An Amateur Radio publication for the Microwave Enthusiast

scatterpoint

Published by the UK Microwave Group

2007 APRIL

G0MJW carefully measures the gain of a 24GHz dish antenna at the test range set up at the QTH of G4NNS as a part of the highly successful RAL Microwave Round Table weekend, held at the end of March this year. Listing the results (left) is David, G6GXK, while on the right are John, G8ACE and Dave, G0RRJ watching with interest
See inside for a full report and a table of results.

The photos of RAL came from G0RRJ, G4ALY and G3PHO.. Many thanks all.

In this issue ...

Latest News ...

- **RAL Roundtable a huge success**
- **G3PFR receives his UKuG Life Time Award**
- **ON4KST is presented with his UKuG Award**
- **New Laser ATV distance record**
- **Olympic Games could see UK 10GHz amateur band withdrawn for the summer of 2012**

MANY THANKS TO ALL OUR CONTRIBUTORS THIS MONTH ... WITHOUT YOU THERE WOULD BE NO SCATTERPOINT!

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From the Editor's Desk

Many thanks to all those who have contributed articles and other information to this issue. However, we are still short of activity news.. Much is posted on the UK Microwave Reflector but we should remember that not all readers of Scatterpoint look at the reflector so please send your news to me as well as posting it on the internet.

Last month, we asked for beginners' material and we were not disappointed. Richard, M1RKH sent in two items, the first of which is published this month. More is very welcome as we'd like this to be a monthly feature of the newsletter.

Last year, UKuG passed a motion to offer free membership to any one under 21 years of age. To date we only have four members in this category. If you know of any "budding" young microwaver then let him know of this facility. The free membership includes an emailed version of Scatterpoint. Of course, the freebie expires on him/her reaching 21 years of age!

Finally, UKuG wishes to thank Dr Mike Willis, G0MJW, and Brian G4NNS for putting on such a good microwave event at RAL last month. The Committee have plans to extend the microwave round table calendar to include venues in the West Country and the North of England. More information on this will appear as plans develop. If you have a venue to offer or have contacts in a University or College Electronics department, where a day's microwave meeting can be set up, then the UKuG Chairman, G4NNS would be most interested to hear from you. His contact details can be found at the top of this page.

73 from Peter, G3PHO, Editor

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News, views and articles for this newsletter are always welcome. Please send them to G3PHO (preferably by email) to the address shown lower left. **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.

- **Welcome to new members this month**
- Scatterpoint is produced in both email (PDF) and printed paper versions.
- Approximately 66% of members take the emailed version of Scatterpoint
- The emailed PDF can be sent to you in booklet format, for you to print out as a paper booklet at home, or plain single page format… just ask the editor!
- Scatterpoint is published around the 22nd of the month
- There are 10 issues a year

SUBSCRIPTION ENQUIRIES SHOULD BE SENT TO THE UKuG GROUP SECRETARY AT THE ADDRESS SHOWN AT THE TOP OF THIS PAGE AND NOT TO THE EDITOR OF SCATTERPOINT

Some notes on the Alcatel White Box

...by Brian Coleman, G4NNS

Some months ago, Christian, F1DLT, obtained an Alcatel "White box" for me. The markings on it were:- 9925RB - Model/ICS number 3CC10064AAA11. The IF module (marked 3CC10608AAAA) had TX IF marked as 1848MHz and RX IF as 840MHz.

I quickly identified the PA module as being useful for 24GHz and built it into my 24GHz EME system as a driver for the TWT. It has not been until January 2007 that I finally found time, over a wet weekend, to look at some of the other components in the "White Box".

Starting with the very useful site Petit Forum sur les "boîtes blanches", **http://f1chf.free.fr/boite%20blanche/forum.htm** , (or search on 9925RB on Google), I decided to test the TX and RX modules to see if they could be used on 24GHz with an IF of 1296MHz. I used an old Microwave Modules 144 -1296MHz transverter the PA of which had long ago expired. The driver was providing some 150mW so with a 10dB attenuator provided about the right amount of drive to the TX mixer. Here are the results:-

The TX Module

Markings on units I tested were:-
3CC09017ABAA 01 GBY311 and 3CC09017ABAB 01 GBY311

The TX Module requires +6V and takes in a local oscillator at 5-6GHz, doubles it and splits the power for use in the (harmonic) mixer of the TX module and provides an ~ 11GHz output for the RX module. For a 1296MHz IF I supplied 5688MHz at +10dBm from a signal generator to the Local oscillator input which is marked "SY" See Fig 1

I then applied some 1296MHz (about +10dBm) to the IF input which is marked "FI".

The system produced a nice clean output at ~ 24048MHz of about –10dBm at the male SMA connector. The frequency is approximate because I was using a free running signal generator (sweeper) not a crystal controlled source.

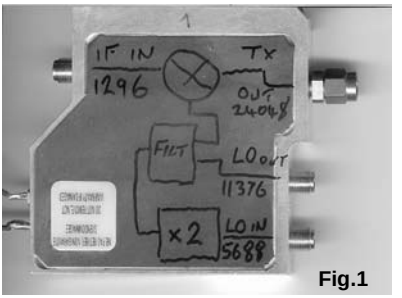


Fig.1

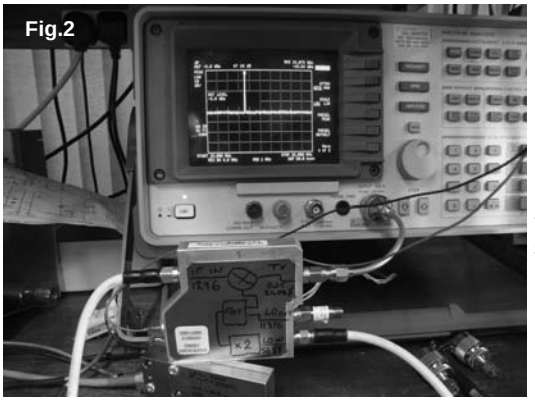


Fig.2

See Fig 2 (left)

I also tested the LO output for the receive module (marked RX) and found that the 11GHz signal level was about +13dBm. I took the input frequency up to 6012MHz so the o/p was 12024MHz and the output level did not change significantly. A useful multiplier / signal source in it's own right.

The RX Module

The markings the units I tested were : 3CC09078ABAA 01 GBY111.
The RX module requires +6V and –5V. With the LO at ~11GHz from the TX module connected to the LO input (marked TX) I looked for an output at the IF connector (marked FI) whilst running a Gun oscillator on 24048MHz a few meters away across the shack.

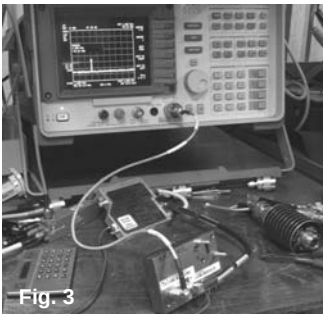


Fig. 3

Fig. 3 shows the 1296MHz signal at the IF connector.

So the RX seems to be quite sensitive. Later testing with a PANFI indicated that the system noise figure was about 2-2.5dB..not bad ! Christian F1DLT and I took the unit to a nearby hill to listen for GB3SCK at 77Km and copied it at about 53 with just a 10dB Horn.

PA Module

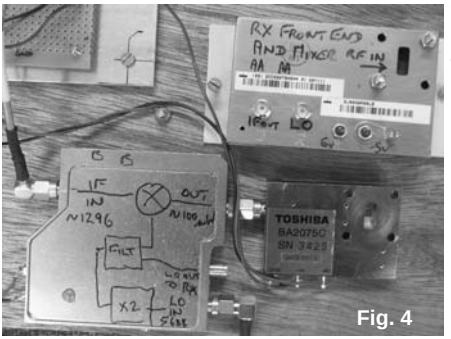


Fig. 4

This is a Toshiba BA2075C. When configured as shown in Fig 4 (the PA module is bottom right) and with +10dBm of drive at 1296MHz, the PA output at 24048 was about 300-500mW. I feel that whilst the TX module was in compression at this level, the PA module was not, so with some additional gain between the modules it may be possible to get more Power... maybe about 1W.

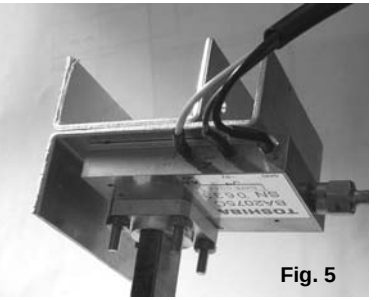


Fig. 5

Both the RX module and the PA module require a heat sink. As a guide, I used about 40 cm^2 of 2mm thick aluminium for the PA (see Fig 5).

Local Oscillator

Having tested the system on the bench, using a signal generator as the LO, I built an OCXO for a 118.5000MHz crystal (G8ACE Design) and a multiplier to 2844MHz (G8ACE Design see **http://www.aoxi24.dsl.pipex.com/5g7/losource.htm**) followed by a doubler to 5688MHz. With this more stable oscillator the system was ready for field testing.

System configuration

While I have not yet built these modules into a complete system, there would seem to be two different approaches. If you have a waveguide switch (such as the RelComm units from ZL) the PA and RX modules could be connected directly through the waveguide switch ports to a dish. Alternatively, the PA and RX modules could each be fitted with their own horn so that no change over relay is needed. I have not yet checked that the isolation will be sufficient with two horns mounted side by side and so close together but I am hopeful that it will be. This would make a

very simple system. 25dB horns look practical and the whole unit would then fit in a plastic box which might be suitable for the mast head.

As a driver at 1296MHz I used an old Microwave Modules MMT1296 transverter that had it's faulty PA removed. The driver provided about 150mW and required only very simple re wiring to the output socket and addition of a 10dB attenuator to drive the "White Box" transmit module. As a future development it would be possible to make a very simple 1296 – 144MHz transverter using just an 1152MHz oscillator / multiplier, a mixer and one or two MMICs.

Conclusion

If these Alcatel "White Boxes" can be purchased for about 50 Euros they would seem to provide an inexpensive means of getting going on 24GHz. All you have to add is an oscillator and multiplier chain to 5688MHz a power supply and an antenna. If you do not have a (WR42 or WR28) waveguide switch, it should be easily possible to make a system with two 25dB horns. The receive performance is quite good at about 2.5dB or better NF and output power of 300-500mW is quite useful. The whole system could be built into a weatherproof box and mounted at the mast head for home station use or it could form the basis of a very compact portable system.

Additional Notes

See also http://pom2pin.net/radioamateur%2024ghz.php for notes on the work of Fabien, F8ESA, who is using a 432MHz IF.
Charles, G4GUO, got a white box from Anchor Surplus in Nottingham. It contained:-
GBY311 (07) 3CC09017ABAB-01
GBX 434 3CC10676ABAA-01
GBA401-2 (04) 3CC09668ABAA-01
WWY401 3CC10685AAAA-01
GBY111 3CC09078ABAA-01
GBA 280-5 3CC08796AEAA-5
BA2075B
GBA255 (06) 3CC08467ABAA-03


Photo by G8KQW

ON4KST RECEIVES UKuG SPECIAL AWARD

Alain ON4KST, was presented with his award (see November/Dec 2006 Scatterpoint) receiving his inscribed quaiche in Brussels on 21st March from the UKug Secretary Ian Lamb, G8KQW. Alain (on the right in the photo) was actually very touched and didn't expect anything more than a certificate at best! Visit www.on4kst.com to see just why he deserves the award.

Power measurement at 24GHz:
… a simple idea for Marconi 6460 power meters

By Gordon Fiander G0EWN

With the surge of interest in 24GHz, this simple idea may be useful if you have a Marconi 6460 power meter complete with the 18GHz waveguide transition.

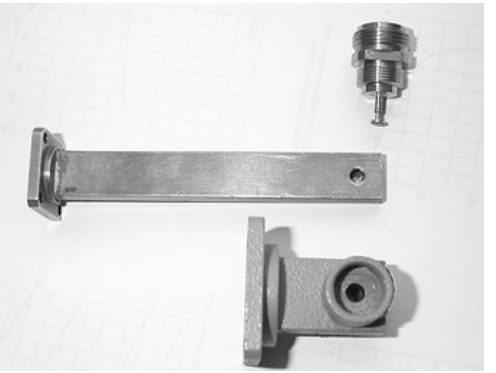
The two most vital measurements the microwaver needs to make are measuring frequency and power. Even the highest microwave bands are usually derived from an oscillator in the 9 to140MHz range, so by measuring the base oscillator frequency and a bit of multiplication its easy to know the final frequency. Good frequency counters measuring 200 to 600MHz are common and relatively inexpensive. Few measure frequency above 1300MHz directly, so it's easier to measure the base oscillator prior to the multiplier chain.

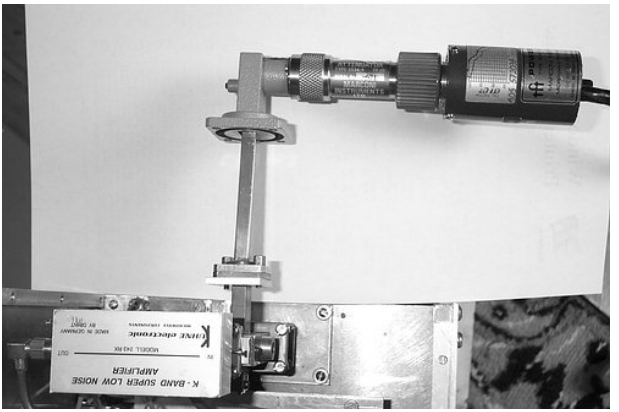
Measuring power is more problematic. Simple diode detectors seem to work well up to 6GHz or so, if made with care. A good modern power meter is an expensive item so many of us end up using an older series power meter such as the Marconi 6460. These normally come with a power sensor capable of measuring up to 18GHz. Marconi did manufacture waveguide input sensor heads for frequencies above 18GHz but these are ***rare!*** If you have a Marconi 6460 and it came complete with the front and rear cover ends (these have molded foam inserts that house the power cord and sensor / attenuator) you may well have a WG 18/ N type transition. If this is the case and, you have a short length of waveguide 20, with a suitable flange to connect to your equipment, you are in business.

Carefully unscrew the N type from the transition. Square off your waveguide 20 and carefully seat /align it inside the WG 18 transition using shims, and then use the original matching screw as a clamp screw. Using a drill the same dimension as the hole through which the N type sensor was mounted, drill a hole through one wall of the WG 20. Disassemble and clean/ remove bits of metal from drilling. Then reassemble this time with N type in position. Now you will be able to connect your Marconi 18GHz power head to your 24GHz system and measure power. Note the measurements will no longer be accurate—in fact the meter will read about 3 to 4db less power than your system actually produces but at least you will be able to see 24GHz power on your meter and make relative measurements. You might even be able to calibrate the transition/ power sensor combination. Matching screws on the WG 20 section may also improve the situation. For such a simple fix its better than nothing---its always good to see a meter move when you key the transmitter!!

Check the accompanying photos as pictures speak a thousand words.

Parts before assembly





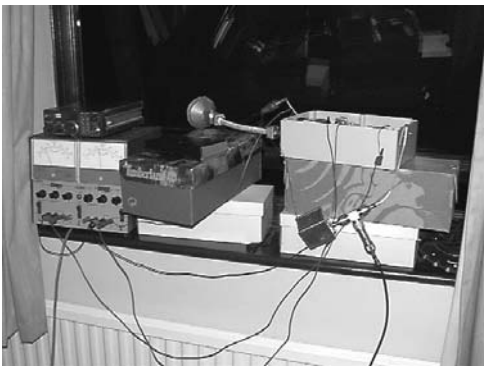
The completed power sensor transition in use

Through-the-Window Microwaves!

From: John, G4BAO

Photo (right): Picture of 'Heath Robinson' used to receive G4BEL 589 on 24GHz over an 11km path recently. The feedhorn is poking at the window!

Editor's comments: It seems everyone is trying to get in on my act! Last month it was G4FSG with his indoor 23cm and now it's John on 24GHz! It's nice to think we Northerners can teach the East Anglians a thing or two about working microwave DX !!



RAL 2007 - Report and Pictures

The annual UK Microwave Round Table meeting at Rutherford Appleton Labs was once again a resounding success, with 78 attendees on the registration list, including DX in the form of Doug Friend, VK4OE and Steve Krull, WB0DBS.

This year we tried a different format in that the whole morning was free of lectures so as to facilitate more socialising among those present. In addition, the Bring and Buy tables and the talks all took place in the same hall. This actually turned out to be a good thing as most people had little choice but to attend the talks, whereas in previous years there has always been a contingent who stayed in the lounge area to have a chat and another look around the surplus bring but not attend the lectures.

The meeting was in fact a two day affair, with Saturday being held at the QTH of Brian G4NNS, the UKuG Chairman. There, an antenna test range was set up with the help of David, G6GXK and some very interesting results obtained (see the measurements list). On Saturday evening, a well attended dinner took place at the Red Lion, Clanville. It is rumoured that afterwards the G4NNS "microwave backpackers hostel" was fully booked overnight! The lucky folk who stayed with Brian even had a complimentary packed lunch provided on Sunday!

Sunday's surplus bring and buy was certainly down in quantity on previous years but was not lacking in quality. Where were the South Birmingham lads? They were sorely missed at the Bring and Buy tables.

Mike Dixon (left) receives his award from Peter, G3PHO

The Chairman's welcome after lunch, was followed by the presentation of Contest Certificates and Trophies. Some of these can be seen in the photographs on the next page. The highlight of the presentations however was that made to the retiring RSGB Microwave Manager, Mike Dixon, G3PFR. Mike has faithfully served the UK microwave fraternity for several decades, often to the detriment of his own microwave activities. In recognition of what he has done for us all, UKuG presented him with a special Lifetime Achievement Award. This was in the form of a silver quaiche, suitably inscribed (see photo left). Mike assures us that he has the necessary brown Scottish liquid to pour into the vessel and will be using it quite regularly!

The talks were extremely interesting and thought provoking. Sam Jewell, G4DDK described a way of getting onto the 134GHz band, including using some ideas gleaned from the 2005 Martlesham meeting when Brian Justin, WA1ZMS, showed us how he got onto these bands. Murray, G6JYB, the new RSGB Microwave Manager, brought us all up to date with the latest spectrum issues. Beacon builders and keepers should read the Ofcom website very carefully and regularly these days!

To round off the afternoon, Robin Lucas, G8APZ gave a most interesting and rather awe-inspiring account of how to set up a portable VHF/UHF/SHF contest station. His own contest group, M1CRO/P, do not do things in halves as the photos shown on the day made very clear!

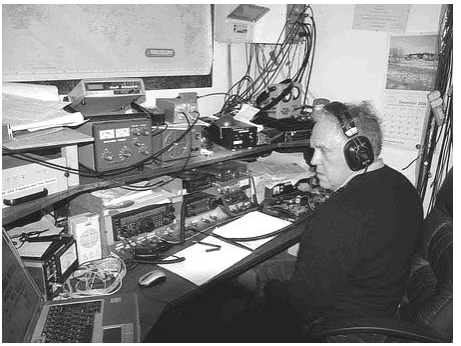
All the talks will, of course, appear in print in the 2007 UKuG Microwave Proceedings, which will be published in November this year and which will include the 2006 Martlesham lectures as well as other papers specially written for the book.

While all this was going on, Mike Willis, G0MJW, was helping some folk to test their equipment on RAL's excellent test gear. He had already spent several weeks working behind the scenes to help ensure the roundtable took place, in spite of unavoidable logistical problems at the Laboratories. Many thanks Mike to you and all the others who helped to make this event the success it was.

RAL 2007

Photos by G0RRJ, G3PHO and G4ALY

Above and right:
Scenes from the Saturday evening dinner at the Red Lion. Apparently the meal was excellent and a very good night was had by all.



Above: Brian, G4NNS, demonstrates his microwave EME system to his visitors on Saturday

Right: Julian, G3YGF, receives his G3JMB certificate from the UKuG Chairman G4NNS, for his position as leading station in the 2006 10GHz Cumulative Contest series (Restricted power section).

ANTENNA TEST RANGE RESULTS :
RAL MICROWAVE ROUND TABLE MARCH 2007

10GHz Measurements			Level	Gain		
Antenna description	Reading	Range	dB	dBi		
Reference Horn	0	30		12.2		
G4LDR 75cm Lidl offset dish	-6	10	14	26.2		
G4LDR 75cm Lidl offset dish	-2	10	18	30.2	used ref horn as feed	
Horn only	-5	30	-5	7.2		
10GHz Measurements			Level	Gain		
Antenna description	Reading	Range	dB	dBi		
Reference Horn	-2	40	0	17.1		
G6GXK 60cm offset dish	-6.5	20	15.5	32.6		
Reference Horn	0	50	0	17.1		
G0MJW " Mini Squarial"	-1.5	40	8.5	25.6		
G0MJW centrefed 70cm	-1.5	30	18.5	35.6		
G4LDR Horn only	-7	40	3	20.1		
G4LDR 75cm Lidl offset dish	-2	30	18	35.1		
G4LDR 50cms angular dish	-8	30	12	29.1		
24GHz Measurements			Level	Gain		
Antenna description	Reading	Range	dB	dBi		
Reference Horn	-4	60	0	20		
G6GXK 60cm offset dish	-8	40	16	36		
G0MJW 45cm Procomm	-6	40	18	38		
Reference Horn	-1	60	0	20		
G4LDR 15dB Std. Horn	-6	60	-5	15		
Home made feed horn	-7.5	60	-6.5	13.5		
G4LDR 75cm Lidl offset dish	-2.5	40	17.5	37.5		
G4LDR 60 cm G- pro dish	-5	40	16	36		
G8ACE 30cm dish	-9	40	12	32		
G4LDR 40 cm dish	-8	40	13	33		
G4NNS 24GHz GD source	0	40	shows 21dB improvement			

NOISE FIGURE MEASUREMENTS: RAL MARCH 2007

Statistics and comments by G0MJW

Not so many this year ... only 3 people wanted NF. Everyone has their own test gear these days judging by the number of noise heads to be checked, so there is there a need for round table test sessions any more?

CALLSIGN	NF	Gain	
G4BRK 3.4GHz TVTR	4.1dB	21dB	Front end fault, this should be just like G0MJW below
G0MJW 3.4GHz TVTR	1.1dB	22dB	Basic DB6NT based system used to check that the NF meter after G4BRK's result
G0RRJ 24GHz DMC LNA	5.4dB	19dB	These are the ones out of the surplus DMC 22 GHz links. Excellent 8.2V gain block.
G0MJW 24GHz TVTR	3.2dB	34dB	Very disappointing, gain is 10dB lower than it should be and the NF is a dB higher
G4DDK 23cms LNA	0.26dB	40dB	Sam's own design; we all want one of these!

All the noise figures below 24GHz were taken with a proper calibrated low ENR (5dB) head. High ENR (15dB) heads will not give correct results on low noise FET LNAs because of the matching change between noise on and noise off. Quite a few NF test sessions in the past have suffered inaccuracy because of this.

Regards from Mike, G0MJW

COMMENTS BY G4DDK ON THE 23cm PREAMP SHOWN ABOVE

Thanks for the results Mike. The Martlesham RT noise figures are all made using an HP346A (5dB ENR) noise head for the reasons given by Mike.

The 23cm preamp noise figure results agree with those I made using the Martlesham NF gear, so I am confident that the new preamp is giving a very low NF. The RAL gain figure was a few dB higher than I measured. The usual caveats apply, of course. Several Preamps have been made to test reproducability. They all achieved the same measured performance.

This preamp is not entirely original to me. After some difficulties sourcing ATF10135/6 for the WD5AGO low noise preamp, I decided to try using the ATF54143 device in the second stage. As this device is very different to the 10135 it required a redesign of the matching, bias etc to incorporate the new device, as well as a major PCB redesign.

The results were outstanding. Noise went down, gain came up (important for EME use where the second stage contribution may be a from a long cable) and excellent stability to at least 13GHz (the limit of the Agilent analyser). The dynamic range is slightly improved over the original WD5AGO VLNA due to the use of the 54143.

I discussed the design changes with Tommy, WD5AGO, as the design is still basically his, at the front end. He said he is happy for me to publish the design in the UK. It turns out that Tommy is working on a similar arrangement of devices and may well publish that in the USA.

The original WD5AGO preamp claims 7dB input return loss. I never quite achieved that excellent figure. In spite of a lot of modelling I couldn't achieve better than 2dB for the new design and still have the desired low NF. Tommy is getting better results for RL (S11) in his new design (I understand).

The importance of the good RL is that NF uncertainty is lower than with designs with very poor input RL.

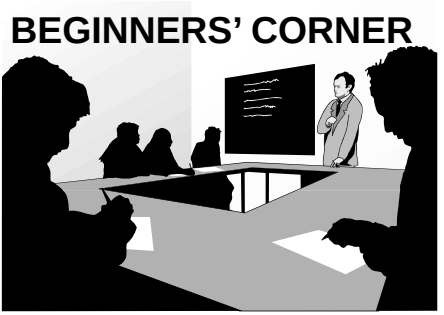
As well as several independent tests of NF, including Simon, G3LQR, measuring sun noise on 23cm (13dB off his dish at SFI of 72) I also checked how the NF increased with added phase change at the input. This indicated that the NF was behaving itself as the phase changed, changing as expected.

I plan to have a batch of PCs produced and will make these available for anyone interested in building a preamp. The design will most likely appear in Scatterpoint.

My thanks to Tommy for his permission to publish the design.

73 de Sam, G4DDK

BEGINNERS' CORNER



From this edition of Scatterpoint onwards we will try to devote a page or two a month to articles that may be of interest to new microwavers. This time we have one on antennas and their location. Many thanks to Richard Herbert, M1RKH, of the Telford and District Amateur Radio Society for this contribution.

Comments and further contributions of material are very welcome.

Does Size Really Matter?

It is often said that you need to get your antennas up as high as possible. At HF, the height above ground can have an effect on the take off angle. At VHF, the reason can be simpler, to get a better line of sight as most signals follow the direct path to the receiving station.

Most VHF signals arrive at their destination via a direct path, or by bouncing off something (for example rain scatter, a building etc) so the height of your mast is important if for example you are planning to talk to someone outside of Telford. Effects such as diffraction or other bending type propagation are less dominant at VHF. What this comes down to is if you can't see the RX station you may have problems communicating between you both.

Step forward Bob. Bob lives somewhere around Stoke. Bob and I regularly have a very good signal between us on FM, even at 2.5W on my FT290. Why could this be so?

Let's assume we both have aerials at 5m height above ground, lets also assume that we are at sea level and then afterwards we'll use some real data. The diagram looks something like this, see **Figure 1:**

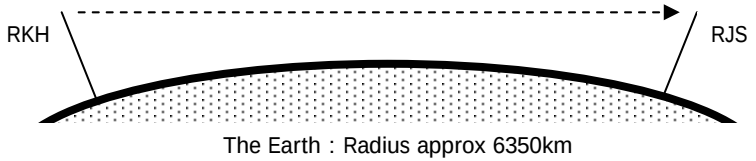


Figure 1: Bob to Richards line of sight path

Remember my aerial is at a distance T above ground. We need to know where about the horizon is, this will be "D" metres away. The distance of my aerial above the centre of the earth is "A+T". Let's go (remembering Pythagoras) ....

$$(A+T)^2 = D^2 + A^2$$

Rearrange this to put D on its own (take A^2 off both sides)

$$D^2 = (A+T)^2 - A^2$$

We need to multiply out $(A+T)^2$, remember this is the same as (A+T) x (A+T), it's the same as 3^2 = 3 x 3, I will give you the answer: $A^2 + AT + AT + T^2 = A^2 + 2AT + T^2$.

So: $D^2 = (A^2 + 2AT + T^2) - A^2$ So $D^2 = 2AT + T^2$

We can make an assumption now to simplify things. A is a lot, lot, lot bigger than T. Do you agree? So the T^2 term becomes pretty small in comparison to the 2AT term.

$D^2 = 2AT$ The same is true for the other triangle : $F^2 = 2AR$

If we know what "X" squared is, if we take the square root we get back to X. I don't know where my square root sign is in this editor programme but we can write it out as $X^{1/2}$, that is X to the power of a half. This is the same as taking the square root.

$$D = (2AT)^{1/2}$$

And

$$F = (2AR)^{1/2}$$

Now we know what the line of sight distance between our homes is, it is D + F:

$$D + F = (2AT)^{1/2} + (2AR)^{1/2}$$

This can be rewritten as:

$$D + F = (2A)^{1/2} \times (T^{1/2} + R^{1/2})$$

Obviously in this case, since both are at the same height D and F are the same and we know A (6350 km or 6,350,000 m), T and R so we can put them in a calculator.

Bob to Richards line of sight path with 5m high aerials is **15km**. Wow, we should be able to shout to each other. So how do we start to model the real path.

Lets start by using some real antenna heights, again assuming we are both at sea level. My aerial is about 10m above ground. Bob's is about 12m. Put these in the same formula and we get the line of sight path is about **23km**. Now we are heading in the right direction. You can see that by adding just over 5m to each side we have almost doubled the line of sight range of our VHF stations. Those extra poles we put in the T-K brackets were useful after all.

I know my house is about 190m above sea level, Bobs is about the same. This increases my effective aerial height "T" to 200 and "R" to 202. Plugging these in gives a path of **101km**.

But our path is not perfect, there is some lumpy land in the way. There is a big lumpy bit about 100m high, in the simplest case this effectively reduces our height above sea level by the same amount. This gives our line of sight path as **71km**. In reality it depends on where the obstruction is, here I am assuming it is right in the middle, somewhere close to the point where we see the horizon (see the pictures above) **in reality it is to one side**. Where the obstruction is influences what we can see on the other side of it as the Earths surface is curved. Between Bob and I we not only have a good line of sight path but the obstructions are probably not too large to affect it.

Now to use a program that will calculate paths between locators that we can use for references (and some data to allow your own calculations):
G3UKV's Locator is IO82RR57, National Grid SJ639158 (52m ASL, 9m Above Ground Level)
Bob's locator is IO83VC26, National Grid SJ845572 (190m ASL, 12m AGL)
Mine is IO82SQ11, National Grid SJ670085 (190m ASL, 10m AGL)

UKV < RKH is 7.9 Km, 156.3 deg / 336.4 deg bearing to/from each other
UKV < RJS is 46.2 Km, 26.0 / 206.2 deg
RKH < RJS is 51.7 Km, 199.5 / 19.3 deg.

From the data above our "as the crow flies" distance between our antennas is 51.7km. We calculated our line of sight path, and it turned out that we could probably be up to 71km apart and still be able to transmit **directly** between each other, though this may mean adding antenna gain or output power to cover a few more kilometres of loss.

You can now see why for even the simpler cases getting those extra few metres on your

VHF/UHF set up will vastly improve your line of sight path. Then you can start to take into account other obstructions. Or to put it another way, this is why Bob and I have a good chance of talking on FM to each other at such low powers over long signal paths. It's also the reason why the microwavers climb up mountains to talk to each other, it has nothing to do with microwaves frying their brains and making them do odd things.....really.

Disclaimer: OK, it's a very simplistic case, and doesn't even start to take into account other variables such as diffraction, antenna gain etc, but it does illustrate the principle. One other way to measure paths is slightly different in perspective. You would use a power budget over the path and account for things like path loss, antenna gain, output power. Of course again, you need to have a way to see the RX station in the first place.

GB3ZME 6cm Beacon

From: M Vincent, G3UKV
<ukv@ukv.me.uk>
22 Mar 2007

The 3400.910 MHz Beacon GB3ZME beacon (IO82SQ) is back on after a few weeks with no P.A. (ie mW output).

Thanks to the Scottish gang, the PA has been replaced, and the cooling system (which failed) is a bit more protected, now.

However, I cannot readily check frequency. It's 26 kHz HF of the South Birmingham beacon at this moment (1600z, Thurs 22 March), so I think it's high. (It was much easier to check when we had multiples of 1152 MHz - ie 3456 MHz !)

Can anyone please check? Reports are very welcome at any time. It would have been fixed sooner if someone had let me know it was off!

Thanks and 73 Martyn G3UKV

Problem Solved ...

In reply to your question in last month's Scatterpoint asking who it was that won the TWT at the Telford Microwave Workshop, well it was John Hutchins, G6ISA (lapsed) .... of all the people to win it ... but it is my purpose in life to get him back in the fold :-)

73 Peter Fambely G0BHP

AMATEUR TV DEMONSTRATION IN NATIONAL SCIENCE WEEK

... from a report by Mike Wade, M0EDU

On Monday 12 March, a demonstration of Amateur TV was successfully carried out in the family area of the John Logie Baird pub in Hastings town centre.

To keep equipment and antennas compact for such a location, the 10GHz band was used, from 1030 to 1430 UTC, between two tables in front of the pub's historical display of pictures and information about J.L. Baird's pioneer television experiments, which he conducted in Hastings.

The 10GHz gear used was a Bob Platts Gunn diode TX into an Amstrad Sat-TV receiver, with a 3cm LNB on the next table. No sound was used as the pub was full of members of the public drinking and talking (!)

The extended display period showed that live transmission could be successfully conducted with the pictures from the pub's own historical display as well as several video recordings of TV films from Germany. These included one of Paul Nipkow who invented the TV disk display system which Baird used.

One of the Amateur Courses for pupils in schools to obtain their own amateur radio licences (previously filmed) was also shown since the demonstration was put on in support of national Science and Engineering Week (9-18th March 2007).

This demonstration clearly showed how it's possible to use a local historical event connected with communications as a platform for encouraging practical scientific experiments in education.

Mike Wade has put in a considerable amount of work in the area of education of the young via amateur radio. Anyone interested in obtaining more information from him, and the complete report of the event above, should phone him on ++44 (0)1424 882283. Mike is keen to point out that the young should be steered towards the truth that one is a user on the Internet but an explorer of science when using amateur radio.... two very different things when it comes to understanding. It behoves us as radio amateurs to contact our local schools and offer to set up a demonstration of amateur radio and to liaise with teachers in a variety of school departments.... Science and geography come to mind. Many thanks Mike for your efforts.

10GHz and the Olympic Games

Thanks to G8KQW and G6JYB for the following comments and observations)

On the 15th March 2007, Ofcom published a discussion document on 10GHz and the London 2012 Olympic Games and Paralympic Games. The document proposes a condition that could be included in the licences that are awarded if Ofcom decides that it may need to make spectrum available to meet the needs of the Games.

Ofcom continues to consider how to proceed with awarding wireless-telegraphy licences to use the 10GHz, 28GHz, 32GHz and 40GHz bands and plans to publish further documents in the spring.

Further information can be found at:

http://wwwofcom.org.uk/consult condocs/2012olympics/ <http://www.ofcom.org.uk/consult/ condocs/2012olympics/>

The Ofcom document seems to put the 10GHz amateur band into some jeopardy during the time the UK will be staging the Olympic Games in 2102.When the document came out the UKuG Committee were naturally rather alarmed at the thought of some, if not all of our main "bread and butter" microwave band being taken from us over quite a long period. *("Goodbye 10GHz Cumulatives" was the first thought of your editor!)*

Murray, G6JYB, our Microwave Manager, comments as follows ….

"In the Ofcom pdf please read 3.3, 3.4 and 3.5 bullet point-3 carefully. It doesn't quite say 'Vacate 10368' but clearly implies it could be used. If it were needed, there is no doubt we would have to keep out the way (BATC and Amsat already agree we should - the former being big 10GHz users as well).

For the moment, Ofcom's attention is on the auction sections which is where we want it to be but it certainly does not guarantee (today) that 10368 would be free of this, and I will bet that replies from prospective bidders will focus attention onto our side of the line! (NIMBY?)

Do remember that we are Secondary at the best of times. This situation has a binding International Treaty obligation to cover all media needs so if Ofcom are short of spectrum we will need to accept it on the chin for perhaps up to six months. Even the M.o.D PU has to buckle to this one. Others who will shortly be paying millions will also have to cede. However, at the present time, I expect most of the bands needed will be non-amateur ones …. we haven't seen the full list yet.

If it came to Ofcom needing spectrum, I have little doubt there would be a shutdown in the affected area - its worth reading up what happened to the amateur bands in Australia during the Sydney Games. Also, take a close look at the licence mod they propose for the auction segment in Sec 3.8 - it's a full clawback - not a sharing situation for that period.

My current plan is to publicly support that clawback condition in the auction segments as part of the ongoing tactics to favour PMSE in the auction and mitigate longer term damage to the Amateur Satellite Service who have bigger problems with this auction than just a 6 month outage

RSGB will put in a joint position time ahead of the deadline, bearing in mind that this consultation is fundamentally about the Auction. I don't intend to volunteer 10368MHz, but we will cooperate if we have to… (gritted teeth if necessary)

We also need to wait for the fuller picture on lots of other bands in a few months when Ofcom launch the full Olympics consultation to see if we have another one affected. After that we will have loads of time to plan around it.

24GHz News

This band seems to be on a rise at the moment with several new stations emerging, mostly from home. This is also be good news for the "portable only" operators who may now find stations to work in what used to be millimetre bands deserts!

Sam, G4DDK (JO02PA), writes about his home station that he put together in early March this year:
Having had home-to-home QSOs with both John, G4EAT, and Robin, G8APZ, on my new 24GHz system, I am again getting that nice feeling about the band that I last experienced back in the 1990s when working Simon (G3LQR), Charlie (G3WDG) and some of the Continentals.

The effort to get 24GHz systems to work properly should not be underestimated. This is a band that requires care in construction at all stages. Even things taken for granted on 10GHz need extra care on 24GHz. For example, I carefully strapped my camcorder to the top of my 24GHz transverter and wound the mast up with the camcorder running on record. I wanted to repeat what I'd done at my Kirton QTH. I wanted to see what the 24GHz system could 'see'. I put partial zoom on and set the thing off.

I reckon my mast is vertical, **but,** to the north, I could see only the ground. The horizon was just off the top of the screen. By the time I was round to the south the horizon was below the screen. If I used a larger dish with small beamwidth I would be losing precious signal. Some form of elevation is almost certainly required. That is the next thing I need to add to the system.

I have been doing daily 24GHz tests with Simon, G3LQR. Simon has an 'interesting' higher power 24GHz SSPA from a European manufacturer. After some careful filter re-tuning and re-testing over our 25km path, Simon has optimised the power output on 24048 and signals from him are now huge at 25km. We use 24GHz for our FM chat channel. It's cleared the local QRM from remote weather gauges, intruder alarms and everything else on 433MHz!

Do look for Simon on 24GHz in the future. He has a 2m EME array for talk back!
73 de Sam

April Update on the G4DDK 24GHz activities
Simon, G3LQR, and I have continued to check the 24.9km non-LOS path between our homes over the last few weeks. Testing is done at least once a day and often twice a day. Tests are usually done with the mast down at my end. That means that my 24GHz dish is looking directly at the ridge of my house. There is a major mixed tree wood (part of Tunstall forest and just east of Sutton Hoo) at 10km from my end of the path with trees that block the path at k=1.33. Without the trees (extending approx 1km) the path would be just LOS but with the hill extending well into the first Fresnel zone. A second hill, near Wickham Market (16km from here), also extends into the first Fresnel zone, and may also have trees that block the path.

Signal levels are measured using Winrad 1.24 from a Softrock 5 SDR connected as the IF to my IC275 (10.75MHz). The S meter on Winrad 1.24 is fairly accurately calibrated at 6dB/S point and then the dB range above S9 is also very accurate. Using this, I can check the noise level on the S meter and then measure how far Simon's signal is above that noise level. The noise level appears to be calibrated to SSB bandwidth (~2.4kHz). The indicated noise level on Winrad is S7.

Signals have varied from 6dB CNR to 28dB CNR. Rain scatter has been noticed on several occasions, appearing as a very flat level of noise extending from the carrier to about 1kHz away. It sounds just like noise and at very low signal levels have be difficult

to detect aurally unless the carrier is of significant level.

Simon can elevate his antenna and on several occasions the signal has been strongest with several degrees of elevation. When my mast is extended, signals increase by about 6dB.

I have now received signals from G4BEL on two occasions. Roger is 87km from me and we have the Suffolk Alps between us. These extend to the incredible height of ~300 feet ASL! I am at 20m ASL. I'm not sure how high Roger's QTH is.

It seems likely that there may be a residual signal present most of the time. On the first occasion, Roger's signal was very scattery and there may have been some rain on the path. On the second occasion Roger's SSB signal was just copiable, indicating perhaps 3 - 5dB CNR. At these low CNRs Winrad's S meter is not so accurate as the noise causes the meter needle to bounce too much. Maybe Alberto can be persuaded to add a peak hold facility, or very slow AGC.

We are investigating why Roger can't hear me. I hope to have a QSO with G4BAO this coming week.

I hope you find this report interesting. 73 de Sam, G4DDK

From Robin, G8APZ,JO01DO, Brentwood :
On 12 March 2007, I worked G4DDK and G4EAT again on 24GHz (in a 3 way SSB QSO) and worked G3LQR on CW at 102Km for my first 24GHz QSO over 100Km from the home station. 73 Robin Lucas

23cm and the Lower Microwave Bands

Dave, G0DJA (IO93FI) has recently got back into microwaves after many years and has become operational on 23cm. His experiences are worth a read ..
I have been wanting to get going on 23cm for many years but never seemed to find a transceiver/transverter that fitted the bill. However, when I decided to sell off some older HF gear and buy a Kenwood TS2000 it seemed too good an opportunity to miss and I spent a bit more for the TS2000X, which provides up to 10W on 23cm.

I then had a bit of luck! Sam (G4DDK) was selling four 23 element yagis plus the bracket and phasing unit to make up a 'box' of 2x2 yagis. I got it all of the kit and picked it up when I was travelling.

So far, I only have one of them up and running, after deciding to take down the dual band (2m/70cm) vertical and replace it with my old Yaesu G-450C rotator and one of the yagis ready for the Activity Contest on 04/03/07.

The results were that I worked Gordon (G0EWN) in Sheffield at 28.5km and Peter (G3LRP) in Wakefield at 42km on SSB and Ray (GM4CXM) in Glasgow at 361km on CW. I only managed a one way with Sam (G4DDK) on CW as he was struggling to hear my signals, which was probably down to my less than optimum set up.

Over the next few days I worked Ray (GM4CXM) on several occasions, plus a one way with GM4LBV who got only one ping of my CW via Aircraft Scatter but who was RST429 here fairly consistently and then, due to a mix up over times, did just the last half hour of the Tuesday Night 23cm UKAC on 20 March 07 and worked Ray (GM4CXM) on CW, Tony (GW8ASD) and the South Birmingham Club (G8OHM) on SSB. Just after the end of the Activity Contest period, I did also work G3XDY on CW.

Since then, I've worked Ray (GM4CXM) using CW on a couple more occasions, to compare the path conditions and have listened to GB3MHL, which is a fairly consistent, if weak, signal. I am planning to use this as a test for any improvements that I make, such as adding a pre-amplifier and eventually mounting the other three yagis, replacing the RG213 coaxial cable with Echoflex15 but having to wait for deliveries from Germany, which is due in the next couple of weeks. I also think that the single yagi needs a small amount of adjustment, as the TS2000X seems to be only producing about 5 Watts, but will produce 10 Watts into a Bird Thermaline dummy load.

During the second Low Microwaves Bands Activity Contest on Sunday 1st April, I managed to work seven stations, although I couldn't operate for the whole time due to family commitments. These included Gordon (G0EWN/ 29km), M0ELS (223km), Martyn (G3UKV - 101km), Ray (GM4CXM - 361km), G4KIY (108km), John (G3XDY - 213km), G8JVM (102km) and Sam (G4DDK - 136km) all two way contacts.

Robin, G8APZ (Essex) reports on the good conditions of Sunday 09/03/07. His logs below show some nice DX!

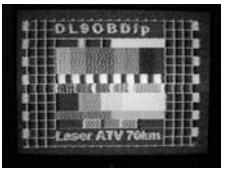
23cm Wkd:
OZ1FF JO45 681Km
OZ3ZW JO54 824Km
OZ2ABI JO46 807Km

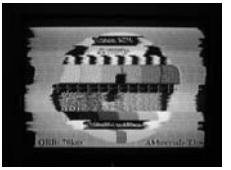
3cm Wkd:-
DJ5BV JO30 481Km

1.2cm Wkd:-
G4DDK JO02 83Km (normal tropo)
G4EAT JO01 27Km (normal tropo)

New Laser ATV Record set by Germans

Over the night of 4-5th April 2007, a new (world?) ATV record of 83.3km was set up in the THz part of the spectrum by Tom, DL9OBD and Wilfred, DJ1WF in the Hanover region. This remarkable achievement follows a 70km record set up some weeks earlier by the same operators. The photos show the received pictures at both ends of the earlier 70km path.





Remember that this is **video modulated laser transmission**! The UK laser record (not ATV!) stands at some 73km and is held by G8LSD and G0MRF. Congratulations to Tom and Wilfred.

That's all the news for this month... is anyone working stuff these days? The UKuG contests this year have been poorly supported so far. Let's hope the summer season sees the situation change.
73 from Peter, G3PHO, Editor

A VK portable on 23cm in Wales?

Yes it's true and it must be a first! The photo left shows UKuG member Doug friend, VK4OE, operating 1296MHz as MW/VK4OE on the Blorenge in S.E Wales, while he was on holiday over here in the UK a few weeks ago.

So this is what the UKuG Secretary does when he's not on 23cm !

The whopping 39 pound 8 ounce catch shown on G8KQW's knee was just one of several made during a recent fishing trip to the Southern Europe. While the rest of us are calling CQ Contest on a cold English morning, he's pulling in the big ones in the sunshine. Ian is not called the "big fella" for nothing ... he is also the holder of the UK 10GHz DX record at over 1300km.

Political infighting threatens Europe's SatNav plans

This interesting article appeared in a recent edition of the New Scientist . It may be of interest to the users of our lowest microwave band, 23cm:

Political infighting is undermining the European Union's biggest ever joint technology programme: the Galileo satellite navigation network.

By 2011, Galileo was to have ended reliance on America's Global Positioning System system, a network that can be switched off at the whim of the Pentagon. But divisive power struggles among the eight European companies that comprise the industrial consortium chosen by the EU to run Galileo are putting the programme's future in doubt.

Galileo's 30 satellites are to be launched into mid-Earth orbits at a cost of around EUR3.2 billion, with one third of that coming from the EU, and the rest coming from the consortium, which hopes to recoup its investment by selling location-based technology and services.

By the end of 2006, the consortium was to have formed a single Galileo operating company and have appointed an independent chief executive so the project has a "clear decision making structure" says Paul Verhoef, Galileo programme manager at the European Commission in Brussels, Belgium.

However, no company has been formed, and the consortium remains rudderless - and unable to place orders for Galileo's critical satellites.

National interests

"This is posing major problems. As time schedules slip, costs go up," says Verhoef, "And Galileo is now at risk of running to unacceptable schedules." A German technology analyst, Bitkom, reckons Galileo will not be up and running until 2014 or later - which represents a delay of at least three years from the original plan.

"The EU is now not talking to the consortium until it sorts itself out and comes back as a single company," says Richard Peckham of EADS Astrium in Portsmouth, UK. "The EU can't continue to negotiate with eight individual companies."

National interests are one of the roots of the debilitating stasis. While each consortium member's nation has secured some aspects of Galileo's operations on its own territory, arguments continue.

'Outrageous demands'

"The Spanish firms are the current block," says one source close to the consortium's negotiations. "They are making outrageous demands over guaranteed workshare arrangements. But Spain has already secured a completely unnecessary control centre and people aren't having any more."

The multinational arguments strike a chord with observers familiar with some of the problems experienced by Airbus Industrie, the troubled pan-European plane maker, which has been riven with UK, French, German and Spanish rivalries. "Galileo is now being compared with the Airbus situation. Unfortunately that analysis is correct," says Verhoef.

Continued delays in ordering the satellites are having an expensive knock-on effect, too. Last week, Galileo's technology developer, the European Space Agency, was forced to order Giove-A2, a EUR30 million Galileo signal testing satellite. It had not planned for the satellite - and only ordered it so it could place it in orbit and maintain rights to Galileo's frequency allocations (see Back-up satellite to secure Galileo navigation system: <http://www.newscientisttech.com/channel/tech/dn11318-backup-satellite-to-secure-galileo-navigation-system.html>).

Reassign frequencies

When the current orbiting test craft Giove-A stops broadcasting Galileo signals in mid-2008 when its fuel runs out, the International Telecommunications Union can reassign the frequencies to others unless another craft replaces it.

Originally, Galileo's first four operational satellites (which have been ordered) were to have been in orbit by 2006 - but they have been pushed back to 2009 or beyond, not soon enough to maintain the frequencies.

Another test craft, Giove-B, has suffered repeated onboard computer problems and is still grounded. If that craft can eventually launch, however, the newly ordered Giove-A2 satellite, which is funded by taxpayers, may remain grounded after all.

"We need Giove-A2 because the situation has evolved. We don't have the consortium's contract signed and we don't know who will take care of the operational Galileo satellites," says ESA spokesman Dominique Detain.

The EU, as major bankroller of the project, has had enough. Wolfgang Tiefensee, president of the EU's Council of Transport Ministers under the current German presidency, is demanding to know when the consortium plans to incorporate a company, appoint a CEO and place firm orders for the Galileo satellite fleet.

"The consortium must fulfil the conditions and obligations it agreed to in 2005," says a spokesman for Tiefensee's office. "We expect substantial progress by June."

Competition from China

Tiefensee is expected to reveal the industry's response at a meeting of European Transport Ministers on 22 March. "We'll see in the next couple of weeks how this pans out," says Verhoef.

But even if the consortium comes good, doubts remain over Galileo's commercial viability. Russia is improving its global satnav fleet and will have 18 spacecraft in orbit by the end of the year. And China has said that it's 30-satellite Beidou satnav network, originally intended for its military, will be an open system usable by anyone.

Fears that China may be planning to go its own way on a satnav network <http://www.newscientisttech.com/channel/tech/dn10472-chinas-satellite-navigation-plans-threaten-galileo.html> - despite putting some seed money into Galileo - were heightened last week when its delegation failed to turn up at a key all-nations satellite positioning conference in Munich, Germany.

The multinational consortium that the EU appointed to run Galileo in December 2005 comprises TeleOp (Germany), EADS Astrium (France/Germany), Inmarsat (UK), Thales (France), Aena (Spain), Finmeccanica (Italy), Hispasat (Spain) and Alcatel-Lucent (France).

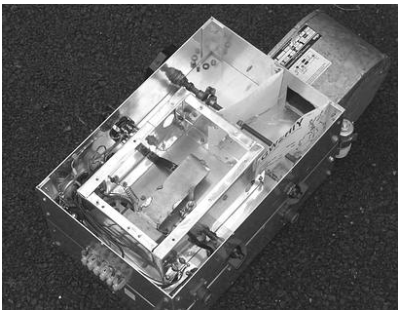
FOR SALE AND WANTED

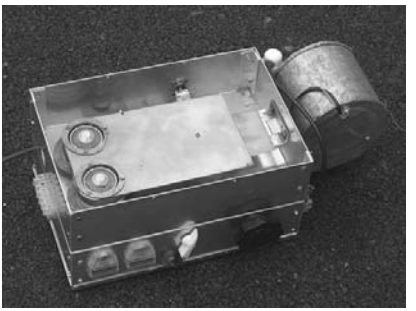
GW2HIY Silent Key Gear Disposal
Both items Free!

1.2metre fibreglass dish, no fitments. Free, but buyer collects
(Prestatyn, North Wales).

70cm Power Amplifier (K2RIW Stripline 1 KKilowatt , (see QST April - May 1972). May need some work, **see photos this page**. Free, but collect or pay carriage.

Contact: John Lawrence,GW3JGA
40 Aberconway Road
Prestatyn
Denbighshire
North Wales
LL19 9HL
Tel: 01745 853255





INFORMATION WANTED

From: VK2EI <neilsan@tpg.com.au>

Has anyone has converted the old Basic System Performance Analysis Program in the RSGB Microwave Handbook Vol 3, p 20.7 to run under Windows?

If so would be interested in obtaining a copy.

73 Neil VK2EI

23cm Septum Feed Choke Ring

From: Paul Wade W1GHZ
<q.w1ghz@verizon.net>

My paper for the Eastern VHF/UHF Conference in April,
Enhancing the OK1DFC Septum Feed with a Choke Ring may be previewed at:

www.w1ghz.org/new/
septum_feed_with_ring.pdf

Conference details are at www.newsvhf.com

73 Paul, W1GHZ

UKUG MICROWAVE CONTESTS

Saturday 5 May 2007: 3.4GHz Contest
1400-2000 utc

Sunday 20 May 2007: First 5.7 and 10GHz Cumulative:
0900-2000 utc

Sunday 3 June 2007: Lowband (23,13 &9cm) Contest: 0900-2000 utc