An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

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Barry G8AGN making 50m record contact on 30THz


Dave G1EHF Homebrew 47GHz Transverter

UK Microwave Group

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

https://groups.io/g/Scatterpoint 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

payukug@microwavers.com

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)

Please send pictures and tables separately, as they can be a bit of a problem.

Thank you for you co-operation.

Roger G8CUB

Reproducing articles from Scatterpoint

If you plan to reproduce an article exactly as in Scatterpoint then please contact the Editor – otherwise you need to seek permission from the original source/author.

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 (e.g. 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 contact the committee.

The current list is available at

www.microwavers.org/tech-support.htm

UKµG Chip Bank – A free service for members

By Mike Scott, G3LYP

Non-members can join the UKµG 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 components on the site will not be a guarantee of availability of that component.

The service is run as a free benefit to all members of the UK Microwave Group. The service may be withdrawn at the discretion of the committee if abused. Such as reselling of components.

There is an order form on the website with an address label which will make processing the orders slightly easier.

Minimum quantity of small components is 10.

These will be sent out in a small jiffy back using a second class large letter stamp. The group is currently covering this cost.

As many components are from unknown sources. It is suggested values are checked before they are used in construction. The UKµG can have no responsibility in this respect.

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

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Loan Equipment

Don't forget, UKuG has loan kit in the form of portable transceivers available to members for use on the following bands: **Contact Neil G4DBN for more information**

5.7GHz 10GHz 24GHz 47GHz 76GHz

UK Microwave Group AGM Minutes 2021

The AGM of the UK Microwave Group took place on 18th April 2021, by Zoom video conferencing. 40 members were present.

Minutes 2020

Minutes 2020 (as published in Scatterpoint Sep/Oct 2020) – no comments had been received, there were no matters arising.

Chairman's Report – Neil Underwood G4LDR

Committee members and officers

Our committee and officers continue to fulfil a number of important roles. These include UKuG representation on a number of committees and working groups, such as the RSGB (Spectrum Forum, Microwave Manager), IARU, CEPT and WRC.

We also have officers who run the Chipbank, act as beacon co-ordinator, look after our trophies, edit Scatterpoint and write the activity column in both Scatterpoint and RadCom. I would like to thank all those members who give their time to help run the UKuG .

Round Tables

This year due to Covid-19, no events could be organised.

We all hope that Microwave Round Tables can resume later this year. Each one is organised by a local club and not the UKuG so it will be for them to decide if and when they can begin again.

On Line Presentations

With no Round Tables this year a series of on-line talks have been given. Presenters have been Chris, G0FDZ, Bryan, G8DKK; Barry, G8AGN; Kent, WA5VJB and Brian, G4NNS.

New licence conditions to ensure we operate within existing and future international safety

guidance These come into effect in May this year (with a grace period until November 2021)

There will be a need to carry out an audit of our radiated power levels and show compliance or how we can make our stations compliant

The RSGB has been developing tools to help members based around the OFCOM EMF calculator (spreadsheet).

All the frequency allocations we have continue to come under some level of threat from commercial applications:

Not least the 23cm band where our sharing with the radionavigation satellite services is currently under study as a World Radio Conference 23 agenda item.

Barry G4SJH will be giving an update on the 23cm situation immediately following the AGM.

Treasurer's Report – David Millard M0GHZ

It's been another stable year for the Group's finances, with net funds increasing by £1351 despite some new costs:

- Zoom licence £143
- 24GHz Loan equipment £919
- Set-up costs for the UKuG polo shirts £25

Loan equipment insurance could not be renewed as the new underwriter would not accept the risk.

The committee concluded that we had been under insured and agreed that the UKuG could cover any losses, the equipment being distributed around the UK.

Two donations, each of £100, have been received from the family of G3JVL to cover the G3JVL Trophy Prize for 2020 and 2021.

This was won in 2020 by G0JBA, and included under 'Trophies'

There is no requirement to increase the subscription rates which have remained at £6 for many years.

The balance sheet below gives a summary of our accounts, for full details please contact the treasurer.

The committee is currently discussing how best to use the funds to the benefit our members
If you have any suggestions or funding requirements please forward them to the committee
I would like to thank John G4BAO for the smooth handover of the accounts following the 2020 AGM in October.

Grateful thanks also to Graham Philips G0KRB who kindly audited the accounts at no cost to the

UKuG. The treasurer's report was accepted by the meeting on a show of hands.

UK Microwave Group Accounts

Covering period 01/Jan/2020 to 31/Dec/2020

Item	Income	Expenditure	Balance
Opening balances as at 01/01/2020			
Current account			£1,103.92
Savings account			£22,793.17
Paypal			£2,442.52
Cash in hand			£0.65
Opening balance			**£26,340.26**
Subscriptions	**£3,579.94**		
Donations	**£205.00**		
Other	**£0.00**		
Interest	**£8.22**		
PayPal fees		**£206.37**	
RSGB Afilliation		**£52.00**	
Websites (inc beaconspot)		**£438.29**	
Beacon Support		**£136.11**	
Trophies		**£308.98**	
Chipbank Expenses		**£71.08**	
Publications		**£66.53**	
Postage		**£30.84**	
Zoom		**£143.88**	
Cloudlog		**£44.00**	
Polo shirt logo		**£25.00**	
Loan equipment		**£918.57**	
Sub-totals	**£3,793.16**	**£2,441.65**	
Excess income over expenditure			£1,351.51
Closing balance as at 31/12/20			**£27,691.77**
Represented by			
Current account			£1,361.65
Savings account			£24,801.39
Paypal			£1,528.73
Cash			£0.00
		Closing balance	**£27,691.77**

D. Millard M0GHZ
Treasurer

G. Phillips G0KRB
Auditor

UKuG Membership – Bryan Harber G8DKK

2020	2021
558 Members (9/2020)	563 Members (4/2021)
82 New Members (January to December 2019)	69 New Members (January to December 2021)
22 New Members (January to April 2020)	22 New Members (January to April 2021)
During 2019 55 members left the group	During 2020 60 members left the group
Groups.io Scatterpoint	Groups.io Scatterpoint
547 members subscribed	551 members subscribed
8 pending	9 pending
88% members pay by PayPal	89% members pay by PayPal

Chipbank – Mike Scott G3LYP

A total of 74 requests were fulfilled during calendar 2020 which included nine LDMOS amplifier boards.
Due to Coronavirus, no meetings were attended during the year.
Donations of components were received from Mark, G6AHY (a car full!!), John, G8SEQ, and Alan, G4EEE. The latter, as well as semiconductors, included a large quantity of crystals ranging in frequency from 4MHz to over 100MHz. Many thanks go to the donors without which the Chipbank wouldn't exist!
The cost to the Group has risen to slightly over £1 per request which is due to postage increases. In the case of the amplifiers mentioned above, the postage cost was recovered from the recipients as was the cost of the few overseas requests.

Election of Officers & Committee

The Trophy Managers Mike & Ann Stevens G8CUL/G8NVI wish to stand down. Other nominations were requested from the floor, none were forthcoming. It was proposed that the committee be elected en-bloc and agreed with no dissensions. On a show of hands on the conference call the following were therefore elected:

Chairman	Neil Underwood	G4LDR
Treasurer	David Millard	M0GHZ
Secretary	John Quarmby	G3XDY
Membership Secretary	Bryan Harber	G8DKK
Beacon Coordinator	Denis Stanton	G0OLX
Web Master	Murray Niman	G6JYB
Contests/Awards	John Quarmby	G3XDY
24GHz and Up	Chris Whitmarsh	G0FDZ
Microwave SDR Projects	Heather Lomond	M0HMO
	Paul Nickalls	G8AQA
Technology	Neil Smith	G4DBN

Corresponding Members

USA Liaison	Kent Britain	WA5VJB/G8EMY
Northern Ireland	Gordon Curry	GI6ATZ
Scotland	Martin Hall	GM8IEM
Wales	Peter Harston	GW4JQP
ATV	Noel Matthews	G8GTZ
Beaconspot	Robin Lucas	G8APZ

Trophies Manager(retiring)	Mike & Ann Stevens	G8CUL/G8NVI
Scatterpoint Editor	Roger Ray	G8CUB
RSGB Microwave Manager	Barry Lewis	G4SJH

Any Other Business

John G4BAO urged UKuG members to offer technical articles for RadCom, he is happy to help with editing before submission.

In response to an earlier question, Bryan G8DKK reported that The UKuG has 444 UK members and 123 Overseas members as of the current date.

Phil Boorman G0JBA proposed a vote of thanks for the committee. The AGM was closed by the Chairman.

UK Microwave Group Awards 2020

Contribution Awards
G3BNL: Not awarded
G3EEZ: Not awarded
G3JVL: Ben Nock G4BXD
Fraser Shepherd Award: The Australian 122GHz team

The G3VVB award for the best home-produced project relevant to the microwave, mmwave or nanowave spectrum exhibited at a microwave roundtable was not awarded this year as no round tables have taken place.

Operating Awards
G4EAT (1.3GHz) John Lemay, G4ZTR
G3KEU (5.7GHz) David Millard, M0GHZ
G3JMB (10GHz) Barry Lewis, G4SJH/P
G3RPE (10GHz) John Lemay, G4ZTR
G0RRJ (24GHz) Martyn Vincent, G3UKV/P
24GHz Martyn Vincent, G3UKV/P
47GHz Roger Ray, G8CUB/P

Off-Beam EMF Calculator

Raymond G8KPS

Now that we need to be able show that we are complying with EMF requirements under our licence conditions. As most of us use old satellite dishes for 10 GHz and other bands and one way of showing compliance is to use off beam gain to reduce Ofcom separation distance.
I thought that the following may be useful to others. These calculations are those that are recognised by Ofcom and come from the ITU in describing the performance of satellite dishes when measured parameters are not available.
Antenna off beam Dish Gain.
Where the ratio between the antenna diameter and the wavelength is not less than 100 the following equation should be used.

From Rec. ITU-R S.465-6

'the following reference radiation patterns should be adopted for angles between the direction considered and the axis of the main beam for frequencies in the range from 2 to 31 GHz:

$$G = 32 - 25 \log \varphi \quad \text{dBi} \quad \text{for } \varphi_{min} \le \varphi < 48°$$
$$= -10 \quad \text{dBi} \quad \text{for } 48° \le \varphi \le 180°$$

where:

φ_{min} = 1° or 100 λ/D degrees, whichever is the greater, for $D/\lambda \ge 50$.
φ_{min} = 2° or 114 $(D/\lambda)^{-1.09}$ degrees, whichever is the greater, for $D/\lambda < 50$.'
D: antenna diameter expressed in the same unit
λ: wavelength

UK 30THz record April 2021

21st April. A short snapshot of the first UK contact on 30THz. The complete saga lasted for 4 hours!

https://www.youtube.com/watch?v=zXwlRLPQBO0

Band: 30THz

G8AGN/P IO93GH40 worked G4APV IO93GH40 DX 42m mode: QRSS3

(world record is 60m by VK3CV and VK3LN, 8 Nov 2020)

Then on 1st May 2021, Barry G8AGN/P and Bob G4APV extended their 30THz DX to 50m, this being the maximum length available in Bob's garden!

Reports both ways were 599 using QRSS3. The TX hot plate source was running at 300W input with a measured plate temperature of 265C.

The weather was variable, being at times hot and sunny and at other times overcast and cooler. The wind was much lighter than during the previous contact over 42m. When the sun shone, great difficulty in receiving consistent signals was experienced due to an elevated sensor temperature and radiation from nearby objects. Once the sky became overcast, the temperature dropped and solid copy both ways was achieved. Because of the slow transmission rate of QRSS3 (1 dot every 3 seconds), signals were again recorded using pencil and paper.


G8AGN/P working G4APV 30THz 50m 1 May 2021


G4APV working G8AGN/P 30THz 50m 1 May 2021


G8AGN/P receiving G4APV 30THz 50m 1 May 2021


G4APV 30THz 50m 1 May 2021

Editors Comments

Very many thanks to Ian G3WRT for his articles this month. I have included all three as they work together, describing detectors from VHF to high microwave frequencies. Also thanks to the other contributors and all that sent in activity reports.

Microwave Group Talk

Backyard Hydrogen Line Astronomy – by Brian Colemann G4NNS
a recording of this is now on the UKuG Youtube channel
https://www.youtube.com/c/UKMicrowaveGroup

Microwave DX expédition in Corsica

The well-known dream team (F1BJD, F5AYE, F5BUU et F5DJL) will operate **TK5SHF in JN42LP from June 4th till June 20th 2021**.

Qrv all bands from 50 MHz till 24 GHz in SSB and DATV.
Talkback on 144.390, KST chat and 10489.790 on satellite.
We will also activate TK21SAT callsign on QO-100 in SSB and DATV live.
QSL manager : F1BJD Jean Luc Dugué 15 rue de Sétif 72000 Le Mans France.
Hoping to see you soon down the log.
73's from Jean Claude F5BUU

One event happening this year in the UK is:

August 21/22 BATC Convention. Midland Air Museum, Coventry.

https://forum.batc.org.uk/viewforum.php?f=135

Dave, G8GKQ
BATC Chairman

Sensitive and simple VHF/UHF field strength indicator

G3WRT I.J.Dilworth

Here is a sensitive, passive field strength meter for VHF and UHF. It can be built for very low cost yet offers very versatile performance. It is sensitive enough to respond to milliwatts of power at a distance as indicated in Figure (1). I have found it useful on many occasions. For example, testing if a handheld is transmitting, aligning frequency multipliers on VHF/UHF local oscillator chains, checking the relative voltage amplitude along the length of an antenna while transmitting, observing the standing waves on a feeder, examining RF hot spots in the shack, resonating tuned circuits, even as a field strength meter if your shack suffers from poor standing waves! Or you are relatively close to your VHF/UHF beam. To name just a few applications.

The simple circuit diagram is shown in figure (2). It consists of a readily obtainable 100 microamp meter, two diodes, a variable capacitor, a decoupling capacitor, a fuse holder and a length of wire. Oh, and one more component which I found very difficult to find! A blown fuse which fits the fuse holder. Remember the adage, 'never throw anything away in the shack'? Luckily, for some reason, I found just two blown fuses in my fuse tray. I also found that it is difficult (impossible) to blow a mains fuse (all my collection are those types) intentionally with a low voltage power supply.

Details of 50/70MHz, 144MHz, and 432MHz meters are shown in the component list and are illustrated in figure (3).

In use the capacitor is adjusted using an insulated tool to resonance as indicated by a peak on the meter. A suitable plastic tool, made from a knitting needle, with a sharp edge is also shown (yellow) in figure (3). The sensitivity is indicated by figure (1) where with a spacing of over 10cm a few milliwatts from a dip oscillator provides full scale deflection. Further separation is required when using a handheld transmitter of 100mW or more. It is light weight and so glue is a useful way of providing a plastic or wood wander.

The inductor wire and its shape do not matter so long as the adjacent length and breadth, if it is made in a rectangle, are not too close because that adds capacitance. The length does matter and that governs the resonant frequency in conjunction with the capacitor. The meter with the red surround consists of adhesive copper tape wound around the meter front. This aspect ratio is about as far as you can usefully go with the inductor without diminishing the meter sensitivity. I used IN60 germanium diodes on the 433MHz unit and its sensitivity compared to the others is somewhat lower. A 100mW transmitter provides adequate deflection at about 5cm distance.

Component details

Meter 100 microamp RS 304 – 239 or any meter of similar sensitivity. I have collected many at rallies for example. However, they tend to be metal and too heavy for this application.

Adhesive copper tape – AmazonDiodes D1, D2 1N914 or similar or better germanium IN60.C1 Variable 22pF dielectric type – usually green.C1 for 433MHz I used a ceramic 0.5 – 4pF variable. C2 15pF ceramicC3 1KpF

Wire, any gauge but for safety use PVC covered (I did not) or Hela shrink covered. Use a gauge stiff enough to keep its shape. Insulated trimming tool. E.g. filed knitting needle. Wander handles for each – plastic or wood.

Inductor

50 and 70MHz. Wire length 20cm.

144MHz Wire length 10cm (3cm diameter) (add C2 15pf capacitor in parallel with C1 if you use the adhesive copper surround on meter method – the red meter. This adhesive loop meter although resonant on 145MHz responds about half full deflection when about 10cm away from a 1W handheld transmitter with a quarter wave whip on 433MHz. For the above meters I used IN914 diodes.

433 MHz – see picture. Wire length 46 mm, diodes used IN60. Capacitors: For 433MHz a small ceramic variable 0.5 – 4pF. For all the other meters I used a 2-22pF dielectric trimmer (green).

Figure (1)
The dip oscillator radiates about 2mW and the distance illustrated is about 10cm using a frequency of 145 MHz. Similar results were found with other frequencies although the 433MHz meter is about half as sensitive for the same distance.

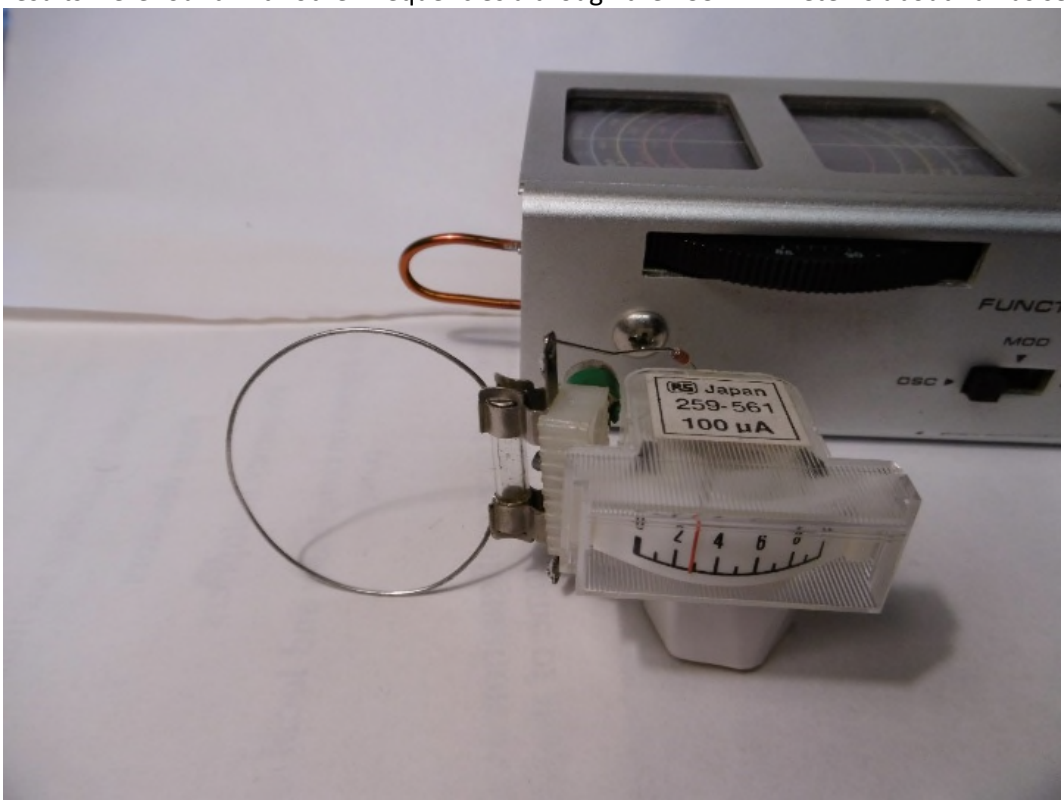


Figure (2)
The simple circuit diagrams. C2 goes in parallel with C1 in the adhesive tape version for 145MHz.

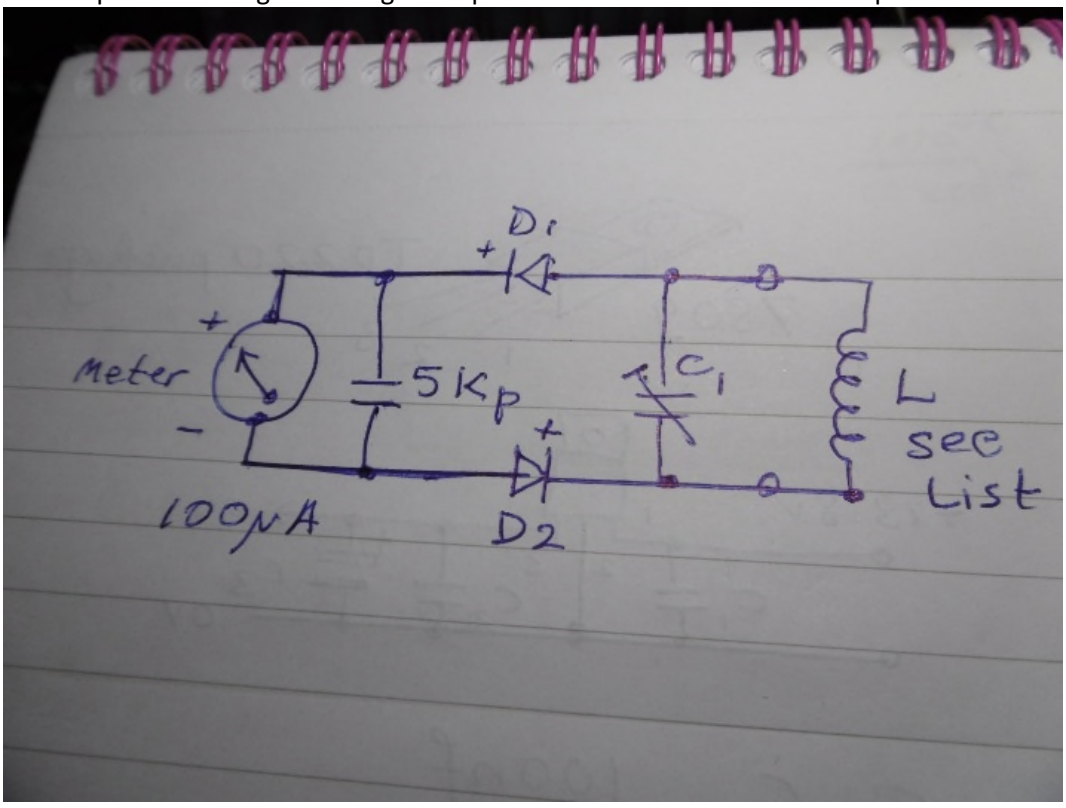


Figure (3)
A fuse holder allows easy changing of the inductor and a secure anchor and solder point for the components. The (blown!) fuse ends provide a rigid place to solder inductor ends.
On the left is the resonator for 145MHz. Next right is the 50/70MHz resonator connected to the detectors and meter. Next the copper foil wound around the meter 144MHz version. And finally, the 433MHz detector. Shown in more detail in figure (4)

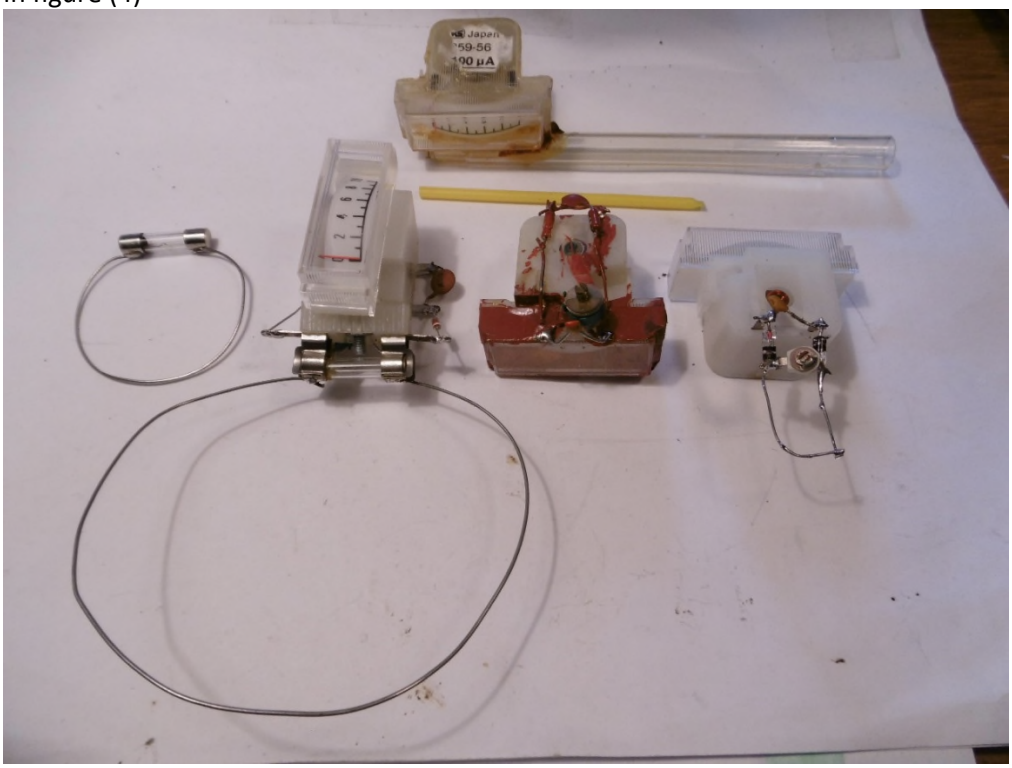
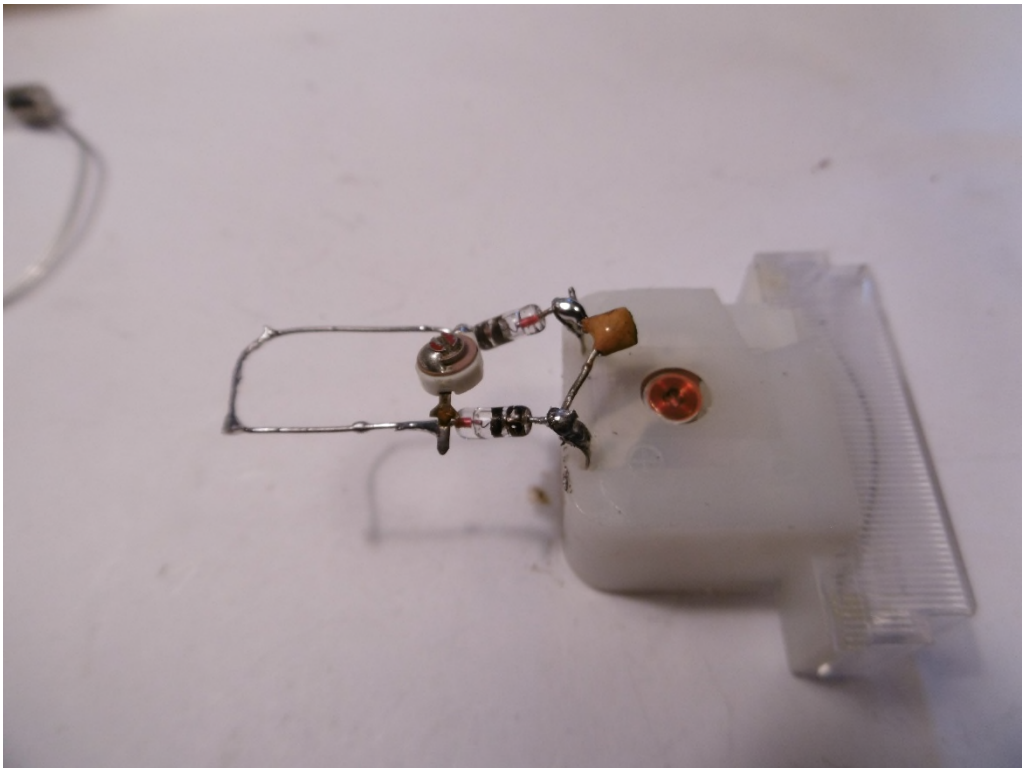


Figure (4)
The 433MHz detector. The IN60 diode leads are used to form the inductor which measures 18 x 10 x18mm.



Microwave field strength detectors 1 – 40GHz

I.J.Dilworth G3WRT

In a previous article [1], I gave details of simple and sensitive VHF –UHF field strength meters. This article takes the application up to the microwave region 1 – 40GHz with practical hardware.

The previously described field strength meters [1] work by mutual inductive coupling.
In the microwave region the coupling is generally in the far field and measures the electric field component of the radiated energy. Nevertheless, a sensitive field strength detector is readily achievable by employing both old and new technology.

The fundamental requirement is a transducer to detect the radiated field from a source. This is most conveniently and practically achieved using a broadband antenna e.g. [6]. This antenna can generally be made small without losing sensitivity. To increase sensitivity cost effective broadband microwave amplifiers preceding the detector are readily available up to and beyond 40GHz. E.g., see [2]

The arrangements typically employed are shown listed in Table (1).

As can be seen there are various combinations of Antenna, transmission media, amplifiers and detectors that can be used to optimise the sensitivity.

Of course, pulsed digital systems present different problems of measurement than a steady CW carrier. We are most interested in the latter and hence simple detectors. However, if pulsed a scope fed from the detector is the ticket.

The most basic detector arrangement is an antenna fed into a 'Back diode' detector. This converts RF to DC directly and is surprisingly sensitive ~ -50dBm. E.g. [3]. These diodes are a variation on a tunnel diode doping profile.

RF Schottky diodes are also useful at microwave frequencies up to about 40GHz. They have a small forward voltage, along with low junction capacitance, make them suitable for detection.

The most versatile arrangement is using a broadband logarithmic amplifier. Note the provisos mentioned in figure (2), 8GHz is a large noise and signal bandwidth. The one used here is 1 – 8000 MHz i.e., 8GHz. [4]. It is available at bargain prices. Always seek a screened version because signals at microwave frequencies only require small holes to couple energy. A screened and unscreened version are also shown in figure (1). Unlike waveguide these coaxial fed detectors are intrinsically broadband (TEM) mode operated.

Indicative photos of the arrangements and antennas listed in table (1) are shown in figures (1) to (5). The latter is an open-ended waveguide, TE10 coax to waveguide transition, which is the only narrow band antenna illustrated here.

All the antenna feeders are coaxial and involve solid sheath coaxial cable of small diameter. UT141 or UT 85 for example. The reason for that is that bigger (diameter) coaxial cable starts to mode and become evanescent i.e., very lossy above frequencies where moding can occur. For example, the normal SMA connector itself has an upper frequency of ~26GHz. Note that there are superior SMA connectors that allow low loss operation up to about 60GHz. Therefore, small diameter coax must be used and hence higher intrinsic losses per unit length than bigger diameter coax. Waveguides are much lower loss.

Perhaps the simplest system for a microwave detector is shown in figure (2).

The back detector requires no supply and a 100 microamp meter with a series resistor is all that is required to indicate level just as it was in [1]. For more sensitivity, a DC amplifier increases usefulness or simply connect it to an oscilloscope e.g., with portable in mind a small one is especially useful and cheap [5].

For the log amplifier version, the supply of ~ +5V can be obtained from a small battery and so the antenna, amplifier and meter / portable DC oscilloscope can be made portable and convenient.

For the higher microwave frequencies, it is convenient to use the dominant mode TE10 waveguide and mount a detector diode in the centre of the E field. In figure (6) it is vertically polarised across the narrow wall of the rectangular waveguide. This is like figure (5) the only difference being that a radiating antenna (monopole) is used in the middle of the waveguide a quarter wave away from a short circuit instead of a diode detector as in figure (6a, b, c). Waveguides act as bandpass filters. Hence the need to use a different size for each allocated amateur band. The surface smoothness of waveguide becomes important as well as conductivity and low loss components do need to be electroformed. One of the reasons parts are often expensive.

Table (1)
Some of the possible combinations versus frequency range and bandwidth, based on practicality, physical size, and cost considerations.

Frequency Range GHz	Log. Periodic	Vivaldi	Dual Polar Vivaldi	Waveguide TE 10	Logarithmic amplifier	RF amplifier	Back Diode	Schottky diode
0.1 -1	X				X	X	X	X
1 - 4	X	X	X		X	X	X	X
2 - 8	X	X	X		X	X	X	X
2 -10	X	X	X			X	X	X
10 -40		X		X		X	X	
20 - 70		X		X			X	

Figure (1)
This consists of a printed log periodic antenna, in this case covering ~ 900 - 2.5 GHz fed to a screened 8 GHz wideband logarithmic amplifier [3] with a sensitivity of -70 dBm. It represents a very broadband and sensitive detector which produces a linear output voltage proportional to the input RF power level. The screening of the log amp is particularly important since it is sensitive from 1MHz upward. A passband filter in front of the log amp is often a necessary inclusion, note that the antenna itself acts as a poor broadband bandpass filter.

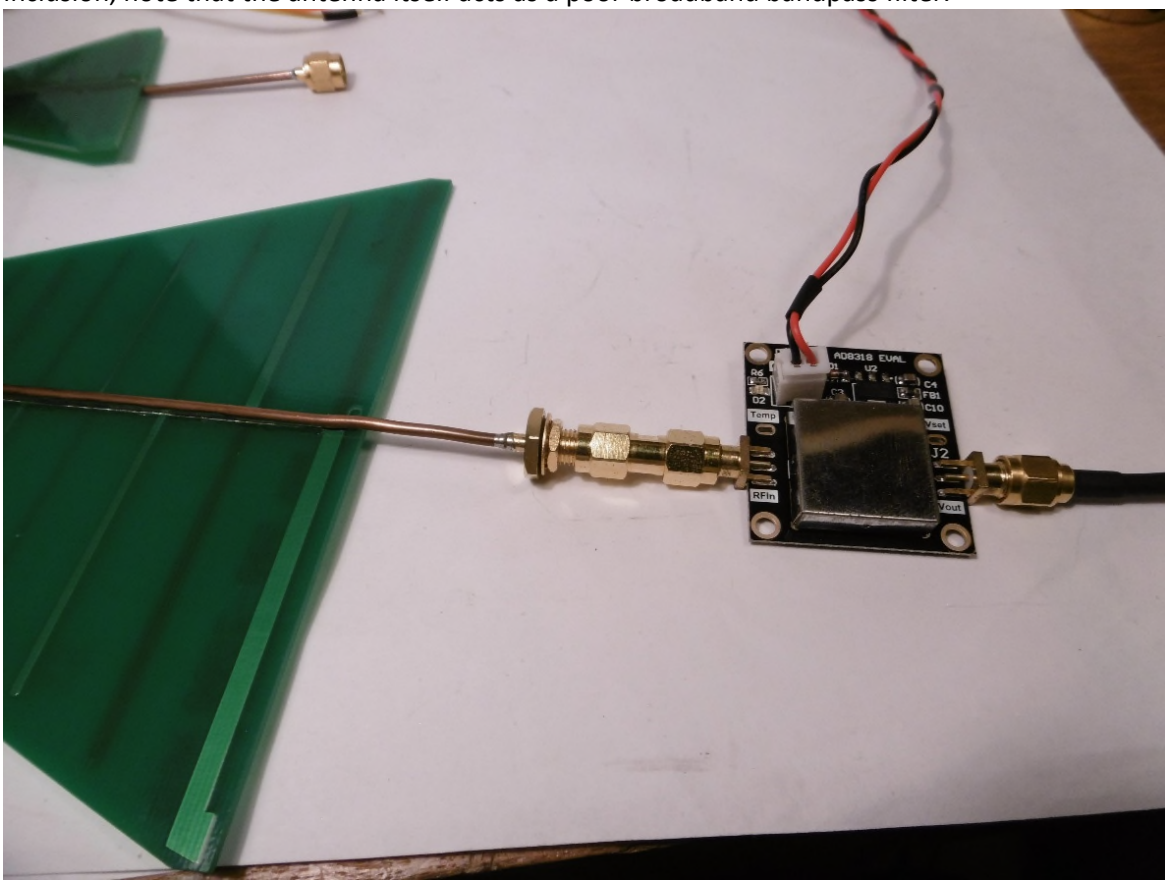


Figure (2) Screened and unscreened broadband log amplifiers.

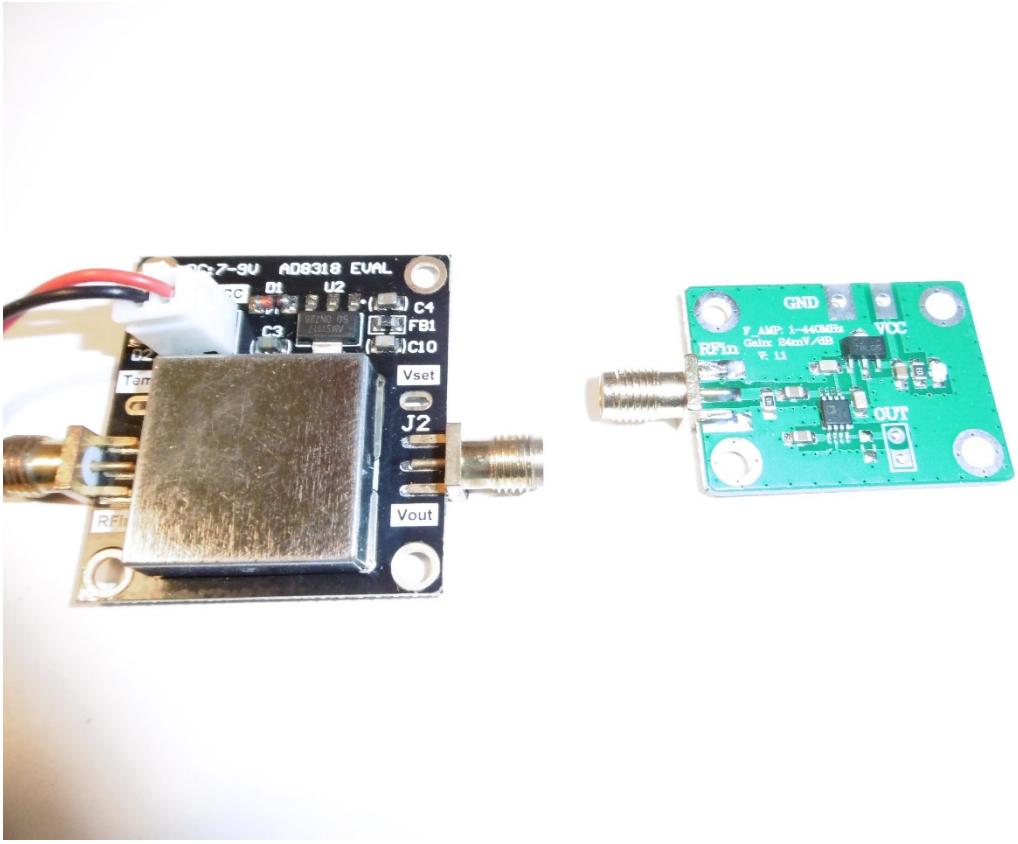


Figure (3)
Shows a Back-detector diode with a Vivaldi wideband antenna sensitive over 2-10GHz. This is less sensitive than the arrangement in figure (1) but nevertheless sensitive down to -50dBm and an impressive in bandwidth up to ~40 GHz.

Figure (4)
This shows a 2 -10GHz log periodic antenna coaxially fed to my HP spectrum analyser (1970) receiver or elsewhere and is rotatable in polarisation via a coaxial rotary joint and a plastic support structure to avoid reflections. (For EMC investigations). As with the other antennas shown, this is polarised and, in the picture, horizontally polarised. In the background is a broadband circularly polarised helix I use for general messing about testing antennas etc. I once dipped the end in molten bee's wax, why? Er ~ 2.6, that is another story. Anyway, I discovered bees wax is not RF lossy.

Figure (5a) Back detector and ~10 – 30 GHz Vivaldi. Note I have used an inline attenuator in this instance. Back diodes can be expensive. This one is obsolete I discovered [3] but not blown.

Figure (5b) Back diode with SMA connectors

Figure (6a) A 10GHz test transmitter. An open-ended coax to waveguide adapter provides about 6dBi gain as an antenna, it is relatively narrow band and vertically polarised in the photograph. I used it to test my detectors, 'spraying' my shack with low power (10mW) coherent X band from a crystal-controlled oscillator. The standing waves generated as one walk about are very educationally rich to listen to as doppler shifted standing waves. 10 GHz gets everywhere. Another test source is the leakage around a 2.45GHz microwave oven. The detectors presented here are far too sensitive for that application.

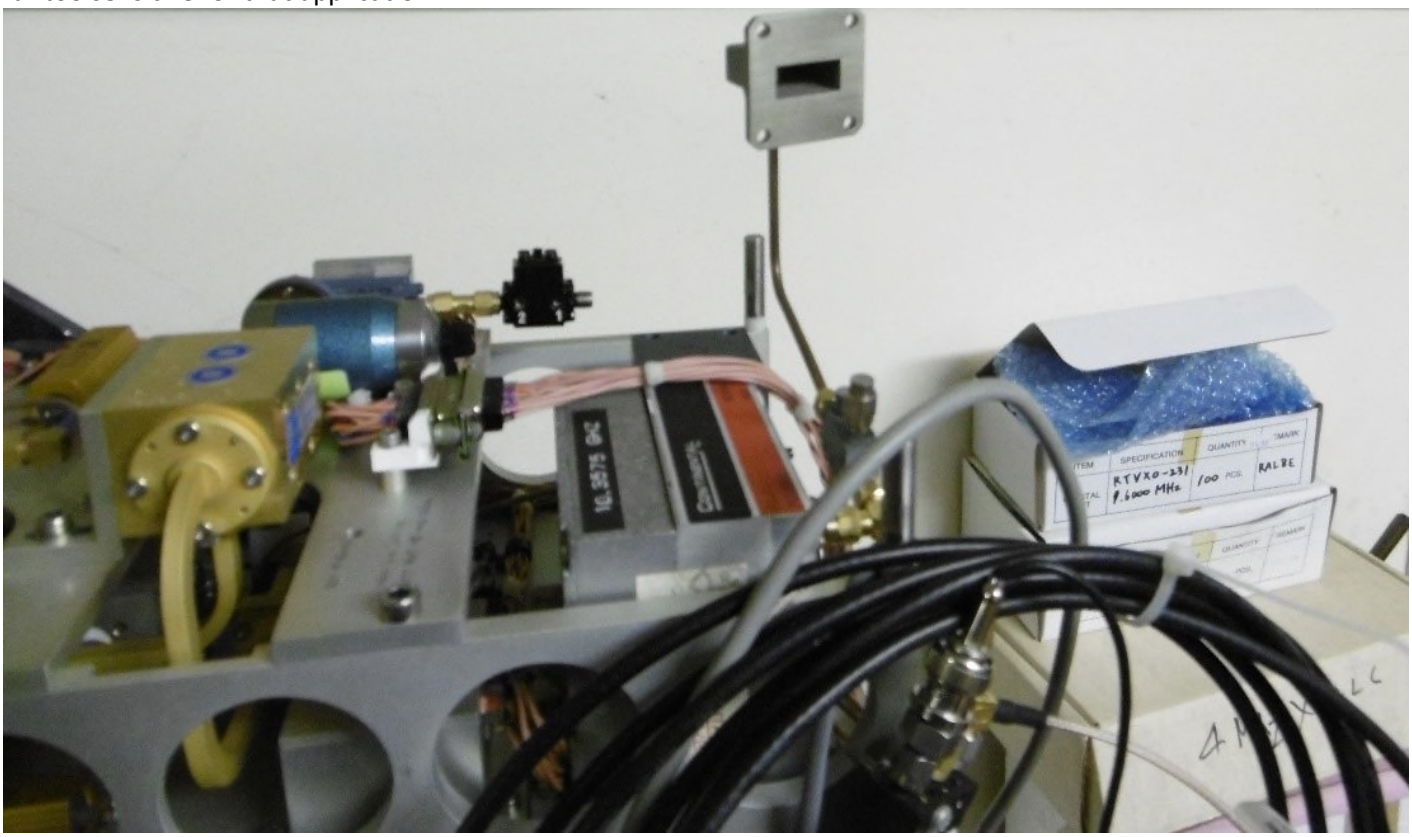


Figure (6b)
This is a Q band (40GHz) TE10 mode waveguide (7 x 3.5mm) with a diode detector and a variable short circuit to maximise sensitivity (by adjusting resonance) over the bandwidth of the waveguide. Ridge waveguide allows a broader bandwidth but for amateur band allocations is not a worthwhile complication.

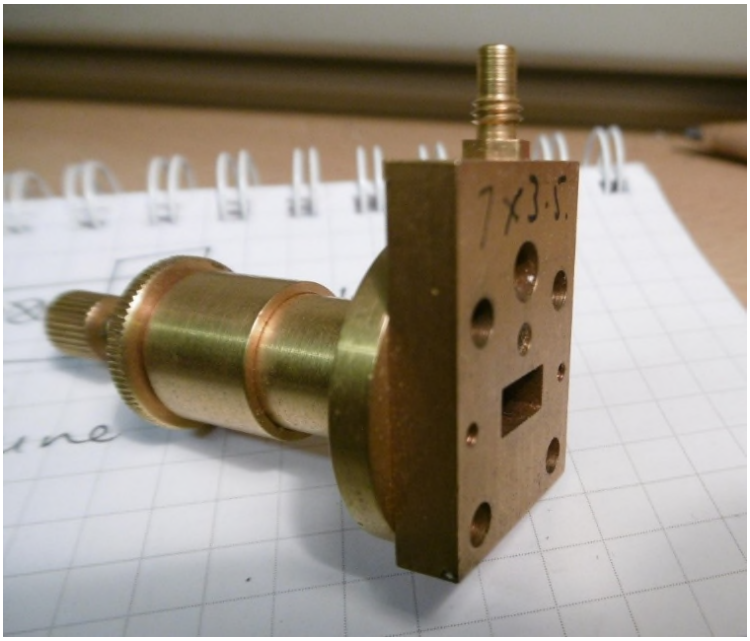
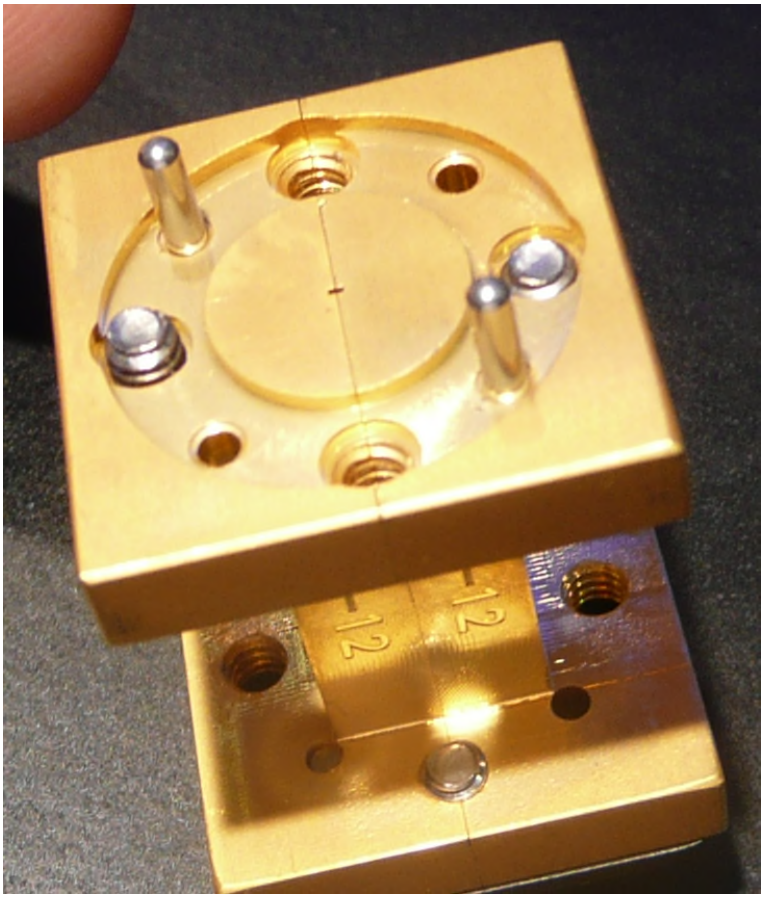
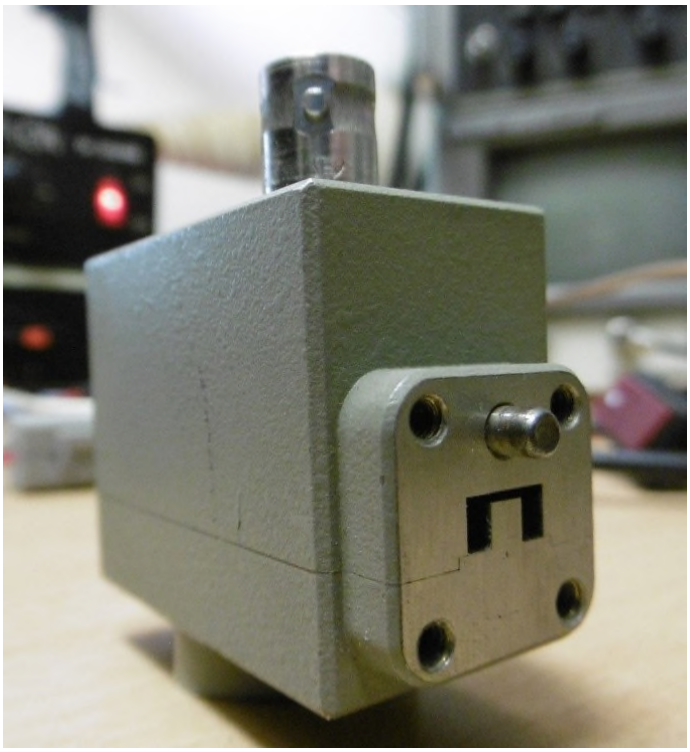


Figure (6c) We can also do the same thing using TE10 mode waveguide at 300GHz. Here the need to electroform the surface to reduce loss is essential



Broadband Harmonic mixer I use with my ancient HP SA.
Instead of DC detection a diode can be used for RF mixing and this can be harmonic mixing. HP use that method in the broadband (40GHz) mixer illustrated and used in conjunction with the LO produced by a spectrum analyser shown in figure (6b) In this case to obtain broad banding a TE10 ridge waveguide is employed working from 12 – 40GHz. A simple TE10 mode waveguide, say waveguide 16, only operates over 8 – 12GHz. A disadvantage of mixer type detectors is that exposure to radiated power levels must be restricted, which in the case of a waveguide means using a waveguide attenuator. I often employ a piece of graphite loaded wood rather than a proper TE10 vane attenuator.



References

[1] 'Sensitive VHF – UHF field strength meter'.

[2] www.macom.com for example. High performance broadband amplifiers are readily and cheaply available with a bit of searching on the web or even eBay.

[3] For example https://www.microphase.com/wp-content/uploads/2015/03/Limitersand-Detectors.pdf

[4] 8 GHz log amp https://www.analog.com/media/en/technical-documentation/datasheets/AD8318.pdf

[5] DSO – digital storage oscilloscope, review, PW Sept 2020.

[6] Antennas for sale, e.g. http://www.wa5vjb.com/

Simple Microwave detectors

Ian Dilworth G3WRT

Simple microwave detectors are often especially useful to test antennas and feeder systems. Unlike spectrum analysers they can be produced cheaply and of good performance.

Apart from a suitable antenna the sensitivity depends on the diode and the DC bias applied, see figure (2). The comparator can be an analogue circuit [1] or an N bit A- D convertor as shown in figure (1).

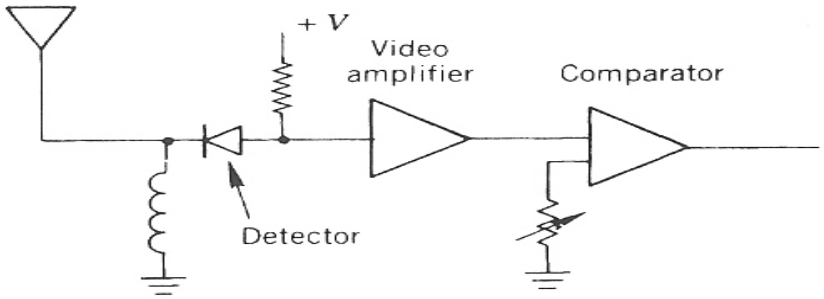


Fig 1

A (crystal) diode rectifier is not a particularly good receiver because its sensitivity is relatively poor, typically ~ –60dBm. The best available type for wideband operation is the Schottky diode, both point & planar construction. The metal to semiconductor junction relies on majority carrier conduction there are no minority carrier storage effects (as there are in PN diodes) & the intrinsic low parasitics of construction allow high frequencies to be achieved up to 1000GHz = 1THz. So, the instantaneous bandwidth is the best available.

A wideband amplifier in front of the diode detector will help sensitivity. This is easily employed & can significantly help improve basic sensitivity. However, bandwidth, dynamic range & blocking characteristics then strongly come into the design criteria. The bandwidth of the antenna employed (typically maximum bandwidths of 10% for simple antennas and much more for Vivaldi types) will also significantly contribute to the systems design & characteristics of the receiver. A typical diode sensitivity versus bias is shown below in figure (2) where bias current less than 5 microamps seriously reduces sensitivity.

Fig 2

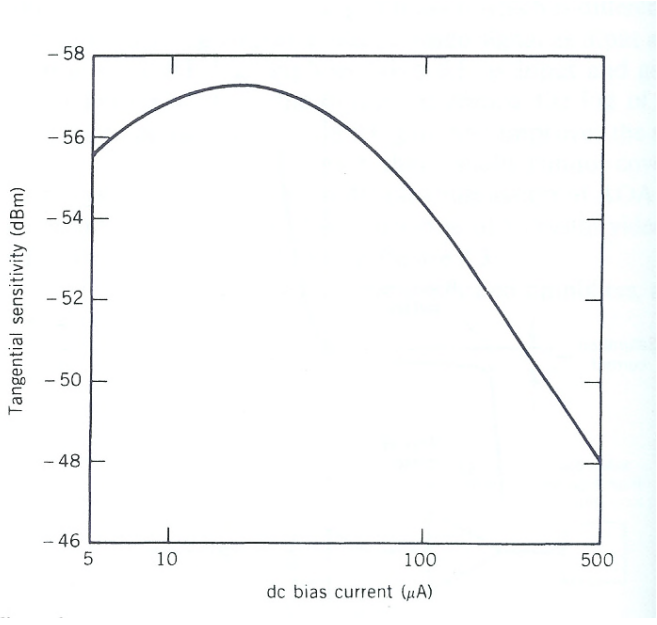
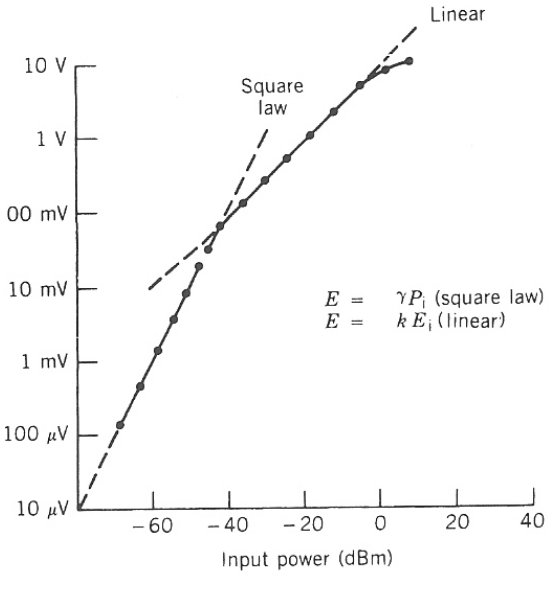


Fig 3

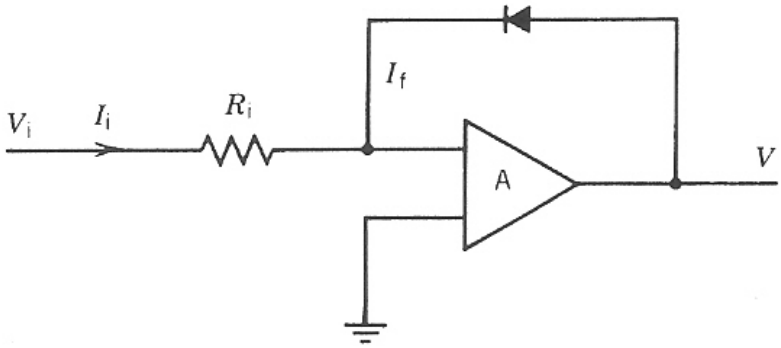


At low levels, the diode square law characteristics apply, and the response becomes linear at higher levels (just like the AGC in my FT897!) as illustrated in figure (3).

A Logarithmic amplifier is convenient to provide a linear output versus input power as shown in figure (4). I bought some recently via Banggood (see the web) at exceptionally attractive prices. A disadvantage is that it does require a power supply. The 10GHz bandwidth version shown in figure (5) represents the state of the art for cheaply available hardware and antennas [2]. The screen is essential since any unscreened circuit acts as an antenna – any hole, in the screen, significantly couples or leaks. I have found this arrangement very practically useful using a portable DSO [1] as a voltage level monitor. Also shown in Figure (5b) is the typical linear input signal power versus output voltage. Of course, such a large bandwidth results in an increased noise floor directly proportional to log(bandwidth) e.g., for 8GHz = -75dBm as indicated in the table below.

Bandwidth Hz	Noise power dBW	dBm
1.0	-204.0	-174.0
10.0	-194.0	-164.0
100.0	-184.0	-154.0
1000.0	-174.0	-144.0
10000.0	-164.0	-134.0
MHz		
1.0	-144.0	-114.0
10.0	-134.0	-104.0
100.0	-124.0	-94.0
1000.0	-114.0	-84.0
10000.0	-104.0	-74.0
GHz		
1.0	-114.0	-84.0
5.0	-107.0	-77.0
8.0	-104.9	-74.9
20.0	-101.0	-71.0
30.0	-99.2	-69.2
40.0	-98.0	-68.0
50.0	-97.0	-67.0
60.0	-96.2	-66.2
70.0	-95.5	-65.5
100.0	-94.0	-64.0

Fig 4 Basic logarithmic amplifier arrangement.



This is thermal noise (kTB) in addition to the noise generated in the amplifier. So, for example, at room temperature if that amplifier has a noise figure of 5dB then the noise floor is increased by that amount. So, to lower the noise floor and improve the sensitivity it is often necessary to use a low pass or bandpass filter if the antenna is not, itself, an effective bandpass filter.

Fig 5 10GHz Vivaldi antenna fed screened broadband log amp detector. Shown horizontally polarised.

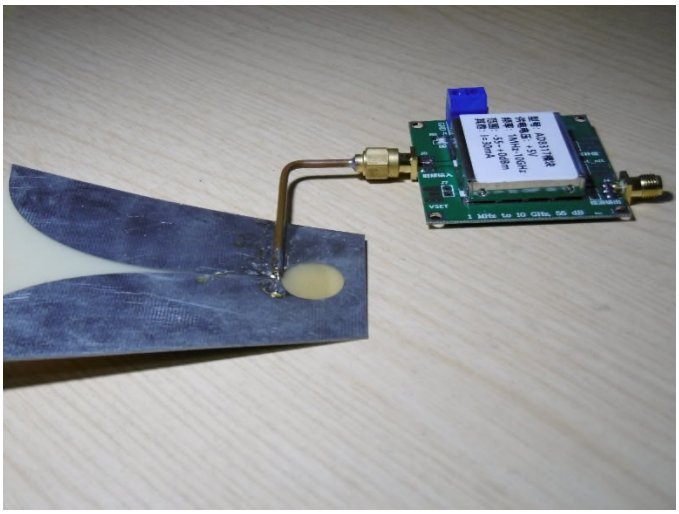
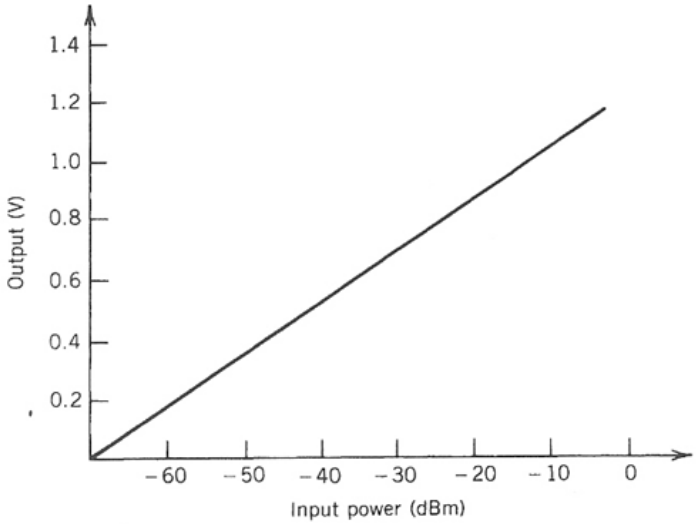


Fig 5b Typical linear voltage versus power characteristics.



Pulsed systems

Portable spectrum analysers have largely replaced simple diode detectors. These systems have few problems 'seeing' & recognising pulsed systems.

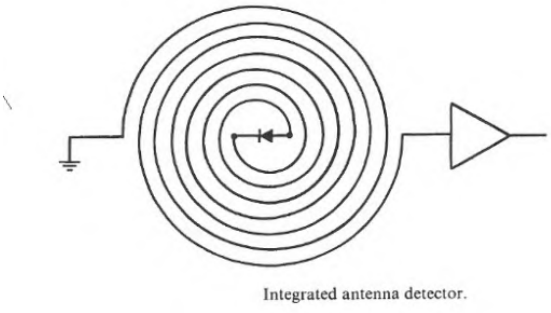
Pulsed systems require special considerations for simple detectors. The detector requires to be peak detecting especially if a ballistic movement meter is to be used.

Wideband antennas

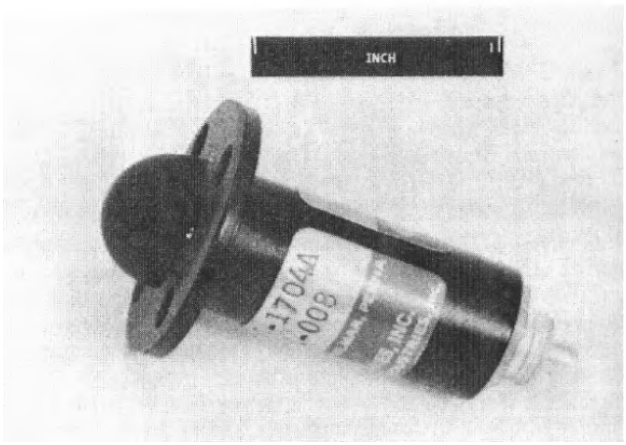
Wideband antennas are problematic. Vivaldi types are particularly useful in this respect. Two Vivaldi antennas, as illustrated in figure (6) provide a convenient dual polarisation antenna with two separate feeders.

Fig.6 Dual polarised wideband antenna

Fig.7 One, low sensitivity, wideband system is illustrated using a special 'multimode' spiral antenna.



Integrated antenna detector.



[1] DSO – digital storage oscilloscope, review, Practical Wireless, August 2020, pp56.
[2] Antennas for sale, e.g., http://www.wa5vjb.com/

Scatterpoint activity report

Activity News: March 2021


By John G4BAO

Please send your activity news to: **scatterpoint@microwavers.org**

From John G4BAO

The work on the GB3PV 1.3GHz ATV repeater for the Cambridgeshire Repeater Group continues. Sadly, the Lime SDR I had turned out to be faulty, but Andrew Back from MyriadRF kindly donated a surplus one to the group so we're back on course. I now have the phase 1 mods done and it's repeating with the existing logic and video tray, so just some tidying up before we return it to service. Phase 2 will be to connect the TX and RX digitally.
I continue to get superb support from BATC's Dave Crump, G8GKQ on the Ryde and Portsdown software that's in use in the repeater.

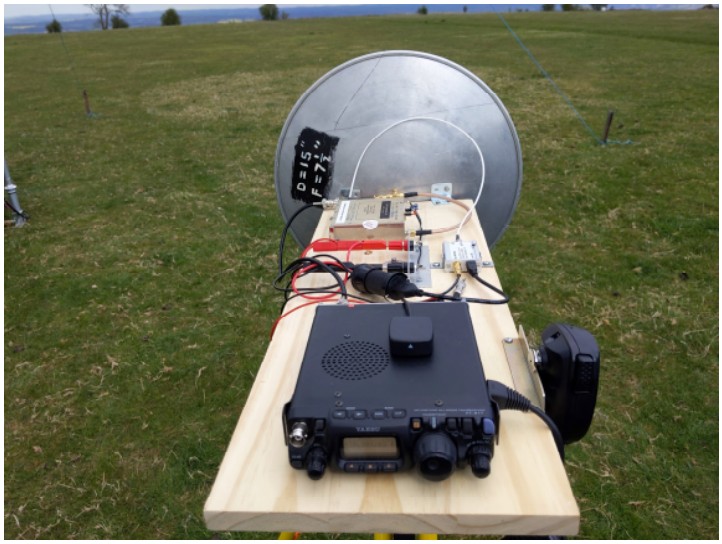
Activity-wise I'm almost ready to put my re-jigged GHz system back up on the second mast, having removed 1.3GHz from the other mast to accommodate a larger 144MHz Yagi. It's the ultimate squeeze, with a 44el Tonna and masthead preamp, plus a 60cm dish giving me 1.3/3.4/10 and 24GHz on one gable end pole. To lighten the load, I've dispensed with the elevation rotator on the dish and this has allowed me to gain another metre in height.
For 3.4 and 1.3GHz I'm using just two feeders, TX and RX, with a pair of relays and a resistive splitter/combiner respectively. I have a masthead preamp and offset twin- dipole feed in the dish for 3.4GHz and a dual band feed for 10 and 24GHz. 10GHz is coax fed from the loft with a masthead preamp and I'm living with the 3dB feeder loss on TX as I still get me around 7 watts at the feed. The 24GHz transverter and 10GHz preamp are slung under the dish feed arm.

From Dave G1EHF

Here's a report of some first QSO attempts on 47 GHz:
"As I was out taking contributing 3.4 GHz to the M0HNA/P May Low Band activity on Walbury Hill (IO91GI44), I took the opportunity to take a rudimentary 47 GHz system to try out. I knew that John G8ACE/P was heading to the site near Stockbridge (IO91GC68) with his kit and Pete G1DFL/P going to Applepie Hill (IO91JM22) with a loan system from Roger G8CUB. Noel G8GTZ/P also joined us on Walbury with his newly completed 47 GHz that includes a DB6NT amplifier.

My system simply comprised a homebrew mixer with an HSMS 8202 anti-parallel diode pair inside 4 mm tube. The tube is part of a homebrew splash-plate feed to a 38cm dish. The mixer is driven by +11 dBm at a GPS locked frequency of 11664.5 MHz, which with a x4 multiplication factor provides a 430 MHz IF product (avoiding the 432 MHz IF of Noel's system!). The IF is simply extracted/inserted via a tee on the drive signal and an LPF. After some efforts to align antennas I was very pleased to be able to work both John at 25.9 km and Pete at 24.3 km using this basic set up, which has whetted my appetite to refine this approach. Thanks to Noel for having his sensitive system alongside to help with finding signals (of course we worked too) and John for his advice and nice bright Phlatlight to help with alignment."

73, Dave G1EHF



From Ralph G4ALY

I still am not QRV above 1.3GHz as the weather up to now has prevented me from working on the mast, and I have some doubt as to whether I can fix my 10GHz system.

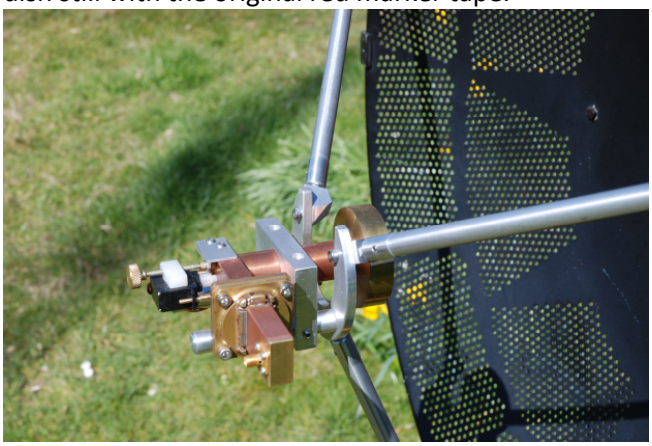
I received the info from Jean-Claude F5BUU about their plans for a DX expedition to TK Corsica, Those with good stations may have the Possibility of working them. They run a good efficient DX station and excellent power so hopefully some may be able to work them. – *see info*

From Peter GM8GAX

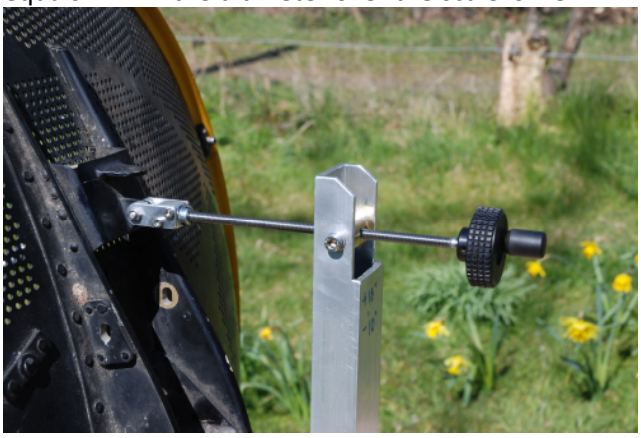
Here is a description and four photographs of my activities this month.
I have built up a dish, tripod mount etc for 10G in readiness for Neil's (G4DBN) F6BVA transverter kit.
Having thought for far too long about returning to the microwave bands, Neil's (G4DBN) announcement at the beginning of the year that he would lead a group purchase for the F6BVA 3cm transverter board made me jump on board. Such was the interest that it is now a full-blown kit of parts, including the DF9NB local oscillator board. Whilst waiting for Neil's plan to come together I dug out my box of microwave gear, put together in the balmy days of WBFM and Gunn diodes, small horns and a 30 inch dish. I remember travelling from Preston to the Leicester rally in 1978, car sharing with Ray G3NKL, with the sole intent of bagging one of these dishes that Ray had heard about. I had also acquired a surveyor's tripod, rescued from the skip as a lab was decommissioned several years ago and have added other items at opportune times. I needed a turntable, a suitable mount for the dish and support arms for the feed (the dish originally had a rear feed) and a SMA to waveguide transition (Paul's W1GHZ paper on the subject was most helpful). With nothing suitable in my box, it was time to make something.
After ordering various pieces of aluminium stock from a 5" dia. x 1" billet to a length of 12mm sq. bar then spending time with a sketch pad, measuring equipment and calculator I retired to the Mechanical workshop, actually my garage which hasn't hosted a car since 1987. I began making swarf and I am pleased to say that I now have a portable antenna system that can be rapidly deployed in a few minutes.
I made the dish feed three years ago, from an article by G3WDG in Dubus – An RPOL feed for 10GHz.
With phase 1 of this journey now complete I have started phase 2 - complete my DDK
Iceni 70cm transverter, put together a sequencer, attenuators, relays and other bits
to enable my KX3 to drive this transverter. Phase 3 – I await Neil's kit of parts with my hot iron and, absolutely essential these days, my magnifying headset at the ready.

The dish, these were rejects from a MoD supplier, you can see the lug that is out of position on the rim of the dish still with the original red marker tape.

The Turntable and main dish mount. The scale in degrees is a stick-on metric measuring scale, 1 degree equals 1mm - the diameter over the scale is 4.511”



The RPOL feed rotates the pick-up loop with a RC model aircraft servo controlled by a remote pot. The small adjustment knob moves the whole pick up



Dish top mount with fine elevation adjustment. I can move the dish from -10 degrees to plus 18 degrees by way of a 6mm threaded rod.

From Barry G8AGN

On 1 May 2021, Barry G8AGN/P and Bob G4APV extended their 30THz DX to 50m, this being the maximum length available in Bob's garden. Reports both ways were 599 using QRSS3. The Tx hot plate source was running at 300W input with a measured plate temperature of 265C. The weather was variable, being at times hot and sunny and at other times overcast and cooler. The wind was much lighter than during the previous contact over 42m. When the sun shone, great difficulty in receiving consistent signals was experienced due to an elevated sensor temperature and radiation from nearby objects. Once the sky became overcast, the temperature dropped and solid copy both ways was achieved. Because of the slow transmission rate of QRSS3 (1 dot every 3 seconds), signals were again recorded using pencil and paper. See the complete article in this magazine.

Contests

March 2021 Lowband Contest Results

Entry levels dropped from last year, but back then portable operation was still allowed which upped activity levels a little.

John G4ZTR takes the leading position on 1.3GHz in this year's event by some distance, with David M0GHZ in the runner up slot. John G3SQQ claims the low power award, a repeat of his performance last year. Best DX was the aircraft scatter contact between G4ZTR and DJ3AK in JO52 at 661km. Conditions were unexceptional.

There were no entries on 2300MHz this time.

2320 MHz saw a relatively low entry level, the winner was David M0GHZ and runner up John G3SQQ. Best DX was between M0GHZ and F8DLS in JN19 at 479km, with G4LDR's contact with ON4CJQ/P not too far behind at 455km.

John G4ZTR had another large winning margin on 3.4GHz, with Neil G4LDR as runner up. G4ZTR also had the best DX contact with G4CBW in IO83 at 249km.

Certificates go to all those mentioned.

This year's events are now being tabulated using the results website software, so there is no overall category this time. Downloadable contest certificates are now available to print out, thanks to assistance from Frank M0AEU with the design work.

Thanks go to Dave G0DJA for his checklog.

John G3XDY
UKuG Contest Manager

March Low Band Contest 2021
1.3GHz

Pos	Callsign	Loc	QSOS	Score	Norm	ODX	Kms	Power
1	G4ZTR	JO01KW	31	8,692	1,000	DJ3AK	661	300
2	M0GHZ	IO81VK	24	4,878	561	ON4CJQ/P	497	400
3	G3TCU	IO91QE	19	3,636	418	GI6ATZ	506	250
4	G3TCT	IO81QC	18	3,242	372	PE1EWR	431	150
5	G4LDR	IO91EC	14	2,929	336	ON4CJQ/P	455	200
6	G3SQQ	IO93JC	19	2,671	307	G3TCT	243	10
7	G4BXD	IO82UJ	15	2,342	269	PA0JCA	482	100
8	G8AIM	IO92FH	10	860	98	G4ZTR	171	100
9	G0LGS	IO81WV	8	828	95	G3XDY	230	10
10	GM8IEM	IO78HF	1	428	49	GI6ATZ	428	180
11	G1JPV	IO83PG	7	365	41	G3SQQ	102	10
12	G6GVI	IO83SN	6	339	39	G3SQQ	98	20

Many thanks for check logs received from G0DJA

March Low Band Contest 2021
2.32GHz

Pos	Callsign	Loc	QSOS	Score	Norm	ODX	Kms	Power
1	M0GHZ	IO81VK	9	1,312	1,000	F8DLS	479	100
2	G3SQQ	IO93JC	6	955	727	G4LDR	225	22
3	G4LDR	IO91EC	4	809	616	ON4CJQ/P	455	30
4	G8AIM	IO92FH	5	367	279	M0GHZ	108	100

March Low Band Contest 2021
3.4GHz

Pos	Callsign	Loc	QSOS	Score	Norm	ODX	Kms	Power
1	G4ZTR	JO01KW	7	1,073	1,000	G4CBW	249	20
2	G4LDR	IO91EC	4	568	529	G4ZTR	197	15
3	G4BXD	IO82UJ	3	417	388	G4ZTR	222	20
4	G8AIM	IO92FH	4	394	367	G4ZTR	171	30
5	G4BAO	JO02CG	2	241	224	G4LDR	182	75

April 2021 Lowband Contest Results

Easing of lockdown restrictions meant that some portable operation was able to take place, with M0HNA/P using three separate stations in different vehicles to keep within the regulations. Activity levels were good, with a high number of entrants on all bands, and more activity on the 2300MHz segment.

On 1296MHz M0HNA/P were in the lead using Phil G3TCU's gear. In second place was Anthony G7LRQ, and John G4ZTR in third. The best DX of 620km was worked by Neil G4LDR who was amongst several entrants that contacted Jon GM4JTJ. John G3SQQ was the leading low power station.

2300MHz had three entries, with M0HNA/P as winner, and G8CUL as runner up. Best DX honours were shared with M0HNA/P working G4ODA, and G8CUL working G3XDY, both at 174km.

John G4ZTR is in the lead on 2320MHz, with Neil G4BRK as runner up. John G3SQQ won the low power section. GM4JTJ provided the best DX for the leading stations, with pick of the crop being the QSO with G7LRQ at 570km.

On 3400MHz John G4ZTR takes the honours, with M0HNA/P as runner up. Nick G0HIK/P was the leading and only low power entrant. Tony G4CBW provided the best DX for the two leading stations, at 249km for G4ZTR.

1296MHz M0HNA/P, G7LRQ, G3SQQ
2300MHz M0HNA/P, G8CUL
2320MHz G4ZTR, G4BRK, G3SQQ
3400MHz G4ZTR, M0HNA/P, G0HIK/P

Thanks go to Keith G4ODA for his checklogs.

John G3XDY
UKuG Contest Manager

April 2021 Low Band 1.3 GHz

Pos	Callsign	Loc	QSOS	Score	Norm	ODX	Kms	Power
1	M0HNA/P	IO91RF	42	8,857	1,000	GM4JTJ	617	400
2	G7LRQ	IO91TQ	36	7,220	815	GM4JTJ	570	250
3	G4ZTR	JO01KW	32	6,870	775	GM4JTJ	569	300
4	G8CUL	IO91JO	32	5,764	650	PA0WMX	497	100
5	G3TCT	IO81QC	25	5,005	565	GM4JTJ	617	150
6	GI6ATZ	IO74AJ	12	4,952	559	G3XDY	543	150
7	G4BRK	IO91HP	27	4,531	511	GM4JTJ	562	400
8	G3SQQ	IO93JC	22	3,556	401	GI6ATZ	344	10
9	GM4BYF	IO85JV	9	3,362	379	M0HNA/P	548	100
10	G0HIK/P	IO84KD	15	2,581	291	M0HNA/P	369	10
11	G3YJR	IO93FJ	16	2,472	279	GI6ATZ	310	8
12	G3UKV	IO82RR	19	2,385	269	M0HNA/P	216	80
13	GD1MIP	IO74TI	8	2,384	269	M0HNA/P	433	99
14	M0GHZ	IO81VK	18	2,329	262	G3XDY	246	250
15	G4LDR	IO91EC	13	2,168	244	GM4JTJ	620	200
16	GW4JQP	IO71KR	10	2,010	226	G3XDY	437	20
17	G1PPA/P	IO93RI	13	1,830	206	M0GHZ	242	10
18	PE1EWR	JO11SL	6	1,673	188	G3TCT	431	90
19	G4GFI	IO91VH	12	1,638	184	M0AFJ/P	372	100
20	G4BXD	IO82UJ	13	1,535	173	G4ZTR	222	100
21	G4KZY	IO91EE	13	1,325	149	G3XDY	219	10
22	G8AIM	IO92FH	12	1,263	142	G0HIK/P	230	100
23	M0AFJ/P	IO70JF	6	1,224	138	M0HNA/P	347	25
24	GM8IEM	IO78HF	2	673	75	GI6ATZ	428	180
25	G6GVI	IO83SN	4	483	54	G7LRQ	252	20
26	GM4DIJ	IO85IW	3	122	13	GM4JTJ	92	20
27	G8EOP	IO93EQ	2	104	11	G3SQQ	71	10

April 2021 Low Band 2.30 GHz

Pos	Callsign	Loc	QSOS	Score	Norm	ODX	Kms	Power
1	M0HNA/P	IO91RF	3	390	1,000	G4ODA	174	60
2	G8CUL	IO91JO	3	387	992	G3XDY	174	50
3	G3YJR	IO93FJ	1	118	302	G4ODA	118	25

April 2021 Low Band 2.32 GHz

Pos	Callsign	Loc	QSOS	Score	Norm	ODX	Kms	Power
1	G4ZTR	JO01KW	15	2,829	1,000	GM4JTJ	569	50
2	G4BRK	IO91HP	16	2,622	926	GM4JTJ	562	120
3	G7LRQ	IO91TQ	16	2,540	897	GM4JTJ	570	100
4	G8CUL	IO91JO	16	2,261	799	GM4JTJ	568	50

5	M0HNA/P	IO91RF	16	2,193	775	G8XVJ	284	60
6	M0GHZ	IO81VK	15	2,105	744	G3XDY	246	100
7	G3SQQ	IO93JC	13	1,927	681	G4LDR	225	10
8	G3UKV	IO82RR	9	1,186	419	M0HNA/P	216	55
9	G4LDR	IO91EC	8	1,001	353	G3SQQ	225	30
10	G8AIM	IO92FH	9	836	295	G4ZTR	171	100
11	G0HIK/P	IO84KD	3	431	152	G4ODA	251	2
12	G3YJR	IO93FJ	4	254	89	G4ODA	118	25
13	G8EOP	IO93EQ	3	176	62	G8XVJ	72	50
14	PE1EWR	JO11SL	1	174	61	G3XDY	174	25
15	GM8IEM	IO78HF	1	129	45	GM0ONN/P	129	80
16	GM4DIJ	IO85IW	3	122	43	GM4JTJ	92	20
17	GM4BYF	IO85JV	2	101	35	GM4JTJ	94	100

April 2021 Low Band 2.32 GHz

Pos	Callsign	Loc	QSOS	Score	Norm	ODX	Kms	Power
1	G4ZTR	JO01KW	15	2,829	1,000	GM4JTJ	569	50
2	G4BRK	IO91HP	16	2,622	926	GM4JTJ	562	120
3	G7LRQ	IO91TQ	16	2,540	897	GM4JTJ	570	100
4	G8CUL	IO91JO	16	2,261	799	GM4JTJ	568	50
5	M0HNA/P	IO91RF	16	2,193	775	G8XVJ	284	60
6	M0GHZ	IO81VK	15	2,105	744	G3XDY	246	100
7	G3SQQ	IO93JC	13	1,927	681	G4LDR	225	10
8	G3UKV	IO82RR	9	1,186	419	M0HNA/P	216	55
9	G4LDR	IO91EC	8	1,001	353	G3SQQ	225	30
10	G8AIM	IO92FH	9	836	295	G4ZTR	171	100
11	G0HIK/P	IO84KD	3	431	152	G4ODA	251	2
12	G3YJR	IO93FJ	4	254	89	G4ODA	118	25
13	G8EOP	IO93EQ	3	176	62	G8XVJ	72	50
14	PE1EWR	JO11SL	1	174	61	G3XDY	174	25
15	GM8IEM	IO78HF	1	129	45	GM0ONN/P	129	80
16	GM4DIJ	IO85IW	3	122	43	GM4JTJ	92	20
17	GM4BYF	IO85JV	2	101	35	GM4JTJ	94	100

Low Band Championship Table

After two events, best three count to the overall score.

1.3 GHz

Pos	Call	07/03/2021	11/04/2021	Total
1	G4ZTR	1,000	775	1,775
2	M0HNA/P		1,000	1,000
3	G3TCT	372	565	937
4	M0GHZ	561	262	823
5	G7LRQ		815	815
6	G3SQQ	307	401	708

7	G8CUL		650	650
8	G4LDR	336	244	580
9	GI6ATZ		559	559
10	G4BRK		511	511
11	G4BXD	269	173	442
12	G3TCU	418		418
13	GM4BYF		379	379
14	G0HIK/P		291	291
15	G3YJR		279	279
16	GD1MIP		269	269
16	G3UKV		269	269
18	G8AIM	98	142	240
19	GW4JQP		226	226
20	G1PPA/P		206	206
21	PE1EWR		188	188
22	G4GFI		184	184
23	G4KZY		149	149
24	M0AFJ/P		138	138
25	GM8IEM	49	75	124
26	G0LGS	95		95
27	G6GVI	39	54	93
28	G1JPV	41		41
29	GM4DIJ		13	13
30	G8EOP		11	11

2.30 GHz

Pos	Call	07/03/2021	11/04/2021	Total
1	M0HNA/P	0	1,000	1,000
2	G8CUL	0	992	992
3	G3YJR	0	302	302

2.32 GHz

Pos	Call	07/03/2021	11/04/2021	Total
1	M0GHZ	1,000	744	1,744
2	G3SQQ	727	681	1,408
3	G4ZTR		1,000	1,000
4	G4LDR	616	353	969
5	G4BRK		926	926
6	G7LRQ		897	897
7	G8CUL		799	799
8	M0HNA/P		775	775
9	G8AIM	279	295	574
10	G3UKV		419	419
11	G0HIK/P		152	152
12	G3YJR		89	89
13	G8EOP		62	62
14	PE1EWR		61	61
15	GM8IEM		45	45
16	GM4DIJ		43	43
17	GM4BYF		35	35

3.4 GHz

Pos	Call	07/03/2021	11/04/2021	Total
1	G4ZTR	1,000	1,000	2,000
2	G4LDR	529	481	1,010
3	M0HNA/P		826	826
4	M0GHZ		780	780
5	G4BXD	388	386	774
6	G8AIM	367	375	742
7	G8CUL		606	606
8	G3UKV		562	562
9	G4BRK		518	518
10	G1PPA/P		515	515
11	G1DFL/P		230	230
12	G4BAO	224		224
13	G0HIK/P		211	211

UKuG MICROWAVE CONTEST CALENDAR 2021

Dates, 2021	Time UTC	Contest name	Certificates
2-May	0800 - 1400	3rd Low band 1.3/2.3/3.4GHz	F, P,L
16-May	0900 – 1700	1st 24GHz Contest	
16-May	0900 – 1700	1st 47GHz Contest	
16-May	0900 – 1700	1st 76GHz Contest	
30-May	0600 - 1800	1st 5.7GHz Contest	F, P,L
30-May	0600 - 1800	1st 10GHz Contest	F, P,L
6-Jun	1000 - 1600	4th Low band 1.3/2.3/3.4GHz	F, P,L
20-Jun	0900 - 1700	122-248 GHz	
27-Jun	0600 - 1800	2nd 5.7GHz Contest	F, P,L
27-Jun	0600 - 1800	2nd 10GHz Contest	F, P,L
11-Jul	0900 – 1700	2nd 24GHz Contest	
11-Jul	0900 – 1700	2nd 47GHz Contest	
11-Jul	0900 – 1700	2nd 76GHz Contest	
25 -Jul	0600 - 1800	3rd 5.7GHz Contest	F, P,L
25 -Jul	0600 - 1800	3rd 10GHz Contest	F, P,L
29-Aug	0600 - 1800	4th 5.7GHz Contest	F, P,L
29-Aug	0600 - 1800	4th 10GHz Contest	F, P,L
12-Sep	0900 - 1700	3rd 24GHz Contest & 24GHz Trophy	
12-Sep	0900 - 1700	3rd 47GHz Contest	
12-Sep	0900 – 1700	3rd 76GHz Contest	
26 -Sep	0600 - 1800	5th 5.7GHz Contest	F, P,L
26 -Sep	0600 - 1800	5th 10GHz Contest	F, P,L
10-Oct	0900 - 1700	122-248 GHz	
17 -Oct	0900 - 1700	4th 24GHz Contest	
17 -Oct	0900 - 1700	4th 47GHz Contest	
17 -Oct	0900 – 1700	4th 76GHz Contest	
15 -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)	

2021 Contest Calendar

May	*432MHz & up*	*Arranged by RSGB*	*1 to 2-May*	*1400 - 1400*	RSGB Contest
May	*10GHz Trophy*	*Arranged by RSGB*	*2-May*	*0800 - 1400*	Sunday, to coincide with IARU
May	REF/DUBUS EME 1.2GHz	*Arranged by REF/DUBUS*	15 to 16-May	0000 - 2400	REF/DUBUS EME 1.2GHz
May	24GHz/47GHz/76GHz		16-May	0900-1700	
May	1.3GHz Activity Contest	*Arranged by RSGB*	18-May	1900 - 2130	RSGB Contest
May	2.3GHz+ Activity Contest	*Arranged by RSGB*	25-May	1830 - 2130	RSGB Contest
May	5.7GHz/10GHz	F, P,L	30-May	0600-1800	
Jun	Low band 1.3/2.3/3.4GHz 4	F, P,L	6-Jun	1000 - 1600	Aligned with some Eu events
Jun	REF/DUBUS EME 5.7GHz	*Arranged by REF/DUBUS*	12 to 13-Jun	0000 - 2400	REF/DUBUS EME 5.7GHz
Jun	1.3GHz Activity Contest	*Arranged by RSGB*	15-Jun	1900 - 2130	RSGB Contest
Jun	122-248GHz		20-Jun	0900-1700	
Jun	2.3GHz+ Activity Contest	*Arranged by RSGB*	22-Jun	1830 - 2130	RSGB Contest
Jun	5.7GHz/10GHz	F, P,L	27-Jun	0600-1800	
Jul	VHF NFD (1.3GHz)	*Arranged by RSGB*	3-Jul to 4-Jul	1400 - 1400	RSGB Contest
Jul	24GHz/47GHz/76GHz		11-Jul	0900-1700	
Jul	1.3GHz Activity Contest	*Arranged by RSGB*	20-Jul	1900 - 2130	RSGB Contest
Jul	5.7GHz/10GHz	F, P,L	25-Jul	0600-1800	
Jul	2.3GHz+ Activity Contest	*Arranged by RSGB*	27-Jul	1830 - 2130	RSGB Contest
Aug	1.3GHz Activity Contest	*Arranged by RSGB*	17-Aug	1900 - 2130	RSGB Contest
Aug	2.3GHz+ Activity Contest	*Arranged by RSGB*	24-Aug	1830 - 2130	RSGB Contest
Aug	5.7GHz/10GHz	F, P,L	29-Aug	0600-1800	
Sep	24GHz/47GHz/76GHz		12-Sep	0900-1700	
Sep	1.3GHz Activity Contest	*Arranged by RSGB*	21-Sep	1900 - 2130	RSGB Contest
Sep	5.7GHz/10GHz	F, P,L	26-Sep	0600-1800	
Sep	2.3GHz+ Activity Contest	*Arranged by RSGB*	28-Sep	1830 - 2130	RSGB Contest
Oct	*1.3 & 2.3GHz Trophies*	*Arranged by RSGB*	*3-Oct*	*1400 - 2200*	RSGB Contest
Oct	*432MHz & up*	*Arranged by RSGB*	*3 to 4-Oct*	*1400 - 1400*	IARU/RSGB Contest
Oct	122-248GHz		10-Oct	0900-1700	
Oct	24GHz/47GHz/76GHz		17-Oct	0900-1700	

Oct	1.3GHz Activity Contest	*Arranged by RSGB*	19-Oct	1900 - 2130	RSGB Contest
Oct	ARRL Microwave EME	*Arranged by ARRL*	23 to 24-Oct	0000 - 2359	ARRL EME 2.3GHz & Up
Oct	2.3GHz+ Activity Contest	*Arranged by RSGB*	26-Oct	1830 - 2130	RSGB Contest
Nov	Low band 1.3/2.3/3.4GHz 5	F, P,L	14-Nov	1000 - 1400	
Nov	1.3GHz Activity Contest	*Arranged by RSGB*	16-Nov	2000 - 2230	RSGB Contest
Nov	ARRL EME 50-1296MHz	*Arranged by ARRL*	20 to 21-Nov	0000 - 2359	ARRL EME Contest
Nov	2.3GHz+ Activity Contest	*Arranged by RSGB*	23-Nov	1930 - 2230	RSGB Contest
Dec	ARRL EME 50-1296MHz	*Arranged by ARRL*	18 to 19-Dec	0000 - 2359	ARRL EME Contest
Dec	1.3GHz Activity Contest	*Arranged by RSGB*	21-Dec	2000 - 2230	RSGB Contest

EVENTS 2021

Events may be subject to cancellation due to the Coronavirus
For latest information consult https://microwavers.org

2021

April 24	RSGB AGM - online	www.rsgb/agm
May 21-23	Hamvention, Dayton - cancelled	www.hamvention.org
June 25-27	Ham Radio, Friedrichshafen - online	www.hamradio-friedrichshafen.de
August 19-22	EME 2021, Prague – rescheduled from 2020	www.eme2020.cz
August 21-22	BATV Convention, Midland Air Museum, Coventry	www.batc.org.uk
September 24-25	National Hamfest	www.nationalhamfest.org.uk
October 10-15	European Microwave Week, London, Excel	www.eumweek.com
October 17-21	IARU-R1 Conference, Part-2 Novi Sad	conf.iaru-r1.org

2022

May 20-22	Hamvention, Dayton	www.hamvention.org
June 24-26	Ham Radio, Friedrichshafen	www.hamradio-friedrichshafen.de
September 25-30	European Microwave Week, London, Excel	www.eumweek.com

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

73 Martyn Vincent G3UKV