



An Amateur Radio publication for the Microwave enthusiast

MICROWAVE NEWSLETTER

Published by the Radio Society of Great Britain and edited by G3PHO and G8AGN.

Lambda House, Cranborne Road, Potters Bar, Hertfordshire EN6 3JE

FROM THE EDITOR

2000 – February

This month's issue starts on a sad note as we announce the passing of Gordon, WB6YLI. Many of you will have either worked him on 10GHz or have met him at microwave meetings when he was over here on one of his regular visits to the UK.

This issue also includes a statement by Charlie and Petra Suckling, G3WDG/G4KGC, concerning the review of their 23cm preamplifier kit in last month's Newsletter. Please read it! We wish to apologise to Charlie and Petra for what appeared to be "bad press" concerning their product. We assure them and readers that there was no such intent on our part.

The 2000 Contest season is not far away. The four middle pages of this Newsletter forms a "pull-out" section containing all the rules and dates. Please pin it on your shack wall and use it! There's now no excuse for missing a contest or for mistakenly coming up on 10GHz on the last Sunday of the month when the contest was on the previous weekend! We would appreciate a revival of contest activity and log entries this year.

Still on the subject of contests only two responses have so far been received concerning the contest programme and rules for 2001. You have until the RAL Round Table in April to get them into G3PHO so that they can be discussed at that event. After that it looks like the present format will continue, if no great quantity of objections are received in the meantime!



IN THIS MONTH'S ISSUE.....

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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 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.



G3PHO: Peter Day 0114 2816701
G8AGN: Barry Chambers 0114 2304202



G3PHO: Email: g3pho@geocities.com
or p.day@virgin.net
G8AGN: Email: b.chambers@sheffield.ac.uk



G3PHO, Peter Day,
146 Springvale Road,
Sheffield, S6 3NU, UK.

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

SILENT KEY

GORDON LEWIN WB6YLI

Readers will be saddened to hear of the death of Gordon Lewin, WB6YLI, a frequent visitor to the UK and a keen 10GHz operator in the RSGB Microwave Cumulatives as G/WB6YLI and, in later years, with his own G callsign.

At his home at Redondo Beach, California, he would set up his gear on the garage roof to give people points in the contests. He ran such an old car that his West Coast pals used to become quite anxious about his safety when out /P on the local mountain tops! On his visits to the UK he resurrected an ancient Ford van each time, often spending cold overnights on the North York Moors and the Derbyshire hills after operating his ten watt 10GHz gear all day. Many of you reading this will have experienced his "QRM" as he fired up his gear on a nearby summit!

I found him to be a most generous man. We often met at round table meetings or on the hills. Most times he would bring me some US magazines or a small "goody", such as the WG16 quick release flange he gave me on our first meeting. He had overheard me on 2 metres mentioning my need for one the previous year!

I believe he was born in England but moved to the USA many years ago and worked for the Boeing Company.

He passed away on November 28th, last year, after suffering complications arising from pneumonia.

Gordon was one of the colourful characters of our hobby. He will be missed by microwavers both in the UK and the USA.

Peter, G3PHO

ERRATA ...page 3 of the January 2000 Newsletter gave the callsign of the new 10GHz wideband beacon as G3WFM/P. This should read **G7WFM/P**. Our apologies to John, G3WFM, at RSGB HQ for the error!

SURPLUS 10.4GHz PAs FOR SALE

From: "Jochen Zilg" (mmwave.zilg@t-online.de)

I have a number of these units for sale. Each unit is a complete RF amplifier system including AGC, and isolators at input and output. Gain > 47 dB, Power out at 1 dB comp. point > 39.5 dBm (measured after the isolator).

The case is small enough to mount it directly at the feedhorn of a parabolic antenna.

The system was originally used as transmitter amplifier in 16 QAM radio relay link (SIEMENS).

The amplifiers are tested in the factory (test protocol) and are unused.

Power supply: +11 to 14 V 7 A and - 9.5 Volts 100 mA. Detailed datasheet and documentation included. Price 900 DM without transport costs (ie £300 sterling).

Power output can be raised by skilled amateurs to more than 10 Watts by replacing the matched 10 W Transistor by a newest 15W Transistor (Toshiba).... **EMAIL FOR DETAILS**

MICROWAVE PLUMBING?

At last, I found an excellent use for that piece of 75 ohm half-inch heliax that I'd failed a few times to get rid of at a round table or boot sale.

Half-inch heliax makes an excellent drain and sewer unblocker.! I found the 75 ohm type a little more flexible than the 50 ohm type (with the smaller inner conductor) and ideal for clearing 3 or 4 inch drains. My particular application was a run about 35 feet long between two man hole covers. The coax is flexible enough to easily turn round the 45 degree bends, but could still just about be pushed at over 35 feet from the end.

Stripping off the outer PVC to expose the copper, it is then possible to solder whatever sort of fitting you want - for example, a few angled tinplate vanes to scrape clean the sides of the sewer pipes. For this application, it doesn't matter about being too careful with the soldering!

Regards,
Steve G4KNZ.

PS: For sale, 75 ohm heliax, approx 50 foot length

G4KGC and G3WDG RESPOND TO THE PRODUCT REVIEW PUBLISHED IN LAST MONTH'S NEWSLETTER.....

We were surprised to see a "review" of the WDG026 1.3GHz preamp in the Microwave Newsletter. We have not yet advertised this kit as a released product - it is referred to in our website as **BETA TEST** in the product list and under a heading marked "Products under Development" in the actual pricelist. We are not sure how we could have made the status of this product any clearer!

For some time we have been advertising beta models via the website to allow both a wider set of constructors to participate in beta testing, as well as allowing confident constructors earlier access to those of the new designs which we felt are either sufficiently developed or relatively "bomb-proof" based on similarity with existing released designs. Writeups were provided on-line as a way of ensuring up-to-date documentation was available to constructors of beta models. This is why G3DVV did not get a booklet with his kit! When the kit is fully released we will of course supply a booklet as we have always done.

We are pleased to have G3DVV as a long-term customer and were pretty sure he was familiar with the WDG modules and did not need the circuit diagram of the FRE power supply, evidently he built it without a phone call back to us for more information.

If and when the kit is fully released there will be a full write up with a circuit diagram, which is our standard policy on all fully released products.

We now realise that the 22uF SMT capacitors supplied with the kit to John were slightly too small to fit the space.... shame to read about it in print, we could have corrected the error earlier. The previous larger size went obsolete and the replacement turned out to be smaller and we missed the fact that it would not fit. We'll try to source larger ones again until the FRE boards can be rearranged to take the smaller part.

The reason why we advise that the board is mounted in the box before soldering the parts in is that in early WDG module development we had some problems with chip capacitors breaking during the inevitable flexing of the board when it is being fitted into the box. Broken chip caps accounted for about 90% of the returns we had for debugging and so we settled on having the board mounted in the box first before anything else was fitted.

The website referred to in the text is wrong. It should be www.g3wdg.free-online.co.uk.

As John notes, the MAR6 is optional for (rare) applications where more gain is needed. This would likely be for EME use, else there would be too much gain for tropo use (overload of transverter etc). It was not a suggestion but rather an intended option.

John notes in his writeup that the gain response was unsymmetrical with the single stage but was symmetrical in the two-stage version and that this was "satisfactory". It is a feature of GaAs FET LNAs that it is not possible in a single ended stable design to get the gain peak and optimum noise peak to coincide, because the device has to be mismatched somewhat for optimum noise figure. John may not have quite got his unit tuned up, as normally the gain peak is slightly LOW in frequency.

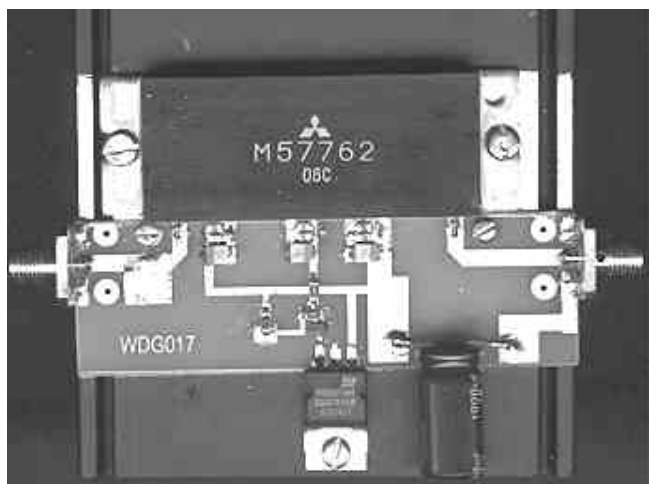
As a point of applications information, the WDG026 as supplied for beta test incorporates a high-pass filter in the input circuit, to reject potential out of band QRM from, eg, UHF TV transmitters. The price paid for this is slightly higher noise figure owing to the loss in this network.

For tropo use the slight increase in NF is not detectable. By replacing one of the 2.2pF capacitors with a 10pF chip, cutting the shunt track on the input where it joins the input line and shorting out the second 2.2pF capacitor, it is possible to lower the NF by about 0.2dB, which may be valuable for EME applications.

We are not sure why John feels that a filter in the output would have improved the design. As it is, the preamp is suitable for the whole of the 1.3GHz band and an output filter would likely limit this. Also, as stated above, the input HPF should take care of most out-of band signals for tropo applications.

We have been using HEMTs now for many years in the WDG004, WDG010, WDG011 and now these preamps and do not have any evidence that they are "amateur unfriendly". There have been a few isolated cases of FETs getting damaged soldering them, but generally people have followed the instructions on static handling precautions and have not had much of a problem. By the way, the HEMTs we use are not "at the cutting edge of technology" but have been around for years now and are probably now used in more "sockets" than conventional FETs, in the commercial world.

Petra and Charlie Suckling



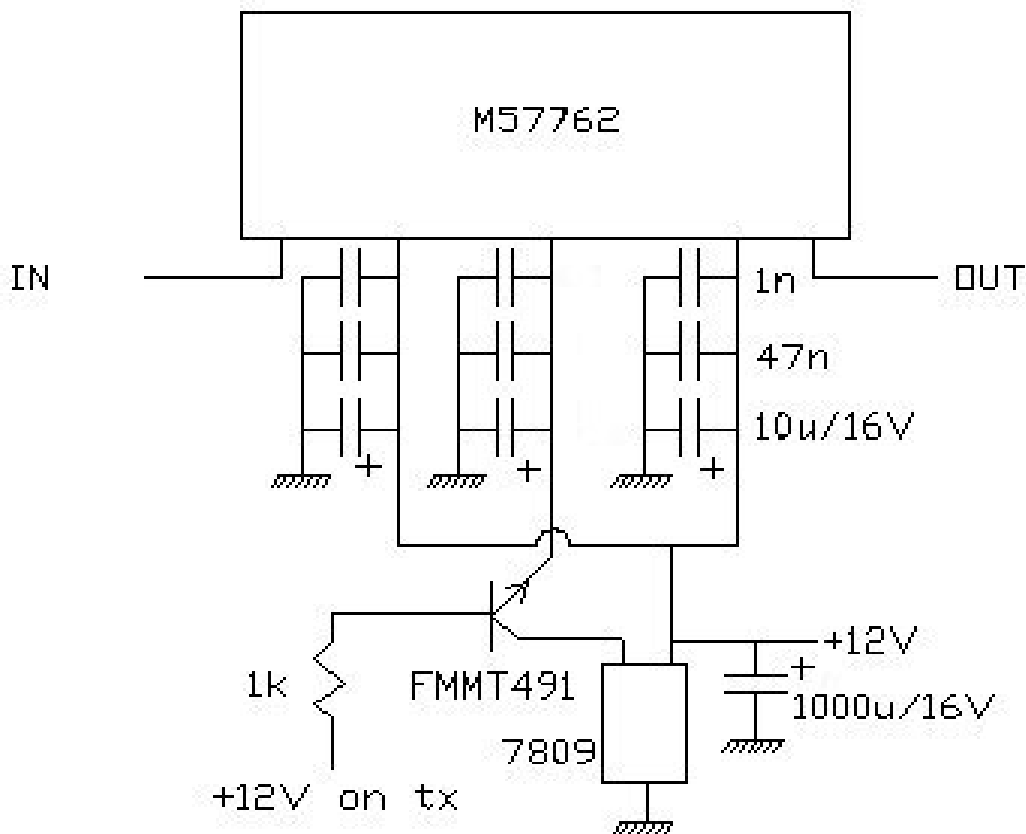
The WDG017 20W 1.3GHz Linear Amplifier

- by Charles Suckling, G3WDG

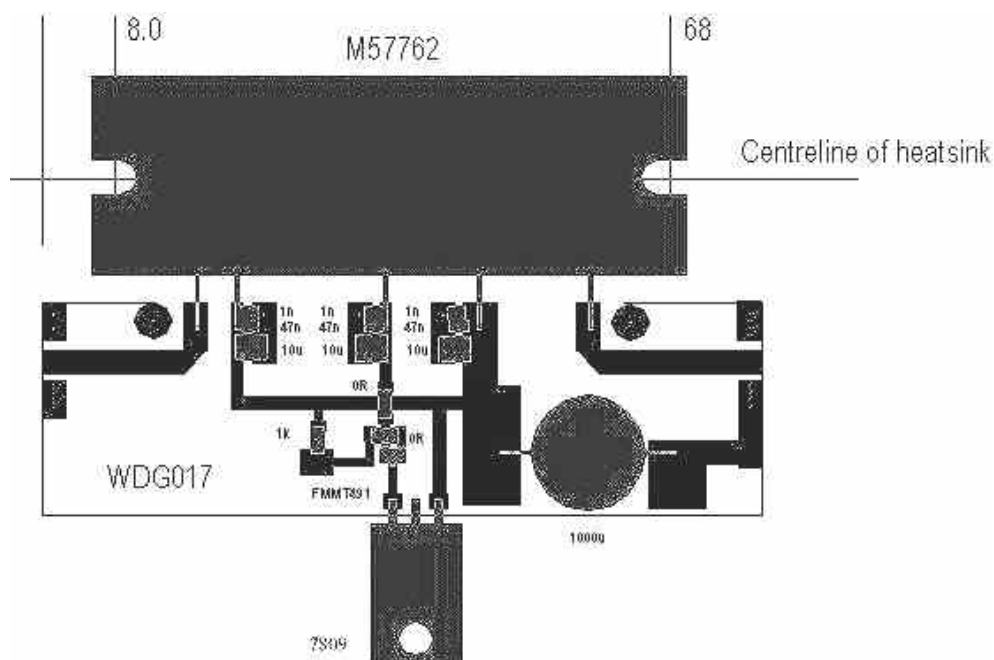
The WDG017 20W PA uses the well-proven Mitsubishi M57762 power module which is designed to cover the whole 1.3GHz band. The power seems to peak around 1260MHz and the module still works very well at 1296MHz. The design is nearing the end of its beta testing phase and kits are available from the Microwave Committee Components Service now. For details of pricing, etc, please refer to our website: www.g3wdg.free-online.co.uk.

The WDG017 employs a transistor switch to enable the PA to be shut down during receive periods, to save energy and lower the heatsink temperature.

The circuit diagram of the PA is shown below:



The layout is shown on the following page.



Construction

The original prototype was constructed using a commercial heatsink as the chassis. The heatsink measured 80 x 100 x 30mm (Farnell 738-906) and the construction notes refer to the use of this heatsink. Other prototypes have been built on a 6mm (or 0.25") thick aluminium plate as the chassis. This has some advantages, in that any heatsink out of the junk-box can be used (provided it is big enough!), or the plate may be water-cooled. In these cases the plate chassis is just screwed on to the main heatsink. Also, most aluminium plate is easier to work than the metal used to make heatsinks, which tends to be rather soft, and there is no need to scrape off the anodising (a rather tedious operation!).

1. For 1W PA, cut heatsink to size (45 mm). 18W PA uses full size heatsink.
2. Drill and tap holes for securing the module to the heatsink. Refer to assembly diagrams for location of holes. Drill 2mm and tap M2.5 (1W), drill 2.5mm tap M3 (18W).
3. Temporarily, fit module to heatsink.
4. Locate pcb onto heatsink - refit and tighten module screws so that pcb aligns to edges of heat sink without under/overlap and module pins align to tracks on pcb.
5. Temporarily, sellotape pcb in place and drill through holes in pcb either side of RF lines part way in to pcb (to make drill location holes).
6. Drill through heatsink in marked places 1.6mm diameter and tap M2. Drill carefully, with lubricant, to avoid breaking drill. Also tap with lubricant.
7. Open holes previously drilled through in pcb to 2mm dia.
8. Fit pcb temporarily to heatsink with M2 screws.
9. Locate voltage regulator and drill 2.0mm hole and tap M2.5 for its fixing screw
10. Locate connectors and drill/tap heatsink for retaining screws. Use 2 x M2 if using SMA types.

Skip 12-14 if using plated through hole pcb

12. *File ends of heatsink to allow clearance for ground pins*
13. *Drill through grounding holes in rectangular pads near module leads to mark heatsink (6 places) and drill these out a few mm into the heatsink to sufficient diameter (4mm suggested) to give clearance to ground pins and associated solder fillet).*
14. *Fit veropins to pcb, heads on groundplane side, cut to leave about 1mm protruding on pcb side, and solder to both sides. File excess solder off heads on groundplane side. Keep solder fillet within confines of blind relief holes or scrape off excess so board still sits flat on heatsink.*
15. Scrape anodising off heatsink under pcb and module area.
16. Reassemble pcb to heatsink and fit connectors. Solder connectors to ground strips on track side of

board using decent sized iron. If you have only a small iron, preheat the heatsink to 150C approx and while hot make the solder joints.

17. Mount other components including the module to pcb.

Testing and using the PA

Apply volts, apply drive and you should have output! Performance of one of the prototypes at 1300MHz is shown below. The data sheet for the M57762 quotes an absolute maximum supply voltage of 17V, and that the device should survive a 16:1 VSWR with a 15.2V supply at 18W output power. For most applications, a supply voltage up to 14V is recommended. If equipment is available to measure the input VSWR, a small improvement may be possible by adding a tuning tab to the input line (see photo at the beginning of this article).

Vcc=12V

Pin (dBm)	Pout (dBm)	Pout (W)	Gain (dB)	Icc (A)
no rf				0.66
20.0	37.67		17.67	2.24 (small signal operation)
24.2	40.95	12.5	16.75	3.25 (1dB gain compression)
27.0	41.96	15.7	14.96	3.85 (near compression)

Vcc=13V

Pin (dBm)	Pout (dBm)	Pout (W)	Gain (dB)	Icc (A)
no rf				0.68
20.0	38.47		18.47	2.39 (small signal operation)
24.3	41.72	14.9	17.42	3.48 (1dB gain compression)
27.8	42.86	19.3	15.06	4.27 (near compression)

Vcc=14V

Pin (dBm)	Pout (dBm)	Pout (W)	Gain (dB)	Icc (A)
no rf				0.70
20.0	39.05		19.05	2.45 (small signal operation)
24.5	42.5	17.8	18.0	3.70 (1dB gain compression)
28.6	43.8	24.0	15.2	4.69 (near compression)

Vcc=15V

Pin (dBm)	Pout (dBm)	Pout (W)	Gain (dB)	Icc (A)
no rf				0.67
20.0	39.2		19.2	2.50 (small signal operation)
24.8	42.98	19.9	18.2	3.87 (1dB gain compression)
28.2	44.06	25.5	15.9	4.74 (near compression)

It is recommended to shut down the PAs on receive. This can be done by removing the 1k resistor and applying +12V on transmit via a 470R resistor to the pad previously connected to the bottom end of the 470R resistor. On receive, the lack of a voltage effectively shuts the module off.

SMT Kit Contents

- 7809 9V regulator (1)
- 1000uF electrolytic (1)
- 1nF chip capacitors (3) 47nF chip capacitors (3) 10uF chip capacitors (3) - bar end is +ve
- 470R chip resistor (1) - replaces 1k shown in circuit diagram and layout diagrams
- 0R chip links (2)
- FM491 smt transistor
- solder for SMT parts (1)

MICROWAVE CONTEST RULES 2000

**These rules are final and binding for 2000. Any previously listed rules should be ignored.
The following contests are scheduled for 2000:**

- 10GHz Cumulatives (6 contest days with 4 to count for scoring purposes)
- 10GHz Trophy (1 event)
- 24GHz Contest (4 separate events - not cumulative)
- 47GHz Contest (4 separate events - not cumulative)
- All Bands Contests (3 separate events - not cumulative)
- In addition there are 5 non-competitive activity days (see above)

The full contest programme and rules were also published in the October 1999 issue of the RSGB's RadCom and is also available on the Internet at the following URL:

<http://www.g3pho.free-online.co.uk/>

GENERAL RULES (applicable to all events):

- All the contests (except for the 10GHz Trophy) run from 0900 to 2100GMT on a Sunday.
- Except for the 10GHz Trophy, *the Contests are open to all comers (you do not have to be an RSGB member)*. 10GHz Trophy contestants must be members of RSGB if they wish to submit logs.
- Contestants are expected to enter in the true spirit of the event and to strictly adhere to any equipment or power restrictions that apply to the particular contest.
- Contacts are scored on the basis of 1 point per kilometre for full, two way microwave contacts and at half points for one-way (ie crossband) contacts. The G4JNT Contest Software is recommended for use in the final scoring process.
- Contest exchanges on the microwave bands consist of **RS(T) + serial number** (starting at 001). In addition the six (or eight) figure **QTH LOCATOR** must be exchanged either via the microwave band or on the talkback frequency. Where the LOCATOR is not known, a full six figure National Grid Reference (UK only) must be provided. **In multiband contests, the serial number will start at 001 for each band** (i.e. a common sequence across the bands is **NOT** to be used).
- Operators may enter as home station or portable (either mixed or separately).
- **Except where indicated**, the VHFCC general rules as published in the RSGB Contest Handbook also apply.
- Contestants are asked to make sure their entries have been scored correctly and that all relevant bonus points and multipliers have been claimed. The adjudicator will not do this for you!
- All entries should be prefaced with an appropriate summary/cover sheet (either an RSGB VHF-UHF type or a personal one) showing : Title of contest, name(s) of operator(s), location(s) of station, section entered, callsign used, band score(s), multipliers or bonus points, final claimed score. The sheet should also detail equipment used, particularly the power output, antenna and receiver for both the microwave band and the talkback. This is very important if the logs are entered in one of the restricted sections. Where the contest has a "rover" facility, it is essential that each location used is clearly stated.
- *Where Locator squares and/or countries are used as multipliers for bonus points, a summary list of the squares and countries worked must be attached to the contest cover (summary) sheet. This list should include the callsign and date of the first contact for each square/country.*
- Log entries may be submitted directly on paper, using standard RSGB VHF Contest sheets or self-prepared contest sheets or on a 3.5 inch diskette (IBM PC format), the latter preferably using the G4JNT Contest Software.
- ***ALL LOGS (EXCEPT FOR THE 10GHz TROPHY CONTEST) SHOULD BE SENT TO THE CONTEST ADJUDICATOR, G4JNT, within 16 DAYS OF THE END OF THE CONTEST. Late entries will be acknowledged but not used in the final ranking. G4JNT's address is : A. Talbot, G4JNT, 15 Noble Road, Hedge End, Southampton, SO30 0PH. (Tel: 01489-787424 or e-mail: drassew2@interalpha.co.uk)***

LOGS FOR THE 10GHz TROPHY CONTEST. whether on paper or diskette, should be posted to:
P.O. Box 2399 Reading, RG74FB. Email logs should be sent to **vhf.entry@rsgb.org.uk**

- Appropriate Certificates will be awarded to overall contest winners and individual section leaders . Additional Certificates of Merit may be awarded at the discretion of the RSGB Microwave Committee. With these, as with the logs, the adjudicator's decision is final.

RULES FOR THE 10GHz CUMULATIVES:

1. The general rules shown above apply.
2. Six, monthly events are available from May to October inclusive. Two of these events (*June and October*) are also part of the ALL BANDS CONTESTS (see below) and their scores can be used in both contests.
3. Any four of the six events may be used for final scoring purposes. Logs for ALL events entered must be submitted.
4. Contestants may submit logs for any one of the following sections:
 - Open
 - Restricted
 - Wideband

There is no separate section for portable stations. However, the Restricted and Wideband sections offer much scope for portable work.

The sections have individual restrictions as follows:

- **Open:** No power or antenna restrictions (other than those laid down in the Amateur Licence) on either 10GHz or on the talkback band.
- **Restricted:** 10GHz transmit output not to exceed 1.0 watts to the antenna. No power restrictions on the talkback band. No antenna restrictions on either band.
- **Wideband:** 100 milliwatts maximum transmit power to the antenna. Modulation bandwidth to exceed 50kHz. This section includes wideband modes such as FM (voice), MCW, ATV and DATA

For both the Restricted and Wideband sections contestants are free to use the "**Rover**" concept of portable operation. This allows the location of the station to be moved as many times as desired and by a minimum of 16 linear kilometres, at any time during the contest period. From each new location, stations worked from any of the previous locations during the event may be worked again, both stations involved in the contact gaining points. The serial number however will not revert to 001 each time a move is made but will carry on consecutively from the previous contact.

The "Rover" concept is to encourage lightweight, low power portable activity. Details of the equipment used for this type of operation should be included on the log summary/cover sheet.

The "Rover" concept is NOT applicable to the Open section.

5. Scoring - as detailed in the General Rules (i.e 1 point per km). In addition the following **BONUS** points will also apply:

LOCATOR SQUARE MULTIPLIER: (*applicable to all sections*) :

- *The final, total kilometre score for the best four cumulative sessions will be multiplied by the total number of different Locator Squares ("grids"), for example IO92, IO81, etc) contacted over the entire cumulative (ie up to the six events maximum). To claim this bonus it is therefore essential to submit logs for all events entered, not just the best four. Please include a separate check list of the squares worked with your cover sheet.*

WIDEBAND BONUS: (*applicable to all contacts in which a wideband mode forms at least one half of the microwave contact*):

- Two-way wideband contacts *multiply the distance points by 2*
- Wideband to non-wideband contacts *multiply the distance points by 1.5*
- One-way contacts score half the points a full contact would have made, including the multiplier. The wideband bonus applies to both sides of the contact. Therefore a narrowband operator working a widebander would also *multiply the score for that contact by 1.5*
- NOTE: Wideband stations do NOT multiply the Locator Square Bonus as well!

It is appreciated that operators who use computer contest log software will not yet have the facility to automatically include the wideband bonus in their logs. For the moment, the bonus will have to be added manually to the final score as calculated by the G4JNT software, for example. All bonus carrying contacts should be clearly marked as such.

6. Logs should be sent to the adjudicator to arrive no later than Tuesday, 24th October 2000.

RULES FOR THE 10GHz TROPHY CONTEST

1. The contest will take place between **1400GMT and 2200GMT on SATURDAY, 6th May, 2000** and will run for part of the time in parallel with the RSGB 432 up Contest.
2. General rules shown above and General RSGB Rules (See Radcom Oct 1999) will apply.
3. There is one section only - Open
4. Scoring will be on a 1 point per km basis. One way contacts score half points.
One way and cross band contacts score for the multipliers listed in 5. Such contacts must be clearly marked.
5. A **BONUS** multiplier based on the number of different **LOCATOR SQUARES** areas *plus number of different COUNTRIES* worked will apply to the final raw distance points score.
Therefore the final score consists of (total points per km) X (number of different squares + number of different countries worked)
6. Awards: The 10GHz Trophy will be awarded to the leading station
7. Logs: These should be posted to arrive at the adjudicator **no later than Tuesday, 23rd May, 2000**

LOGS FOR THE 10GHz TROPHY CONTEST, whether on paper or diskette, should be posted to:
P.O. Box 2399 Reading, RG74FB. Email logs should be sent to **vhf.entry@rsgb.org.uk**

Please do not send these logs to G4JNT

RULES FOR THE 24GHz and 47GHz CONTESTS

1. The rules are identical for each of these bands.
2. These contests are "stand alone" events and will be scored as such. However, as an incentive to millimetre wave activity, an award will also be made to the operator with the highest combined 24GHz scores and a further one to the operator with the highest combined 47GHz scores. These awards will be in addition to the band leaders in each event.
3. The General Rules apply (see above)
4. Sections: One section only (Open) on each band. There will be **FOUR contests for each band** held over the summer season.
5. Scoring: Each contact will be scored on a 1 point per km basis.
 - Crossband and one-way contacts score half points.
 - The "rover" concept is applicable to both bands (see 10GHz Cumulative rules above) as it has been in previous years for the 24GHz contests
 - There are no bonus points for wideband contacts, unlike the 10GHz contests.
6. Logs should be sent to the adjudicator **to arrive no later than the following dates:**

Tuesday , 2nd May 2000 for the first 24 and 47GHz Contest
Tuesday , 27th June 2000 for the second 24 and 47GHz Contest
Tuesday, 26th September 2000 for the third 24 and 47GHz Contest
Tuesday, 7th November 2000 for the fourth 24 and 47GHz Contest

RULES FOR THE ALL BAND MICROWAVE CONTESTS

1. The General Rules (see above) apply to this contest.
2. **Three All Bands Contests** will be held, each one to be a "stand alone "event.
3. Each band will be scored separately and band leaders will receive certificates. The overall contest winner will be the operator with the highest normalised scores for the whole band range 1.3 to 47GHz.
4. The raw claimed scores will be "normalised" to a maximum score of 1000 and then ranked.
5. There are **no bonus points**. The normalisation of scores takes care of differences in activity and "difficulty" from band to band.
6. **"Rover" contacts may be made on 24 and 47GHz** only (see 10GHz Contest Rules for a definition of this).
7. There are no separate sections for low power, wideband, etc.
8. Logs should therefore only include the exchange of information outlined in the General Rules.
9. One-way and crossband contacts score half points.
10. **If the 10GHz logs are to be also entered in the 10GHz Cumulative Contest they will need to be rescored for that contest in the light of the Cumulative Contest rules (see earlier).**
11. The completed logs and summary/cover sheets should be sent to **arrive at the adjudicator no later than:**
Tuesday, 11th July 2000 (for the June contest), Tuesday, 29th August, 2000 (for the August Contest)
Tuesday, 24th October, 2000 (for the October contest)

RSGB MICROWAVE COMMITTEE

MICROWAVE CONTEST CALENDAR

2000

(All events are scheduled for Sundays 0900-2100GMT unless otherwise stated)

This list also includes other contests having microwave sections: The May RSGB 432MHz and Up contest, the IARU VHF/UHF/SHF October contest, the Autumn RSGB 1.2/2.3GHz Cumulatives (held 2000-2230 local time), the RSGB Fixed 1.2/2.3GHz Contests held in April and September and the RSGB 1.2/2.3GHz Trophies held in October. These contests are NOT organised by the Microwave Committee. The rules for them can be found in RadCom 1999-October. *They are shown in italics in the list below....*

JAN	30	All Bands Activity Day -non competitive	Last Sunday of month
FEB	27	All Bands Activity Day -non competitive	Last Sunday of month
MAR	26	All Bands Activity Day -non competitive	Last Sunday of month
APR	9	<i>1.2/2.3GHz Fixed Contest (1700-2100GMT)</i>	<i>2nd Sunday of month</i>
APR	16	24/47GHz Stand alone contest	3rd Sunday of month
MAY	6/7	<i>RSGB 432 - 248GHz Contest</i>	<i>1st weekend of month</i>
MAY	6	10GHz Trophy Contest: 1400-2200: In parallel with <i>RSGB 432+Up Contest</i> : 1st Saturday	
MAY	28	1st 10GHz Cumulative Contest	Last Sunday of month
JUNE	11	24/47GHz Stand alone contest	2nd Sunday of month
JUNE	25	All Band Contest (incl. 2nd 10GHz Cumulative)	Last Sunday of month
JULY	1/2	<i>RSGB VHF NFD (Includes 1.2GHz)</i>	<i>First weekend of month</i>
JULY	30	3rd 10GHz Cumulative	Last Sunday of month
AUG	13	All Bands Contest	2nd Sunday of month
AUG	27	4th 10GHz Cumulative	Last Sunday of month
SEPT	10	24/47GHz Stand alone	2nd Sunday of month
SEPT	10	<i>1.2/2.3GHz fixed contest (1800-2200)</i>	<i>2nd Sunday of month</i>
SEPT	17	5th 10GHz Cumulative	3rd Sunday of month
OCT	7	<i>1.2/2.3GHz Trophies</i>	<i>1st Saturday of month</i>
OCT	7/8	<i>IARU VHF/UHF/SHF</i>	<i>1st weekend of month</i>
OCT	8	All Band Microwave Contest (including 6th 10GHz Cumulative)	2nd Sunday of month
OCT	12/17	<i>1.2/2.3GHz Cumulatives (2000-2230 local)</i>	
OCT	22	24/47GHz Stand alone contest	4th Sunday of month
NOV	6/21	<i>1.2/2.3GHz Cumulatives (2000-2230 local)</i>	<i>1st Monday of month</i>
NOV	26	All Bands Activity Day -non competitive	Last Sunday of month
DEC	6	<i>1.2/2.3GHz Cumulatives (2000-2230 local)</i>	
DEC	31	All Bands Activity Day -non competitive	Last Sunday of month



SANDOWN VHF CONVENTION 2000



Sunday, 20th February 2000
Sandown Park, Esher, Surrey

The RSGB Microwave Committee are looking forward to meeting many of our Newsletter readers at this annual event. The microwave component of the Convention is detailed below. Note also that there are two constructional trophies "up for grabs" so bring along your latest home constructed microwave gear and enter the competition!

MICROWAVE LECTURE PROGRAMME:

All these lectures will be held in the Eclipse Bar, located on the ground floor.

1200 -1300 GMT:

Microwave Operating and Contests on 10GHz, by Peter Horbaczewskyj, G4ZXO

1400 -1500 GMT:

Developments in Solid State Microwave Power Amplifiers, By Charlie Suckling, G3WDG

1500 – 1530 GMT

DX Operating on 1.3GHz and 2.3GHz, by John Quarmby, G3XDY

1530 – 1600 GMT *

Rainscatter propagation on the microwave bands, by Sam Jewell, G4DDK

*** PLEASE NOTE G4DDK'S CHANGE OF LECTURE THEME FROM THAT ADVERTISED IN RADCOM**

MICROWAVE CONSTRUCTION COMPETITIONS:

[1] The G3VVB Trophy

This trophy is awarded to the best item of home construction exhibited on the Microwave Committee stand at the Sandown Convention. Unlike the John Rouse trophy mentioned below, it need not be an original design and, indeed, may be constructed from a kitset (eg G3WDG, DB6NT kits, etc). The exhibit may be in the form of the actual equipment or a detailed, annotated photographic display. The RSGB Microwave Committee reserve the right to arrange a visual inspection of the actual winning equipment if the latter form of entry is made.

[2] The John Rouse Memorial Award

This award is made to the best item of originally designed, home-constructed microwave equipment completed with the 12 months leading up to the Sandown VHF Convention.

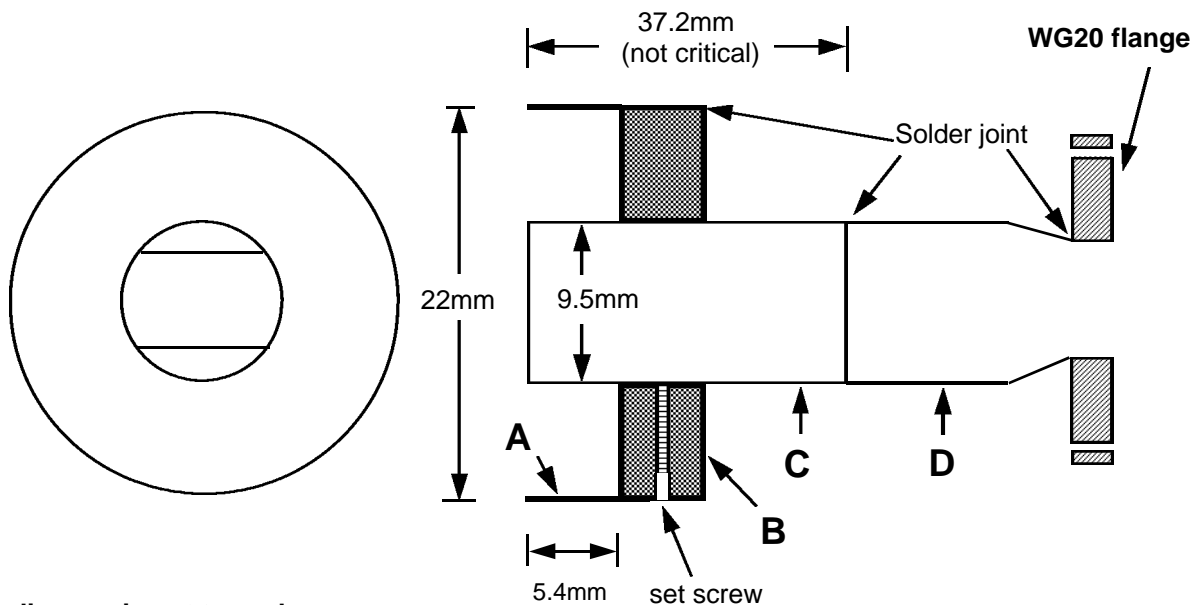
No prior notification of entry is required for either of these competitions.

SCALAR FEEDHORN FOR 24GHz

~ by VE4MA

(reprinted with the permission of the North Texas Microwave Society)

This versatile scalar ring feed first appeared in the June/July 1999 issue of the NTMS newsletter "Feedpoint" and looks just the job for those 24GHz operators who are using dishes with an f/D of around 0.4 or so. For larger f/Ds, such as those found on offset fed dishes, it is suggested you use a dual mode horn of the W2IMU type.



This diagram is not to scale

The diagram above is largely self explanatory. Part A, the scalar ring, is formed from a piece of copper waterpipe of an internal diameter that will be a snug fit over Part B, a brass disc (thickness not critical), and to which it is eventually soldered to provide a ring depth of 5.4mm as shown in the diagram. The brass disc is also a snug fit over Part C, a section of brass or copper pipe with an internal diameter of 9.5mm and an external diameter of 11.1mm.

Part D is a soft copper plumbing coupler or pipe of suitable diameter to enable it to be carefully butt jointed and soldered to Part C. Its other end is squeezed and shaped as accurately as possible to fit inside a WG20 flange and then soldered.

For an f/D of 0.4, the open face of the scalar ring should be flush with the open end of Part C. The whole scalar ring assembly (Parts A and B) can be slid back and forth over Part C to adjust for different f/Ds, after which it can be secured with a set screw. Part B is drilled and tapped as shown for the screw.

This design can, of course, be scaled for use on other microwave bands.

(Many thanks to VE4MA and NTMS for this useful article Editor)

THE ONGOING QUEST FOR FREQUENCY STABILITY

... some notes by John Hazell, G8ACE

The 10GHz home station is now rather more frequency accurate than before, when it was rather mobile in frequency due to an unheated xtal and being located in the loft. I have been using an Adret 5104 synthesiser as a marker but this method does have its disadvantages:

- 1) It ties up a valuable tool.
- 2) It needs the internal reference setting up to be accurate. My Adret did not have the lock applied to the calibration knob at the rear, thus causing doubts as to its setup accuracy.
- 3) Offsets need to be measured from a harmonic source and applied to the 10GHz I.F. tuning.

To make further progress, the first step was to obtain a quality reference for Adret alignment purposes. A design by Andy G4JNT uses the 60kHz MSF transmission to phase lock a 10MHz crystal reference. Another design uses the 198kHz Droitwich transmission. As a constructor always using the "cum-handly box" as the prime source of components, I decided to go down the 198 kHz reception route since components were readily available in the box.

Droitwich, by the way, has 25Hz data, phase modulated, on its carrier so it is necessary to remove this with a suitable time constant in the PLL. Always having parallel projects on the go, I was, in any case, also building PLLs for the improving stability of the various microwave LOs. These also require either a 5 or 10 MHz reference. On completion of the Droitwich calibrator, I used it to measure the short term stability of a number of 5MHz ovened references. These seem to be quite variable in short term stability, with slip times for one cycle on the oscilloscope being as short as 30 seconds or up to 22 minutes after stabilisation, depending on the unit. The oven in an HP equipment was the most reliable, almost always returning a one cycle slip time of around 2 minutes whenever it was measured. However, I was then tempted to bypass the free running ovened reference for the 10GHz PLL locking and use Droitwich directly. This, I believe, is an unqualified success! It has been in use to lock the 10GHz LO since mid December, 1999, the LO always locking within 0.5 secs from switch on.

As a user of the Reigate 10GHz beacon for frequency calibration I knew it drifted but the amount is quite staggering. Its highest frequency measured so far was 10368.852MHz when the outside temperature in Winchester was -6 degrees C. The lowest frequency was 10368.832MHz at +13 degrees C outside. My outside temperatures will not mimic Reigate exactly but it is possible to assume the frequency is going to change by around 1kHz per degree. A change of frequency from .848 down to .834 occurred in just 12 hours on January 29 this year. The Bushey beacon also appears to go walk-about! Its frequency during an early morning lift was .201 and about a week later it was down at .193. Any attempt to use these beacons for propagation monitoring means a wide tuning search needs to be used. The Wolverhampton beacon, on the other hand, when heard via rainscatter, is invariably on 10368.892MHz. Likewise, Martlesham is very stable. Once the frequency was found during an early morning lift, I discovered I could get short bursts of reception by leaving the dish on the correct bearing and waiting for reception, presumably by aircraft reflection. The distance is around 200km.

This reception is a direct outcome of improved LO stability and precise 2m readout. Needless to say I never did get around to setting up the Adret!



ACTIVITY NEWS

Not a great deal of news has been forthcoming from readers this month. Maybe you are all beavering away at some world shattering microwave project this winter, ready to surprise the rest of us with it when the so-called cumulative season starts in May! Or then again, you may be letting your gear gather dust and cobwebs in the hope that it will all work again when you next switch it on. We hope it will do so!

However, a regular group of home station operators does come up on Monday evenings, 10GHz being the usual band in use but with an increasing number of 23cm operators appearing also. This is good news indeed! The following are known to be around on the Monday Microwave nights: G3KEU, G3FYX, G3JHM, G3JMY, G4NNS, G3VKV, G3LRP, G6UAJ, G3LQR, G1JRU, G0HNNW., G4UVZ, G4LDR and G4BRK. There maybe others of course. Of the list above, G0HNNW and G3LRP are both in West Yorkshire, G3LQR in East Anglia and the rest are in the Wilts/Glos/Hants/Somerset quarter of England.

Paul, G6UAJ (Swindon) has fairly recently got on 10GHz, running a DB6NT system into a Qualcomm 1 watt PA. He is actively seeking further information on the 10 watt German PAs described on page 2 of this Newsletter! Paul is also aiming to be on 24GHz by the time the contest season starts up.

Paul's near neighbour **Tim, G3KEU** (Swindon) runs a daily 10GHz sked, Monday to Saturday, with Peter, G3LRP (near Wakefield, Yorkshire). This is over a tortuous path of around 200km and is proving to be a most interesting study in propagation. Clear skies and strong winds usually mean very

poor signals, whilst overcast skies can produce sufficient reflection to enhance signals to SSB levels. Of course, rainscatter and aircraft reflections are also noticed from time to time. If you are around at 0800-0815 local time during the week then take a listen on 10368.100MHz ... you might hear something!

On the much lower band of 80 metres, the UK Microwave Net on 3625kHz is still going strong after several years. The usual residents on this daily net are G0HNNW, G3PHO, G3KEU, G3LRP and M5AFG(aka G8VZT). The net usually starts at around 0815 and can go on well after 0930 ... daily except Sundays. Occasionally G3UKV, G4PBP, G4UVZ and GW3ATM also pop in for an exchange of microwave chat. Others are most welcome.

Early in January this year, Allan and Jack, **G8LSD and G3JMB**, dusted the cobwebs from their 10GHz WIDEBAND FM gear and had a contact with each other, just to prove the gear still works... and it did. They must have made the first wb contacts of the new millenium! Well done to both. It's a pity more do not do the same and encourage newcomers to microwaves to get active through this simple route to success. We have room for all modes on the 10GHz band. And wideband FM is still a fun mode to have. While it may not be capable of 400km tropo paths, it can still provide a lot of enjoyment for those who build the gear and can of course sow seeds for the future, encouraging more and more new operators. Over the past 10 to 15 years wideband suffered a decline in the UK, primarily as a result of the availability of excellent narrowband kits from the G3WDG and

G4DDK stables but the decline was actually encouraged by the more technically-minded (often also professionally engaged) microwavers who "rubbished" the mode and turned their backs on those operators who had neither the expertise nor the inclination to change to narrowband. In this way we lost dozens, if not hundreds, of microwavers during the early 1990s. Your scribe has a list of over 180 UK callsigns no longer heard on 10GHz! It is interesting to note that in the USA, 10GHz and 24 GHz wideband FM is still encouraged and used a great deal, especially in their contests. Your editor receives weekly requests for information on how to get started on microwaves via this mode. Unfortunately most of these requests are from overseas! Not everyone can enter the microwave world via narrowband. Also, don't forget that the UK 10GHz Cumulatives have bonus points for wideband contacts!

Allan, G8LSD, has been trying to sort out his 10GHz nb system which was damaged some months ago. A change of employment status has also meant the loss of the Volvo station wagon. The little Renault Clio is quite a different vehicle from which to operate /P ! Allan has been developing an interesting portable rotator system. You may remember that he and Jack, G3JMB, use a simple rotator based upon a battery operated screwdriver motor. Their design appeared in the Newsletter several years ago. Here's Allan's latest idea

"During the run-up to Christmas I re-designed my microwave rotator. It is now computerised. The laptop has my bearing and distance program plus a new function. Work out the bearing - choose to work the station - press the function key - and, hey presto!, the rotator moves to the new position.

I had a very nice stepper motor from an old piece of graphic arts equipment that I rescued, complete with driver card. It is a 5 phase job with 350mN of torque. A two-to-one belt reduction drive to the heavy duty worm turntable increases the torque to an adequate level. I have not yet tested it in high winds but under normal conditions it works well. The resolution is

theoretically very high but, with backlash in the turntable, it is sound to a quarter of a degree. Once optimised on the beacon, by jogging the control, the computer is then set by typing in the bearing actually in force. It then tracks the system relative to this point. It's just like half of a telescope pointing system. As yet I have no control in the vertical plane ... but I do have another 5 phase motor!"

John, G3XDY (East Anglia) emails the following report:

I just received my Newsletter and realised that I had not sent in a final update for the score for the Microwave League. Final score is:

1296MHz 210 stations, best DX 1206km

2320MHz 51 stations, best DX 980km

Scores were well up this year thanks to having got the gear generally working OK and some good tropo openings in the summer. This autumn has been notable for the lack of good tropo though. Activity in the cumulatives on 1.3/2.3GHz seemed pretty good from here, it was a pleasure to work G3PHO and others from the North such as G0HNW/P and G3NEO.

2000 has got off to a good start on 1.3GHz, with some activity around on the 9th January. Although conditions were fairly average, a sked with DL8OBU in JO42XI produced good signals (53-55) over a distance of just under 600km.

The 1999 Microwave League Table was published last month. John's updated scores above serve to keep him in top position with a grand total points score of 19,494. This is an excellent performance when you realise that the grand total is based upon 7 microwave bands. John has only entered two of these (23 and 13cm) and yet has beaten all band operators such as G4DDK, G3ZME/P and G3FYX/P! Amazingly he worked 210 different stations on 23cm last year, beating G4BRK's total of 73 by an impressive margin. Well done John!

We won't be printing the 1999 table again as it is now closed. The final version, with John's update is available on the editor's website at:

<http://www.g3pho.free-online.co.uk/microwaves/>

A new League Table will be starting as soon as entries come in. The rules are as before and can be found at the above website address. We will publish them in the next issue but before then just keep on working as many different callsigns as you can, on as many different microwave bands as you can! G3XXX, GM3XXX, GW3XXX, GI3XXX, GJ3XXX, F/G3XXX. G3XXX/P and so on all count as different callsigns for the League Table. Submit these and your best DX to date, from 1 January 2000 and we will do the rest on our "magic" Excel spreadsheet!

ANYONE FOR MICROWAVE UPDATE THIS YEAR?

The Mount Airy VHF Radio Club, Inc. ("The Pack Rats") invites UK microwavers to Philadelphia, USA for Microwave Update 2000.

The dates for Microwave Update 2000 are:
Surplus Tour Thursday - September 28
Conference Friday - September 29
Conference Saturday - September 30
Hamarama Sunday - October 1

uWave Update is the world's premier gathering of amateur microwavers. Every microwaver should attend at least once in their lives.

The Holiday Inn Select, Bucks County will be providing accommodation for the event. This is a 215 room full service hotel with a restaurant, lounge, indoor pool, fitness room, etc. It is centrally located between the Bucks County countryside and historic Philadelphia. Full use of the conference centre has been acquired for Friday and Saturday. Two smaller meeting rooms will be available for the evening flea market(s). Permission is granted to use the executive suite for the obligatory Update Happy Hour(s)!! The hotel staff expect late night rag chewing!

Room rates will be in the low to mid \$80's (approx £53) per night There is no additional charge for double occupancy. The Packrats have blocked booked 100 rooms under the key code "Microwave Update" which will be held for them until September 7th. This might sound like a lot of rooms but don't wait until the last minute

LATE PRODUCT NEWS

Mainline Surplus Sales of Leicester, a part of Mainline Electronics, has just issued their second "Flyer" catalogue of surplus goodies. Whilst not specifically microwave in content, there quite a number items of interest to the "heat ray" fraternity! The following items stuck us as being real bargains:

- * 12V 18AH sealed lead acid batteries @ £12.50
- * Ceramic heaters, mains, 125W, ideal for keeping the loft and its microwave gear warm and dry! 2 for only £10.00
- * 12V relays 8A rating. 3 for £1.00
- * SMA rotary coupling (works like a rotary WG joint) £65
- * SMA, N, BNC connectors at very low prices
- * Diecast boxes at low prices
- * Toshiba 144MHz FM PA module. 300mW I/P produces 28 watts output. 2 for £30
- * WG22 flanges (works well on 24GHz) @ £1.00
- * 2.4GHz cavity filters £15

Plus loads of LCD displays, cheap NiCads etc, etc.

For your copy of the catalogue....

Phone 0870 241 0810

or email:

surplus@mainlinegroup.co.uk

to make your reservation. This is a busy area!
To book your rooms contact:

Holiday Inn Select, Bucks County
4700 Street Road
Treose, PA 19053
USA

Your lady partners are also well catered for with a wide range of non-amateur radio events and visits.

You can make the event a lot cheaper by sharing a room with an amateur friend as the price quoted above is per room. Anyone willing to share with G3PHO? If so, ring him soon!

For more information:

email: JohnKB3XG@aol.com

<http://www.ij.net/packrats>

<http://www.basshotels.com/holiday-inn>