

MICROWAVE NEWSLETTER



An Amateur Radio publication for the Microwave enthusiast, published by the Radio Society of Great Britain and edited by G3PHO and G8AGN

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FROM THE EDITORS

June 1994

This edition comes close on the heels of the May 10GHz Cumulative Contest. Few reports are to hand as yet but conditions and activity seemed lower than usual. Familiar callsigns are now becoming noticeable by their absence! For more comments see **ACTIVITY NEWS**.

"Use it or lose it" is the editorial theme of the April 1994 edition of **QST** and is a comment made specifically in regard to the 13cm band where the National Telecommunications Administration has "selected" the band for re-location of services within the 2300-2310 and 2390-2450MHz areas. In effect these are now shared with government agencies in the States but the relocation of the government frequencies could result in the stated segments becoming available for commercial uses, with potentially disastrous results for our amateur friends in the U.S.

Don't forget the old saying..."When America sneezes Britain catches a cold....."

Thanks once again to all our contributors this month. If your item is not published this time it is in the "stockpile" and will appear soon.

R.S.G.B. LIBRARY SERVICE

The Society now has a library service for its members. It is based at RSGB HQ and is run by John Crab. The

service contains all the Society's publications and those of many other amateur radio bodies such as ARRL, NZART, WIA and so on. There are also some Dubus and VHF Communications but there are gaps. Some text books are held. The Microwave Newsletter will hopefully soon be kept by the library. A full list of the library contents will be available in due course.

The library is open to RSGB members on Tuesday and Thursday afternoons from 1pm to 5pm. It is possible to obtain a copy of a single article and it is also possible to write or telephone instead in order to obtain an article. These enquiries are also **only** dealt with on Tuesday and Thursday afternoons.

By the way....the museum contains a dustbin lid dish of the G3RPE era!

FOR SALE

Bill James, G6XM has the following items to sell in order to finance his new 24GHz gear!

TWO Hewlett Packard HP477B Dual element Coaxial Thermistor mounts, 10MHz - 10GHz

The price is a mere **£15 plus postage**.
Tel 0837 52923 or write to him at 56 Fern Meadow, **Okehampton**, Devon, EX20 1PB

THE SOUTHERN MICROWAVE ROUND TABLE

A report of the 13 March 1994 meeting (from notes by Mike, G3LYP)

About forty microwave enthusiasts attended this meeting, held at the Rutherford-Appleton Laboratory at Chilton, Oxfordshire. A good selection of "Bring 'n Buy" items were on sale, including TWT power supplies! The Microwave Components Service was also present. GW4LXO arranged a Calibration and Alignment Service and this was kept very busy throughout the day.

Three talks were presented:

1. A Review of the current state of the art on the 47GHz band - by G8KMH
2. Using the Sun as a signal source on 10GHz - by G3NAQ
3. Calibration of a noise amplifier - by G3LYP

The 47GHz Band:

Free space loss is estimated to be 165dB over a 100km path. Water vapour loss is significant and oxygen loss is increasing at this frequency. In winter, paths of 100km should be possible in the UK, especially if high mountain sites are used. Narrowband is preferred, with dishes of 25-45cm optimum. These should be aligned using 24GHz and then not moved! TX outputs of approx 5mW and RX noise figures of 7 to 12dB are achievable using a rat-race or subharmonic mixer. A possible transmitter could be a G4DDK009 driver following by multipliers to 23.5GHz and then a doubler to 47GHz.

Most components are hard to obtain in the UK. Some professional MMICs may be available in the future. Diodes cost £10 to £40 each. Various waveguide sizes are usable: R400, R500, R330/WG23 as well as K & S 264 brass tube, available from model shops. PCBs using 0.125mm ptfе board are possible but very fragile.

One possible TX route would be to triple from 12.3GHz to 37GHz and then mix with 10GHz.

In the future, leadless HEMTs may become available for 47GHz.

Using the Sun as a 10GHz Signal Source:

On the 10GHz band the atmospheric attenuation of noise from an overhead Sun is about 0.1dB (on 24GHz it rises to 1.0dB due to absorption by water vapour). As the Sun's elevation angle decreases the attenuation rises since the path of the signal through the atmosphere increases. Clouds between the observer and the Sun markedly increase signal losses. Solar radiation is polarised but its plane of polarisation varies over the Sun's surface and can be averaged out over the whole disk. The average temperature (for amateur measurements) can be taken as 10,000 degrees Kelvin (the Moon is only 208 degrees K). Solar flares can markedly increase radiation levels so any measurements need to be interpreted with care, especially during periods of high solar activity.

Calibration of a noise amplifier:

G3LYP described his amplifier on 144MHz, designed by G4JNT, the detector circuit of which was published in this Newsletter in February 1994. It was calibrated using an FT290, on the low power setting, with a combination of 100dB of fixed attenuators and a 0-10dB step attenuator. A graph of power ratios against current displayed on the 1mA meter of the detector unit was plotted over the full range of 1.0dB (0dB) to 0.1dB (10dB). The initial graph was not linear so a new graph was plotted of the same power ratios against the **square** of the current. From a ratio of 0.3 (5dB) to 1.0 (0dB) the graph was quite linear but below this range considerable non-linearity was apparent. G4JNT suggested that the 1.5K resistor in series with the 1mA meter in the detector should be decreased to 100 ohms so as to increase the sensitivity of the detector. It would then operate in the square law portion of its characteristic curve. When this modification was done the graph showed an excellent straight-line relationship between power ratio and current.

1993 WINTER MICROWAVE CUMULATIVE TABLES

10GHz

The following tables show the final positions of those operators who submitted logs for the Winter Cumulatives. This is not a contest in the strict sense of the word as no certificates are being awarded to leading stations. Nevertheless the score would do justice to many a Summer Cumulative contest! Congratulations to Petra, G4KGC, for putting in such an outstanding entry. She managed a consistent 25 to 26 contacts per scoring session, a good performance even in a Summer cumulative! Thanks also to all who took part and special thanks go to those who sent in entries! Please let us have more next time!

There was a total of 46 different stations appearing in the logs, all but the HB9 being UK stations. This is indicative of high activity over the winter months, a pleasing trend on the band.

24GHz

What can one say! Activity over the winter seemed to be at an all time low, not helped by the weather of course. Where are the cold, crisp, winter days of old, so conducive to good 24GHz propagation? It would be nice to see some more entries next winter.....

10 GHz

Pos	Call	Points	QSO's	Sessions	Best DX	km
1	G4KGC	10574	76	3	HB9AMH/P	793
2	G3JVL	6728	52	3	G4CBW	268
3	G4BRK	6532	60	3	G3FNQ	236
4	G3JMY	4835	48	3	G4LOJ	290
5	G3GRO	3459	30	3	G3GNR	277
6	G4LDR	2583	27	3	G3LQR	242
7	G4MAP	2359	24	3	G3GNR	224
8	G1MPW/P	2316	25	3	G8UYR/P	215
9	G4JNT	1832	20	3	G8UYR/P	189
10	G4KNZ	1610	19	3	G8SWZ/P	171
11	G8KMH(P)	258	2	2	G4KNZ/P	142

24GHz

Pos	Call	Points	QSO's	Best DX	km
1	G4KNZ/P	160	2(nb+wb)	G8KMH/P	126
2	G8KMH/P	126	1(nb)	G4KNZ/P	126

ACTIVITY MAPS 1993

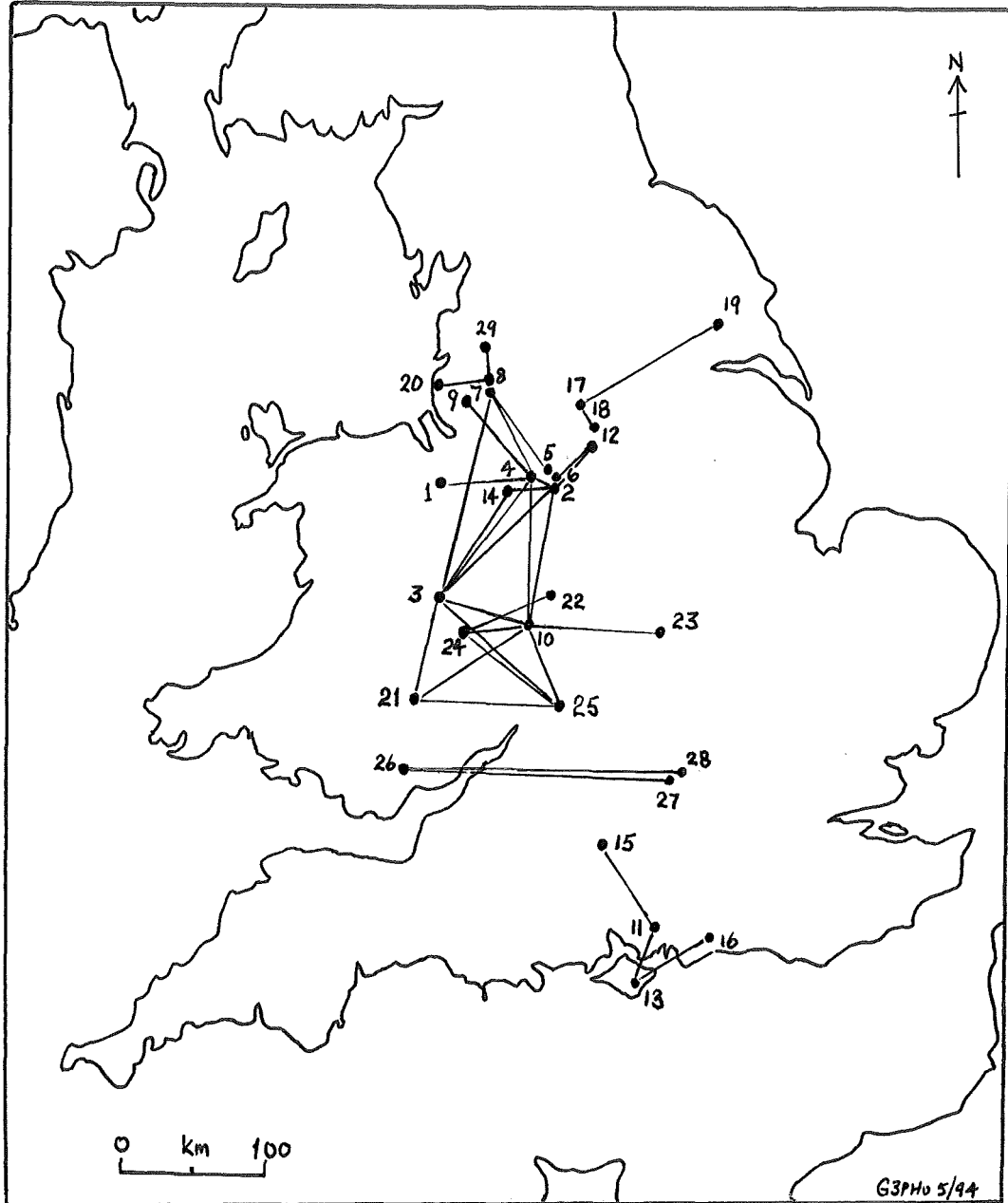
The maps on the following pages show the paths worked on both 10GHz and 24GHz over the whole of 1993. They have been compiled from data provided by the Microwave Contest adjudicator and from reports sent to the Newsletter Editors. If YOUR path does not appear then you have not informed us of its existence!

Due to an unprecedented improvement in overall path lengths achieved on 10GHz last year, we have had to restrict the map for that band to paths in excess of 300 kilometres! Last year showed paths over 200km and it isn't so long ago that we displayed all paths exceeding 100km!! If we included 200km+ paths this time you would not see any white space between the lines! While there are some excellent DX contacts to the Continent on record we notice that the 1000km paths of a couple of years ago have not been repeated. HB9MIN/P and HB9AMH/P should be applauded for their efforts in giving many G stations a new country, new square and all-time best DX.

The 24GHz map has some interesting paths, particularly those achieved by G4KNZ. He is responsible, along with G3FYX/P and G3PPF/P for the excellent 156km record shown.

PATHS WORKED ON 24GHz DURING 1993

(SEE PAGE OPPOSITE FOR KEY TO SITES)



Almost all of the paths were achieved using **portable low power wideband** equipment. G4KNZ had up to 350mW of wideband available and G3FYX had 50mW. Almost all other operators used 5mW Plessey modules. The UK record of 156km was made this year, using wideband equipment (path from sites 26 to 28). Narrowband was used on the following paths by G4KNZ and G8KMH.

- 3 to 25 (90km)
- 24 to 25 (65km)

G4KNZ and G8KMH also made some very short distance (1-2km) narrowband contacts not shown on this map.

PATHS WORKED ON 24GHz DURING 1993

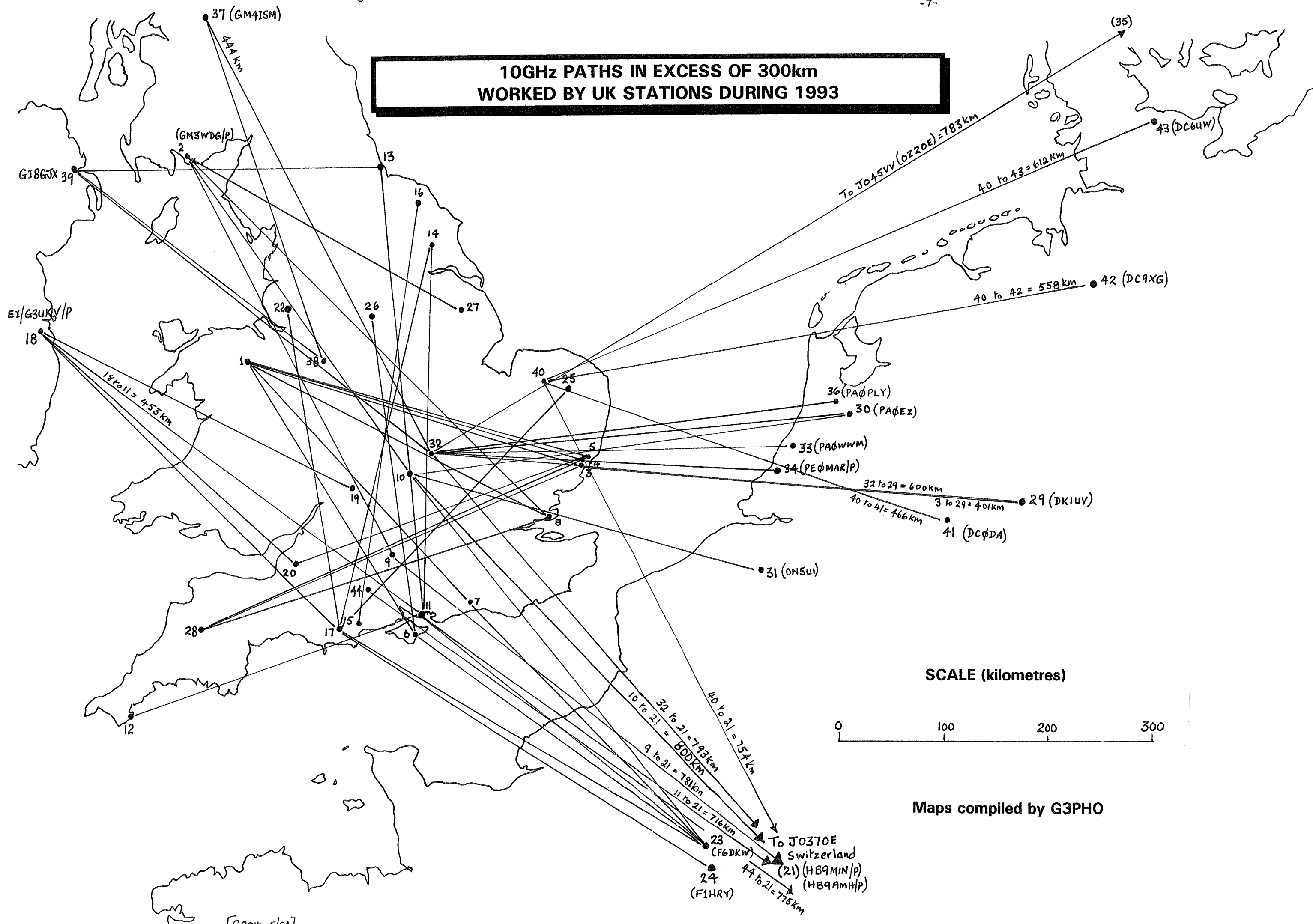
KEY TO SITES

SITE No.	LOCATION	LOCATOR	BEST PATH TO	LOCATION	DISTANCE Km
1	HOPE MT.	IO83LC	4	SUTTON COMMON	65
2	MERRYTON LOW	IO93AD	3	LONG MYNND	90
3	LONG MYNND	IO82NN	7	WINTER HILL	120
4	SUTTON COMMON	IO83WE	3	LONG MYNND	90
5	SHINING TOR	IO83XG	7	WINTER HILL	50
6	AXE EDGE	IO93AF	12	COWPER STONE	30
7	WINTER HILL	IO83RO	3	LONG MYNND	120
8	BELMONT	IO83RP	20	SOUTHPORT	34
9	ASHURST BEACON	IO83PM	4	SUTTON COMMON	57
10	WALTON HILL	IO82WJ	4	SUTTON COMMON	88
11	BUTSER HILL	IO90MX	15	WALBURY HILL	53
12	COWPER STONE	IO93EI	2	MERRYTON LOW	30
13	VENTNOR I.O.W.	IO90JO	16	KITHURST HILL	61
14	MOW COP	IO83VC	3	LONG MYNND	75
15	WALBURY HILL	IO91GI	11	BUTSER HILL	53
16	KITHURST HILL	IO90SV	13	VENTNOR I.O.W.	61
17	EMLEY MOOR	IO93EU	19	NUNBURNHOLME	72
18	BRADFIELD	IO93FK	17	EMLEY MOOR	21
19	NUNBURNHOLME	IO93PV	17	EMLEY MOOR	72
20	SOUTHPORT	IO83LO	8	BELMONT	34
21	6k SE HAY on WYE	IO82LA	10	WALTON HILL	75
22	BARR BEACON	IO92BN	24	TITTERSTONE	50
23	HONEY HILL	IO92MJ	10	WALTON HILL	69
24	TITTERSTONE	IO82RJ	25	BROADWAY	65
25	BROADWAY HILL	IO92CA	3	LONG MYNND	* 90
26	MYNYDD MAEN	IO81LQ	28	LOOSELY ROW	## 156
27	STOKENCHURCH	IO91MP	26	MYNYDD MAEN	146
28	LOOSELY ROW	IO91OR	26	MYNYDD MAEN	## 156
29	LONGRIDGE	IO83RU	8	BELMONT	23

* ONE - WAY CONTACT

NEW U.K. 24GHz DISTANCE RECORD

**10GHz PATHS IN EXCESS OF 300km
WORKED BY UK STATIONS DURING 1993**



SCALE (kilometres)



Maps compiled by G3PHO

PATHS WORKED ON 10GHz DURING 1993

KEY TO SITES (see map pages 6 & 7)

Home stations are shown thus: #

SITE No.	LOCATION	LOCATOR
1	8 kilometres West of WREXHAM	IO83JA
2	8 kilometres East of WIGTOWN, SCOTLAND	IO74UU
3 #	G4DDK, KIRTON	JO02PA
4 #	G0BPU, IPSWICH	JO02OB
5 #	G3LQR, WOODBRIDGE, SUFFOLK	JO02QF
6	VENTNOR, ISLE OF WIGHT	IO90JO
7	CHANCTONBURY	IO90TV
8 #	G4FUF, BENFLEET, ESSEX	JO01GN
9	WALBURY HILL	IO91GI
10 #	G4FCD, BRACKLEY	IO91KX
11 #	G3JVL, HAYLING ISLAND	IO90MS
12	MANACLE POINT, CORNWALL	IO70LB
13 #	G3NWU, HARTLEPOOL, Co. DURHAM	IO94JQ
14	NUNBURNHOLME WOLD, EAST YORKSHIRE	IO93PV
15 #	G0API, CORFE MULLEN, DORSET	IO80XS
16	BLAKEY RIDGE, NORTH YORK MOORS	IO94MI
17	BELL HILL, DORSET	IO80UU
18	KIPPURE MOUNTAIN, WICKLOW, EIRE	IO63UE
19	CLEEVE HILL	IO81XN
20	CHARTERHOUSE, MENDIP HILLS	IO81PH
21	MONT JOBERT, SWITZERLAND	JO37OE
22	WINTER HILL, NEAR BOLTON, LANCASHIRE	IO83RP
23 #	F6DKW, 5 km South West of PARIS, FRANCE	JN18CS
24 #	F1HRY, near PARIS, FRANCE	JN18EQ
25 #	G4LOJ, NORWICH, EAST ANGLIA	JO02QN
26	HOUNDKIRK MOOR, SW SHEFFIELD, YORKSHIRE	IO93EH
27	CLAXBY (NEAR CAISTOR), LINCS.	IO93TK
28 #	G3GNR, HIGHAMPTON, DEVON	IO70WT
29 #	DK1UV, GERMANY	JO41CT
30 #	PA0EZ, HILVERSUM, THE NETHERLANDS	JO22OF
31 #	ON5UI, BELGIUM	JO11VB
32 #	G3WDG & G4KGC, RUSHDEN, NORTHANTS.	IO92RG
33 #	PA0WWM, THE NETHERLANDS	JO22FE
34	PEOMAR/P, THE NETHERLANDS	JO21BX
35 #	OZ2OE, DENMARK	JO45VV
36 #	PA0PLY, THE NETHERLANDS	JO22MH
37 #	GM4ISM, LANARKSHIRE, SCOTLAND	IO85AR
38 #	G4CBW, NEWCASTLE UNDER LYME, STAFFS	IO83UB
39 #	G18GJX, NEWTOWNABBEY, BELFAST, N. IRELAND	IO74AQ
40 #	G4BYV, DEREHAM, NORFOLK	????
41 #	DC0DA, GERMANY	JO31SL
42 #	DC9XG, BREMEN, GERMANY	JO43OM
43 #	DC6UW, GERMANY	JO44VJ
44 #	G4LDR, SALISBURY, WILTSHIRE	IO91EC

BEST 10GHz DX OF 1993, OVER 400 KILOMETRES
 (refer to map pages 6/7 and to key page 8)

DISTANCE (km)	FROM SITE No	CALLSIGN	TO SITE No.	CALLSIGN
802	10	G4FCD	21	HB9MIN/P, HB9AMH/P
793	32	G3WDG/G4KGC	21	HB9MIN/P, HB9AMH/P
783	32	G3WDG/G4KGC	35	OZ2OE
781	9	G3FYX/P	21	HB9MIN/P, HB9AMH/P
775	44	G4LDR	21	HB9MIN/P, HB9AMH/P
754	40	G4BYV	21	HB9MIN/P, HB9AMH/P
716	11	G3JVL	21	HB9MIN/P, HB9AMH/P
612	40	G4BYV	42	DC6UW
600	32	G3WDG/G4KGC	29	DK1UV
558	40	G4BYV	42	DC9XG
487	2	GM3WDG/P	8	G4FUF
466	40	G4BYV	41	DC0DA
453	18	EI/G3UKV/P	11	G3JVL
447	32	G3WDG/G4KGC	39	GI8GJX
444	32	G3WDG/G4KGC	37	GM4ISM
436	11	G3JVL	13	G3NWU
433	10	G4FCD	30	PA0EZ
433	9	G3FYX/P	2	GM3WDG/P
428	10	G4FCD	23	F6DKW
414	5	G3LQR	28	G3GNR
414	17	G4RFR/P	24	F1HRY
405	15	G0API	16	G3PYB/P
401	3	G4DDK	29	DK1UV

TECHNICAL SECTION

MORE MODIFICATIONS TO THE CW POWER MONITOR -by Derek, G3GRO

The November 1993 Newsletter included information by G8PSD on the surplus cw power monitor available from Telford Electronics. There is an omission from the published circuit. There should be a feedback network connected between the output pins and the inverting input pin 2 of the 741 op-amp. This network consists of a 22K resistor in series with what looks like a thermistor and provides the required feedback to set up the closed loop gain of the 741. The thermistor probably provides some first-order gain/temperature compensation for the microwave diode. On my sample, C2 was 47pF not 47nF and C1 does not appear.

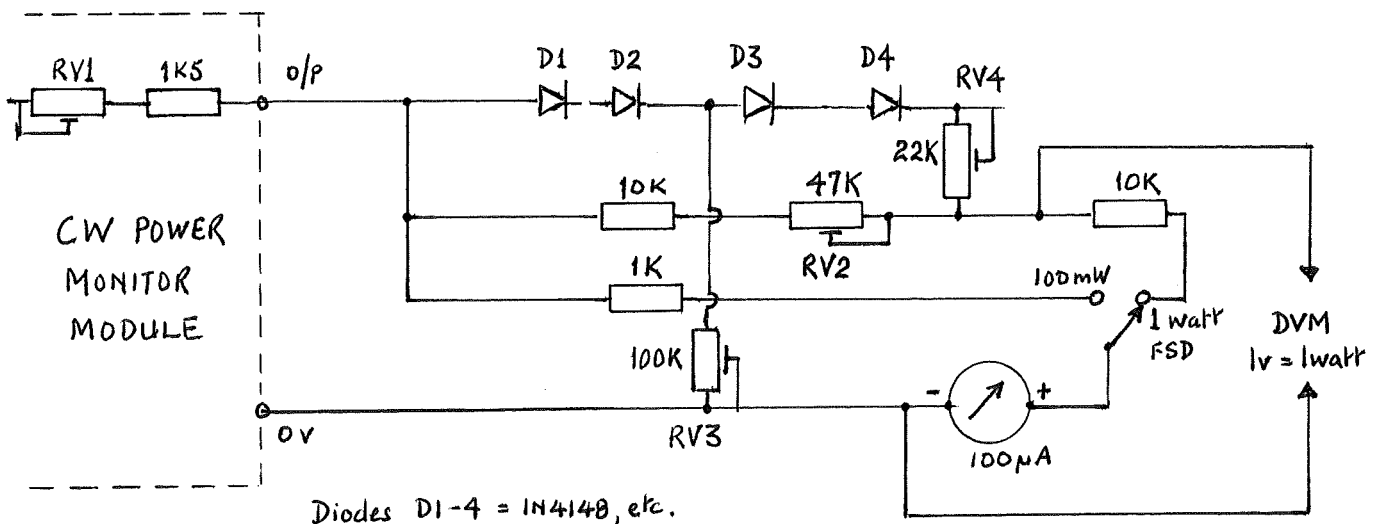
The 35 dB attenuator pad and detector diode are made by Omni-Spectra. The pad is rated from DC to 12.4GHz and has a cw power rating of 2 watts. The diode detector appears to be a "special" but data on a similar part number in the Omni-Spectra catalogue suggests that it is probably a back-diode with a maximum power input of 40 milliwatts. The module is therefore potentially useable up to a maximum of 2 watts. Initial tests at 10.368GHz show that at power input levels above approx 300mW into the 35dB attenuator (ie about -10dBm into the diode), the detector characteristic starts to significantly depart from a square law and the transfer characteristic of op-amp output versus RF power input begins to flatten off.

A scale expansion unit was therefore constructed (see Figure 1). This uses several diodes in series with the external meter so as to linearise the meter scale. A linearity of some + or - 10% was achieved for RF input levels from 1.5 watts down to less than 100 mW. The circuit values of Figure 1 are designed for use with a 100 microamp meter, giving two switched power ranges of 0-100 mW and 0-1.0 watt FSD. Alternatively a DVM can be used to measure the voltage across a 10K ohm resistor, giving an output of 1 volt for 1 watt RF input and a maximum useful power range in excess of 1.5 watts.

The series diode circuit gives two adjustable break points to get the best straight-line fit of the RF input versus DC output current characteristic. Useful readings can be obtained all the way down to 10 mW or less, though the accuracy tends to fall off below 10 mW. The offset current needs to be zeroed as per G8PSD's article in order to read down to these levels.

Tests at frequencies other than 10GHz indicate that the sensitivity at 5.7GHz was about - 1dB relative to that at 10GHz and fell still further at 1.3GHz. It may be possible to have a sensitivity correction control with frequency rather like that on a Hewlett-Packard HP435c etc.

Figure 1: Scale Expansion Circuit:



The power meter was set up by reference to a HP435 power meter and calibrated attenuator. The sequence of adjustment was as follows:

1. Set RV for FSD on 100mW range with 100mW input.
2. Set RV3 and RV4 to mid travel.
3. Adjust RV2 for a reading of 200mW on the 1 watt range with 1 watt input.
4. Adjust RV4 for full scale on the 1 watt range with 1 watt input.
5. Adjust RV3 for reading of 0.75 watt with 0.75 watt input.
6. Repeat steps 4 & 5 for best compromise in accuracy

There you have it.....an excellent power monitoring facility at low cost. Have it stand-alone or build it into the TX.

For calibration assistance or for further exchange of information, you are most welcome to contact Derek, G3GRO QTHR or telephone 0293 520424.

ACTIVITY NEWS NEWS AND VIEWS FROM THE WORLD ABOVE 1000MHZ

With the 10GHz Cumulatives now regularly occupying the final Sunday of each month it is difficult for readers to get up-to-date activity news into your scribe's mailbox by the last Friday of the month!. Therefore, from this month on, please try to get your news to me by the **FIRST DAY** of each month. This should ensure that the news is up-to-date regarding the most recent contest. The rest of the Newsletter is usually assembled over the weekend before however.

Steve, G4KNZ (Bracknell, Berks.) reports 24GHz activity. On 1st May he worked G4FRE/P at Kirton, Suffolk over 17km from Otley. This narrowband, 24192MHz, qso was not quite LOS due to trees mid-path. Cw reports of 529/539 were swapped. On the 8th May he was /P at Botley, Surrey and worked G4DDK/P in Essex over a 38km path, giving Sam his first 24GHz narrowband contact.

Bob, G3GNR (Highampton, Devon) found the April 10GHz cumulative quite productive although many stations appeared to have poor 144MHz talkback, resulting in many missed 10GHz qsos. However he bagged three ones in the form of G3UYM/P at 314km, G4JNT and G1MPW/P. He has also recently worked G8UYR at his home in the West Midlands.

Ted, G3JMY (Bristol), found 10GHz conditions during the April contest better west-east than north-south. He had a good day with 26 stations worked from his home station. These included 5 one-ways. Other contacts made on weekdays include G8UYR, G8SWX, G4BRK, G4UVZ, G3MTG, G3GNR, G3KEU and G4MAP. These seem to show that Ted has a good all round take-off from his QTH.

It is nice to hear from **Andy, G4JNT of Southampton.** He has managed to put together a mast/pulley/winch system which can be raised and lowered safely

and is happy in winds up to Force 4, so he is more likely to be QRV during rainy weather from now on. During the April 10GHz event he was pleased to work G3GNR for a new square. Weak signals from the north included a **very weak** G1S.. who was heard briefly on 2 metres only. He did not announce his location during the 2 metre CQ call so Andy could not peak up his signal. Andy appeals to all operators to clearly state their location (the county would be a good idea) when calling on two metres for microwave contacts). The G1 was most likely G1SLE/P who was on Alport Height near Matlock, Derbyshire. Your scribe was operating within 100 yards of him. Richard was using low power to an HB9CV antenna on 2 metres.

Several readers have written in over the past few weeks regarding talkback. Portable stations now have 10GHz gear capable of working well over 300km but their two metre gear is often not up to the same standard. Unfortunately 100 watts of 2 metres does sap the old batteries somewhat so it makes sense to get the extra dBs by having a good antenna. Fortunately high sites are usually the order of the day for portables and these often make up for the lower power. Your scribe has already begun to notice that the increase in home stations on 10GHz has led to an increase in **unsuccessful** contacts on that band since a lot of the home stations have relatively **poor** microwave sites. Whereas the portables have potential paths of over 300km available to them, many home stations find such distances very difficult unless there is enhanced propagation. The Operating Ladder bears this out. Hence we put in a plea for **MORE** portable operating! The home station is great for the wet days of winter. Get out and enjoy the fresh air in the Summer contests! Also, please move off the 144.175MHz calling channel after your CQ has been answered!

Bryan, G4DKK (Letchworth, Herts.) has been making the most of rainscatter propagation on 3cm of late, his new dish making a difference over the longer paths. G3JMY was finally "hooked" as a result! The May 432MHz - 24GHz contest provided many strong signals but Bryan was disappointed to miss out on PA0EZ, heard for the first time on 10GHz. Two 3cm tropo openings in May brought GB3MLE up to +10dBn on the 2nd and 10th of the month. GB3SWH is consistently useful at +10/15dBn via Bryan's 40cm dish. GB3SWH drifts around 10368.220MHz.

We hear again from Bill, G6XM (Okehampton, Devon). He has completely rebuilt his 10GHz station, now running the WDG system instead of the "White Box" gear of last year. 500mW from the new gear is backed up by a much better receiver, lined up with a much improved noise source and HP 50dB variable attenuator. During the May Cumulative he managed eight contacts from his /P site on Dartmoor, most of them being over 200km. He likewise bemoans the low power 2 metre talkback used by several portables. GM4CBW/P was worked on 2 metres but 10GHz did not go. Bill suggest we go back to a 2 metre bandplan using geographical areas (as we had in the old A.M days). He believes it would prevent strong semi-local stations clobbering the long distance ones during the contests. A recent trip to Exmoor, in order to work 24GHz to G3FYX/P on Cleeve Common, found excellent 10GHz signals over the 146km path but nothing on 24GHz. His friend G3GNR was with him and finally made contact with Roy but only after dragging his gear up to the trig point. Bill's gear is car-bound unfortunately.

Neil, G4BRK (Swindon) was /P on White Horse Hill for the April 10GHz contest and found very good conditions. His best DX was G4LOJ (234km) and he heard GI8GJX in beacon mode. The 432-24G May Contest saw him operate from home. He was delighted to work PEOMAR/P at 539/529 over the 402km path, his first "real" DX on the band. Just before bedtime on the 7th May he netted PA0EZ who was calling CQ on 3cm! Arie came straight back to Neil's response. Reports were 54A/52A over the 478km path with thunderstorms along the route! the 21/22 May period was a highlight in that he worked GM4ISM

(at works QTH IO85BU) using MS-style operating on aircraft reflections! Signals over the long 490km were 329/539. Neil believes this type of operating opens up great possibilities of long distance contacts on 10GHz. They used 2 minute and 5 minute periods and normal CW speeds as the "bursts" are quite long. The May Cumulative saw him /P on Walbury Hill, with G3FYX for company. Activity seemed down on April but they were both pleased to work GM4CBW/P in Galloway (IO74) for 432km. Neil hears GI8GJX when there is rainscatter about, strong enough for CW only.

Martyn, G3UKV (Telford) has also worked GM4ISM at his work QTH on Blackhill near Glasgow. This was on 22 May at 1120gmt, signals being 529/519. At 357km this is Martyn's best DX so far. GM4CBW/P was worked on 28 May with ssb reports of 56/55. The May Cumulative saw himself and G8PAW try to operate from Esclusham Mountain near Wrexham. Unfortunately the access to the summit has now been blocked off with trenches and mounds to prevent our "travelling friends" getting there! Instead they drove on to Cynr y Brain at 1844 feet asl. After a late start they had 15 contacts and found that their 15 watts of 144MHz to an HB9CV just does not "cut the ice"!! (See earlier comments...ed) Best Dx of the day was G4PCS/P in Herts. (239km).

Your scribe, G3PHO operated from Houndkirk Moor near Sheffield. (IO93EH). Gordon, G0/WB6YLI joined him for the day and they both worked 17 stations, the best being G4BCH/P (Ventnor) at 304km. GM4CBW/P was easily worked over an extremely obstructed hill/mountain path at 57/41 ssb for a new square and country from this South Yorkshire site. The receiver problem reported last month turned out to be a faulty master c/o relay, not a blown GaAsFET but this was found out only after the FET was changed for another, less-good one!!

A short note from John, G3BYV (Dereham), details some useful technical tips that we will give half a page to in the next issue...many thanks OM. Thanks also to G4FRE and G3GRO for their technical articles. They will appear soon. No room for the Operating Ladders this time but thanks for the updates chaps. They will appear next time. 73....Peter.