation of a W2IMU dual-mode horn. At the moment, it is stuck together with insulation tape. To this I have added my own experimental design of a waveguide crook. Behind the horn is a 135 deg bend, followed by a 180 deg sweep bend up to the main bit of waveguide. Then there is a wide 90 deg sweep into the box. So it is a bit like a shepherd's crook, but bendier.

This has probably all been done before for an off-set dish, so it is probably not a "G3YJR Crook" at all, it which case, here it is again!



I've used 22mm copper pipe as circular waveguide. I'm not using any rectangular waveguide. Rectangular waveguide seems popular and there are probably very good reasons for using it, but as a newcomer to microwaves, I don't know them.

There is a twist to the polarisation along the waveguide. I haven't measured this yet, but it looks like about 45° at the coax feed point. My SMA-coax transition accounts for this. The twist seems stable. I've mounted a weather-protective plastic box behind the dish. The SMA feed transition sits inside the box along with the electrickery.

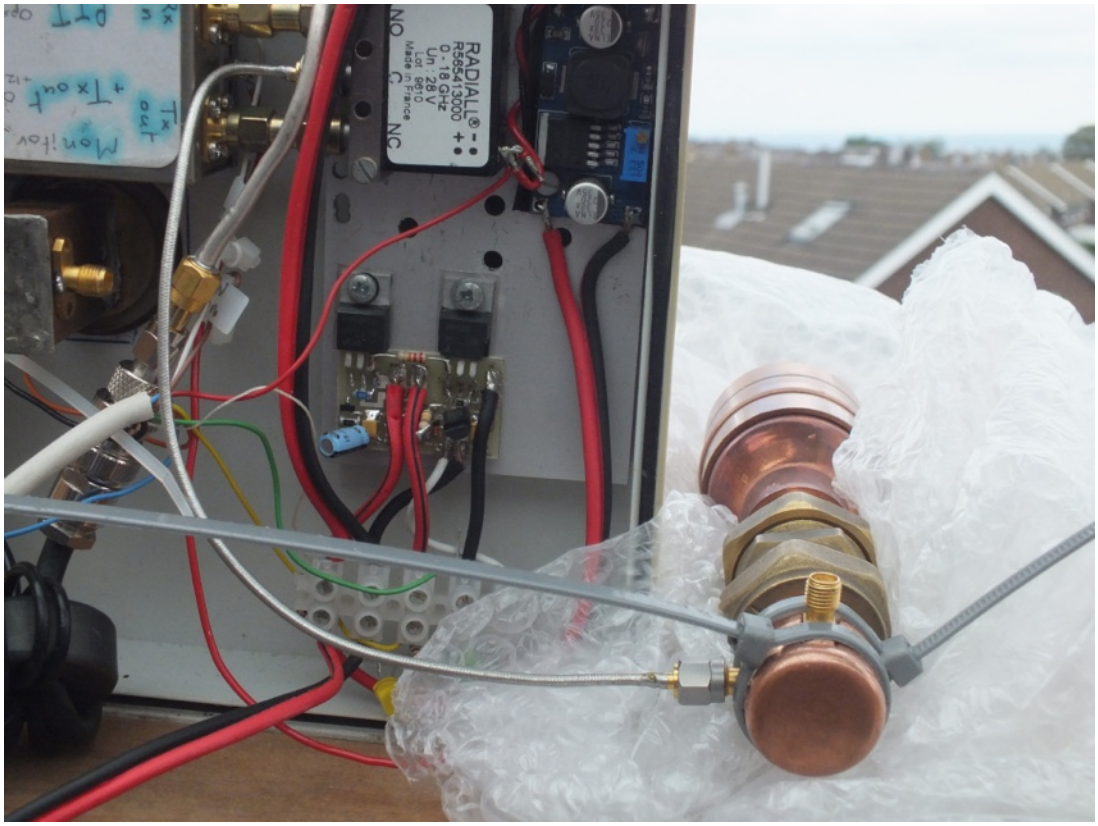
The idea is to move the pre-amp/transverter from the end of the off-set arm into the box behind the dish in order to minimise the weight on the off-set arm, whilst keeping the losses low by using rigid waveguide. My coax transition has two SMA feeds at right-angles in order to allow for switching polarisation.

With the dish in the terrestrial position, looking at the horizon, the waveguide slopes gently down to the horn so that any condensation should dribble down & escape from the horn.

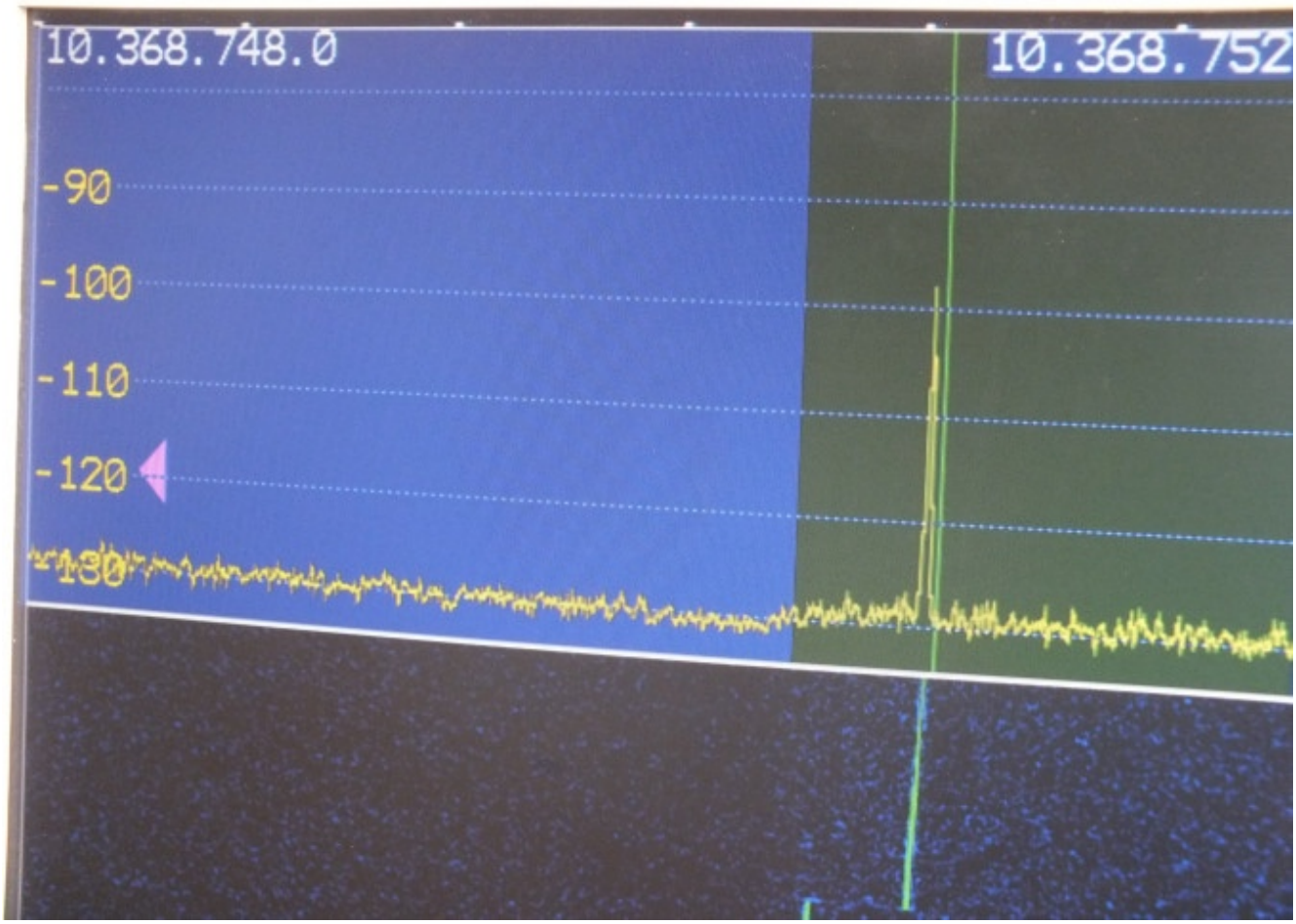
Feeding the crook/horn from the DB6NT shows the same monitor output as I got using my ex-LNB horn with my home-brew SMA-to-rectangular transition: 5 “units” on the moving-coil meter scale. This looks encouraging. I need a way to measure the insertion loss.

I added a bracket under the box so as to not distort the dish with the weight of the box (not in the picture).

I tested the horn straight into the SMA transition using GB3FNY as a source. And then with the crook in between.



The results seemed comparable with the old LNB horn, so that seems reasonable. One surprise was that when I removed the back-short (the 22mm plumbing cap) from the SMA transition and left the waveguide open, I couldn’t see any difference in the signal strength.



Using the vertical polarisation SMA feed resulted in about a 20dB drop in signal (as predicted by Bryan G8DDK).

This month I ‘ave mostly been ...

John Worsnop G4BAO

… repairing stuff that expired, is no more, has ceased to be, has run down the curtain and joined the choir invisib**u**le.....

My 3.4, 10 and 24GHz mast has been lying on the lawn since my Kuhne MKU24G2 24GHz transverter failed yet again.

Now I don't want to spoil Anglo European relations in these sensitive, pre-Brexit days, but certain German readers of this magazine might want to consider explaining to me why,

a) the same fault occurred 2 years after it failed and was repaired last time and, more annoyingly,
b) this time I was charged €200 instead of €60 to have the same fault repaired.

24GHz is proving very expensive for one QSO a year, but hey, there's no pockets in a shroud.

While the mast was down I took the opportunity to upgrade the 10GHz preamp to two stage, upgrade the relays and I've now finally upgraded the regulator in my Toshiba 9cm 50W amplifier. I hope performance will improve on the higher bands when I get back on in the autumn.

Had a few 3cm and 6cm EME contacts despite things being far from optimised yet, and it's nice to say I've got confirmed EME QSOs on four GHz bands now....

Only 9cm EME left to do, then, if noise levels continue to increase on both 23cms and 9cms, I'll need to find a new hobby.

Basket weaving anyone?

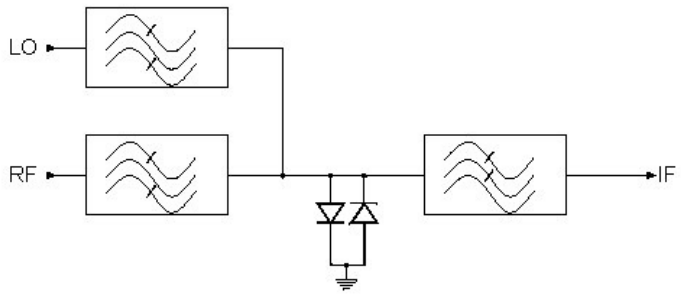
A Simple Wideband Harmonic Downconverter

John Owen MW1FGQ - mw1fgq@btinternet.com

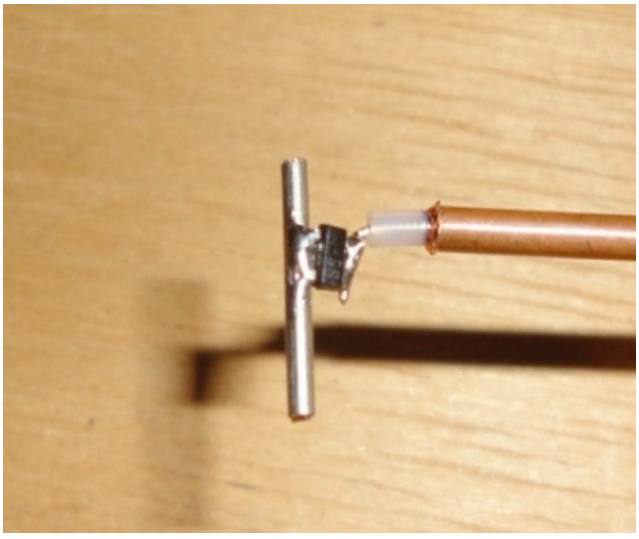
Here's a remarkably simple harmonic downconverter intended for 24 GHz but seems pretty wide band, giving good results at higher frequencies and on the lower bands, so should be useful for those of us with limited test equipment - in my case a 1500 MHz spectrum analyser and a 2GHz scanner. Results can be straightforward although some care must always be taken to interpret them or you may fall down a Rabbit hole as I did! If it looks too good to be true, it probably is.

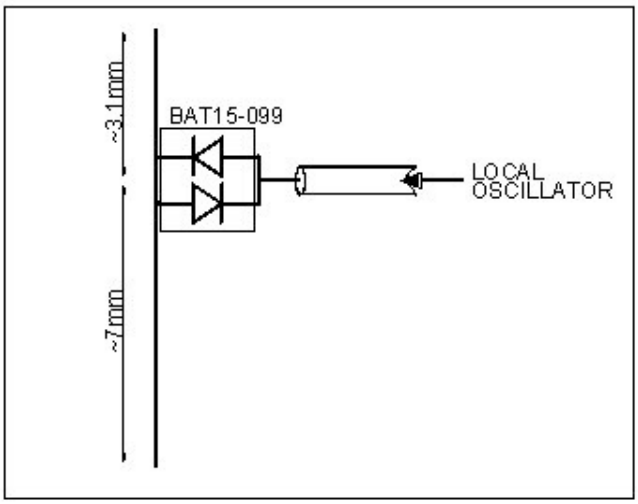
I recently decided to make an effort to use the 24 GHz kit I'd collected over a number of years. I'd no experience of the band or the frequencies involved and had no suitable test equipment so before building the proper stuff, I thought I'd have a look at some of the junk I'd collected to see if anything might be useful – mostly Gunn oscillators from commercial 23 and 38-39 GHz systems and a couple of DMC bricks at 22/23 GHz. I found a nice WG20 mixer that worked well but, before finding it, I'd done some research into subharmonic mixers. I soon decided against buying a proper one as they're expensive. My analyser doesn't have the facility for an external converter and building anything would be a non-starter or take too long because it would be too difficult and I had no fancy PCB material or even suitable diodes – or so I thought.

I'm not really the person to explain the details and complexities of harmonic mixers but, put simply, they use a pair of back to back diodes to generate harmonics of a relatively low frequency local oscillator and mixes these with the incoming RF to provide a much lower frequency IF output. Much has been written about them and they are still used up to extremely high frequencies. Shown below is the shunt version I used:-



At some stage my attention was drawn to the Octagon PLL satellite LNB I'd been using as a 10 GHz downconverter for my analyser and I wondered if it would be useful as a second IF for a simple harmonic converter using a relatively low frequency first local oscillator. I imagined a simple wire probe in air with a pair of back to back diodes part way down so that one section was about λ/4 at 24GHz and the other λ/4 at 10GHz (so close to λ/2 and high Z at 24 GHz if it matters?) with the probe supported by semi rigid cable for the local oscillator feed, the idea being that the output of this first mixer would radiate into the mouth of the LNB. I gave no thought to filtering or matching which sounded far too difficult and could come later - I just wanted to "see" signals.



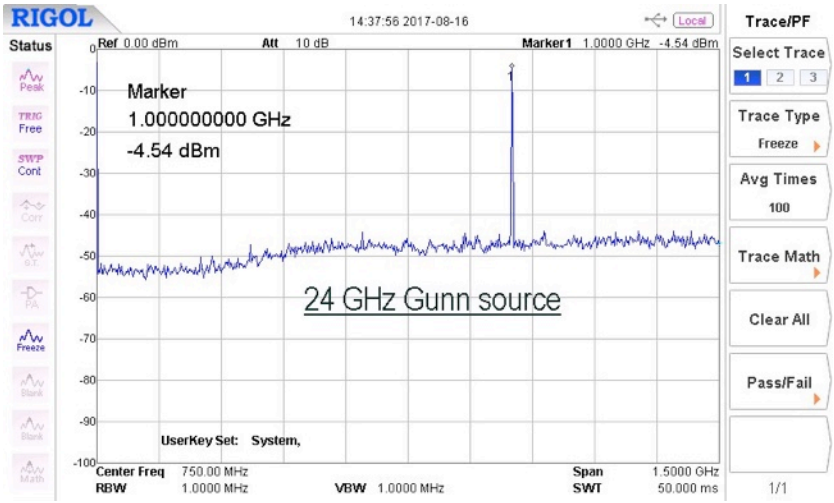


I quickly made up a crude prototype using a length of TC wire and a BAT15-099 for the pair of diodes as shown above and just clamped it in front of the LNB. I know - in my haste I got this wrong with no return path for the LO signal but it worked!

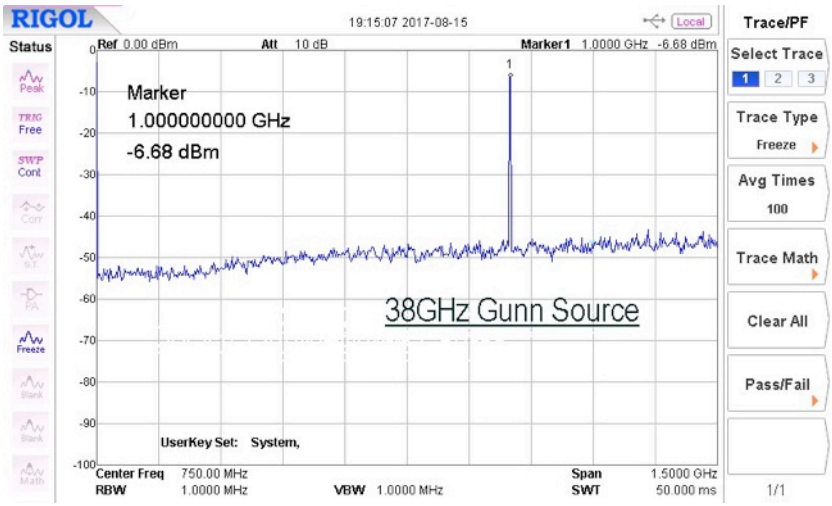
I reckoned for a 1 GHz final IF into the analyser I'd need a local oscillator at

24,048 – (9,750 +1,000) = 13,298 MHz

so the second harmonic of 6,649 MHz which is within the range of my only microwave signal generator – an ancient tuned Gunn Marconi 6,057 covering 4-8 GHz.

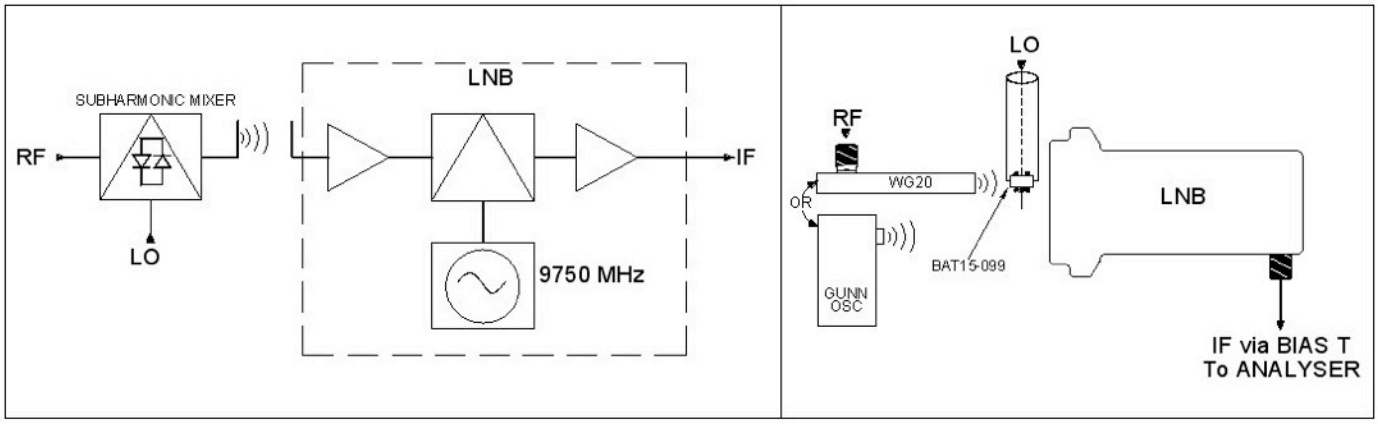


With a local oscillator level of about 15dBm I was amazed it worked first time! The frequency setting and accuracy of the old Marconi is terrible but it was good enough for me to be happy the system worked pretty much as I'd hoped. Being a double conversion system, increasing the frequency of the first oscillator reduces the final IF frequency thus proving I wasn't looking at the image frequency from the LNB, the sums seemed to add up. See the SA plots (left) of 24 and 38 GHz Gunn sources with the local oscillator at very roughly 6650 and 6813 MHz



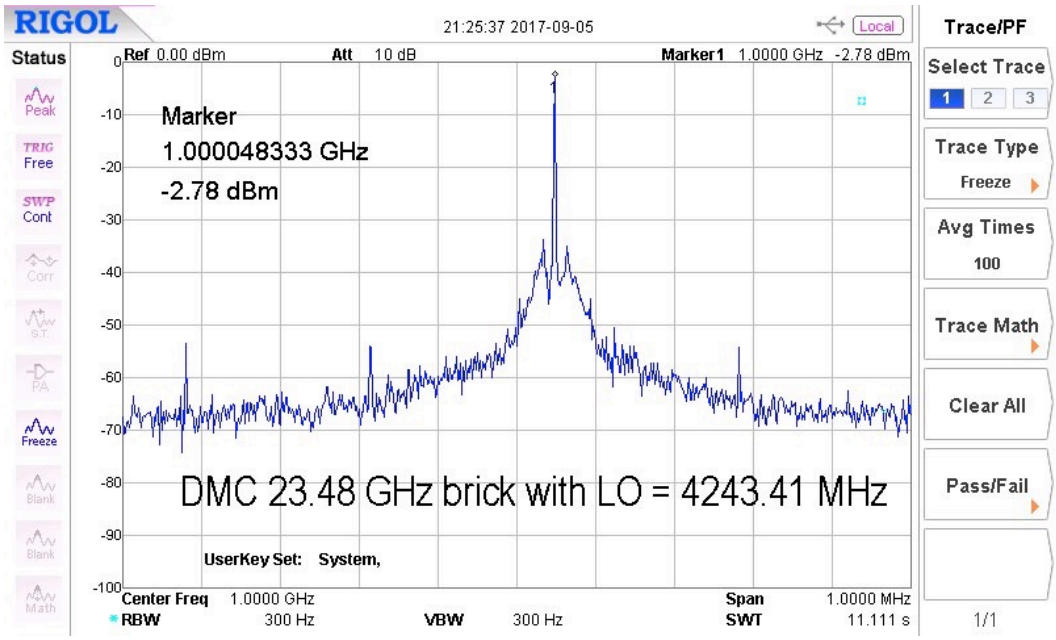
One of the few advantages of using Gunn oscillators is that I could be pretty certain that there would be no signals lower than the expected frequencies to confuse me as shown above for full 1500 MHz sweeps showing no additional responses.

Below is a simple block diagram and a representation of my simple test setup.



I made several versions of the mixer, including waveguide and coaxial input versions, screened with a jar lid. They all worked but I wouldn't claim any of them are decent so won't show them here.

Left is the simple Mk.2 version together with a plot (below) made with it from one of the DMC oscillators at 23.48 GHz feeding a transition.



Arithmetic

A bit of arithmetic is all that's needed to find a signal, I aim for a convenient 1 GHz final IF from the LNB which makes the numbers easier and narrows down where to start looking for weak signals. For this 1GHz final IF the input to the LNB from the first mixer should be at 10750 MHz for its 9750 LO so the wanted harmonic of the first local oscillator will be:-

(Input RF) – 10750 MHz. I then divide this by an even integer sufficient to reach a frequency within the range of my local oscillator:-

Say for 48096 MHz, the wanted harmonic of the local oscillator is 48096-10750 = 37346 MHz and divided by 6 = 6224.33 MHz so within the range of my oscillator.

Odds and Evens

I got a bit confused here; the anti-parallel diode mixer should only give responses for even multiples of the local oscillator but I do see odd harmonic responses which I think are because the diodes aren't well matched – a simple test at VHF with my diodes shunted across a signal fed into the analyser shows both even and somewhat weaker odd harmonics. The local oscillator itself may also be generating its own harmonics which will get into the mix. The ADF4350 synthesiser mentioned later definitely generates both odd and even harmonics so the output must be some sort of rectangular waveform with a non-unity mark space ratio.

Local Oscillator

My old Marconi Gunn source is far from ideal but enabled me to prove the scheme works. It also has an output attenuator, useful to vary the injection level into the mixer and although pretty unstable in frequency, the output is clean so gives an uncluttered display. A microwave signal generator is an obvious solution if you have one although a VHF/UHF generator such as my Marconi 2022 will work with some amplification but with higher multiplication ratios so the LNB output levels may be low and there will be far more clutter to contend with – I saw a level of -15dBm from a 19GHz DRO using 687.5 MHz x12.

Any fixed frequency oscillator such as a suitable brick would be fine for a single band, say centred on 24 GHz, and you can obviously use any final IF within the useful range of the LNB or even switch the LNB to the 10.6 GHz LO high band mode if it suits. The oscillator should be fairly clean or you'll end up with a confusing display full of unexpected responses - a pipe-cap filter would obviously clean things up. The many synthesiser options available these days are obvious candidates but I only have an ADF4350 here.

ADF4350/51 – I have one of the fake ADF4351 (that isn't) Chinese boards running with an Arduino and the F1CJN software but my first attempts at feeding the output directly into the diode mixer were poor which I put down to lots of spurious signals and the seemingly low output at higher frequencies - but note I stupidly wasn't terminating it with 50 Ohms. I then made a two stage MMIC amplifier using ERA-2s but this didn't help much until I added a 6dB attenuator to the ADF4350 output when it mostly calmed down. I later tried the synthesiser direct without the amplifier but still with the 6dB attenuator in circuit and again it was better so it obviously needs a decent match which presumably my MMIC amplifier isn't. The penalty is the reduced signal level so I guess an amplifier is necessary.

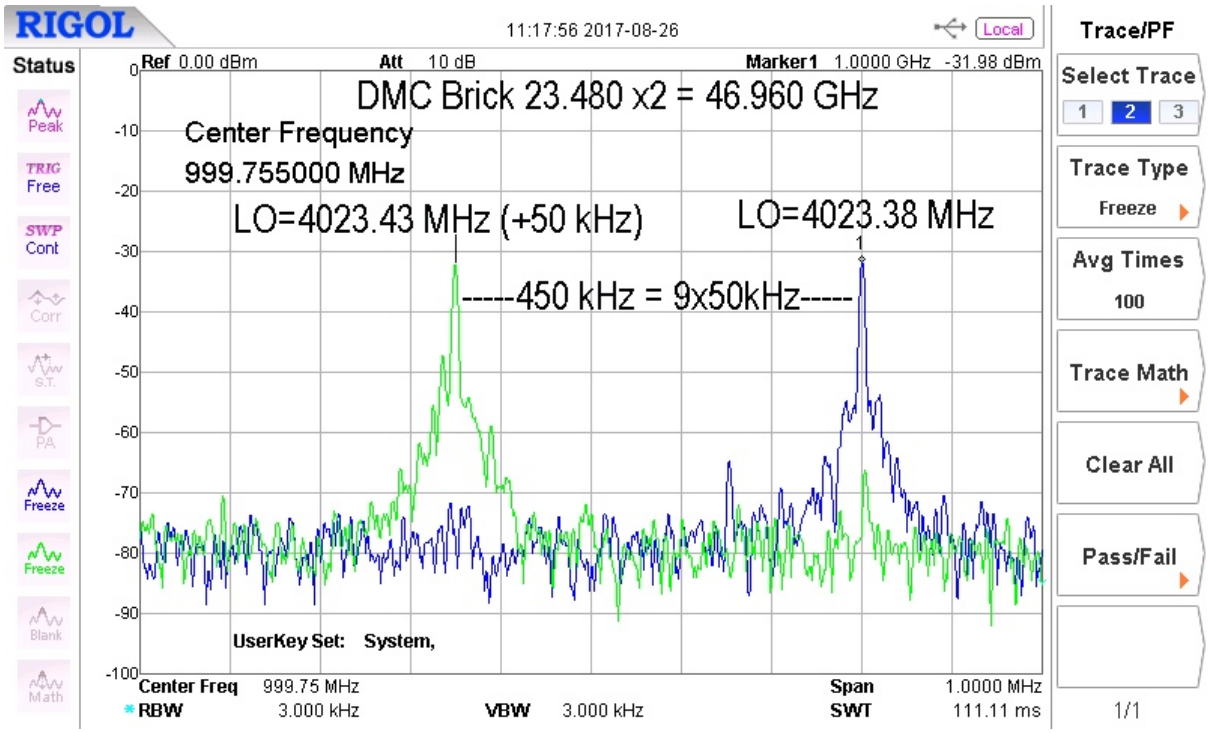
A variable attenuator or level control is needed to get the best results from the mixer; the optimum local oscillator injection level depends on the diode types and which point on the diode characteristic gives best conversion for the individual frequencies and signal levels involved. I plan to make a PIN diode attenuator to go with the ERA-2 amplifier but have an old HP wide band PIN device which I'll try in the meantime. Some LO harmonics will obviously fall into the input range of the LNB but shouldn't be a problem if they're not masking wanted signals, they may be so strong as to cause intermodulation products in the LNB itself so changing to a different LO multiple can help.

Externally referencing everything will obviously greatly improve the frequency accuracy of the overall system but isn't absolutely necessary for simple qualitative tests - it is on my list! I should mention that any old DRO LNB will work but with obviously poorer frequency determination.

Higher Frequencies

I know the system performs above 24 GHz as I've had good results at 38 and 40GHz with relatively powerful Gunn sources but, try as I might, I haven't been able to generate a clean harmonic of any of my oscillators so, although many of my early results looked impressive, they were mostly wrong! The reason these seemingly wonderful results are false is that I'm not able to get rid of the fundamental frequency of the basic oscillators; I tried making a frequency multiplier using a diode pair in a 7mm diameter tube as a waveguide high pass filter and although it did work as expected I found the bricks radiate the fundamental from the boxes themselves over a good distance and into the unscreened mixer. The problem is the anti-parallel diodes behave as a frequency multiplier for both the local oscillator and for the incoming RF so most of the high harmonics I was seeing were generated in the mixer diodes themselves by multiplying the fundamental I couldn't suppress! I saw impressively high multiplication ratios before the penny dropped; I just don't have any suitable sources to make any more meaningful tests.

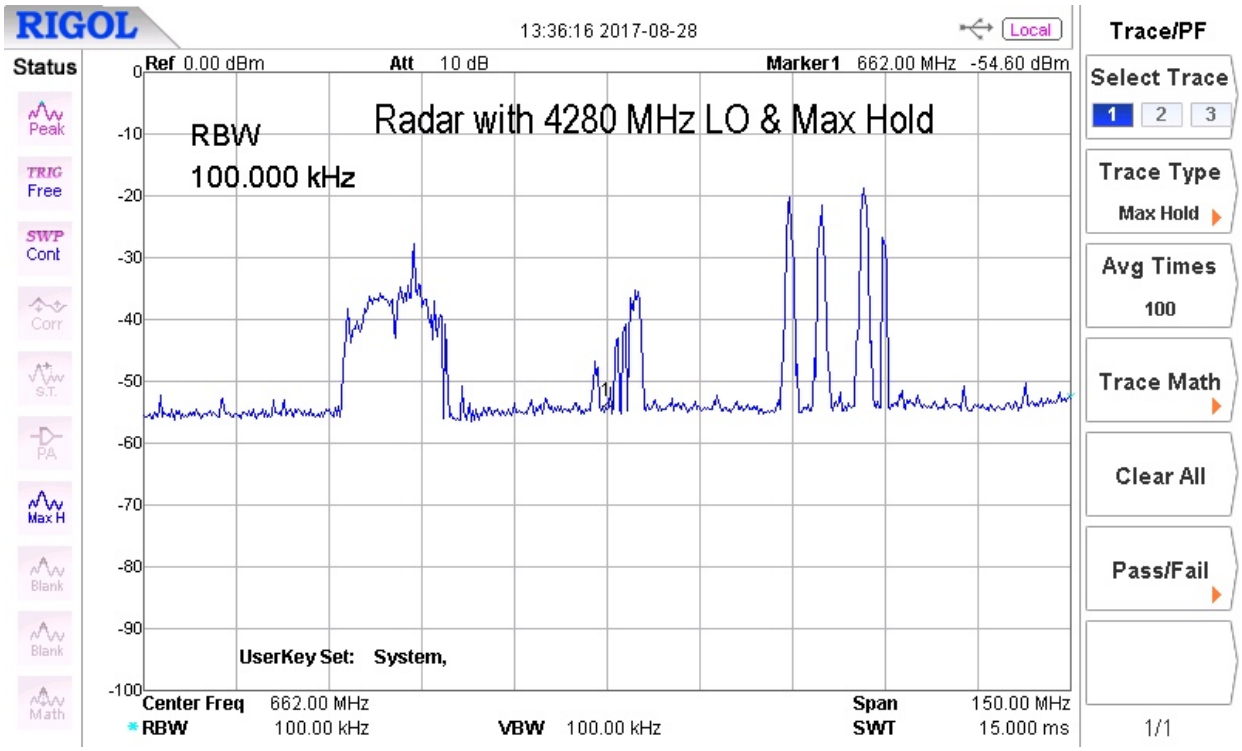
Once I started using the ADF4350 synthesiser my LO frequency setting became much better and I was more confidently able to search for signals. My first attempt was to look for the second harmonic of a DMC 23.480 GHz brick. The results are actually false but I'll use them to illustrate the simple test I use for the multiplication ratio:-



You can see from the SA plot above that, in order to prove I wasn't fooling myself (!). I froze the first blue trace, increased the LO frequency by 50 kHz and was gratified to see the final IF had dropped in frequency by 450 kHz as shown by the green trace thus proving I was seeing a product of the 9th harmonic of the LO, sadly it isn't real as explained above. Now don't laugh but I found responses with multiplication ratios of 19, 25, 31 and 37 before I caught on! At least I have the satisfaction of knowing that somewhere within the mixer diode package some tiny but ridiculously high frequencies may be being generated.

Lower Bands

The system also works below 10 GHz so can be useful for the lower bands. This could be with a fundamental mode single diode or the two diode harmonic mixer. I could easily see the outputs of 2.4 and 5.8 GHz video senders used as convenient sources from the next room. You may also see odd pulses popping up all over the place from strong Radar interference. Here's a Max Hold trace of the very short duration pulses:-



More to do

So there you have it, the basic idea is pretty simple and uses no difficult to find parts or obsolete modules but works far better than I could have expected, as I hope the analyser traces show. It's just a harmonic mixer and double conversion system taking advantage of the useful properties of a domestic LNB to keep the frequency of the first local oscillator and multiplication factor low and to provide some filtering and lots of gain to make up for the conversion loss. I devised it as a simple piece of test kit using what little I had available. Amplitude calibration may be difficult other than perhaps over a limited range but the system should still be useful for finding and peaking signals – I can now see and adjust the outputs of all the oscillators I've collected over the years which is a big step forward. The version presented is just about the simplest possible but still useful for anyone with limited facilities. I've no doubt the system can be improved with better diodes in a properly designed mixer with better coupling, matching and filtering.

I really shouldn't be trying to design this sort of thing so rather than sitting on it and trying to improve it myself - which might never happen, I've decided to publish the concept as it is. It's better that others with more ability, time and facilities take it from here – please do so and report your results so that we might all benefit – but please don't make it too complicated or costly. Although it's seemingly obvious, I think it's original.

It'll be very interesting to hear what sensitivity, frequency coverage and novel uses are possible, it can be used with any back end device within the output frequency range of the LNB, even an SDR stick with limited span for known stable frequencies. Might it make a half useful receiver given some front end and/or antenna gain, perhaps useful to monitor a transmitter or very local beacon?

Again no LNBs were harmed in this project; I only have one Octagon PLL type and need it intact! Sadly a number of diodes were lost in the process - but I'm still looking…..

> *Dyfeisiwyd yng Nghymru [Devised in Wales]*

P.S. Whilst trying to finish this article I had a bit of a panic and wondered if the multiplying and mixing really were being done in the antiparallel diodes or might be happening in the LNB as in my 10GHz narrowband idea. To test I used a simple dipole probe with no diodes at the LNB fed from the ADF4350/MMIC oscillator and worryingly found fairly weak results at the expected 1 GHz IF from one of my test sources. Changing to the Gunn local oscillator brought no responses that I could find so I can only guess the ADF4350 generates sufficient harmonics to allow some mixing of the right order to take place in the first stage of the LNB. I don't think it should be a problem - tricky stuff this RF!

READ CAREFULLY!!!

Scatterpoint Distribution Change from Yahoo to Groups.io

As many readers will be aware, Yahoo Groups, which is used for Scatterpoint delivery, has somewhat erratic performance. In July the UKuG Committee internally migrated its own work from a Yahoo Group to Groups.io and this is now planned for the much larger membership group used for Scatterpoint email/web distribution. A number of other radio-related Yahoo groups have already migrated, e.g. linuxham, digitalradio.

The change will be

- From: https://uk.groups.yahoo.com/neo/groups/scatterpoint
- To: https://groups.io/g/Scatterpoint

Previous experience of migration requires some preparation by yourself to ensure this goes smoothly – and this varies depending whether you have ever used Groups.io

Case-1: I have never used Groups.io

Your existing/preferred email address currently registered with Yahoo for Scatterpoint delivery will be automatically carried over to Groups.io where a new account will be created for you. Note that if you wish to access the group file area and archives for Scatterpoint files, indexes etc, you will need to set a fresh password as the process cannot copy Yahoo passwords. This can be quickly achieved after the initial migration by asking for a Groups.io password reset (which triggers an email to your address). Once migrated it is recommended you do this asap. You will find web access mode for the groups.io account has better facilities (and may be useful if you wish to join additional groups that are now on groups.io)

Case-2: I have a current Groups.io Account – Is that ok?

The answer to this depends on whether the email address you use for Scatterpoint in Yahoo, is identical to your existing groups.io. login

a) **It is the same – Easy! The new Scatterpoint group.io entry should be added to your existing account**

b) **It is not – This typically arises because some yahoo users have multiple email preferences/ accounts or a different one has been used for another groups.io item**

If b), then it is recommended to change your Scatterpoint yahoo email preference NOW to be identical, as a preparatory measure. Otherwise on migration a separate new groups io account will be created based on your current yahoo email setting as per Case-1.

Notes:-

Membership of the new groups.io Scatterpoint group will be managed by the UKuG Membership secretary who will verify if you are a current paid-up member in a similar manner to its Yahoo predecessor. Contact: membership@microwavers.org

Tip: Once migrated it can be worth adding the scatterpoint@groups.io email address that will be used to your contacts in order to ‘train’ any local spam filter

From The Editor

Thanks to Murray for the explanation!

We’re also about to launch the UKµG Wiki.

Martin RH G8BHC

Contest Results

John G3XDY, UKuG Contest Manager

July 5.7GHz Contest 2017 (revised)

Some moderately helpful rain scatter conditions were reported in this event, although scores and activity were comparable with the June event.

The top two places swapped over this time, with Telford & District G3ZME/P taking top spot from the Combe Gibberlets group M0HNA/P. Congratulations to both.

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	G3ZME/P	IO82QL	7	1199	G3XDY	265
2	M0HNA/P	IO91GI	8	991	G4ALY	216
3	M0GHZ	IO81VK	6	857	G3XDY	246
4	G4LDR	IO91EC	6	801	G3XDY	223
5	G4EML/P	IO90SV	2	172	M0HNA/P	87
6	M0RKX/P	IO92DB	4	112	G4NZV	29
7=	G4NZV	IO82WA	3	51	M0RKX/P	29
7=	M0BUX	IO82WA	3	51	M0RKX/P	29
9=	2E0MDJ/P	IO81XW	3	49	M0RKX/P	27
9=	G0LGS/P	IO81XW	3	49	M0RKX/P	27

July 10GHz Contest 2017 (revised)

Rain scatter propagation aided signals for several stations, with respectable totals for the leading stations.

The Telford group G3ZME/P win the Open section this time, with G4KUX as runner up, and Keith GW3TKH/P with Rover operation from two locations pushed the Combe Gibberlets team M0HNA/P into second place in the Restricted section. Congratulations to all.

Open Section

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	G3ZME/P	IO82QL	24	3856	F6DKW	535
2	G4KUX	IO94BP	10	3367	F6DKW	712
3	G4LDR	IO91EC	19	3350	G4KUX	395
4	G8HAJ	JO01JR	15	2661	G4KUX	370
5	G4BAO	JO02CG	9	1520	G3UVR	253
6	G3UVR	IO83KH	7	1274	G3XDY	324
7	G4EML/P	IO90SV	3	382	G4ODA	210

Restricted Section

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	GW3TKH/P	IO81LS	15	2491	G6TRM/P	314
2	M0HNA/P	IO91GI	15	1844	G4DDK	204
3	G3YKI	IO92BD	14	1622	G4KUX	279
4	G0LGS/P	IO81XW	12	1225	G4KUX	302
5	2E0MDJ/P	IO81XW	11	1198	G4KUX	302
6	M0GHZ	IO81VK	8	935	G8HAJ	210
7	M0RKX/P	IO92DB	5	303	G4UVZ	156

July Championship tables (revised)

5.7GHz

Pos	Callsign	28-May-17	25-Jun-17	30-Jul-17	27-Aug-17	TOTAL
1	G3ZME/P	1000	973	1000	1000	3000
2	M0HNA/P	0	1000	827	671	2498
3	G4LDR	500	704	668	381	1872
4	GW3TKH/P	461	457	0	663	1581
5	GW4HQX/P	368	305	0	426	1099
6	G4JNT	216	283	0	342	841
7	M0GHZ	0	0	0	407	407
8	M0RKX/P	62	0	93	86	241
9	2E0NEY	0	0	0	226	226
10	G4EML/P	0	0	0	183	183
11	G4FRE/P	0	0	0	151	151
12=	M0BUX	28	21	43	38	109
12=	G4NZV	28	11	43	38	109
14=	2E0MDJ/P	27	21	41	30	98
14=	G0LGS/P	27	21	41	30	98

10GHz Open

Pos	Callsign	28-May-17	25-Jun-17	30-Jul-17	27-Aug-17	TOTAL
1	G3ZME/P	1000	985	1000	907	2985
2	G4LDR	870	1000	869	548	2739
3	G8HAJ	559	639	690	1000	2329
4	G4KUX	0	0	873	595	1468
5	GW3TKH/P	436	308	0	583	1327
6	G3UVR	0	270	330	0	600
7	G6TRM/P	567	0	0	0	567
8	G4ASR	0	0	0	455	455
9	G4KCT/P	0	448	0	0	448
10	G4BAO	0	0	394	0	394
11	G4EML/P	0	104	99	99	302
12	G4CLA	238	0	0	0	238
13	G8EEM/P	0	81	0	0	81

10GHz Restricted

Pos	Callsign	28-May-17	25-Jun-17	30-Jul-17	27-Aug-17	TOTAL
1	M0HNA/P	0	1000	740	1000	2740
2	G0LGS/P	1000	558	492	547	2105
3	2E0MDJ/P	621	424	481	547	1649
4	GW4HQX/P	619	325	0	511	1455
5	GW3TKH/P	0	0	1000	0	1000
6	M0GHZ	0	0	375	438	813
7	M0KSW/P	0	0	740	0	740
8	M0RKX/P	430	0	122	130	682
9	G3YKI	0	0	651	0	651
10	G1DFL/P	570	61	0	0	631
11	2E0NEY	0	0	0	220	220
12	G8EOP/P	0	98	0	0	98
13	G3YJR	0	0	0	42	42

August 5.7GHz Contest 2017

Entry levels equalled those on 10GHz for this event, for the first time ever. Several stations are having success with modified video senders and panel antennas.

The top places were a re-run of the July event, with Telford & District G3ZME/P in first place, with the Combe Gibberlets group M0HNA/Pas runners up. Congratulations to both.

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	G3ZME/P	IO82QL	12	1620	G3XDY	265
2	M0HNA/P	IO91GI	10	1087	G4ALY	216
3	GW3TKH/P	IO81LS	9	1074	G4ODA	228
4	GW4HQX/P	IO81LS	7	690	G4ALY	166
5	M0GHZ	IO81VK	7	660	G4ODA	206
6	G4LDR	IO91EC	7	617	G4ALY	195
7	G4JNT	IO90IV	5	554	G4ODA	224
8	2E0NEY	IO81VK	5	366	G3ZME/P	120
9	G4EML/P	IO90SV	2	297	G4ODA	210
10	G4FRE/P	IO82UA	4	245	M0HNA/P	94
11	M0RKX/P	IO92DB	5	139	G4NZV	29
12=	G4NZV	IO82WA	4	62	M0RKX/P	29
12=	M0BUX	IO82WA	4	62	M0RKX/P	29
14=	2E0MDJ/P	IO81XW	3	49	M0RKX/P	27
14=	G0LGS/P	IO81XW	3	49	M0RKX/P	27

August 10GHz Contest 2017

Conditions were rather poor for this event with several stations finding that normally reliable paths wouldn't work. David G4ASR commented: Propagation could be likened to firing into a blancmange covered in a wet blanket.

A new callsign appears at the top of the Open section, with Graham G8HAJ as winner this time, with the Telford group G3ZME/P as runners up. In the restricted section the Combe Gibberlets M0HNA/P take top spot with the father and son team of G0LGS/P and 2E0MDJ/P as joint runners up. Congratulations to all.

Open Section

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	G8HAJ	JO01JR	17	3722	G4KUX	370
2	G3ZME/P	IO82QL	21	3377	F6DKW	535
3	G4KUX	IO94BP	8	2216	G4LDR	395
4	GW3TKH/P	IO81LS	15	2169	F6DKW	501
5	G4LDR	IO91EC	13	2038	G4KUX	395
6	G4ASR	IO81MX	14	1694	M0DTS/P	300
7	G4EML/P	IO90SV	3	367	G4ODA	210

Restricted Section

Pos	Callsign	Locator	QSOs	Score	ODX Call	ODX km
1	M0HNA/P	IO91GI	20	2819	G4KUX	368
2=	2E0MDJ/P	IO81XW	14	1543	G4KUX	302
2=	G0LGS/P	IO81XW	14	1543	G4KUX	302
4	GW4HQX/P	IO81LS	13	1440	G8HAJ	264
5	M0GHZ	IO81VK	10	1236	M0DTS/P	340
6	2E0NEY	IO81VK	7	621	G8HAJ	210
7	M0RKX/P	IO92DB	6	367	GW3TKH/P	98
8	G3YJR	IO93FJ	1	118	M0DTS/P	118

August 5.7/10GHz Championship Tables

5.7GHz

Pos	Callsign	28-May-17	25-Jun-17	30-Jul-17	27-Aug-17	TOTAL
1	G3ZME/P	1000	973	1000	1000	3000
2	M0HNA/P	0	1000	827	671	2498
3	G4LDR	500	704	668	381	1872
4	GW3TKH/P	461	457	0	663	1581
5	GW4HQX/P	368	305	0	426	1099
6	G4JNT	216	283	0	342	841
7	M0GHZ	0	0	0	407	407
8	M0RKX/P	62	0	93	86	241
9	2E0NEY	0	0	0	226	226
10	G4EML/P	0	0	0	183	183
11	G4FRE/P	0	0	0	151	151
12=	M0BUX	28	21	43	38	109
12=	G4NZV	28	11	43	38	109
14=	2E0MDJ/P	27	21	41	30	98
14=	G0LGS/P	27	21	41	30	98

10GHz Open

Pos	Callsign	28-May-17	25-Jun-17	30-Jul-17	27-Aug-17	TOTAL
1	G3ZME/P	1000	985	1000	907	2985
2	G4LDR	870	1000	869	548	2739
3	G8HAJ	559	639	690	1000	2329
4	GW3TKH/P	436	308	0	583	1327
5	G3UVR	0	270	330	0	600
6	G4KUX	0	0	0	595	595
7	G6TRM/P	567	0	0	0	567
8	G4ASR	0	0	0	455	455
9	G4KCT/P	0	448	0	0	448
10	G4EML/P	0	104	99	99	302
11	G4CLA	238	0	0	0	238
12	G8EEM/P	0	81	0	0	81

10GHz Restricted

Pos	Callsign	28-May-17	25-Jun-17	30-Jul-17	27-Aug-17	TOTAL
1	M0HNA/P	0	1000	740	1000	2740
2	G0LGS/P	1000	558	492	547	2105
3	2E0MDJ/P	621	424	481	547	1649
4	GW4HQX/P	619	325	0	511	1455
5	GW3TKH/P	0	0	1000	0	1000
6	M0GHZ	0	0	375	438	813
7	M0KSW/P	0	0	740	0	740
8	M0RKX/P	430	0	122	130	682
9	G3YKI	0	0	651	0	651
10	G1DFL/P	570	61	0	0	631
11	2E0NEY	0	0	0	220	220
12	G8EOP/P	0	98	0	0	98
13	G3YJR	0	0	0	42	42

UKuG Microwave Contest Calendar 2017

Dates	Time UTC	Contest name	Certificates
17- Sep	0900 - 1700	3rd 24GHz Contest	
17- Sep	0900 - 1700	3rd 47GHz Contest	
17- Sep	0900 – 1700	3rd 76GHz Contest	
24 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
24 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
22 -Oct	0900 - 1700	4th 24GHz Contest	
22 -Oct	0900 - 1700	4th 47GHz Contest	
22 -Oct	0900 – 1700	4th 76GHz Contest	
19 -Nov	1000 - 1400	5th Low band 1.3/2.3/3.4GHz	F, P,L
Key:	F	Fixed / home station	
	P	Portable	
	L	Low-power (<10W on 1.3-3.4GHz, <1W on 5.7/10GHz)	

Scottish Microwave Round Table

The GMRT reverts to the first Saturday of the month this year, so it will be held on Saturday 4 November.

The venue for the Round Table will be the Museum of Communication as in previous years, and the evening meal has again been booked in the Kingswood Hotel.

Currently three speakers are confirmed:

- Mark GM4ISM - "A 10 GHz Home Station"
- David GM6BIG - "A High Quality 10GHz Beacon"
- Andy MM0FMF - "13cm SOTA"

As before, it will include the GM round of the UK Microwave Group Projects Trophy, so get that project completed before November – built, modified, hardware or software.

Places will be limited to about 50 as usual, and booking will be available through this website soon.

Announcements will also appear on the ukmicrowaves Yahoo reflector.

Crawley Microwave Round Table Report

Sunday 10th September 2017

We had a very enjoyable Crawley MRT. I counted about 20-25 participants. It was difficult to be certain as so many came and went during the morning.

An interesting range of talks. Thanks to the speakers.

Chris ,G0FDZ, and the Crawley Club members did a great job of organising the event. Next year the event will be run by Denis Stanton G0OLX and Alun Cross G4WGE. The future of the CMRT is assured for another year.

John G4BAO and I judged the construction contest. There were just three entries – all of those from Andy G4JNT.

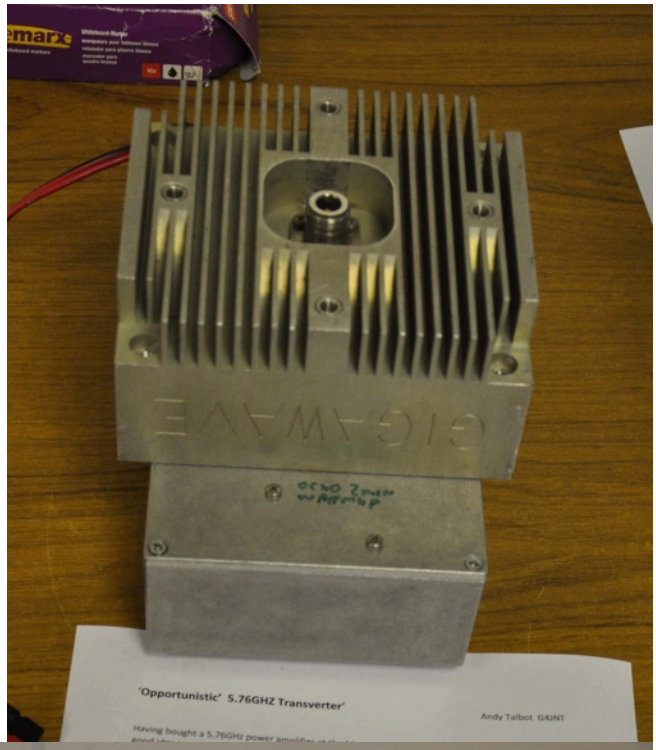
Of course, Andy won (and came second and third!) the Crawley G3GRO construction contest shield.

Well done, Andy.

The winning entry was a beautifully built digital down-converter for 140–4400MHz.

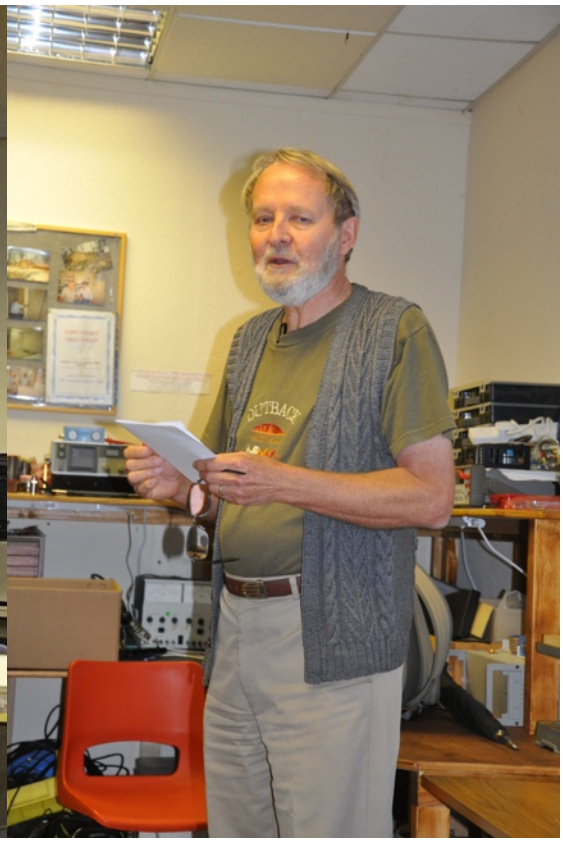
This now goes forward to the 2018 MMRT final judging for the G3VVB trophy.

73 de Sam



Andy received the G3GRO plate for the Crawley heat of the UKuW Group Project contest for his 6cms transverter.

Brian Coleman G4NNS – Goonhilly activity



VK4OE informal presentation on microwaves down under

Plenty of chatting at the RT

Photo by Doug Friend VK4OE who also gave us a brief presentation on 'Microwaves down under' which was very well received.

Next year

Many thanks to Denis Stanton G0OLX and Alun Cross G4WGE for offering to take over the organisation of the Crawley RT. It will be good to hand over to someone else, after having done it on 'temporary' basis for 10 years.

Thanks and regards **Chris Whitmarsh G0FDZ**

Activity News : August 2017

By Neil Underwood G4LDR

Please send your activity news to:

scatterpoint@microwavers. org

Introduction

I was very privileged to be part of the team operating EME from Goonhilly Earth Station using their biggest dish, the 32m GHY6 antenna. On 6cm signals were so strong that it was possible to hear our own FM echo's nearly fully quietening.

More down to earth we have reports on modifying and using a commercial LNB, 3cm activity in the microwave UKAC and some scatter experiments on 47GHz.

cm-Wave Bands

From John G0API

who describes modifications to an Octagon LNB for 10GHz and what he has been able to hear with it.

Octagon LNB Model: Slim Optima Twin LNB modification for 27MHz reference injection locking.

As reported previously in Scatterpoint this off the shelf LNB provides a fast and cost effective way of getting a low noise, frequency locked RX on the 10GHz band, with bandwidth also capable of future ATV activity above the usual narrowband section at 10368MHz.

The unused second F type port has its internal pcb track cut just beyond the point of entry and a 1k resistor added to the spill of the socket. This needs to run straight down the die-cast aluminium compartment as shown.

The wall of the lid section needs to be notched (use a pair of end cutters as the material is soft) and a 0.47uF or similar ceramic disc leaded cap fitted to connect onto one of the on-board synth inputs used by the Xtal. Add a sleeve over the pass through tail of the cap to avoid shorting. This forms the external 27MHz injection mod.

DO NOT attempt to remove the 27MHz Xtal as you will break the copper tracking (been there, fixed it with difficulty). An advantage of doing it this way is that if the locking fails for any reason the Xtal will just take over again as it does before the mod - free running but depending on ambient temp, it will be within a few kHz at 10GHz.

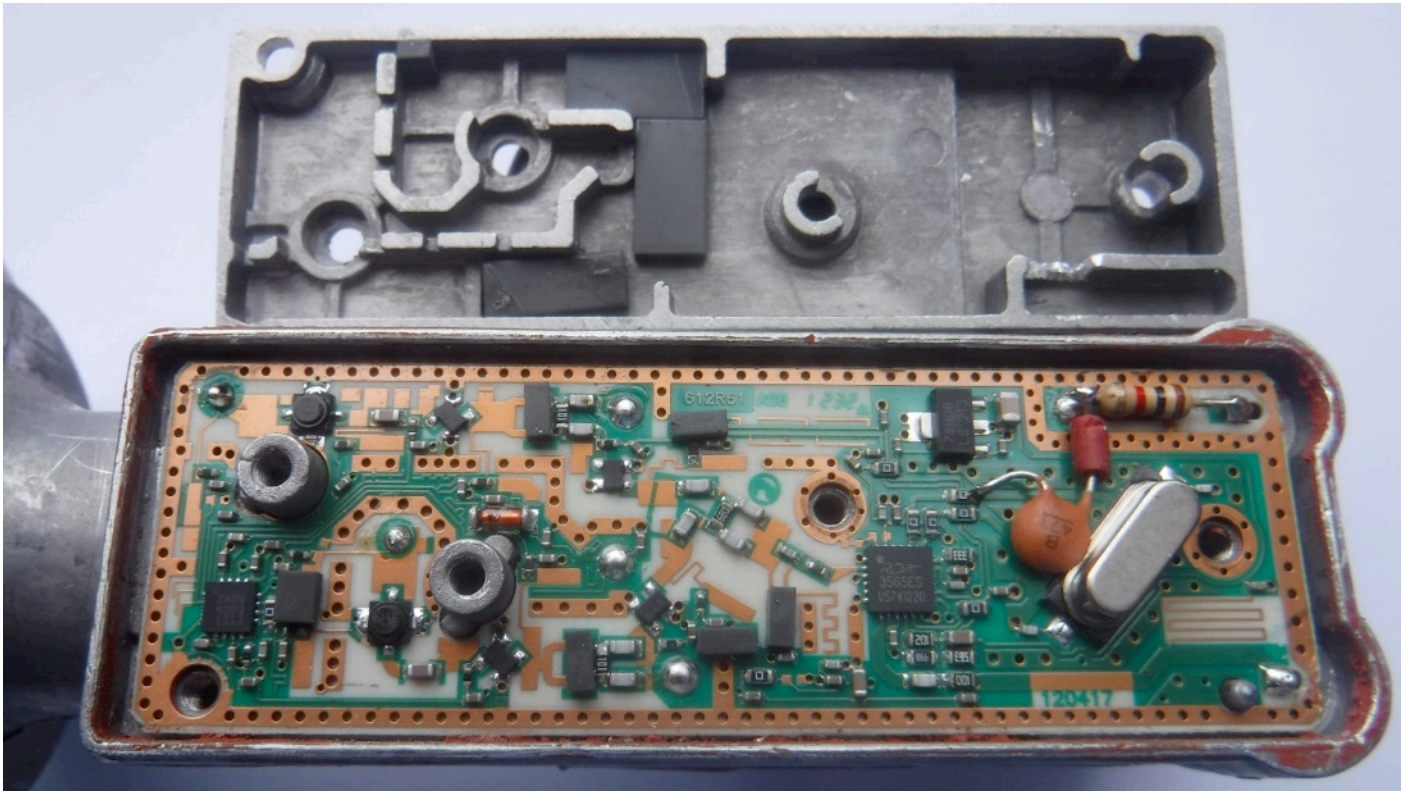
The DC is applied via the normal RX down lead and if reversed it will be DC blocked by the new cap and display no signals.

To open the LNB you will need to carefully remove the flexible red silicone sealant from all edges and the Torx head screws. A Torx screwdriver kit of bits can be bought for under £5. The bit I use is marked CR-V T9.

The outside plastic two part case is removed by prising the joint apart - pre-heating the plastic will make it soften and may save the multitude snap on features present. DO NOT remove the front Horn cover - that ensures waterproof integrity of the RF probes inside which are soldered directly to the LNB inputs.

Test the mod before re-sealing with a generous amount of DOW 3145 Adhesive /Sealant. I also favour an over spray or two of Silicone Conformal coating to be sure to be sure.

With F sockets coming out of the side (3 or 9pm positions) and 12V DC applied you will have Horizontal polarisation. Raising the Voltage to above 16V will automatically give you Vertical Polarisation.



Modified Octagon LNB.

You should find that -20dBm at 27MHz up to the masthead via 20m + standard 75 Ohm Sat TV coaxial cable will cause the 10GHZ signal to pull straight onto lock. The better the 27MHz , the closer will be the 10GHz. The i.f. output from the locked LNB will place 10368MHZ at 618MHZ. You can use a scanner or USB dongle or better to directly de-modulate signals to audio and input to decoding software in the WSJT series.

I use a G4JNT SBL1 mixer + synth to down convert to an i.f. of 144MHz and then an old , locked, Meon TVTR to 28MHZ, so I can band stare over 190kHz or use my Airspy at 618MHz over 9MHz. You do not miss much activity with this ability.

I can highly rate the GPS twin channel source supplied by Leo Bodnar Electronics. This item can have each channel set in software over a massive range. In my case 10MHz for instrumentation /SDR RX and 27MHz for the LNB.

Using the modified LNB on my normal ex-TV 60cm dish at 6m agl I regularly log UK beacons. I heard 6 during RS in mid-August within 5 mins, ranging from GB3KBQ in Taunton to GB3PKT near Clacton.

Also heard since the recent mod have been PA, ON and F beacons - all under RS conditions.

To put the LNB capability into context , I have also tested from home using a ground based 80 cm offset dish and had multiple decodes from DL0SHF using a modified Siemens security camera mount. I could see reliably up to 0.2db of Moon surface noise on my SDR-IQ.

I also, for fun, decoded the beacon using my up mast 60cm dish, using visual tracking on a full Moon - looking up from ground level!

From Graham G3YJR

3cm SHF UKAC 22-August-2017

https://g3yjr.wordpress.com/2017/08/22/3cm-shf-ukac-22-august-2017/

I managed to lash up the 80cm dish minutes before the contest in a patch of decent weather. There was quite a bit of insulation tape & bungie cord holding the bits together. A Blue Peter job really!

The 3cm antenna set up by G3YJR just before the August UKAC began.

Last month I managed to work Denis G3UVR over the Pennines. I was using just the LNB horn (10dB gain maybe?). He was quite easy copy, but he struggled to hear me on my 0.25W approx. We aimed at the direct path.

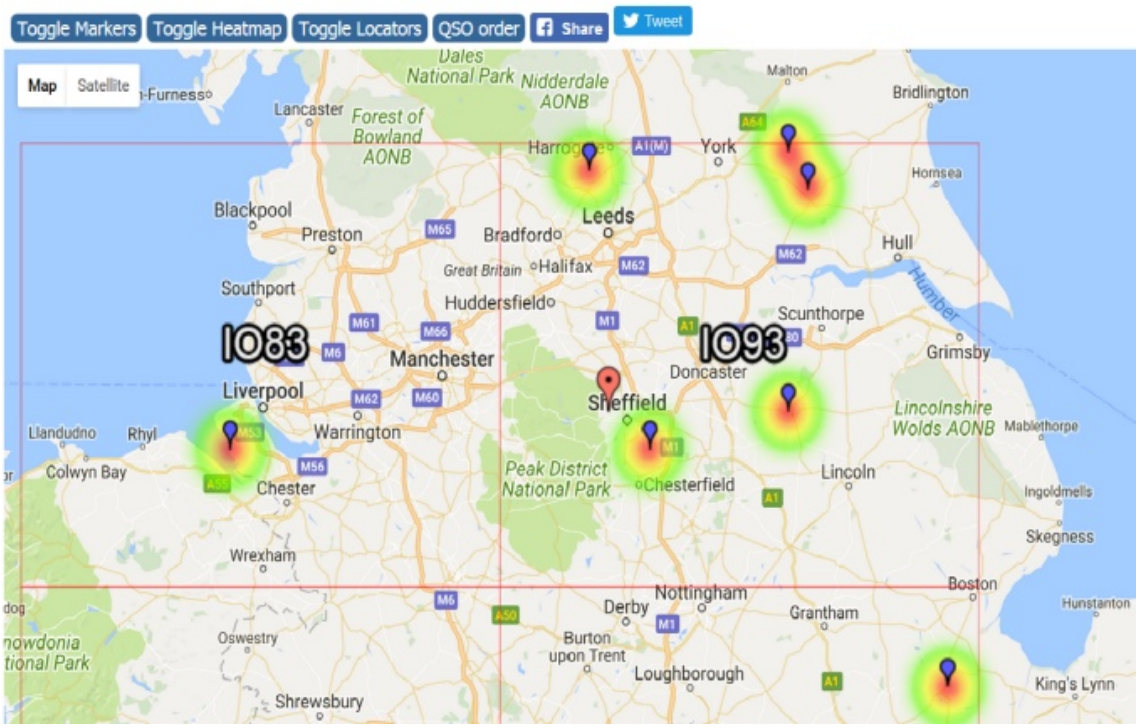
Tonight we were Q5 to each other on CW. I was still using about 250mW and probably with greater losses in the coax couplings.

The dish looks more robust on its new roof pole – Peter G3PHO has given me a section of thick-walled aluminium scaffold pole. The upper part of the pole is steadied by some chimney-bracket extensions, custom-made by Blakes of Rutland Road, Sheffield. The azimuth rotator has some play in it, so the dish can waggle a bit.

At the end, I even managed to hear Peter G3PHO off a reflection. I could read him sending my callsign. He struggled to hear me however. He is tucked away behind a couple of hills roughly south of me, so a very difficult path. Mandy M0MDY is also a tricky path from here and she was obviously struggling to hear me, but we completed OK.

South is difficult! I am a bit down from the Crosspool hill-top. The top of the Crosspool tower looks a nice reflection target however, maybe with a bit of elevation.

SHF UKAC 10 GHz 22 Aug for G3YJR IO83FJ



mm-Wave Bands

From Neil G4LDR

John, G8ACE has recently been carrying out some cloud and rain scatter experiments on 47GHz himself. See John's video on his YouTube channel, 'UKG8ACE', 'Insect Migration Doppler music at 47GHz'.

John and I decided we would try some scatter tests over the obstructed path between his QTH in Winchester and my QTH near Salisbury. Initial tests resulted in a rather wide scattered signal being received at my QTH, the signal peaked at an elevation of about 10 to 15° but soon faded out. Later the signal from John was re-acquired but this time there was less spreading and the signal level remained relatively constant for some time, there appeared to be no rain around this time, but there had been for the initial acquisition of John's signal. It is speculated that the very wide signal may have been due to rain scatter, whereas the narrower signal may have been due to cloud scatter.

During these experiments John had both a high power 47GHz Gunn source operating and the 47GHz beacon due to go on the Bell Hill site in Dorset under test. Only the high power Gunn source was received at the G4LDR QTH.

More experiments are planned in the near future.

EME and Deep Space Reception

From John G0API

In July this year as part of the FRARS (G4RFR) EME team tests, I used the modified Octagon LNB described above for EME reception and clocked Moon noise in the 3db region, with Sun noise approaching 15.5dB.

The pic shows the modification to the input of the standard LNB produced by Julian G3YGF last year. This comprises a Super VE4MA choke feed to match the 3.4m dish f/D of 0.431, feeding into a constant taper section to match the mouth of the LNB.

The outside of the transition has a turned in brass external tape, matched to that of the basic LNB integral horn. In true YGF style this was 'Rapid 'Araldited' in position 30 mins before the EME test. I think the results speak for themselves.

Since then I have tested a C130 flanged Octagon, modified by Paul M0EYT and added my own taper transition based on flanged brass tube and a modified 22mm Conex plumbing fitting - use a pipe cutter to ensure square ends and the losses are in-line with the YGF model. A 22mm copper transition was added to a WG16 flange, which will allow this to be fitted to a 4 port WG switch as the LNA of a 10GHZ EME system.

Deep Space Reception at FRARS Hamfest

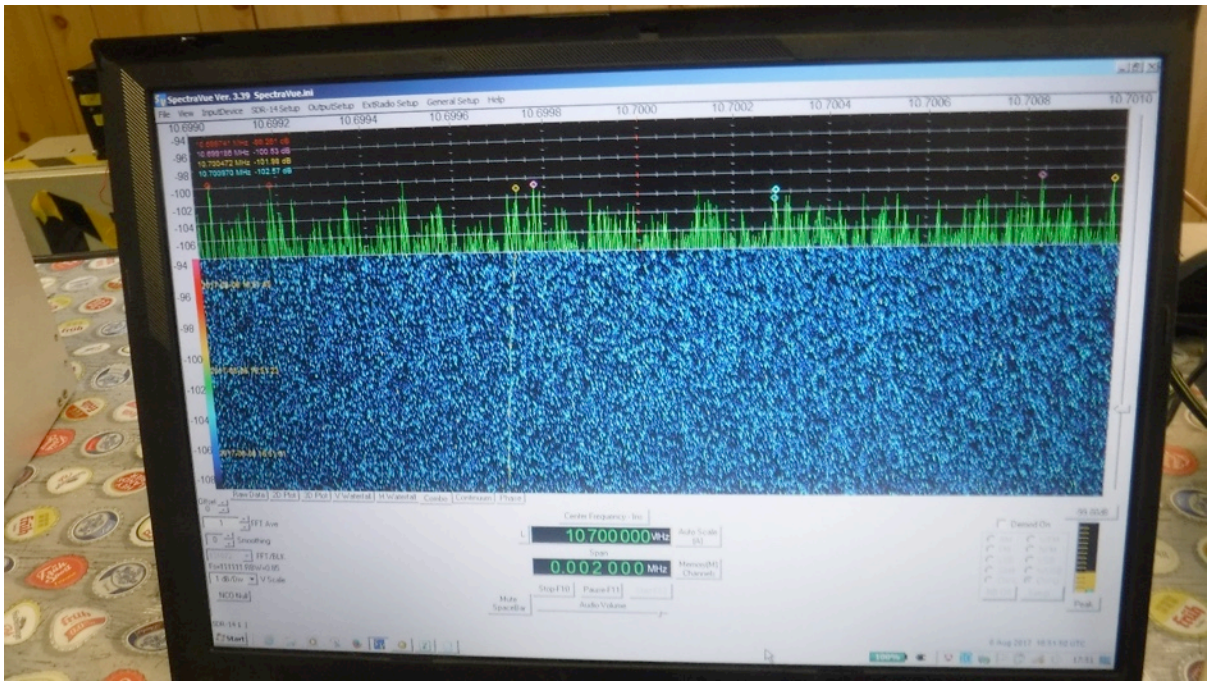
On Sunday August 13th, Paul M0EYT delivered his lecture on reception techniques for Space vehicles in the 8GHZ band.

This well attended event was followed by a demo using the 3.4m FRARS EME dish, fitted with one of Paul's RX systems, down converting to display on a wideband version of the SDR-IQ.

Circular polarisation was used via a "squeezed" waveguide behind the purpose built VE4MA feed.

The FRARS 3.4m dish set up for deep space reception.

Signals with impressive Doppler were seen from Stereo A at around 180,000,000 miles and Juno as it made its way above the treetops at in excess of 870,000,000 km. Many other "local " signals were visible for antenna tweaking .



SpectraVue Screen Shot of signal from the Juno Spacecraft at 870,000,000 km.

It was good to see many of the UK microwavers on the day and to learn of the Goonhilly EME event first hand from G4NNS and G3LTF.

From Tony G8DMU

Thanks to your loan equipment on 10GHz I had the enthusiasm to build my own set up and now I'm active on the UKAC contests on the same band with DB6NT transverter and PA.

As you may be aware Kevin at Finningley has now a 5.7 GHz beacon in operation and so is trying to generate some activity on the band.

…..and finally

The deadline for activity reports to be included in the next issue is Sunday 1st October 2017.

Events calendar

2017

Sept 8 – 10	62.UKW Tagung Weinheim	www.ukw-tagung.de/
Sept 9–10	BATC Convention (CAT 17) at Finningley	http://batc.org.uk/convention.html
Sept 10	Crawley Roundtable	carc.org.uk
Sept 17–21	IARU-R1 Conference, Landshut, Germany	www.iaru2017.org/
Sept 29–30	National Hamfest	www.nationalhamfest.org.uk/
Oct 8 – 13	European Microwave Week, Nürnberg	www.eumweek.com/
Oct 13 – 15	RSGB Convention, Kents Hill Park Conference Centre, Milton Keynes	rsgb.org/convention/
Oct 14 – 15	Amsat-UK International Space Colloquium, Kents Hill Park Conference Centre, Milton Keynes	https://amsat-uk.org
Oct 26 – 29	Microwave Update, Santa Clara, California	www.microwaveupdate.org
Nov 4	Scottish Round Table	www.gmroundtable.org.uk/

2018

February 9–11	Hamcation, Orlando, Florida	www.hamcation.com
February 17	Tagung Dorsten	www.ghz-tagung.de/
April 7	CJ-2018, Seigy	http://cj.r-e-f.org
April 21	RSGB AGM	http://rsgb.org/agm
May 18–20	Hamvention, Dayton	http://www.hamvention.org/
* June 1–3	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
August 17–19	EME2018, Egmond aan Zee,NL	https://www.eme2018.nl
Sept 23–28	European Microwave Week, Madrid	www.eumweek.com/

2019

June 28–30	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
Sept 15–20	European Microwave Week, Utrecht	www.eumweek.com/

NB Some of the 2018/19 event links may not be working/updated yet.

* HAM RADIO 2018 will take place from 1 to 3 June (note change of date)

EME 2018

The website http://eme2018.nl/ is online. Booking now open! Email info@eme2018.nl to register interest and for updates.

There's also a Facebook page: https://www.facebook.com/EME2018/

73!
Jan PA3FXB (team PI9CAM) team EME 2018

80m UK Microwavers net

Tuesdays 08:30 local on 3626 kHz (+/- QRM)

73 Martyn Vincent G3UKV