An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

May 2016

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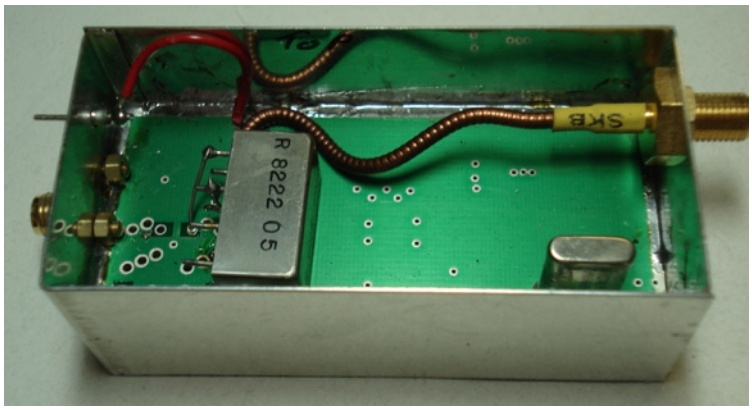
A 618-144MHz Converter for Satellite TV LNBs

By Mike Scott, G3LYP



In this Issue

UK Microwave Group Contact Information

Chairman: G4DDK
Sam Jewell
Email: chairman @microwavers.org
Located: Suffolk JO02pa
Address: Blenheim Cottage
Falkenham
IPSWICH
IP10 0QU
Home Tel: 01394 448495

General Secretary: G3XDY
John Quarmby
Email: secretary @microwavers.org
Located: Suffolk JO02ob
Address:
12 Chestnut Close,
Rushmere St Andrew
IPSWICH IP5 1ED
Home Tel: 01473 717830

Membership Secretary:
G8DKK Bryan Harber
Email: membership @microwavers.org
Located: Hertfordshire IO91vx
Address:
45 Brandles Road
Letchworth
Hertfordshire SG6 2JA
Home Tel: n/a

Treasurer: G4BAO
Dr. John C. Worsnop
Email: treasurer @microwavers.org
Located: Cambridgeshire JO02cg
Address: 20 Lode Avenue
Waterbeach
Cambs CB25 9PX
Home Tel: 01223 862480

Scatterpoint
Editor: G8BHC
Martin Richmond-Hardy
Email: editor @microwavers.org
Located: Suffolk JO02pa
Address:
45 Burnt House Lane
Kirton
Ipswich IP10 0PZ
NB editor & scatterpoint email addresses go to both Neil and myself.

Scatterpoint
Activity News: G4LDR
Neil Underwood
Email: scatterpoint @microwavers.org

Contest & Awards Manager: G3XDY
John Quarmby
Email: g3xdy @btinternet.com
Located: Suffolk (JO02OB)
Address:
12 Chestnut Close
Rushmere St. Andrew
Ipswich
Suffolk IP5 1ED
Home Tel: 01473 717830

Beacon Coordinator:
GW8ASD
Tony Pugh
Email: beacons @microwavers.org
Located: Essex (JO01)
Address: Gwersyllt
WREXHAM
LL11 4AF
Wales
Home Tel: 01978 720183

UK Regional Reps

John Cooke	Scotland	GM8OTI	john@marwynandjohn.org.uk
Gordon Curry	NI	GI6ATZ	gi6atz@qsl.net
Chris Bartram	Wales	GW4DGU	

Assistants

Kent Britain	USA	WA5VJB/G8EMY	wa5vjb@flash.net
[Vacancy, p5]	Trophies		
Noel Matthews	ATV	G8GTZ	noel@noelandsally.net
Robin Lucas	www.beaconspot.eu	G8APZ	
Chris Whitmarsh	24GHz and up	G0FDZ	chris@g0fdz.com
Mike Scott	Chip Bank	G3LYP	
Tony Pugh	Beacon Coordinator	GW8ASD	gw8asd@gw8asd.co.uk

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 76GHz

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

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UK Microwave Group AGM Minutes 2016

The AGM of the UK Microwave Group took place on 17 April 2016, at the Martlesham Microwave Round Table.

Minutes 2015

Minutes 2015 (as published in Scatterpoint May 2015) – no comments received.

Chairman's Report

In the absence of a Chairman, a short report was introduced by the Secretary, John Quarmby G3XDY

Unfortunately personal issues had limited the amount of time Bob G8DTF could undertake the Chairman's role in the past year, and he was now relinquishing the role. Best wishes and thanks go to Bob for his work on behalf of the group.

On the spectrum management front, the RSGB Spectrum Manager reported that further studies on spectrum release at 2.3GHz were starting and that it was vital to activate the band, including the new segment at 2300-2302MHz. The pioneering work at 134 and 241GHz in the past year had considerable public relations value for amateur microwaves.

Internationally, the WRC-19 agenda includes WiFi expansion at 5760MHz, potential threats to 47GHz from the work on 5G systems in the range 24.5 to 86 GHz, and increased interest in bands above 275GHz.

Further work on expanding the UKuG social media footprint had been undertaken, with about 150 followers on Twitter for the @UKGHz account, and over 100 views of the 241GHz record video on You Tube, although there were only 18 subscribers to the You Tube channel so far, more than 100 are needed.

Treasurer's Report – John Worsnop G4BAO

UK Microwave Group Accounts **2015**

Covering period 01/Jan/2015 to 31/Dec/2015

Item	Income	Expenditure	Balance	Notes
Opening C/A+PayPal balance 01/Jan/15			18369.26	
Subscriptions	2618.62			
Cash Donations to Chipbank	5.00			
Interest	6.33			
Sale of small parts and badges	17.40			
Transfer in from Paypal to C/A				
PayPal fees		£118.58		
RSGB Afilliation		£47.00		
Websites (inc beaconspot)		349.80		
Beacon Support		425.41		
Trophies		136.08		
Chipbank Expenses		28.47		
Purchase of loan equipment		200.00		
Loan equipment insurance		107.97		
Sub-totals	**2647.35**	**1413.31**		
Closing C/A+paypal balances 31/Dec/2015			**19603.30**	

J C Worsnop G4BAO
Treasurer

Highlights

Group funds increased by approximately £1234 (7%) for a subscription income of £2618.

Hence more projects that can be funded by the group are being sought – please contact the Treasurer with any ideas.

One request for funding for the GB3MHZ 10GHz beacon was met during the year.

The web fees for beaconspot.eu were paid

Chipbank costs were £24, justifying the decision to make this a free service. Many thanks to Mike G3LYP for running it.

The group purchased loan equipment for 24GHz and 76GHz to add to the existing 5.7 and 10GHz equipment.

Membership – Bryan Harber G8DKK

2015/16 Membership Stats

2015:	**2016:**
456 Members	460 Members (4/2015)
15 New Members (calendar year 2014)	52 New members (Calendar 2015)
15 New Members (January to April 2016)	
Yahoo Scatterpoint	Yahoo Scatterpoint
451 members subscribed	463 members subscribed
25 pending	25 pending
83% members pay by PayPal	83.5% members pay by PayPal

Please see p32 for a note about log-in to Scatterpoint Yahoo group.

Election of Officers & Committee

Vacancies exist for Chairman, 24GHz and Up representative, and Trophies Manager. John Worsnop G4BAO was proposed for Chairman but as no candidate to take over the treasurer role came forward, he declined to stand. The committee is prepared to select a chairman after the AGM. The retiring representative for 24GHz and Up, Chris G0FDZ, nominated Barry G8AGN as his replacement.

Mike and Ann Stevens G8CUL/G8NVI volunteered for the Trophy Manager role, and were formally nominated by John G4BAO.

G4BAO also nominated Graham Murchie G4FSG as a committee member. Graham explained that he could not commit to a large role at present as he has a continuing commitment as RSGB Board Member and organiser of the RSGB Convention, but that this load will diminish after October.
Neil Underwood G4LDR volunteered to take on the Activity News role.

These nominations were put to the meeting and approved *nem con*.

The current committee is now:

Chairman	TBA	
Treasurer	John Worsnop	G4BAO
Secretary	John Quarmby	G3XDY
Membership Secretary	Bryan Harber	G8DKK
Activity News Column	Neil Underwood	G4LDR
Beacon Coordinator	Tony Pugh	GW8ASD
Web Master	Murray Niman	G6JYB
Contests/Awards	John Quarmby	G3XDY
24GHz and Up	Barry Chambers	G8AGN
	Graham Murchie	G4FSG

Corresponding Members

USA Liaison	Kent Britain	WA5VJB/G8EMY
Northern Ireland	Gordon Curry	GI6ATZ
Scotland	John Cooke	GM8OTI
Wales	Chris Bartram	GW4DGU
ATV	Noel Matthews	G8GTZ
Beaconspot	Robin Lucas	G8APZ
Trophies Manager	Mike & Ann Stevens	G8CUL/G8NVI
Scatterpoint Editor	Martin Richmond-Hardy	G8BHC

AOB

None.

Contests & Awards

The high bands championship was changed to include just 5.7 and 10GHz in 2015. Support was at a comparable level in terms of contacts made but numbers of entrants declined a little.

The Low Band events (1.3/2.3/3.4GHz) continued but with rather low levels of participation. For 2016 there will be a new trophy for the 1.3GHz section.

The new series of mmwave events were well supported.

No major rule changes have been made in 2016.

Two Squares Certificates have been issued since the last AGM to G4BAO

Downloadable certificates will be available shortly

The Awards

G3BNL:	To Chris Bartram GW4DGU for the Gemini 23cm Amplifier
G3EEZ:	To Charlie Suckling G3WDG for continued work on microwave Solid State PAs and small dish EME
Fraser Shepherd Award:	To John Hazell G8ACE and Ian Lamb G8KQW for their record-breaking 134GHz work
G3KEU Trophy (5.7GHz)	Ian Lamb G8KQW/P
G3JMB Trophy (10GHz)	Stewart Wilkinson G0LGS/P
G3RPE Trophy (10GHz)	Ian Lamb G8KQW/P
G0RRJ Trophy (24GHz)	Ian Lamb G8KQW/P
24GHz Trophy	Ian Lamb G8KQW/P
47GHz Trophy	Ian Lamb G8KQW/P

John Hazell G8ACE and Ian Lamb G8KQW holding the
Fraser Shepherd Award plaques for their record-breaking 134GHz work,
presented by Graham Murchie G4FSG, retiring Chairman of the RSGB

Photo by: Jason Flynn G7OCD

One of the several awards to Ian Lamb G8KQW

Photo by: Jason Flynn G7OCD

Chairman's report

Sam Jewell, G4DDK

Acting UKuG Chairman

I was recently appointed as the acting chairman of the UK Microwave Group. In a moment of euphoria (maybe I should say weakness?) at not being elected to the Committee again this year I mentioned that I might be willing to volunteer for the role of acting chairman until a new Chairman could be appointed. Your Committee has someone in mind but they are not yet able to fill the role due to ongoing commitments elsewhere in the hobby. Until the handover can take place it was felt that we needed to have someone to fill the role. Here I am!

For those who don't know me, I was one of the original 'gang of three' who in the mid 1990's recognised that the role of the RSGB Microwave Committee was beginning to be superseded by changes within the RSGB and a special interest group, initially modelled along the lines of the UK Six Metre Group, was needed. Indeed all of the RSGB spectrum committees found themselves in a similar situation. Lehane, G8KMH; Steve, G4KNZ and myself discussed the need to establish an independent, elected, group to lobby for the interests of UK amateur radio microwave enthusiasts. In November1999 the UK Microwave Group was formed at the Martlesham Microwave Round Table. I was elected the first Chairman of the group.

The first few years were characterised by uncertainties about the actual role of the group whilst the RSGB Microwave Committee still existed. Eventually the RSGB 'snuffed out' the spectrum committees in favour of a single Spectrum board who would take representation from across all the spectrum interest groups. A once a year Spectrum Forum meeting took place near Bedford and for the first few years I represented the UKuG. This role is now taken by John, G4BAO.

In general the Spectrum Forum has worked well, but occasionally there is need for some direct input from those who actually use the amateur microwave bands.

Because the Spectrum Forum meets only once a year, but has a very able Spectrum Manager in Murray, G6YJB, there is plenty of work for the UKuG Committee to do to ensure our interests are protected, grown and respected by OFCOM and the professional radio industry. Have professional radio people in our own midst has helped immensely.

Amongst our successes are the granting of an NOV to use 2300MHz when the inevitable loss of 2350-2390MHz happened. A lot of effort went into preparing for our meeting with OFCOM and lobbying for continued access to a part of the 'under pressure' 2.3GHz spectrum. I am pleased to say that OFCOM were persuaded that we still needed access to some of this prime spectrum without the restrictions imposed by the need for our MOD to move into the frequency range we had occupied for so many years. Can I appeal to everyone to make good use of this allocation while we have it, to show that we need it and to publicise our use of 2300MHz at every opportunity. This way we may be able to retain use of the 2MHz, well away from the mobile allocations, which can only get busier in the future.

It remains for me to welcome three new assistants to the Committee following the Martlesham MRT. Mike and Anne Stevens (G8CUL/G8NVI) who will be responsible for UKuG trophies and Neil Underwood, G4LDR, who will be responsible for collating activity new for Scatterpoint.

I also want to thank those who are retiring from Committee and especially to Bob, G8DTF, who has done such a fine job of chairing the Group for the last year, but who now finds himself unable to carry on in the role due to health reasons. Get well soon, Bob. My thanks also to the rest of your Committee who do such a great job of keeping the Group together, coordinating activities and ensuring that the UKuG has a continuing place in UK amateur radio.

73 de Sam, G4DDK

Acting UKuG Chairman

UKµG Chip Bank – A free service for members

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

Non members can join the UKuG by following the non-members link on the same page and members will be able to email Mike with requests for components. All will be subject to availability, and a listing of a component on the site will not be a guarantee of availability of that component. The service is run as a free benefit to all members and the UK Microwave Group will pick up the cost of packaging and postage.

Minimum quantity of small components supplied is 10. Some people have ordered a single smd resistor!

The service may be withdrawn at the discretion of the committee if abuse such as reselling of components is suspected.

There is an order form on the website with an address label which will slightly reduce what I have to do in dealing with orders so please could you use it. Also, as many of the components are from unknown sources, if you have the facility to check the value, particularly unmarked items such as capacitors, do so, and let me know if any items have been mislabelled. G4HUP's Inductance/ capacitance meter with SM probes is ideal for this (Unsolicited testimonial!)

Don't forget it is completely free, you don't even have to pay postage!

Mike G3LYP

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.comThe current list is available at

www.microwavers.org/tech-support.htm

80m UK Microwavers net – Tuesdays 08:30 local on 3626 kHz (+/- QRM)

Martlesham Microwave Round Table Report

The Talks

Saturday 16th April 2016

G8KQW *134GHz The New Frontier - a progress update*

WA5VJB *Circular polarisation*

G4HUP *Dish Azimuth Drive Update*

Sunday 17th April 2016

UK Microwave Group AGM, Trophy Presentations

The Construction Contest

G4BAO *Using your 2300MHz NoV – options and ideas*

G8GTZ *Tim Peake, on a TV near you*

G8DKK *23cm and 13cm PA LPFs*

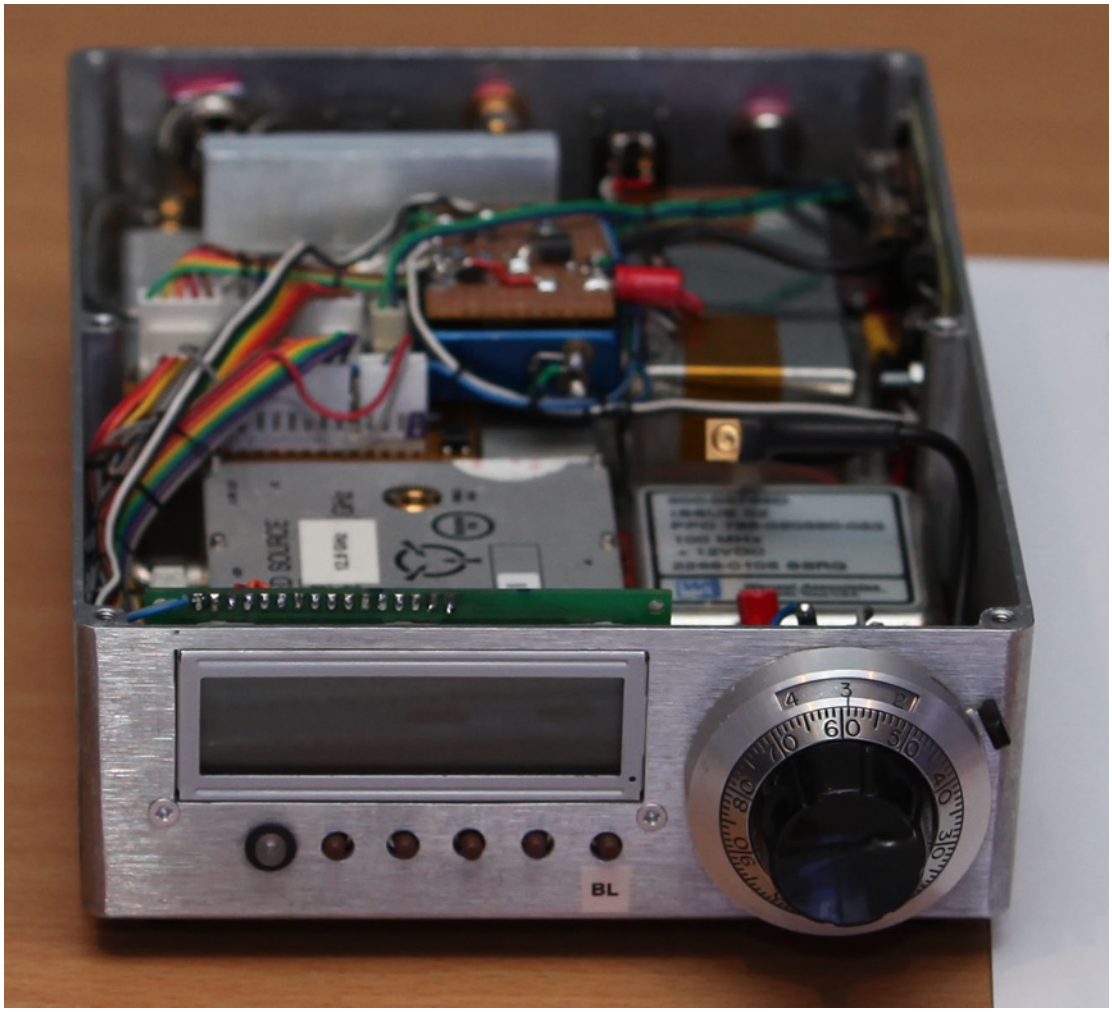
C8CUB/G0FDZ *241GHz- a new challenge*

UKuG Contest Forum John G3XDY

The Construction Competition

Graham Murchie G4FSG and John Quarmby G3XDY judged the project competition and awarded first place to Jeff Easdown G4HIZ for his 24GHz signal generator.

The Winner:



24 GHz Signal Generator by Jeff Easdown G4HIZ

Photo by: Jason Flynn G7OCD

Shopping

Photos by: Jason Flynn G7OCD

”You really need one of these….”

MMRT 2016: Noise Figure Results

John Quarmby G3XDY

17-Apr-16			T_{cold} =	293
Band	**Callsign**	**System**	**Gain (dB)**	**NF (dB)**
30MHz	G3AAF	BBA-M masthead preamp	27.30	0.80
50MHz	G3AAF	BBA-M masthead preamp	28.50	0.75
70MHz	G3AAF	BBA-M masthead preamp	28.50	0.77
150MHz	G3AAF	BBA-M masthead preamp	28.90	0.81
430MHz	G3AAF	BBA-M masthead preamp	28.70	0.84
1296MHz	G3AAF	BBA-M masthead preamp	27.10	1.10
1490MHz	G3AAF	BBA-M masthead preamp	26.90	1.17
144MHz	G4BRK	PGA103+	22.10	1.53
	G4BRK	ATF54143	21.50	0.86
	G4BRK	MGF1302 DJ9BV design	16.80	0.73
	G4BRK	DG8 Preamp	16.80	6.80
	G4BRK	DG8 Preamp #2	15.10	4.70
	G8DKK	PGA103+	10.00	0.96
	G4NRG	Dressler Mast Head Preamp	15.36	1.15
432MHz	G4BRK	PGA103+	20.20	0.98
	G8FEK	SBA430	36.51	0.37
1.3GHz	G4BRK	G4DDK ULNA	35.20	0.25
	G4BRK	PGA103+	13.10	1.00
	G8DKK	LZ5HP Transverter	12.50	1.15
	G3AAF	DB6NT LNA132AH	35.10	0.42
	M0BOP	MMT1296 transverter	34.80	5.93
	G4HSK	G4DDK VLNA	32.60	0.49
	G3aaf	SBA1250/1450	33.70	0.32
1.42GHz	G3AAF	SBA1250/1450	32.20	0.35
10GHz	G3LYP	Modified LNB with WG transition	26.10	1.00
	G7JTT	10GHz Transverter (DB6NT)	22.50	2.08

K1JT to be named 2016 Amateur of the year at Dayton

This month's CQ magazine announced that Joe Taylor will be recognised at Dayton as the 2016 Amateur of the year.

BroadBand HamNet (BBHN) Meeting 22nd May 2016

Location: Crawley Amateur Radio Club http://www.carc.org.uk/

A get together of BBHN Mesh Operators and those interested in this system of digital communications on the amateur microwave bands

We will be holding an initial meeting for all those interested in BBHN and hope to attract attendees from across the southern part of England for this event. Objectives for the day are to introduce the Mesh Network concept to newcomers and to allow existing operators to exchange information, opinions and even system components!

The morning will feature introductory presentations and a brief demonstration of a small BBHN system running on 2.4 GHz. Easily available and low-cost digital microwave transceivers will be displayed and explained which all use Open Source, FREE software/firmware!

The program of the meeting is flexible and, after lunch, will include open discussions on the potential for forming a UK-wide organisation to promote BBHN and microwave Mesh networking.

The usual "legendary" hospitality of CARC will be available including the famous bacon butties!

Please come out of the Cloud and Mesh together in a friendly environment.

Please contact Ted, G4ELM on BBHN.Event.2016@gmail.com to receive a copy of the agenda and to indicate likely attendance numbers - as a courtesy to the organisers and the venue hosts.

Access to Site:

The access road into Tilgate Recreational Centre and the CARC Clubhouse (Hut18) is via the slip-road at the new traffic lights on the southbound carriageway of the A23 (Brighton Road), just south of Crawley heading towards Brighton, and about 200m from the Broadfield Football Stadium roundabout which is well signposted.

The Clubhouse is accessed via a fairly narrow track for about 200m. Watch out for deliberate pinch points and other traffic restricting measures then turn right at the 3rd sleeping policeman!

More Detailed Directions are available on the CARC Web site.

80m UK Microwavers net

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

Every Tuesday there is a µWave net on 80m – it was mentioned in the November Scatterpoint Activity News.

There is only a very small group of us currently active – come and join us!

Essentially, the UK Microwave net is held on Tuesday mornings from 08:30 on, or close to, 3626 kHz. Typically it lasts about half an hour at present. All are welcome to join in to share with others what they are up to, planning, worked, constructed, tested or experimenting with. Sometimes the content is unrelated to microwaves, but that's 80m for you!

73 Martyn Vincent G3UKV

This month I ‘ave mostly been building…

A column (idea borrowed from the SBMS Newsletter and with a hat tip to Mark Williams’ character Jesse of the Fast Show) designed for those of you who don’t want to write a full technical article – but also those of you who do but only have a snippet to contribute such as a new project or a progress report.

From Graham Coyne G3YJR

My main "what I am working on" activity is trying to make some space in the shack so that I can move about in it! [*How many of us can relate to that?! Ed.*]

On 23cm I entered a few contests recently.

In the 15-March UKAC I managed 27 contacts; best DX PA0EHG on CW at 441km.

In the 10-April Low Bands contest I made 13 contacts, all in England.

In the 19-April UKAC I got up the dizzy heights of 30 contacts. It was hard going to the north, but a bit of tropo opened up to the SE & I worked PE0EHG, PA0S & OQ4U, the latter my best DX for the night using SSB at 558km.

The next day, there was still a bit of tropo & I heard some beacons , in & out of the noise: DB0JK, PI7QHN, DB0GW & DB0XY (822km). They faded away soon.

On 3cm last year in a good tropo patch, I was excited to work my first continental DX:

151102	1938	1036	J3E	DK1VC	53 51 655	JO31RG
151102	2227	1036	A1A	F6DKW	559 529 577	JN18CS

I was very surprised to work either of these. Maurice is not a particularly easy direction as I am some way down from the hill-top to the south of me. I nearly didn't bother trying as either felt impossible. So I learnt that 3cm is always worth a try! So Maurice is my best DX on 3cm so far.

I've managed little on 3cm this year, but I did work Nick G4KUX on a direct path recently and also via a rain-cell east of Leeds. With luck, the coal-fired power stations won't be demolished for a while - I can see several from here. I'd like to try working Nick again via Eggborough.

I've moved my blog to: http://g3yjr.livejournal.com

2016 Finningley µWave Roundtable

Saturday 9 and Sunday 10 July 2016

- FRT’16 to feature talks and demos on the millimetric bands – 24Ghz upwards
- FRT 15 had a full Lecture programme of talks, **the 2016 agenda TBA soon** -23/4/16
- A test lab: noise figure measurement
- Power measurement & swept measurement
- UK microwave group Chipbank
- Flea market in building 2

Register at www.g0ghk.com/events/round-table/

A 618-144MHz Converter for Satellite TV LNBs

By Mike Scott, G3LYP

I have been experimenting with the new range of Octagon PLL satellite TV LNBs since Bernie Wright, G4HJW, published an article in Scatterpoint in September 2014 which used a 3MHz Isotemp OCXO to generate a stable 27MHz LO to replace the internal 27MHz crystal. While the unmodified LNBs represent a considerable improvement over those with a DRO controlled oscillator, unless maintained at a constant temperature, the stability is not good enough for serious use on 10GHz. After a few teething problems, I got Bernie's modification to work quite well (See correspondence in Scatterpoint February and May 2015).

One disadvantage of this system is that for reception on 10.368GHz the IF is 618MHz (the LO on most LNBs is 9.750GHz). Various SDR devices such as the Funcube dongle can be used, and also some other radios such as the Yaesu FT100 cover this frequency. Although satisfactory for use in the shack, this is not very convenient for portable work as it requires the use of a computer, or a relatively heavy radio.

As the FT817 has an internal battery and is lightweight and can be conveniently carried with a shoulder strap, it is ideal for the purpose. Various bands on this radio could be used with a suitable converter, but the obvious one is 144MHz. To convert from 618 to 144MHz requires a local oscillator of 474MHz. Several options are available: 94.8 x 5, 79 x 6 or a synthesiser, such as the SI570. I have tried both the first two and they work equally well, but the subject of this note is the second.

Sam Jewell, G4DDK, published an updated version of his 1980's 001 LO in RadCom, September 2008, p80, designated the 2001. I have built a couple of these units for different projects and they work very well. As I had a spare board, bought from Sam at a roundtable, I decided to see if, with a little modification, it could be used as a 474MHz LO, and as the groundplane side of the board has, in this case, only one component on it, namely the crystal, there should be room to incorporate a mixer, thus providing a complete converter in a small box.

Referring to the circuit in RadCom:

Other than the 79MHz third overtone crystal, obtained from Krystaly via Dave Powis, G4HUP, the only component change up to the base of Tr4 was that the 18nF inductors (L5 and 6) were replaced by 22nF, partly because, in the original this stage tunes to 567MHz rather than 474, and also because there was a reel of 22nH, 0805 inductors in the Chipbank but no 18nH!

Using a spectrum analyser to assist the alignment, the oscillator was adjusted to a point with C5 and C10 which was a compromise between frequency accuracy and reliable starting. The tripler was then adjusted to 237MHz followed by the doubler, Tr3, to 474MHz. Ideally, Tr4 would have been used as an amplifier with a helical filter also tuned to 474MHz. As the minimum order quantity for a suitable filter was 20 at £8 each plus VAT, I decided to convert Tr4 to an emitter follower to provide a low impedance output to drive a mixer. The only change to the board was to isolate the emitter pad, which was grounded, and place a 120Ω resistor between it and ground. Output was taken to the mixer from this point. The inductor, L7, and resistor, R17, were replaced with zero Ω 0603 chips, although wire links could have been used. All decoupling capacitors were left in place, (see Photo 1).

After a final tweak of all the trimmers, 10mW was obtained at the output. The third harmonic of the crystal was present at about 30dB below the 474MHz signal.

The mixer is a Minicircuits SRA-2 as I had a couple retrieved from a piece of surplus gear, but an SBL-1X or TUF-2 could also be used. By carefully bending pins 1 and 3 at right angles, they could be made to fit two of the holes in the PCB originally intended for the helical filter. Pins 5 and 6 were joined and connected, via a short length of semi-rigid coax, to a bulkhead mounted SMA connector on the far end of the box. IF was taken from pin 8 to the hole on the board which was originally intended for the output of the filter and hence to an SMA connector. The arrangement is shown in Photo 2.

When fed to a spectrum analyser, the IF output showed the presence of the 474MHz LO signal, but as this is a long way from the 144MHz band, it probably doesn't matter. However a simple 144MHz low pass filter removed all spurii to at least the -50dB level.

All of the resistors, fixed capacitors and inductors are available from the Chipbank as is the BFS17. The trimmers are still available from Farnell and the other transistors can be sourced from e-bay. Sam informs me that he still has a few of the DDK2001 boards left.

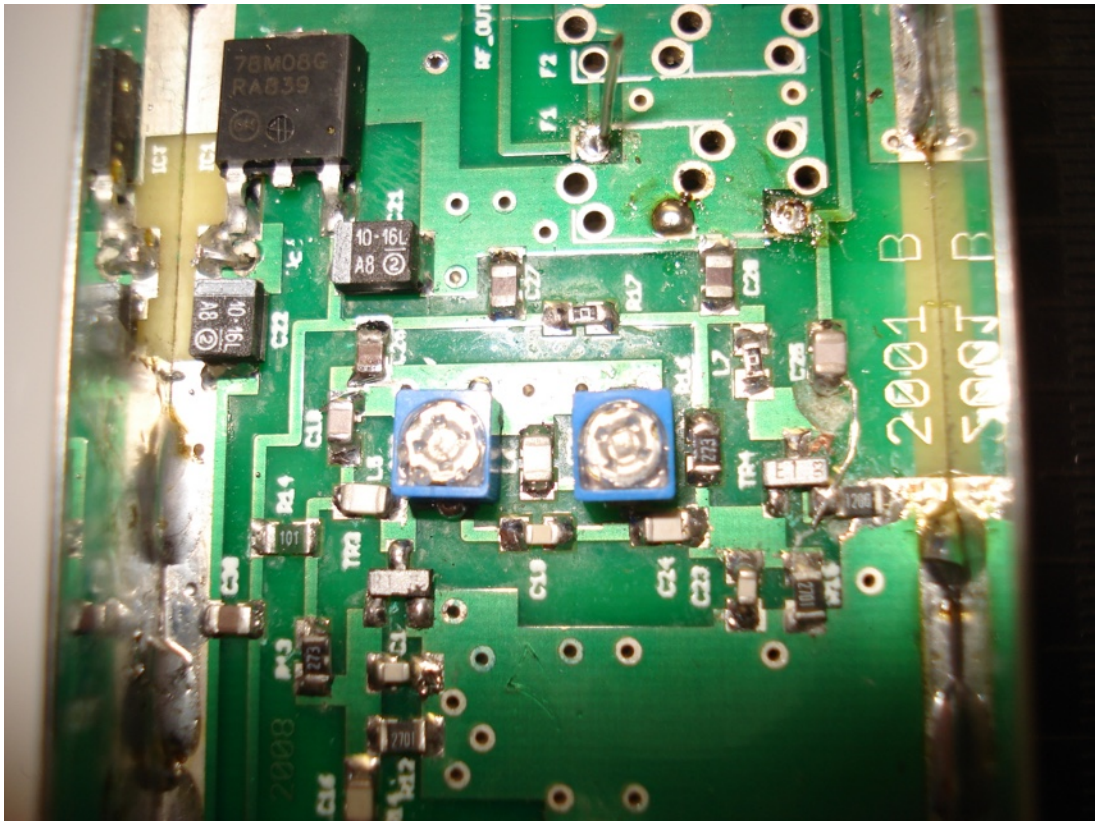


Photo 1: Modified G4DDK LO 2001

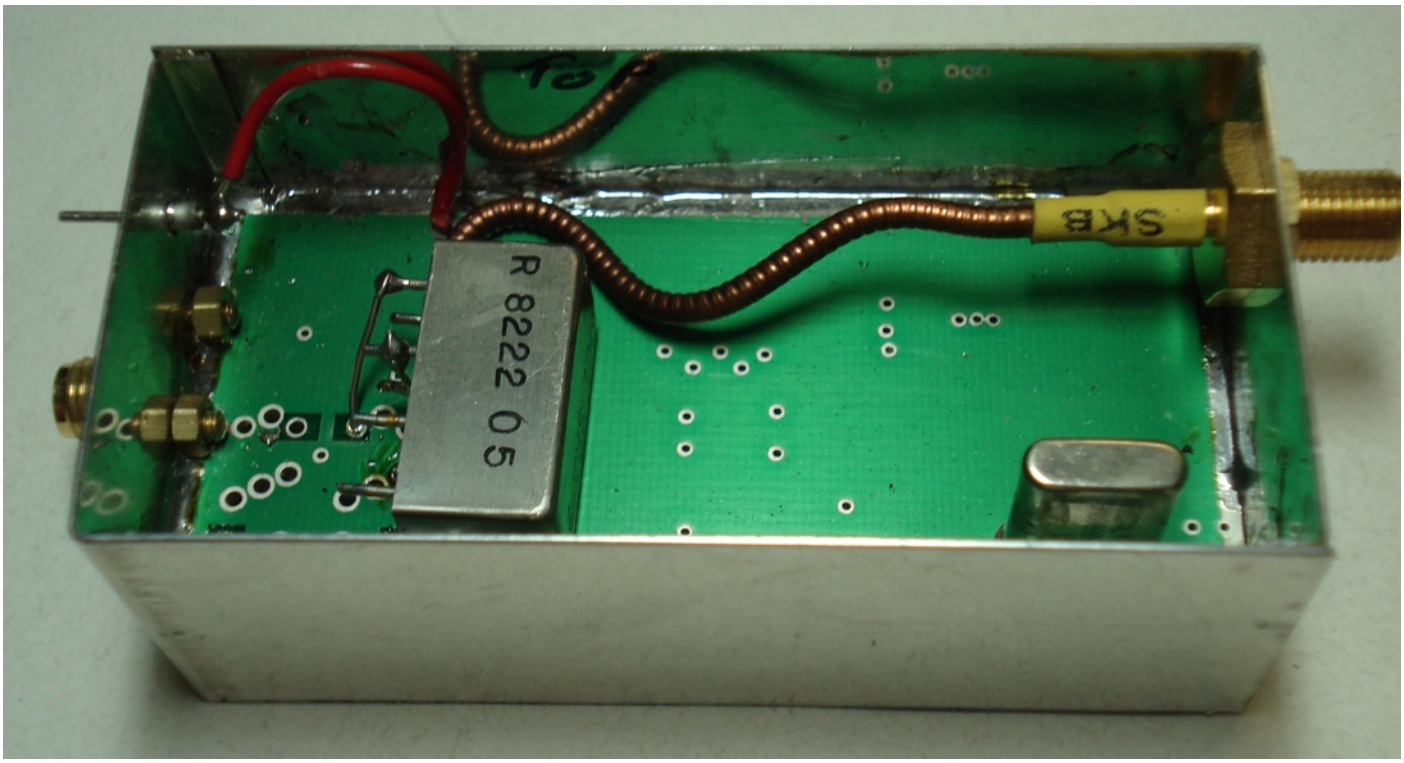


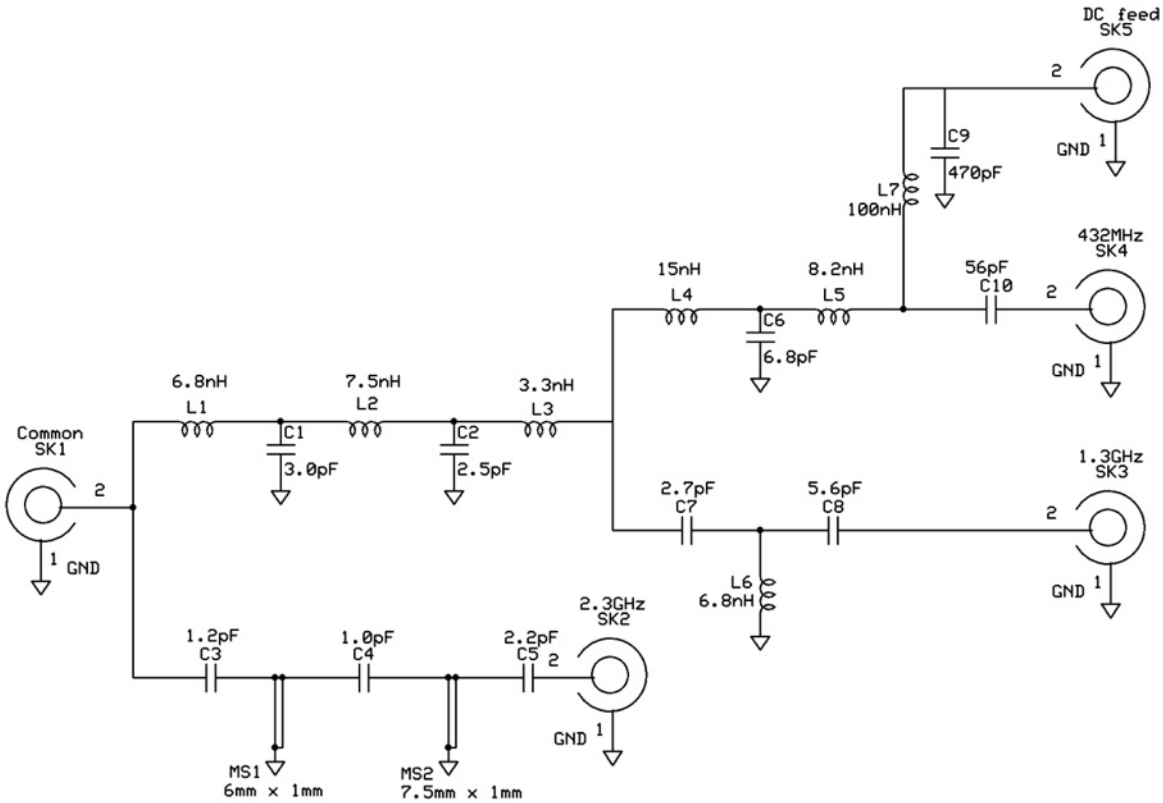
Photo 2: The mixer

A Triplexer for Combining/Splitting Preamp Outputs

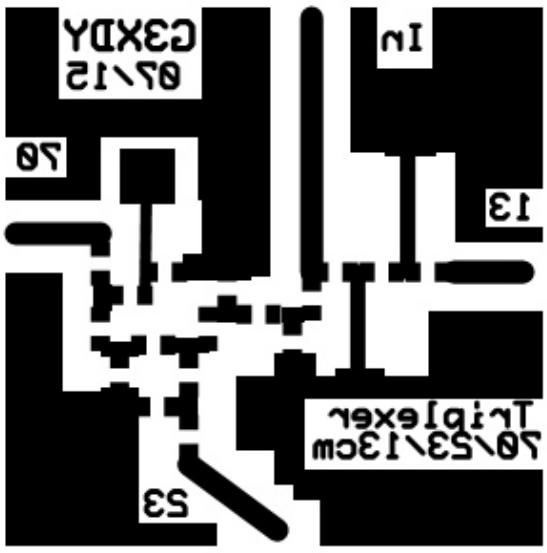
John Quarmby G3XDY

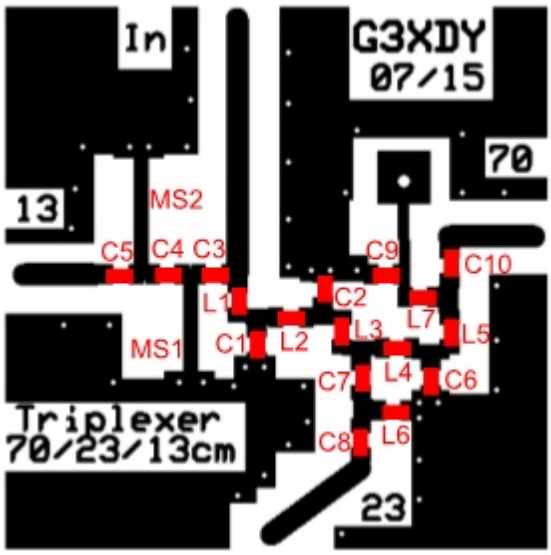
With multi-band antenna systems the weight and bulk of all the feeders becomes a serious consideration. One way to keep this down is to combine several bands on one feeder, either using relays or a combiner/splitter arrangement. This article describes a simple filter that can be used to combine or split low level signals on 70cm, 23cm and 13cm, with adequate isolation between the bands. It is compact (38mmx38mmx30mm excluding connectors) and includes an optional bias feed for powering preamps too. It is not suitable for transmit applications above a few hundred milliwatts or so as the losses in the SMD inductors may cause significant self heating. One important feature of the triplexer is that it rejects out of band noise from other preamps when used at the masthead, which would be a problem if using a non-selective combiner unless the preamps are powered down when not being used.

The circuit is in Figure 1 below. This was designed using a program called “Diplexer” by James Tonne and then simulated and optimised using Ansoft SerenadeSV with “real world” preferred value components, some inclusion of stray capacitances, and realistic Q factors. The capacitors are standard 0805 SMD parts and came from a large kit of values from a far eastern supplier on Ebay. On the other hand the coils are all genuine Coilcraft parts, in my case they came from an 0805CS designers kit, but they are all available individually from Farnell.



The circuit board is realised on 0.8mm thick FR4 board. The usual 1.6mm thick FR4 does not lend itself to usable line widths with smaller SMD components. The pre-sensitised pcb material is exposed using the mask below in a UV lightbox and then developed and etched.





After drilling 0.8mm holes for rivets/wire vias it can optionally be tin plate coated to help solderability. The vias should be added next, if using rivets then peen them over then solder, if using wire then solder each side and cut off as close to the pcb as possible.

At this stage the tin box sides need marking out for the connectors so they align with the PCB input/output tracks, then drilling and reaming out to fit the connector type required. If using N type connectors the type with a smaller (BNC size) flange are easier to fit, full size versions with a flat flange can be used but the flanges will need to be cut down to fit between the top and bottom covers on the box. Flat faced BNC/TNC or SMA flange mount connectors should fit without modification. The DC feed for a preamp is optional, if not required L7 and C9 may be omitted. In the original an SMC style connector was used for preamp power, a solder in feedthrough capacitor could also be used.

The connectors are held in place initially with stainless steel screws and nuts (stainless hardware can be easily removed after soldering) and the pcb trimmed to fit snugly in the box with the tracks resting on the connector pins, shortening the pins to 2-3mm and trimming any excess length of Teflon insulation back flush with the box inner wall. The box sides can then be soldered together with the PCB supported in place and the box top and bottom plates in situ. Then the pcb ground plane is soldered to the walls – start by tacking each side in one or two places then flowing the solder after the pcb is securely held in place.

The connectors can then be soldered to the box walls and the centre pins soldered down. A high powered soldering iron is required for assembling the tin plate box and connectors, I have used a Weller TCP iron or a Metcal iron with large screwdriver shape bits for this job.

The bolts that temporarily held the connectors in place can now be removed and the ground plane joints tidied up if required. Then the SMD parts can be carefully soldered in place, using 0.5mm solder and a fine soldering iron bit. After testing, the top and bottom covers should be soldered in place.

Measured performance is listed in the table below and shown in the accompanying pictures.

In band insertion loss (low pass port)	432MHz:	0.5dB		
In band insertion loss (mid band port)	1296MHz:	1.2dB		
In band insertion loss (high pass port)	2300MHz:	0.6dB	2320MHz:	0.7dB
Out of band rejection/isolation (low pass port)	1296MHz:	30dB	2320MHz:	>60dB
Out of band rejection/isolation (mid band port)	432MHz:	18dB	2320MHz:	40dB
Out of band rejection/isolation (high pass port)	432MHz:	65dB	1296MHz:	20dB
In band return loss (low pass port)	432MHz:	24dB		
In band return loss (mid band port)	1296MHz:	12.6dB		
In band return loss (high pass port)	2320MHz:	22dB		
In band return loss (common port)	432MHz:	35dB	1296MHz:	15dB
			2320MHz:	18dB

The performance may vary due to component tolerances. The figures for return loss and insertion loss on 1.3GHz are not as good as the simulation predicted, possibly for this reason, but the performance is still acceptable.

Components

All capacitors are 0805 size 5% tolerance or better

C1	3.0pF	C7	2.7pF
C2	2.5pF	C8	5.6pF
C3	1.2pF	C9	470pF
C4	1.0pF	C10	56pF
C5	2.2pF		
C6	6.8pF		

All Inductors are Coilcraft 0805CS types

L1	6.8nH	Farnell	2286398	L5	8.2nH	Farnell 2286400
L2	7.5nH	Farnell	2286399	L6	6.8nH	Farnell 2286398
L3	3.3nH	Farnell	2286395	L7	100nH	Farnell 2286419
L4	15nH	Farnell	2286363			

SK1	Common	Flange mount N/SMA/BNC/TNC as required	
SK2	>2.3GHz	N/SMA/BNC/TNC	
SK3	1.3GHz	N/SMA/BNC/TNC	
SK4	<500MHz	N/SMA/BNC/TNC	
SK5	DC feed	SMC or feedthrough capacitor	
PCB	Farnell	ABB16 0.8mm photocoated FR4	Farnell 1267748
MS1	Microstrip	6mm long x 1mm wide	
MS2	Microstrip	7.5mm long x 1mm wide	

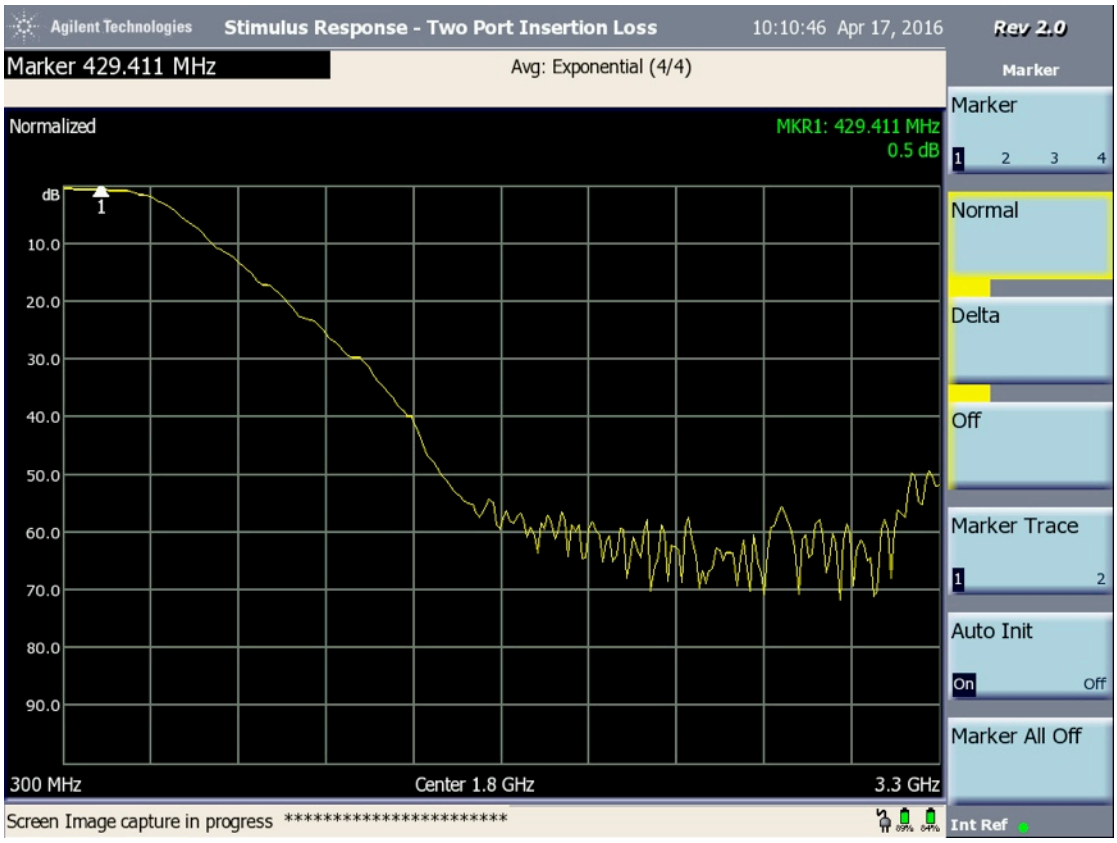
0.8mm outside diameter copper rivets or 22swg tinned copper wire to create vias.

Tinplate box 37x37x30mm (1000101 type) see http://g3nyk.ham-radio-op.net/componen.htm

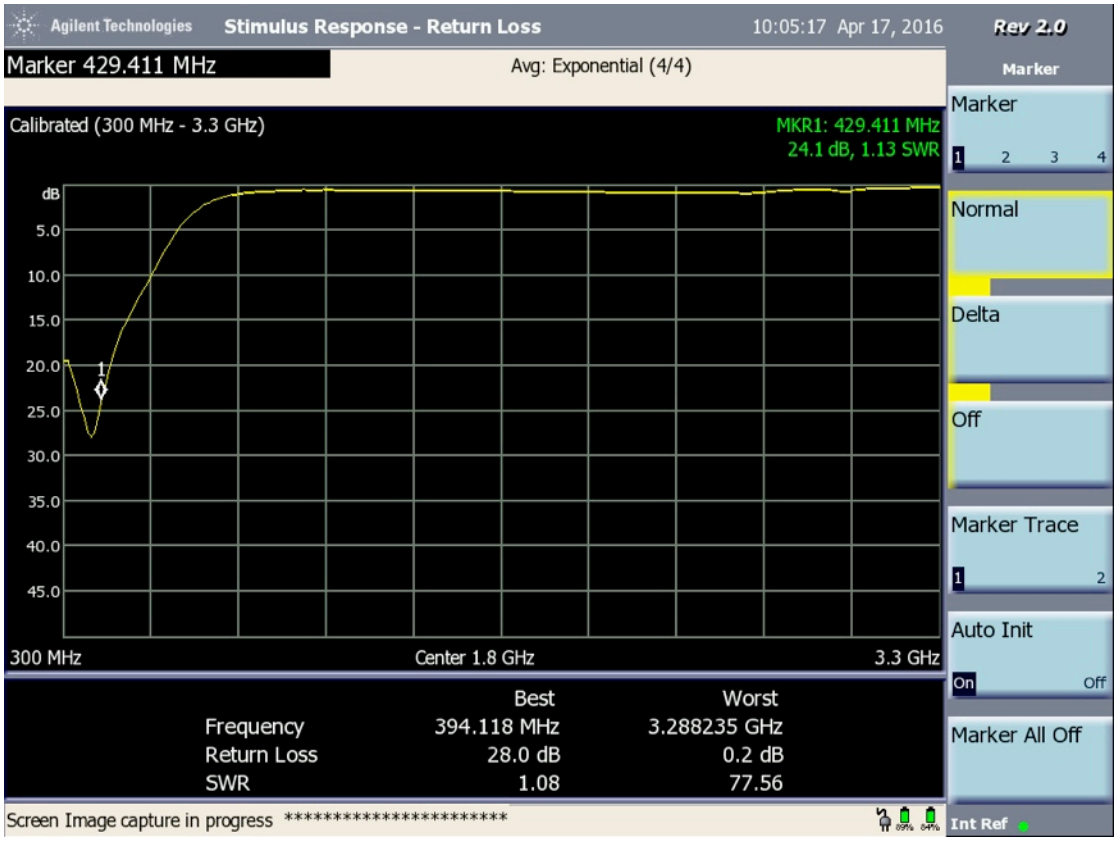
If there is enough interest then professional plated through hole PCBs could be produced.

Acknowledgements:

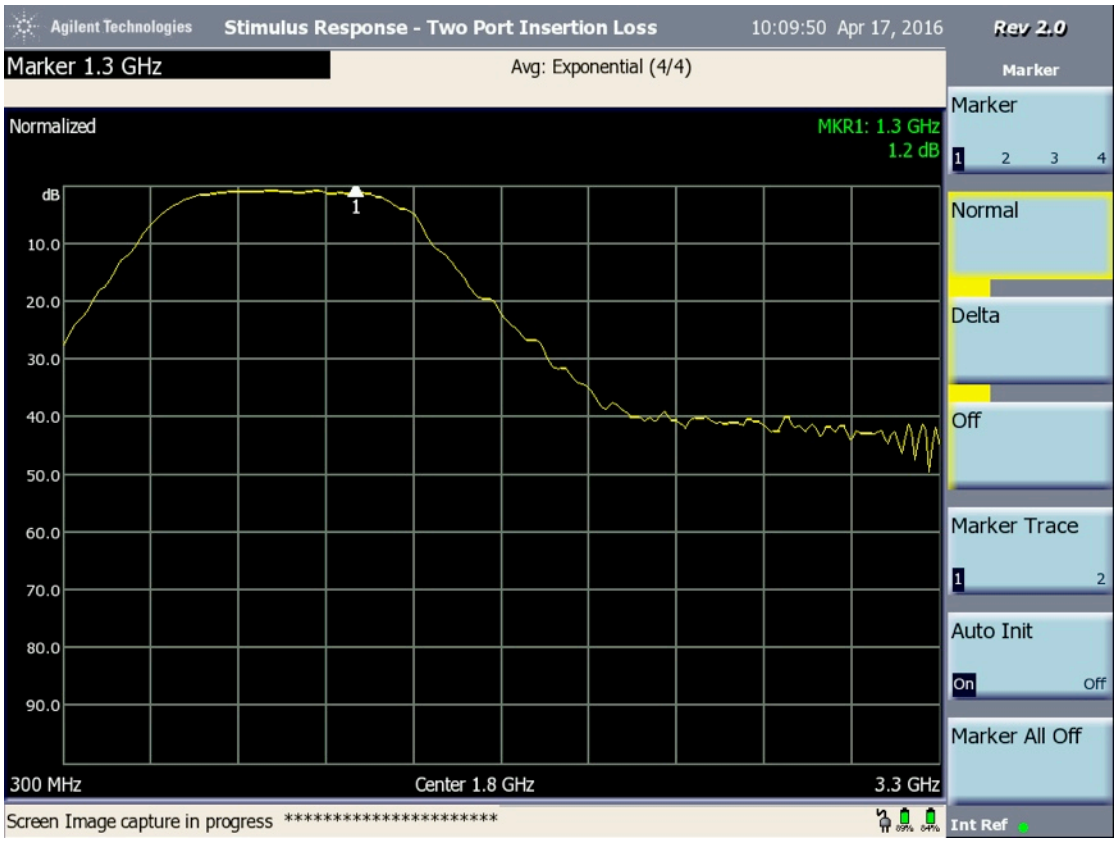
Diplexer design - James L Tonne www.tonnesoftware.com,
Measurements – Graham Murchie G4FSG for use of his Agilent Network Analyser



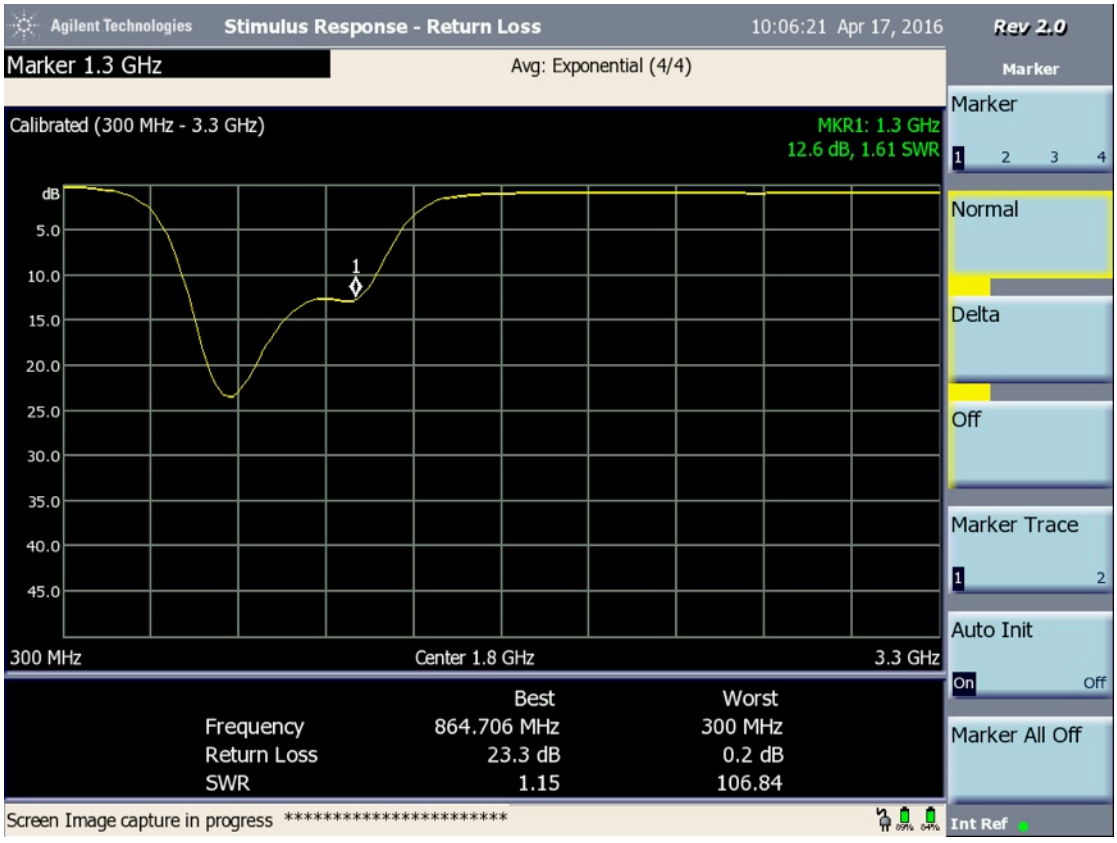
Insertion loss from Common to 432MHz port



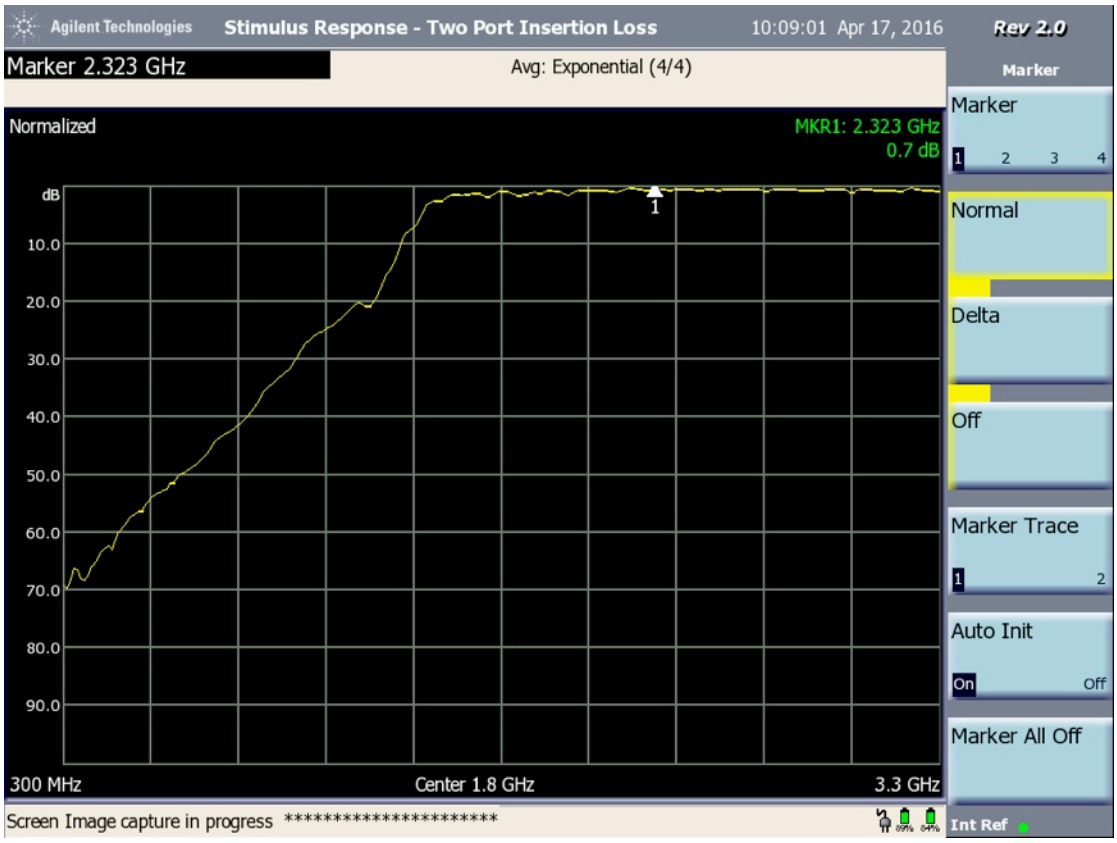
Return Loss looking into the 432MHz port, all other ports terminated



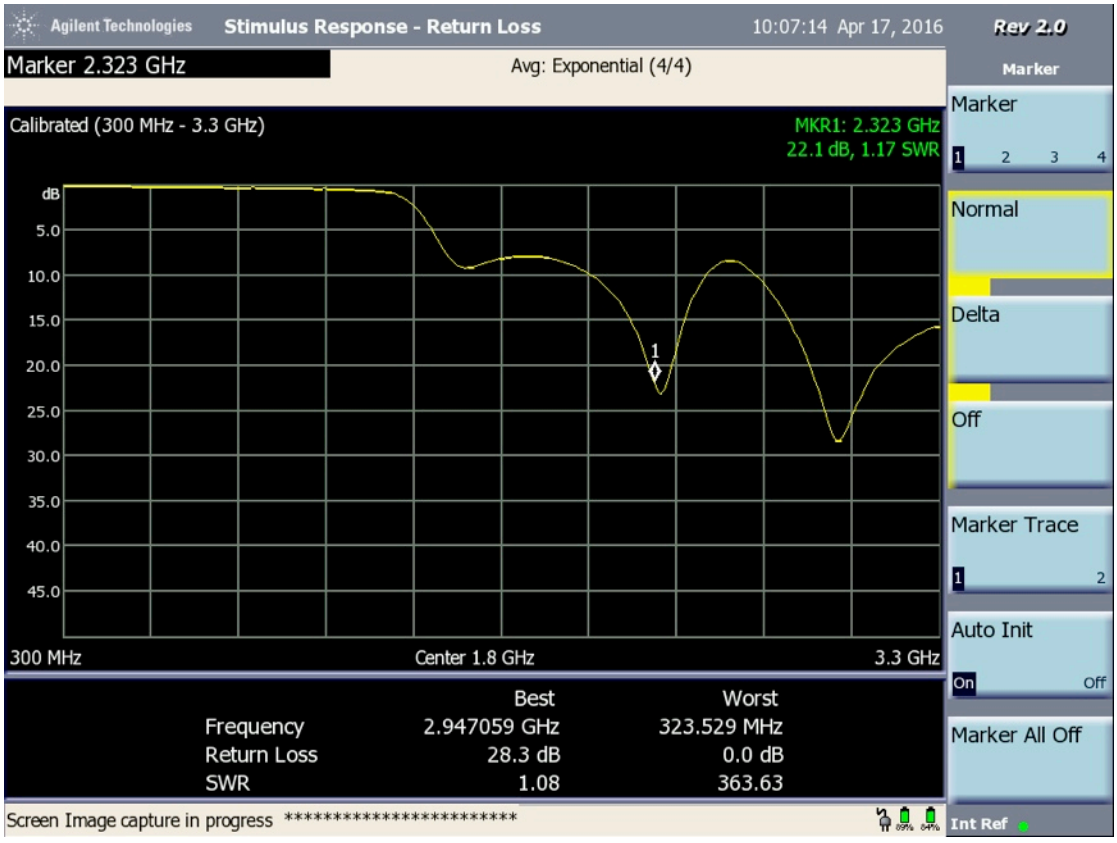
Insertion loss looking from the 1.3GHz port to the common port, all other ports terminated



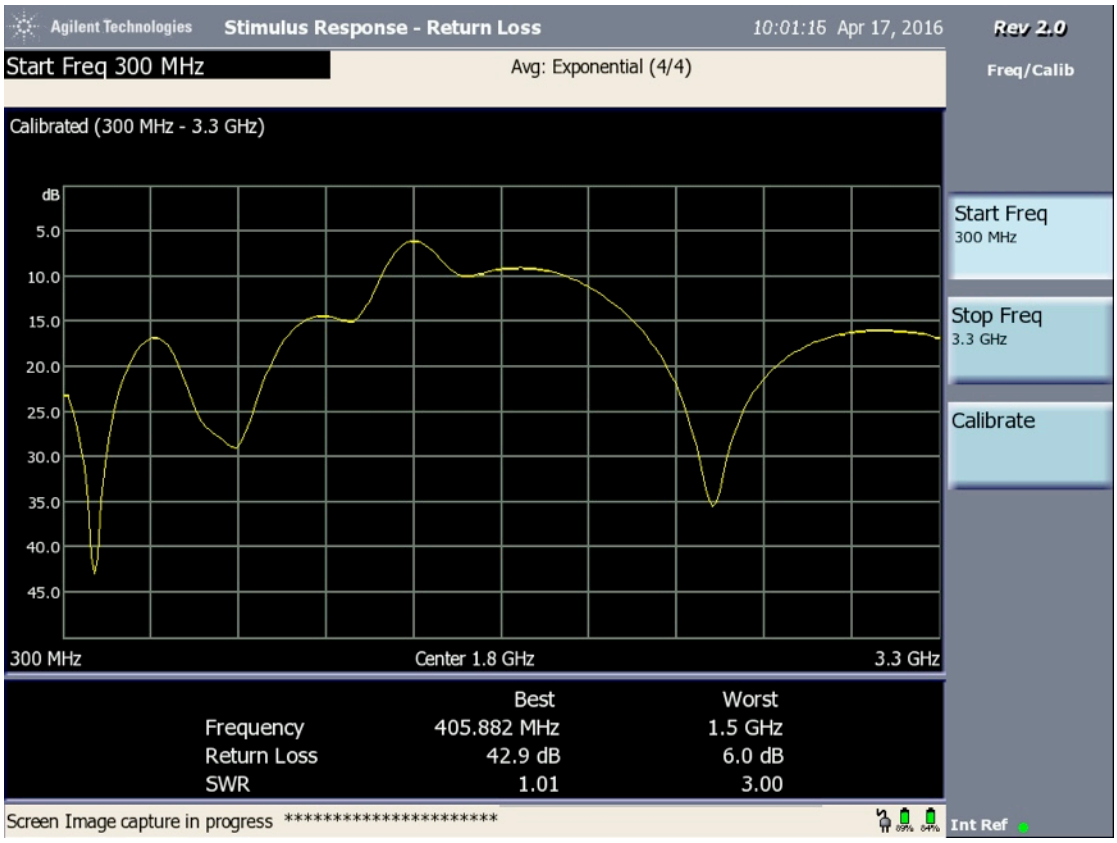
Return loss looking into the 1.3GHz port, all other ports terminated.



Insertion loss from Common to the 2.3GHz port



Return loss looking into the 2.3GHz port, all other ports terminated



Return loss looking into the common port. All other ports terminated.

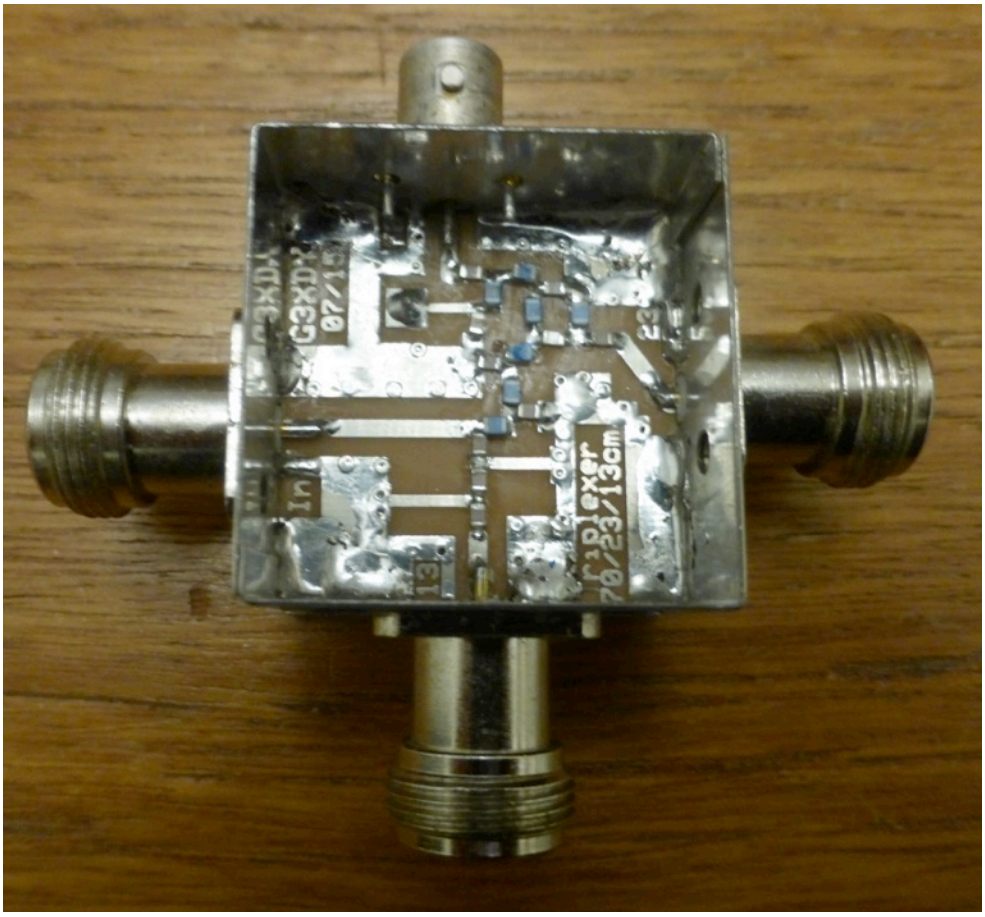


Photo of the unit with top cover removed

Low Pass Filter (Part 2)

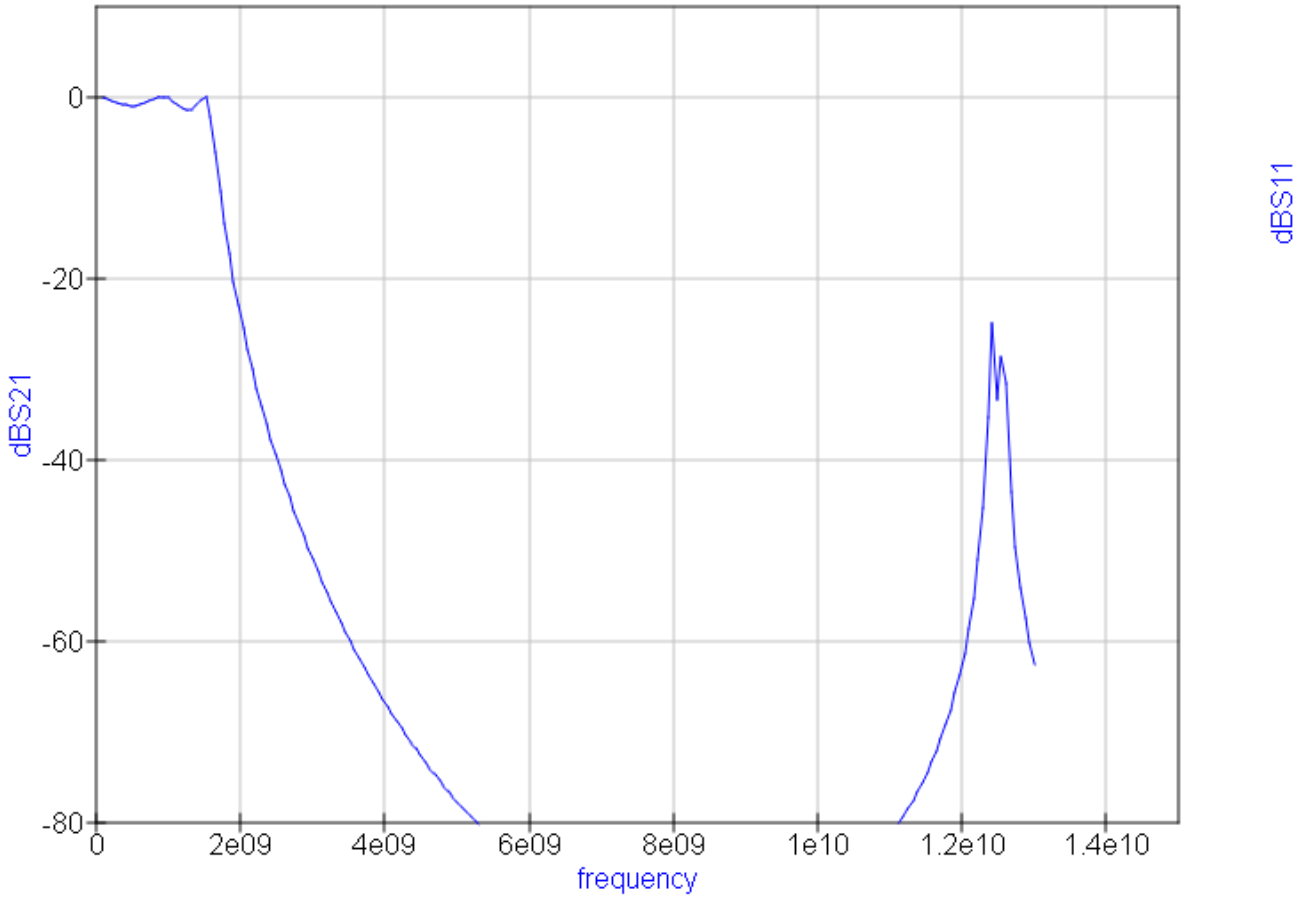
Ken Vickers G3YKI

I almost promised last month some more comments on the low pass filter. Here goes.

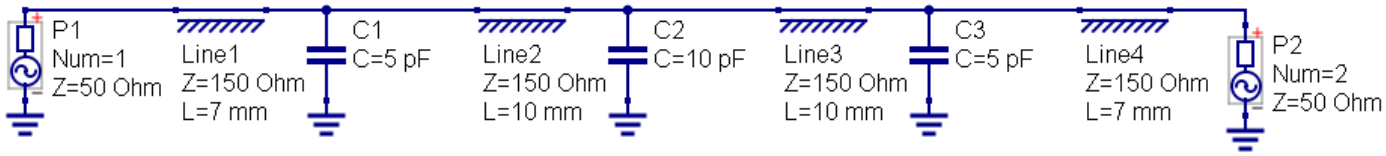
Someone asked me if I included all the dimensions of the “sixpenny filter” or is it a trade secret? Well, I included all the information in the diagram, albeit in the form of the Z_0 of the lines, from which you could calculate their diameter. Anyway the diameter of my central “C” is 18.55mm and the end ones are 17.9mm.

It may be something of an academic exercise to want to move the 7GHz response and make the stopband wider, but as we established that it is the result of a half wave resonance in the 23mm sections, can we make these shorter?

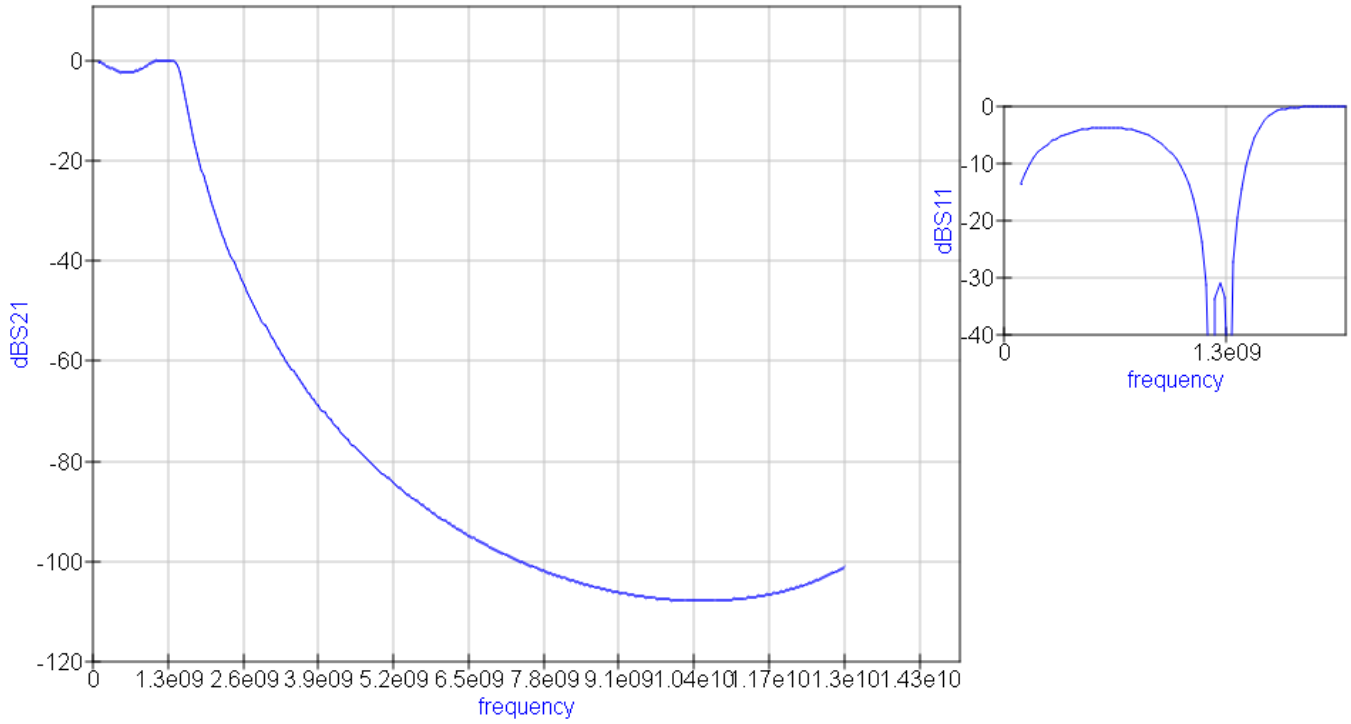
The first thought is to increase the Zo of these lines, but that leads to a diameter which is impracticably small from both mechanical and power handling considerations. Thinking laterally, the alternative is to design the filter for lower impedance terminations. So for 25Ω I roughly halved the “L”s and doubled the “C”s and this moved the response to over 12GHz. When terminated in 50Ω we get ripples of a couple of dB in the passband.



To improve the match at 1.3 GHz you might think of adding additional LC sections, or quarter-wave transformers at each end, but none of these would work over whole 0 to 1.3 GHz band, and anyway we don’t need to do that for this application when it will not be used at any other frequency. So just adjust the values of the components we already have to achieve a suitable result.

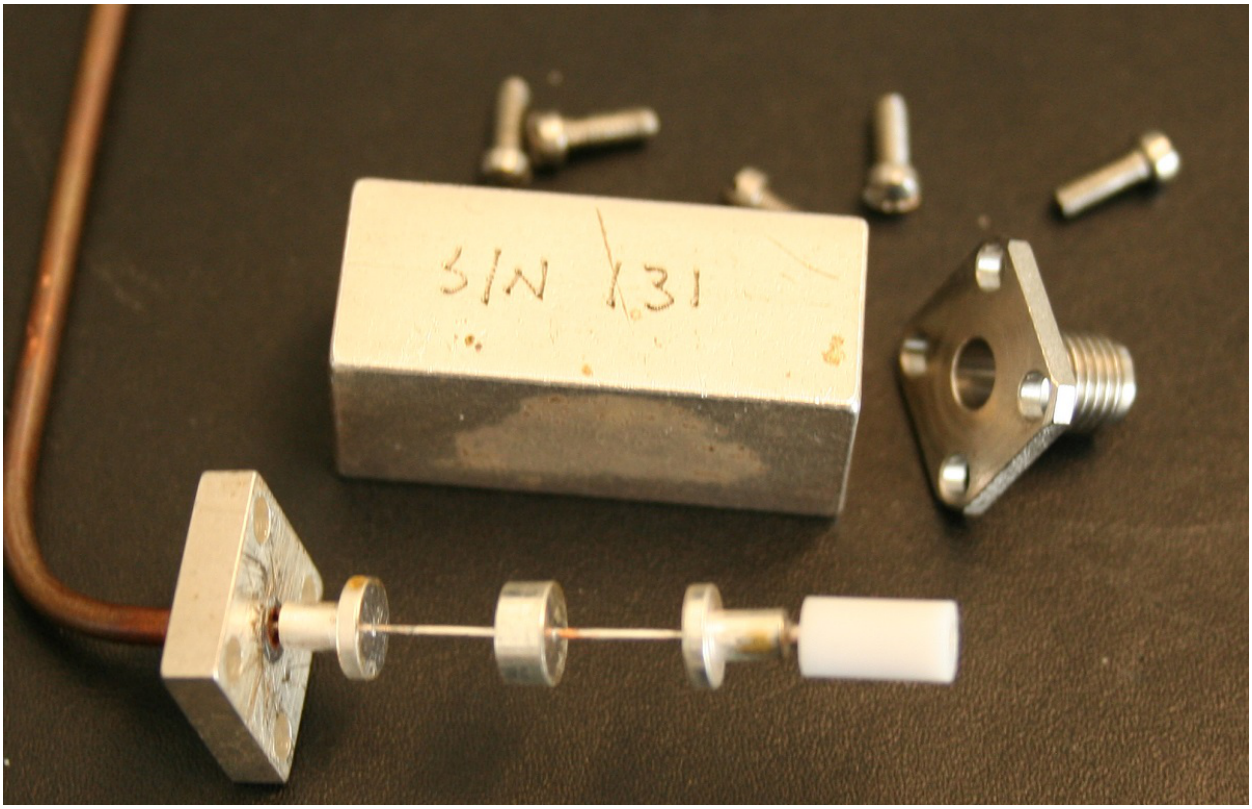


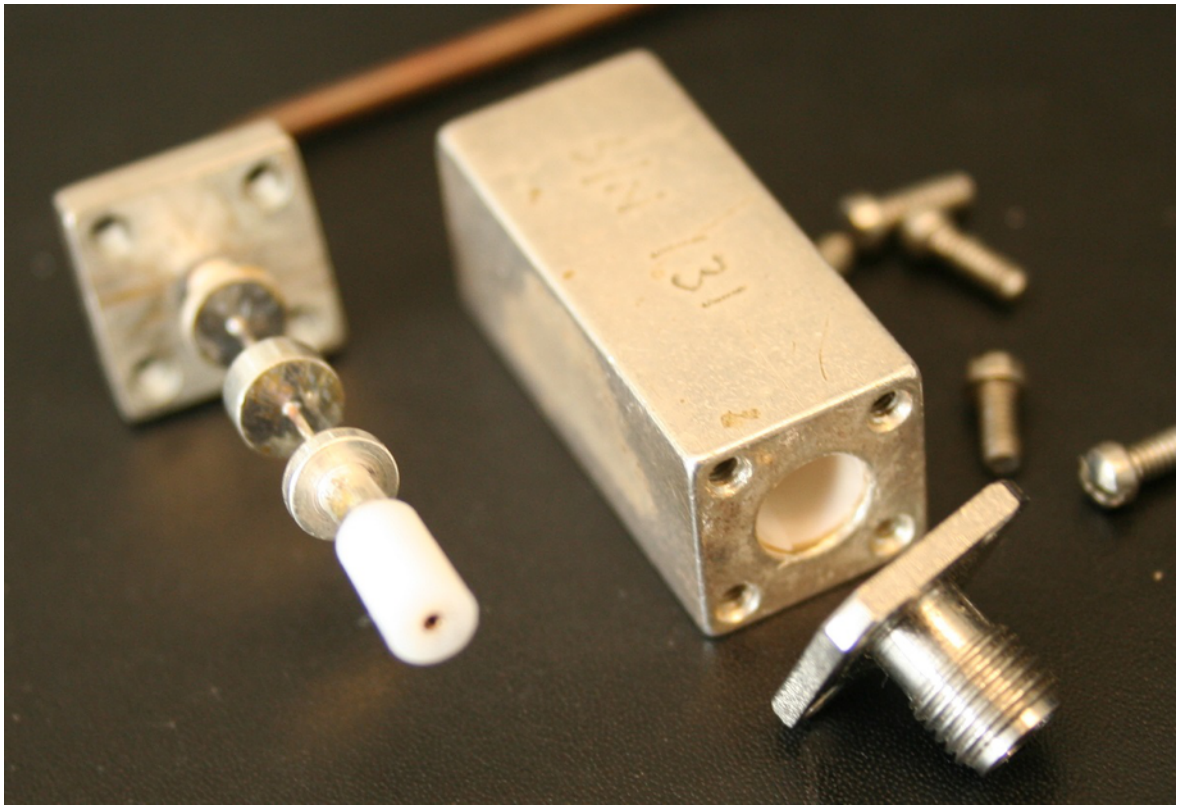
This proved fairly easy as you can see, I did not even need to depart from round numbers in my model. It also moved two of the return loss notches close to 1.3 GHz, giving a broad passband and possibly implying less critical construction.



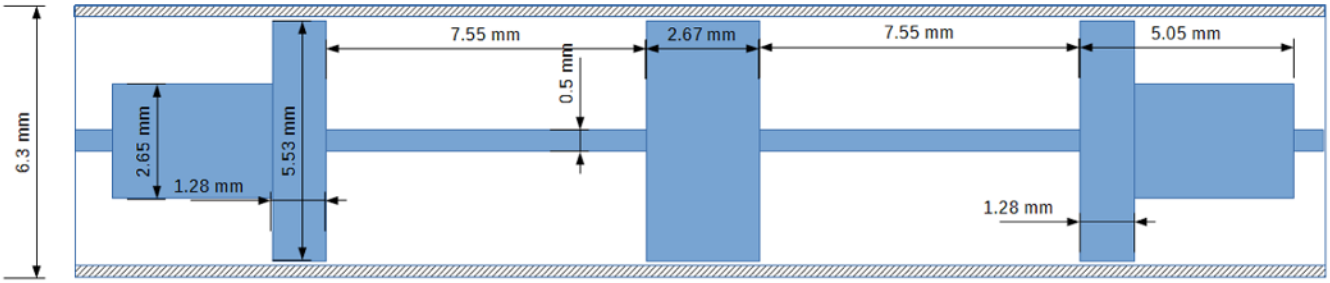
This filter has not yet been built.

In the meantime, I have a filter recovered from a TV camera link transmitter (2.5 to 2.7 GHz band, I think) and here is some information about it. It is 12.7mm square with the cavity being 6.3mm diameter, 29.5mm long, and lined with slightly more than one turn of 0.25mm thick PTFE sheet. So quite compact, and hardly suitable for hundreds of watts! This is only a 5 element low pass filter so also may not provide the attenuation of harmonics required for a high power amplifier but would make a useful contribution to the performance of a low power 2.3 GHz transmitter.

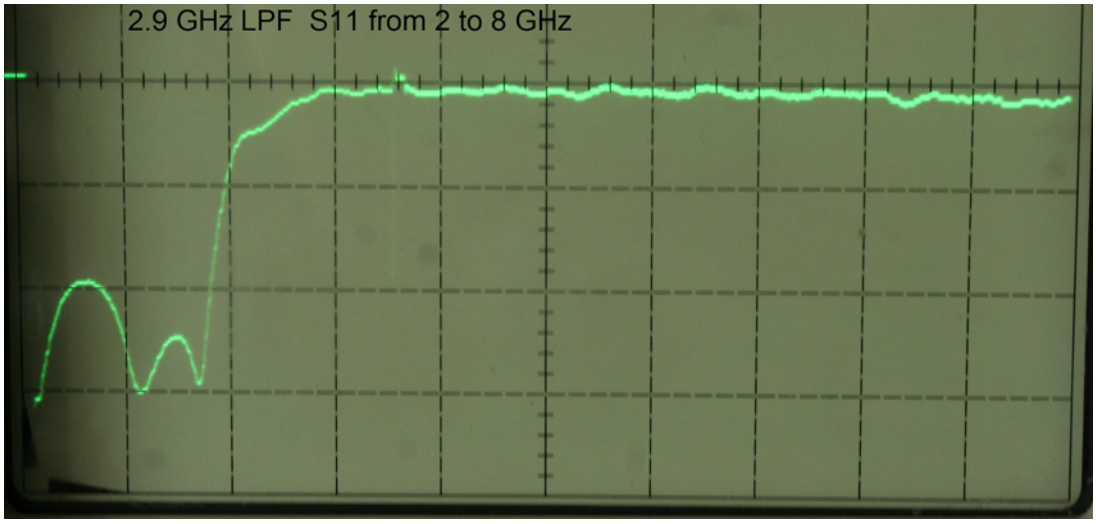


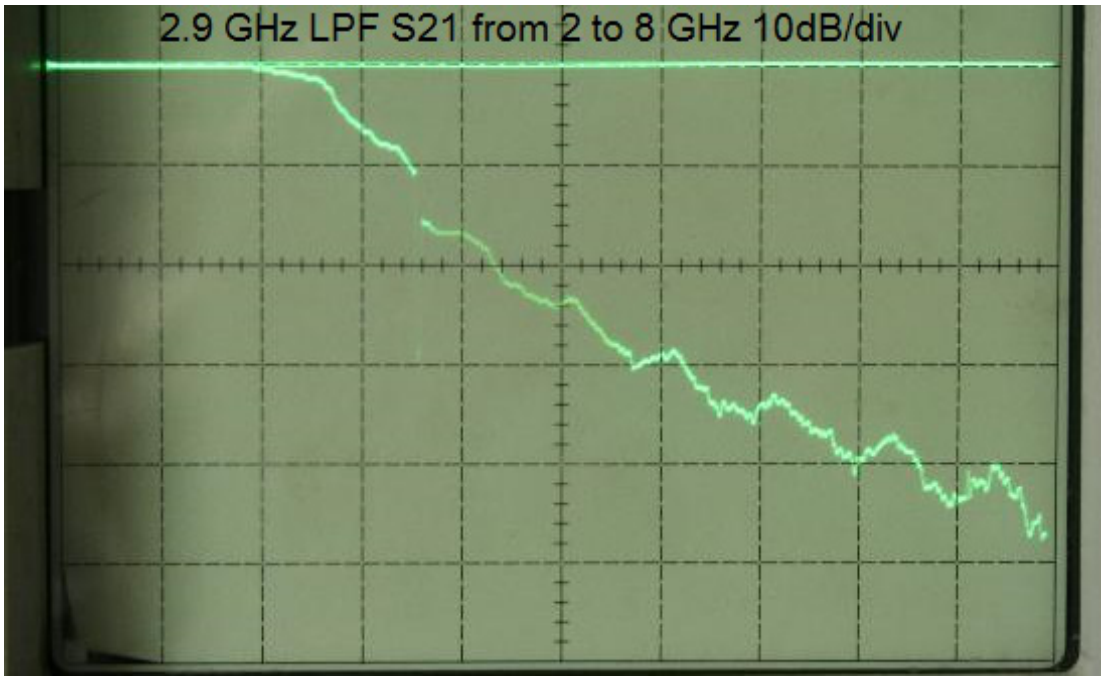


2.9 GHz Low pass filter



2.65mm inner is ~ 50 ohm





Planned contest activity from Guernsey

Paul Bowen, M0PNN

G8VZT, G3UKV, G8UGL, G4NKC, etc will be QRV June 24th-29th from Guernsey as GP3ZME/P 50MHZ -24GHZ main operations towards UK will take place from IN89QK25 but other sites will be used for better paths to Europe etc.

Taking part in the following contests. ON4KST and VHF talkback will be used.

UKuG Contests

26th June 5.7GHz Cumulative

26th June 10GHz Cumulative

RSGB Contests

26th June 6 Meter CW Contest

28th June SHF UKAC 2.3GHz -24GHz

G8UGL looking for GB3ZME beacon.

Activity News : April 2016

By Neil Underwood G4LDR

Please send your activity news to:

scatterpoint@microwavers.org

Introduction 1

Please welcome Neil G4LDR as the new Activity News editor.

73 Martin G8BHC

Introduction 2

I would like to begin by thanking Bob, G8DTF, for his contribution to the UK Microwave Group both as Chairman and as Activity News Editor.

I have received three reports of activity this month, from GW4KTH, G0API and G3YJR, thank you, covering contest operation, Monday night activity and mm wave testing. I am sure there must be more activity out there so why not let me know and I can then include it here so it becomes a permanent record which can be used to demonstrate to Ofcom and others that we actually do use the microwave bands.

Monday Night Activity

There seems to be an upsurge of microwave activity on Monday evenings lately, let us hope it continues.

On Monday 4th April, there were six stations active on 3cm, stretching from the New Forest in Hampshire to Saltash in Cornwall. They were G4UVZ/P at Coombe Beacon near Taunton, G7JTT/P at Pickets Post in the New Forest, G3VPF/P at Hardyes Monument near Dorchester and home stations G0API near Poole, G4ALY, near Saltash Cornwall and G4LDR near Salisbury. The following reports were posted on the microwave reflector.

From John G7JTT/P, IO90 (New Forest):

I would just like to thank all who helped me make my first contacts on 3cm in a long time happen tonight and the first on the new kit. Lessons learned, wear warm clothes for one, shorts and a thin hoodie are not really suitable for hill top operating, better 2 metre talk back and better placement of the gear to allow me to sit in the car (then I can turn the heating on). What did work well was the use of the laptop and a SDR to find signals (due to not everyone being locked) once found on the SDR the IF lead was plugged back into the FT290 then it was just a case of TX'ing and tune to same spot.

From Ed G3VPF/P, IO80 (Hardyes Monument):

My thanks to G4UVZ/P, G4LDR and G7JTT/P for a very successful evening operating from Hardyes Monument on 3cms. No rain, but thick fog and drizzle at the end forced an early shut down. Lessons learnt: need to waterproof the gear, need to make it easier to carry, need better mechanics to ensure highest frequency stability, and 10dB more output would help!

A good evening's return to 3cms after a 30 year gap.

From John G0API, IO80 (Poole):

Some activity on 10GHZ from several stations using my normal mast mounted Octagon and 60 cm offset dish @8m agl:

> G4UVZ/P, 589 from Coombe Beacon, G3VPF/P, 579 from Hardyes Monument (reflected path) G7JTT/P, 599 from Picketts Post New Forest and G4LDR, 589 from home.
>
> I was heard on CW by G4UVZ/P using my suitcase based system, 400mW into a 60 cm offset on the roof of my garage. I hope to be out /M soon - yes I do mean Mobile.

There is usually activity most Monday evenings in the in the South West and of late further afield, as monitored via ON4KST. Two stations that called G4LDR recently were John G4BAO (JO02) on 3cm and G4RQI (IO93) on 13cm, unfortunately the later attempt did not result in a successful contact.

Contest Operating

From Graham, G3YJR

On 23cm I entered a few contests recently. On the 15-March UKAC I managed 27 contacts; best DX PA0EHG on CW at 441km. In the 10-April Low Bands contest I made 13 contacts, all in England. In the 19-April UKAC I got up the dizzy heights of 30 contacts. It was hard going to the north, but a bit of tropo opened up to the SE & I worked PE0EHG, PA0S & OQ4U, the latter my best DX for the night using SSB at 558km. The next day, there was still a bit of tropo & I heard some beacons in & out of the noise: DB0JK, PI7QHN, DB0GW & DB0XY (822km). They faded away soon.

From G4LDR (IO91)

I usually find time to operate during most of the UK microwave contests. Several lately have coincided with high winds at my QTH which has meant keeping the antennas below local tree height resulting in fewer successful contacts than normal, this was particularly true for the April Low Bands Contest.

I did operate during the French activity day on the 24the April, but conditions on the higher frequencies were poor. Nevertheless I did work F8DLS at 425 km for my best DX on the day on13cm and 3cms.

Other Activity on the cm bands

From John, G0API (IO80)

Adrian G4UVZ and G0API have been testing on 10GHz /P using systems built over the Winter , one based on G4DGU components and one using a 20 year old G3WDG arrangement , now using a GPS referenced synth LO at 2556MHz.

On 21/04/2016 G0API/P was at Whiteway car park on the Dorset Purbecks IO80WP32DI and G4UVZ/P was at Castle Hill IO80LW23CE in Somerset. A dry, misty morning with flat pressure, path loss quoted at -196dB, so easy for 60cm dishes and 2W/0.4W outputs, resulting in 599 both ways. Interestingly, the peak signals were exchanged at nearly 5 degrees from predicted. Signals from two local beacons were exactly on heading; so local obstructions at the UVZ end presumed to be in play.

We then repeated the test with different antennas at G0API/P. First a 20dB pcb horn - again 599. This was followed by a 10 slot per side waveguide "omni" mag mounted onto the Landrover roof – 54 peak ssb /M to /P. Finally a 1/4wave mounted horizontally, approx. a wavelength in front of the system carry case - readable CW, which means a JT data mode would have easily worked .When G0API returned to his shack and took a picture of this antenna, he discovered that it had a 6dB SMA pad inline ...

G0API's 1/4 wave antenna for 3cm, complete with 6 db attenuator!

From Graham G3YJR

Graham has sent in a summary of his 3cm operation during the last six months.

On 3cm last year in a good tropo patch, I was excited to work my first continental DX:

20151102	1938	10368	J3E	DK1VC	53	51	655	JO31RG
20151102	2227	10368	A1A	F6DKW	559	529	577	JN18CS

I was very surprised to work either of these. Maurice (F6DKW) is not a particularly easy direction as I am some way down from the hill-top to the south of me. I nearly didn't bother trying as either felt impossible. So I learnt that 3cm is always worth a try! So Maurice is my best DX on 3cm so far.

I've managed little on 3cm this year, but I did work Nick G4KUX on a direct path recently and also via a rain-cell east of Leeds. With luck, the coal-fired power stations won't be demolished for a while - I can see several from here. I'd like to try working Nick again via Eggborough.

mm-wave Activity

From Neil, G4LDR (IO91)

After a very wet winter I finally had the opportunity in the middle of April to conduct some more tests with the UKuG 76GHz loan equipment. From my QTH near Salisbury I have a line of sight (los) path to Portsdown Hill north of Portsmouth a distance of 45km. I set up the separate beacon transmitter (with open waveguide as antenna) in my garden pointing at Portsdown. I then drove to Portsdown (passing through an area of heavy rain) and set up the receiver. Unfortunately I was unable to hear the beacon, even after changing location. On the way home I again drove through a heavy rain storm. On replaying the rain radar for the time I spent on Portsdown Hill showed a continuous line of rain showers across the path to my QTH. This may have been the reason for the failure to hear the beacon, or I may have been expecting too much using only open waveguide at the transmitter end, (I had previously received 599 signals over a 15km los path with the same set up).

I have now handed the loan equipment to Martyn G3UKV, so I hope to be able to report on his experience with the kit in the coming months. Just before I handed it on I was able to get my own 76GHz system working in the shack, all I need to do now is box it up for portable use and obtain a dish.

From Keith, GW4KTH (IO81)

A test on 76GHz with Pete, G4HQX, across the Severn estuary was not successful. The last couple of km at Severn Beach were shrouded in mist, and Pete did not have a "LOS" view of my position bathed in sunshine!

The lack of success was probably due to a combination of alignment and signal attenuation.

Pete was assisted by Steve M6JJV/P on 2m talkback; recently licenced, this was Steve's first foray into microwaves.

A recent test of 11km across Cardiff, using G8CUB's beacon, produced S9 signals as a check that our gear was still working. More paths are planned.

… and finally

The deadline for activity news for the next edition of Scatterpoint is the 1st of the month. So for the June issue please send your activity reports to Scatterpoint@microwavers.org by Wednesday1st June. I would like to report as much activity as possible whether it be during contests or activity periods or random contacts at other times. Please include any mode (i.e. narrow band, wide band, digital or ATV etc.)

New 47 GHz Beacon

Murray Niman G6JYB

Chris Towns G8BKE has applied for GB3SCQ on 47088.905 to be added at Bell Hill. This will succeed the previous personal beacon and should support activity on a valuable amateur primary allocation. The application has already been processed by RSGB and is in Ofcom for approval.

UKµG Microwave Contest Calendar 2016

Dates	Time UTC	Contest name	Certificates
6-Mar	1000 - 1600	1st Low band 1.3/2.3/3.4GHz	F, P,L
10-Apr	1000 - 1600	2nd Low band 1.3/2.3/3.4GHz	F, P,L
8-May	0800 - 1400	3rd Low band 1.3/2.3/3.4GHz	F, P,L
29-May	0600 - 1800	1st 5.7GHz Contest	F, P,L
29-May	0600 - 1800	1st 10GHz Contest	F, P,L
5-Jun	1000 - 1600	4th Low band 1.3/2.3/3.4GHz	F, P,L
19-Jun	0900 - 1700	1st 24GHz Contest	
19-Jun	0900 – 1700	1st 47GHz Contest	
19-Jun	0900 – 1700	1st 76GHz Contest	
26-Jun	0600 - 1800	2nd 5.7GHz Contest	F, P,L
26-Jun	0600 - 1800	2nd 10GHz Contest	F, P,L
17 -Jul	0900 - 1700	24GHz Trophy / 47 / 76/122-248 GHz	
31 -Jul	0600 - 1800	3rd 5.7GHz Contest	F, P,L
31 -Jul	0600 - 1800	3rd 10GHz Contest	F, P,L
14- Aug	0900 - 1700	3rd 24GHz Contest	
14- Aug	0900 - 1700	3rd 47GHz Contest	
14- Aug	0900 – 1700	3rd 76GHz Contest	
28 -Aug	0600 - 1800	4th 5.7GHz Contest	F, P,L
28 -Aug	0600 - 1800	4th 10GHz Contest	F, P,L
11 -Sep	0900 - 1700	4th 24GHz Contest	
11 -Sep	0900 - 1700	4th 47GHz Contest	
11 -Sep	0900 – 1700	4th 76GHz Contest	
25 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
25 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
13 -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)

Contest results are also published online – please follow the link from the UKuG Contests page at:

www.microwavers.org/?contesting.htm

73
John Quarmby G3XDY

Microwave activity days in France. Journeés d'Activité

JA March	WE 26 & 27	JA July	WE 30 & 31
JA of April	WE 23 & 24	JA August	WE 20 et 21
JA May	WE 28 et 29	JA September	WE 24 & 25
JA June	WE 18 & 19	JA October	WE 29 et 30

On the 17th July in the morning will be a special JA in memory of F6BSJ, all contacts will be done by reflection on Mont Blanc.

73 Jean Paul F5AYE

Events calendar

2016

Jan 23	Heelweg	www.pamicrowaves.nl/
Feb 13	Tagung Dorsten	www.ghz-tagung.de/
Apr 9	CJ-2016, Seigy	cj.ref-union.org/
Apr 16–17	Martlesham Microwave Round Table & UKμG AGM	http://mmrt.homedns.org
Apr 16–17	IARU-R1, Vienna	
Apr 16–17	EUCARA (European Conference on Amateur Radio Astronomy)	https://www.eucara.nl
Apr 23	RSGB AGM, Scotland	rsgb.org/agm
May 20 – 22	Hamvention, Dayton	www.hamvention.org/
May 22	BroadBand HamNet (BBHN) Meeting, Crawley ARC	BBHN.Event.2016@gmail.com
Jun 24 – 26	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
July 9–10	Finningley Round Table	www.g0ghk.com/events/round-table/
Jul 29 – 31	Amsat-UK Colloquium, Holiday Inn, Guildford	www.amsat-uk.org/colloquium/
Aug 19–21	EME2016, Venice	www.eme2016.org/
Sept 9–11	61.UKW Tagung Weinheim	www.ukw-tagung.de/
Sept 18	Crawley Round Table	
Sept 24 –25	BATC Convention, RAF Museum Cosford	www.batc.org.uk/convention.html
Sept 30–Oct 1	National Hamfest	www.nationalhamfest.org.uk/
Oct 3 – 7	European Microwave Week, London	www.eumweek.com/
Oct 7 – 9	RSGB Convention	rsgb.org/convention/
Oct 14–15	Microwave Update, Saint Louis, Missouri	www.microwaveupdate.org/
Nov 12 (tbc)	Scottish Round Table	www.gmroundtable.org.uk/

2017

Apr 22–23	Martlesham Microwave Round Table & UKμG AGM	http://mmrt.homedns.org
July 14 – 16	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de/
Oct 6 – 8	RSGB Convention	rsgb.org/convention/
Oct 8 – 13	European Microwave Week, Nurembourg	www.eumweek.com/

2018

June 22–24	Ham Radio, Friedrichshafen	http://www.hamradio-friedrichshafen.de/
Sept 23–28	European Microwave Week, Madrid	http://www.eumweek.com/

NB Some of the 2017/18 event links may not be working yet.

Yahoo log-in for Scatterpoint

We have received a number of reports from members advising they are no longer able to log into Yahoo groups. Some months ago Yahoo Groups made changes to its formatting including a change to the sign-in page where the original single page requested entry of Yahoo ID or email and a password.

The revised sign-in now has two pages where the first page requests an email address only. If you enter a non-Yahoo email address and click "Next" you will see a message: "sorry, we don't recognise this email".

The solution is to enter your normal Yahoo ID into the "email box" and click "Next", this will bring in the second page requesting your Yahoo password.

Enter your password and click "Sign in" and you should now be in your Yahoo groups Home page.

If you are aware of any UKuG members having difficulty with their login to Yahoo groups please pass this information on to them.