

Microwave Newsletter

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No. 01/82

Microwave Newsletter 01-82 (January)

After a year of newsletters being distributed by RSGB HQ, subscription reminders will be sent out in the near future. We regret it has been necessary to increase the cost to £4 to cover increasing duplication and postage costs.

Items for the next newsletter should be sent to Steve Davies, G4KNZ at 10, Wilberforce Way, Bracknell, Berks. RG12 3PN. Any news - operating, technical, nets, meetings etc is welcome. The deadline is around the middle of February, and the newsletter should be out by the beginning of March.

The microwave directory has been continued this month, including the information held over from the last issue when we ran short of space. There are still many operators about whom we have little or no information who we hope will send in an entry.

Conventions and Round Tables

Winchester Round Table: A reminder that the next round table at Winchester will be on Sunday 17th January starting at about 10.30am. The location is IBA Crawley Court, Nr Winchester, Hants., and further details of how to get there can be obtained from G3JHM, QTHR, telephone 0420-63315. Test equipment and assistance in fault finding will be available.

VHF Convention: Further to last month, we note that the date has been CHANGED to 20th March 1982.

Midland VHF Convention: A provisional date of 9th October 1982 has been given. More details later in the year.

Beacon News

GB3IOW (1.3GHz) has been off the air for several weeks

G3PFR hopes to move his beacon GB3XGH to a much better site (Winter Hill) in the near future.

G3AYJ has been testing the hardware for a narrowband 10GHz beacon from his home (550 feet asl) on 10368.190MHz and is looking for a site in the Sutton Coldfield area. More details further on in the newsletter

G3UQH reports that the 1.3GHz beacon on Brown Clee, Salop, GB3CLE became operational again on 14th Nov 1981. All the details are much the same as before, the only difference being that the FSK keyer now sends the QTH as 14km NE Ludlow Shropshire. The power output is 35W on a frequency of 1296.910 and the antenna system is a pair of 'J Beams' 15/15, one beaming north, the other 135 deg. The PA is a 3CX100 in a cavity and is home constructed. The frequency should be within 3ppm. Many thanks are due to the Salop Amateur Radio Society who built and financed this beacon, and they would be very pleased to receive any reports of its reception, which should be sent to Mr. D Goddard, 4 Gravels Bank, Minsterley, Salop.

Approval for GB3GBY, a wideband beacon running 10mW on 10GHz has been received. The antenna will be slotted waveguide.

A beacon at Start Point, South Devon is planned, GB3SD which will give good coverage of the South coast. Power will be 10mW on a frequency 10100MHz.

Since writing the above, we have learnt that GB3CLE has been off the air again. Hopefully this is only a temporary fault. Also, GB3BPO (23cm) was off on 3rd Jan, although it is back on now.



Microwave Committee Meeting 28-11-81

Amongst the items discussed were:-

A request from a local club for a lecture on "Microwaves" was considered, and a lecturer was approached.

Changes in committee standing orders agreed by council were noted, and the provisional constitution of the 1982 committee was discussed.

It was agreed that the conditions of 24GHz licencing, and the licencing of the higher bands allocated at WARC should be discussed early in 1982.

It was suggested that a member of this committee ought to sit as a full member on the Society's Propagation Studies committee to replace the present corresponding member. (This suggestion has subsequently been warmly received by the chairman of the PSC).

Further discussion was held on publicity for the Newsletter. Those that receive it consider it very useful; making it more widely known is a problem.

It was noted that a professional conference paper entitled "Frontal Disturbances in Anti-Cyclonic Subsidence - a cause of Microwave Propagation beyond the horizon" had been presented as a joint British Telecom/RSGB effort.

Approval has been received from the Home Office for the GB3LES 2.3GHz beacon. A proposal for a 10GHz wideband beacon in Grimsby (GB3GBY) was discussed and approved.

There was a discussion on the subject of Microwave Radiation Hazards.

A letter had been received from the Microwave Manager of VERON stating that with effect from 1-1-82 the Dutch would be adopting the German bandplan for 2.3GHz, ie the narrowband section will start from 2320MHz. It was agreed to discuss this topic at the January meeting.

Topics for the Winchester Round Table on the 17th January were discussed.

Graham Murchie, G4FSG.

Chairman, Microwave Committee

News

There is a net in the North/Midlands (Sheffield and surrounding area), on Monday evenings at 8pm local time on 144.330MHz, and anyone able to do so is welcome to join in.

Don, G3JHM, requests data on 10GHz and 24GHz contacts. He is compiling a map of paths worked on these bands, and now has over 300 in the UK and to Europe. He is interested in details of any contact made, and in particular, new paths. He has most of the data from the cumulative logs, The most vital data is the NGR at each end, preferably the 8 figure reference, and the names of the sites to identify them.

Sam, G4DDK, reports that he has been busy building for 2.3GHz recently. So far he has had two one-way contacts: one way transmit to G3LRS/P near Leicester (65km) and one way receive from G4LRT near Rugby (95km). Sam says his gear was designed with portable operation in mind, and both contacts were made from a local hill near Stone, Staffs. He hopes to be able to publish further details of the transverter he uses in the future.

Several people in the North report being QRV on 3.4GHz wideband - G3PHO, G8AFC, G8AXE and G8AGN. Paul, G8AFC, also reports that with G8AXE he is building 3.4GHz equipment for narrowband, and at present they have a receiver working. We know of one or two other people QRV on this band (G4MBS and G3FYX), but is there anyone else? Any news of 3.4GHz activity (and 2.3 or 5.7GHz) would be most welcome.

G3JHM reports that he has been active on both 10 and 24GHz over the last month. On 7th Dec he heard Clive G4MBS (Upper Wield) on 10GHz at his home QTH via rain scatter about 20dB above noise. On removing the 50cm dish the signal level dropped slightly, but the note became very rough, and the signals were audible over a 90 degree range of bearings. On 6th Dec, Don made a one way contact on 24GHz with Les, G3BNL/P, (Chobham Common) over a 15km path from the Hogs Back. On 31st Dec, two further one way tests with G3BNL proved successful - With G3BNL at Old Redding, Don heard him over 45km located at the Hogs Back, and over 60km from Hindhead. On this last test there was 15dB in hand until showers over the path caused the signal to drop, first by 6-8dB before being lost completely.

The 24GHz receiver uses a crystal controlled oscillator, converting to a 144MHz IF, with a 10" dish. The transmitter is a phase locked Gunn oscillator providing 30 - 40mW to an 18" dish. Both Les and Dom are now building for 47GHz.

On the 27th Dec, activity, like the weather, was not at all good, with snow falling in the North. G8AFC, G4BBU et al managed to get their land rover part way up Winter Hill through the snow drifts, and tried with G4KNZ (on Mow Cop) briefly, to no avail before G4KNZ decided he had better leave before being snowed in. In the south, G4MBS worked G3YGF/P and G3JVL, G3YGF/P being located on Shotover Hill, near Oxford. G8MCQ/P was out on the Purbeck Hills and tried listening for G3YGF/P, G4MBS and G3JVL, but with no luck. One or two other people were rumoured to be going out but nothing was heard from them. Perhaps if the WX is better next Christmas, the event might be more successful. It did show up some deficiencies in the gear which need fixing before next summer, though.

Clive, G4MBS reports trying snow scatter tests during the last month. On the 13th December Clive had set up a 10" dish beaming south from his QTH and an open waveguide 100 microwatt source 25ft away beaming east. During a snow storm which followed (large flakes) very rough scattered signals peaked 14dBN in 270Hz. After the snow had passed no signal was detectable so the level of enhancement was not known. During a "thin flake" snowing on 21st December an enhancement of a few dB was also detected. An attempt at a qso with G3JVL to observe any enhancement (on the 13th) failed unfortunately because of the intense wind blowing the G3JVL reflector horizontal. Clive also mentions some of the problems he has to contend with in the bad weather:

1. The telescopic mast freezes and becomes inoperative.
2. Although the fly swatter has a stress relieving mechanism to blow horizontal in gales, gusts cause the reflector to be blown vertically and receive maximum resistance which causes bending of the reflector surface and breaking of his elevation control mechanism.
3. As the gear is remotely operated in the loft the oscillator is subjected to below zero temperatures. (Although Clive intends to remedy this using a temp controlled oscillator).
4. Living in a rural area, the mains voltages often fluctuate in bad weather down to 210V, causing problems on power supplies.

Clive also mentions the test with G3JHM (see earlier) and urges other stations who are principally portable operators to poke a piece of waveguide or a horn out of the bedroom window when it rains and make use of rainscatter propagation, which occurs quite often in our climate! He says he has now rebuilt his 24GHz narrow band tx, and that the rx is nearly complete.

For getting going on the millimetric bands, G3JHM suggests the use of sub-harmonic mixing: $F_{sig} - 2x F_{lo} = F_{if}$. This will enable existing multipliers to 24GHz to be used for a 48GHz downconverter, for example. The sub harmonic mixing enables a simpler design of mixer circuit to be used since the frequency separation between F_{sig} and F_{lo} is much greater. This technique has been studied by several workers at BTL and TRG (Alpha) and may be applied from 1GHz to at least 18GHz. Don says he has a bibliography and copies of the relevant papers if anyone is interested. In general, the realisation of the circuits is by using stripline mounted symmetrically in waveguide, with the base material being quartz substrate but it may be possible to use polyguide or other microwave pcb materials.

There have been a few comments on the subject of contests. Several people say that the microwave talk back frequency should remain on 144.330 MHz since this is well known. However, it does not appear in the IARU bandplan, and thus the plan for 2m published in January's Radcom. Also, when listening on 2m, very few non microwave operators seem aware of such a frequency. Thus, whatever frequency we choose, perhaps more publicity should be given to it outside the microwave community. With quite a number of new operators getting on 10GHz WB, perhaps due to the article in Practical Wireless, it has also been suggested having a separate section in the Cumulative's to encourage them to enter.

Apologies for not giving a firm deadline for the last few issues of the newsletter. Next month, as stated earlier, the newsletter should be out by march. Thus the latest date for info to arrive is probably 20th Feb.

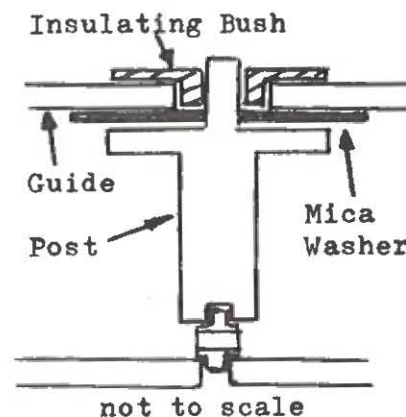
Improvements to multiplier and mixer diode mounts

Leonard, GM4HFM, has come up with some suggestions to improve the mounts for multiplier and mixer diodes in narrowband rigs.

SRD and Gunn diode mounting posts:

There are often problems when using thin PTFE or Sellotape as the insulating washer, as it can puncture and short out the diode. An alternative insulator is a mica washer that is normally used for mounting power transistors - these already have holes drilled in them, and can be adjusted in thickness by splitting the layers of mica apart with a needle.

It is also possible to use the plastic insulating bushes to keep the post central and insulated where it passes through the waveguide wall.



The tapered mixer assembly :

As an alternative to forming the tapered section with copper foil soldered in the guide, Leonard has suggested bolting a tapered block of brass or copper in place as shown below. This also makes it possible to use a socket for the mixer diode connection. The block is inserted through a hole in the upper face of the guide and held in good contact with the walls using 6BA bolts in the sidewalls. It is then very easy to drill and tap the block to accept the matching screws.

The advantage of using a socket mounted on the guide, is that it can be used to support the parts of the choke and diode connection. In some of the other designs either the assembling is rather difficult, or the insulation is likely to puncture after a while. Either of BNC or SMA sockets could be used. The choke is made from a section of low impedance transmission line formed by the large diameter inner rod, insulated by a layer of Sellotape.

The diameter of the rod is not critical, somewhere between 5 - 8 mm, but the gap between the rod and the hole in the block should only be sufficient to allow the rod to be wrapped in one or two layers of Sellotape.

The characteristic impedance of this rod can be calculated from the following expression:

$$Z_c = \frac{\sqrt{\frac{\mu_0}{\epsilon_0 \epsilon_r}}}{2\pi} \log_e \frac{b}{a} \quad \text{ohms}$$

where μ_0 = permeability of free space, 4×10^{-7} H/m

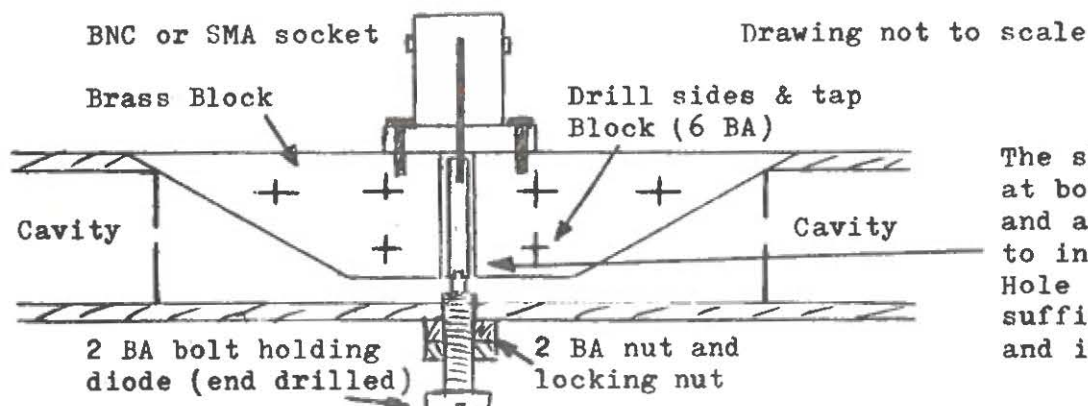
ϵ_0 = permittivity of free space 8.85×10^{-12} F/m

a = diameter of rod

b = diameter of hole

ϵ = dielectric constant of the insulator

For $\frac{1}{4}$ " rod with $\frac{1}{4}$ mm gap around it filled with $\epsilon=2$ then Z_c works out at 3.2 ohms.



The slug is drilled at bottom for diode and at top to solder to inner pin of skt. Hole in brass block sufficient for rod and insulation.

Odd Behaviour of the IC202

G3YGF

A popular choice of crystals for the IC202 consists of 144.0 - 144.2, 144.2 - 144.4, 144.4 - 144.6 and 144.8 - 145.0. This combination of the last two crystals is not recommended by Icom, but the reason for it is not widely known, and it may appear to perform ok.

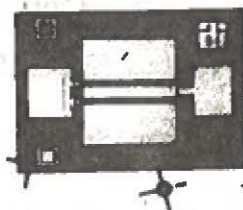
The problem is that the top two crystals interact at one point in the .8 - 145.0 vxo range. The frequency jumps by about 10 or 20 kHz as the frequency of approximately 144.850 is approached from either direction. Thus there is a small range of frequencies which it is not possible to reach! The fault is rather subtle, as there is no audible sign of the jump unless there is a signal in the passband at the point where it jumps. It was noticed when the rig was used as an IF for 1296MHz while listening for beacons - one around that frequency proved very elusive, as it only appeared when the drift in the converter crystal brought it outside the 'forbidden band'.

The only cure I have found is to remove the .4 - .6 crystal when listening around this frequency. The effect can be found by slowly tuning a signal generator across the .8 - 145.0 band, keeping it in the passband with the 202 tuning, and listening for the jump. Alternatively, put the rig on transmit and observe the frequency on a counter.

Graham, G4FSG sent us the following advert for GaAs FET's from "Microwaves" October 81. We are not sure if they are available in the UK yet but it looks promising for the future.

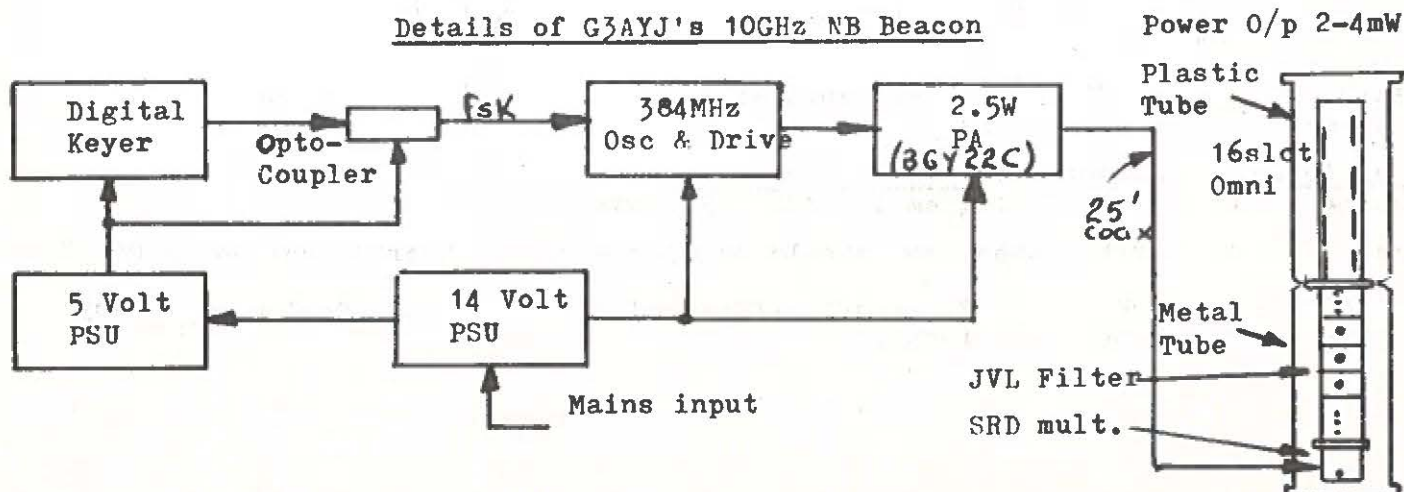
\$10 FET features
1.6-dB NF at 4 GHz

The ALF 1020 GaAs FET costs under \$10 in lots of 200, yet offers a typical noise figure of 1.6 dB with associated gain of 11.5 dB at 4 GHz. Versions are available in chip or packaged form. The transistor features a recessed-gate structure, and is suggested for applications through X band. Alpha Industries, Inc., Semiconductor Div., 20 Sylvan Rd., Woburn, MA 01801 (617) 935-5150 TWX 710-393-1236.

2.3GHz Satellite Beacon

Several people have reported the existence of a carrier on 2304.00 MHz from a satellite. G4MBS reports first hearing it on 1st Nov 81 which he first thought was a locally generated spurious signal since it did not appear to beam up. However, the use of a 2' dish enabled the signal to be peaked up at 170 deg grid at approx 70 deg elevation. The signal remained audible for about 1½ hours at 15dBm in 270 Hz before disappearing on a bearing of 190 deg grid.

Other people confirmed Clive's reception including G8ADC, G3FYX, G3BNL, G3WDC, G4BYV and PAOSSB. The latter station using a 20 foot dish was able to define periods when it switches to a much lower power and some telemetry is sent. The satellite orbit time decreases by about 5 mins per day and Clive says that on 1st Jan 82 it was audible from 0830 to 1000. On a few days it does not seem to operate, although it may lie on its low power mode. G3WDC has explored several lines of enquiry and it seems it is probably one of four Russian satellites (non amateur). However, it is a very useful aid to receiver alignment when present.

Details of G3AYJ's 10GHz NB Beacon

- Mike Dixon G3PFR, Norley, Cheshire. Tel: 0928 - 88427
Equipment: 10 GHz WB and NB, 5.7GHz NB under construction.
- Rick Dodd G8PNL, Winsford, Cheshire. Tel: 06065 - 57766
Equipment: 10GHz WB.
- Gerry Farrance G3KPT, Birmingham, West Midlands. Tel: 021 - 358 - 1573
Equipment: 10GHz WB, 10GHz NB under construction.
- Roy Warrender G8ASW, Birmingham, West Midlands. Tel: 021 - 358 - 7706
Equipment: 10GHz WB, 10GHz NB under construction.
- Jonathan Eastment GW4LXO, Cardiff, South Glamorgan. Tel: 0222 - 60694
Equipment: 1.3GHz, 10GHz WB and NB, 24GHz WB.
- Cliff Scrase G8SHF, Nailsea, Avon. Tel: 0272 - 855693
Equipment: 10GHz WB and NB.
- Terry Allen G4ETU, Chichester, West Sussex. Tel: 024358 - 463
Equipment: 10GHz WB, 24GHz WB under construction.
- Ivan Gurton G8ASP, Harpenden, Herts. Tel: 05827 - 3770
Equipment: 10GHz WB, 24GHz WB, 10GHz NB under construction.
- Barry Chambers G8AGN, Sheffield, South Yorks. Tel: 0742 - 304888
Equipment: 3.4GHz WB, 10GHz WB, 10GHz NB under construction.
- Peter Day G3PHO, Sheffield, South Yorks. Tel: 0742 - 681216
Equipment: 3.4GHz WB, 10GHz WB, 10GHz NB and 24GH WB under construction.
- Jack Bushby G3WLV, Rotherham, South Yorks. Tel 0709 - 895506
Equipment: 10GHz WB.
- Gerry O'Hara G8GUH, Sheffield, South Yorks. Tel: 0909 - 567304
Equipment: 10GHz WB.
- Paul Entwistle G8AFC, Urmston, Greater Manchester. Tel: 061 - 865 - 3183
Equipment: 1.3GHz, 3.4GHz WB, NB rx, 10GHz WB and NB, 5.7GHz under construction.
- Graham Jones G8AXE, Stockport, Cheshire. Tel: 061 - 442 - 0696
Equipment: 1.3GHz, 3.4GHz WB, 10GHz WB and NB.
- Frank Beesley G8CZE, Droylsden, Greater Manchester. Tel: 061 - 370 - 5825
Equipment: 1.3GHz, 10GHz WB.
- Bob Price G8DTF, Swinton, Greater Manchester. Tel: 061 - 794 - 9333
Equipment: 1.3GHz, 10GHz WB and NB, 5.7GHz under construction.
- Ray Coley G3IFF, Havant, Hants. Tel: 0705 - 453043
Equipment: 10GHz WB (no talkback).
- Dennis Morris G3AYJ, Sutton Coldfield, W Midlands. Tel: 021 - 354 - 5783
Equipment: 10GHz WB and NB, 24GHz WB under construction.
- Mike Walters G3JVL, Hayling Island, Pants. Tel: 07016 - 4482
Equipment: 1.3GHz, 10GHz WB and NB (3W, fixed station only).
- Steve Davies G4KNZ, Bracknell, Berks. Tel: 0344 - 23200
Equipment: 10GHz WB and NB, 24GHz WB.
- Steve Baugh G4AUC, Bracknell, Berks. Tel: 0344 - 20577
Equipment: 10GHz WB.
- Petra Suckling G4KGC, Towcester, Northants. Tel: 0327 - 802100
Equipment: 10GHz NB, 5.7GHz NB.
- Charlie Suckling G3WDG, Towcester, Northants. Tel: 0327 - 802100
Equipment: 1.3GHz including eme, 2.3GHz rx, 10GHz WB and NB, 24GHz.

Correction to G3VPF's phone no: should be 0305 - 820381 (work), not as in 08/9/81.

Please let us know if there are any errors, additions to equipment etc and any more entries for the next issue.