An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

Formerly the RSGB Microwave Newsletter and now published by the UK Microwave Group

FROM THE EDITOR

2004 – OCTOBER

First of all, I like to extend a warm welcome to new readers who have joined the UK Microwave Group since last month's issue. Among them are Mike, AA9IL and Jim,WA5JAT, both of whom I had the pleasure of meeting at Microwave Update just a few days ago. The reason why your Scatterpoint is a few days late this month is, of course, that I have been over in Dallas, USA to attend a really excellent amateur microwave convention — Microwave Update 2004. You'll find a short report in this issue. I hope to put a more photographic version onto my website shortly.

Membership of the Group continues to grow weekly. We now have members in the following parts of the world: DL, EI, F, G, GM, GW, GI, HB, I, JA, LA, OE, ON, PA, SM, VK, W and ZL. Please tell other microwave friends about the group ... we'd like to reach a "DXCC" subscription list one day! Maybe we might have to make our group name a little more international one day?

After my plea for articles there is now a surplus of material, so much so that I have left two excellent articles over until next month. Neverthless, it's vital that you the readers keep submitting material for this newsletter ...we don't want to let the tap run dry!

Many thanks to our contributers this month, in particular Chris, GW4DGU, Jonathan, G4KLX and Peter, G3LTF. Thanks also to all who have sent in activity reports and snippets of information that help us all to be more aware of what is happening in the World above 1GHz.

See you at Martlesham. If not, then 73 until next month ... **Peter, G3PHO (Editor).**

In this issue ...

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 THE UKuW GROUP SECRETARY AT THE ADDRESS SHOWN ON PAGE 2

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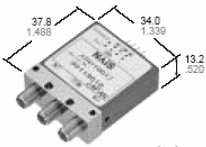
FOR SALE

NAiS

26.5GHz COAXIAL SWITCH

RD-COAXIAL SWITCHES



FEATURES

1. High frequency characteristics (Impedance 50Ω)

Frequency (GHz)	to 1	1 to 4	4 to 8	8 to 12.4	12.4 to 18	18 to 26.5*
V.S.W.R. (max.)	1.1	1.15	1.25	1.35	1.5	1.7
Insertion loss (dB. max.)	0.2		0.3	0.4	0.5	0.8
Isolation (dB. min.)	85	80	70	65	60	55

*: 18 to 26.5GHz characteristics can be applied ARD5○○○○(26.5GHz type) only

2. Small size
34.0(W)x37.8(L)x13.2(H) mm
1.339(W)x1.488(L)x.520(H) inch

3. High sensitivity: 700 mW nominal operating power (Failsafe type)

From: Jason Ingram G7BSK [jase.ingram@ntlworld.com]

I have three of the above relays for sale.They are brand new and sealed. **They are rated to 26GHz and can handle 120 watts at 3GHz** provided they are not “hot switched”. They are a 24V DC failsafe type. The new list price is in excess of £150. I am quite happy to sell them at a reasonable “amateur price”.

Email me for further details and a “haggle”!

Jason, G7BSK

MARTLESHAM - 13/14 November 2004

This is the UK's most important amateur microwave event of the year! If you haven't yet registered then do so before you finish reading this newsletter as time is very short. You need to register no later than the 6th November (possibly it's already that as you read this later-than-usual Scatterpoint!). You can register on line by following the link from the UK Microwave Group's website at: **http://www.microwavers.org** . The webpage also gives details of the hotel accommodation.

At the time of writing this page there are already (in addition to dozens of UK operators) many overseas callsigns on the registration list, including no less than seven German microwavers (DB6NT being one of them), two from Belgium, as well as microwavers from Sweden, France and the USA .... truly an international event!

THE PROGRAMME:

SATURDAY 13 November 2004

1300-1700: Test equipment facilities and Antenna Test Range **(10GHz and 24GHz .. see next page)**

1400-1445: Lecture 1: Peter, G3PHO: Microwave Update 2004 — a photo report

1500-1545: Lecture 2: Sam, G4DDK: A 38.4kb/s data modulator for 2.4GHz and the SSETI Express Project

2000- midnight(?): UKuG/Martlesham Dinner: Guest Speaker: Kent Britain, WA5VJB

SUNDAY 14 November 2004

0900-0945: UK Microwave Group Committee meeting (committee members only)

1000-1045: Welcome speech, followed by UK Microwave Group Annual General Meeting

1045-1115: G3PFR: RSGB Microwave Manager's report from the Spectrum Forum.

1115-1200: Lecture 3: Brian G4NNS: An AZ-EL system for a 3.4m EME dish

1200-1300: Lunch break (light refreshments available)

1300-1345: Lecture 4: Paul, M0EYT: Using 2.4GHz WLANs in amateur microwaves

1400-1445: Lecture 5: Freddie, ON6UG: Amsat's first steps towards an interplanetary mission

1500-1545: Lecture 6: Dave, G4HUP/DL4MUP: Microwave Construction for the higher bands and the hotplate method for SMD assembly

1545-1630: Peter G3PHO: Review of uW Activity 2004 and open forum on contest plans for 2005

1630-1645: Convention close down.

Don't miss it!

Martlesham Round Table 2004 10GHz and 24GHz Antenna Test Range

G4DDK and helpers will be running a 10GHz and 24GHz antenna test range at Martlesham. This is the first time we have attempted 24GHz. We have been loaned the 24GHz reference horn used by WA5VJB for many of the North American amateur antenna test range measurements, so our measurements should be traceable to the results published by ARRL and NTMS.

The range will operate on 24048MHz and use the common 1kHz modulation system. A high sensitivity coaxial diode detector will be connected to a SMA/APC3.5 to a waveguide 20 (WR42) rectangular adaptor. We will also be able to connect to WG20 round flanges as well as rectangular and round WG22 flanges and APC3.5 coax.

The 10GHz antenna system will use coax SMA or N and WG16 rectangular flange ONLY. If you have a round flange on your antenna feed, please arrange to bring a rectangular to round flange adaptor. No Belling Lee connectors!! The system set-up will be similar to last year.

The range will operate on SATURDAY AFTERNOON ONLY. It may be interrupted briefly whilst I do one of the talks, although I'll try to ensure someone else can operate the range whilst I'm unavailable.

You are urged to bring a 24GHz antenna to measure as well as your 10GHz antenna. We plan to make this the best (UK) antenna range yet. There must be lots of 24GHz antenas just waiting to be measured!

Sam Jewell, G4DDK

UK MICROWAVE GROUP ANNUAL GENERAL MEETING SUNDAY 14 November 2004

The UKuG AGM will take place at 10 am, on the date shown above, at the Martlesham Round Table. The basic agenda is as follows:

1. **Apologies for absence**
2. **Minutes of the last AGM (Nov.2003)**
3. **Matters arising**
4. **Reports of UKuG officers**
5. **Election of committee for the year 2004-5**
6. **Any other business**

Items for section 6 should be sent to G0CZD (see page 2 for address) as soon as possible.

Microwave Update 2004

- a review by Peter, G3PHO

Microwave Update this year was organised by the North Texas Microwave Society and held at the Harvey Hotel, right next to Dallas Forth Worth Airport in Texas, USA. Attended by 130 or so microwavers and their wives, it brought together many people from VK, VE, G, JA as well as the USA. Although the official dates were 14-16 October, many arrived the day before.

I travelled with G3PYB and G6GXK from Manchester on the Wednesday in order to arrive at the hotel the night before Thursday's grand surplus tour of the Dallas area. The journey involved an eight hour flight to Atlanta, GA, and a two hour flight from there to Dallas FW. With airport waits and the drive to Manchester, it all made for a long and tiring journey of around seventeen hours. Once there we met up with the rest of the Brit crowd, G4DDK(and his XYL Shirley), G8GTZ, G8UBN, G4FRE and G4PBP.

The following day proved the journey was well worth it! At 8 am we began the grand surplus tour. The attendees were divided into groups and cars were pooled in order to ferry groups around a circuit previously arranged by Kent, WA5VJB. Some ten surplus stores were on a map provided by Kent the idea being to visit as many as possible in the day. Kent kindly took a group of Brits, G3PYB, G6GXK, G8UBN and myself, to some of the most amazing "Aladdin's Caves" that you could imagine. Nortex Electronics was stacked to the ceiling with all kinds of microwave test gear and spares, as was Tesco (NOT the well known UK supermarket!). We all bought something at each of these, with G3PYB managing to obtain two superb, cast aluminium, offset dishes with excellent profiles ... highly suitable for 76GHz. They have weatherproof covers and a waterproof compartment at the rear of the dish. Another fantastic store was Harbor Freight Tools.It was jammed packed with all kinds of tools at very reasonable prices. Fry's is another amazing place. It's about the size of a soccer pitch and sells a tremendous range of radio components, both smd and discrete types, plus computers, video cameras, TV sets and much more. It makes Maplin look like a corner shop!

Once back at the hotel we found many other microwavers had checked in and it was nice to meet up with old friends such as VK4OE, VK2AXA, W1GHZ, WA1ZMS, W2PED, WA5VJB, K5VH and VE4MA. I was also delighted to meet Roger, VK5NY, for the first time. We had swapped emails on a number of occasions around the time he and Walt, VK6KZ made a new world record 10GHz contact at over 1900km some years ago (now superceded by the 2000km+ record by DJ4AM). He and Walt are now eyeing the 24GHz world record ... Roger even bought a 3 watt PA for the band at Update! I was also delighted to meet Christophe, ON4IY, for the first time. We both had to fly 4000 miles away from the UK/Belgium region for this "eyeball" contact to happen! The social side of Update is really something to be experienced. The USA microwavers rarely forget a face. Once you've attended one Update you'll be immediately recognised and warmly welcomed at the next one you go to.

Friday and Saturday's programme was packed with lectures, equipment and antenna testing plus a demonstration of software radio. A room adjacent to the lecture hall was full of trade tables, covered in a mouth watering selection of components and spares. Down East Microwave was there as usual and I was pleased to learn that they are to shortly bring out an 8 to 10 watt PA for 10GHz at the low price of $295 ... well below anything of that nature over here in Europe. My name went down on the order sheet straight away! Paul Drexler, W2PED, had loads of 2 and 3 watt 24GHz PAs for sale. A Scatterpoint subscriber, Paul been working very hard to supply these amps to us all. If you want to get on to 24GHz with respectable power then contact him now! Email him at :
pdrexler@hotmail.com

The lectures began on Friday with my own talk on 'Microwaving in the UK'. It was an unnerving experience to take 'first bat' at such a prestigious event as this! After that the technical content rose rapidly (!) and many excellent lectures followed. Of particular interest to me were the talks on oscillators for the millimetric bands (by WA1ZMS, world record holder for the 241GHz band), multi-reflector dish feeds (W1GHZ), Extra Terrestrial Laser communications (WA5WCP)and using WG22 on 47GHz (VE4MA).

Saturday night saw the Banquet, a great event in which everyone had an excellent buffet meal followed by a Grand Prize draw. This gave all 130 people there a prize! Some of the prizes were very good ones indeed, including a $675 DEMI 10GHz transverter kit, a DSP receiver and a $425 24GHz three watt PA. Sadly, I missed out on those as the prize draw was a "draw them out of the hat" affair but, nevertheless, I came away with a nice six-way microwave coaxial relay and a few very low noise MMICs for the 1 to 2GHz region, just right to upgrade my old DEMI 23cm transverter!

This review cannot begin to do justice to what this gathering of microwavers was like. In short, it was superb. My sincere thanks go to all who organised Update 2004 ... the North Texas Microwave Society and, in particular, Al Ward, W5LUA and Kent Britain, WA5VJB ... and thanks Dallas!

All the lectures and presentations are now downloadable from the North Texas Microwave Group website at **www.ntms.org** ..... take a look!

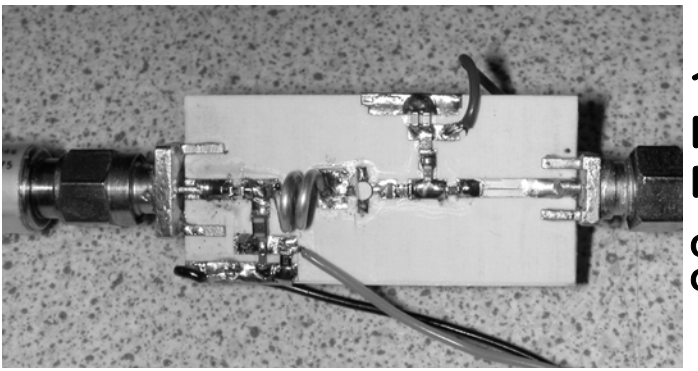
Next year's Microwave Update is in California ... you owe it to yourself to make the pilgrimage!

Microwave Update 2004

Antenna Range Results

Conducted by WA5VJB ... All results in dBi ... Oct 15, 2004

Gain	Call	Antenna Description
902MHz		
2.2	WB5TBL	Military 4071 Dipole
5.0	WA5VJB	RFID Antenna
7.5	WA5VJB	Reference 4 element Yagi
14.5	N5GDB	12 element Yagi with Screen Reflector
1296MHz	No Entries	
2400MHz		
7.5	KA2UPW	CP Patch from a candy can 7.5 Vert -6.0 Horiz (Not CP)
7.7	KD5ZYG	16 element Vertical Collinear
8.9	W5OE	Omni Slot array, 8 slots per side
11.5 dBic	KA2UPW	16 turn Helix Axial Ratio 0.5 dB 8.7 Vert 8.2 Hori
12.7	WA5VJB	Commercial Reference Horn
16.9	K5LLL	Commercial 8 Patch array
20.2	K5VH	34" dish with triangle feed (Optimized for 2.3 GHz)
3456MHz		
15.8	WA5VJB	Commercial Reference Horn
20.0	WA5VJB	British IONICA Patch Array
24.8	K5VH	34" Dish with Dual Band triangle feed
5.7GHz	No Antennas Tested	
10.368GHz		
18.5	WA5VJB	Reference Horn
19.5	WA5VJB	8" WR62 dish with Cassegrain Feed
30.5	K5VH	24" dish with 5.7/10 GHz Dual band feed
34.0	KA5BOU	30" dish with 5.7/10 GHz Dual band feed
24GHz		
6.0	W3HMS	6 Turn Helix 45 deg off axis Axial Ratio 8 dB
15.2	W5DF	WR-42 Cast Horn
17.9	W5DF	WR-42 Cast Horn
20.7	WA5VJB	MA Com Reference Horn
23.7	WA5VJB	8" WR-62 dish with Cassegrain Feed
38.5	W5DF	18" Cassegrain Feed Dish
47GHz	(Equipment died after 10 minutes !)	
76-80GHz	Equipment Available but no Entries!	



1.3GHz HEMT Tropo Preamp

Chris Bartram GW4DGU

Getting back on the bands after a long period QRT has been a far more complex and time consuming business than I'd expected! Having put together 'legal limit' systems for 144, 432, and something reasonable for 10368MHz, I'm now starting to work on 1296. I like to design and build my own kit, even though it might seem a bit of a busman's holiday to some. I'm very fortunate to have excellent computing and laboratory facilities as a consequence of my work as a freelance RF/microwave circuit designer, which makes life a bit easier! This preamp has been designed to be an excellent tropo preamp and a good second stage for EME. In practice, a pair of the amplifiers cascaded would probably be just about good enough for EME, but some redesign could probably shave 10K or more off of the noise temperature, at the expense of simplicity and possibly unconditional stability.

Please don't expect this to be a detailed constructional article. It's not. I'm trying to informally describe aspects of a project I've completed for my own entertainment and to to possibly provide a small amount of inspiration for others. Experienced microwave equipment builders should find enough information here to duplicate the design but I hardly have enough time to earn a living, look after a small farm, and to play radio, let alone properly support a constructional project! If somebody wants to take the design further, and make PCBs available, I'd be be happy to help, though.

I set-out to design a preamp covering the whole 1240 - 1315MHz range which would be easy to make with good, but not necessarily spectacular, noise figure, adequate gain, unconditional stability, good linearity and output return loss.

The bandwidth of the preamp is very large. In gain terms, although not in terms of noise figure, it's still usable at 432! As it has good intermodulation performance, in many locations the amplifier could be attached directly to a 1296MHz antenna and not suffer from intermodulation and out of band issues.

Living in the primary service areas of two major TV broadcast transmitters, I can use the amplifier connected directly to a 1296MHz yagi antenna without noticing intermodulation products, but I may be lucky! In more stringent situations, a low-loss bandpass (or highpass) filter could be connected to the input. From a systems viewpoint, it makes good sense to separate the functions, rather than trying to design a narrowband preamp. If the filter and antenna have good return-loss at 1296MHz, the amplifier will still see something close to 50Ω, so the noise match will be uneffected and the noise figure of the filter-amplifier combination will be the sum of the preamplifier Noise Figure and filter loss. I'm working on the design of a simple-to-make, but very low loss bandpass filter, which I'll be putting ahead of this amplifier as a precaution. There are a number of options for a post-amplifier filter. My 'final' solution will probably be to use a second low-loss input filter as an interstage filter, as my planned new transverter will have an excellent narrowband response from dielectric resonator filters.

Filters and antennas present impedances which can be far removed from 50Ω outside their passbands. For an amplifier to be stable with any combination of passive input and output load over the range of frequencies where the active device has gain is a highly desirable, but often difficult requirement to meet. It's even more difficult to prove in the real world. This preamplifier has been designed to be stable using the usual stability measures, and a detailed model been simulated to beyond 15GHz. It shows none of the usual signs of instability in simulation and I've so far failed to see any on the bench. That doesn't mean that there isn't a frequency somewhere in the spectrum where a combination of passive source and load impedances couldn't provoke instability. It just means that I've not yet found it!

Performance:
My prototype achieved the following performance at 1296MHz:
Noise figure: 0.55dB (T ≅ 40K)
Gain: 12.1dB
Input 3rd order intercept: -4dBm
Input 1dB gain compression: -11dBm
Output return loss: 20dB

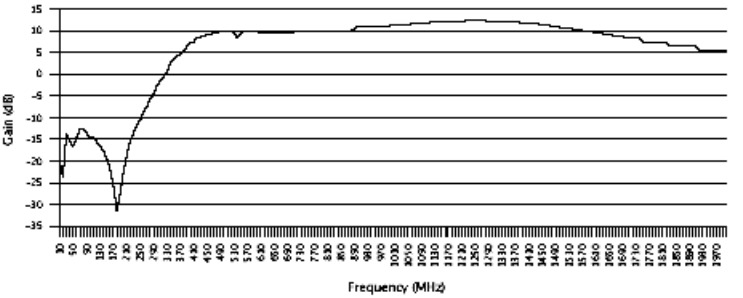
The measured data agrees well with my simulations and also meets Bartram's First Law of LNA design: in the absence of linearisation circuitry, the input third order intercept of any low noise device, biased for low-noise operation, will be of the order of 0dBm.

The plots were obtained from my VNA and written to a file via the IEE488 bus and then plotted using OpenOfficeCalc running under Linux. The return loss graph looks a little noisy, as I accidentally read the data at 1dB resolution and didn't notice until I came to plot it.

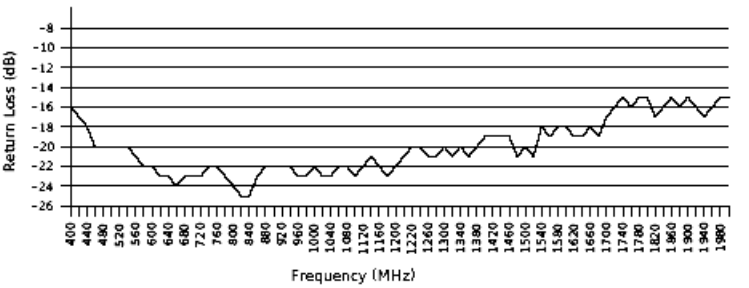
My simulations also suggest that the noise figure remains good across the1.3GHz amateur band and is still OK at 1420MHz. I'd expect that to be the case, in practice, but I haven't yet measured the amplifier at other frequencies. Although apparently relatively simple, noise figure is a difficult parameter to measure accurately, particularly with modern test equipment! I am sceptical of many claimed noise figures. My measurement was made using a professional semiconductor noise source and my spectrum analyser, preceded by a low noise broadband amplifier. I guesstimate that the accuracy of my measurement is within about 0.3dB. A more accurate - and probably appropriate - method for amateur measurement of modern LNAs would be to return to the basic physics and use a low thermal mass 50 ohm termination dipped alternatively in melting ice and boiling water. However, that doesn't quite have the cachet of a £30k item of test equipment and it requires a modicum of understanding rather than the ability to read a display uncritically...!

Background
I have a number of Fujitsu FHX05 HEMTs in my component drawers following a successful Ebay bid(!). OK, there are better devices, but not *much* better, and at £1 each.....?! Using Fujitsu's published device models, it was clear, following a lot of analysis, (using the Eagleware Genesys software I use in my work) that it it wouldn't be possible to guarantee unconditional stability out-of-band using a 'source feedback' topology. As an aside, although the source feedback topology has been around for twenty years or more, and is highly trendy - probably because it's possible to obtain a reasonable input match without degrading the noise figure - I've never found it possible to make a completely stable amplifier when using it. It's nearly always possible to find a region of instability, often at tens of GHz! I know of at least one other UK 1.3GHz preamp project (using Agilent PHEMTs with source feedback) which foundered for exactly that reason. For an LNA, good input match isn't actually necessary. Good input matching won't provide any more sensitivity (it's a matter of getting the right 'mismatch') but instabilities can completely wreck a potentially good NF.

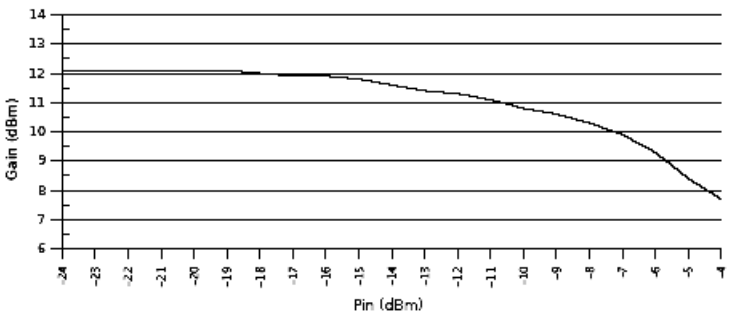
1.3GHz Preamp – Gain

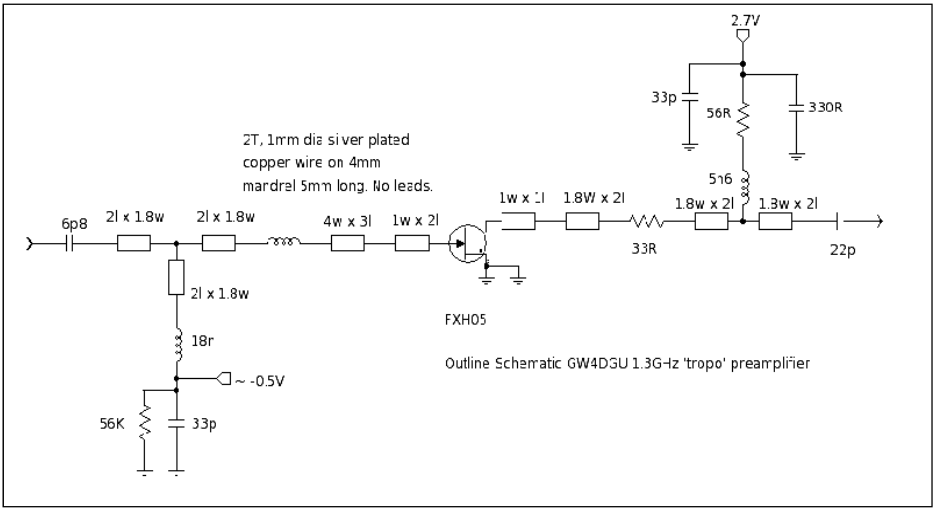


1.3GHz Preamp -Output return loss



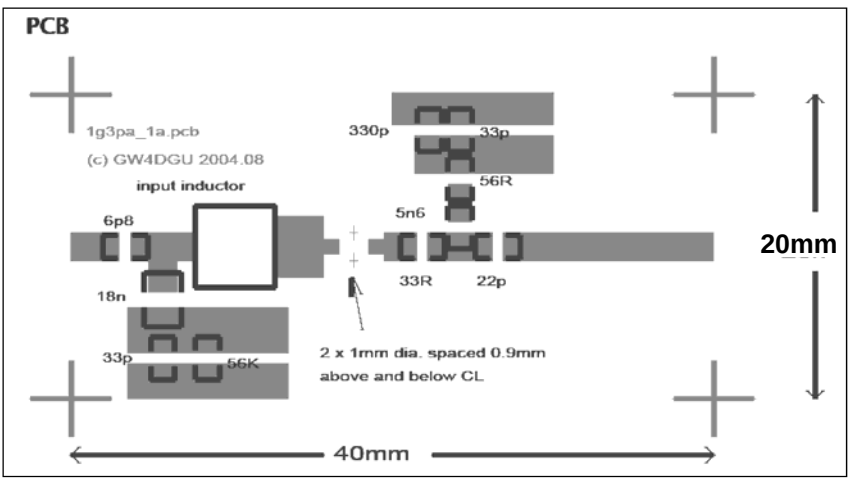
1.3GHz preamp - Power Sweep near compression





The design that emerged after a number of simulations employs a conventional mismatched input circuit realised using lumped inductors for the input impedance transformation and gate bias feed and a shunt capacitance formed by a short length of microstripline. This forms a shunt-L, series-L, shunt-C network, which allows gate bias to be introduced at a relatively insensitive circuit node. The HEMT source connections are grounded via 1mm diameter pins, cut and filed flush to the top (component side) surface of the PCB. This is critical for stability. The other component grounds are made by wrapping a piece of copper foil around the edge of the PCB at the appropriate places.

The output circuit is broadband. In order to control potential instabilities, caused effectively by the output resistance of the FET going negative at some frequencies, a small series resistor has to be inserted in the drain circuit. This causes a small degradation in the obtainable noise temperature but not as much as the device hooting away merrily at 30GHz! There is also a gain penalty, but gain is cheap, nowadays! The drain load is an inductor-resistor series network.



This gives a good broadband output match.

My prototype PCB was cut by hand from 0.75mm (0.030 inch) thick Rogers R4350 pcb material. I used just a scapel, and a steel rule, working under a X10 binocular microscope. Using this technique I've made prototype LNAs to past 10GHz, and power amplifier boards to several GHz. R4350 is a low-cost, low-loss, PCB material intended for large quantity RF/microwave applications. It can apparently be processed by using standard production techniques employed for FR4 material. It's probably not part of the manufacturers design remit, but R4350 is also particularly easy to work by hand! I have generated a set of Gerber files for the PCB layout and put them on the <www.blaenffos.org> website. These may be used for non-commercial applications.

The drawing here has been through a number of format translations and is adequate as an illustration. It isn't to scale and a number of 'funnies' have crept in. I'd recommend that even if you intend to adopt the scalpel approach to PCB production, you download a Gerber viewer, such as PREVUE and use that to print scale drawings of the PCB.

Components

The most critical components are in the input circuit. The 6p8 capacitor really needs to be a low-loss part. I used an 0603 AVX 'Accu-P' capacitor. Porcelain capacitors could be used, and even, at a pinch, a standard 0603 COG cap although that would have an effect on the obtainable NF. The 18nH shunt inductor is reasonably critical. A low-Q device could degrade the noise figure by some tenths of a dB. My choice was a Coilcraft 0805CS series wound inductor. Perhaps the most critical part is the handwound inductor. This is wound with a constant 2.5mm pitch on a 4mm mandrel eg. a 4mm drill shank, such that the spacing of the centre of the start and finish of the winding is 5mm. There are no leads. Simply trim the coil so that it is a two turn helix. I used silver plated copper wire because I had some! Enamelled copper wire would also be suitable. In practice, unless high conductivity silver plating is used - and it's protected from corrosion, there's little advantage over copper. Don't even think of using tinned copper wire ....

It may be necessary to slightly squeeze or stretch the inductor to optimise the noise figure, depending on exactly how the amplifier is built. If you feel this is necessary, thoroughly ground the gate of the HEMT before you do anything and remove the solder at one end of the coil. Make your modification, resolder and then remove the gate grounding. Otherwise you'll either lift a pcb track or damage the HEMT, or both! I know!

All other passive components were standard 0603 parts. The capacitors should have COG dielectric. In my case, the 5n6 inductor was a Coilcraft 0603CS wound part, but monolithic inductors would also be suitable. The FHX05 is the middle device in a series. It looks from the data sheet as though the devices are selected for noise figure in the 11GHz satellite television band. The FHX04 has better guaranteed NF at that frequency, and the FHX 06, slightly worse. I suspect that there would be very little difference between them at 1.3GHz.

Enclosure

Although it might just be sensible to use a milled enclosure for a preamplifier built on a flexible substrate like ptfe/glass, that's really overkill. I tend to solder preamp pcbs into a lidless brass shim 'case'. This is more for physical protection than for RF screening, as I don't treat screening as a universal prophylactic! In this case, the bare PCB is small, the substrate material is relatively rigid and, providing the board isn't maltreated by being flexed, the amplifier will work entirely adequately just hung in the wiring! Flexing will break surface-mount components very easily and, even with a microscope, it's sometimes difficult to detect this visually.

Although there are, of course, many situations where good screening is mandatory, it can bring its own problems. This is particularly true of amplifiers using devices with bandwidths of tens of GHz. There are hazards in packaging microwave amplifiers: putting-on lids leads to many potential problems as it is frighteningly easy to excite cavity resonances. Identifying and killing these can be as much work as designing the amplifier in the first place!

HEMT precautions
It's very easy to damage HEMTs and not realise it. They are extremely susceptible to static damage during assembly and from supply line transients in operation. This doesn't usually show as a significant change in the dc parameters, just as a change (for the worse!) in noise figure. Be VERY careful and take extreme precautions to avoid static damage when soldering the device into circuit.

Power supplies
The preamp requires a drain supply of +2.8V, 10mA. The gate bias required for this will be of the order of -0.6V. As HEMTs, along with most LNA devices are susceptible to supply-line transients, I now operate my preamps from isolated power supplies. In this I use a cheap packaged transformer-coupled inverter which converts 8 - 36V dc into ±5V, this largely isolates the preamp from supply line transients, and lets me power the preamp from my 28V antenna relay supply, as I energise the antenna c/o relays on receive. Following the inverter, I filter and clamp the ±5V lines and use these to power active bias networks. I'll write-up this 'preamp power supply for the paranoid' in the near future, along with details of the sequencing circuitry I use.

DUTCH BEACON REVITALISED

From: Hans v Alphen [pa0ehg@amsat.org]

The 9cm beacon at Schiphol, PI7SHF, is QRV again after a rebuild of the microwave part. The renewed beacon has 9dB more output power and I hope it will be more stable in the output than before.

The frequency is 3400.015MHz with 8 Watt output and an 8dB gain omni antenna giving a total of 50 W ERP.

Best 73 from Hans PA0EHG

Visit my home page at:
www.pa0ehg.com

Ron G2DSP : Silent Key

Ron passed away at the beginning of June this year. An unfortunate editorial error shortly afterwards led to the loss of the following tribute to him. Thanks to both G8LSD and G0FDZ we are now able to print this short tribute to one of the old timers of UK microwaves ...

From Allan, G8LSD:
There was a family only cremation and also a memorial service on Tuesday 08/06/2004 at St Mary Magdalene Church, South Bearsted. I couldn't get to it and I emailed Chris G0FDZ with the sad news. His response email gave a splendid tribute and I reproduce it here with a few words of mine. I had known Ron from the early 1980s. He and the late Ern, G8GKV, provided great assistance to both Jack, G3JMB, and myself when we we starting out on the wonderful adventure that is amateur microwaves.

From G0FDZ:
Alan G8BJG (now M0GAD) and I have both known Ron right from the beginning of our 10GHz activities. Ron was a very special character in amateur radio, having been, and continued to be, active, for pretty well 60 years. He had been involved in many aspects of the amateur radio hobby but it was microwaves that really caught his enthusiasm in the later years of his life. Ron made all his equipment, both wideband 10GHz and 24 GHz and they were works of art. I remember that, even when he was unable to continue his portable activities, he still got tremendous enjoyment from operating 10GHz from home. Ron provided Alan and myself with many 10GHz wide-band and narrow-band QSO's and my first 24GHz wideband QSO. He was also the receive end of my first one-way laser QSO. On our trips to GU, he was always around to help and offer support and provide liaison. All these things will not be forgotten. Amateur radio and in particular microwaves, has lost another true amateur.

FEEDHORN INFORMATION

From: Brian Coleman
[briancoleman@tiscali.co.uk]

Following some internet reflector discussions on feed horns, I have added some info and templates on horns to my website. These incorporate a Co-ax to WG transition which I have made for 5.7GHz and 3.4GHz. I have made quite a few of the 5.7GHz ones ! If anyone is interested, I would like to know if you are able to print the templates to scale as they have undergone a series of file conversions from my pre-historic drawing package. They are now in .gif format.

Details can be found at

http://myweb.tiscali.co.uk/g4nns/FeedHorn.html

73 Brian G4NNS

FRENCH BEACON REINSTATED

From:Dom F6DRO
[Dominique.DEHAYS@enac.fr]

After a long time being QRT because of technical problems F5XAY is back , on a new QRG of 10368.900MHz. It's 1671m ASL on Mont Alembre QTH in JN24BW. Power output is 2W into 2 x 8 slots antenna.

73 Dom / F6DRO

NOISE FIGURE ... INTERNET RESOURCE

Measuring noise figure is not the easiest of things to do if you want REAL accuracy and reliable data. An excellent website resource, well worth a look, can be found at:

http://www.micronetics.com/Noise/Source.html

The pages, which include a great deal of technical help as well as product information, are those of

Micronetics, Inc.
NASDAQ: NOIZ
26 Hampshire Dr, Hudson NH, 03051
+1 603 882 8987 x346

The company's Director(Noise Products Division) is Patrick Robbins

Weinheim 2004 ~ a report by G4KLX

One of the delights of living in mainland Europe is that going to events such as Weinheim doesn't involve packing clothes, customs formalities or anything else associated with flying or even getting in or out of the UK! It is true that the distances are large, Brussels to Weinheim is over 400 kms, but it is a relatively painless trip especially if you're not the one doing the driving. I was taken by Jacques ON7NP, who allowed me to stay at his house the night before so that we would be able to leave early on Saturday morning.

As you know, the Weinheim event was hijacked by a secondary group of local amateurs backed by the DARC. The original group, the OV-A20 group, mounted a large publicity campaign to differentiate between the interloper and their original meeting. They were successful and just before the date of the pseudo Weinheim, it was announced that it had been cancelled. The spirit of amateur radio had won out over the commercial and financial interests of the upstart group. It is to be hoped that there are no problems next year, as I am a sure a number of amateurs decided to forego Weinheim this year because of the confusion. Maybe as a result of this Weinheim was only a one day event instead of the normal two. There was a party at the OV-A20 clubhouse on the Sunday but that was impossible for me to attend.

The meeting did not take place in Weinheim this year, but at the Karl Kübel Schule in Bensheim a matter of only 10 km north of Weinheim. The venue was another school but this one appeared to offer more space than the old one along with much easier navigation from the motorway. All the big names in microwaves were there, DB6NT, Eisch-Kafka, ID-Elektronik, and UKW-Berichte, to name but a few, as well as the usual bring and buy stands which were split between indoors and outdoors. The school had two floors both of which were used and the classrooms were used for the traders as well as the corridors as at the previous location. Overall I thought this new venue was better than the old, so don't be surprised if it becomes the new permanent location.

One of the delights of events like Weinheim is the meeting of fellow amateurs and the people I saw were: Michael DB6NT, Lorenz DL6NC1, Nino DL3IAS, Oliver DL1EJA, Karel OK1JKT, Hans ON4CDU, and Freddy ON6UG. I saw numerous other well-known callsigns from a distance, but these were the people I actually stopped to speak to. As usual there were lecture streams. The one from Freddy about P3E looked interesting but our time at Weinheim was limited so I didn't go to any this time.

I spent a total of five hours at the event and over eight hours travelling ! Next year, if I have my own transport, I will try and spend more time there and travel on the Friday and Sunday instead. This will be more possible next year as it is again a two day event and hopefully the lack of confusion will lead to a higher attendance once more.

The only disappointment was that the catering was not up to the normal standards, although it is still much better than that to be found at equivalent events in the UK. The range was not particularly good and it was spread over a number of locations, each specialising in different things.

Weinheim next year is on the **11/12 September** and will be the 50th anniversary event so it should be special.

Jonathan ON/G4KLX

Radar frequency bands for automotive

The 76-77GHz band has already been designated for automotive use but pressure is coming from the car makers for the use of the 24GHz band. It is easier and cheaper to make radar systems for this band, says Adrian Garrod of Roke Manor Research's sensor technology unit.

However, there are silent bands close to 24GHz which means it is not ideal. The band 23.6 to 24GHz is a passive band used for radio astronomy and earth exploration satellite service.

Garrod says the current arrangement is that the 24 to 28GHz band will be available for a limited time and then there will be a migration to the 77-81GHz band. It makes the development of radar for cars more complicated, with most developers looking at the 77GHz band.

In the UK Ofcom has accepted a temporary use of the 21.5 to 26.5GHz range with safeguards on the final date for new equipment, market penetration and deactivation. Ofcom says it remains "mindful of the difficulties that the introduction of short range radar on a temporary basis at 24 GHz will present for existing spectrum users".

ELECTRONICS WEEKLY 22/09/04

LASER COMMUNICATIONS

We start this month's activity column with several news items concerning **recent lightwave communication** tests in the UK. For those of you who think this is not 'real' radio please think again! Lightwave experiments remind one of the days of wideband FM on 10GHz ... simple equipment and line-of-site paths for the most part ... but don't be fooled into thinking it's kid's stuff! Non LOS paths have been worked by operators in the USA and of course there have been EME experiments in the past. For those of us with low power laser pointers built into simple transmitters it's still LOS of course. Although it is not an official, regulated amateur band there's a very encouraging improvement in lightwave activity in the UK. There's a solid core of enthusiasts based in the South East, while new addicts in the North include G8AGN and G3PHO, both based in Sheffield. At the recent Microwave Update in Texas a very well known microwaver who lives in Portsmouth was seen carrying a laser level from one of the stores visited on the surplus tour .... and he wasn't going to use it for home DIY!

Peter, G3PHO and Barry, G8AGN began tests on the 2nd of July 2004, with a simple TX/RX test across the Redmires Reservoir in Sheffield. Barry had made both items of equipment (TX and RX) and was anxious to see if they would work over a short path. Peter operated the transmitter unit which was mounted on a very small tripod and placed on an aluminium step ladder, which in turn stood on a stone wall! They didn't need a more sturdy mount in view of the short distance involved. Barry received the MCW beacon ID so strongly that Peter could clearly hear it from Barry's loudspeaker across the 600 metre wide reservoir! After these encouraging results and some salutary lessons in accurate pointing techniques, a series of longer and longer distances were tried, culminating in a successful one way test over a 45.9km path between Roper Hill, on the west side of Sheffield and Gringley on the Hill, east of Gainsborough. This took place on Friday night, 8th October 2004. Peter operated the laser TX as usual while Barry went to the far end of the path with the RX. As usual, Peter was with the Tx at nearby RoperHill while Barry drew the short straw and drove to Gringley with the Rx! The weather was not ideal and slightly murky but, after some difficulty in setting up the laser TX (due to a misaligned boresight), Barry clearly copied the test signal from Peter at RST 51/29.This is not strong but in view of the poor conditions it is believed this distance can be considerably improved upon over the coming winter months. Peter is now planning to build a complete TX/RX system similar to that of Barry's so expect to hear of some interesting two way contacts over the coming months! Some long distance LOS paths have already been identified but everything depends on suitable weather conditions.

From: Chris G0FDZ
[chris@chrisfdz.fsnet.co.uk]

At last, the new laser transmitter is tested and working ok. Some of you saw it earlier this year at the Crawley lightwave workshop when I had just completed it's construction. However, testing , de-bugging and setting up has had to wait until the summer was over. With some guidance from Allan, G8LSD, I've finally set up the Bragg modulator and beam expander and have tested the transmitter in the garden ok. I have 400/800Hz keyable tone for CW and pulse width modulation for speech using the PWM design that John G7JTT sent to me. The speech quality as monitored on my receiver sounds pretty good. For those of you not quite in the picture, I'm using a 10mW HeNe laser with an acousto-optic modulator. This system is very similar to that built by Allan some time ago and described on his web-site. However, to cut down on the length of chassis required (and consequently any flexing) I am using a prism arrangement to turn the beam around 180 degrees after the laser, before it goes through the modulator and beam expander. The transmitter is mains driven, but that's not a problem for portable as it runs ok from my generator. I have also improved the azimuth adjustment following the experiences of using the barefoot laser (before I built the electronics) and positioning system last winter. A picture of the transmitter appears on Allan's web-site in the report on the Crawley workshop. All I need now is to try it over distance to set up the gun sight. Regards to you all. **Chris G0FDZ**

From: Allan Wyatt G8LSD
[allan@r-type.org]:
Sent: 18 July 2004

I nearly purchased a 35 mW red laser diode module yesterday but was out-bid. It still shows that more power is out there at an ever lower

price. I will email the seller to see if more are available. I was looking at higher power for a second transmitter with non line-of-sight in mind. After all we have plenty of obstacles here in the south!

I am interested in developing a non-los system as I have the laptop, etc..

It looks as if we may end up with several modes to play with: MCW, Digital and Voice and each one with its own propagation and range parameters to discover. Full duplex was great fun back in the 10GHz wideband days.

I have been toying with the idea of saving my pennies for a Meade telescope. These have two axis motor control and a PC control language. The AutoStar feature is a goto system. After you align the telescope on a known object it will then allow movement to any object in the database by the touch of a button. We do nearly the same thing on microwaves for bearings. I've been considering the alignment of the laser equipment on prominent local landmarks (with precisely known NGR's) and then being able to align on distant hills by software control. This would be useful for non LOS work as well. It looks like a fun time this Winter!

73 from Allan, G8LSD

Websites containing laser information include:
http://fr.groups.yahoo.com/group/qsolaser/
http://f6kaw.free.fr/
http:/www.g3pho.org.uk
http://www.g0mrf.freeserve.co.uk/laser.htm

THE MILLIMETRE BANDS

New World 47GHz Record

Gary, AD6FP [ad6fp@lbachs.com]:
Sent: 21 September 2004 04:36

This past Sunday afternoon during the "10 GHz and Up Cumulative Contest" W6QI and AD6FP completed a 47 GHz contact over a 290 Km distance to set a new world record. W6QI operated from Shuteye Peak DM07GI just south of Yosemite and AD6FP operated from Frazier Mountain DM04MS north of Los Angeles. W6QI had to brave 30 degree temperatures and snow while modifying the radio in order to complete the contact. Signal margins were >40 db on the W6QI end and about 8 db on the AD6FP end. The contact was completed using a combination of narrow band FM and CW. The station details are as follows:

W6QI: 36" cassegrain dish, 10dBm xmit, 8dB nf, ocxo locked
AD6FP:12" splash plate dish, 45dBm xmit, 4dB nf, Rb locked

The weather conditions were quite unusual for September with scattered rain showers in the central California valley between Shuteye and Frazier. More details to follow.

73 from Frank W6QI and Gary AD6FP

122MHz Band Record contact

From: W0EOM@aol.com
Sent: 03 September 2004 17:44

On Friday, Aug 27, KF6KVG and I extended our prior record on the new 122GHz band (122.25 to 123.0) to 24.88km. This was across the Silicon Valley from CM97CJ to CM87XH.

Precision 1 ft dishes were used. Mine uses a cassegrain feed built by Mark, N0IO. Transmit power was about -23dBm and noise figure estimated at 25dB. Triplers with output in the 40 to 41GHz range with power of +19dBm are used to drive the mixers and multipliers. Transmit frequency was 122.400GHz, referenced to 10MHz.

Signals were at the noise floor but easy CW copy. Weather was calm, temp 60 deg, and dew point 50 degrees, a little dryer than normal for this summer. The 2nd harmonic on 81.6GHz was used to align the antennas. We now plan to retune the rigs to 78GHz.

73 from Will, W0EOM

FIRST W to VE 47GHz CONTACT ...

From: Dave Hallidy [k2dh@frontiernet.net]
Sent: 14 September 2004

I would like to announce what we believe to be the first ever W-VE 47GHz QSO. This contact took place on Sunday, September 12, 2004 at 2007Z between WB2BYP and K2LDU/VE3. WB2BYP was located in FN02vu and K2LDU/VE3 was located in FN04xa. The distance of this QSO was 81 miles/131km.

Lat/Lon is:
FN04xa: 44 01' 11.3" / 78 00' 09.2"
FN02vu: 42 51' 10.4" / 78 12' 25.2"

Both stations were using DB6NT transverters, with DB6NT 30mW Power Amplifiers as both PA's and LNA's, Micro-Mechanik 47GHz Image Filters, 12" dishes, and 144Mhz IF's.

Signals were first peaked on 10GHz, then on 24GHz where they were "on the peg" on both sides. According to John and Charlie, it took a while to find the 47GHz dashes, but once peaked, the CW signals on 47GHz were peaking 20dB out of the noise, with QSB.

Congratulations to John and Charlie on their fine accomplishment and to the continued efforts and success of the 47GHz team of the Rochester VHF Group!

73 Dave Hallidy K2DH
Chairman, Rochester VHF Group 2004-2005

UK CONTEST REPORTS

August 5.7/10GHz Cumulative

The following reports somehow missed last month's issue..

From: Derek G3GRO [derek.atter@btinternet.com]

Herewith is an activity report for the August 10GHz/5.7GHz Cumulative. Operating again from Ashdown Forest, **JO01BB**, I teamed up with Lech G3KAU again but was also joined this time by Peter Madagan, G3RQZ, to put in a joint 2-band entry - Callsign on 5.7GHz being G3RQZ/P with 10W to a 60cm dish and signing G3GRO/P on 10GHz with 5W to an 85cm offset fed dish.

Again we were rather late getting on air due to some mechanical problems - not helped during the initial dish alignment on 10GHz by the discovery, after some 20 minutes or so of wasted time, that the rotator was going round the wrong way! Because of the threatened heavy rain forecast for the afternoon, we chose to operate from the CARC contest caravan and of course the dish was up out of sight from the operating position! We eventually got going at 12-25 local time.

We made 11 valid QSOs on 10GHz for a total of 1641 points and 4 QSOs on 5.7GHz for a total of 661 points. Best DX : G3PHO/P on both bands at 374km. Also worked GW3ATM/P at 234km on 10GHz. and tried the path to GW4DGU at 331km but with no luck. Total points for the two bands was 2302 for just over 4 hours of operation.

From: Neil G4BRK, IO91DP [neil@ignika.com]

I managed to be around for the whole day for the August cumulative. Impressive activity levels again, with 32 QSO's on 3cm despite not managing any of the French portables in the morning (couldn't raise them on talkback, F8BRK should have been an easy 3cm QSO). Four DX contacts were made, the best being DJ5BV (JO30KI) at 618km - nothing heard for the 1st 2 minutes, then he just appeared out of the noise, 419/329 reports exchanged. Others were ON4IY and ON4CDU in JO10SS, 379km, and a good signal from F6DKW at 425km (this path goes about a third of attempts). So conditions were not bad, though nothing special.

On 6cm there was no real DX, my best being G3PHO/P at 305km. It was nice to make 11 QSOs but I was playing catch up as only one was before 1200z - don't know where everybody was hiding before that.

September 5.7/10GHz Cumulative

Activity levels were good once again but band conditions were definitely not! A number of reports have come in saying much the same thing ... when are we going to have reasonable propagation during a contest?

From: Paul G8AYY [p.gaskin@tiscali.co.uk]

I went to Merryton Low Triangle(**IO93AD**) for 10GHz but only worked two stations. I had a problem with the wind moving the 60cm dish but managed to copy M0GHZ at 186 km but he could not copy my 250 mW. I also worked GW8AWM/P near Monmouth at 151 km via rain scatter.I heard strong signals on 144MHz from GM3UKV/P and G3PHO/P but unfortunately the wind blew the dish over and broke the tripod when I turned the dish NW for GM3UKV/P. This curtailed 10GHz operation!

The tripod is beyond repair and I am now looking for a heavy-duty replacement. High winds and thunderstorms this year have restricted my home 1296MHz operations as I have to keep the Versatower almost permanently wound down!

Microwave operation is not helped by the fact that the now defunct West Midlands County Council planted screening trees in the park at the end of some neighbours' back gardens. These trees are now 25 feet high!

Peter, G3PHO/P (IO93PW37) operated from a site near Pocklington, on the Yorkshire Wolds. The total of 17 stations worked on 10GHz and 12 on 5.7GHz was well down on the normal tally. Best DX on 10GHz included G4ZXO/P (IO90TV), G1MPW/P and G6KIE/P (JO00BU) and M0GHZ(IO81VK) all at the 300km or more mark. A test with F6DKW (JN18) saw an exchange of beacon dots but no QSO, the signals being right on the noise floor. Perhaps some sort of computer type DSP will have to be used next season! 5.7GHz was in better shape than 10GHz but activity on this band is not at the same level. However, a very satisfying CW contact was made with G4ALY (IO71VL) at 453km.

From: David G6KIE [david@banksd.fsnet.co.uk]

Steve G1MPW/P and Dave G6KIE/P were back at Firle (**JO00BU**) for the September 10GHz Cumulative after a visit to JO03 square in August. Conditions were not great up at Firle and a bit variable. 2m talkback was up and down and the whole day was a bit of a struggle with long periods between contacts in spite of repeated calls. It always amazes them how some people are up in double figures by midday while they can count theirs on a single hand.

By the afternoon with the wind getting stronger, they were up to double figures with G3PHO/P (347k) and G3LRP (322k) best DX of the day. GM3UKV/P was raised earlier on 2m but nothing heard on 3cm. Then just as they were considering calling it a day, up popped G3LTF, M0GHZ and G4NNS, all on the tail of each other A total of fourteen stations were worked by the end of the day.

Steve was testing a new dish, of unknown origin, with a scalar feed which seemed to perform better than his PW dish and penny feed. For next season some means of turning the dish remotely must be investigated so that operation from the car is possible in bad weather when the wind makes it difficult to listen even on cans.

From: Mike, G0JMI [mike.karen1@tesco.net]

I was active for the 10GHz contest on 19th September from Home QTH (**IO91MD**). I worked the following (using the Fly Swatter and 10w on 3cm as per usual): G4ZXO/P at IO90WV SSB. Received 5/7, gave 5/8. 65km distance. G3PYB/P at IO90LU SSB. Received 5/9, gave 3/7. 33km distance. G8VOI/P at IO90MX SSB. Received 5/9, gave 5/9 (off Air Plane Scatter we think!). 18 km distance. G1JRU at IO90HU, CW received 3/1/4, gave 2/1/7. 44km distance. G4NNS at IO91FF CW. I received 3/1/9, gave 3/1/5. 42km distance.

From: G3UKV M.Vincent [ukv@globalnet.co.uk] GM3UKV/P Galloway, IO74UU

Dave (G8VZT) and myself (G3UKV) had decided to at least get on this year from somewhere outside the Shropshire borders. So we headed up the M6 on Saturday for the Mull of Galloway in atrocious weather, having made contact with a known land owner previously. We had several attempts to get on the desired site (Barholm Hill) but, apart from scraping the underside of my Ford Focus to bare metal on a concealed rock, could not get enough grip on wet grass to even approach the 300m ASL mark. So we settled for a lower site, still within IO74UU at about 100m ASL, and put up the tent. Sunday dawned and so did the rain for almost the whole day. It wasn't that short, sharp 10GHz reflecting sort of rain but horizontal, Scottish mizzle, where no gap between sky and sea could be discerned for most of the time! Transmitting at 10 and 5.7GHz felt like feeding RF into a wall of water. Whereas in 1997 we had 14 successful QSOs on 10GHz, this time we had just three two way QSOs (G4BRK 397Km, G3PHO/P 252 Km, GW8AWM/P 342 Km) and a one-way with G4ZXO/P at Therfield (562 Km). On 5.7GHz, we worked only G4PBP (289 Km) and G3PHO/P (252 Km). However, we are very grateful to the 16 stations who had a go with us. The "expedition" may have been a washout, but at least it wasn't for lack of trying.

From: Frank GW8AWM/P, IO81NV [frank@simplehappy.co.uk]

Another good day on the hill, and I was especially pleased to work a new country, Scotland. Many thanks, Martyn, GM3UKV/P. However, congratulations must go to Martyn and G4ZXO/P, Jim for a 521 km contact, which I believe they completed as I was packing up, between Scotland And the south coast. *(ACTUALLY IT WAS A ONE WAY ... EDITOR)*

Here's a warning to all hill-top operators:
Despite trying very hard not too, I inadvertantly allowed a sheep, one of about 500 on my hill top, to escape into a lower field as I drove through a gate off my hill. The farmer was quite relaxed about it when I told him but if you do not hear me next month, then you know the reason why!

September 24GHz/47GHz Cumulative

From: John G8ACE/P, IO91CL [usuallyqrt@dsl.pipex.com]

Peter G3PYB, Mike, M0MJW and myself activated Hackpen IO91CL21 in excellent sunshine for the 24/47GHz activity and took along 76GHz gear just in case. Activity seemed to be at an all time, low with fewer stations active than there are high power amps for 24G in the UK, never mind counting the half watters! There was just GW3PHO/P active from the Blorenge and Roy G3FYX/P and Chris G8BKE/P active from Tog Hill and later Landsdowne, plus ourselves. Hackpen was chosen specifically for first qsos with GW3PHO/P on 24G and particularly 47G in the south. We were not disappointed. The 24G signal from GW3PHO/P at 94km, was enormous and sent the S meter to new levels for that band. 47G was also excellent with FM copy on my new little rig with an 8" ex 38G cassegrain dish. There was a little qsb from multipathing but caused little difficulty. Tog Hill was not a good location for working east and so Chris and Roy relocated at midday but their second chosen site proved to be unsuitable and so they moved onto Lansdowne. We had contacts on 24 and 47G but the path was unsuitable for 76G. Their very first site choice of Cleeve ceased to be an option when it was discovered ditches had been dug to deter bikers, also preventing Roy and Chris getting access. That scuppered the best possiblity of 76G contacts. Unfortunately I had left the close up lens set on my camera and so my pictures are rather soft. Some thumbnails are on my website for anyone interested in viewing the Hackpen operation.

http://www.microwaves.dsl.pipex.com/

An array of tripods and dishes to be seen.
73, from John, G8ACE

From: Mike G0JMI/P, IO91KA [mike.karen1@tesco.net]

Del, G1JRU, and I worked each other during the 24GHz Contest on Sunday 5th September as follows: My /P QTH: IO91KA, Beacon Hill, Warnford, Hants. G1JRU at Home QTH: IO90HU, Hythe, Southampton.RST both ways was 5/9. Distance 26km. Modes went from CW, SSB then to FM! My system: DB6NT mixer and amp. Approx 10mw o/p into 18 inch dish.

Mike, G0MJW[m.j.willis@rl.ac.uk] sends in the following resume of his 24GHz contacts this year:
G8ACE/P 04/04/2004 1350 24048.1 F3E 59001 59002 IO91JA from IO91GI (Walbury Hill) 1st 24GHz QSO 41 41
G8BKE/P 04/04/2004 1445 24048.1 J3E 55002 55002 Rain Scatter QSO IO91GI - IO90EV 52 52
G3UKV/P 01/05/2004 1435 24048.1 A1A 21R001 21R001 IO82QL From Bury Down IO91IN23 - very difficult QSO! 137 137
G8IFT/P 01/05/2004 1600 24048.1 J3E 59002 59001 IO92GB From Bury Down IO91IN23 - very strong 24GHz QSO! 57 57
GW3PHO/P 05/09/2004 1118 24192.1 J3E 59001 59005 IO81LS From Hackpen IO91CL 92

GENERAL ACTIVITY REPORTS

From: G3XDY, JO02OB [g3xdy@btinternet.com] Sent: 09 October 2004

A quick update following the IARU UHF Contest this past weekend: Conditions were fairly flat on the Saturday with some rainscatter to PA0, and a little better on Sunday. My 2m talkback antenna had a fault and was u/s so the higher band contacts were set up by QSY from 23cm, or on ON4KST/WW Convers.

1.3GHz
59 QSOs, Best DX OK2KKW in JO60JJ at 827km. Other good DX (>500km) included DL3YEE (JO42), DL0GTH (JO50), DL3YCW/P (JO41), DF9IC (JN48), DK6AS (JO52), F6KSL (JN28), DK9IP (JN48), DL3IAS (JN49), GM4LBV (IO86).
2.3GHz
33 QSOs, Best DX DL3IAS in JN49EJ at 585km. Other DX (>400km) DK2MN (JO32), DL3YEE (JO42), and DL0VR (JO31). DL3IAS is a new square on 13cm. I was using an 80cm offset fed dish dedicated to this band rather than the usual azimuth displaced feed on the 60cm dish, it appeared to be >3 dB better on receive and worked well in the contest.
3.4GHz
10 QSOs, Best DX DL3IAS in JN49EJ at 585km. Other DX DK2MN (JO32) and DL0VR (JO31). DL3IAS is a new square on 9cm.
5.7GHz
15 QSOs, Best DX DK2MN in JO32PC at 416km. Other DX PA6C (JO33) and DL0VR
(JO31)
10GHz
23 QSOs, Best DX DH8AG in JO31RL at 384km. Other DX DK2MN (JO32) plus DL4BBU/P and DL0VR (JO31)

From: John G3NWU, Hartlepool, IO94 [g3nwu@yahoo.co.uk]

During the first week of September I caught the tropo lift with my 10yr old 3cm rig ,fed with 10ft of wg16 up through the roof to a 20dB horn rusting away and just seeing through top of many trees! I heard following: GB3MLE (both north and south beacons) and strong enough 2 hear both keyers leaking onto each other carriers. Other beacons heard were: GB3SXC on .903, GB3SCX on .913, DB0GHZ on .804 in JO24WE, SM6MHI/b in JO70XQ. I am trying to replace the 20dB horn with a 90cm dish and a new DB9NT transverter, as soon work and
weather permit.

From: Rob M0DTS, IO94IL (just south of Stockton) [rswinbank@customnet.co.uk]

I've just got my 3cm transverter from DB6NT built up and just have had a little play testing it out. I've got a 60cm dish with an old LNB gutted and mounted on the dish. I'm feeding a bit of semi rigid coax bared off at the end and poked up into the LNB's horn and that's going into the transverter (really simple !!). I can receive GB3MLE on 10368.920MHz with the dish on the front garden. It took me 2 hours to make out if it was a beacon not just some odd spurious signal!! These microwaves are a bit new but I'm getting there!

From: Adrian G8PSF [adrian.g8psf@blueyonder.co.uk]

I have now finally re crystalled for 24.048GHz but now have to sort out WG switching ,PA, Preamp, WG re routing and all things wire!!! I'm getting there as, BELIEVE IT OR NOT, my replacement 24.048 WG Filter has finally arrived back from MICRO MEKANIK in Germany! It is a spanking new mechanical re-design by the looks of it and a vast improvement on the old "build" previously supplied (which proved totally "dead" ie no tuning resonace AT ALL at 24.048GHz, or at any other frequency actually!) Never mind ... "All's well that ends well".

From: Bryan G9DKK, IO91 [bryan@harber.f9.co.uk]

A quick update on the tropo opening of early September: I managed to work some of the stations I could hear but my poor take-off to the east is always a problem. For me, the highlight of the week and best dx this year on 3cm was John, GM4LBV in IO86RQ worked 59/55 for a new country and square. I was hearing GB3MLE(IO93EO) from Tuesday through to Friday morning at strengths up to S7. On 23cm I worked GM6VXB (IO97AQ), GM4LBV (IO86RQ), GM4ZUK/P (IO86RW) G4CCH (IO93QL), G3YJR (IO93FJ). The most frustrating event was hearing LA4SHF/B for 4 days continuously but not a single LA heard on 23cm! I saw several cluster spots from others (eg. G3LTF) spotting the beacon but I don't think anyone from down here worked an LA - must dig around my professional contacts in Nera Telecom in Bergen!

That's all for this month. Check my website for the latest Operating Ladder positions ...
73 from Peter,G3PHO

Report on the 11th EME conference, August 2004

The conference was held at Trenton NJ with 75 attendees, well organised by Al Katz, K2UYH and Marc Franco, N2UO.The Europeans were, sadly, not very well represented, I was the only G plus Dave DL4MUP: also there were HB, I, DL, ON,OK,SM ,S51 and F in the person of F5SE, son of F9FT. The technical programme was interesting and well balanced, There was an excellent programme for the spouses and evening visits to the QTHs of K2UYH and K1JT for food, drink and talking! It was, as always, great to meet in person people that one had worked off the moon for many years like for example, KU4F from central Florida who is now on his second 40 ft dish and active on 432 and 1296 MHz.

There were several papers of interest to the general microwave community. Bob N4HY gave an excellent round up of the on-going work on software-defined radios with emphasis on 144 MHz receivers, much of it based around the SDR1000. There were many web references given in his talk, probably http://www.sdradio.org/ would be a place to start. Franc, F5SE described his development of a method of very high accuracy EME Doppler calculation. Most of the popular EME prediction programmes contain significant approximations, which show up when you get to 10GHz and above. Al, K2UYH is a long time proponent of stress dishes where the ribs are tensioned to give an approximation to a parabola. This time he described an interesting variation, a 7.5 ft portable offset stressed dish for 1296, with the objective of making it aircraft baggage size to put new countries on the EME map! It could be useful for tropo as well.

Zdenek, OK1DFC updated his work on the septum fed horn which provides a simpler way to get CP than most other polarisers, it is basically an open wave guide feed and needs some shaping to make it efficient, see www.qsl.net/ok1dfc for more details and design data in spread sheet form. Marc, N2UO described his 500W 1296 MHz PA using two of the low cost Russian triodes, GI7B, combined with 3dB hybrids. It is constructed entirely from standard (US) plumbing parts, so no lathe work is needed. I had the opportunity to see the amplifier at N2UOs QTH and it really is an excellent piece of design work and practical realisation. Paul, W1GHZ gave an excellent paper on the subject of Multiple Reflector Dish Antennas dealing with Cassegrain and Gregorian types and containing much design data and well supported with references. The real advantage of the Cassegrain in correctly shaping the feed pattern is most applicable to deep dishes of diameter greater than 100 wavelengths. I suspect that much of the design data is available on his website. Joe, K1JT presented a paper on the fundamental limits to weak signal communication dealing with the development of the JT44 and JT65 digital systems now used extensively on MS and 144MHz EME and less frequently up to 1296MHz. There is no doubt that these schemes enable contacts to be made at lower S/N ratios than conventional CW but they do require precise frequency setting and are less effective on paths where there is Doppler spreading. We should do more experiments with this in the microwave spectrum. Joe described a new mode, to be released soon, with an even higher level of source encoding called JT1. For more details, see his website.

Gary, AD6FP, described progress towards 47GHz EME by the Stanford Club. The key problem for all the stations working on this band is to obtain a TWT that gives enough power. With 1.8m dishes, that is about 35W. Fibreglass dish performance was improved by glueing aluminium foil directly onto the surface. Cooling the LNA to liquid Nitrogen temperatures lowered the NF from 4.2 to 1.7dB.They have yet to hear echoes but since the conference this has been achieved by Sergei, RW3BP who has also been heard by VE4MA and W5LUA Finally there was a written contribution by Paul W1GHZ on improving the dual band 10/24GHz feed based on the W2IMU design. The next conference will be held in Wurtzburg Germany in 2006 organised by Rainer DF6NA.

A copy of the CD of the conference proceedings can be obtained from Marc Franco N2UO at lu6dw@yahoo.com, price $8 including post and packing.

Peter Blair, G3LTF