Microwave Newsletter

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Microwave Newsletter 03-82 (April)

Many thanks to all who have sent in contributions. We are continuing with the 'reduced A3' format that we used in the last issue, as it is much more economical with space. News for the next issue, which will be out just before the second cumulative, should be sent to Steve Davies, G4KNZ, 10 Wilberforce way, Bracknell, Berks. RG12 3PN, tel. 0344 23200, and should reach him by 3 May.

News

On Sunday 28th March, Don G3JHM went to Butser Hill, ZK06h, and on arriving heard the Alderney 10GHz beacon GB3ALD at about 20dB above noise. At 1630 gmt he worked F1CIK/P who was located at La Pernelle, ZJ34a, at a distance of 154km. Signals were greater than 25dB above noise using wideband equipment. This was the first contact for Alain, F1CIK, out of France, and we hope to hear him on during the Cumulatives.

Don also reports that there is 26dB in hand on the path between the Hogs Back and Old Redding over which he has worked Les, G3BNL, on 24GHz recently. Don is now hoping to try a cross-Channel contact on 24GHz with G3BNL as soon as he can get a reciprocal licence.

The next Winchester Round Table will be held on Sunday 13th June, starting at about 10.30 am. We hope to have more details for the May Newsletter, or information can be obtained directly from Don Hayter, G3JHM, who is QTHR.

Bob, G4APV, reports he is now qrv on 10GHz wb and hopes to start building nb gear soon. He is fortunate in having a line-of-sight path to the beacon GB3MLE on 10.4GHz (30km), making it easy to check that his receiver is working, and also a reasonable path to G3PHO over which he hopes to do some fixed-station to fixed-station tests.

Nick, G8MCQ, sends several items of interest. He reports that he is qrv from home (Bournemouth) on 1296, with 10-15 watts, and would like to try skeds with anyone interested in working into Dorset. His best direction is to the east, and he is able to hear GB3BPO for about 80% of the time. Skeds can be arranged by phoning 0202 674141 ext 77 during office hours, or calling him on GB3SC.

Local tests with 10GHz atv have been conducted over short paths (approx 100 yds) using fm video at 10GHz. Using slope detection on a normal am tv, good colour pictures have been obtained. An fm video demodulator is under construction.

Nick also mentions that he has a friend with engineering facilities who has offered to manufacture the filter and mixer parts of the JVL 10GHz transverter if enough interest is shown. For a price of approx. 27 pounds including postage he would provide a length of copper wG16 with slots milled, holes drilled, plus a set of iris plates and the reduced-height mixer section. The price would not include soldering the iris plates or reduced-height section in place, or tapping the holes.

If there is enough interest shown, these units would be made in batches, so delivery would not be immediate. If anyone is interested in this, please could they write to: Nick Foot, G8MCQ
29, Wheelers Lane
Bournemouth BH11 9QQ
Dorset
enclosing an sae, but no money at this stage, so that he can gauge whether there are enough people interested to make the project viable.

Finally, he suggests a propagation warning system based on a series of phone calls for 1.3GHz lifts. He finds it frustrating to hear beacons coming in at stronger-than-normal signal levels and yet no activity on the band. Any comments?

G3YJH reports a number of improvements to both wideband and narrowband 10GHz gear during the winter, and looks forward eagerly to this season's cumulatives.

G3FYX has completed a 2C39a 2.3GHz doubler, and is working on a pa which he hopes to fire up in the next couple of days. Roy uses a Quad-loop yagi antenna, and an interdigital converter for receive.

Clive, G4MBS, sends a letter in his usual entertaining style, and reports that he is back on the air again following storm damage to his flyswatter antenna system. At one stage the 60ft pneumatic mast collapsed, very nearly killing its owner, and subsequently twisted itself over a power cable to the house next door. The mast has now been straightened and the reflector rebuilt (which required 288 lengths of wire threaded between the wire mesh - a tedious job!) He is now somewhat sceptical of the idea that the higher above ground, the safer a microwave antenna!

He notes that moving from 2304 to 2320MHz means that the Russian satellite cannot be used as a beacon, and that 1152MHz drive sources can no longer be used. But since it would be more discouraging to both new and present activity to have a split band, and because the few stations already on the band generally use transverter systems which are relatively easily modified, he is making the move, albeit reluctantly.

He also reports that a protective cover for N type sockets is readily provided by the cylindrical plastic seals which are fitted to many car aerosol paint cans.

SM6GPV sends a report of 10GHz activity in SM, and notes interest in the "Microwave Committee" LO board design, though they appear to have a problem obtaining leadless disc capacitors.

There are about 15-20 stations qrv or building; a large percentage of the rigs are Gunnplexers. The ODX in Sweden is 165km with NB-equipment (105km for WB). The NB-qso was made over an obstructed path.

The Swedish society SSA are launching a microwave cumulative contest along the lines of, and synchronised with, our own contest. Given the right propagation conditions a G-SM qso on 10GHz might well be feasible. SM6HYG in FS-square is qrv with about 10mW on 10368.

They also have their own Microwave Newsletter, edited by the well-known EMEer Ben, SM6CKU.

Ivan James, G5IJ, has come across an article in the old T&R Bulletin (predecessor of Radcomm) July 1931, pp2-11, by E.C.S. Megaw, giving an account of a lecture and demonstration which he gave before the RSGB entitled "Electron Oscillations and their Application to Ultra-high Frequency Communications". In essence, thiis describes the work of Berkhausen-Kurz and Gill-Morell, and others, on using ordinary triode valves to produce centimetric oscillations by making the grid positive and the anode negative. Ivan wonders whether, with rather more advanced valves (planar triodes etc) available today, the idea might not be worth re-investigation by amateurs. He estimates that efficiencies of 1-2% should be achievable, which might correspond to several watts of power output, and also that such an oscillator could fairly easily be injection or phase-locked. He offers to send a copy of the article to anyone, on receipt of one pound to cover photocopying expenses. His address is: 35 Gerrard Gardens, Eastcote, Pinner, Middx HA5 2PT.

The latest circulation list for the Microwave Newsletter has approximately 90 entries.

The 3/81 issue of DUBUS-INFO has just arrived, and has a number of items of interest. Most of the issue is devoted to an analysis by DL7QY of interdigital bandpass filters, including a computer program in BASIC intended for a HP41c calculator.

DK7LJ is able to supply kits for 2.3GHz 2C39 amplifiers capable of 30w output. The kit is complete apart from fingerstock, and costs DM50 (about 12 pounds). Write to Per Dudek, DK7LJ, Zum Forst 67, 2301 KIEL RONNE, W-GERMANY

There is also a report of the first ever France-Germany qso on 24GHz, between DD5CA/P and F0GOH/P (DJ7FJ). The path was 69km long, between a site in the Black Forest area of Germany (Brandenkopf, EI51b) and a mountain in eastern France (Ottilienberg, DI47c). Signals were 5/9, in spite of rain, and the equipment consisted of commercial Gunn oscillators (Microwave Associates), nomemade mixers, and parabolic antennas.

Microwave Committee Meeting 13-3-82

The possibility of making a video recording of a Microwave subject was discussed. Both spelalist and beginners topics were considered. The latter was thought more useful for showing by most clubs.

G3APE reported that a paper on 1296MHz Mobile Operation presented at the IEE Conference in January had been well received. He also commented that the Society was again being encouraged to input information to the CCIR.

The topic of licences and the problems with the HO was discussed, but as the topic has been extensively covered elsewhere it will not be repeated.

The new format of the Newsletter was discussed, and generally felt to be a significant improvement.

G3WDG reported that his 1.3GHz amplifier design was now giving of the order of 70w output and that a 2.3GHz version of the OZ9CR amplifier was working well with about 10dB gain.

G8AGN reported that he had been making gain measurements on horns which showed that it was not difficult to achieve within 0.5dB of theoretical. He also described a BASIC program giving horn dimensions when frequency and gain data are input.

G3HWR showed a WG jointing arrangement for the mm-wave bands based on a modified bnc connector.

BEACONS: GB3CEM/GB3GBY/GB3XGH(change of site) have all been approved by the HO. GB3FRS and GB3NWK are operational.

G4KNZ reported that five 1.3GHz TV repeaters were now being proposed.

It was agreed that the recommended narrowband segment of 2.3GHz should be 2320 to 2322MHz in line with the Germans and Dutch. Many stations in the east of England are already using this segment. G4FSG agreed to approach the 13cm Beacon keepers to request that they move to this segment as soon as possible.

Plans for the exhibition at Alexandra Palace, where the Committee will be using part of the RSGB stand were discussed in detail.

Graham Murchie, G4FSG
Chairman, Microwave Committee.

An Improved 24GHz Diode Mount

The 1N26 diode mount described in 'Microwaves', February 1980 is a useful basic design, but suffers from a rather inelegant way of making the if/dc connection. This modification avoids the need to connect directly to the diode body; rather than decoupling between the diode body and the diode holder (OBA nut), the two ends of the T-transition are decoupled, and the if/dc connection is taken from one end of the T-crossbar.

The construction should be evident from the diagrams. In all other respects the design is the same as the original.

Two such mounts have been built, one of which is intended for use in the GB3IOW 24GHz beacon, and the whole mount including matching screws is just 30mm (1.2 inches) long.

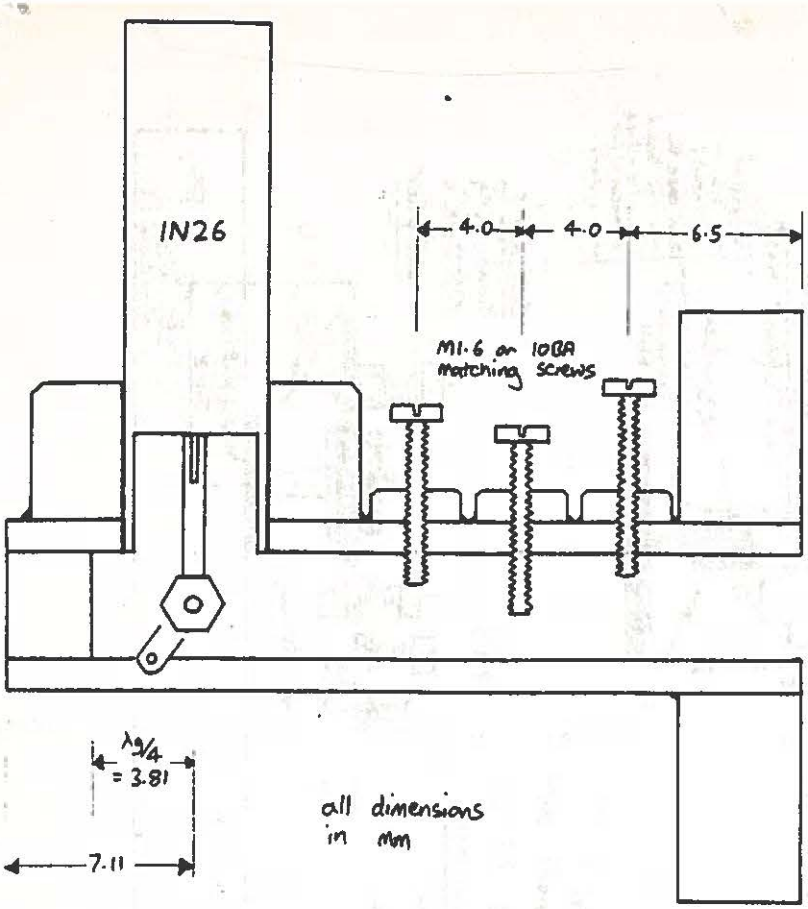
If the unit is used as a mixer rather than a detector, it is good practice to build the if preamplifier stage directly onto the mixer mount, so that the matching between the mixer and preamplifier is constant once optimised, and not affected by random lengths of cable that might otherwise be used to connect mixer and preamp.

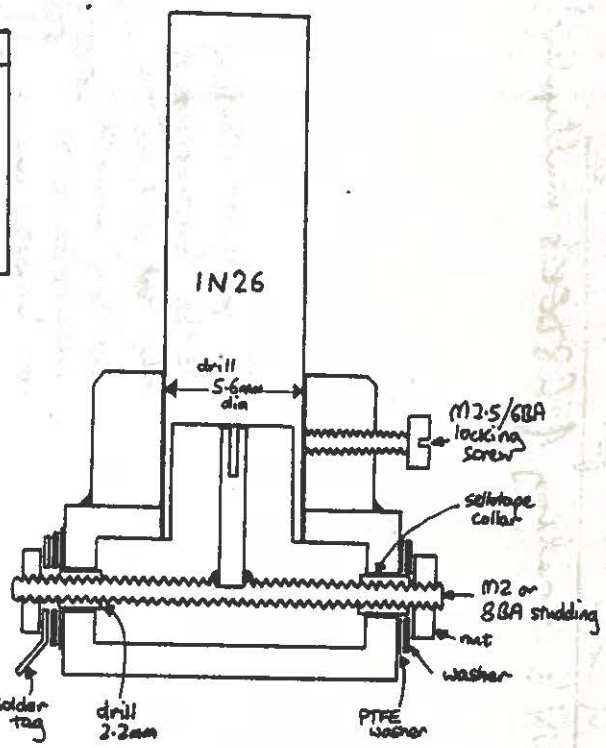
One standard design of if preamplifier is the untuned 2 x BF180 circuit (VHF/UHF Manual, 3rd edition, p8.39), which is usable at the common if's of 10.7, 30, 100 or 144MHz. This design has been quite widely used, mostly at 10GHz, where the ability to cope with if's of different frequencies has sometimes been useful, when, for instance, a narrow-band 144MHz receiver could easily be substituted for the usual wideband fm if strip.

The basic design does not appear to be optimum, and it seems worthwhile to incorporate some means of adjusting the Ic of the first transistor to optimise the receiver performance.

Adjusting the Ic in this way has two effects - firstly the transistor noise figure will occur at a particular value of Ic, and secondly the transistor input impedance will vary with Ic and can therefore be adjusted to provide the best match to the diode, whose video impedance will be of the order of a few hundred ohms.

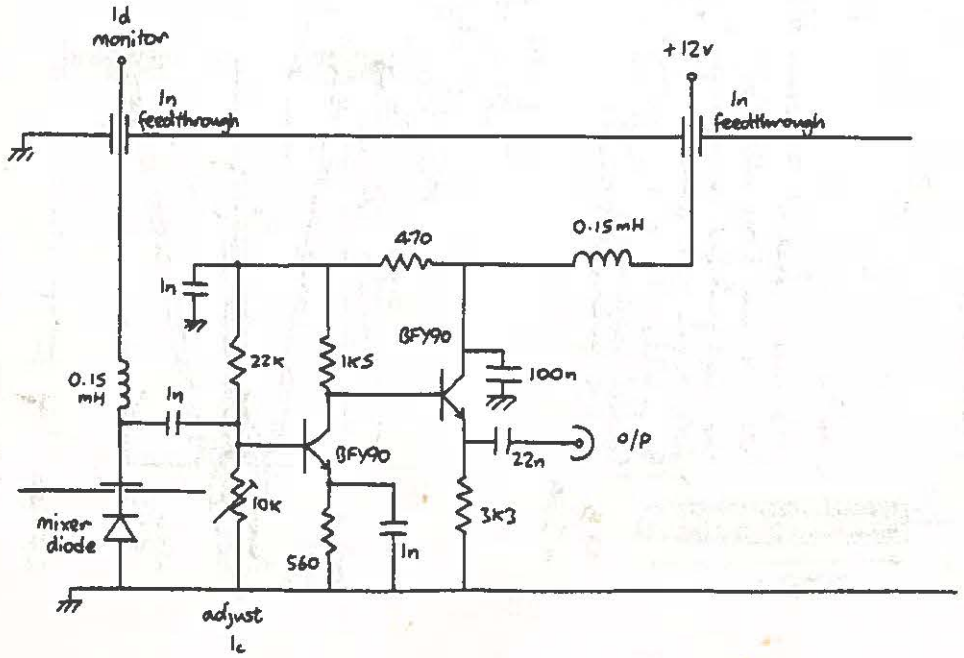
The adjustment will, of course, be a compromise between these two effects, and the mixer unit should ideally be aligned using a noise figure indicator, though it is possible to optimise by ear using a weak signal.





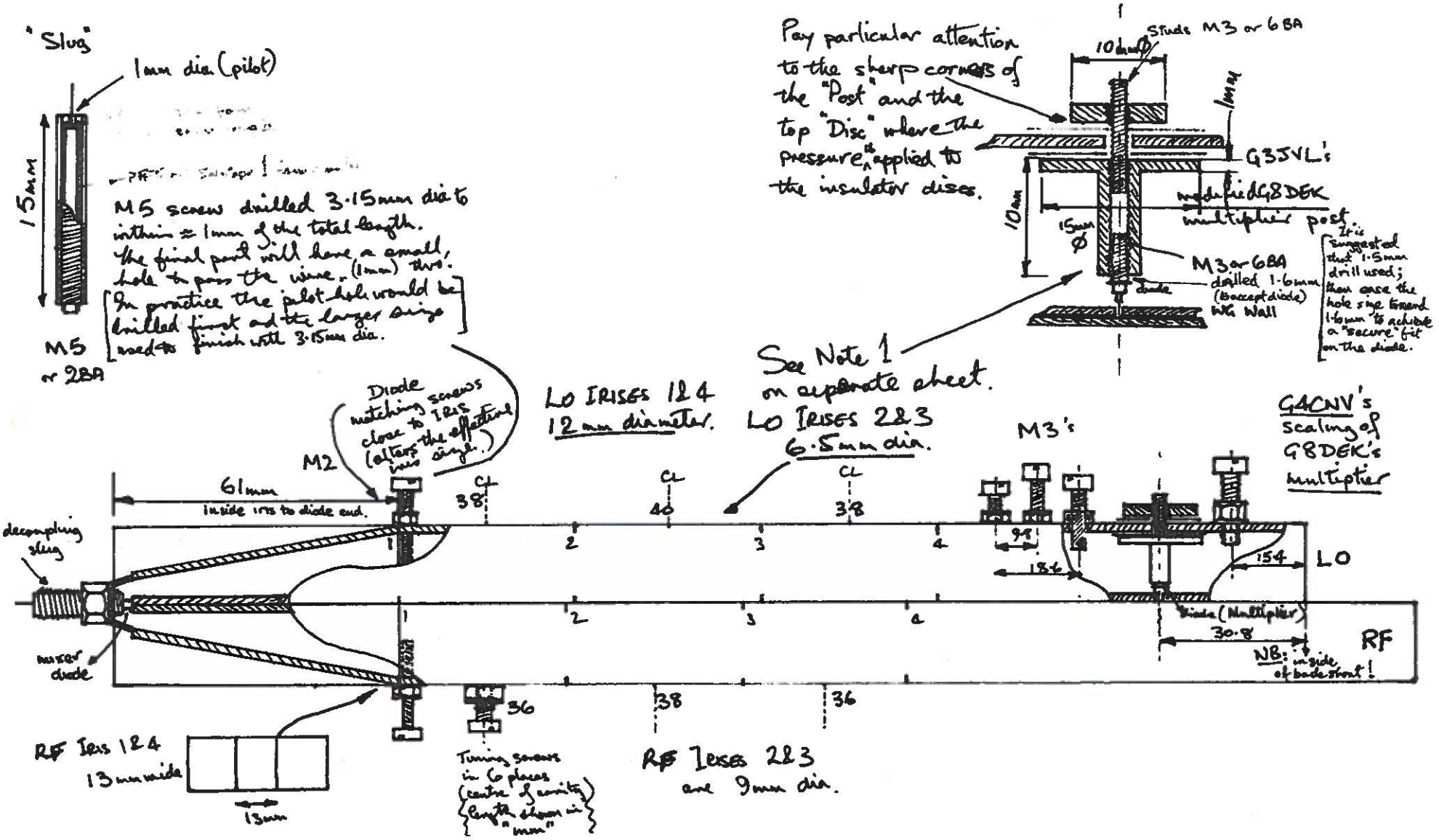
There are several variables in the mixer assembly that can be tweaked; lo level, rf matching (screws), mixer-preamplifier matching, preamplifier noise figure, and if several mixer diodes are available it may be possible to select the best of the batch. G3WDG has demonstrated with 10GHz wideband receivers that there are usually many dB's of performance to be won by careful optimisation. The potential improvement with 24GHz receivers is probably even greater, though it has not yet been possible to use a IN26 diode as a noise source in the same way as at 10GHz.

The improved preamplifier design, which uses BFY90 transistors, is given in the diagram below.



Mixer by G3JVL for 5.7GHz

[using G4CNV's scaling of G8DEK's multiplier]



Note 1 :- Step-Recovery Multiplier Post Modifications.

[G8DEK's Design scaled by G4CNV and modified by G3JVL]

The lower stud is used to apply the clamping pressure to the diode. With the stud screwed back into the body of the post as far as possible (with the diode in position - tight fit).

With the back short removed, pass the post assembly through the guide end until it is in the correct position. Using a suitable small screwdriver adjust the lower stud to apply a sensible pressure between the diode and the decoupling disc and the WG walls (carefully position the insulator first).

Microwave Directory Entries

Nick Foot G8MCQ, Bournemouth, Dorset. Tel 0202-674I4I ex 77 (work)
Equipment: 23cm, IOGHz WB & NB.

Bob Harris G4APV, Sheffield, S Yorks. Tel 0742-446463
Equipment: IOGHz WB.

Phil Johnson GJ8KNV, Grouville, Jersey. Tel 0534-53333
Eqipment: 23cm, IOGHz WB (300mW), IOGHz NB under construction

Andrew Renouf GJ8SBT, St Peter's, Jersey.
Equipment: 23cm, IOGHz WB under construction

Sid Smith GJ8EZA, St Helier, Jersey.
Equipment: 23cm, IOGHz WB.

Derick Naylor, GJ4JWA, St John, Jersey.
Equipment: 23cm SSB (20W)

Nigel Lihou GU8OVO, St Peter Port, Guernsey.
Equipment: IOGHz WB under construction.

Richard Mills G4LPD, Nottingham, Notts. Tel 0602-8I8406
Equipment: IOGHz WB.

Dave Powis G4HUP, Trentham, Staffs. Tel 0782-642507
Equipment: IOGHz WB, 5.7GHz & IOGHz NB under construction.

Sam Jewell G4DDK, Stone, Staffs. Tel 0785-8I4889
Equipment: IOGHz WB, 2.3GHz system nearing completion.

23cm Beacon Station - GB3NWK

GB3NWK, transmitting on a frequency of 1296.81 Mhz, became operational on 7th March, 1982.

GB3NWK is located at Chelsfield, near Orpington, Kent. It uses the site previously used by the 70cm repeater GB3NK, until that unit's move to Wrotham in 1980. The site is 525 ft above sea level.

The specifications of the beacon are as follows:-

Transmitter: Modified Wood & Douglas MDO5T Microwave Drive Source + BPF 433 Bandpass Filter + 70FM10 10W P.A.
This drives a Microwave Modules varactor tripler. The output is fed to an interdigital filter, and the whole system provides 4 watts of RF at 23cm.
30 watts E.R.P

Keyer: The keyer unit employs 74-series logic using a diode matrix to generate the morse code.
The keyer generates the following message:-

'GB3NWK AL51B CHELSFIELD'.

This information is repeated every 40 seconds.

Power Supply: The P.S.U. provides +13.8v & +5v for the TX & Logic, using 78-series regulator integrated circuits. +12v & -5v rails are also provided to allow for future use of microprocessor technology in the keyer unit.

Antenna: At present the antenna is a single 15/15 slot fed yagi. It is mounted 20 ft above ground level, and beams WNW. This present arrangement is only temporary. When some outstanding problems at the site have been sorted out, the antenna(s) can be mounted at the full height of 36 ft. There is also a possibility of an extra antenna to provide coverage in another direction.

It is hoped in the future to upgrade the keyer unit to employ a microprocessor system. This would allow a varied sending sequence, and the possibility of RTTY information to be sent.

The beacon keeper, G8BJG, would like to thank the following people and organisations for their invaluable help in bringing this project to fruition.

Wood & Douglas, for their assistance with the supply of the transmitter components.

Quartslab Marketing Ltd., for supplying the crystal for the transmitter.

G8CIU, for building the keyer, and providing much valuable help on site, especially with putting up the antenna.

G4GLN, for providing the interdigital filter.

G8CTT & G4EGU, for assisting with funds and helping on site.

G3TAA, for assisting with the supply of the beacon cabinet.

G8JNZ & G8GGP, for providing financial assistance.

and last, but not least, Jerry Wing, for his generous help in supplying us with accommodtion for the beacon.

Reception reports will be most welcome, and should be sent to the beacon keeper, Alan Grove, G8BJG, who is QTHR.

1st Cumulative Activity List

Call	Phone	Site, equipt. etc
G4ABS	0420-62316	Home qth (SU634383) only, nb only, 10GHz + 2.3, 3.4, 5.7, 24GHz as appropriate
G4FRE +G8HPU		Suffolk, TM358401, all day, 10GHz wb & nb, 2320MHz nb, 3w. 432.33MHz ssb talkback, 144 also available.
G3YJH	054-33-4230 (021 262 4979 work)	Titterstone Clee, SO601771, 10GHz wb & nb
G3FYX	0454-778288	Cleeve Hill, SO997246, 10GHz wb & nb, 2304MHz nb.
G4KNZ	0344-23200	probably Mynydd Maen, ST260977, 10GHz wb & nb.
G3YGF	0794-40008	probably Dean Hill, nr Romsey, Hants, SU276260 (4276 1260), 10GHz wb & nb.

Stop Press

The phone number for the Farnborough beacon was incorrectly given last month as DIDCOT 6221. The correct number is FARNBOROUGH (0252) 6221. Apologies to someone in Didcot who must be rather puzzled at being thought to be an Ansaphone.

73 de G3YGF, G4KNZ and J4CNV.