



An Amateur Radio publication for the Microwave enthusiast

MICROWAVE NEWSLETTER

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FROM THE EDITOR

This issue, appearing a little later than usual, is the last one before the New Year. As usual at this time, it covers a two month period so the next issue will be published around the middle of January, 2002 and will contain the annual Microwave Contest Supplement.

Well, it's almost Christmas and well into the winter microwave construction "season". What project have **you** completed by now? None? Well you'd better get cracking because the Spring contests 2002 will be upon us before you can say Santa Claus! If you haven't already written to Santa for a good present this time, why not add a few microwave "goodies" to your list ... a 2.4GHz WDG040 downconverter maybe ... a DB6NT kit for a band you haven't got ... a decent Oven Controlled Xtal Oscillator (G8ACE has a nice kit). Above all you need a new log book so that you can fill it with a record of all the microwave activity that you are going to generate in 2002!

I **am** being serious here folks. The level of activity on our microwave bands has shown a marked decrease over the past twelve months. The Monday Microwave Activity night has only the resident "wardens" still on ... what has happened to the rest of you? The summer contests and activity days saw a 30-40% fall in participation. The winter 23/13cm RSGB Cumulatives have been very poorly supported so far this year. Treasure our microwave bands ...

REMEMBER .. USE 'EM OR LOSE 'EM!

2001 – NOVEMBER / DECEMBER



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**MANY THANKS TO ALL OUR
CONTRIBUTORS**

News, views and articles for this newsletter are always welcome. Please send them to G3PHO (preferably by email) to the address shown below. The closing date is the Friday at the end of the first full week of the month if you want your material to be published in the next issue.



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**SUBSCRIPTION ENQUIRIES SHOULD BE
SENT TO RSGB HEADQUARTERS AT THE
ADDRESS SHOWN AT THE TOP OF THIS
PAGE AND NOT TO THE EDITOR ..**

Antenna test results from the Adastral Park Microwave Roundtable ~ 10/11 November 2001

Measurements were made on a large number of 10GHz and 2.4GHz antennas at the 2001 Adastral Park (Martlesham) Microwave Roundtable. The measurements provided absolute gain figures, referenced to a known gain antenna. The results of these measurements are presented below.

The reference antenna was a Sivers Lab wideband reference horn for 10GHz. The gain is given as 16.5dBi. Because we couldn't obtain the use of the reference horn used at the Amsat Colloquium for the 2.4GHz range, all measurements on 2.4GHz were made with reference to a G3RUH patch antenna previously measured at the Colloquium against the linear reference horn. The gain of the patch is 8.5dBic.

10GHz			
Callsign	Antenna measured	Results (dBi)	Comments
G3PHO	60cm Amstrad dish with W21MU feed and extension (wide section length = 64mm)	35.2	G3PHO version of dual mode horn with WG16/22mm pipe transition
G3PHO	As above without extension (= 35mm)	34.2	
G8PSF	80cm Amstrad dish with W5LUA dual band feed	30.5	10GHz + 5.7GHz feed (sma)
G3LYP	BSB 35cm dish with feed based on LNB feedhorn	29.5	
G3LYP	PW dish with penny feed	29.5	After adjustment
G3LYP	Horn	19.8	20 dB commercial design
G8LSD	80cm prime focus with penny feed	34.5	
G3JMB	60cm prime focus with penny feed	27.5	
G3JMB	60cm prime focus with dipole and reflector	27.5	
G3JMB	PW dish with penny feed	29.0	
G3NYK	Horn	21.5	Commercial horn with large aperture
G3NYK	Elliptical Horn with Fresnel lens	19.5	Commercial
G3NYK	Small horn	15.8	Commercial
G4DDK	Andrew 60cm prime focus with shepherd crook and horn feed	33.1	The popular commercial surplus dish

G4DDK	RSGB '20dBi' horn from the Microwave manual	20.0	Calculates at 19.9dB at 10368MHz
G4ZXO	42cm dish with dipole and reflector feed	30.0	
G7JTT	Channelmaster minidish with tubular horn feed	30.3	One of the popular digital Sky dishes. About 42cm wide
G8GTZ	Grundig Sky minidish with G3PHO/W21MU feed	30.3 !	Also one of the popular digital Sky dishes. About 42cm wide
G7JTT	16 slot (8 each side) waveguide	12.3	Typical beacon antenna
G3XGK	Horn	19.0	Commercial
G3XGK	25 inch prime focus with penny feed	32.0	Home brew fibreglass design
2.4GHz			
Callsign	Antenna measured	Gain (dBicircular)	Comments
G3LYP	16 turn helix (G3RUH design)	15.0	All 2.4GHz antennas measured were corrected for a known 2dB error on the range. Because of other problems with reflections on the 2.4GHz range that we weren't able to solve completely, gain measurements should be regarded as for information only. The likely error may still be as high as 1dB.
G3LYP	60cm Amstrad dish with G3RUH short helix feed	23.0	
G3IRQ	90cm Amstrad dish with G3RUH short helix feed	23.5	
G8TTU	Sandpiper 20 turn helix	15.0	
G6GXX	WA5VJB PCB log periodic 2 to 6GHz (linear polarisation)	5.0dBi	
G4GFI	G3RUH dish and feed	21.0	

My thanks to all those who brought antennas to measure and to the management at BT Adastral Park who lent the use of their ground for our range! I would also like to thank G3LQR for the loan of his Marconi test source and indicator unit used at 10GHz.

Details of the measurement system have previously been covered in issue 1 of Scatterpoint, the magazine of the UK Microwave Group (WWW.MICROWAVERS.ORG) and a full write up of the actual system employed at Adastral Park will appear in the issue 6 of Scatterpoint.

73 from Sam, G4DDK, for the Martlesham Radio Society, G4MRS

FOR SALE

John Tye

[g4byv@woodgate73.freemove.co.uk

has 2 beacon keyers, G4FRE types,
complete with eproms. He would like £10

WANTED

Waveguide switch for 10GHz (in WG16), 12V operated. 4 port. Good price paid for the right item! **Please contact John, W3HMS via email at: W3HMS@aol.com** or phone to the newsletter editor with details.

FOR SALE:

14GHz AMPLIFIERS

12 volt operation
0.5mW input for >3 watts output.
14 - 15 GHz

2 available first come first served !
Price £65.00 each

Contact Adrian, G4UVZ on 01823 421751
Or email at:

adrian.whatmore@tst.nhs.uk

PRECISION 24GHz WAVEGUIDE SWITCHES MADE TO ORDER



From Stan Hilinski, KA1ZE
(Stanka1ze@aol.com)

I'd like to inform you of a project that I have taken on at my business. My next band up is 24GHz. I couldn't scrounge enough stuff to become operational so I decided to build commercial quality WR-42 (WG20) components at my aerospace manufacturing company. There were many replies to a posting I made on the WA1MBA reflector so I decided to send the following information to you folk in the UK as well:

My company has started manufacturing a short run of WR-42, 12 volt, 4 port transfer relays. Many of you attending the NEWS meeting or the Mid-Atlantic Conference have seen the 1st switch. I am also making WR-42 90 degree "H" and "E" bends. If anyone would like a photo of the switch or 90 degree bends I will be able to send an email attachment. My current model is the "E" style. The switch mechanism can be made smaller this way. I can do it either way if anyone is interested. Highlights of the switch are the following:

1. All CNC machining. Horizontal machining center (3D) as well as CNC lathe.
2. 12 volt solenoid actuation. The switch draws no current when the cycle has completed. The 12 volt power then becomes available at 5 amps to power an amplifier.
3. Two precision ball bearing assemblies are used. This makes the switch very easy to flip positions.
4. If I get orders for 10 or more I will plate the aluminum details.
5. All clearances and sizes to have tolerance of .001 inches
6. The price each, for a run of 10, will be \$500. Delivery 6 weeks

Please contact me by email or via the Newsletter editor

SOME (MORE) NOTES ON THE ADRET 5104

By Mike Scott G3LYP

About two years ago I bought an Adret which, on testing, I found to be faulty, giving output on about 125MHz which was not controlled by the switches on the front panel. I then obtained a second unit which was working, and by swapping plug in modules between the two units, I found that the faulty module in the first unit was the output module designated 6887. At the time I had a quick look inside the module and noticed that some of the PCB was a bit brown, indicating that it had been quite hot. As the second unit was working I decided to keep the first one as spares.

Recently, I wanted to make a signal source for testing AO-40 antennas and receivers using the Adret and a modified DDK004 LO source. Unfortunately when I switched on the Adret, I found that it was no longer working, giving output on about 74MHz which, like the first unit, was not affected by the switches. As I had previously established that all the modules in the first unit, with the exception of the output, were working, I thought that there was a good chance that the fault in the second unit would be in a different module. Not so! The output module was again the faulty one.

The Adret is a very complex device and after going through the manual several times, I still don't fully understand it. However, there was no choice but to have a go!

One of the problems in servicing the units is that, because of the modular design, most of the circuitry is in metal boxes plugged into a motherboard and it is virtually impossible to work on the modules while they are in situ. The manual refers to extender cards which are used to make the modules accessible while remaining connected to the motherboard.

The 6887 output module has only an eleven pin connector and not all of the pins are used (some of the modules have 35 pin connectors) so in my case it was possible to solder wires to the mother board and to the PCB and so get access to the module on the bench while still connected to the main unit. There are also a number of SMB connectors on the top of most of the modules and by using a commercial "T" adapter or fabricating one from bits of coax and SMB connectors, it is possible to monitor the signals at many points in the unit. The manual recommends the use of a spectrum analyser and 100MHz oscilloscope, neither of which were available to me. Nevertheless, with a frequency counter, a multimeter, and a 20MHz 'scope, it was possible to do quite a lot. The Manual contains several fault trees, but working through these confirmed what I already knew, that the fault(s) were in the output modules.

These modules contain three basic circuits. The first is an oscillator which covers 90 – 120MHz, and which provides the output of the Adret after buffering and amplification. The second circuit is a virtually identical oscillator covering 87 – 117MHz which is fed back to the 1MHz Spectrum module (6883). Both oscillators also provide output, via separate buffers to a mixer (an MCL device similar in appearance and pinout to the SBL-1). The 3MHz IF from the mixer is passed through a multistage filter to the 11 pin connector and via the motherboard to the Phase/Frequency module (6886). There are also a number of other bits of circuitry associated with the control of the two oscillators.

On the first of the faulty modules, a check of the signals at the various SMB connectors indicated that there was no output from the 87 – 117MHz oscillator sub-unit. A check with a multimeter revealed that the 2N5179 base-emitter junction in the buffer between the oscillator and the output socket was defective. This transistor was replaced with a BFY90 which is listed as an equivalent. After replacing the module in the motherboard, the unit started to work normally.

Unfortunately, tracing the fault in the second unit took considerably longer. I established that both oscillators were working, although the output of the 90 – 120MHz oscillator was at about 75MHz. The 87 – 117MHz oscillator appeared to be working normally and was controlled by the switches on the front panel. On checking carefully, I discovered that it worked up to 114MHz but, on switching the 1MHz switch to the next step (115MHz), the frequency fell back to 107MHz. On checking the DC level on the "Approach" line to this oscillator I found that the voltage at Test point 1 (All the five test points on this module were connected to colour coded wires and brought to the top of the module to enable monitoring while the module was in situ) rose steadily to a similar level as on the now working module (approx. 8v) but on switching to the next step, the voltage fell back to about 6.8v. On the good module the level rose to 8.8v. The "Approach" line is fed via a 4.7k resistor (R9) to a group of four transistors (Q8 – Q11) which compare the "Approach" signals from both oscillators and feed a signal back to the Phase/Frequency Comparator. On the working module the voltage at Test point 3 (the bases of Q8/Q9) was only marginally lower than at TP1 and ranged from 3v to 8.8v depending on the switch settings. On the faulty unit the voltage at TP3 was very low (less than 1v) on all switch settings. The immediate conclusion was that one of the transistors in this group was faulty. Unfortunately, checking with a multimeter suggested that all were in good condition, but as the voltage from the meter was only about 3v, I decided to replace all four. Luckily, all were common types and easily replaced. This was a good decision, because on re-installing the module, all was well and the output ranged from 90 – 120MHz with all the switches functioning as expected.

Having a working unit for comparison was a great help, and it would be useful if the Microwave Committee could keep a record of Adret owners who might be willing to help owners of faulty units.

As a final note, not having the correct mains lead, I replaced the mains connector on the back of both my units with IEC connectors fitted with integral filters.

Thanks to Paul, GOHNW, for a helpful telephone discussion.

BEACON NEWS from: Andy, G4JNT [ACTALBOT@dstl.gov.uk] 31 October 2001 13:54

Over the next few weeks I may have to switch off my personal beacon on Portsdown Hill from time to time due to the potential to cause QRM with some official experiments on this site. Ironically, I'm in charge of these - at least it won't be a third party requesting turn off !

The beacon can probably be switched on for evenings and weekends (no overtime here) and if anyone finds the signal is off, phone me at home to see if its just a case of forgetting to turn back on.

Hopefully the new site and installation for GB3SCX is not too far off now, in

Noise Source and Calibration

.... By David Wrigley, G6GXK

The news that an Agilent Noise Measuring Equipment was to be provided at RAL 2001 in April this year was an opportunity too good to miss. Noise measurement was a thing I had not been involved in and, having by chance just completed a homebrew SLNA preamp for my 10GHz transverter, now seemed as good a time to start as any. A quick check of the info around soon revealed the excellent articles by Paul Wade (W1GHZ) previously published in the Microwave Newsletter for November and December 1997 but available online (www.qsl.net/n1bwt/noise99.pdf - Ref. 1). It was decided to build three noise heads using the most likely devices available in the UK and see how well they performed on the day.

Basics

The noise head works by using the random noise produced by the avalanche breakdown region of a semiconductor junction. In order to achieve this, a reverse voltage has to be applied to the junction. Clearly the current under these conditions needs to be limited or the junction will be destroyed, and this limiting is achieved by means a series resistor.

However the precise current which gives the best noise output at any frequency or the flattest output across all frequencies has to be determined by experiment and there is usually a potentiometer provided for that purpose. In choosing a suitable device, the base-emitter junction of a microwave npn device seems to work well although there are advantages in reliability and stability in using a specially designed diode such as those produced by Noisecom. These latter devices have been designed to minimise flutter effects and instability over time.

History

With only two weeks to go to the RAL event and other priorities competing, it was decided to buy a selection of likely devices from Farnell and check these out prior to the proper tests at RAL. It was also decided to build a skeleton assembly type source from Paul Wade's article and also two samples of the later Teflon PCB type using some available Rogers material.

All of them worked but, as luck would have it, the skeleton type proved to have to flattest frequency response from 28MHz to 10GHz. The results are shown below. I must add at this point that these and many other measurements were taken with Ian (G3SEK) operating the controls for much of the day at RAL and it is to Ian and Dave Stockton of Agilent we owe our thanks for the operation and provision of such a great piece of test gear.

Frequency MHz	Noise Level dB
28	-7.2
50	-6.8
70	-6.7
144	-6.6
432	-6.6
1296	-6.5
2320	-7.0
3450	-9.0
10368	-6.1

The noise head had an external 15dB SMA attenuator attached to it throughout the tests and I figured that it would best to keep that attenuator with it.

Construction:

You will almost certainly require some sort of magnifier to assemble this head. I use a headband binocular type, which is "hands free" and doesn't require the watchmakers ability to screw up the eye to hold an eyeglass. You will need a fairly powerful soldering iron – I used a 40 Watt temperature controlled Weller with a pointed tip. The construction is based on a two hole, female SMA chassis mounting connector. The procedure is as follows:

1. Screw a male connector onto the female connector so that it can be gripped in a vice rear side up.
2. As close as possible to the Teflon form a pool of solder and then drop a 1pF SMD capacitor in it –end on. It will stay that way because of the way the solder surface pulls it. I then tilted the cap towards the central conductor of the connector, because I wanted to make sure that the transistor would fit. Take care only to try to move the capacitor whilst the solder is molten otherwise it will fracture near the termination. – (Been there – done that)
3. About a chip length back from the 1pF, mount a 1nF capacitor vertically in another pool of solder. This will be near the fixing hole of the connector – so make sure that it is to one side of it to keep the hole clear.
4. With tweezers carefully mount a 47R (marked 470) SMD resistor across the top of the two capacitors.
5. With tweezers carefully mount the base emitter junction of the BFS520 transistor between the top of the 1pF and the central conductor. If you have done that right, the markings of the transistor will be uppermost and with the collector away from you, the base (LHS) will be connected to the central conductor.
6. Solder a wire near the other side of the Teflon as a ground connection, but don't thread it through the hole first – unless you are using Teflon insulated wire.
7. Thread the ground wire through the hole and thread another wire for the supply current through both holes as shown in the photos. This wire can then be soldered to the top of the 1nF where it connects to the 47R. Threading the wires in this way will minimise the possibility of the wire breaking off or worse, pulling off the termination of a component.

And that's it, apart from putting a wire ended 1K fixed resistor (limits the max current) and a 10K pot in series with the live lead, and also not forgetting to add a BNC connector on the end of the wire, for the supply voltage.

Supply voltage differences

The supply voltage to the head when driven from the Agilent Equipment is 28 Volts. When I built my PANFI (Precision Automatic Noise Figure Indicator) I decided to use 15 Volts, because this was the voltage used by the higher frequency heads manufactured by Noisecom – and one never knows I might be lucky enough to come across one.

So I had a noise head calibrated at 28 Volts, with an external series resistor of $0.98K + 7.9K$ (total resistance $0.98K + 7.9K + 47R + 50R = 8.977K$, near enough to 9K total) which now needed to have the series resistor changed to enable it to work on 15 Volts. In order to work this out I needed to check the Avalanche breakdown voltage at the current at which it was calibrated. So I supplied 28 Volts and measured it – this turned out to be 5.28 Volts (measured across the diode), and a calculated current of 2.53mA.

The total series resistance required for 15 Volts at 2.53mA is 3.84K. The 47R series resistor and the 50R attenuator input resistance need to be subtracted from this to give the required external resistor 3.74K. A combination of a 3.9K and a 180K in parallel was used to replace the external resistor and potentiometer. This had the advantage of no potentiometer and therefore no accidental way of it changing.

Conclusions

Well, some checks have been made using the head and a home made PANFI (based on ref.1) and now, for the first time, I can see the significant difference in noise figure between a straight FT290 and one with a Mutek front end. There was also found to be a slight benefit in using the Mutek front end in preference to the pre-amp in the 100W PA.

I then decided to try the Noise head at 10GHz. Here unfortunately, it demonstrated that my attempts at designing my own SLNA for 10GHz was less successful than the original G3WDG transverter, which has a NF of between 2 and 3dB. I did try tabbing the lines to improve the matching but try as I could, I could not bring it to the 1dB NF which I believed was possible. I therefore removed the preamp in order to carry out further tests and most probably I will rebuild it later this year.

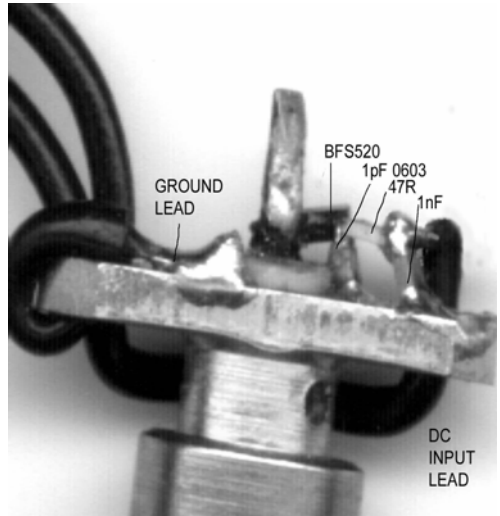
This noise figure measuring system has certainly proved to be a most useful tool and has removed some of guesswork when tuning up receivers. At least I can be confident that I have got my rigs to the best they can do at the time and have revealed the weaknesses which can be the focus of future improvement.

Ref. 1 - Noise Measurement and Generation by Paul Wade (W1GHZ) previously published in the Microwave Newsletter but now available online (www.qsi.net/n1bwt/noise99.pdf).

Ref. 2 - Simple PANFI design – “an Alignment aid” in the Microwave Handbook, RSGB, 1993 reprint, Vol.2 page 10.37 to 10.42. It should be noted that some modifications were made to this.

1. The Loudspeaker was omitted from the final build. The LS was found to be acting as a microphone and inputting sound into the system – this gave spurious readings. Therefore an 8 ohm resistor was used instead.
2. The 100uA meter was provided with 8 and 16dB scales and appropriate changes to the series resistors were made.
3. A mains powered +/-17V supply was used to give a regulated 15V for the Head and regulated +/- 12V for the rest of the circuit.

© David Wrigley 2001-07-31



WHY SURE DEODORANT SPRAY CAN PREVENT WETNESS IN YOUR G3PHO 10GHz FEED

(from an original idea from Dave G6KIE and forwarded with his kind permission)

STEP 1. Buy a can of SURE deodorant spray and use as directed (it will make you smell nice anyway!)

STEP 2 Place plastic cap over your G3PHO 10GHz feed . It's a perfect fit , it keep the rain out and prevents any wetness in your feed horn !!

73 steve cooke GIMPW

G3WDG040 S-band downconverter

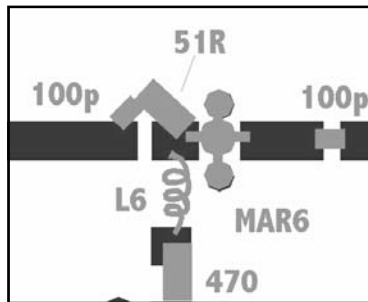
WDG040 Update Bulletin 1 - High Gain "MAR-6"

We have recently come across one example of a WDG040 which had unusually high conversion gain (47dB instead of the usual 39-40dB). This is not a problem in itself, but did lead to lid-induced oscillation problems, requiring the LNA screen described in the Appendix to the construction notes to be fitted. The converter was then stable, but still had the very high gain. [Lid-induced oscillations can manifest themselves as either a large increase or decrease in noise when the lid is fitted, usually accompanied by a very large drop in overall sensitivity].

We have traced the high gain to the MAR-6 device used in the RF amplifier section. After contacting the manufacturer (Mini-Circuits), it seems that the die used in the MAR-6 has been replaced with a different type, which has a lot more gain at 2.4GHz than the previous one. They did this without telling any or all of their customers (thanks Mini-Circuits!). The new MAR-6 have (difficult to read) laser markings on the top of the package, while the previous ones with normal gain have white paint markings. Thus the two types are easily distinguishable.

As noted above, the fitting of the extra screen over the LNA (as well as the one over the filter, which should be fitted as standard) should cure the problem. The screen needs to be soldered to the sidewalls of the box in several places per the photo in the writeup. Insufficient soldering points may render the screen ineffective. We have found a simple way of reducing the extra gain back to nominal, should this be required. The "fix" is to add a series 51 ohm 1206 chip resistor to the output of the MAR-6 in the RF amplifier section. By orienting the 100pF and 51R resistors at an angle, the pcb does not need to be modified. The arrangement is shown in the diagram shown on the right.

If you would like to carry out this modification and need the parts, please send us a SAE and we will include a 51R resistor and spare 100pF capacitor.



Screens in WDG040 / MAR-6 and MSA06

Someone asked if the "51 ohm resistor" means that the small screen over the filter will not then be required. **The little screen over the filter is still a requirement.**

The extra screen over the LNA section noted at the end of the booklet hopefully will then not be needed to be prepared to fit it if the unit is difficult about working with the lid on! If you need metal for this, again please forward an SAE and we'll send you some.

We are awaiting stocks of MSA06 from Agilent. These use the same internal chip that was used in the OLD Minicircuits MAR-6. In fact, Agilent (previously HP, previously AvanteK) have always made the die inside the MSA06/MAR6 until recently, when Minicircuits started putting their own die inside the MAR-6.

If anyone has not yet used their MAR-6, we would be happy to swap them for MSA06.

73 from Charlie ... (charles.suckling@ntlworld.com)

Editor's note... A full article on this excellent downconverter appeared in the September issue of the Newsletter this year. If you are not yet on AO40, building this this would be a very good start! Kits are obtainable direct from G3WDG at £85 for RSGB members and £100 for non-members. For prices outside the UK please enquire. Either email him at the above address or telephone him at: ++ 44 (0)1933 411446



USING SURPLUS “DIGI DISHES” AT 10GHz ... by John McCarthy, G7JTT

So far, using the G4JNT beacon, as a source, I get about an S1 signal with a 18" penny feed dish and a S5 with the digi dish shown in the photo on the left. I tried it with a G3PHO type dual mode feed but only got about an S1, the same as the penny feed. I then tried the 22mm open feed and got about S3 then tried various LNB feed horns and found one that got me an S5.

The feed is off an old, unbranded LNB . It is 63mm diameter at the open end down to 22mm copper at the other end. There are 4 rings inside, with an average depth of about 6mm. The length is about 37mm and the copper feed enters about 5mm into the horn to give an SWR of about 1.4:1. As to the position of the feed, it is 330mm from the top of the dish to the centre of the horn's face and 230mm from the bottom. It is pointed to the centre of the dish.



The gain seems to be in the order of about 4 "S" points above an 18" penny feed dish and about 5 "S" points above a 20db horn. It's also much sharper than either the penny feed or horn, about 36 degrees from no signal to no signal. There seems to be at least two types of dish, I have one type

(Channel Master) and my friend Noel, G8GTX, has the other (made by Grundig), so, over the next few months, we will see how they differ. As to shape, the dishes differ quite a bit ... mine had the LNB with a swept back elliptical horn where as Noel's is a straight forward round feed.

At the Adastral Park (Martlesham) Microwave Round Table meeting this month, the following measurements were made on the antenna test range. The dishes appear to outperform the ubiquitous PW type with penny feed.

CALLSIGN	DISH TYPE	GAIN (dBi)	COMMENTS
G7JTT	Channelmaster mini-dish with tubular horn feed	30.3	One of the popular digital Sky dishes. About 42cm wide
G8GTZ	Grundig Sky mini-dish with G3PHO/W21MU feed	30.3	Also one of the popular digital Sky dishes. About 42cm wide

24/47/76GHz Microwave Contest - 09/Sep/2001

Adjudicated scores

Individual Band Tables

24GHz	Best DX	Located	Distance	QSOs	Score
G4BRK/P	G7MRF/P	IO93AD	125	7	617
G3PHO/P	G4BRK/P	IO92CA	117	9	617
G4KNZ/P	G0HNV/P	IO93RO	143	6	490
G8BKE/P	G4BRK/P	IO92CA	79	3	134
G8ACE/P	G8BKE/P	IO91GI	38	2	49
G4LDR/P	G8BKE/P	IO91GI	30 (one way)	2	24
47GHz	Best DX	Located	Distance	QSOs	Score
G4KNZ/P	G0IVA/P	IO83XE	90	2	58
G8BKE/P	G3PYB/P	IO91MX	53	2	58
G8ACE/P	G8BKE/P	IO91GI	38	2	58
76GHz	Best DX	Located	Distance	QSOs	Score
G8ACE/P	G8BKE/P	IO91GI	31	2	42
G8BKE/P	G8ACE/P	IO91HB	33	1	33

There was good activity in this event, despite being a very windy day, the best mm activity of the year so far. A total of 14 stations were active.

Adjudicating the 24GHz event was difficult, with the top two stations, G3PHO/P and G4BRK/P, very close. Initially, G3PHO had claimed fewer points due to an error totalling up his score. Correcting this put G3PHO slightly ahead, before checking the distances (and points) claimed. Working from just the locators in the entry logs, G4BRK came out 1 point ahead, whereas using knowledge of most stations' actual exact location put G3PHO slightly ahead again. In the end, the adjudicator decided the fairest option was to award 1st equal to both stations!

On 24GHz, most stations were using a PA, running up to 0.5W, and this firstly made the contacts easier and quicker, and secondly allowed one or two more difficult (non Line-of-Sight) contacts to be made. G3PHO/P also made use of the **rover rule**, allowing a second contact with G0HNV/P, after having moved more than 16km.

On 47GHz, there was less activity - 6 stations logged as being active. G4KNZ lead on this band, working two stations (90, 85km).

On 76GHz, activity was confined to the South, with 3 stations logged active: G8ACE/P, G8BKE/P, and G3PYB. This band was won by G8ACE, with 2 contacts.

73 from Steve, G4KNZ. Microwave Committee Contest Adjudicator



ACTIVITY NEWS FROM THE WORLD ABOVE 1000MHz

47GHz RECORDS BROKEN IN THE UK AND THE USA!

Great things have been happening on the **millimetre wave bands** over the past few weeks. **Here in the UK, the 47GHz DX record was extended to 203km** by the intrepid group who set the earlier record. Not only was it a DX record but it was the first GM to GW contact on 47GHz! Here's G0IVA's account of the whole thing...

From: David, G0IVA [g0iva@ic24.net]
Here is summary of our activity on Sunday 21 Oct 2001.

After a very early start by everyone involved, Paul G0HNW, Martin G7MRF and David MOVZT headed to GM and David G0IVA and Jeremy G6ZGP went to GW.

The walk up Snowdon, North Wales, started at 0900 BST and it was decided to use the Llanberis path since it's the most gentle (!) although still approx. 5 miles each way.

We reached the top at around 1230BST but, to avoid any congestion on the quite small Snowdon summit (the train was operating hence quite a few people about), we decided to set up on the summit of Crib-y-Ddysgl (SH611552 IO73XB 1065m asl) slightly to the North and a short walk across the col separating the two peaks.

Meanwhile the lads at the GM end were already on site at Cambret Hill (NX523577 IO74UV34, 361m asl) and virtually ready to go.

24GHz was used first and 59 reports using NBFM were exchanged both ways very quickly between GW0IVA/P and GMOHNNW/P and GM7MRF/P (*no mean distance for that band ...editor*).

47GHz was then tried; all three stations at GM end were using their 20mW beacon sources simultaneously. The GMOHNNW/P and GM7MRF/P signals were heard very soon but not MOVZT/P at this time. After some fine tuning of dish Alignment, CW exchanges were made at 519/419 with GMOHNNW/P and 419/519 with

GM7MRF/P at 202.7km. Further attempts were made to work MOVZT/P but unfortunately, although brief signals were heard at the GW end (319), no two way contact resulted.

By this time it was getting on for 1430 BST and was rapidly approaching our cut off time to ensure getting back down before dark. We left the top at 1500 BST and arrived back at the car at about 1745 BST.

At the GM end, attention turned towards Sam G18GJX/P who had gone out to try his 24/47GHz transverters. On 24GHz Sam heard a weak signal from GMOHNNW/P but when Paul tried to resolve Sam's signal nothing was heard at all. Signals were sent back and forth but nothing else was heard on 24GHz. The same story applied to 47GHz ah well we can't win them all!

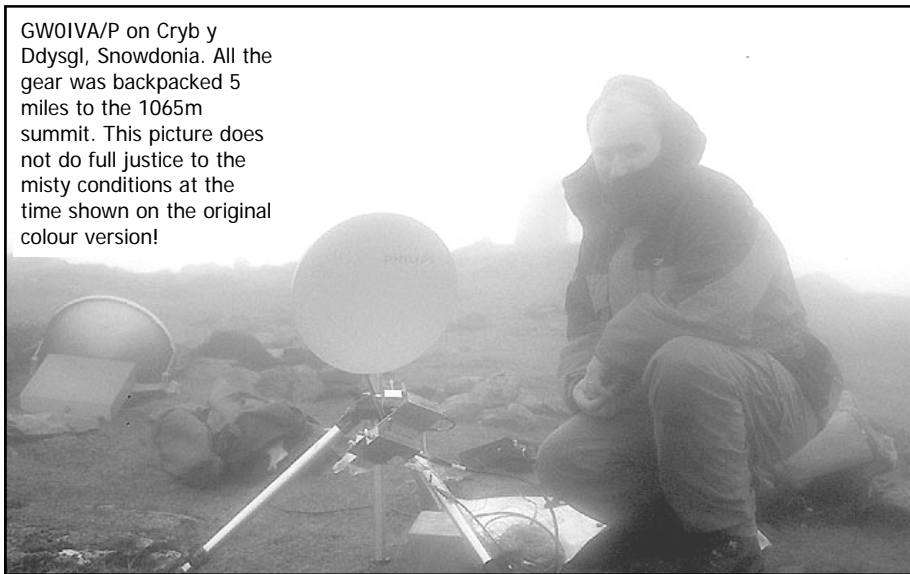
Subsequent diagnosis by Sam revealed a faulty BFR91 in the LO chain of the 24GHz system and a loose cassegrain reflector in the 47GHz system (hidden behind a plastic radome).

After calling it a day with Sam, the mist came in and drizzle followed, soon turning to heavy rain by the time they had packed away the gear.

Weather conditions: GW end

At the GW end the weather was very poor throughout with cloud base at approx 600m (ie we were over 400m into cloud). Over the period we were operating, the weather data for Snowdon summit was as follows (obtained from the Snowdon weather station archive www.fhc.co.uk/weather/archive/)
Temp 5 deg C . Humidity 104% (!).
Rainfall 0 mm/hour. Mean wind speed 30 mph.
Gust wind speed 40 mph.

The high humidity, due to being in dense cloud (visibility no better than 10m), definitely would not have helped with signals at 47 GHz!



Weather Conditions: GM end

Temp 11 deg C. Humidity 100% + (meter was off the scale)

The conditions on arrival at the site were not to bad; the silhouette of the Isle of Man could be made out although cloud covered the higher ground on the island. Rain clouds could be seen in the middle distance.

Equipment

GW01VA/P

24GHz: 0.5w, NE32584 LNA, DB6NT transverter 45cm dish.

47GHz: 20mW TX, DB6NT transverter, 30 cm offset dish, W21MU type feedhorn.

GM7MRF/P

24GHz: 0.4w, NE32584 LNA, DB6NT transverter 90cm dish with cassegrain type reflector and W21MU type feedhorn.

47GHz: 20mW TX, DB6NT transverter, 90cm dish with cassegrain type reflector and W21MU type feedhorn.

GM0HNW/P

24GHz: 0.5w, NE32584 LNA, DB6NT transverter 90cm dish with cassegrain type

reflector and W21MU type feedhorn.

47GHz: 20mW TX, DB6NT transverter, 90cm dish with cassegrain type reflector and W21MU type feedhorn.

MM0VZT/P

47GHz: 20mW TX, DB6NT transverter, 30cm dish with cassegrain type reflector

and W21MU type feedhorn.

Regards from David (G01VA) and Martin (G7MRF)

MEANWHILE, ACROSS THE ATLANTIC OCEAN ANOTHER 47GHz RECORD WAS BEING BROKEN

From: Bill Seabreeze [w3iy@fcc.net] 15 November 2001 00:21.... Just wanted to relate the FB afternoon that Bernie, W4SW, John, W3HMS, and myself, Bill, W31Y, just had out in the Shenandoah valley. The humidity was low, and the mm-waves were calling. Bernie went to Hogback Mtn FM08us, and John and I went to FN10ff. We knew the path was good when Bernie broke into our 2m FM simplex

John worked Bernie 1st on 10GHz SSB...Signals were bone crushing...pinning the S-meter. Bernie runs 2W and a 2ft dish. John runs 4W to an 18in offset dish. Calculated path predictions said we could expect 90dB S/N...I think we got it!

Next we set up **24GHz**. Bernie immediately heard us over this 174km path on SSB. After peaking dishes at both ends, the W4SW signals were again pinning the s-meter on my FT-817 IF. Bernie runs 80mW to a 19in dish...I run 500mW. This was very encouraging, and we proceeded to our real objective...to work on **47GHz at a range of 108 miles...174 km**. The 24 GHz QSO was a new distance record for both W4SW and W31Y. Path calculations indicated that we could expect 70dB S/N...I think we came close to this.

Next, we keyed up my xtal controlled exciter on **47GHz** and tuned it in to verify its presence. The dish is co-located on a boom with the 24GHz dish, so we were already pretty much aimed right at FM08us. Bernie heard us within a few minutes and began calling on 47GHz. We found him within a minute or so, 519 on CW. Signals at my end were Q5, but only about 5-8dB out of the noise...not good enough for SSB. We exchanged reports, 5-digit grids, and 73s on 47GHz. There was no detectable QSB at my end. Just solid Q5 CW clearly audible in the thermal noise. This is a **North American record on 47 GHz...174 km, 108 miles.** (FN10ff to FM08us)

Conditions were as follows: Wind very calm. Temp approx 70 deg F. Dew Point appx 32 deg F. Atmosphere very hazy Visibility: abt 10 miles Our rigs run between 25 and 35 mW Antennas 25 cm dish (estimated gain 38 dBi) Rx NF: 11dB
Tnx es 73, Bill W31Y

UK MILLIMETRE BAND CONTEST: 21st October 2001

This event was doomed from the start! Four of the regular operators of this contest were away breaking the UK 47GHz record, while G3PHO could only be on for an hour so due to family commitments, G3UKV was away on holiday, G4KNZ wasn't sure and on the story goes!! Unfortunately for G8IRT, Ian did not get the last minute cancellation emails of the Saturday evening so he duly went out with his pals to Brown Clee, only to find activity extremely low! However they appeared to have a jolly time as this email indicates ...

"Unfortunately this message was too late, as we had already set out for the hilltop, and an overnight stay! We (Bob G8GDZ, Mark M0CZE, Tom and myself, G8IFT) had

an excellent evening meal and a few beers in the Boyne Arms on Saturday night. Bob G8GDZ prepared breakfast (and lunch for that matter) and we were ready at 10am (local) for the event We even had two visitors, G4MAP and GU4IAN. Only one contact was made on **24GHz**, G4BRK at home, some 111 km and it was marginal, just making the contact in a peak of slow qsb. Bob was testing a Wimo 67el yagi on 13cm and contacted G3XDY on that band.

With six of us on the hill at least we had some people to talk to! **Regards Ian G8IFT**

THE REST OF THE MICROWAVE NEWS ..

From John, G3XDY (Suffolk)

Conditions were very good late in the evening of October 11, I found OE5VRL/5 via the DXCluster on 70cm, it took a while to convey that 23cm was QRT but we eventually QSY'd to 13cm, initially his signals were very weak but we tried again 15 minutes or so later and had a QSO which finished up on SSB with his signal at 54 here. We then went to 3cm and to my surprise he was there, very weak but readable on peaks of QSB at 419, we completed the QSO in about 5 minutes. Rudi is in JN78DK and so the distance is 1012km - my best DX on 3cm. I got up early on the 12th October, expecting conditions to still be good and was not disappointed. I saw from the DXCluster that Arnold HB9AMH/P was working OE5VRL/5 on 3cm, so beamed up his way after alerting him via the cluster that I would like a QSO. It was more than a bit surprised to hear him peaking 55 whilst he was still in QSO with the OE beaming East. When he swung the dish he was about 20dB over S9, not bad for a distance of 693km!

We had more good tropo at the beginning of November and, prior to that, some rainscatter on **10GHz** on the 21st October with G4BRK worked at good strength. On the 2nd November the bands opened to DL, southern SM and OZ. On **1296MHz**, OZ6OL and SM7FMX in JO65 were good signals. Successful tests with DL3YEE and DF9OX in JO42 increased my **3.4GHz** DX to 506km. The following morning the conditions moved further south, giving QSOs with DL7VTX (JO62) and SP2DDX (JO83) on **1296MHz**. Signals on 1.3GHz were much weaker than on 144/432MHz. In the evening of the 3rd November I saw on the packet cluster that OK1JKT (JO60) was working PA0 on 10GHz and used the WW-Converters network to set up a sked, which resulted in signals peaking 559 both ways for a new country and square. It was a surprise that this path worked as signals from OK had started to drop back on 70cm by then, and I had heard nothing on 1.3GHz from there all day.

I managed to get on for the end of the 3rd 1.3/2.3GHz cumulative on 5th November, and found conditions to be reasonable around the UK on both bands, but without any great DX.

24/47GHz Microwave Contest - 21/Oct/2001					
Adjudicated scores					
Individual Band Tables					
24GHz	Best DX	Located	Distance	QSOs	Score
GW0IVA/P	GM0HNW/P	IO74UV34	203	2	406
G4BRK	G8IFT/P	IO82QL	112	1	112
G8IFT/P	G4BRK	IO91DP	112	1	112
47GHz	Best DX	Located	Distance	QSOs	Score
GW0IVA/P	GM0HNW/P	IO74UV34	203	2	406

From: steve.davies@nokia.com Sent: 20 November 2001 08:01
Subject: Results of the mm-band contest 21. Oct. 2001

Here are the results of the mm-band contest held on Sunday 21st October 2001. Shown above in MS Excel format.

In England, activity was disappointing, due to combination of uncertain weather and some operators being unavailable, and so the only two 24GHz stations active in this part of the UK (G8IFT/P and G4BRK at home) worked each other – albeit over a respectable 112km path.

However, several stations did travel further afield - to North Wales and Southern Scotland, to test over a 203km path on both 24 and 47GHz. Dave G0IVA made the journey up Snowdon (IO73XB18) aided by G6ZGP, while the stations at the Scottish end were G0HNW and G7MRF, with M0VZT. Two easy 59 contacts were made on 24GHz, followed by more difficult contacts on 47GHz - for a new UK DX record for this band. Equipment at GW0IVA/P on 47GHz was 20mW TX, DB6NT transverter, and 30cm offset dish with W21MU type feedhorn.

NB: See <http://www.g3pho.free-online.co.uk/microwaves/news1.htm> for more information about the GW/GM contacts.

73 Steve G4KNZ.

Once again we have run out of space to include the All Time Operating Ladders and the Microwave League Table! Hopefully we can rectify that in the next issue, due out mid January 2002. Meanwhile you can find the updated lists on the "World above 1000MHz " website at www.g3pho.free-online.co.uk/microwaves/