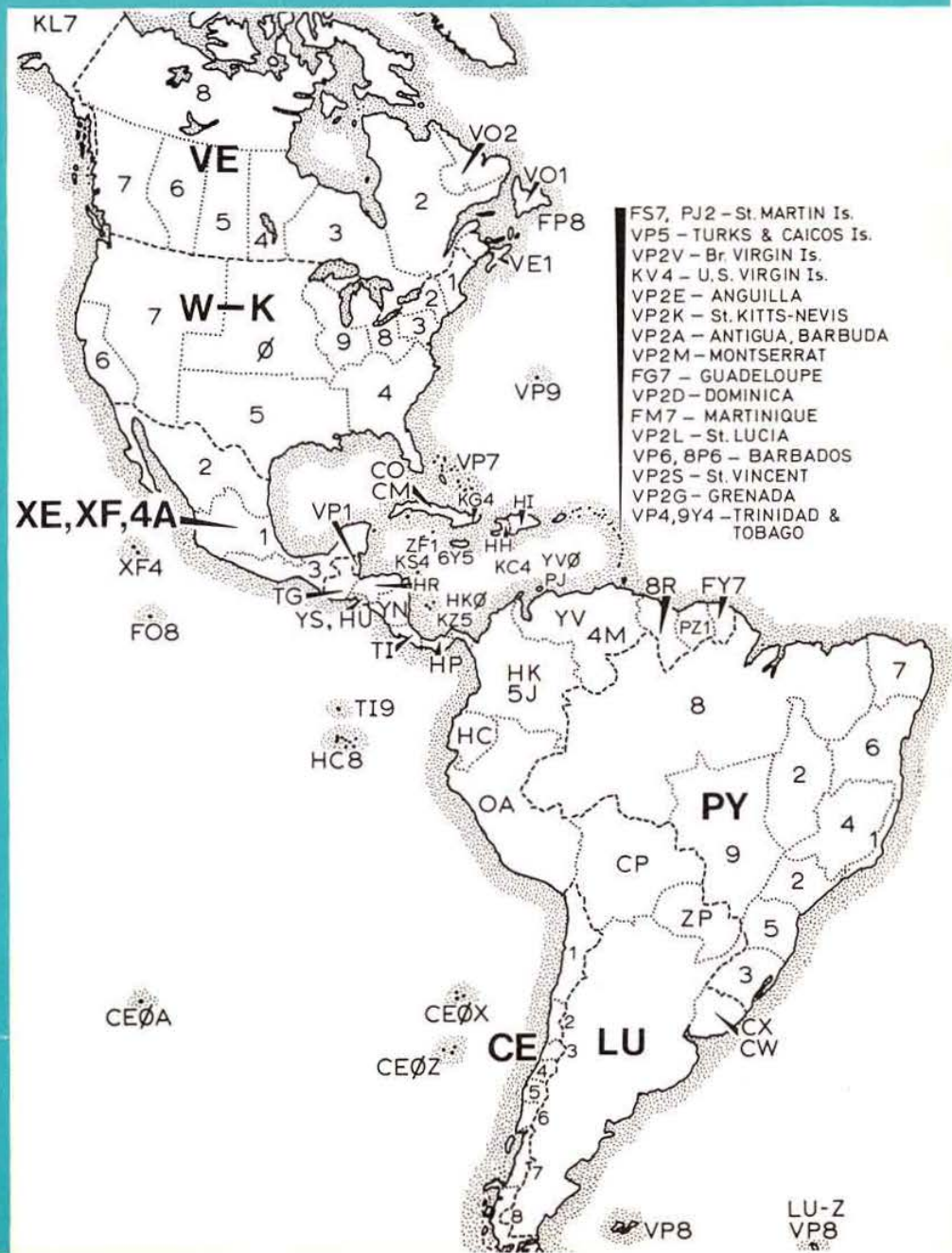
radio communication

March 1972

Journal of the Radio Society of Great Britain



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March 1972

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CONTENTS

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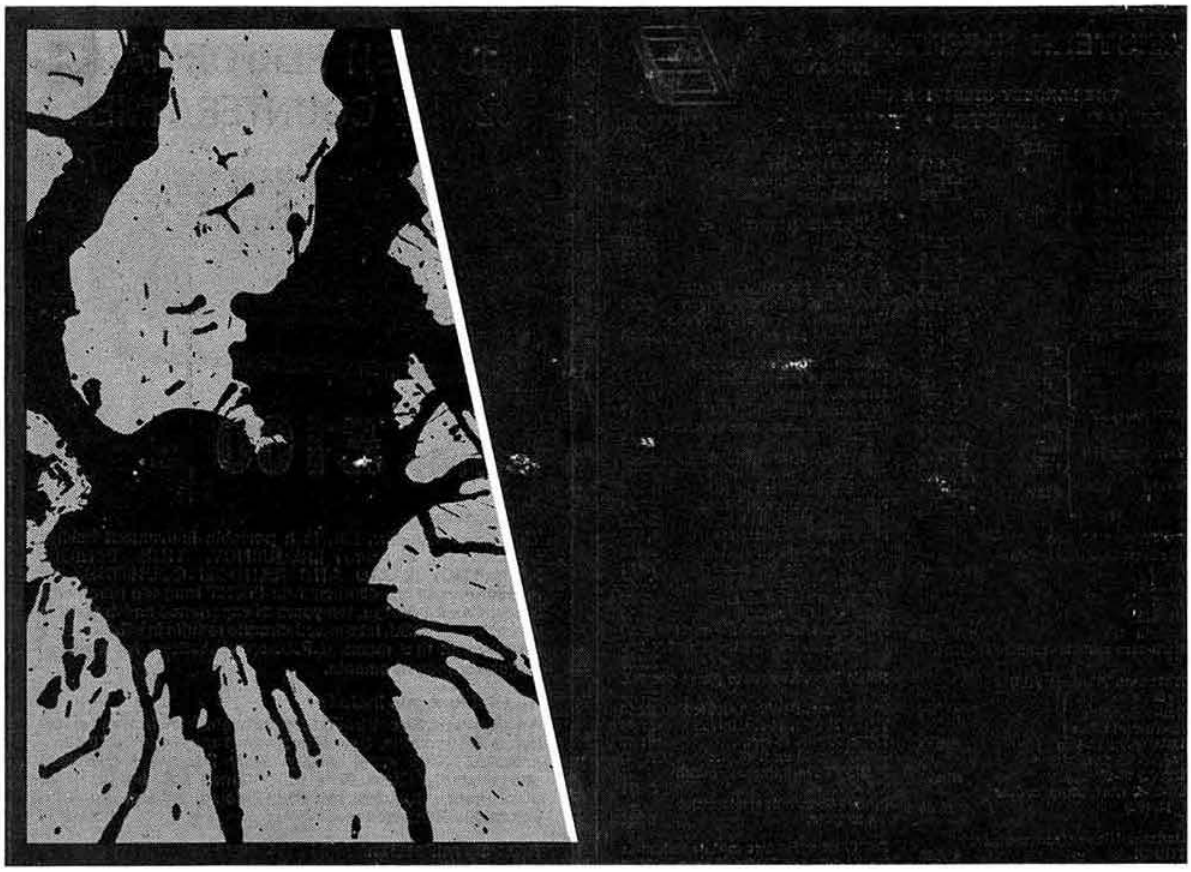

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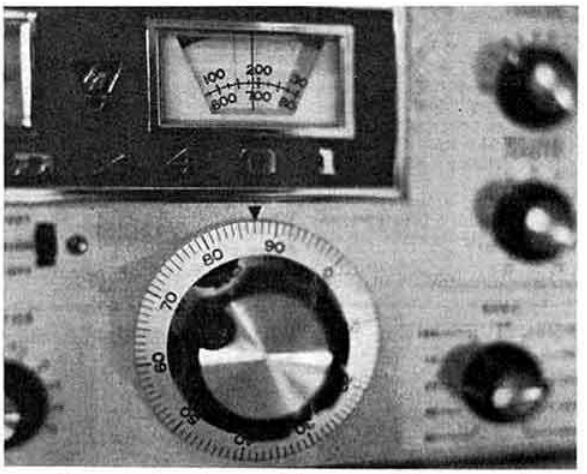

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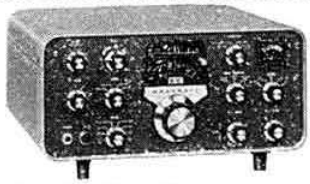

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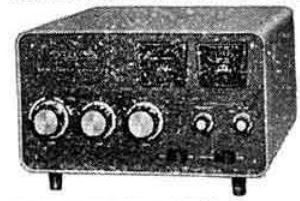

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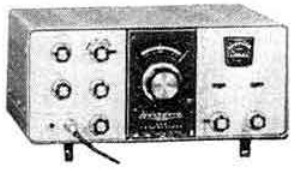

High performance, minimum cost—80-10 metres—170 watts C.W., 180 watts PEP—Solid state L.M.O.—Less than 100Hz drift —Requires PSU (HP-23A-HP-13A).

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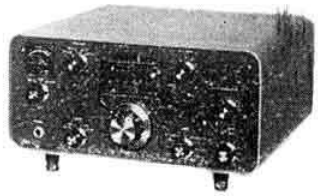

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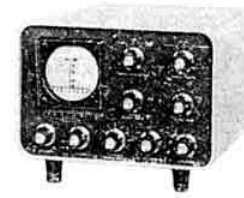

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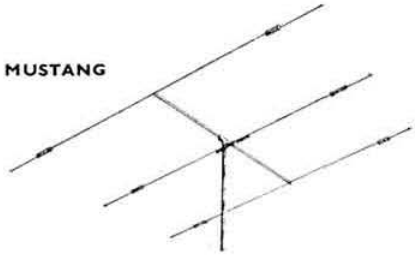

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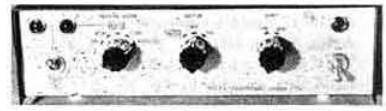

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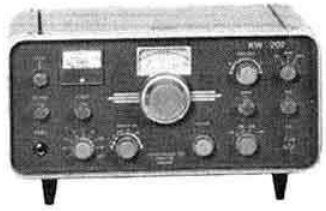

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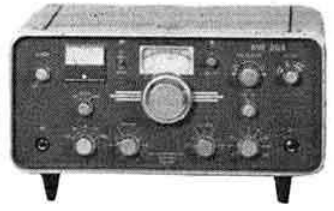

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QTC AMATEUR RADIO NEWS

Financial year, first half

Members may be interested to know that the unaudited figures show that the Society had a net deficiency for the first half of the current financial year of £2,238. This compares with a deficiency of £7,200 for the whole of the previous financial year. While it will be seen that the position is gradually improving there are many problems looming in the six months ahead brought about by inflation and especially increased postage charges, and these remain to be settled.

Value Added Tax

You may well ask what this has to do with the radio amateur. Nothing, it is hoped, but it seems that this tax will start on 1 April 1973 and in the normal course of events the Society will suffer this tax on its input costs (this is probably all expenditure apart from wages and depreciation), and at the same time it will have to collect the tax from all the UK members by adding to the subscription the rate of tax laid down by the Government. This apparent increase in subscriptions will be of no benefit to members as the tax collected less the tax suffered, will be paid over to HM Customs & Excise.

The RSGB Council is carefully watching the position and when the legislation is finalized, application will be made for the Society to be "zero-rated". This means that the Society will be refunded all the VAT which it has suffered and that subscriptions will be exempt, but present indications are that this rating may be difficult to obtain.

Regional representation

Will all club secretaries ensure that reports sent to regional representatives are going to the addresses shown on page 137 of this issue. Some regional representatives are receiving club news which has been delayed because it was sent in the first instance to the former regional representative. Representatives have still to be appointed for Regions 6 and 11.

3,624kHz

Members are asked, wherever possible, to avoid the use of this frequency in the 80m allocation. In Region 1 the band 3,500 to 3,800kHz is shared by the amateur service with fixed stations and mobile stations (except aeronautical mobile). 3,624kHz is used extensively by stations located on the North Sea oil drilling rigs whose operators will appreciate an interference free channel for the short periods during which communication is required.

CBE for GM3AVA

The February issue recorded the award in the New Year's Honours List of the CBE to George Twist, G3LWH. Also honoured at the same time was Watson ("Bill") Peat, GM3AVA, of Larbert, Stirlingshire, who received the CBE for services to agriculture in Scotland. GM3AVA was one of the first Scottish amateurs to gain the Empire DX Certificate.

"Radio Communication" circulation

The audited total average circulation of "Radio Communication" during 1971, as certified by the Audit Bureau of Circulations, was 17,442 copies per issue. This compares with the total of 16,954 for 1970, which indicates that the increase in subscriptions which came into force on 1 January 1971 had no adverse effect on the steadily increasing membership of RSGB.

"Ideas for noise limiters"

The author of this article which appeared in the December 1971 issue of *Radio Communication*, Dr D. A. Tong, apologizes to readers for an error in the circuit. As shown, C2 would discharge rapidly to +10V via R4 and R3. This was due to the wrong sign being given to both the supply voltage and to C2. As implied in the text, both D1 and D2 are intended to be slightly forward biased by the *negative* supply line. The biasing components for TR1 shown in Fig 4 will not result in "an output voltage of about 6V" with no input as stated in the text: the correct voltage is that shown on the figure, ie about 3V.

RSGB publications

Following massive increases in printing costs the price of the latest reprint of the fourth edition of the *Radio Communication Handbook* will be raised to £3.75 (postage extra). This is an increase of 60p on the existing cover price and represents a less than 20 per cent rise on the original cost fixed in September 1968. The handbook continues to sell in large numbers all over the world and is regarded as the standard text book covering the majority of amateur radio interests. At £3.75 for a quality 832-page hard-bound volume it is still very much a "best buy".

The third edition of the *Radio Data Reference Book* is now available at a cover price of 90p. This is a completely new edition of 150 pages revised and updated. Following the style of previous editions it is again a hard bound volume. The information contained in the book comprises data essential to all those engaged in radio communication whether their interest be amateur or professional.

Following the postal increases announced to take effect from 6 March 1972 the prices of RSGB publications sent by post have been revised and before ordering them members should check the new prices which appear on the inside back cover of this issue.

Saturday opening

As an experiment, headquarters will be open on Saturday 18 March from 10am to 1pm for the sale of publications.

If the experiment is successful, arrangements may be made for headquarters to be open for the sale of publications on occasional Saturdays during the year.

Can you help?

Mr M. J. Shepherd, BRS25625, of 72 Westerland Avenue, Canvey Island, Essex, has been unable to obtain ferrite-cored RFCs of 330μh, 470μh, 680μh and 1mh for the Deltahet Mk 2 and would appreciate any information about where they can be obtained.

Mr C. W. Sutcliffe, BRS31408, of 24 Medfield Street, Roehampton Village, London SW15, would like to contact any local BRS members.

Holidaying in Devon or Cornwall?

Many mobileers come to Devon or Cornwall on holiday and complain about the lack of local stations to work. G3NKE for Cornwall and G4UZ for Devon are willing to arrange skeds and visits and pass on information of local interest. Please write, with dates to: G3NKE, "Hillside", Kehelland, Camborne, Cornwall, or to G4UZ, 4 Start Bay Park, Strete, nr Dartmouth, S Devon.

Licence figures

The Ministry of Posts and Telecommunications advises that the following numbers of amateur licences were in force at the end of December 1971:

Class A	14,065	Class B/M	545
Class B	3,012	Television	214
Class A/M	2,666		

NRSA Convention

The Northern Radio Societies Association is again holding a Convention and Exhibition on Sunday 7 May 1972.

The venue, as before, will be the Belle Vue zoological gardens and amusement park on the A57 to the east of Manchester. This is the ideal place for an amateur to bring the family. There will of course be the usual trade stands, and the very popular local club stands on which northern radio societies give details of their activities.

Talk-in stations will be active on 160m, 4m and 2m, and there will also be a demonstration station on the hf bands.

ITU membership

The ITU has announced the acceptance of the application for admission to membership of the Kingdom of Tonga. There are now 141 members of the Union.

ARRL subscription

The recent board meeting of the ARRL gave authority for an increase in subscription rates. With effect from 1 July 1972 the yearly subscription to *QST*, which includes associate membership of ARRL, will be increased to $9 from the present figure of $7. The rate of exchange, at the time of writing, is $2·60 to the £.

Racal Radio Club junk sale

Since the last sale in June 1971 another pile of radio components, assemblies, cabinets, equipments and materials has accumulated. The sources are communication receivers, transmitters, counters and associated test equipment and are therefore of interest to the amateur radio fraternity.

The next sale will be held in St Sebastian's Hall, Nine Mile Ride, Crowthorne, Berks, 1400 to 1700 on Saturday 25 March and members of radio clubs are invited to attend. Nine Mile Ride runs east and west just south of Wokingham, passing the Road Research Laboratory and connecting A321 and A3099. The hall is on a crossroad, has its own car park and there is additional parking space on the road opposite.

The "junk", some new, some assembled but unused and some just junk, will be offered "as seen" at modest prices which we hope will clear the decks. Racal Club members will do their best to advise but can accept no liability for condition of items offered; particularly this applies to apparently complete equipments. Our target is the genuine home-constructor and he will find bargains galore; trade and bulk buyers will, however, be actively discouraged.

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Third (1972) edition

Compiled by G. R. Jessop, CEng, MIERE, G6JP

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150pp **£1 post paid**

Obtainable from:

RSGB Publications Section,

35 Doughty Street, London WC1N 2AE

USA Callbook

Due to delays caused by the dock strike on the east coast of the USA the RSGB publications section has for disposal a small number of the DX edition of the USA **Radio Amateur Callbook.** These callbooks are the autumn 1971 edition and are being offered at the greatly reduced prices of £2.25 to callers and £2.50 post paid, compared with the normal price of £3.10.

Also available are the *Prefix maps of the world* (60p post paid) and the *World atlas* (85p post paid), both published by Radio Amateur Callbook Inc. These are current stock items.

SPRING CLEANING SALE

At RSGB headquarters there are quantities of back-numbers of the *RSGB Bulletin* and *Radio Communication* which will be made available to members at a nominal charge:

If collected from headquarters on Saturday 18 March between 10am and 1pm the cost will be 5p each or 12 for 50p.

If ordered by post up to Friday 17 March 8p each or 12 for 75p (post included).

If ordering by post please send an addressed label. Orders will be dealt with in strict rotation.

No guarantee is made as to the availability of particular issues but, if available, copies of requested issues will be supplied.

Note: Collection from headquarters is on **Saturday 18 March ONLY.**

After 18 March magazines will be available in bundles of 12 assorted dates (our selection) at 50p per bundle (post free)

A mixer-vfo for 70MHz

by D. A. TONG, BSc, PhD, G8ENN*

Introduction

There are many possible approaches to the problem of building a stable vfo for vhf, but of the more conventional techniques one of the best is that of directly mixing a signal at a relatively high fixed frequency derived from a crystal oscillator with one at a relatively low frequency from a tunable oscillator. Such an approach can easily give an output of high stability but equally it can also give a multitude of unwanted spurious outputs, and great attention must be paid to this crucial aspect of a mixer-vfo design. The vfo for 70MHz described below uses an overtone crystal oscillator near 55MHz and a vfo at 15MHz. Its stability has proved perfectly adequate for its purpose (it is used in a miniature four-metre transceiver [2] built by the author) and it seems to be taken for a crystal-controlled source by receiving stations until they are informed otherwise.

Design aspects

The heart of a mixer-vfo is, of course, the mixer, since this is the point at which spurious outputs are all too easily generated. This was brought home to the author during initial experiments using a single bipolar transistor as the mixer. With the same oscillator frequencies as those used in the design presented here, it was at times difficult to pick out the desired output signal from all of the others. Good filtering after the mixer is essential in any vfo but it cannot by itself ensure a clean output. In a simple non-balanced mixer using a diode or transistor the possible outputs are $\pm mf_1 \pm nf_2$ where f_1 and f_2 are the crystal oscillator frequency and vfo frequency, respectively, and m and n range from zero to plus infinity. There are obviously many values for m and n which will give output frequencies close to the one desired (usually $f_1 + f_2$ or $f_1 - f_2$).

In order to cut down the number of possible mixing products to manageable proportions some kind of balanced device is highly desirable. A modulator which is balanced with respect to the carrier (ie the crystal oscillator output at f_1) would have output sidebands around old multiples only of the carrier, $f_1 \pm f_2$, $3f_1 \pm f_2$, $5f_1 \pm f_2$ etc, the carrier itself being suppressed. The values of n which are important in the output will depend on the properties of the particular nonlinear element used. A balanced modulator of this type is shown in Fig 1.

An even better device is the "ring modulator" which is shown in Fig 2. This is balanced with respect to both carrier and modulation and thus the possible outputs are $\pm mf_1 \pm nf_2$ where both n and m have only odd integer values. Such modulators are available commercially as encapsulated units, for example the Hatfield model 1759 measures only 0·5in³ and is broadband over the range 0·1 to 500MHz. Devices such as this would solve many of the problems in vhf vfo design (and in ssb transmitters) were it not for their high prices which reflect the problems in designing suitable wideband transformers and the cost of matched diode quads. Double-balanced modulators are now available in integrated circuit form with upper frequency limits around 70MHz and these are liable to become very widely used before very long. In the present design, however, a cheaper approach than either of these alternatives is used but one which is still capable of producing a relatively spurious-free output.

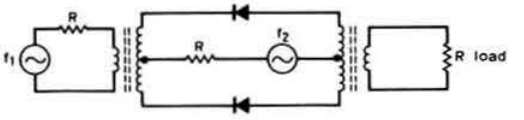

Fig 1. Balanced mixer

It is well known that FETs have a transfer function which approximates to a square law rather than the exponential law which is characteristic of bipolar devices. This means that, in principle, if two signals of frequency f_1 and f_2 are applied to a fet mixer, the only outputs would be at f_1, f_2, $f_1 + f_2$, $f_1 - f_2$, $2f_1$, $2f_2$. In practice, care must be taken to ensure that the input signals are of amplitude sufficiently low that the fet operates on the square-law part of its characteristic. If overdriven, a fet will operate as a switch and will then be no better than a diode so far as spurious outputs are concerned. A balanced mixer of the type shown in Fig 1, but using FETs, has the additional advantage that both f_1 and $2f_1$ are suppressed and therefore the filtering requirement reduces to that of separating, say, $f_1 + f_2$ from $f_1 - f_2$, $2f_1$ and f_1. Despite the fact that FETs do not have an *exact* square-law characteristic, the improvement over the average bipolar transistor mixer in this application is striking. It is for the self-same reasons that FETs are used in most recent receiver designs; there the problem is less serious in that spurious responses in a receiver affect only the operator, whereas that is not the case with the spurious emissions from a transmitter.

In the light of the foregoing the choice of oscillator frequencies can now be considered. Clearly a compromise is involved. The vfo frequency should be as low as possible for highest stability, while for ease in filtering the desired sideband from the other one, a high vfo frequency is desirable. The deciding factor in the author's case was the possession of a subminiature overtone crystal on 54·875MHz. Using this, a vfo frequency around 15MHz is required and this means that the nearest strong unwanted signal is the lower sideband at 40MHz. Other signals at 54·87, 109·74, 15 and 30MHz are still reasonably well separated from the desired output and will, of course, be at relatively low levels, depending in the first two cases on the degree of balance.

Circuit details

The circuit of the complete mixer-vfo is given in Fig 3. Also included is the circuit of another 15MHz vfo, almost identical to the first, which occupies the same die-cast box as the

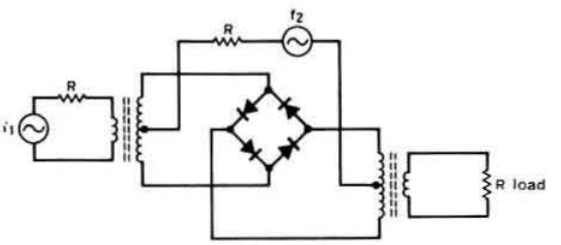

Fig 2. Double balanced mixer or "ring modulator"

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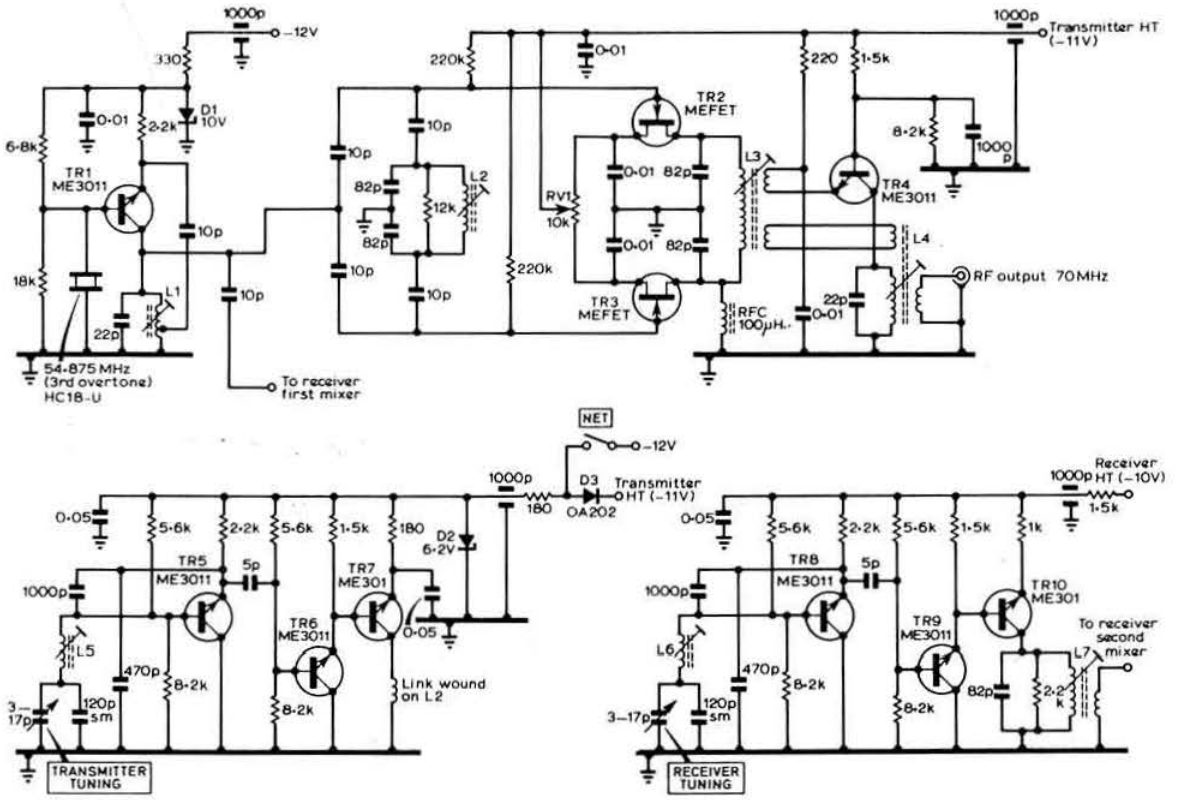

Fig 3. Circuit of mixer-vfo plus extra vfo for use with accompanying receiver

Notes on Fig 3

(1) All decoupling capacitors are low voltage disc ceramics.
(2) Low value capacitors are low voltage polystyrene except where labelled "sm" (silvered mica).
(3) Transistors shown are low-cost plastic encapsulated types made by Microelectronics Ltd. Suitable equivalents for the ME3011 are 2N918, ZTX320. Almost any silicon planar device would replace the HK301. A suitable replacement for the MEFET would be the ubiquitous 2N3819.
(4) The vfo tuning capacitors were one section of a Jackson Bros Ltd Type C21 2-gang vhf variable capacitor. A very similar type is the 3/CG80-03 made by Wingrove and Rogers Ltd. The latter is currently available very cheaply on the surplus market. Both types have a three-to-one reduction drive built-in.
(5) Coil data is as follows:
L1, 5 turns tapped 1 turn from earthy end.
L2, 13¾in of 32swg close-wound, link winding 10in of 32swg close-wound.
L3, 5 turns with 2½-turn link winding.
L4, 7 turns with 3½-turn link winding.
L5, 10½in of 32swg close-wound (14½ turns).
L6, 7in of 32swg close-wound (12½ turns).
L7, 18 turns with 2-turn link winding at earthy end.
All coils except L5 and L6 were wound on ¼in o/d Aladdin formers and use appropriate ferrite slugs. L5 and L6 were wound on Cambion ceramic formers with lockable ferrite cores and of ¼in o/d.

transmitter vfo and which in the author's transceiver is used as the second oscillator in a dual-conversion receiver; the first oscillator being the 54·875MHz crystal-controlled oscillator.

What may seem an odd feature of the circuit is the use of a positive chassis with npn transistors. This was done in order to improve the supply decoupling between stages. Thus, in this configuration, tank circuits have one end directly connected to the chassis while the emitter resistors and emitter bypass capacitors now act as decoupling components for the ht supply to the particular stage. The principle is good but the author's present opinion is that it would be better to retain a negative chassis and to use pnp transistors where these advantages are desired. Reasons for this are: (*a*) vhf power transistors require a very low inductance emitter connection to earth, and since the readily available vhf power transistors are now npn this is not so easy to achieve (initially it was planned to use germanium AFY19 devices); (*b*) most other instruments now use negative chassis and conformity in this is highly desirable; (*c*) the trend in cars now is to use a negative chassis.

Mixer balance is adjusted by RV1 while monitoring the output at 54MHz. Several specimens of the fet specified were tried in the circuit and wide variations in the balance point were observed. It is likely that more recent rf FETs would behave better in this respect. Mixer balance is also aided by a symmetrical layout of the circuit and printed circuit construction is ideal for this purpose. Good electrical centre-taps on coils are hard to achieve and, therefore, equivalent capacitative centre-taps are used. Link coils

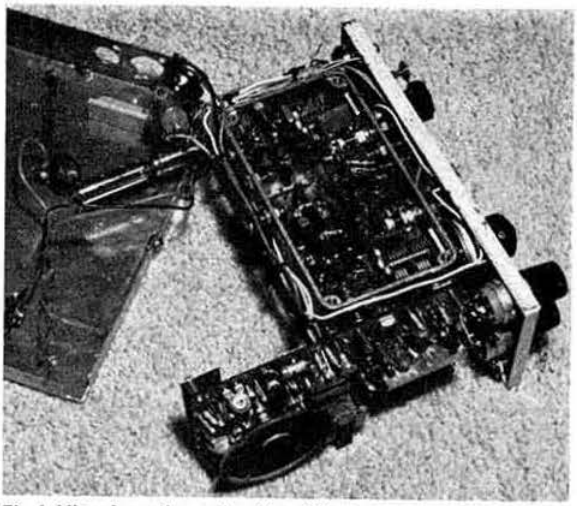

Fig 4. View from the underside of the transceiver in which the author's vfo is incorporated. The circuitry described in this article is contained in the diecast box which forms the mechanical basis for the whole assembly

should be wound at the centre of the coils. Tuning slugs should be tried in either of their two possible tuning points. Because the output from the mixer is at very low level a Class A amplifier (TR4) is used to raise the power output to the milliwatt level. In the prototype the input and output coils for this stage were only about 1in apart and, not surprisingly therefore, their mutual coupling (which happened to be of the correct sense to give positive feedback) had to be neutralized. This was done very simply by using a one-turn link on each coil, adjusted so that L4 tuned symmetrically.

Both the VFOs are Clapp circuits. Frequency stability with respect to supply voltage variations is inherently good, and using a zener stabilized supply no trace of fm is observed during modulation of the following transmitter. There is also negligible chirp at the moment of switch-on and no warm-up drift. These features are useful if one wishes to masquerade as crystal-controlled. Stability with respect to temperature fluctuations depends on a number of factors. Firstly, the tuning coil should preferably be tightly wound on a ceramic former so that its temperature coefficient of expansion is determined by the ceramic and not the copper wire. Secondly, the correct choice of the fixed capacitors in the tank circuit has a large bearing on the stability. Good results were obtained in the author's version using polystyrene capacitors for all positions except the capacitor in parallel with the tuning capacitor. The temperature coefficients of polystyrene and silvered mica capacitors are nominally −150 and +30ppm/°C respectively and the combination used in the author's vfo was carefully chosen to give a low temperature coefficient of frequency for the complete mixer-vfo. A detailed procedure for the temperature compensation has been described in [1]. Actual drift figures for the 15MHz vfo were +3ppm/°C, ie about 0·5kHz for a temperature change of 10°C. In the author's opinion this is adequate for amateur operation using a.m. or fm. It is well worth while enclosing the complete mixer-vfo assembly in a small diecast box: mechanical stability is then excellent; temperature fluctuations are smoothed out and therefore compensation can be effective; and good electrical screening is obtained. This latter point is especially important in a transmitter vfo.

As a point of interest the constructional technique used by the author for rf circuitry is as follows. Double-sided printed circuit board (preferably of the glass-filled epoxy resin variety) is used to provide the equivalent of an earthed chassis. All the wiring appears on the underside as usual but the complete upper foil is left intact except for a small disc around each component hole. The discs are removed using a drill such as a No 8 as a countersink. In this way the wiring is screened from the components and very low-inductance earth returns can be achieved by soldering them directly to the upper foil. In some cases only part of the circuit is at radio frequencies and then the parts of the foil associated with low frequency circuitry can be used for wiring in addition to that beneath the board.

Excellent interstage screens can be made from strips of double-sided board, an idea for which the author is indebted to G3TDZ. This gives, in effect, a double screen if both copper surfaces are soldered to the main board. In miniaturized construction it is important to reduce circulating rf currents in the upper foil to a minimum. Thus, for example, capacitors involved in a tuned circuit ought to be earthed at points which are as close together as possible. Also when disc ceramic capacitors are used for decoupling purposes the earthy side of the disc should be presented to any sensitive nearby circuitry. Similarly when resistors are mounted with their axes perpendicular to the board to allow closer packing, it is good practice to ensure that the lead which is at the highest rf potential is the short one. This also applies to miniature tubular polystyrene capacitors, but here it is also good practice to connect the outer foil to the point at lowest rf potential. The terminal connected to the outer foil is usually marked in some way.

At the output of the circuit shown in Fig 3 the level of spurious outputs is fairly low, and after passing through the further tuned stages after the vfo unit they can be ignored. The use of a 54·8MHz crystal turned out to be advantageous in that it is close enough to interfere with many Band I tv channels; it is, therefore, a simple matter to check for spurious emissions by loosely coupling the vfo output to a BBC 1 tv input. This also provides a useful method of setting the mixer balance potentiometer. The output at 54·8MHz when the vfo signal has traversed three additional tuned circuits in the transmitter is so low that the transmitter whip aerial must be within several feet of a tv aerial before patterning is discernible.

In the author's version of the vfo all the circuitry shown in Fig 3 was mounted on a printed circuit board measuring 2⅛in by 4⅛in overall, which was in turn mounted inside an Eddystone die-cast aluminium box Type 7134P (overall size 4¼in by 2⅜in by 1¼in). Feedthrough capacitors were used for the power supply connections. The 70MHz output signal was passed via a longitudinal hole in a 0BA bolt whose other function was to support a printed circuit board carrying the rest of the transmitter, the modulator, and the loudspeaker. A photograph of the interior of the oscillator box is shown in Fig 4, and it also shows part of the transceiver into which the vfo is fitted and which will be described in a future article.

References

[1] "Temperature compensation of oscillators", by D. A. Tong, *Wireless World*, January 1972, pp 41-42.

[2] "Portable transceiver for 70MHz", by D. A. Tong, *Radio Communication* (in press).

Curing interference to relay tv

by F. N. F. BEWLEY, G8HX*

FOR about a year the author caused considerable interference to relay tv and it may be of interest to readers to know that Rediffusion have cleared the trouble completely.

In a hf relay tv system the wide-band tv signal is converted to a much lower band of frequencies, since transmission at the original vhf or uhf frequencies would be uneconomical due to heavy losses in the transmission lines. Our system covers six programmes each using a twisted pair of wires, each of these pairs carries the audio which is fed directly to the loudspeaker, and in the case of television the line also carries the rf signal which extends from about 4MHz to 10MHz since the bandwidth of the tv signal is about 6MHz. The 7MHz amateur band falls right in the centre of the passband and, of course, it is not possible to prevent the interference by fitting filters or traps in either the transmitter or the line.

The interference was first noticed when the author changed from 160m to 40m and his own relay tv set went peak white whenever the key was pressed. Fortunately members of the author's family are not tv addicts so it caused them little inconvenience, although the neighbours (perhaps some 30 households) were naturally up in arms about it. Not wishing to cause any bad feeling and wanting to make his position clear the author spoke to the owners of two local grocery shops (where all the local news appears to be discussed), explained the position and offered to help in any way he could short of closing down. Both these shopkeepers were subscribers to the relay system and had first-hand knowledge of the interference, and quite willingly put his point of view to anyone who complained. The line taken was that although the author regretted the interference he was acting within the terms of his licence and there was nothing he could do apart from closing down, which he did not intend to do; also that the relay tv subscriber has no protection from the MPT as an aerial set viewer has and it was purely a matter for the relay company.

Later, since nothing was being done, one of the shopkeepers organized a petition which was sent to the PO at Nottingham drawing its attention to the trouble. This resulted in a reply sympathizing with the sufferers but confirming that the author was acting within the conditions of his licence; however, they did take the matter up with the relay company although this did not appear to have any effect.

Although the author rarely operated for more than an hour each evening, the viewers continued (quite rightly) to protest and early in September he was *requested* by the PO to close down during peak tv hours to give Rediffusion an opportunity to clear the trouble. For the next four weeks there was no interference between 6pm and 11pm, there were also no complaints, everybody was happy and nothing was done by the relay company—from the author's point of view it was a complete waste of operating hours.

The author had been in touch with the RSGB from the outset and he was advised to try and get the matter settled at local level, but if nothing was done the Society would take it to a higher level. About the time the author went back on the air full time he had a letter from the RSGB enquiring what the position was and on hearing that he was still in square one they took the matter further, and shortly afterwards he was visited by one of the relay company's engineers who requested his co-operation in some tests with an engineer who was coming down from headquarters. Since the author had never refused a request for a test (his log book up to this time shows six hours of tests) he agreed, and when the time came he spent two hours on each of two nights sitting on a suitable pirate broadcaster in the 7MHz band transmitting for three minutes and switching off for two and, of course, sending his callsign and entering the tests in the log.

Very little (apart from an occasional test and a request not to operate during the Cup Final) happened until the author was told by the relay company that all the modifications recommended by its headquarters engineer had been carried out and it would like his help when the engineer came back in a few days' time. These tests were made using the same procedure as before, all the complaining subscribers were visited, little trouble spots were cleared up, and dozens of field strength readings of the signal were made and plotted on a large scale ordnance survey map. The interference on the author's tv set was still bad, although it was now possible to watch a programme while he was transmitting, but after a word with the engineer and the fitting of a screened lead his family can now watch a programme without knowing if he is transmitting or not.

As a tv service engineer, and having some knowledge of interference problems, the author was quite prepared to think that it would not be possible to clear the interference, as measurements of his signal showed it to be exceptionally strong for an amateur station and there were relay overhead lines on every side. The full 150W is run to a dipole 35ft high and the signal is such that on one occasion he worked PY, W5, VK and Europe in just over an hour.

If the author may give any advice to anyone having this problem he would suggest full co-operation with the relay company, insist on the amateur's rights to operate, inform the local PO so that it knows what is happening, and be sympathetic with the sufferers—if they can be advised in any way, do so. Do not transmit during important tv programmes such as state occasions and national sporting events unless really essential, to do so deliberately is just sticking one's neck out. Obviously the amateur cannot close down just to allow others to watch their favourite normal tv programmes; viewers must take a chance that he is not operating at that particular time. Above all, insist on the amateur's rights; the viewers' rights do not lie with him—they lie with the relay company. On the occasion of the last tests the author spent the last hour of the day in his local with the visiting engineer and the manager of the local relay company and there was no malice borne on either side.

The author thanks the RSGB for its help in getting things moving; the Nottingham PO for its assistance and the stand it took for him as a radio amateur; and, not least, Mr Gibbs of Rediffusion Engineering who had all the answers.

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EQUIPMENT REVIEW

by P. SIMPSON, G3GGK,
and
B. ARMSTRONG, G3EDD

The Heathkit frequency counter Model IB101

ALL transmitting amateurs in the UK have to be equipped with some form of frequency measuring apparatus as part of the Ministry of Post and Telecommunications licensing requirements. The most stringent requirement is for a measuring accuracy of 300 parts per million (ppm).

This accuracy is hardly adequate for the serious sked keeper whether on the crowded hf bands or searching for an intermittent meteor scatter signal on 2m.

Professional frequency measurement available has, until recently, cost many hundreds of pounds. The breakthrough in price has been made by the development of the digital integrated circuit. Fortunately for the end customer almost all semiconductor manufacturers have entered into a price war which has resulted in many digital integrated circuits being sold at a price which does not bring the manufacturer the profit he originally planned.

The Heathkit frequency counter IB101 contains 26 integrated circuits, each of which contains typically over 30 transistors. To market the kit at £95 plus 40p post and packing is a feat which would have appeared impossible several years ago. The kit under review was loaned by the UK end of Heathkit—Heath (Gloucester) Ltd, Gloucester GL2-6EE.

Description

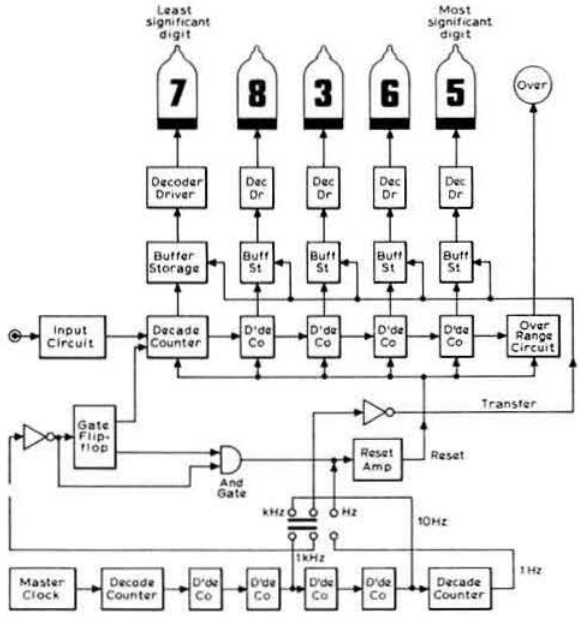
All frequency counters operate in a similar way. A stable frequency source, in this case a 1MHz crystal, sets the basic accuracy of the counter. This source frequency is divided to, say, 1Hz which is used to open and close an electronic gate. A series of basically flip-flop circuits count the number of pulses, formed from the unknown frequency, passing through the open gate. At the end of the counting period the various states in the counter circuits are decoded and used to drive a series of numerical indicator tubes from which the frequency is read off. In order to save cost, five indicator tubes are used in the IB101, but there is a switch which enables the counter to show the number of hertz or kilohertz. A frequency of, say, 1·721356MHz would thus be shown as 01721 with the switch in the kilohertz position, or 21356 in the hertz position. In order to indicate to the user when there are unshown digits on the left hand side of the display, as in the 21356Hz case above, there is an "over range" neon.

One of the unusual features of the IB101 is that it has buffer storage which is often missed out of a low-cost counter. Buffer storage holds the display on the indicator tubes as a steady reading while the count is taking place, only when the count is finished will the tubes display the frequency of that count. In counters without buffer storage the numbers change at a rate depending on frequency input during the count period and are only steady when the gate closes. If a steady frequency is being measured, the indicator tubes will read the frequency continuously with buffer storage.

Among many people there seems to be an unfortunate psychological influence with a digital readout in that the observer has complete faith that the readout is unquestionably accurate. They forget that the accuracy of a counter, assuming all the circuits are functioning correctly, is controlled by the internal frequency standard—or "clock" to use a digital term. The IB101 internal frequency standard is a 1MHz crystal-controlled oscillator. The full specification for this oscillator is quoted in the specification table opposite, but the most important part to bear in mind is the ageing characteristic of the crystal. All crystals age to some degree, and the "less than 1ppm/month after 30 days" can mean an error of, say, 10ppm after a year's operation. For most users this is negligible, but the purist will need to check, and readjust if necessary, at regular intervals. The crystal frequency/temperature characteristic will only be important to those with outside shacks in winter.

The styling of the IB101 is attractive, the upper and lower case halves are aluminium painted in biscuit-coloured crackle paint. The front panel is an aluminium casting with a darkened transparent full-width window.

One print board is used which has circuits on both sides. All integrated circuits are the plastic dual-in-line type for which sockets are provided. The sockets are supplied in



Block diagram

strips which are cut to length before mounting. After being soldered in position the joining strip is broken off. There are two schools of thought on mounting integrated circuits—one is pro-, the other anti-socket. The former says that trying to unsolder 22 connections simultaneously is near impossible, the other that since integrated circuits are so reliable any type of socket will degrade reliability.

For the IB101 the reviewers believe that it is much to be preferred to have sockets, since in the event of failure (as occurred after building due to an error) it is easy to locate the fault by substitution.

Assembly

Time taken for assembly was 10 hours from start to finish including a careful check of all components against the checklist. One resistor supplied was of incorrect value. No particular problems were encountered until the time came to put the miniature indicator tubes in their sockets. Even though the reviewers were pre-warned of a potential problem by a report in *QST*, it was only after several tries that they were successfully mounted. The tubes have 12 thin but reasonably stiff leads. The lead geometry is different from the socket geometry and the leads have thus to be rerouted. This is done by Heathkit and a plastic former holds the leads in place. However, if the socket is tight, some leads go in, but some are liable to be pushed up and either make casual contact or short onto another lead. Both effects happened to the reviewers. Heathkit accept that extreme care is necessary and as stated in the manual, tube leads must match socket holes.

After assembly the unit was given a thorough visual check by two people under a proper viewing lamp. However, on applying mains and gingerly switching on, an over-hot resistor was noticed. The resistor was identified, but only after considerable further inspection in the fault area was the problem solved. An extremely small thread of solder was bridged between two adjacent tracks on the underside of the print board. Unfortunately this put 170V onto one of the ic leads which understandably died. Heathkit sent a replacement ic immediately it was reported to them by telephone.

The few internal adjustments were carried out following the instructions with no problems, and testing was commenced.

Tests

Testing was simple. First, the maximum frequency was measured; 17·0MHz could be measured reliably. This will vary with individual counters since the highest speed ic is selected for greater than 15MHz operation.

The sensitivity was checked by feeding a Marconi Instruments TF2002 into the counter at varying frequencies and adjusting the output of the signal generator to find the minimum input at which the counter would give a reliable display.

FREQUENCY (MHz)	INPUT LEVEL (mV)
3	20
5	22
8	26
10	50
12	70
15	80
17	100

This result is well within the manufacturer's specification.

Since the 1MHz oscillator was set accurately during the set-up procedure there was no real point in checking accuracy, but just to make sure the counter was cross-checked for any indication of oddies by comparing with a Hewlett Packard counter; none were found.

Conclusions

The counter achieved what it is meant to do without fuss or bother, thus instilling confidence in its measurements. Anyone who wished to measure frequency in this way would have to look very hard to find a counter to compete with it. The only prerequisite to ownership is £95 for the kit, plus 40p for post and packaging or £120 assembled. The professional user as well as the amateur would do well to give it serious consideration.

Manufacturer's specification IB101

Frequency range	1Hz to > 15MHz,
Accuracy	±1 count ± time base stability.
Gate times	1 millisecond or 1 second; with automatic reset.

Input characteristics

Sensitivity	1Hz to 1MHz: < 100mV rms. 1MHz to 15MHz: < 250mV rms after 30min operation.
Trigger level	Automatic.
Impedance	1MΩ shunted by less than 20pF.
Maximum input	AC only 200V rms; (dc coupled) 1Hz to 1kHz. (Derate 48V per frequency decade).

Time base

Frequency	1MHz, crystal controlled.
Ageing rate	< 1ppm/month after 30 days' operation.
Ambient temperature stability	< ± 2 parts in 10^7/°C within 20°C to 35°C after 30min warm up. ±0·002 per cent from 0°C to 50°C.

General

Readout	5 digit plus overrange.
Ambient temperature range	Storage: −55°C to 80°C. Operating: 0°C to 40°C.
Power requirements	105–125 or 210–250V ac. 50/60Hz, 8W.
Cabinet dimensions	8½in wide by 3⅝in high by 9in deep. (Dimensions do not include handle)
Net weight	4½lb.

EQUIPMENT REVIEW

by P. SIMPSON, G3GGK
and
B. ARMSTRONG, G3EDD

The Heathkit frequency scaler Model IB102

DESIGNED primarily to extend the frequency range of the Heathkit IB101 counter, the IB102 can be used for any purpose where any frequency up to 175MHz needs to be divided by 10 or 100.

Mechanically, the IB102 is almost identical to the IB101. Electrically the IB102 consists of seven integrated circuits and seven transistors arranged to divide the input frequency by 100, 10 or 1 depending on the position of a three-position push-button switch. A front panel meter with red and green sections indicates the adequacy or otherwise of the input level; the sensitivity of the scaler is altered by an edge knob. Apart from the rocker on/off switch, sensitivity control and BNC input and output sockets, the only other control on the front panel is a spring loaded test push button.

Assembly

Oddly enough, the time taken to build the IB102 was similar to the IB101 construction time—about 10 hours. One of the reasons for this was the time taken in searching for an alternative to one of the handle screws which on quick inspection looked all right, but on closer examination had a two-start thread instead of the conventional single-thread start. Apart from this, no other problems were experienced, assembly being straight forward. At one time it was thought that a small transistor heat sink was missing, but it was eventually found pushed into the mains lead bundle.

Manufacturer's specification IB102

Frequency range	2MHz to 175MHz	
Resolution	(Counter with 1ms time base)	Divide by 10 = 10kHz Divide by 100 = 100kHz
	(Counter with 1s time base)	Divide by 10 = 10Hz Divide by 100 = 100Hz
Meter		Green area indicates adequate signal level.

Input

Sensitivity	50mV: 2MHz to 100MHz
Impedance	Divide by 1: Same as frequency counter. Divide by 10 and 100: 50Ω.
Amplitude (maximum)	3V rms, in ÷ 10 and ÷ 100; and 600V rms, in ÷ 1.

Output

Amplitude (minimum)	1V across 1MΩ and 20pF load.
Rise time	20ns.
Fall time	10ns.
Offset from ground	Adjustable from zero to ± 500mV.

General

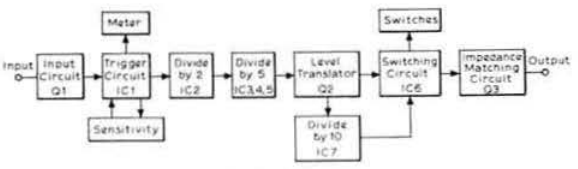
Power requirements	110–130 or 220–260V ac, 50/60Hz, 5W
Ambient temperature range	Storage: —55°C to 80°C. Operation: 10°C to 40°C.
Dimensions	8¾in wide by 3¾in high by 9in deep. (Dimensions do not include handle)
Weight	7lb.

The assembly manual

It was unusual to find a minor mistake in the manual, which was otherwise well up to the excellent Heathkit standard. On detail 15C on page 26 the annotations BA and BD, referring to each end of the handle assembly, were transposed.

Setting up and testing

After a very thorough check on soldering, the unit was switched on and, as per instructions, the dc voltage was set to the correct level. A variable feedback capacitor across the input trigger circuit has to be adjusted for best sensitivity consistent with bandwidth and stability. The instructions infer that it is necessary to make many small adjustments to obtain the correct setting, but the reviewers found that only a couple of steps were necessary. A vhf signal generator was fed into the scaler which was in turn connected to the IB101 counter, and a count obtained. A problem was then encountered in that all was well on the divide by 100 or 1 switch



Block diagram

positions, but no count could be obtained in the divide by 10 position. Not unnaturally the switch wiring was inspected, but nothing wrong was found. Eventually the assembly manual was consulted, with the resultant loss of ego! A few paragraphs in the ADJUSTMENTS section gave the clue. These paragraphs are in a separate box, and not in the printed adjustment sequence. No doubt the heavy ruling around the paragraphs is intended to make sure that they are brought more obviously to the reader's attention. To the reviewers it had the opposite effect. The output of the scaler is dc coupled, as is the input to IB101. As the paragraphs referred to infer, any dc bias from the scaler will offset the logic levels into the counter, and the "zero adjust" control in the scaler is there to bring the output potential of the scaler down to chassis. Adjustment of this control was critical, but stable, and solved the no count on divide by 10 problem.

Apart from the range switch, the only other control is a 10-turn edge-wheel controlled sensitivity potentiometer. A meter with red and green sectors is used to indicate the input level; sensitivity control adjustment results in a peak indication which varies with frequency rather than being linear. This control is very broad and adjustment is only normally necessary when best sensitivity is required.

The only test performed was to check the sensitivity of the scaler by feeding it from a Marconi Instruments 995/A5 signal generator and adjusting the level until the counter showed a reliable count. It was found possible to obtain a consistent wrong count under certain low level conditions, but this was with the level meter indication well into the red part of the scale. In addition, the TEST button provides a check. If on pressing the button the count changes, the display is unreliable. If no change is observed, the count is reliable.

The sensitivity figures recorded were as follows:

FREQUENCY (MHz)	INPUT LEVEL (mV)
20	3
40	10
60	20
80	20
100	20
120	40
140	40
160	50
180	100

The figures are well within the Heathkit specification. Oddly enough, although the basic IB101 would not count above 17·5MHz, when fed from the IB102 it would display, on occasions, 20MHz with 200MHz into the scaler.

Conclusions

If the reader can afford £95 for the IB101 kit, the extra £40, plus 40p post and packaging, from Heath (Gloucester) Ltd, Gloucester GL2-6EE, who loaned this kit for review, is well worth while especially for the vhf man. It has to be remembered that the basic count accuracy of the IB101 is reduced to 10Hz with the scaler on divide by 10, and by 100Hz on divide by 100, but this is well compensated by the confidence in the measurements achieved. For those who build their own counter from one of the several designs published, the IB102 scaler would be an excellent accessory.

A multi-vibrator i.f. sweep generator

by H. L. GIBSON, MIEE, G8CGA*

AN i.f. sweep generator or wobbulator is a useful instrument for quickly aligning i.f. strips and bandpass filters, and for setting up fm discriminators, since the response of the equipment can be displayed on an oscilloscope and the effect of tuning adjustments can be seen without recourse to point by point methods. Existing designs normally achieve frequency deviation by modulating the supply voltage of a simple LC valve or transistor oscillator or more elegantly by means of a varicap diode or reactance modulator.

A prime requirement of a sweep frequency generator is that it should be completely free of amplitude modulation over the swept frequency range and have a linear change of frequency with sweep voltage. While these features can be achieved with careful design, the more simple devices all too frequently have considerable amplitude modulation. If this defect is not realized, it is possible to produce response curves on the oscilloscope which appear to be ideal while the true response of the equipment being aligned may be quite unsatisfactory. There is, therefore, a need for a simple sweep generator in which constant amplitude can be taken for granted.

In view of the Q values of the circuits likely to be aligned in this manner, there is no need for the sweep generator to produce sine waves and a square wave generator of suitable pulse width and repetition frequency is equally effective. The basic saturating multi-vibrator may be readily modulated in frequency with a linear sweep while giving an output of constant amplitude, and this is the basis of the present design. The values given are suitable for 440-550kHz but designs for use up to 10-20MHz would be easily achievable with available transistors.

Circuit description

The circuit shown in Fig 1 will be recognized as a conventional multi-vibrator. Tuning is achieved by varying the voltage applied to the base of TR2 by the 10kΩ potentiometer RV2, while the deviation is controlled by varying the amplitude of the sweep voltage applied to the transistor bases by means of RV1. As in other designs, the sweep frequency is obtained from the time-base of the oscilloscope on which the display is shown. The sweep voltage is ac coupled to ensure symmetrical deviation. The output is taken from the emitter of TR2 through the potentiometer RV3 and the three-position switched attenuator S1. Provided a simple screen is fitted over the attenuator components, the control of output is quite adequate to allow the effects of agc on change of gain or i.f. response to be checked.

The multi-vibrator is supplied from a 9V battery through a constant current circuit TR3 feeding a 5·1V zener diode

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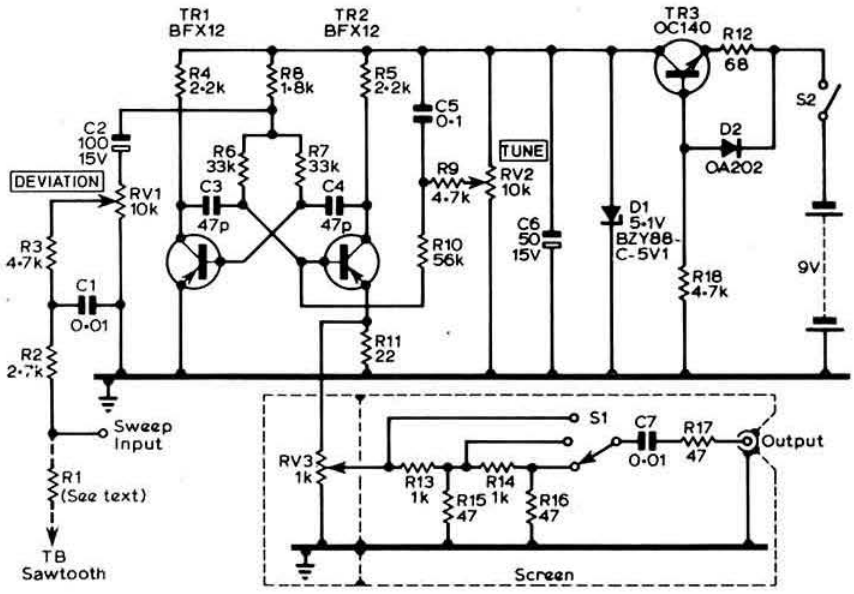

Fig 1. Circuit diagram. TR1, TR2-BFX12 (type not critical but should have a moderate value of hfe to avoid latching with both "on". TR3—OC140. D1—5·1V BZY88C5V1. D2—OA202. Tuning range—440-550kHz. Sweep—0-30kHz. Output 0—50mV. Battery consumption—8mA at 9V

D1. This ensures constant performance until the battery voltage has fallen to 6V.

Construction

All the components except for the output attenuator were built on a piece of 0·15in matrix Veroboard 3¾in by 3¾in. This was mounted centrally on the lid of a 7¼in by 4¾in by 2in die-cast box. This leaves sufficient space for a PP4 battery at one end of the lid and the output attenuator at the other end. The miniature potentiometer and switch of the latter are contained in a shielding box of tinned iron 3½in by 1½in by ¾in. In the original, the output was taken from the attenuator by a length of screened lead but, of course, a coaxial socket could be mounted on the box lid.

Operation

The sawtooth time-base voltage from the oscilloscope is fed into the sweep terminal through a resistor R1 of about 40kΩ per 10V peak to peak of time-base voltage. The output of the sweep generator is coupled into the receiver i.f. amplifier, usually at the mixer grid. The input of the oscilloscope y amplifier may be connected to the detector output. The oscilloscope time-base should be set for the lowest sweep rate which can be tolerated without undue flicker. In selecting this rate, the bandwidth of the receiver being checked should be considered, since a distorted response will be shown if a filter is swept at too fast a rate. This is most likely to be a problem with narrow band crystal filters. As a general rule, if reducing the sweep rate changes the apparent response of the filter, then the rate should be still further reduced until no change occurs.

Calibration

The tuning controls may be calibrated by listening for harmonics of the generated frequency on a calibrated receiver. Deviation and bandwidth of the displayed trace

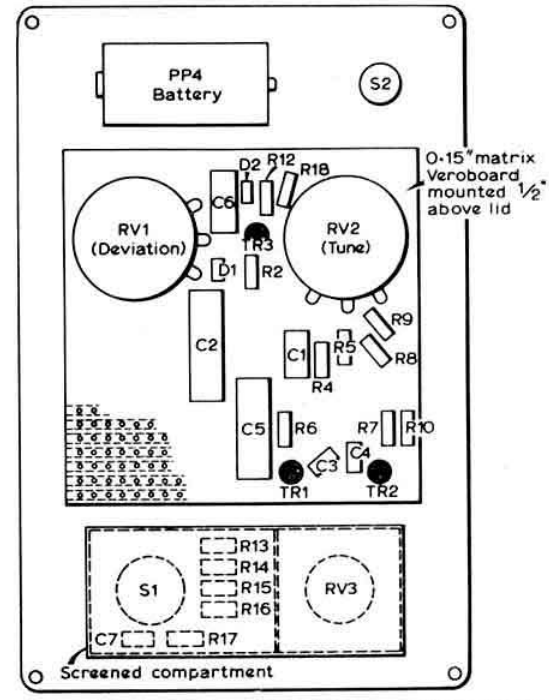

Fig 2. Approximate layout on the lid of a die-cast box

may be checked by noting the change in tuning needed to shift the display on the oscilloscope screen. It would, however, be inadvisable to use the calibration for setting the i.f. centre frequency as the oscillator will show some change of frequency with temperature.

160m with the FT-101

THE usual editorial practice is that articles dealing with the modification of commercial equipment are not published in *Radio Communication* unless (a) the alterations have the approval of the manufacturer, (b) the equipment is out of current production or (c) the modifications provide a worthwhile additional facility and have been successfully carried out by a number of persons. The article in the February issue of *Radio Communication* by Mr B. S. Sutherland, G3IES, came in the latter category. To further safeguard the interests of readers the article was sent to a Yaesu Musen distributor for comment.

The original article was submitted in the late summer of 1971 and was subsequently modified in the light of further experience when using the FT-101 on 160m. It is now obvious that during this period the manufacturer issued details of the modifications required for additional bands and unfortunately no reference to these was made. A copy of the document entitled *FT-101 auxiliary band installation* has been made available to the editor by Mr H. Perkins of Western Electronics (UK) Ltd who have been successfully carrying out factory modification of this equipment for some considerable time. The first section of booklet contains details of the alterations for frequencies below 8MHz and a comprehensive set of data is provided. In the light of this an individually generated modification procedure is not necessary.

Comments in connection with the original article are: (a) the factory modification does not involve additional inductance, (b) the carrier suppression is not degraded, (d) the 5kΩ resistor (p84 of the article) does reduce rf drive, (d) the selection of capacitance values provides improved receiver performance, and (e) power output is reduced to approximately 26W. Naturally, factory modification does not invalidate any guarantee.

Summarizing the position it may be said, firstly, that the original article did not imply that the modifications carried out by Western Electronics (UK) Ltd were unsatisfactory —their existence was not mentioned. Secondly, despite the checking carried out before publication, and acknowledging the co-operation of both author and distributor, certain current information was not revealed. Therefore, before modifying commercial equipment check with your distributor for his comments.

Final note

Prior to publication of the article, the author advised us of another modification eliminating the additional tank coil, and subsequently of yet another modification to the WWV circuit. Readers interested in these modifications should contact the author, bearing in mind the above comments.

IARU Region 1 Conference

The triennial conference of the Region 1 division of the IARU commencing on 15 May 1972 at Scheveningen, Holland, will be opened by the Deputy-Secretary of the International Telecommunication Union, Mr R. E. Butler.

Mr Butler, who took up his duties at the ITU on 1 October 1968, was the Deputy Assistant Director-General of the Australian Post Office. He entered the Australian Post Office in 1941 and for some years he has been adviser on international relationships and inter-governmental communications partnerships, as well as domestic services. Mr Butler is well known in the field of telecommunications, having participated in ITU conferences and international meetings; being deputy leader of the Australian delegations to the Plenipotentiary Conference, Montreux, 1965, and to the UN Conference on the Exploration and Peaceful Uses of Outer Space in Vienna, 1968. He also participated in the negotiations which led to the agreements for the International Telecommunications Consortium (Intelstat).

Mr R. E. Butler

During his period of office at the ITU, Geneva, Mr Butler has given every encouragement to the representatives of amateur radio. He has participated each year in the convention organized by the International Amateur Radio Club, whose station, 4U1ITU, is located in the ITU building. The amateur service is fortunate in having the support of Mr Butler, whose position and ability can do much to guide us through future problems.

National societies of the following countries have so far stated their intention of sending a delegation to the conference: Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, France, German F R, Holland, Hungary, Ireland, Italy, Liberia, Luxembourg, Nigeria, Norway, Poland, Portugal, Romania, Spain, Switzerland, United Kingdom, USSR and Yugoslavia. In addition there will be observers present from IARU Headquarters, the IARU Region 2 organization and the International Amateur Radio Club (Geneva).

The RSGB delegation will be led by the President, Mr R. J. Hughes, G3GVV, and will include Messrs L. E. Newnham, G6NZ; G. M. C. Stone, G3FZL, and the general manager, Mr D. A. Findlay, G3BZG. The organization of the conference is in the hands of the secretary of IARU Region 1, Roy Stevens, G2BVN.

Portable operation with ground planes

by J. B. ROSCOE, GM4QK*

THE attraction of portable operation may not be immediately apparent. Too often it may turn out like the typical caravan holiday: exchanging an efficient domestic set-up for an inefficient one, warm and cosy surroundings for wet and windy. Men have been known to brave the arctic conditions habitually encountered in the middle of a June night, but what motivates them in the absence of the competitive urge of NFD? Perhaps for some it presents an escape—from suburbia, domestic chores, tvi. For others it may provide an opportunity to explore new country, or to be slightly sought-after on the air. In any case it poses a challenge, to overcome the limitations of site and apparatus, to prove a measure of self-reliance. Some portable operators aspire to put remote parts of the land on the air for the benefit of their fellow-countrymen, others to raise the ends of the earth: neither variety is likely to be content with the shouting matches, R3 at five miles, apparently beloved of the mobileer.

Equipment

All mobile equipment leads a hard life. Prolonged exposure to vibration in cars soon reveals mechanical resonances and loosens fastenings. Portable equipment is subjected to the additional hazards of hasty erection and dismantling, of snatch loads when radiators become trip wires, of fatigue failures in connections that have to be made and broken repeatedly. Aerials in general have to be of lighter construction than in permanent installations: constant coiling and uncoiling of heavy-gauge cadmium-copper is not good for the wire—or the operator.

The older hands will have poignant memories of Field Days with vibrators and rotaries of impressive thirst, together with hundredweights of accumulators. These devices still exist; and remember that that "old clunker" (G3UBO) the HRO, with the output stage removed, works perfectly happily on less than 3W of ht. The practical alternatives these days are transistorized inverters and equipment, or engine-driven generators running, usually, on petrol (PO field units use bottled gas for generators, pumps, and tea-brewing).

The author's portable outfit uses standard 240V ac gear and a petrol generator. The transmitter and receiver (STAR 700/700A) sit behind the back seat of a "semi-estate-car" facing forwards: when the seat-back is lowered the equipment is immediately ready for operation. Also in the boot are a Honda 800W generator, Z-matches for 1·8/3·5 and 7/28MHz, low-pass filters, swr meter, cables, enough wire and insulators for a rhombic, dismantled box-kite, compass, absorption wavemeter, tools and spares, etc. The only item carried in the car proper is a sectional rod aerial under the back seat, and there are no outward signs of the unusual cargo. Apart, that is, from the decidedly tail-down attitude of the car: this has necessitated some re-adjustment of the headlights, but has virtually no effect on the (exemplary) handling of the car. The singlehanded station goes fully operational in about nine minutes.

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Site

Ideally, two types of site can be envisaged. One is a high plain equipped with the four trees required to support a rhombic aerial, each tree in turn equipped with nicely climbable branches but bereft of leaves, since these absorb rf. The other type of site is a mountain top with all-round visibility for 100 miles and a hard road right up to the summit. Neither exists.

In practice, portable operation, like camping and caravanning, is becoming increasingly difficult because of land enclosure. It would be commendable if the fences were being put up by the moorland farmer to protect your car from the savage onslaughts of his sheep, but a more likely motive these days is the determination of a city-dwelling landowner to ensure that he has something to shoot. It is difficult to convince his armed representative that the steady hum of a generator will not disturb ground-nesting birds. It is necessary, therefore, to contemplate highly non-ideal sites and the sorts of aerials that will work at them. One of these aerials is the ground plane.

The ground plane

The ground plane aerial needs no introduction. It consists of a $\frac{1}{4}\lambda$ vertical element fed against a perfectly conducting plane. Nature has provided one of these round our shores, but inland dwellers have to make do with artefacts—gas holders, flight decks of aircraft carriers, reservoirs perhaps? Unfortunately these devices are not notably portable, so the vertical element is usually loaded against a system of radial wires, a $\frac{1}{4}\lambda$ or longer, set out along the ground.

The orthogonal ground plane—ie one that can eventually be persuaded to remain nearly upright by patient juggling of the guys—looks like half a dipole and has half its impedance at the feed point. This low-impedance feed has caused unhappiness in the past; though there is no reason why it should, as the ordinary Z-match (*Radio Communication Handbook*, page 13.37) will cope with it admirably. A particularly elegant solution has been provided by 5B4IP (*Amateur Radio Techniques*), who has shown that by increasing the electrical length of the radiator to 113° and tuning out the reactance capacitatively, a straight match to 75Ω coaxial is obtainable. This is an attractive method for portable working, since a 60pF variable can easily be made showerproof, at least, by enclosing it in a plastic food box.

The ground plane is a low-angle radiator, and, considering its modest dimensions, an impressively efficient one: therein lies its attraction. The vertical dipole, particularly with its lower end at ground level, is unlikely to inspire the same sentiments. As the angle between the vertical element and the radials in the ground plane is increased, through the

"drooping" configuration to the vertical dipole, the feed impedance goes up and the radiation angle follows suit. The ground plane works perfectly well at ground level, and in portable operation, where there are likely to be few local obstacles apart from the car or tent, there is really no point in trying to raise it.

Any low-angle radiator really comes into its own when the band is just opening: when the band is wide open its signal may be drowned by high-angle ones. Experience here suggests that the ground plane is most useful on 14MHz: on this band there is always somebody around to take advantage of band openings, whereas on 21MHz nobody wakes up until the band is wide open. On 21 and 28MHz, also, the competitive "big beams" are smaller and therefore more numerous.

Apart from the question of impedance matching, the low-angle radiation of the ground plane can be improved, as 5B4IP has shown, by making the radiator longer than $\frac{1}{4}\lambda$. On 14MHz anything from about 19ft upwards can be tuned capacitatively (or with a Z-match), and the most useful length is around 25ft: beyond this the impedance rises rapidly, and a low swr is unobtainable by simple means. The highest gain at low angles occurs at about double this length, when an impedance of 75Ω is obtainable with inductive loading, but the shorter length is handier for portable work. Equally, the radiator can also be shortened below $\frac{1}{4}\lambda$, and loaded inductively if necessary, though the efficiency soon falls off as the high-current portion disappears into the loading coil. About 15ft is the limit that some Z-matches will accommodate on 14MHz, and this still produces useful low-angle radiation.

Radials

There seems some conflict of opinion about the length of radials, as some authorities are on record as saying that they should *not* be longer than $\frac{1}{4}\lambda$, which seems a little unexpected. Two lengths are suggested here, as minimum rather than accurate dimensions: 16½ft for 14/21MHz and 66ft for 3·5/7MHz, with no attempt to combine them.

How many radials are needed? This depends entirely on the coverage required. For a start, if the aerial is fed through a capacitor the feeder will act as a radial, whereas if transformer coupling (Z-match) is used the feeder will make little contribution. For all-round coverage four radials may be regarded as the minimum and eight, at least in portable work, as the maximum. It is clear what happens if fewer radials are used. With two in-line radials, as an inverted T, the radiation along the line of the radials is not affected at all, whereas the radiation at right-angles to it will take place entirely by courtesy of the conductivity of the soil. Typically, a reduction in signal strength of three S-points may be experienced.

Construction

A portable mast of about 18ft can be constructed simply from lengths of scrap steel conduit and screwed connectors. If the mast is made up of five pieces of roughly equal length it will fit easily into the average car. It is inadvisable to try anything much more ambitious with this material, as the conduit snaps off readily at the start of the threaded sections. Any old jam jar will do as a base insulator, and string and iron spikes form the four guys. Yes, four: three guys are obviously enough for stability, but somehow it is much easier to put up a mast singlehanded with four guys.

A more refined version is the government surplus "29/41 foot aerial" available from Colomor Electronics (170 Goldhawk Road, London W12. £4 + 50p). This outfit consists of 10 tubular screwed rods, a 6-section whip, an earth spike, and a base insulator, as well as two sets of guys and pegs. With it a 24ft self-supporting vertical is perfectly feasible: this saves time in erection, and is useful where there is not enough room for guys. With two sets of rods, heights greater than 41ft can certainly be achieved, possibly even singlehanded with patience and ingenuity. By sacrificing one 3ft rod, a 2ft and a 1ft section can be made and, once the paint has been cleaned off, used for fine tuning at the lower end of the mast.

Radials are probably best made from single-strand wire of sufficient stiffness to roll up easily, and with brightly coloured insulation (they are not earthed) so that they show up on the ground. They can be pegged down with short lengths of fence wire; which, like swabs, should be counted at the end of the operation. Eight radials can be permanently joined to a single strong wire, which will be subjected to considerable bending at times, and any that are not in use can be left rolled up.

Operational strategy

All this leads to a minimum policy of portable operation.

1. Find a section of road aligned in the required direction: England has no monopoly of rolling roads and this should not take long.
2. Pull into the side of the road—still possible in the remoter parts of the country.
3. Run out two radials at the side of the road.
4. Work one station.
5. Dismantle.
6. Drive a few yards, round the first corner, and raise another country.

The West of Scotland as a whole, both in the highlands and the lowlands, enjoys the benefits of greater than average precipitation throughout the year: in other words, it is wet. At the 1,000ft level the ground is frequently boggy, and by 1,500ft it appears to be permanently waterlogged—ideal as a ground plane. Unfortunately the roads tend to follow the valleys even more than they do elsewhere, and rarely arrive at the top of anything very much. However, it is possible to stop at the side of a main road in a valley and raise a KR6 first call.

Results

Operation has been largely in spells of 30 to 60 minutes—not the most efficient way of getting the feel of a band—spread over last summer, generally on cw running about 50W. The total so far on 14 and 21MHz is 42 countries, including JA, KP4, KZ5, KR6, KL7, VP2, W6, 9Y4. On 14MHz S9 reports have been received frequently from Europe as well as from UH8, UA9 and W4. Operation on 7MHz has been confined to the one occasion when assistance was available for the erection of a 44ft (guyed) mast: W and VP9 were worked on cw. Aerials of the same type, with and without a "skyhook", have also been used on 3·5MHz, notably in Argyll—but that is another story.

TECHNICAL TOPICS

by PAT HAWKER, G3VA

EVERY month as soon as the copy for one *TT* is sent off to Doughty Street, it is time to start thinking about the next. For there always seems the possibility that nothing of technical interest will turn up during the next four weeks; that the American dockers will hold up transatlantic periodicals, or a postal or power disturbance eliminate the local ideas, or conceivably even that nobody will come up with a worthwhile new technique, a new circuit or a new aerial to improve amateur radio communication. After all, with this issue 13 long years of *TT* are completed, and I can hardly follow television practice and start repeating the whole series all over again.

Fortunately this month none of these secret fears have been realized—indeed there seems to be plenty happening, and the problem has been to squeeze in as much as possible with the hope that others may find the selected topics as interesting as I have. So read on, while I keep my fingers crossed and eyes open for next month.

SSB speech processing—intentional and unintentional

The recent notes (*TT* November 1971 and January 1972) on speech processing for ssb have stirred up a number of readers to provide further information. In particular the question raised by Stephen Dykes of how much unintentional rf clipping is already taking place—by flat-topping of linear amplifiers—has brought in some interesting, and on the whole reassuring, observations.

These relate to whether or not a moderate degree of flat-topping of an otherwise correctly adjusted and loaded linear is really to be condemned, or should be regarded as an acceptable method of adding to the effectiveness of amateur ssb transmissions. In other words, does moderate flat-topping really result in the appearance of significant spurii in adjacent channels?

One reader, whom I will not identify although he has not asked for anonymity, writes: "I am largely interested in *regular* contacts with VK stations on 28, 21 and 14MHz. This takes some doing on ssb when two members of the net use rf clipping and I do not. If I limit my audio to the point where the peaks touch top on the crt, I simply am not read.

"So I feel I have to flat-top to the point where average speech goes to the top; this puts my readability up from R1 to R5 (except on 28MHz where there is often no one else about). I felt very bad about doing this, and spent a year or two trying, with limited instruments, to find out just how much damage I was doing either side of the 3kHz channel.

"Either an old KW Vespa or a KW2000A is used to drive a KW1000 linear. Results with both are identical. There is a tickling little spitch at the start of sibilants out to about 10kHz either side—but I would not care even to guess how many decibels down. And this effect is *always* there, increasing in proportion as the average output is varied from 1 to 400W, with no apparent threshold effect as the peaks go over and flatten right out on top.

"It would seem, at least in this case, that the out-of-band products are inherent and that using the amplifier as a clipper causes no additional trouble."

This amateur is now firmly convinced that a well-designed and correctly loaded ssb transmitter, limiting at pa saturation, is *far less damaging* to other operators than, for example, allowing the normal audio baseband to extend up from 3,500Hz to even 4,000Hz.

Valuable comment on this topic has come also from Les Moxon, G6XN, who has been using rf speech clipping for many years. He has recently completed a statistical analysis of mean/peak power ratios of typical signals. This has indicated that the average amateur using ssb without intentional speech clipping is, in practice, already obtaining significant processing gain (ie largely by flat-topping); but G6XN has not found evidence that this results in adjacent channel splatter.

G6XN says he would not expect the clipping of a few decibels off speech peaks to produce anything other than just an occasional spike of interference. Indeed, from G3FRB's figures for intermodulation products (November 1971 or G3FRB's article in the February issue) it can be surmised that 10dB of such clipping should not produce adjacent channel interference worse than the −25dB level; this is only slightly worse than the internationally agreed figure for commercial practice. With speech, rather than tone, reference to Fig 6 of *TT* July 1970 further indicates that IPS should exist only 15 per cent of the time, during which they may vary between −60 and −25dB, but mostly around the −60dB level!

And on the general topic of speech processing, G6XN believes that the often-quoted figures of Pappenfus (*SSB Principles and Circuits*) are responsible for some of the confusion that exists. Pappenfus, as we indicated, suggests that there is virtually a linear relationship between clipping and power gain. On the contrary, G6XN points out that the first few decibels of clipping are almost all gain, since nearly all the speech sounds are amplified by the amount of clipping. But by the time the clipping is sufficient to produce a moderately square envelope, then little or no further increase in mean power is possible, even with infinite clipping. Thus the relationship is inherently *non-linear*.

He indicates that 10dB of clipping by a final pa as analysed above would be excessive and exceptional; but the first few decibels of processing gain can be (and in practice *are*) obtained in this way without causing serious interference. On the other hand, he warns that the last few decibels can be achieved *only* by intentional rf clipping, implemented with very careful attention to all the finer points of engineering design, many of which have so far not been discussed. Furthermore there must be very high standards of adjustment and maintenance, and extreme care to prevent overloading of the power amplifier.

G6XN agrees that the arguments put forward by Pappenfus, by Schreuer and by others against audio clipping for

ssb are valid, and that only about 5dB can be obtained in this way—but he adds that the arguments apply equally to any scheme omitting the first filter (such as in the ON5FE technique noted by G3XVY).

He mentions a number of matters which will have to be deferred to another occasion, although I cannot omit an apt story he tells stemming from the days of a.m., when equally there was often unintentional clipping. There was once, it seems, a well-known G-station famed for his outstandingly good and clean dx signal. Then suddenly one morning he appeared on the band a good two S-points below normal and putting out thin and reedy speech. The reason? He had obtained a cro and was using it conscientiously!

So perhaps, after all, Mr Average Amateur is not so very far wrong in happily shouting up the meter of his rig until it "seems about right". But this does explain why, if he then attempts to obtain a further 5dB by fitting an audio clipper, he can be in trouble.

Infinitely-clipped phase-locked ssb

Dick Rollema, PA0SE, who writes the Dutch "technical topics", draws attention to a technique being used currently in the Netherlands to help overcome the problem of tvi and "audio detection interference" which is called lfi across the water. Unfortunately, lfi has become a major topic in PA-land at the moment, with the local PTT authorities tending almost always to put the blame on the amateur, resulting in serious limitations to permitted transmission times.

It was soon appreciated by vhf operators that fm was a practically foolproof remedy to this type of interference, but it also soon became evident that nbfm transmissions were less effective for long-haul and dx working on 144MHz. This led to a search for a system which would avoid the problems of envelope detection of amplitude variations—ideally some form of ssb but having constant amplitude. The outcome has been the practical development of an infinitely-clipped form of ssb which is now being used effectively by several amateurs on 144MHz, notably PA0EPS.

Details of the set-up at PA0EPS have been featured by PA0EZ in the January issue of *Electron*. I have not seen this issue but PA0SE kindly provides the following outline, mentioning that while so far the technique has been used only on 144MHz there would seem to be no reason why it should not work equally well on hf.

Briefly, the system works as follows: a 9MHz ssb signal is infinitely clipped, so that it has constant amplitude (even during speech pauses when the residual carrier is brought up to full level). As might be expected, such a signal spreads over as a result of the clipping process. If the normal (rf clipping) technique were followed this would be passed through a second filter to remove the out-of-band products, but in doing so some degree of amplitude variation would inevitably be reintroduced.

But instead of using a second filter, it is possible to phase-lock another oscillator to the clipped ssb signal. The output of this oscillator will be of constant amplitude, though there remains a theoretical problem of making the spectrum of the phase-locked oscillator as narrow as possible. PA0SE believes that no complete theoretical solution to this has ever been found, but, as he emphasizes, "the amateur has never been hampered by this". By experiment, PA0EPS has found it possible to achieve a good compromise between bandwidth and intelligibility.

The resulting 9MHz signal is then *heterodyned* to 144MHz in the conventional ssb manner. It is worth noting that while, unlike fm, infinitely-clipped phase-locked ssb should not be subjected to frequency multiplication, there is nothing to prevent the use, once the final frequency has been achieved, of Class C power amplifier stages.

The 144MHz signal, as transmitted, sounds "very loud and rather swollen" but has already proved to be superior to nbfm for dx operation—and yet plssb has the same advantages as fm when it comes to curing local interference. The system thus represents a most interesting new weapon in the anti-tvi armoury—though we can well imagine that the potent, "swollen" signal could add fuel to the flames of the controversy over what does or does not infringe the "defective signals" rule of the vhf contests!

Automatic tuning and netting on ssb?

One of the most famous names in amateur (and professional) hf communications is that of Professor O. G. Villard, Jr, W6QYT, of Stanford University. It was with the Stanford call W6YX that he showed that suppressed-carrier hf operation was feasible for amateurs in a series of tests from 21 September 1947 onwards—so launching, for better or for worse, amateur ssb. Almost all previous application of hf ssb for point-to-point circuits was based on using a pilot carrier to operate the automatic frequency control circuits of the complex commercial ssb receivers of that era.

So we sat up and took notice when Robert J. Gill, G8DSU, drew attention to a short paper by Villard in *IEEE Transactions on Communications Technology* (Part 1 of the two-part October 1971 issue, pp 729-733) on the subject of "Sideband-operated automatic frequency control of suppressed carrier ssb voice signals". For a long time people have been looking for ways of providing afc on ssb signals that do not radiate a pilot carrier, not just because of the well-known problem of oscillator drift but also to overcome the frequency changes caused by Doppler frequency shift on signals from aircraft or space vehicles.

The paper indicates that frequency errors in the reinserted carrier in ssb systems—whether due to oscillator drift or Doppler shift—can be corrected by an afc system using the actual sidebands rather than having to depend on a pilot carrier. The system would seem to have possibilities for correcting tuning errors of up to 2kHz in ssb receivers and

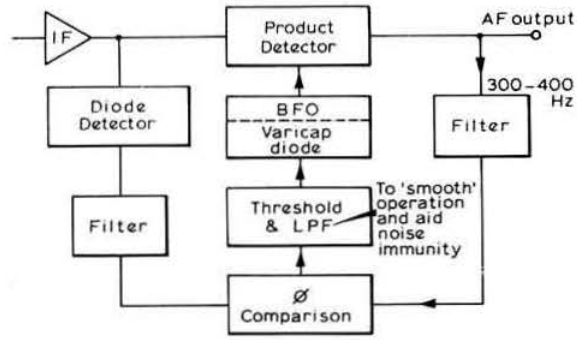


Fig 1. A proposed method of providing automatic frequency control on ssb, freely adapted by G8DSU from the techniques described by Professor Villard in *IEEE Trans on Communications Technology*

capable of improving the tuning accuracy by an order of magnitude. In other words, if a receiver is set to within 2kHz of an ssb signal it will pull itself accurately into tune and hold it regardless of moderate drift in transmitter or receiver. Of course, in a crowded hf amateur band any afc system can result in the receiver locking on to an interfering signal rather than the wanted signal—but this objection would be much less valid on vhf and some of the less crowded bands.

The abstract of the paper reads: "It is suggested that frequency errors in the reinserted carrier in ssb voice reception . . . may be corrected by an afc arrangement utilizing the sidebands themselves. The technique depends on the fact that the loudest speech sounds are rich in harmonics of the vibration rate of the vocal cords. The harmonic spectrum can be established, essentially independent of receiver tuning, by diode-rectifying the incoming sideband energy while it is at radio or intermediate frequency. The afc compares the spectral content of the output of the normal ssb (product) detector with that of the diode detector, it then adjusts the frequency of the reinserted carrier until frequency components of the two audio signals properly overlap."

The paper shows that frequency correction may be accomplished either by a phase-locking procedure or by a control depending on frequency rather than phase difference (this latter method is more suitable for the larger deviations of 1 or 2 kHz). A number of block diagrams outlining both phase-lock and zero-cross-over techniques are given, but no detailed circuitry; anyone looking into the technique from an amateur viewpoint would have to be prepared to design his own hardware.

G8DSU explains the system as follows. The loudest speech noises are produced by the vocal cords, the output of which are very rich in harmonics. When an ssb signal is diode demodulated these components beat to reproduce the fundamental (plus many other products). Provided that the receiver is not too far off tune, this frequency can be recovered irrespective of receiver tuning. The output of the product detector is then filtered and together with the corresponding signal from the diode detector is fed to a phase comparator, the output of which corrects the bfo (insertion oscillator) frequency by means of a varicap diode or similar arrangement.

While this gives a very accurate lock there remains a danger of locking on to a harmonic. If, however, the instantaneous frequencies of the two outputs are compared (using zero crossing rate counters to derive voltages to compare) then the danger ceases to exist although the accuracy is reduced.

G8DSU suggests that a combination of the two methods would seem the ideal answer, but for amateur purposes the phase comparison technique alone would seem very useful for countering oscillator drifts and bad netting. Fig 1 is based on one of Villard's diagrams but includes a filter after the diode detector which G8DSU feels would be necessary to avoid sibilants getting to the phase detector.

He believes it would be relatively simple to design an add-on unit for an existing receiver, and has put this on his list of future projects even though this is already a long one. In the meantime it seems well worth passing on these ideas in the hope that somebody may be in a position to investigate whether the technique could usefully be applied to amateur practice or whether the danger of the receiver being "captured" by strong interference is too great.

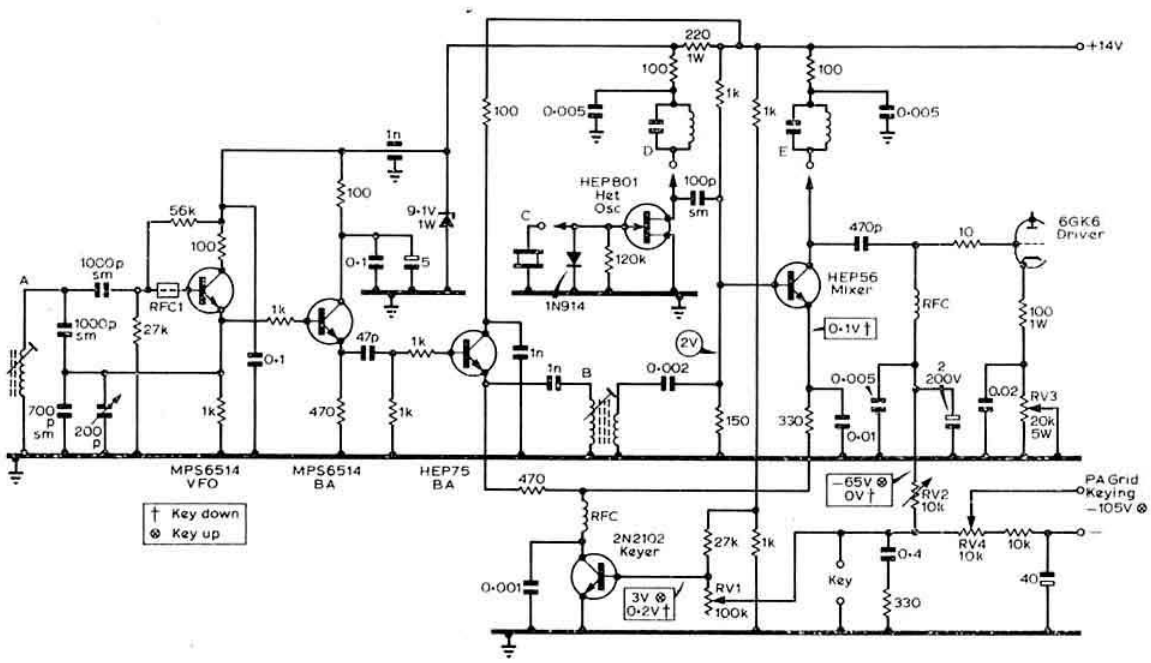


Fig 2. Simplified circuit of the transistorized vfo and exciter of W1FBY's T9-er cw transmitter

A modern transmitter for cw

There must have been a number of cw addicts wondering just how long it would be before *TT* got back on track! For there is still a significant body of enthusiasts who regard cw operation as something that somehow can never quite be equalled with a microphone. And it will not have missed the cw men that for many years almost all transmitters have been designed for speech first with cw tacked on as an "also ran". So a warm welcome must be given to "A cw man's kilowatt" by Robert Myers, W1FBY of ARRL, in *QST* October 1971. And if the article leaves you wondering why a transmitter with a maximum input of 240W (and an output of about 150W on most bands and dropping down to about 100W on 28MHz) should be called "a kilowatt" the answer is that we are promised a Part II on a 3-500Z grounded-grid triode amplifier for the full gallon.

The main features of this "T9-er" design include the borrowing from ssb practice of frequency heterodyning rather than doublers to give consistent stability and frequency calibration on all bands from 1·8 to 30MHz. W1FBY implements the entire exciter section with semiconductors. It achieves shaped, clickless, chirpless keying by controlling the mixer transistor while allowing both variable and crystal oscillators to run continuously, at the same time grid-block keying the driver and pa stages. The thermionic section comprises a 6GK6 driver, two 6146B for the pa and a built-in 6AH6 T-R switch to allow full break-in operation with a single aerial.

Because of the paucity of information on home-constructed transistorized exciters for hf transmitters, a simplified diagram of this semiconductor part of the T9-er is given in Fig 2. By omitting the banks of band-switched tuned circuits, this reduces to a reasonably simple circuit, but it should be stressed that anyone wanting to duplicate the complete transmitter will find a great deal of additional information in the original *QST* article. W1FBY also indicates that this is not a design to be lightly tackled by a newcomer, and certainly it would not be a particularly cheap rig. But Fig 2 should prove useful to anyone thinking about building transistorized exciters for cw or for ssb.

The basic vfo covers 5·0 to 5·2MHz (A); after two buffer amplifiers a fixed-tuned transformer is resonated to 5·1MHz (B) with a two-turn output winding. The crystals for the heterodyne oscillator are (C): 7·0 for 1·8MHz; 8·7 (3·5); 12·2 (7); 19·2 (14); 26·2 (21); and 33·2MHz for 28MHz. The drain tank circuit (D) of the heterodyne oscillator corresponds to the crystal frequencies with the following fixed capacitors: 150pF (1·8); 120pF; 100pF; 68pF; 47pF; and 10pF for 28MHz. The collector tuned circuit for the mixer is tuned to the band in use, the capacitors being 560pF (1·8MHz); 330pF; 220pF; 68pF; 47pF; and 33pF (28MHz). The RFC1 shown in the vfo consists of three ferrite beads threaded on 0·5in of No 22 wire but this can be replaced by a 15Ω resistor. RV1 adjusts mixer cut-off; RV2 adjusts keying shape; RV3 is drive control; and RV4 is a bias adjustment control forming part of the bias supply.

Signal processing for cw reception

The name "T9-er" given to W1FBY's transmitter reminded me that I once wrote a piece entitled "The T5-er—a different approach to cw reception" (*RSGB Bulletin* September 1962). At the time I thought this represented an original development—to turn incoming A1 signals into A2 modulated cw within the receiver. Subsequently, thanks to G3JAG, I discovered that the idea had already been explored by a number of amateurs in the 'thirties (*TT* September 1967). But somehow it has never caught on.

Now, in *Ham Radio* (October 1971), Don Hildreth, W6NRW, comes up with a "high-performance cw processor for communications receivers". And once again the object is to work on the incoming signals in such a way as to give them the character they would have had if they had originally been tone modulated. W6NRW does it by *frequency-modulating* the i.f. signal, and then demodulating it with an fm discriminator to reduce susceptibility to impulse noise and to provide signal compression so that a signal, no matter how loud, will not blow your ears off when searching for weak ones. Actually he does a lot more than this, using a full range of semiconductor techniques including a good assortment of bipolars, FETs, a double-balanced diode mixer and even a CA3000 integrated-circuit. It is all much more complicated than my own 1962 efforts which worked on the af signal and used just a couple of diodes and the odd transistor! Although I ceased using the gadget quite a few years ago, I have retained my belief that there are advantages in listening to what appears to be A2 while the radio link carries only a narrow-band A1 signal.

Aerial topics

One subject affects all amateurs and listeners, whether phone or cw addicts, whether favouring commercial or home-brew gear: the perennial topic of aerials. This month the ideas are mostly follow-ups to types discussed over the past few months—but surely no less useful for that.

First a comment from Les Moxon on the "Levy-Quad" (*TT* January). He points out that it would be better when using this type of structure to turn the aerial upside down (electrically) and voltage feed at points *a*, *b*, of Fig 3. This places the maximum current section higher off the ground. But he warns that no matter which way round it is arranged, the radiation resistance will be down to about 5Ω; this in itself is feasible for single-element quad-type aerials but G6XN feels that it would be unsuitable for building into a beam array, since this will further lower the radiation resistance to around 2Ω. G6XN described a number of related aerials in an article in *CQ* (November 1962).

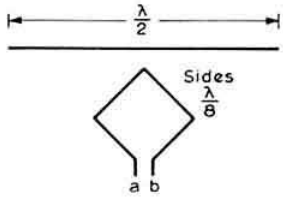


Fig 3. Preferred method of using the "Levy-Quad" element as suggested by G6XN. The aerial is voltage-fed at a,b

Dick Rollema, PA0SE, is worried about the technical justification provided by DJ4BQ in his original description in *DL-QTC* (No 10, 1971) of the all-band double dipole (*TT* December 1971). He warns that the favourable swr readings reported by the German station may have been just "one of those miracles that make up the spice of the amateur's life". He thinks that DJ4BQ may have overlooked the basic fact that since the aerial element is not resonant, the feed-point impedance must comprise reactance as well as resistance, and reference to Jasik's *Antenna Engineering*

Handbook suggests that on 3·5MHz this is going to make the feedpoint almost purely capacitive for the usual range of wire sizes. PA0SE puts forward the suggestion that, in DJ4BQ's case, it could be that his balun compensates for the "weird impedance" with which it is presented. Since we presented in *TT* only the aerial and not the technical commentary of DJ4BQ, we will restrict this comment to just these remarks, and thank PA0SE for his detailed analysis. But we would be interested to know if anyone tried one out and, if so, what results or swr readings they obtained.

Multi-element dipoles

In *TT* August 1971 we reported, from a visit to the Admiralty Surface Weapons Establishment (ASWE) that the British Navy uses a form of broadband hf dipole consisting of four or five spaced wires joined at the centre feed points but left disconnected at the far ends. At the same time we included a design of a 7MHz broadband dipole by WB5ACP comprising a four-wire dipole (using rotor cable) with the ends fanned out and the lengths staggered in increments of 6in.

It was, therefore, with something of a shock that we recently came across in *IEEE Transactions on Antennas and Propagation* (September 1971, pages 682-684) a letter from S. K. Chowdhury of Jadavpur University concluding as follows: "A new wide-band antenna has been developed from a very simple idea. Its impedance properties have been investigated both theoretically and experimentally. The results indicate that it can be used where the bandwidth requirement is less than a log-periodic array but much larger than a single dipole. It has the added advantage of light weight, and it can be fabricated very easily."

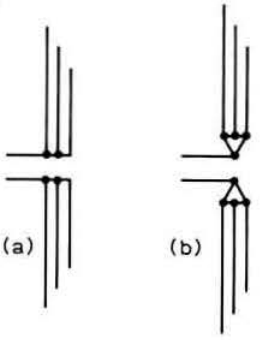


Fig 4. Chowdhury multi-element dipoles: (a) fed directly from two-wire transmission line: (b) via conical conductors

Reference to Fig 4 shows that this new aerial is, in effect, a cross between the ASWE and WB5ACP aerials and has the same basic ideas. We are not, of course, suggesting that someone is trying to claim credit to which they are not entitled: rather it is another example of how the same ideas and proposals tend to germinate at roughly the same time in many minds in many parts of the world.

The experimental trials in India were based on uhf models at about 85cm (350MHz) with a spacing between adjacent elements of 0·5cm and a preferred difference in length between adjacent elements of 0·25cm. It thus seems that this form of construction represents a useful approach for a non-critical single-band dipole at almost any frequency from hf to uhf. At hf an easy way of fabricating a dipole with two elements would be to use 300Ω ribbon, as is often done for two-band aerials, but with just a few inches difference in length; one application would be for portable operation to avoid having to trim to resonance when putting up the aerial at different heights.

So it really does look as though a valuable new idea has emerged from these Indian, British and American sources.

Flexible aerial tuning unit

Several years ago a versatile atu—providing a number of different matching networks for 1·8 and 3·5MHz operating—was included in *TT*, stemming from Alan Gordon, G3XOI. A somewhat different combination of commonly-used matching networks is provided in a general-purpose unit described by John Jörgensen, SM0ETP, in *QTC*, Nr 9/10, 1971: see Fig 5. Switch S1 selects the type of network, while S2 progressively short-circuits the main inductor. C1 and C2 are 150pF, high-voltage types. S1 will need to be a fairly heavy duty switch suitable for switching the low-impedance, rf currents of the input or output sockets.

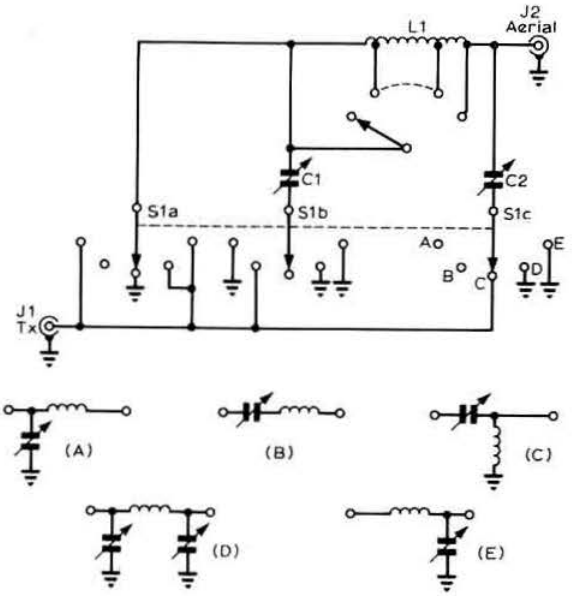


Fig 5. Flexible aerial tuning unit which can be directly switched to any of five matching networks

Voltage multipliers

The ready availability of low-cost silicon diodes and high-capacitance electrolytic capacitors has made the various voltage-multiplier configurations much more useful and practical than in the old days. For example, they can be used in conjunction with the 5V and 6·3V heater windings that, with silicon diodes in the ht supplies, are often going spare to provide power lines of up to around 50V for biasing and keying applications etc. The low voltage-drop across modern semiconductor diodes means that much better voltage regulation is achieved than was at one time associated with voltage multiplier power supplies.

In *QST* October 1971, Jack Althouse, K6NY, reviews a large number of arrangements varying from doubler right through to octuplers, in both half-wave and full-wave versions, providing guidance on minimum ratings for diodes and capacitors, and design procedures for determining the

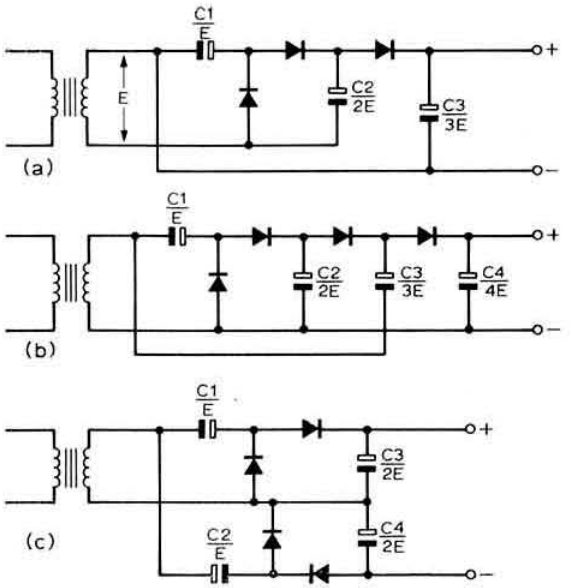


Fig 6. Voltage multiplier arrangements: (a) half-wave tripler; (b) half-wave quadrupler; (c) full-wave quadrupler. The relationship between capacitor voltage rating and transformer voltage E is shown

values of capacitors needed to provide one per cent ripple with 60Hz supplies. Fig 6 shows a few of his suggestions, although it will have to be taken for granted that the capacitors need to be very high values (up to thousands of microfarads) if appreciable current is going to be drawn.

FET voltmeter

Although a number of designs for fet voltmeters have been given before in *Radio Communication*, these are always useful instruments to have around and no apologies need be made for including another one this month. This time the design comes from one presented in an ITA engineering bulletin by Bob Price, G3ECH, although he points out that it has much in common with the unit described in detail by G3LTZ (*Radio Communication* January 1968): Fig 7.

It represents almost a direct "conversion" of the standard twin-triode design featured in the *ARRL Handbook* for many years, but adapted for two 3N128 MOSFETs. Basic sensitivity is set at 300mV fsd, using a 100μA fsd meter scaled 0-3 and 0-10, and running from two PP1 batteries (G3ECH suggests that mercury cells would provide a more constant supply, but at higher cost). Consumption is about 3mA at 12V.

Two OAZ203 zener diodes are used, one to protect the input to the first mosfet, the second to provide a reference voltage to check dc calibration (if this facility is not required it could be replaced by a 22kΩ resistor). The original meter was built in a small die-cast box, with components mounted on Vero-board on the switch selector; the ac probe should have some screening around the diode assembly to avoid hand-capacitance effects. The divider chain is made up to give a total resistance of 10MΩ, values indicated providing ranges of 300mV, 1V, 10V, 30V and 100V. While ideally these should be low-tolerance high-stability resistors, in practice selection was made from 10 per cent values to give correct readings. The probes are made up in fibre pen cases.

The dc sensitivity is set by RV1 and ac sensitivity by RV2—some useful hints on calibration and other matters can be found in the G3LTZ article if this is available.

Integrated circuit news

Last month G8ENN showed how a linear integrated circuit device such as the TAD100 can greatly simplify the construction of general purpose receivers and tunable i.f. strips. Two other recent devices that can be used to form the "heart" of receivers are discussed by Doug DeMaw, W1CER, in *QST* (October 1971). These are two RCA devices: the CA3089E for simple fm receivers using a single tuned circuit to provide quadrature demodulation; and the CA3088E for a.m. receivers (or ssb/cw with a discrete-component bfo). Latest USA prices are given as under $4 for the CA3089E and under $2 for the CA3088E.

A note from James Bryant, G8FNT, of Plessey confirms that the SL623C ic for am/ssb receivers works to well above the data sheet figure of 2MHz. He has checked that it goes to over 30MHz with little if any change in characteristics and, with reduced performance, to at least 120MHz! So the device can be used with confidence for 9MHz i.f. strips.

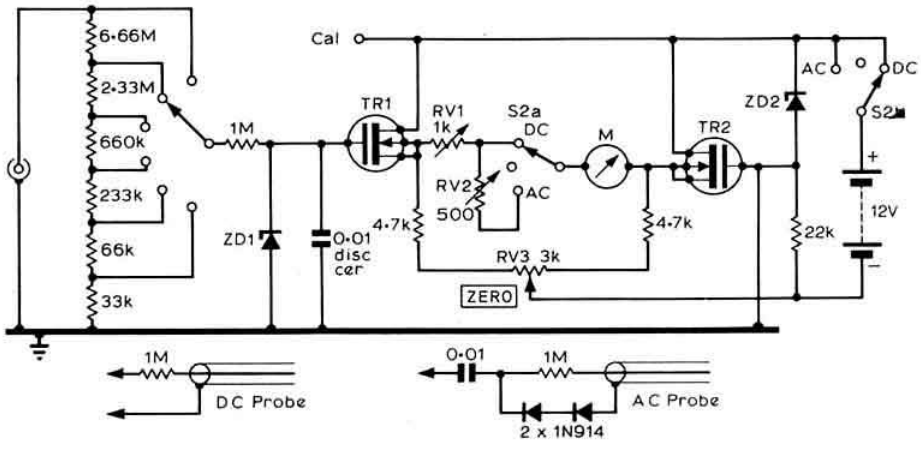


Fig 7. FET voltmeter found useful by G3ECH

MICROWAVES—1,000MHz and up

by DAIN EVANS, G3RPE*

Microwave activity periods

The microwave activity periods for 1972 published in the January column have been enthusiastically received. A bonus, unexpected to the writer at least, is that they have stimulated several people actually to start on the microwave bands. Three operators only have written in to say that they will be unable to use 70cm as the talk-back band, and ask for others to check 2m for them.

Finally, a reminder that the first activity period will be on 25-26 March, and will concentrate on the 13cm, 9cm and 6cm bands. Details of sites, including NGR, and the bands to be operated should reach the writer before mid-March, please, so that the information can be passed on for broadcasting over GB2RS on 19 March.

Activity

The writer had expected a lull in activity during the winter months, during which it was hoped to catch up with the backlog of more technical pieces. However, this was not the case, and the map of activity published in the January column was slightly incomplete. (It was for *3cm* not *30cm*, of course). G8ADP (Teignmouth) has given details of some Christmas activity in the South-West. An attempt on Boxing Day to work G3BNL/P on Exmoor was blotted out by impossible weather, which included static-charged rain, but S9 signals were received later at the same site, Haytor on Dartmoor, over a 57-mile path from G3VPF at Portland. A few days later he worked G3VPF again over the 40-mile path from Teignmouth to Abbotsbury, signals being S9 with an aerial, and S5 without. His transceiver uses a CV2346 klystron 50mW output feeding a 10in dish. The 30MHz i.f. amplifier employed was designed by G3WDG and an article on it is being prepared for publication. He also reports earlier contacts with G3WDG, G8AGT and G3EEZ, that G2RY (Bridport) has had one contact on 3cm with G3VPF, and that G3RZG is rebuilding a 1W rig. G8ADP is also on 23cm, 13cm and 9cm, and has started on some 6cm equipment; he would like to know of other stations on the 6cm band.

Gunn diode power supply and modulator

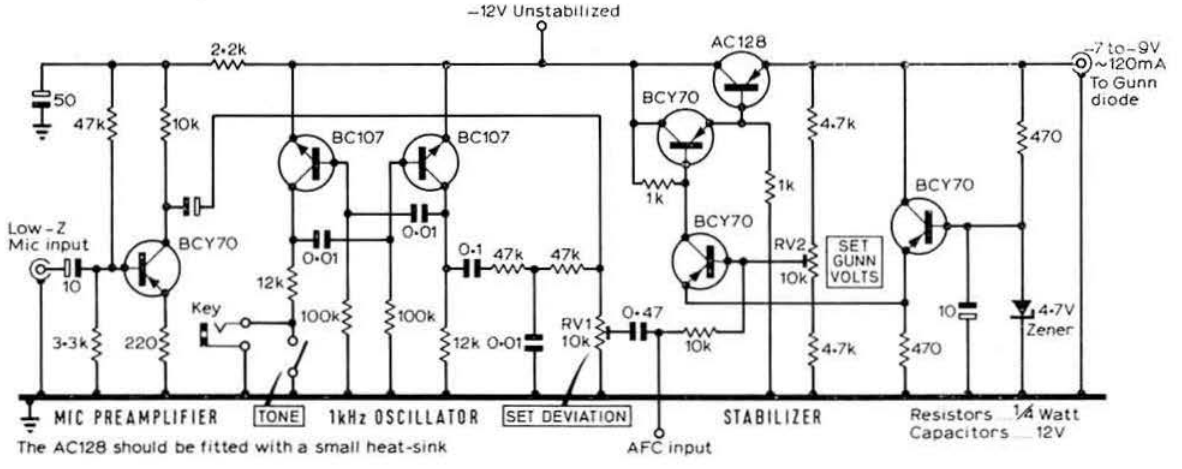
G3ZGO (Ealing) has supplied the accompanying circuit of a variable stabilized psu, combined with a 1kHz tone generator and a microphone pre-amplifier, for use with low power Gunn diodes. It operates from an unstabilized 12V dc supply. Provision is also made for injecting an afc voltage, which will be covered in a future article. As shown, the unit is intended for a transceiver: if it is required for a receiver only, then the pre-amplifier and the key jack can be omitted although the tone generator should be retained. The circuit can be modified for negative earth by reversing the polarity of the zener reference diode and the electrolytic capacitors, and by substituting the corresponding n-p-n transistors for the p-n-p types and vice versa.

Setting up involves only the adjustment of RV2 to produce stable operation of the Gunn diode (usually 7 to 9V), and RV1 to produce the fm deviation required. RV2 may also be used as a fine tuning control.

13cm equipment

If only for reasons of self-defence, may the writer appeal for people to send in constructional details of 13cm equipment that can be built without too elaborate facilities. The most urgent requirement is for 1,152/2,304MHz doublers, and for 2304MHz amplifiers or oscillators. Transistor converters for both narrow-band and wide-band operation are also in great demand.

* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.



SWL NEWS

by BOB TREACHER, BRS32525*

THE statement "I am only a short wave listener" seems to upset many listeners, yet others openly refer to themselves as such. SWLs are the licensed amateurs of the future and without them the hobby would be deprived of a very useful section of the amateur radio fraternity. It has been said by numerous people—including many amateurs—that a large number of keen listeners do more for the hobby than many who hold transmitting licences. With this as an incentive let us all continue to play our part to the full until the day when we obtain transmitting licences.

Equipment

It seems that many listeners today have larger amounts of money available for equipment than the writer had when he first became interested in the hobby, or so it would seem from letters regarding the purchase of commercial receivers and aerials.

It is often said that the most important item at any station is the aerial, but a reasonably selective and sensitive receiver must also be used to make a competent receiving set up. There are many receivers on the market at the present time which are excellent buys and some of them are listed below, in no significant order as tastes vary. Sommerkamp/Yaesu Musen FR100B, FRDX400, FRDX500; KW Electronics KW202; Trio JR310, JR500SE, JR599, 9R59DS; Heathkit SB301, SB303; Drake 2C; Hammarlund SP600, HA600, and the Eddystone EC10. These are all modern commercial receivers and the most popular on the market; the prices range from £45–£160. There are also more expensive ones, such as the Drake R4-B and the Eddystone EA-12 both of which are around the £200 mark. Details of individual prices and specifications if not advertised in *Radio Communication* can be obtained from the suppliers.

Turning to aerials, it is difficult to know where to begin as there are so many variations to choose from. Space does not permit details of each type, but the most popular would seem to be a dipole. A random long wire would also prove successful on most frequencies.

Listening on the lower frequency bands presents slightly more of a problem as a specialized aerial is needed if dx stations are to be heard: an inverted-V dipole is considered to be good for this purpose. Beam arrays can be used with good effect on the higher frequency bands. Last, but by no means least, are vertical aerials. Aerials which are purchased, however, can be very expensive and it is recommended that they be "homebrew" whenever possible.

For those interested in erecting a $\frac{1}{2}\lambda$ dipole, the following measurements may prove helpful:

1·8MHz = 259·7ft	3·8MHz = 123·0ft	14·3MHz = 32·7ft
1·9MHz = 246·1ft	7·0MHz = 66·8ft	21·0MHz = 22·3ft
2·0MHz = 233·8ft	7·1MHz = 65·8ft	21·4MHz = 21·8ft
3·5MHz = 133·6ft	14·0MHz = 33·4ft	28·5MHz = 16·4ft
3·6MHz = 129·9ft	14·1MHz = 33·2ft	
3·7MHz = 126·4ft	14·2MHz = 32·9ft	

* 392 Rochester Way, Eltham, London SE9 6LH.

RSGB 1972 countries table

	10	15	20	40	80	160	*Total*
A7082	0	9	21	36	26	12	104
A7387	9	5	30	7	25	4	77
A7780	5	19	23	7	5	1	60
A7159	0	9	22	9	24	0	57
BRS30594	0	10	23	10	9	2	54
BRS33211	0	9	5	2	8	0	24
A7857	0	0	7	0	0	0	7

Support for this table is promising. Once again the requirements are simply the number of different countries heard on each band since 1 January 1972.

It is said that a good earth system is needed. A simple system would be a series of copper pipes driven into the ground or even a buried copper water tank. The earth wire should be kept as short as possible and should be soldered to the pipes or tank.

An atu will also be necessary. There are many circuits but it consists simply of a couple of variable capacitors and a coil of copper wire with tappings as required.

Band conditions and reports

Conditions on all bands appear to be improving and by the time this is read the hf bands, with the exception of 10m, will probably remain open longer for dx traffic than of late. Both the 7 and 3·5MHz bands have produced some choice dx during January.

Reading the mail

It is nice to know we have yl SWLs. Christina, A7783, is gifted with an ideal QTH 750ft asl overlooking Sheffield, with a good take-off in each direction except to the west. This location is partly the reason why she has been able to hear some choice dx on the hf bands.

Fraser Robertson, A6736, is at present taking an RAE course and will be entering for the exam in May. Fraser's main interest is cw and he proudly possesses an RNARS certificate for 30wpm and hopes to get up to 35wpm in the near future.

Maurice Graham, BRS32601, is a keen dx listener who also dabbles in the world of HAB. As most already know, this is an award run by the Cannock Chase ARS for hearing a specified number of 10km squares which Britain is divided into for the purpose of this award. Weekly nets are run on 3,760 (Fridays 2200), 7,060 (Sundays 1400), and 1,860 (Tuesdays 2000). Those interested in finding out more about this interesting and fascinating aspect of amateur radio should write for details, enclosing sae, to G3ABG, 9 Fairmount Drive, Cannock, Staffs WS11 3DZ. A record book listing all the areas is available at 60p. All proceeds go to the RAIBC—a very worthwhile cause.

Comments are acknowledged from BRS25932, BRS32324, BRS32876, BRS33237, A7545 and A7637. All correspondence for inclusion in the May issue to reach the writer by 1 April 1972.

FOUR METRES AND DOWN

by JACK HUM, G5UM*

Number 18 coming up

With ever-increasing numbers of Class A licensees coming on to the metre wavelengths, and with Class B men now over the 3,000 mark, there should be a record crowd at the Eighteenth Annual VHF/UHF Convention on 22 April—and it is fortunate indeed that the Winning Post Hotel is spacious enough to accommodate this order of expansion year after year.

Taking full account of current developments on the technical, political and operational fronts, the lecture programme will open with a discourse by the Society's VHF Manager, Geoff Stone, G3FZL, on the metre-wave scene today and tomorrow (this may not be the title but this is what he will talk about). Then Roy Stevens, G2BVN, will give some background—and foreground—to that space conference of last summer that holds such important implications for the amateur radio movement. Next, "our third celebrity will sign in", none other than Tom Douglas, G3BA, with a 65min illustrated lecture on vhf operating techniques. Hearing ourselves as others hear us may be a salutary experience with a valuable end-product: better operating on the air.

After the tea-break the customary two lecture streams will offer their usual tantalizing choice. This year BRS15744 (Ron Ham to us all) will be in there batting on the subject on which he is nationally famous—and this is no exaggeration: remember seeing him in "Tomorrow's World"?—long distance vhf propagation. Concurrently in the other lecture area Bob Burns, G3OOU, will lecture on wide dynamic range vhf receiver design, pretty vital when there are powerful signals coming from almost every suburban street; and in a very different area of technology G3OAD will let his audience into a few secrets about microwave pulse techniques, on which subject appetites may well have been sharpened by the forward looking comments by G8AVX a few issues ago.

At the dinner in the evening the guest of honour will be Mr D. E. Baptiste from the MPT—and leader of the UK delegation to the 1971 Space Conference. He spoke strongly in favour of amateur radio then, and is a good friend of the movement.

All in all, then, a convention not to be missed. It will be no bad thing to get ticket applications in early, after a quick roundup at the next club meeting to determine how many wish to go en bloc. Here are the prices: £1.80, convention and dinner; 40p, convention afternoon only; £1.50, evening dinner only (give the yf/yl a night out!).

More to tell next time: no more space, this. But one last exhortation: get that constructional job you are now engaged upon completed by 22 April. It could win you the 1962 VHF Committee Trophy for the best item of home constructed equipment on view that afternoon.

Address ticket applications, with remittance, to Mr A. Wheeler, RSGB, 35 Doughty Street, London WC1N 2AE, marking envelopes "VHF Convention" in top left-hand corner.

* Houghton-on-the-Hill, Leicester LE7 9JJ

In the wilderness

To expatiate on the advantages of RSGB membership to the people who read this column is talking to the converted. And perhaps this is no place to perform the exercise anyway. Yet it does occur to us that we can all do something to help the newer G8F-- men (and perhaps some of the older licensees too) to a realization of how much stronger the movement will be if they add their weight to it. As random, separate bodies *outside* the Society they have no say in its affairs, no opportunity to speak with authority to, say, the VHF Committee, or to influence such various things as liaison with the MPT, whether a beacon shall be put up at such-and-such a site, whether vhf contest organization could be improved, and so on.

Most non-members possess some awareness of the more obvious advantages of belonging, which are the journal and the QSL bureau. There are half a hundred others. Some they enjoy whether they subscribe to them or not, such as the beacon service, for which the Society bears the cost. Others are concealed benefits, eg liaison with the licensing authority. All cost money. The greater the membership the better the facilities.

Blindingly obvious, maybe; but to spread more illumination over the wilderness is well worthwhile.

Video standards

Scanning last month's piece "Video GM style", G3OGY of the Engineering Information Service of the ITA reminds us that the UK 625-line standard is amplitude modulated with negative polarity, and therefore maximum vision transmitter output corresponds to *peak sync* and not to peak white.

He also politely challenges our comment that GM6ADR/T puts out 625-line transmissions "to best BBC2 standards", as he may well do, for BBC and ITA on uhf are to the same standard! Point taken: habit dies hard, and it is about time it did.

G3OGY invites attention to a document "Specification of television standards for 625-line system-I transmissions" published jointly by the ITA and BBC. Its purpose is aptly summed up by the opening phrases of its foreword contributed by the Deputy Director of Radio Technology at the MPT: "Each piece of equipment used to generate, process or transmit a television signal inevitably introduces some distortion into the waveform. How much? . . .".

To the advanced /T worker this booklet will be of absorbing interest. If he sends a cheque for 50p payable to the Independent Television Authority addressed to Mr S. H. Andrews, Engineering Information Service, ITA, 70 Brompton Road, London SW3 1EY, G3OGY will arrange for a copy to be sent.

Certificates on their way to . . .

So your QTH is an impossible one? You stand no chance of ever rating for a Four Metres and Down Certificate? With

nil desperandum on one hand and *pour encourager les autres* on the other, now read on:

In south-east London lives G3CXM, sited at 50ft asl and surrounded by tower blocks. All he may put up by way of aerial is a 5-element Yagi poked out of the bedroom window. Years ago (seven in fact) he gained the 144MHz Transmitting Award No 71. Now he is well on the way to a Two Metre Senior with 17 countries worked and hopes that anyone in the 60 counties he requires who owes him a card will send him one. His secret? Netting facilities with vxo and lots of cw to winkle out the weak ones.

* * *

At its January meeting the VHF Committee had the sad duty to allocate the first posthumous Four Metres and Down Certificate. The late Bob Cliffe, G8BRT, of Sheffield, whose annual appearance on 2m as EI2VBD/P brought pleasure to hundreds, was well on the way to collecting the needful five plus 30 which had been worked from EI when he died last September. His wife Ivy ("My logkeeper and QSL manager", as Bob described her), succeeded in collecting the remaining cards to submit a claim. Now Certificate No 247 for EI2VBD/P has reached her, to be put up alongside Nos 206 and 207 which Bob won in February last year.

Other 2m certificates issued: No 246, G8DWC; 248, G8EJH; 249, G8AWA. And a Senior to Jack Mitchell of Sanderstead: G3KEQ gets No 37. In the 432MHz Transmitting category No 85 to G8ADP/A operating from his "alternative" at Bristol.

* * *

Just as he was packing up QTH for the move to Perth, Western Australia, Ron Vaughan, G3FRV, was fortunate enough to see the last few cards he required for his FMD certificate claims drop through the letter box. Now, in his baggage on board will be Certificate No 86 for 432MHz Transmitting and No 250 for 144MHz Transmitting, the latter submission including a card from EA1AB worked as far back as 1965. As a leading member of the Crawley club, a superlative vhf operator and for 20 years or more a good RSGB man (he was general manager for a time), Ron Vaughan will be greatly missed from the UK scene. His new callsign will be VK6RV.

Help from the BRS man

Referring to our thoughts (January) on BRS men's difficulty in pulling in enough QSLs to submit for an FMD award, G3ZPZ of Chesterfield makes the point that even local reports are worth having if they are well documented. He was much impressed with a QSL card he had from BRS30484, Jim Batchelor of Leeds, that gave a detailed report on the 'ZPZ negative cycle loaded modulation as seen on a scope. "If others, transmitting members included, took as much trouble with their reports things would be fine," declares Ken Robinson.

It should be added that BRS30484 has scopes monitoring several bands other than vhf, can take rtty, and runs a pen recorder on GB3VHF to study long-haul metre-wave characteristics. And he belongs to RAIBC and Raynet. We hope to have the pleasure of booking him into the FMD Receiving Awards lists before too long.

Skeds wanted

By G3ZPZ, Ken Robinson, 91 Hilltop, Bolsover, Chesterfield, Derbyshire, with stations beyond the 200-mile limit, cw only. With 150W and high-gain aerials giving 3kW erp, plus a superb site, seeks schedules only with distant stations likely to provide a readable telegraphy signal in normal conditions, and no lift.

Expeditionaries

This news about the GM8FFX/P expedition to Cairn o' Mount in Kincardineshire on 2m and 70cm may reach you *after* 3-5 March, when he went, but no matter: you will probably have heard it over GB2RS. And he is going again frequently on as many weekends as possible, operating in the GM window 145·85-145·95 on 2m and with no less than 75W on 433·35MHz on 70cm, helped by a 46-el. Being in company with a Class A man, GM3ZBE, there is opportunity for cw operation at the bottom end of each band. For schedules on 70cm write to GM8FFX, Graham Knight, 108 Rosemount Place, Aberdeen AB2 4YW.

Still in a GM context, and particularly apropos our remarks elsewhere about collecting the more difficult counties, we hear from G3ZNS that a 10-man team from G3VUM (University of Manchester) will activate the islands of Jura and Islay (both in Argyllshire) at the end of June and beginning of July, high power cw and A3J on 2m, and possibly 70cm and 70MHz as well. Now, if they could be persuaded to move on to even rarer counties farther north. . .!

DX miscellany

Propagation peculiarities on New Year's Day, noted by G2UJ/G5NU (page 99 last time) are confirmed by G8EYN. From Dorset, using only 15W of a.m., he worked G8CIW, London, 110 miles; G8BDJ, Brighton, 95 miles, and G8EJH in Kent at 120 miles, all at high level with the same deep QSB reported last month. The only possible anomaly-inducer around at the time was the Quadrantid meteor shower, which at BRS15744 at Storrington was registering 2,083 pings on 2 January. But m-s is not phone-conscious. Any other theories?

* * *

Another northerner besides G3PFR who caught EA1AB was G3NHE of Sheffield, who patiently queued up from 1620 to 2040gmt on 12 December to catch the Spaniard when the southern QRM lifted, and as QSB was about to kill the contact. After '1AB had faded, EA1CP remained audible until 2200gmt, when Martin Dann worked him on the 13th call. Regular telegraphists will echo the 'NHE comment: "Considering the activity during 2m cw contests, and during the Spanish affair, I find the low level at other times quite incomprehensible, especially as it is always possible to work good distances on the key whatever the conditions".

* * *

Writing from crowded SE England, G8EDJ of Ashford in Kent is disturbed by the close packing that occurs on 2m when vfo-equipped operators attempt to co-channel with the dx. "Many tens of watts fired at one's front end from short range a few kilohertz away from a weak signal render a QSO impossible," he says, and states a problem peculiar to vhf, where big signals, made even bigger by high gain aerials, attenuate only slowly with distance. On the hf

bands skip removes all but the real locals: there is none to do this on the metre wavelengths. Solutions, gentlemen, please!

The top end window

Much support both over the air and by mail has been expressed for the plan to open a window between 145·85 and 145·95MHz to let the GM and GI operators through, clear of Zone D QRM. Typical of the situation to date is the experience of G8BMJ at Stoke on Trent: "I worked fewer GMs in 1971 than in 1970. The reason is the QRM laid upon them by strong Lancashire and Cheshire stations" —to which people farther east would add—"strong Nottingham and Yorkshire stations". Even the beacon zone gets clobbered, adds Peter Wild; one evening he counted 20 Yorks and Lancs stations between 145·85-146·00, all beaming south.

There must be many Zone D operators who would willingly exchange crystals for 145·85-145·95 with GM and GI operators, and the latter no doubt hold crystals scattered uselessly in the remainder of Zone D. We will print any "Xtal Xchange" requests which come in.

Contest corner

"Not a 3/20A but a BAY96 on a.m. at 10W input," says G8BYV, correcting a small slip on page 108 last time in the UHF Contest Results. John Tye came second in the 1,296MHz Fixed section, and achieved greatest range of any contestant on 23cm: his best was 299km, and there were two other contacts at 262 and 235km. Almost anything worked from Norfolk on 23cm is dx! A DL3WR converter has just been built and can be highly recommended to other 1,296MHz men.

Much writing for "seventy centimentalists" to do: two days after the end of the Cumulatives on 2 March, the big 24-hour event of 4-5 March. "But this is a 2m event as well as a 70cm one". It is indeed; but take special note of the VHF Contests Committee's welcome action in applying *a multiplier of six to the total score on 432MHz.* See p. 108 last month.

A suggestion to contestants, whether solo or group: send entries by *recorded delivery* to the named adjudicator, and so set at rest any "lost in the post" qualms.

Another point: when operating in a contest enter QSOs in the permanent station log. Afterwards, transcribe the relevant particulars on to the RSGB log sheets for sending off.

Tech corner

From G8CUT (Les Turner of Chelmsford)

The 75W a.m. transmitter at this station covers 144·16 to 145·98MHz using four 12MHz BT-cut crystals in a vxo consisting of 6AU6 oscillator, 6BH6 untuned BA and 6BH6 tuned amplifier giving 75Ω output. Each crystal provides a spread of at least 500kHz at 2m. To obviate tvi no crystal at 8MHz nor multipliers at 24MHz are used. After the vxo, therefore, the transmitter line-up is:

6BW7 tripler at 36·5MHz, 6BH6 BA at 36·125 and another 6BH6 BA at 36·450MHz. Then comes a 6AK6 doubler centred on 72·5 followed by a 5763 doubler to 145MHz. The last two stages are a 3/10 BA at 145MHz and a 6/40A at 145MHz.

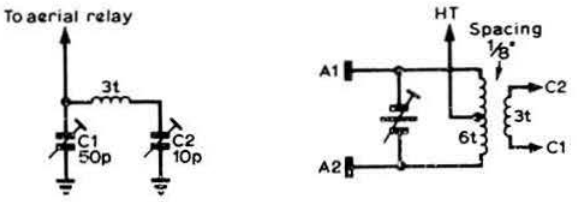


Fig 1

The screen of the 6/40A is regulated by a 6BW6 in a circuit suggested by G3FZL to limit the amount of modulation applied to the screen grid, thereby reducing bandwidth and spikes. The 6/40A thus runs in Class C but in a virtually linear mode.

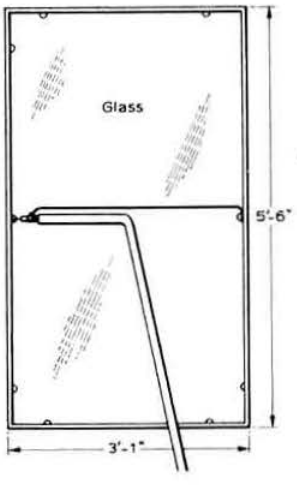
Further to help achieve a clean transmitted signal, the oscillator, multipliers and amplifiers in the early stages are run at a low level; there are double tuned circuits. Thus, on "Net" the spacer cannot be heard locally. When radiating in any part of the 2m band no stages are retuned. Measured power output is 48-50W (anode current of 6/40A is 145-150mA). The measured third harmonic in the 70cm band is greater than 50dB down. The nearest television receiver in this high-density populated area is 80ft away. The transmitter aerial is an 8 over 8 slot at 50ft.

Untuned link output to the 6/40A is not used. Instead, to remove any spurious signals remaining above and below the wanted frequency in the 144–146MHz band, the simple pi-trap coupling shown in Fig 1 is used. The ideal condition is when C1 and C2 are at half mesh. Coils are to ¾in minimum inside diameter.

From G8ACJ (Frank Mathews of Guildford)

Seeing the window-frame simple quad for 144MHz (page 23, January) prompts me to send details of the one I use for /A work in the office, 115ft above street level in Croydon.

The radiating element is the existing fixed aluminium window frame (3ft 1in wide by 5ft 6in high). The coaxial feed is connected directly to a self-tapping screw which secures the window's aluminium glazing bead and the outer is returned to the opposite glazing bead by means of a length of wire. The coaxial cable is taped centrally on the glass.



BEACON STATIONS

Callsign	Location	Nominal frequency	Emission	Aerial direction
GB3ANG	Angus	145·95MHz	A1	SSE
GB3CTC	Redruth, Cornwall	144·13MHz	A1	ENE
GB3DM	Burnhope, Co Durham	145·975MHz	F1	N/S
GB3GW	Swansea	144·25MHz	A1	ENE
GB3GM	Thurso	70·305MHz	A1	N/S
GB3GM	Thurso	145·995MHz	A1	N/S
GB3GEC	W. London	433·45MHz	F1	N/W
GB3SC	Sutton Coldfield	433·50MHz	F1	N/S
GB3SU	Sheffield (temporary location)	70·695MHz	A1/F1*	Omni
GB3SX	Crowborough Sussex	28·185MHz	A1	E/Omni
GB3SX	Crowborough	70·699MHz	A1	N
GB3VHF	Wrotham, Kent	144·500MHz	F1	NW

* Callsign on F1 continuously, on A1 once a minute. When on A1, F1 is suppressed

No special calculations were done, and the swr appeared to be fair but not good. Even so, feeding the system with a HW17A has resulted in dx up to 100 miles, comparing very well with the former halo used resting against the window glass. Tests with many stations up and down the Thames Valley showed that polarization was mainly vertical.

Here and there

Our DL friends now have a 432MHz activity night on Wednesday between 1930 and 2300 gmt. Pity it clashes with the UK 70MHz ditto . . . but perhaps it does not: you are likely to work the Germans on 70cm only when a big lift is on, but on 4m you can work many G-men any Wednesday.

* * *

Apropos the above, not to forget the Germans' 2m telegraphy night every Tuesday. Now this *is* more "do-able".

* * *

Not to forget something else: the large sae when you ask G5UM to send you a copy of the rules for the FMD Awards.

* * *

Also from G5UM the VERON callbook with loose leaf supplement updating it to May 1971. Literally only half-a-dozen left. Price 50p post paid.

* * *

For the latest on repeaters watch "Council Proceedings". You probably saw last month's progress report on p 106. Things are moving.

* * *

People constantly ask us: "What happens to vhf county status when the boundaries change?" Answer: let us wait until they do. The situation is still fluid, eg Colchester has already changed hands twice!

* * *

We have now had an opportunity to see EI2W's book referred to here last month (*Common Market or Common Sense?*, De Vere Publications, price £2.50). Harry Wilson reviews world trade trends in detail, and concludes with some scepticism about EEC and the feeling that the UK would have done better to use her influence in the Commonwealth. Relevant to amateur radio? Yes: are we not already "in Europe" via IARU Region 1?

Another question (it was raised by a member of long standing): "How about a 100 counties endorsement to the FMD certificate?" Answer: there are 98 counties, and if anybody can work all of them on vhf we would be delighted to endorse an FMD certificate accordingly. You cannot of course include counties outside the UK such as those in EI or the *departements* of F. Impossible to work 98 on 2m? It *could* be done if an expedition activated the remoter Scottish counties this summer. Next summer may be too late; the boundaries may have changed by then.

* * *

Sadly, no more G3UGF/MM activity: Richard Constantine has come ashore as a sales engineer with Farnell Instruments. He hopes to be active from their club, G4ADQ, and from his new QTH, Victoria Farm Cottage, Clifford, Boston Spa, Yorks. While aboard *Esso Inverness* he worked 500 stations and made a vast number of new friends via 2m.

* * *

Another source of supply of nylon nuts and bolts: Ron Ham tells us that Radiospares will supply in 2, 4 and 6BA sizes, and that most retailers can get them for members.

25 YEARS BACK

"Our Front Cover. The Mullard QVO4/7 is a Beam Tetrode Transmitting Valve suitable for operation at anode voltages up to 400V, with an anode dissipation of some 7 watts, and at frequencies up to 150Mc/s. Primarily developed as a R.F. power amplifier, it is also employed as a Class C oscillator".

"Up to the end of January last, approximately 4,400 licences had been issued by the G.P.O., of which number it is estimated that at least 50 per cent are new".—*RSGB Bulletin*, March 1947.

The RSGB News Bulletin Service

The RSGB News Bulletin, callsign GB2RS, is broadcast every Sunday morning. This bulletin can be received on either vhf or hf, which gives almost complete coverage of the British Isles. It keeps radio amateurs up-to-date about happenings in the world of amateur radio and gives information on coming events, supplementing and bridging the gap between successive issues of *Radio Communication*.

SCHEDULE

Time	Frequency (MHz)	Location and coverage (hf) or beam heading (vhf) of station
0930	3·6	Bromley, Kent (SE England)
1000	3·6	Cheltenham (SW England)
	145·8	Aberdeen (NNW)
	145·095	Farnham, Surrey (NE)
1015	3·6	Belfast (N. Ireland)
	145·8	Bangor, Co Down (N)
1030	3·6	Derby (N. Midlands)
	145·8	Aberdeen (SW)
	145·89	Bishop Auckland (N)
	145·3	Sutton Coldfield (NW)
1045	145·89	Bishop Auckland (E)
	145·095	Farnham, Surrey (SW)
1100	3·6	Bridlington (NE England)
	3·6	Aberdeen (NE Scotland)
	144·3	Sutton Coldfield (SW)
1130	3·6	Motherwell (S Central Scotland)
	145·5	Bradford (NE)
1200	145·5	Bradford (SE)

Exhibitions — Beacons — Conventions — Contests — Local events
Rallies — Scientific projects — Meetings — Licensing — Clubs
Propagation reports — Lectures — Field days — Expeditions

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

THE entry of Britain into the EEC may well herald the day when the majority of European amateurs will be in the fortunate position of having a transmitting licence which entitles them to operate in any of the member countries. It seems to the writer that the time should come when there is an International Amateur Radio Licence—we already have a similar document in the form of the International Driving Licence—which would be accepted by all civilized nations as evidence of its owner's ability to operate radio equipment. The use of a radio transmitter is likely to do less harm than the mis-use of a motor car!

The Bermuda Contest 1972

No apology is offered for drawing readers' particular attention to this annual event—a contest with a difference, the difference being that the winners of each section are rewarded with a week's holiday in Bermuda during which they are presented with their winner's certificates at the Radio Society of Bermuda's Annual Banquet. The time/dates this year are 0001 22 April to 0200 23 April (phone section) and 0001 6 May to 0200 7 May (cw section).. All bands 3·5 to 28MHz will be covered and UK stations have to contact as many stations in Bermuda, Canada and the USA as possible. This year's winners will be accommodated at the luxurious Holiday Inn Hotel. Illustrated brochures giving full details of the contest etc, are available from J. Bazley, G3HCT, "Brooklands", Ullenhall, Nr Henly in Arden, Warwicks, in exchange for an sae.

News from overseas

A letter from 5H3LV announces with regret that the QSL bureau for Tanzania and Zanzibar was closed on 31 December 1971 as there was no one available who would undertake the work and expense of running it. Cards for 5H3 stations should be routed as indicated in the list below:

5H1LV via VE3BIZ.	5H3LV via VE3BIZ.
5H3FQ Box 168, Dar es Salaam.	5H3LZ via G3LQP.
5H3JJ via 5Z4JJ.	5H3MA via VE2DCY.
5H3JL via W9NNC.	5H3MB via WA2UYX.
5H3JR via W2SNM.	5H3ML via VE3ODX.
5H3KA Box 939, Arusha, Tanzania.	5H3MM via SM5ERJ.
5H3KF via 9J2CS.	5H3MT via LA6PF.
5H3KG via Italian QSL Bureau.	5H3MV via VE7SE.
5H3KJ via LA6GF.	

Oliver Perkins, K2MH/G5ATJ/GC5ATJ, has written from Lisbon to say that he is having considerable difficulty in obtaining the release of his radio equipment from the Portugese customs department, in spite of the fact that he has all the required documents. This means that intended trips to CT3, CR4, CR5, CR6 and CR7 may have to be abandoned and a return to the UK or USA in April may result. Oliver says that all his GC5ATJ/Sark logs and QSLs and many personal documents are with the locked-up equipment and he is, therefore, unable to deal with any QSL requests at present.

Andre Saunders, 5Z4KL, has a new address (see *QTH Corner*). He is very interested in making a dxpedition but has problems with transport and finance, and although he still holds his VQ9KL licence for operation from Aldabra, Desroches and Farquhar Is he is despondent over the possibility of ever using it before his return to Scotland in 1973. There has been no response to a request for a 6O1 (Somalia) licence. If all else fails Andre will attempt to operate from TL8, TT8, TZ and some of the other rarer African countries on his way home overland.

W1NYA wishes to publicize the fact that he has received no logs from TA3AY for contacts since 15 September 1970. He understands that TA3AY is in gaol but says that if and when any later logs are received he will confirm contacts accordingly.

"GC Day"

A burst of activity from the Channel Is may be expected on 7 May when a big effort is being made in Guernsey to persuade all licensees to come on the air for at least four hours. It is hoped that the amateur population of Jersey will also join in. Activity will be on all bands, including vhf.

Dxpeditions

WA5VTU was in the vicinity of Spratly Is during January but bad weather prevented him landing. He sailed to Thailand and will be embarking on a Pacific tour by the time this reaches readers. INDXA and VS6DR have donated some equipment and another attempt may be made, but in any case Dave will attempt to operate from some unusual locations.

VE8RA now has dates for his Pacific island activities. These are: 14 to 22 March, Wallis Is (FW8); and 22 to 27 March, New Caledonia (FK8). Karl will operate on all bands using a Hy-Gain 18AVT aerial, with a quad for the hf bands if the materials are available locally. QSLs will be sent out by VE7BWG.

The JA-DX Association has been given permission to operate from Parce Vela Is using the callsign JD1ADD. DXCC status is not known, but the previous operation by KG6ID some years ago was not accepted as from a "new" country. However, the administration of the area has reverted to Japan since that time.

Full details of the Revilla Gigedo trip are now to hand. XE1FFC, XE1J and XE3EB (operating as 4D4FFC, 6D4J and 6D4EB respectively) will be on Benito Juarez island from 16 to 23 March. Each operator will specialize on certain bands—6D4J will use 7,095 and 3,795kHz, 6D4EB 14,195kHz, and 6D4FFC 28,595 and 21,295/21,305kHz. Each will handle his own QSLs—please send sae and IRCs.

* 10 Knightlow Road, Birmingham B17 8QB.

The Marconi staff at Writtle, who were responsible for building station 2MT. L to r (back): B. N. MacLarty (retired Engineer-in-chief, The Marconi Company), H. L. Kirke, The Hon R. T. B.Wynn (subsequently a Chief Engineer BBC, but now retired), H. J. Russell; (front): F. Bubb, Noel (later Sir Noel) Ashbridge (formerly Director of Technical Services, BBC), Captain P. P. Eckersley (subsequently BBC's first Chief Engineer), E. H. Trump, Miss E. M. Beeson

A Marconi photograph

The 2MT transmitter

Further information concerning this has been very kindly supplied by The Marconi Company through its company historian, Mrs B. Hance. A picture of the 1922 Writtle staff provided is reproduced here and it seems that the Writtle hut is now located in the grounds of the Kings Road County Junior School in Chelmsford.

DX news

C21GB has now returned to the UK and is licensed as G4ANY. QSLs for Nauru Is contacts may be obtained from the address in *QTH Corner*.

DOTM has taken over QSL duties for VK9JK, VS6DR and 3F1IE/HP1IE (formerly done by W2CTN). Other active stations for whom QSLs should be sent via Box 7388, Newark, NJ, 07107, USA include CN8HD, CR5SP, CX2CO, DJ0VB, FM7WQ, HK0AI, JW1EE, KF4SJ, KV4FZ, LA1H, OY7ML, PJ7VL, PY2PA, PY2PE, VA2UN, VE8RCS, VK3BM, VK3CIF, VK9XI, VK9XK, VK9XX, VP7NY, VP8JV, VP9GR, VS6DO, W4EXI/P, W9OIJ/P, XE1IIJ, 6D1AA and 9Y4VT. VK9DR has now left Christmas Is and is in VK4, and QSLing for CR7FR was transferred to W7VRO for contacts after 1 September 1971. Readers may obtain copies of the *DOTM Bulletin* by sending a large sae and IRCs to W2GHK/4, Box 17316, Raleigh, NC, 27609, USA.

The annual change of operators at FB8XX may have taken place by now and the new ones intend to put their SB102, GT550, and rhombic aerials to good use. They hope to keep the following schedule: 7,005, 7,083kHz, 1900 to 2000 on Saturdays. 3,507, 3,798kHz, 2000 to 2100 on Saturdays. Other times—14,040, 14,090 (for rtty), 14,120 14,225, 21,080, 21,220, 21,300, 28,080 and 28,575kHz. They will work their QSL manager, F2MO, on Saturdays at 0900 on 28,575kHz.

ZD7BB says that ZD7SD and he are the only amateurs on St Helena, and that they both operate only on ssb. Eric (ZD7BB) is learning cw and hopes to be able to use it soon, but any cw ZD7 signal heard until then is a pirate.

There is a new operator at KH6EDY but he may only be there for a short time. Kure logs were last received by KH6BZF in September 1971. In addition to ZL3PO/C, ZL4ND/C is said to be on Chatham Is. VR2 stations have been heard using the new Fijian 3D2 prefix. *West Coast DX Bulletin* says that Nauru stations use the C20 prefix only on certain holidays.

UW3HY will be active from a location 100km from the North Pole from March until May and will use the callsign UW3HY/0. He will be active on all bands 80 to 10m, and 14,005kHz and 14,150kHz have been mentioned as possible frequencies on which to look for him.

The "7P8AZ" who has been heard on 80m is a pirate. *DX News Sheet* reports that GW3AX is no longer QSL manager for 9L1RP and that cards should be sent direct to the address given in *QTH Corner*. ZD9GA is now on Gough Is and is Les, ex-ZD9BR, he has been reported on 14,220kHz at 2100 on Saturdays.

There is a Bermudan net to be found at 1400 to 1600 on Sundays in the 14,200-14,225kHz area. The I-DX-ARA net meets on Sundays on 14,300kHz from 1600 to 1630, and on 21,360 from 1630 to 1700. This net is said to be for the passing of information of dx interest.

G3ROM will be on the air from Trinidad in the near future and will be looking for UK contacts. His 9Y4 call is not known yet.

The Liberian RAA is running a West Africa net on 7,060kHz at 0800 every Sunday. So far 9G1, EL, 9L1 and 5V7 stations have been checking in. *NARS News* notes that 5N2AAJ and NARS itself will accept *incoming QSLs only* for Togo and Cameroun stations.

Top Band news

W2BP will be travelling in the Caribbean area from 4 to 25 April and will operate on 160m from **St Martin** (FS7 and PJ7), **Montserrat** (VP2M), **Dominica** (VP2D), **Martinique** (FM7), **St Lucia** (VP2L) and **St Vincent** (VP2S) in the order given and for a few days from each. He will use his own or "borrowed" callsigns and will make special efforts to work into Europe at Caribbean sunset time (2210-2225) at which time he will transmit on 1,803/1,804kHz and listen between 1,825 and 1,830kHz. He will also be on from 0400 to 0600. Equipment consists of a Drake T4X/R4B and inverted-L

aerials. QSLs should be sent to W2BP, 101 Collins Av, Pleasantville, NJ, 08232, USA.

The UK-Australia "season" seems to be past, but G3TR summarizes the fruits of 80 hours operating spread over some 50 evenings as two contacts with VK3CZ, and one each with VK6NK and VK5KO. However, John was heard on a number of occasions when no contacts took place. QSOs with VK6HD have been reported, but the genuine 6HD has confirmed that his only European contacts have been with G2JL, and HB9s CM and TL, all on 20 January. Another rather suspicious character was "HZ1KE" who appeared during the CQ 160 DX Contest. Other interesting calls heard or worked during the event were EP2BQ, HR2HH, OA8V, PY1DVG, VE5QU, VP2AAA, W4BRB/VP7, VP9JW, K5DEG (Texas), W5SUS (Ark.), W0NFL, YN1CW and 8P6DR. Correspondents mention the fact that some UK stations were calling dx stations on their own frequencies—a highly unpopular practice on 160m!

ZD8AY is now GW3UPX, and W1BB says that he made 252 QSOs from Ascension Is during 126 evenings on the air. Stew also reports that signals from KZ5AA, CO2AA, VE7UZ and W9UCW/HK0 have been received by GM3YCB.

Cambridge University Wireless Society, G6UW, has now finalized plans for visiting **Switzerland** (13 to 16 March inclusive) and **Lichtenstein** (17 to 20 March inclusive). Callsigns have been allocated to all but one of the group and are HB9s XIP, XIS, XIX, XIO and XIV—in Lichtenstein they will use the HB0 prefix. There is also a chance that they may be able to operate from 4U1ITU. Activity will be mostly on 160m.

Contests

In January *MOTA* the scores of the multi-operator UK participants in the **1970 CQ WW DX** contests were omitted. They were as follows: **G3KWK** (305,696 points) and **G3VYI** (300,576 points).

The WAB Contests

HF Phone (14, 21 and 28MHz) 12 March.
HF CW 26 March.
LF Phone (1·8, 3·5 and 7MHz) 2 April.
LF CW 9 April.

In all cases from 0900 to 2100. Five points per QSO. Single and multi-band entries accepted. Stations may be worked once per band. The multiplier for UK entrants is the total number of WAB areas (each counts only once), plus the number of DXCC countries (ARRL list) worked. Note that all the British Isles prefixes count as one country for UK participants. Overseas entrants give RS(T) plus serial QSO number (starting from 001) plus WAB book number (if a book holder). UK stations give RS(T), QSO number, WAB area, and book number (again, if appropriate). Note that VE, VK and W/K call areas count as separate multipliers. Logs must reach WAB Contest Manager/G2DSF, 49 Baggrave St, Leicester, no later than 50 days after the contests. Listeners may take part and should log QSOs of stations taking part in the contest only—"CQs" do not count.

The CQ WW WPX SSB Contest

0000 25 March to 2400 26 March

All bands 1·8 to 28MHz—ssb only. Stations exchange report and serial QSO number (starting from 001). Contacts with one's own continent count one point, with others three points. QSOs with one's own country do not count for points but only as multipliers. Contacts on 1·8, 3·5 and 7MHz count double. Final score is total QSO points multiplied by the number of different prefixes worked—each counts only once. There are single-operator, single or multi-band, and multi-operator single and multi-transmitter categories (the latter may only transmit one signal at a time on any one band). Single operators may only operate for 36 hours and may take up to five breaks which must be clearly logged. Multi-transmitter stations must use separate serial numbers on each band. Separate log sheets must be used for each band and summary and log sheets are available from: CQ WPX SSB Contest Committee, 14 Vanderventer Av, Port Washington, LI, NY, 11050, USA. Entries must be posted not later than 15 May.

The International SP DX Contest

1500 1 April to 2400 2 April, 3·5 to 28MHz cw only.

There are single-operator single and multi-band, and multi-operator multi-band categories. Non-Polish stations send RST plus QSO number (starting from 001) and Polish stations RST followed by two letters indicating their powiat (county). Each QSO counts three points, and the multiplier is the total number of powiats worked (each can only be counted once). Separate logs should be used for each band, and a summary sheet with signed declaration that all contest rules and amateur radio regulations have been observed should be included. A list of powiats worked should also be submitted. Logs should be postmarked no later than 1 May and sent to: Contest Manager of PZK, PO Box 320, Warszawa 1, Poland. Those working more than 100 powiats may apply for the SPPA Award by enclosing seven IRCs and an SPPA application form with their log. In the 1971 event UK scores were as follows:

		Points			Points
G3ESF	(All band)	41,712	G3IRM	(14MHz)	5,781
G2DC	"	35,520	**GC5AGA**	"	3,534
G3NSY	(14MHz)	23,976	**GM3MHG**	"	2,400
G3INW	"	13,608	**G3OCA**	(7MHz)	270
G3HCV	"	11,715			
GW3SLY	(All band)	7,656			

Band reports

Many thanks to the following for the information contained in this part of *MOTA*: G2BJY, G2HKU, G2JL, G3GVV, G3HB, G3IGW, G3KDB, G3KYF, G3UKH, GM3UMW, GM3YCB, G5JL, G6GH, G8VG, BRS2098, BRS17567, BRS19682, BRS25429, BRS30694, BRS31301, A6148, A7056, A7555 and A7850.

Stations listed in italics were on cw, the rest on ssb.

1·8MHz. 0200 *HK1QQ*, **0300** *EQ2BQ, HKO/BKX*. **0400** *8P6DR*. **0800** *K5DEG, VE5QU, KG4CS*. **2100** *VK6HD, VK6NK, 4S7DS*. **2200** *PY1DVG, ZD9BM*.

3·5MHz. 0100 VP1BH. **0200** HR1KAS, JX6QO, VP2s VAA, VAM. **0300** *CR4BC*, PZ5BU, 8R1G. **0400** VE7MT. **0500** W7s RS, YPN, *ZC4CB*. **0600** TI2AD, 9Y4T. **0700** K6UA, W6NLZ, W7RM, 9V1VW. **0800** FP8AP, VP1BH, ZLs, 5W1AU. **1100** VE1FO. **1600** DU1FH, JW1EE, VS6DO, K6UA. **1700** ZL4KE etc. **1800** ET3JH, EQ2BI, ZS5LB, 4X4UF. **1900** WB0FFG/TF. **2000** FL8MM, ZB2A. **2100** 3A0FN, 5N2AAF, 9F3USA, 9H3B, 9K2CI. **2200** JY1/B, VP9CY, 5B4IS. **2300** JY1, OA4OS. **2400** 5A3TB (?).

7MHz. 0200 *HC1CS, PYs*. **0600** *LU1AZO*, 5N2AAN.

QTH Corner

A2CAL via DK2SI, U.E.Sick, Rothenburger Str 23, 741 Reutlingen, Germany.
AP2KV O. Ekblom, PO Box 40, Sigtuna, Sweden.
BV2AB W. Eacho Jr, RFD-4-Box 165, Grafton, Va, 23450, USA.
C21GB D. G. Stephens, 63 Church Rd, Roby, Liverpool.
CT2BC via W4SYL, R. A. Burt, 201 Bob White St, Portsmouth, Va, 23701, USA.
EL2CJ via DL2YM, W. Tonn, Sperberweg 27, 29 Oldenburg, Germany.
DA1DW B. R. Chambers, c/o Postmaster, Ft Huachuca, Ariz, 85613, USA.
DA2YU J. C. Eastauch, ESG, RAF Gutersloh, BFPO 47.
FM7AA via WA8TDY, J. C. Kroll, 3528 Craig Dr, Flint, Mich, 48506, USA.
FR7AL G. Boris, Caserne Vermes, St Denis, Reunion Is.
HT0HSM via WA8TDY (see FM7AA).
JD1ACH via JA3GZN, M. Katusai, 1-6-3 Nanamatsu Amagasaki, Hyogo 660, Japan.
JX6RL via LA8AG, H. Eriksen, Ovre Mollenberggt 44B, 7000 Trondheim, Norway.
KB6DA via W6CUF, J. A. Maxwell, Box 473, Redwood Estates, Cal, 95044, USA.
LU1ZC via K4MZU, R. P. Hines, 1807 NE 21st St, Fort Lauderdale, Fla, 33305, USA.
MP4BHD (via DA2YU—see above).
MP4BJI G3PQA, "Trail", Poplar Row, Theydon Bois, Epping, Essex.
VP2GVW via W3GJY, 1403 Chaplin St, Conway, Pa, 15027, USA.
VP2LY PO Box 79, Castries, St Lucia, BWI.
VQ9LW Bob Hope, PO Box 47872, Nairobi, Kenya.
YJ8DS via ZL4NH, 18 Fraser St, Sawyers Bay, Dunedin, New Zealand.
ZD7BB via WA0WKW, M. E. Browne Jr, 2806 S Upham St, Denver, Col, 80227, USA.
ZD9GA via ZS2RM, P. B. Buckley, PO Box 5181, Port Elizabeth, CP, Rep of S. Africa.
ZL4ND/C via ZL2AFZ, G. C. Studd, 48 Nuffield Av, Napier, New Zealand.
5Z4 QSL Bureau RSEA, Box 30077, Nairobi, Kenya.
5Z4KL A. Saunders, c/o Kenya Polytechnic, PO Box 30214, Nairobi, Kenya.
5Z4NM via DL3YU, A. Holz, Lichtenberger Str, 7141 Hof Und Lembach, Germany.
9L1RP R. Parsons, c/o Bata Shoe Co, PO Box 111, Freetown, Sierra Leone.

RSGB QSL Bureau, G2MI, Bromley, Kent, BR2 7NH

0700 *HP1EE, OX5AS, UA0BL, UV0IP* (Wrangel Is). **0800** JAs, KH6RS, KL7HEE, *UA0RA, VE7IG/VE8*, VKs, ZLs' W7CVD (Nev). **0900** *W6s, W7IPM*. **1000** *W6OAT* (599—4-el beam at 170ft). **1800** YA1RG. **1900** *EA9EO*, 5Z4KL, 6W8DY, *9J2XZ*. **2000** *FL8HM, VK3MR, ZD9BM*. **2100** *CT3AW* (QSL to DJ2IB), *JA2XYO, VP2AAA* (QSL to W4DQS), *YK1OR, 5U7AB*. **2200** *UA1KAE/1* (Antarctica).

14MHz. **0700** *ZD9GA*. **0800** KX6DC, VK9s JV, KO, LV, VP8MO, ZLs, 3A0FN (QSL to DL4VA). **0900** KX6TR, ZL4ND/C. **1000** VK9KA. **1100** CE3CZ. **1200** AP2KV, YB0BY. **1500** VQ9R. **1600** XT2AE, 5X5NA. **1700** FR7s AL, AN, KH6BB, VK0s CC, MX, 3D6AB. **1800** VP2MZ, ZD7s BB, SD, ZLs. **1900** VP2SG, YB2AY, ZD9BM, 3B8s AW, DG, 5T5DY. **2000** 5V7GE, 8P6EK. **2100** VP2LAC (QSL to WA9UCE), VQ9AB. **2200** ZD7SD. **2400** K7RAJ, 9G1WW.

21MHz. **0900** *JT0AE*, VS6DO. **1000** *VQ9LW*. **1100** CE3CZ, VS6CY, 9N1MM. **1200** ET3USF (QSL via WA1KSL), VU2AAA, *6Y5SR*. **1300** CR8AK, *EA9EO*, YB0CR. **1400** *G6ZY/CN/M, CX1EK/KP4*, VP2s *AAA*, GVW, LAT. 9H3B (=3A0GB/TA3GB—QSL to VE3MR). **1500** *TG4SR*. VP1TB, 4S7AB. **1600** *ET3USD*. **1700** G3MUL/CE3, W7TNA/MM (*Chamaru* nr. FM7), ZD3D. **1900** FM7AI.

28MHz. **1000** FL8MM. **1100** *FB8XX*. **1200** *CR6AI*, LUs, SV0WOO, *ZS3AW*, 8R1G. **1400** ZD9BM, ZEs, ZSs. **1500** TU2DA, ZD7BB, 5X5NK. **1600** EL2CB, HK3AYR, 5N2ABG.

Many thanks to all correspondents and also to the following for items extracted from their publications: **QUAX** (*G3DME*), the **DXers Magazine** (*W4BPD*), **NARS Newsletter** (*5N2ABG*), **Long Skip** (*Nick Sawchuk*), **CARS Newsletter** (*ZC4RS*), the **West Coast DX Bulletin** (*WA6AUD*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX'press** (*PA0INA/PA0TO*), **DX News Sheet** (*Geoff Watts*), and the **29 DX Club Newsletter** (*VK6PG*).

Please send all items for the **April** issue **to reach G3FKM** not later than **6 March**, and for **May** not later than **5 April.**

Cu in BERU? 1200 11 March to 1200 12 March—**new rules**—see page 785 November 1971 *Radio Communication*.

Propagation Predictions

The seasonal fall of the F2 MUFs in the northern hemisphere starts slowly in March. This, together with the declining phase in the sunspot cycle, will lead to a worsening of conditions on **28MHz**. Contacts will be possible now and again with South America and Africa. Under normal conditions traffic with North America will hardly be possible during the present solar activity. Should there be a sudden rise in solar activity, even if only temporary, traffic might be possible. This might happen between 1430 and 1900gmt.

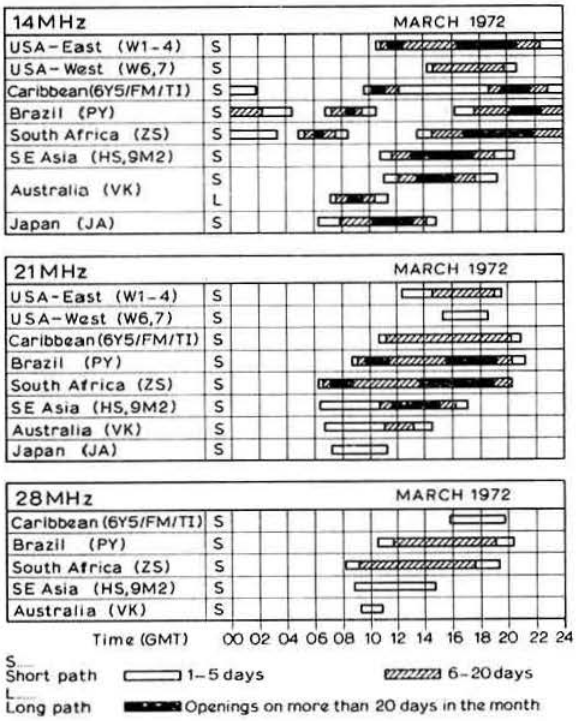
On **21MHz** the decline in F2 MUFs will be noticed as a deterioration of dx conditions. Only South America, Africa and Asia will be heard with certainty.

The decline of solar activity will not be as noticeable on **14MHz** as on 21 and 28MHz. All continents will be heard with certainty on the former band in the coming years of sunspot minimum. During the months of the equinox (March-April, September-October) it will hardly be possible to work on the indirect path. An exception is traffic with Australia, for which this path is often better than the direct one. Contact with Hawaii will be possible from about 0700 to 0930gmt and from 1700 to 2000gmt. As the path lies over the pole and through the auroral zone, contacts will be interrupted.

The **7MHz** band will provide dx opportunities during March, when most of the path lies in darkness. The east coast of N America will be heard on this band about 2200gmt, about the same time as 14MHz closes in this direction, and will be open until shortly after sunrise. Favourable conditions will occur from 0000 to 0500gmt. It will be possible to hear western North America on 7MHz between 0330 and 0600gmt, and under favourable conditions Alaska and Hawaii from 0430 to 0600gmt.

It will be possible to hear the east coast of the USA from about 0030 to 0500gmt on **3·5MHz**. During the latter half of the night this band will be interrupted for local traffic by the dead zone. This can only be favourable for dx traffic with North America at this time.

The provisional sunspot number for January 1972 is 64·6 with the period of greatest solar activity occurring during the last 10 days of the month. Daily variation in the month was between R = 22 (11 January) and R = 135 (24 January). The predicted smoothed sunspot numbers for May, June and July 1972 are 47, 45 and 44 respectively.



COUNCIL PROCEEDINGS

A brief report of the Council meeting held at Society HQ on 6 January 1972

Present: *Mr R. J. Hughes (President, in the Chair), Dr E. J. Allaway Messrs B. D. A. Armstrong, J. O. Brown, E. G. Ingram, G. R. Jessop, W. F. McGonigle, L. E. Newnham, C. H. Parsons, J. R. Petty, W. A. Scarr, R. F. Stevens, G. M. C. Stone, F. C. Ward, E. W. Yeomanson (members of Council), D. A. Findlay, general manager, A. W. Hutchinson, editor.*

Apologies for absence were received from Messrs J. Bazley and A. W. Smith.

The President extended a welcome to Mr J. O. Brown, who had been appointed Honorary Treasurer at the Council meeting held on 5 October 1971.

President's opening remarks

The President said that he hoped his presidential year would be of value to the Society and to this end he wished to bring forward a number of points that he felt needed attention. Among these were:

(i) *Headquarters station*

The society had received a most generous gift from Heath (Gloucester) Ltd, and Council must decide how and when it is to be used, by whom it is to be operated, and whether there should be a HQ Station Committee.

(ii) *Official regional meetings*

During the year there would, no doubt, be requests from regions that Official Meetings should be held and it was desirable that Council should be well represented at these meetings. Further, Council might decide whether they continue to take place at random or whether the frequency of their occurrence should be stipulated.

(iii) *Younger members*

It was necessary for the continued effectiveness of the Society that younger enthusiasts should not only be encouraged to join the Society, but also to take an active interest in its affairs. It was suggested that younger members be invited to serve on almost all committees.

Election of Executive Vice-President

Council's attention was drawn to the necessity for thinking ahead as next year (1973) would be the Diamond Jubilee Year of the Society during which the President would be called upon to attend various additional functions of a prestige nature. This would entail increased reponsibility falling on the Executive Vice-President, who would have to be involved with the routine matters normally referred to the President.

Council agreed that it was desirable to have a President who was held in high esteem and it had been suggested that Dr J. A. Saxton, who was President in 1970, should be invited to be President again in 1973. It was accepted that in this event the Executive Vice-President would probably be asked to serve in that capacity for two or more years.

On this understanding, it was proposed that Mr J. O. Brown, Honorary Treasurer, should be Executive Vice-President for 1972. Mr Brown indicated his willingness to serve, and there being no other nominations, Mr Brown was unanimously elected Executive Vice-President for 1972.

It was proposed and agreed unanimously that an approach be made to Dr J. A. Saxton inviting him to be President of the Society in 1973.

It was also agreed that Dr Saxton be invited to serve on one or more committees (particularly the Finance and Staff Committee) during 1972.

VHF Contests Committee, VHF NFD

Mr Stone reported that a "code of practice" had been discussed with the VHF Contests Committee and conditions which would be for the benefit of all contest entrants would be drawn up.

University College of Wales

Mr Parsons pointed out that the scope of the meeting at which he would speak was now extended and would include the four university colleges, Aberystwyth, Bangor, Cardiff and Swansea. In addition, members of various other societies would be present so that the meeting would be representative of the region.

Finance report

Council considered a memorandum from the Honorary Treasurer, together with financial estimates and proposals.

In considering the proposals put forward in Mr Brown's memorandum, it was agreed that a reduction in the number of Council and Committee meetings would reduce the deficit in 1972. After discussion it was agreed that it should be emphasized that the reduction in committee expenses was an economic necessity and committee chairmen should be requested to reduce expenditure to a minimum.

Mr Ingram asked whether economies would affect the standard of *Radio Communication* and Mr Brown confirmed that it was not the intention to reduce the standard in any way.

A suggestion that there should be a charge for the use of the QSL Bureau was discussed at length. The Finance and Staff Committee was considering the matter and the general manager had arranged to visit Mr Milne in order to obtain further information on the costs of running the bureau.

Mr Brown pointed out that consideration had been given to the expenditure of the Society, but little had been said about increasing the income. It had been agreed that efforts should be made to persuade licensed amateurs who were non-members to join the Society.

Council agreed that the documents put forward by Mr Brown were of great assistance and the President thanked him for his efforts.

Membership and affiliation

It was resolved:

(i) to elect 183 corporate members and 45 associates;
(ii) to transfer 26 associate members to corporate membership;
(iii) to accept reduced subscriptions from seven members;
(iv) to waive the subscriptions of four members on the grounds of blindness or other disability;
(v) to grant life membership to four members;
(vi) to grant affiliation to the Amateur Radio & Electronics Society, University of St Andrews; Lowestoft & District Amateur Radio Society, Nigerian Amateur Radio Society and the Gordonstoun Amateur Radio Society.

Zone C representation

The President reported that he had had discussions with the regional representatives in Zone C and the consensus of opinion was that Mr W. J. Green, G3FBA, should be invited to serve on the Council as Zone C member. The general manager was instructed to invite Mr Green accordingly.

Regional representation

It was reported that there were still four vacancies for regional representatives.

Council accepted a recommendation that Mr M. A. Comrie, GM3YRK, should be invited to serve as representative for Region 14 (West Scotland), and the general manager was instructed to write to Mr Comrie accordingly.

As no recommendations had been received for the other three regions, it was agreed that the previous representatives should be invited to serve again. The general manager was therefore instructed to invite Mr L. W. Lewis, G8ML (Region 6, South Central), Mr P. H. Hudson, GW3IEQ (Region 11, North Wales), and Mr J. Thompson, GI3ILV (Region 15, Northern Ireland), accordingly.

The results of the ballots held for Regions 2, 3, 12 and 17 were reported as follows:

Region 2	*Votes*	*Region 3*	*Votes*
J. E. Agar, G8AZA	24	R. W. Fisher, G3PWJ	42
W. Burton, G8ANQ	11	B. Kennedy, G3ZUL	28
D. M. Pratt, G3KEP	4		
Region 12	*Votes*		*Votes*
G. Grant, GM3UKG	3	L. Hawkyard, G3ZKR	36
A. J. Oliphant, GM3SFH	7	C. Sharpe, G2HIF	15

It was agreed that Messrs Agar, Fisher, Oliphant and Hawkyard be invited to serve as regional representatives for 1972-74.

Dates of Council meetings

Considerable discussion took place on a proposal that as an economy measure only six Council meetings be held this year.

It was agreed that in addition to the present meeting, Council meetings in the first half of the year would be held on Friday 11 February, Monday 10 April and Thursday 1 June. At the June meeting dates would be arranged for the six months to December 1972.

Repeaters
Mr Stone has asked that further consideration should be given to the technical and administrative aspects of the use of repeaters. He reminded Council that details of two schemes had been submitted, one by the Pye Telecommunications Amateur Radio Group, and one by Mr M. Hearsey, G8ATK, President, Farnham & District Radio Society.

A general discussion took place and it was agreed that, in order for the MPT to consider the use of repeaters on the amateur bands, a detailed proposal would have to be submitted. It would be suggested to MPT that the Pye Telecommunications ARG proposals should be used as a basis for discussion in principle, although at this stage the relative technical merit of the two proposals (Pye and Hearsey) had not been evaluated.

It was therefore resolved that request be made to the MPT to grant permission for the RSGB to organise a repeater system based initially on the Pye Telecommunications ARG proposals. A trial period of six months would be suggested and the RSGB Technical and Publications Committee would be asked to submit proposals as to the tolerances to be applicable to the system.

"Radio Communication Handbook"
Mr Stevens reported that there had been a further increase in the cost of binding *Radio Communication Handbook* and it was advisable to increase the cover price of this publication. It was agreed that the cover price should be £3.75 when the present bound stocks were exhausted and stocks of the new binding were available.

ARRL film "Hams wide world"
The ARRL had offered to provide a copy of the film *Hams wide world* on free loan. This film could probably be shown at off-peak times on television and Council agreed that the offer of the film on loan should be accepted.

VHF/UHF Convention
Mr Stone reported that the annual VHF/UHF Convention would be held on Saturday 22 April at the Winning Post Hotel, Whitton. The guest of honour would be Mr D. E. Baptiste of the Ministry of Posts & Telecommunications.

OBITUARIES

Mr G. Adams, G3ULE, ex G6IP
George Adams died on 2 February. He was an excellent cw operator, spending much of his time working 80, 40 and 20m, and was an honorary member of the Basingstoke ARC.

Lt Col N. I. Bower, Royal Corps of Signals (Ret'd), OBE, G5HZ
Norman Bower died suddenly on 24 January. He was active on hf and vhf bands until just prior to his death and his call was well known during vhf contests. During his army career he had operated under VU and VS1 prefixes. He was associated with the Reading Radio Club.

Mr E. Box, G3TJO
Eric Box, a blind operator, died on 10 November 1971 at the age of 45. He was chairman of the Lincoln Short Wave Club and took part in the club's vhf activities as well as being active on 2 and 80m from home. He was also a member of RAIBC.

Mr L. Foden, G3CHJ
Lewis Foden died on 19 December 1971. He was a founder member and keen supporter of Hartlepool ARC.

Mr W. T. Larbey, G2DWV
Mr Larbey, of Tottenham, died on 31 December 1971, aged 63. He was a keen and active member during the days of G6CL.

Mr R. Simpson, G3SSI
Dick Simpson died on 6 February at the age of 79 at Soberton Heath, Hampshire. He was a member of RAIBC and only became interested in amateur radio at the age of 71 when he was housebound by a damaged spine, despite which he persevered to pass the RAE and morse test.

Mr P. Wingfield, G3SKO
Peter Wingfield died suddenly before Christmas, aged 49. He was a very keen home constructor of equipment.

We have also been notified of the deaths of:
Mr E. J. Allen, G5ZD, of Potters Bar, Herts.
Mr L. W. Barrett on 14 November 1971.
Mr John Clue, G3OEU, on 13 November 1971 in Northampton.
Mr C. Coulborn, of St Bees, Cumberland, in May 1971.
Mr Douglas Dugdale, G3AUO/W4, on 8 January in N Carolina, USA.
Mr G. W. Gray on 24 December 1971.
Mr H. Cross, HB9VA, on 23 December at Fallanden, Switzerland.
Mr Joseph McDermott, G3NZ, aged 71.
Mr S. Pennington on 12 October 1971.
Mr E.W. O. Shackle, G3MIS, of Dorset.
Mr E. H. P. G. Wrightson, G2FVO, on 21 January 1972.

YOUR OPINION

The Editor
Radio Communication
Sir—When the Members' Ads scheme was introduced some considerable time ago I was greatly surprised, considering it to be uneconomic. This has proved to be the case and did not require the prudent warning of an accountant to assess the inevitable result.

Some of the Ads in the issue for January 1972 contain 40 words and even at 2½p a word, cheap enough today, would cost £1. Yet a member will get a similar Ad, under the charge to be imposed in April, for the ridiculous sum of 25p. I do not agree with the Council that free advertisements should be one of the advantages of membership. This is nonsense.

I joined the Society as BERS 51 in 1931 (page 236 of the *T & R Bulletin* of February 1931), and during my 25 years in Malaya as an official of the Colonial Posts and Tels Dept, supported and assisted the Society in every way possible, holding office for some years as the official representative for Malaya and Borneo. The welfare of amateur radio, both short and long term, is therefore, to me a *sine qua non*.

In conclusion may I suggest that the Society rid itself of any uneconomic venture, otherwise the future could be bleak indeed.

As a suggestion, a charge of 50p should be levied for all members' advertisements.

Yours sincerely,
J. MacIntosh, GM3IAA

The Editor
Radio Communication
Sir—Reference the letter in the October issue by Gordon Bowhay, G3ZYL, advocating the use of much lower power on the amateur bands than is at present the situation.

We would like to endorse his statement with the following facts. On 11 September 1971, we at 2247 (County of Flint) Sqn ATC HQ held our annual "open day", when parents and friends of our cadets came along just to see what their "lads" get up to.

To a 100ft piece of wire (end-fed, of course) at only 20ft agl we worked ATC Network stations on a frequency of 4,925kHz, as far afield as Dumfries, Berwick-upon-Tweed, Southsea, Portsmouth, Newbury (Berks) and a host of South Wales stations; all this on a.m. using a very ancient 1154/M transmitter and 1155 receiver running at a mere 25W to an equally ancient carbon mic, and you should know the quality (if that is the correct term) of the modulation of the 1154 tx.

On the same day we were using our KW "Vanguard" and Drake 2B receiver using the callsign GB3ATC. We had erected a very efficient ground plane for specific use on 20m but unfortunately there was a contest on the same day. However, we put calls out right, left and centre and the replies we received back were "Sorry, not Europe". The Eastern Europeans and some Far East stations were saying "Sorry, not G". We did manage to get a kind gentleman in W-land to give us just a quick report which was Q5 and S7, VE6 gave us Q5 and S5, and SM, OH, OE, OK, OZ and all zones of Italy gave us Q5 and S9+++.

You will appreciate that the "Vanguard" only runs at 50W and is also amplitude modulated, so the object of this letter is merely to illustrate that 1kW is not really needed if amateur radio is to be what it used to be many years ago, ie for experimental purpose. The aerial

and the earth is more important than the massive power outputs one reads about these days. The log book at GB3ATC and the ATC callsign VQ5X49 will prove this to any one who cares to inspect it.

Yours faithfully,
H. D. Fennah, VQ5X49
J. C. Carroll, GW3KCC

The Editor
Radio Communication

Sir—I read with interest the opening paragraph of G3FKM's *MOTA* in the October issue, especially the phrase "There are absolutely no frequencies where amateurs have priority". I hope at last that Top Band users will realize this.

May I give an example of Top Band interference caused to the Maritime Mobile R/T service (*not* fish-phone, please!) which, I hasten to add, is by no means an isolated case.

About a month ago the vessel on which I was serving returned to the UK after an 11-month voyage, and naturally those on board wanted to make calls to their relatives and friends ashore. After contacting the PO radio station at Lands End with no trouble at all, I proceeded to place details of the calls. So far so good, but at the crucial moment when we were being connected to the shore subscriber, up came a CQ bang on the frequency. Result—a necessary change of frequency for both ship and coast station (as the frequencies are "paired") and a consequent delay of nearly an hour waiting for ships already on the new frequency to clear their calls first.

I never stayed around to find out who the culprit was, as his CQ dragged on and on ad infinitum, by which time I had QSYd.

So long as you have authorities that say "shared", you will always get a small minority who will take it to mean "priority", just to be awkward and downright stupid.

I sincerely hope that what I have said will ring home in the ears of those concerned, and that they will, in future, take a careful look around the band before putting out their full power to call a station just down the road. Better still, do away with Top Band altogether, and then the amateurs would not be subject to so much complaint, and the professional communicators would be able to carry on without any hindrance.

Oh Lord, what have I started now!

Yours faithfully,
Radio Officer Richard J. Ware, BRS32457

Looking ahead

18 April—"Dud" Charman, G6CJ, "Aerial Circus" at Lichfield ARS.
22 April—VHF Convention.
5 May—RAOTA Reunion.
20 May—BARTG Convention.
25 June-1 July—Echelford ARS "At Home" (GB3HCW), Hanworth Carnival, Hanworth Airpark, Middx.
26-27 August—Harlow & DARS at Harlow Town Show, Town Park, Harlow.
23-24 September—NW Amateur Radio Convention; University of Lancaster.

Special Event Station

University of Keele, 22 April
In connection with the 21st Anniversary celebrations of the University of Keele in April, the university's amateur radio society, G3UOK, in co-operation with the North Staffs ARS, will operate a station on 80 and 20m using ssb, and another on 2m using a.m. on 22 April. Special QSL cards will confirm all QSOs.

MOBILE RALLY NEWS

White Rose Mobile Rally, 2 April
Easter Sunday family occasion at Lawnswood High School, Junction of A660 (Leeds-Otley Road) and A6120 (Leeds Ring Road), a change of venue from previous years. Talk-in stations on 160 and 2m, callsign G3XEP/A. All the usual attractions. Further information from R. Short, G3YEE, Bradford 664220, or E. Lawley, G8EHV, QTHR.

Hull & D ARS Mobile Rally, 28 May
This, the Hull society's first mobile rally, will be held in the grounds of the East Riding College of Agriculture, on the A1079 (York to Beverley Road) at Bishop Burton, near Beverley. Talk-in stations on 160 and 2m. Attractions and activities for the whole family: sports, treasure hunt, technical lectures, barbecue tea and all the usual rally attractions. Organized by G3AGX assisted by G3OIB.

Anglian Mobile Rally, 18 June
At the Suffolk Show Ground, Ipswich, once more, it will take its usual form. Talk-in on Top Band, 80m and hf bands, and on 2 and 4m. All enquiries to D.W. N. Thomas, G3ZLN, 9 Burlington Road, Ipswich, Suffolk IP1 2EU.

RAYNET

by S. W. LAW, G3PAZ*

A recent letter from a transmitter with a pre-war callsign brings to mind the famous political adage "The inevitability of gradualness". The correspondent, having spent many years away from this country and collecting in his travels a very handsome handful of reciprocal callsigns, has now returned to the UK and discovered something called "Raynet". As an intelligent and enthusiastic amateur he writes asking for details and offering his services to what he conjectures is a worthwhile organization. Needless to say, we are very glad indeed to accept him as a member and trust that he will find us upright and of good report.

What is interesting in the foregoing is that we who have worked for a number of years to bring things to the present stage of development may fail to realize the degree of growth over the years and the consequent picture presented to the unwittingly uninformed observer. Thus we have yet another argument in favour of losing no opportunity of presenting our aims to all and sundry. Is it not strange that an active amateur should not have heard Raynet discussed on the dx bands over a number of years? It is unfortunately true that we have our detractors, but many a good point is often gained by a negative attitude giving rise to positive thinking. So do not hide our light under the proverbial bushel.

Early warning
Only five months before the RSGB Mobile Rally at Woburn Abbey, Raynet will be there once more and in view of the success of our efforts in 1971 it behoves us to make a bold note in our diaries to make 1972 an even better show. Need we reiterate our comments of last year that an enormous amount of work was done by a mere handful of members? We are sure that there are many who would volunteer even one hour to assist in some way to ease the burden of manning the tent or of stewarding the incoming Raynet mobiles to the appropriate section of the car park. Many hands make light work, so do not leave it to the other fellow to do it all, but get in touch with the Raynet Committee as soon as possible with your offers of exhibits or assistance and any helpful suggestions to make the Raynet section of the rally an even greater success than last year.

Floods
At the time of writing there is no news of the position with regard to the floods in the Avon valley. By all appearances there will be a great deal of work involved in the aftermath when the water recedes. No doubt the groups in the area are well prepared for any call-out from the authorities. As to the SE London/N Kent combine it is known that a stand-by takes place whenever the elements combine to form a dangerous situation from the Thames estuary to the London area. In this they are fortunate in having our honorary committee chairman, G3BPT, in such a position that an early warning can be passed along in ample time to arrange for a quick exercise to be set up to check that all systems are ready to go at the drop of a switch. We trust that the predicted trouble in the second week of February will have been easily contained by the time these words are being read.

Honorary registrations secretary: **Mrs Jane Balestrini, "Merrivale", Willow Walk, Culverstone, Gravesend, Kent.**

*130 Alexandra Road, Croydon, Surrey, CR0 6EW.

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These slow morse practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the honorary organizer, Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Sundays

Clock time	Callsign	MHz	Town
0900	G3KEP	1·910	Bingley, Yorks
0930	G3HZL	1·940	Isleworth, Middlesex
0945	G3YRO	1·860	Fareham, Hants
0945	G3USK	1·975	Mablethorpe, Lincs
1000	G2FXA	437·000 to north	Stockton-on-Tees
1015	G3CGD	1·875	Cheltenham
1030	G2FXA	437·000 to south	Stockton-on-Tees
1030	G3NPB	1·875	St Ives, Cornwall
1030	G3ZNW	144·520 to east	West Molesey, Surrey
1100	G2FXA	1·900	Stockton-on-Tees
1100	GW3UMB	1·880	Colwyn Bay
1200	G3HVI	1·890	Stoke-on-Trent
1200	G3GNS	1·910	Weston-super-Mare
1330	G3FWW	1·880	Burnham-on-Sea, Soms
1330	G3XDV	1·190	Canterbury, Kent
1330	G3WDS	1·975	Carlisle
1400	G3XWQ	1·975	Canterbury, Kent
1400	G3XGJ	1·830	Huddersfield, Yorks
1930	G3YFO	144·19 to south	Burnham, Bucks

†Alternately

Mondays

Clock time	Callsign	MHz	Town
1800	G3SWR	1·980	Birmingham
1830	G3NCZ	1·920	Blackburn, Lancs
1830	G3RXH	1·910	Skipton, Yorks
1900	G3WGU	1·880	Bispham, Lancs
1900	GC2FMV	3·600	Jersey, CI
1900	G3YJA	1·920	Coventry, Warks
1900 ††	G3ZBO		Preston, Lancs
	G3WFY	1·850	Thornton Cleveleys
	G3YEI		Fleetwood, Lancs
1900 †	G3YED	145·640	Leeds, Yorks
	G3YEE		Bradford, Yorks
1930	G2ABC	144·050 omni-directional	Woodford, Essex
1930	G3TLF	1·930	Hull, Yorks
2000	G3XWZ	1·910	Mansfield, Notts
2000	G3KAN	1·990	Northampton
2000	G3IBJ	1·910	Southampton, Hants
2015	G3BIA	1·910	Teddington, Middlesex
2030 †	G3YEB	1·915	Harlow, Essex
	G3PRN		
2030	G3JHM	70·050	Worthing, Sussex

†Alternately

Tuesdays

Clock time	Callsign	MHz	Town
1100	G3EBU	1·952	South Woodham, Essex
1800	G3XDV	1·910	Canterbury, Kent
1900 †	G3UFO	1·980	Wirral, Cheshire
	G3XAM		
1900	G3XWQ	1·975	Canterbury, Kent
1930	G3SWP	1·850	Doncaster, Yorks
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930 ††	G3XUD	1·910	Leeds, Yorks
	G3YEE		Bradford, Yorks
1930	G3XGY	144·240 Omni-directional	Weston-super-Mare
1930	G3ZUM	144·144 to south	Iver Heath, Bucks
2000	G3TUW	145·200 to south-east	Banbury, Oxon
2000	G3UPA	1·850	Meriden, Warks
2000 ††	G3TIK	1·980	Stevenage, Herts
	G3KSS		
	G3OVT		
2000	G3FWW	1·880	Burnham-on-Sea, Soms
2000	G3WGD	1·860	Leicester
2000	GM3PIP	3·590	Mintlaw, Aberdeen
2030	G3HZL	1·845	Isleworth, Middlesex
2030	G3ROE	1·915	Harlow, Essex
2030	G3RB	1·975	Whitley Bay, Nth'land
2045	GM3CRY	3·590	St. Andrews, Fife
2100	G4RS	1·865	Blandford, Dorset
2200	G3HZM	1·925	Manchester

†Alternately

Wednesdays

Clock time	Callsign	MHz	Town
1830	G2FXA	1·900	Stockton-on-Tees
1900	G3YPZ	28·700	Harlow, Essex
1930	G3WGU	433·500 to south-east	Bispham, Lancs
1930	G3YFO	144·19 to north	Burnham, Bucks
2000 ††	G3AJX	1·925	Winchester, Hants
	G3TWP		
	G3YSK		
2000	G8QU	1·970	London, N22
2000	G3JHM	70·050	Worthing, Sussex
2000	G3VCV	145·020 to north-east	Wyton, Hunts.
2030	G3KGU	1·915	Theydon Bois, Essex
2100	G3HVI	1·890	Stoke-on-Trent

†Alternately

Thursdays

Clock time	Callsign	MHz	Town
1800	G3SWR	1·980	Birmingham
1830	GW3VBP	3·590	Barry, Glam
1830	GW3UMB	1·880	Colwyn Bay
1830	G3NC	1·968	Swindon, Wilts
1900 ††	G3ZBO		Preston, Lancs.
	G3WFY	1·850	Thornton Cleveleys
	G3YEI		Fleetwood, Lancs
1900	G3WGU	1·880	Bispham, Lancs
1915	G3ZNW	144·520 to north	West Molesey, Surrey
1930	G3GNS	1·910	Weston-super-Mare
1930	G2ABC	145·500 omni-directional	Woodford, Essex
2030 †	G3SJE	1·875	Harrow, Middlesex
	G3GC		
2030	G3YMJ	1.915	Harlow, Essex
2100	G4RS	1·865	Blandford, Dorset
2100	GW3XNI	1·930	Crosskeys, Mon

†Alternately

Fridays

Clock time	Callsign	MHz	Town
1800	G3XDV	1·910	Canterbury, Kent
1830	G3NCZ	1·920	Blackburn, Lancs
1900	G3IQF	1·980	Marlow, Bucks
1900	G3NPB	1·875	St Ives, Cornwall
1930	G3PQF	1·825	Farnborough, Hants
1930	G3ZUM	144·144 to south	Iver Heath, Bucks
2000	G3EEL	1·980	Peterborough
2000	G3WGD	1·860	Leicester
2000	G3ZOD	1·925	Stockport, Cheshire
2015	G3SAZ	1·845	Ashford, Middlesex
2030	G3JHM	70·050	Worthing, Sussex

†Alternately

Saturdays

Clock time	Callsign	MHz	Town
0930	G3YZZ	3·590	Maidenhead, Berks
1000	G3PLE	1·820	Stourbridge, Worcs
1100†	G3ZOQ	28·350	Leyland, Lancs
	G3ZRE		
1300	G2FXA	1·900	Stockton-on-Tees
1400	GC2FMV	3·600	Jersey, CI
1600	G3ZOD	1·925	Stockport, Cheshire
1730	G3TNF	1·980	Gateshead
2000	G3KPO	1·980	Peterborough

†Alternately

G3BZU morse proficiency transmissions at 20, 25, 30, 35 and 40wpm are made at 1900 gmt on the first Tuesday of each month on a frequency of 3·520MHz. For 100 per cent copy at 20wpm a certificate is awarded, and endorsement stickers are available for 100 per cent copy at the higher speeds. A charge of 10p or two IRCs is made for the basic certificate, and 2½p or one IRC for each endorsement sticker claimed. All claims should be sent to—The QRQ Manager, RNARS, HMS *Mercury*, Leydene, Petersfield, Hants.

CONTEST NEWS

Rules for VHF NFD 1972

There have been several changes in the rules this year and entrants are urged to read them carefully, both now and just before the contest. The RSGB is organizing the IARU Region 1 VHF/UHF contests in 1972, and the VHF Contests Committee looks forward to receiving large entries—see Rule 19. Entrants for the Fixed Station sections of the IARU event should send their logs to the address given in Rule 20.

1. Duration
From 1800gmt on 2 September to 1800gmt on 3 September.

2. Bands
The 70MHz, 144MHz, 432MHz and 1,296MHz bands only will be used.

3. Eligible Entrants
Any RSGB member or group of members operating within the British Isles may take part.

4. Operators
(*a*) Operators of stations taking part in the contest must each hold a current British Isles amateur (sound) licence and must be fully paid up corporate members of the RSGB at the time of the contest.
(*b*) Points may not be claimed for contacts with stations operated by, or using the callsigns of, operators of the competing station or group of stations.

5. Power supplies
Stations may not use public supply mains. Power for all equipment must be derived from an on-site portable generator or battery.

6. Stations
Each competing group will be permitted a maximum of four stations, each using a different callsign. Only one station may score points on a given band. There is no restriction on the way in which the bands are divided between the stations (eg 70MHz and 432MHz on one station, 144MHz on another, to form a two station entry). Special event callsigns (eg GB) may not be used.

7. Sites
All the stations forming one entry must operate from the same site. The Field Day site is defined as a circle of 1km radius centred on the operating position of any of the stations.

8. Groups
Any two groups may combine their score to form one entry, subject to the requirements of Rules 6 and 7.

9. Setting-up time
All equipment, including aerials, must be installed on the site (as defined in Rule 7) during the 24 hours preceding the contest or during the contest. The site may not be used for any transmitting activities by the group or member during the five days before this time.

10. Power
The dc input power (as defined by the terms of the licence) shall not exceed 25W to any rf stage of the transmitter, except on 1,296MHz where the licensed power may be used.

11. Scoring
(*a*) On the 70, 144 and 432MHz bands, contacts will be scored as follows:

km	points	km	points
0–50	1	200–250	9
50–100	3	250–300	11
100–150	5	300–350	13
150–200	7	and pro rata	

Contacts on boundaries between scoring rings score **low.**
(*b*) Band multipliers will be as follows: 70MHz–2, 144MHz–1, 432MHz–6.
(*c*) On 1,296MHz scoring will be one point per kilometre.

12. Contest exchanges
(*a*) Contestants must exchange RS or RST reports followed by a serial number. Serial numbers start at 001 on each band and advance by one for each contact.
(*b*) Contestants must send and log both QTH and QRA Locator. The QTH must be a point which is identifiable on the Ordnance Survey Ten-mile Map, or a distance in kilometres and a bearing from such a point. The distance must not exceed 25 kilometres and should be given to the nearest kilometre. The QRA Locator is the standard location fixing system.
(*c*) The QTH given on 1,296MHz must differ in form from that given on the other bands, eg a location given as "10km north of Marlborough" on 432MHz could be given as "8km south-east of Swindon" on 1,296MHz.

13. Contacts
(*a*) Only one contact may be made with a given station (ie callsigns that are fixed, /P, /A or /M, or the same set of equipment used under a different callsign, all count as one station). If a station that has moved location is contacted a second time, only the higher scoring contact may be claimed.
(*b*) Repeat contacts must be clearly marked as such and the points column left blank.
(*c*) The 1,296MHz station may operate on any other band for the purposes of arranging a contact, but the exchange of contest information must take place on 1,296MHz only and may not be interrupted by recourse to another band.

14. Calling CQ
Contestants are asked to indicate on which band they are calling CQ and are strongly urged to state their tuning intentions, and to call CQ in the correct frequency zone. 1,296MHz stations operating on another band (Rule 13c) should call "CQ for 23cm only".

15. CW segments
Any station operating on modes other than A1 or F1 in the segments 70·025–70·1, 144–144·15, 432–432·1 or 1,296–1.296·15MHz is liable to be disqualified.

16. Defective signals
Stations that persistently overmodulate, radiate key clicks or poor quality signals, or transmit excessive harmonics, are liable to disqualification or loss of points. Monitoring stations will be in operation.

17. Proof
Proof of contacts may be required.

18. Disputes
The decision of the Council of the RSGB is final in any cases of dispute.

19. Logs
(*a*) Logs must be submitted on RSGB Contest Log Sheets. Separate logs must be submitted for each band. Groups wishing to have their logs forwarded to the IARU Region 1 VHF Contest should enter the distance in kilometres in the points column and the score as Rule 11 on the rear of the sheet.
(*b*) Entrants must keep their own log records in accordance with the licence requirements.

20. Entries
(*a*) Entries must be postmarked not later than 18 September 1972.
(*b*) Entries must be marked VHF NFD in the top left-hand corner of the envelope and addressed to: The Chairman, VHF Contests Committee, 20 Harcourt Road, Wantage, Berks.
(*c*) A cover sheet (Form 427) must be made out for each band and must show the callsigns of all operators.
(*d*) In addition to the Forms 427, a special summary sheet must be forwarded, even by single-band entries. The declaration must be signed by one member of the group, who will be considered responsible for the entry.

21. Awards
At the discretion of the Council, the Surrey Trophy will be awarded to the overall winners, and Certificates of Merit will be awarded to the overall runner-up, the leading entry from each country and the highest scoring station on each band.

NFD 1972

The NFD rules, published on pages 107 and 108 of February's *Radio Communication*, contain a number of changes introduced as a result of the NFD questionnaire which was sent to all interested groups and societies last summer. In particular, Rule 6b no longer restricts single station entries to three bands, but allows operation on all six bands if so desired. Rule 8 now permits the use of any aerial providing that the height restriction is complied with. The time limit for the erection of stations has been relaxed to bring it into line with the requirements of the General Rules. There are also other changes. It is to your advantage to read the revised rules carefully **now.**

Second 1·8MHz Contest 1971 Results

Over 160 stations from all parts of the British Isles participated in this popular five-hour cw contest held on 13-14 November although only 49 sent in their entries. Conditions into the continent of Europe were favourable for most entrants, and contacts were made with DJ, OE, OH, OK, OL and PA0. ZD8AY was worked by a few.

Fred Curtis, G3SVK, made 150 contacts from a /A location in Gilwell Park, Essex, to win this event by a substantial margin over the runners-up Peter Lamb, G3VRW, and Mike Whitaker, G3IGW. G3SVK's log included 17 contacts with OK/OL, nine with GM, and eight with GW, and the station consisted of a Codar AT5 feeding a half-wave dipole at 65ft with an HRO receiver.

In the first leg of the Maitland Trophy competition, GM3SSB leads the field with GM3FXM not far behind. Chris Milner, G3ZJK, heads the "Under 18" section by a clear margin over David Gething, G3XZK in second place.

Some entrants will note that their claimed score has been adjusted—downwards! This is because of inaccuracies in their logging of callsigns and report/serial number groups. On the other hand, a misprint in the published rule relating to the scoring has meant an increase in the claimed score of those who did not hear the corrected version go out over the GB2RS service. While most entries were easy to read and on standard paperwork, a few were presented on odd scraps of paper with the declaration hastily added at the bottom of the last page. Entrants are reminded that to make life easier for them and the adjudicator, supplies of contest paperwork are available from RSGB HQ. Please send the general manager a large stamped addressed envelope and a clear instruction asking for hf contest cover-sheets and log-sheets. Entrants who do not check for duplicate contacts should note the provisions of General Rule 11 (e) on page 42 of January's *Radio Communication*.

Comments: "Would like to see 2300gmt as a starting time"—G6BQ. "Congrats on the timing—much more respectable for the over 18's!"—G3JEQ. "A lot of poor notes"—G3TR. "Why is QSL sent when R is so short?"—G3JLE.

The Victor Desmond Trophy will be presented to G3SVK, and Certificates of Merit will be sent to G3VRW, G3IGW and G3ZJK.

D.T.

Posn	Callsign	Points	County	Posn	Callsign	Points	County
1	G3SVK/A	810	EX	26	G6UW/A	448	CE
2	G3VRW	714	LE	27	GW3JI	408	CV
3	G3IGW	658	YS	*28	G3ZJK	402	GR
4	G3ZPC	651	DH	29	G3JLE	395	OX
5	GM3SSB	645	LK	30	G3WSN	390	EX
6	G3WDF/A	608	EX	31	G3XZK*	366	GR
7	GM3FXM	606	FE		GM3YOR	366	FE
	G6BQ	606	KT	33	G3WGV	363	DT
9	G3JEQ	603	SY		G3JVJ/A	363	WK
10	G3PDL	597	LN	35	G8RZ	312	CD
11	G3YMH	588	MX	*36	G4AAW	309	SY
12	G4AR	568	SY	37	G3FJE/A	306	BD
13	G3MXJ	567	BS	*38	G4ALG	274	BE
14	GM3UKG/P	561	BF	*39	G4ANS	260	NM
15	G3TR	557	SY	40	G3LCH	249	LD
16	G3VUM	547	LE	41	G3VLX	234	KT
17	G3GVA	543	WK	42	G3ZFC	230	CH
18	G2DC	534	HE	43	GM3ZRT	218	AY
19	G3WTA	530	ND	44	G3ZNH	210	WE
20	G3HZL/A	504	BS	45	G3FVW	186	YS
21	G3RZP	492	EX	46	G3THY	183	EX
22	G3TAA	491	LD	47	G3YMC	174	LN
23	G3XWZ	482	NM	48	G8QZ	150	DY
24	GM3NCS/A	472	MY	49	G3ZME/A	126	SE
25	G3GMK	456	HE				

Checklogs received with thanks from G3WDS, G4VF and GM3AWF

*Under-18 section

December 144MHz Fixed Station Contest Results

It is rare to find entrants in unanimous agreement with the timing of the contest and the propagation conditions prevailing. However, 5 December produced excellent north-south propagation within the UK and the 89 entrants were not slow to take advantage of this during the eight-hour period.

Roger Taylor, G8BBB, again takes first place with over 150 contacts. The use of ssb contributed to his clear lead over the runner-up, G3UER. The best dx was also recorded on ssb by G3NAS to DC6EQ at 625km during the first hour.

Certificates of merit go to G8BBB and G3UER. Check logs were received from G2UJ, G4ARN, G6PG, G8FCV/A. GW8ERP/P; and from BRS15822, BRS28005 and A6729 (whose scores will be credited to the Listeners Championship).

W. J. M.

Posn	Callsign	Claimed score	QSOs	County	Best dx	km
1	G8BBB	984	154	CE	DK1BM	480
2	G3UER	844	108	YS	G8DUO	285
3	G3NHE	822	113	YS	F6BTH	425
4	G6GN	806	121	GR	GD2HDZ	320
5	GW8EQH	774	111	FT	G8ECI/A	416
6	G8DMY	713	122	WE	G8EGO	254
7	G4AGE	673	90	DY	G3TIR/P	258
8	G3ZPZ	668	86	DY	GM8BRM/P	502
9	G8CVD	655	130	WK	G8CCO	240
10	G8BXC/A	643	87	EX	G8BVR/P	356
11	G8CUL	641	96	BE	G8ERQ	252
12	GD2HDZ	634	65	IM	G3WZT	444
13	G3NAS	560	83	SD	DC6EQ	625
14	G3ZMD	559	104	BD	GC2FZC	320
15	G4ABX	534	105	WR	G8FAY	214
16	G8EGO	494	77	YS	G2JF	335
17	G8DTQ	482	97	SY	G8ERQ	310
18	G8DUO	464	80	HE	G8BNE	329
19	G8DKN	451	78	GR	GD2HDZ	300+
20	G3OHH	436	61	SD	G3DAH	290
21	G8EYL	433	82	WK	G8ECI/A	208
22	G8CUT	428	70	EX	GW8ERP/P	282
23	G8CRN	417	75	CE	GD2HDZ	360
24	G4AJE	412	85	NR	F1BJB	350
25	G8BQA	409	82	KT	G8BNE	294
26	G8DDW	374	72	LD	GD2HDZ	410
27	G8BNE	345	50	YS	G8DUO	329
28	G8FBL	334	65	SD	G3DAH	250
29	G8DTA	323	65	GR	GD2HDZ	300
30	GC2FZC	321	35	GY	G2XV	350
31	G8DHA	318	63	GR	GD2HDZ	290
32	G3YNC	314	80	LD	G8DNK	270
33	G3ZKH	310	47	YS	G6GN	200+
34	G8AWA	305	50	BE		
35	G3YED	296	51	YS	G2JF	345
36	G4ANP	293	60	YS	G6RH	250
37	G3WHK	284	72	SY	G8DNK	276
38	G2XV	274	46	CE	GC2FZC	350
39	G8EIK	272	54	HF	G8DNK	220
40	G3FEV	265	57	BE	G3KMS	238
41	G8BCG	263	67	LE		
42	G8DNF	253	54	SX	GW8ERP/P	310
43	G3BPM	251	50	MX	G8DNK	305
44	G8EEM	250	35	YS	G2JF	395
45	G8CWX	249	40	NM	G8EPZ	255
46	G3XTT	235	59	NR	G8BNE	191
47	G4ANS	234	40	NM	G8DWD	239
48	G8DWD	232	40	KT	GW8EQM	280
49	G8DKR	216	47	GR	GD2HDZ	300+
50	G4AJC	211	36	KT	PA0BGO	395
51	G8EFR	210	53	SD	G4ARN	210
52	G8DYJ	203	35	ST	G3DAH	280
53	G8BKR	193	33	GR	GD2HDZ	330
54	G8CIG	191	45	SY	G8EGO	296
55	GW8EQJ	190	41	FT	G8DTQ	265
56	G8ETV/A	189	43	WR		
57	G8DXS	182	35	YS	G6GN	243
58	G3ZUM	175	71	BS	GW8ERP/P	255
59	G3NHZ	174	38	LD	F3DJ	355
60	G8DFO	173	34	LN		
61	G8CQW	171	48	LR	GD2HDZ	280
62	G2HH	170	26	WE	F6BQH	310
63	GW3NNF	169	21	AG	G4ANT	394
64	G2WS	155	18	ST	F6BQH	332
65	G8ERQ	148	24	YS	G8DTQ	319
66	G5VU	144	23	NM		
67	G3UFB	140	59	LD	G3UER	224
68	GM8DMZ	130	34	AY	GM8BRM/P	282
69	G3WJG	120	46	MX	F2YT	215
70	G3THY	119	40	EX	GC2FZC	290
71	G3EQQ	117	32	KT	G8COG/P	200+
72	G8BDJ	111	25	SX	G8ABP	235
73	G8DNQ	110	21	LE	G8AWM/P	212
74	G3LCH	108	28	LD	G3NHE	200
75	G4APL	104	25	SY	GW8EQH	290
76	G3FPK	103	22	SY		
77	G3ZKE	102	53	LD		
78	G3NUE	100	30	WR	G3ZKH	180
79	G8DJE	99	36	EX	G3UER	250
80	G4AEQ	95	20	LE	G6GN	230
81	G3XFW	93	21	ST		
82	G8BNJ	92	29	GR	G3KMS	195
83	G2FNK	74	31	MX	GW8ERP/P	260
84	G3ZOD	48	17	CH	G8DMY	210
85	G8CDP	46	17	YS	GD2HDZ	210
86	G8EIA	22	10	YS	GD2HDZ	220
87	G8DVA	12	7	YS	G8CZY	80
88	G3MGL	11	8	SX	G8DRW/P	52
89	G4APA	10	10	KT	G8DNF	45
	BRS28005	654	88	SX	GD2HDZ	465
	BRS15822	191	45	LD		
	A6729	125	31	NR	G8ERQ	175

70MHz Cumulative Activity Contest

It was obvious that tv and flat conditions caused the lack of logs entered, although there were pockets of high activity, notably North London, South Yorkshire and the Hampshire coast. The winner, G3KSU/P, with the most points and contacts, beat the immaculately logged score of G6HD into second place; these two will receive the appropriate certificates. A check log from G3ZLQ/P is gratefully acknowledged.

Posn	Callsign	Points	Contacts	Best DX	km
1	G3KSU/P	216	60	G3OHH	280
2	G6HD	165	56	G3RLE	288
3	G3WOS/P	143	47	G4AGQ	195
4	G3HBG	97	33	G3OHH	270
5	G3RDQ	85	23	G3TSJ	224
6	G3WJG	80	45	G3KSU/P	113
7	G3VHH	64	32	G3KSU/P	
8	G8LY	63	27	G3RLE	318
9	G3ZKE	50	32	G3KSU/P	120
10	G4AGQ	34	8	G3RDQ	224

G3OHH disqualified (rule 14(i))

432MHz Contest Rules

When: 1800–2400gmt on 6 May to 0600–1800gmt on 7 May.

All entries and check logs to: VHF Contests Committee, c/o G3ZGO, 18 Eastbourne Ave., Acton, London W3 6JN.

The following General Rules will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 11–24.

144MHz Contest Rules

When: 0900–1700gmt 21 May 1972.

All entries and checklogs to: VHF Contests Committee, c/o G3XHU, 5 Birkdale Drive, Oakham Green, Tividale, Warley, Worcs.

The following General Rules will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8a, 9a, 10a, 11–24.

SSB Field Day, 8-9 July 1972, Rules

In view of the criticisms directed towards last year's mixed mode High Power Field Day, the HF Contests Committee has decided to restyle this year's event as an SSB Field Day. It should be emphasized that the contest is still of an experimental nature, and hence its future depends entirely upon the support which it receives.

1. **The General Rules for HF Contests,** as published in the January 1972 issue of *Radio Communication*, will apply.
2. **When.** From 1700gmt on Saturday 8 July to 1700gmt on Sunday 9 July 1972.
3. **Eligible entrants.** Any group of RSGB members resident in the British Isles, or any affiliated society in the British Isles or overseas. This is a multi-operator contest as provided for in General Rule 5b.
4. **Stations.** Each group may operate one portable station, as defined in General Rule 4b, on any or all of the 3·5, 7, 14, 21 and 28MHz bands. Simultaneous operation on two or more bands is not allowed.
5. **Power.** The rf output peak envelope power must not exceed 400W.
6. **Contacts.** SSB (A3a or A3j) only.
7. **Scoring.** Three points for each completed contact with a fixed station, and six points for each completed contact with a portable station.
8. **Awards.** Certificates will be awarded to the three leading groups, and to the fixed station whose check log shows that it gave the highest number of contacts to entrants.
9. **Entries** must be addressed to HF Contests Committee, c/o S. V. Knowles, G3UFY, 32 Nursery Road, Thornton Heath, Surrey.

80m Low Power Contest Rules

1. **The General Rules for HF Contests,** as published in the January 1972 issue of *Radio Communication*, will apply.
2. **When.** 0900gmt to 1600gmt on Sunday 9 April 1972.
3. **Contacts.** CW (A1) only in the 3·5-3·6MHz band. The location of the station must be sent.
4. **Scoring.** Max power to pa 0·5 1 2 3 4 5 watts
   Points 100 50 25 15 10 5
5. **Logs.** Column (5) must be headed "Location as received", and (6) "My power". Entries must be addressed to HF Contests Committee, c/o D. Thom[illegible]S). 6 Bracken Close, Copthorne, Crawley, Sussex. RH10 3QE.
6. **Trophy.** The 1930 Committee Cup will be awarded to the winner.

Grafton's Annual "G2AAN" Top Band Contest Rules

When: Phone a.m. only: 2230-0100gmt 18-19 March 1972.
CW only: 2130-2400gmt 25 March 1972.
Phone ssb only: 2130-2400gmt 1 April 1972.

Rules: One point per contact, any station may be worked only once in each section of the contest. RST (or RS) reports shall be exchanged, followed by a serial number starting anywhere between 001 and 100 increasing by one throughout the whole contest. All reports to be acknowledged. Competing stations shall call "CQ GRS" on cw "CQ Grafton a.m. contest" on a.m. phone, "CQ Grafton ssb contest" on ssb phone.

Logs bearing the usual signed declaration should be sent to C. E. Heywood, G3KEB, 23 Richmond House, East Street, London SE17 2DU, and must be postmarked no later than 12 April 1972. Blank log sheets and copies of the rules are available from G3KEB on receipt of an sae.

Certificates will be awarded to the two highest scores in the whole contest and further certificates to the winners of each section.

Please ensure that your address is on your entry.

Contests calendar

11–12 March—BERU
18–19 March—ARRL DX CW
18–19 March—Grafton's Annual Top Band (Rules in this issue)
25–26 March—CQ WW WPX SSB
25–27 March—BARTG Spring RTTY (Rules in December issue)
25 March–2 April—IARC Propagation Phone
9 April—80m LP (Rules in this issue)
9 April—70MHz (Rules in February issue)
6–7 May—432MHz (Rules in this issue)
21 May—144MHz (Rules in this issue)
3–4 June—NFD (Rules in February issue)
10–11 June—70MHz
24–25 June—Summer 1·8MHz
25 June-Microwave Contest
25 June—RSGB Region 1 VHF
1–2 July—144MHz
8–9 July—SSB Field Day (Rules in this issue)
23 July—432MHz
13 August—70MHz
20 August—144MHz SSB
2–3 September—VHF NFD (Rules in this issue)
2–3 September—IARU VHF
10 September—80m Field Day
7–8 October—21/28MHz
7–8 October—IARU UHF
21–22 October—7MHz CW
4–5 November—7MHz Phone
5 November—144/432MHz CW
11–12 November—Second 1·8MHz
November-December—70MHz Cumulative

Mobile Rallies Calendar

2 April	White Rose at Lawnswood High School, Leeds 6.
16 April	North Midlands, Drayton Manor Park, Near Tamworth, Staffs.
7 May	Spalding Tulip Time.
21 May	Northern, at Moor Grange School, Ring Road, West Park, Leeds.
28 May	Hull & DARS at College of Agriculture, Bishop Burton, Beverley
11 June	Third Elvaston Castle, Elvaston Castle Countryside Park, Nr Derby
18 June	Anglian, at Suffolk Show Ground, Ipswich
25 June	Bristol City & County RSGB Group, at Longleat Warminster, Wilts.
2 July	South Shields & DARC.
16 July	Worcester & DARC, at Hill County Secondary School, Upton-on-Severn, Worcs.
6 August	Woburn Abbey Rally
13 August	Torbay ARS at Newton Abbot Rugby Ground
13 August	Derby & DARS at Rykneld Schools, Bedford St, Derby
24 September	Harlow & DARS.

CLUB NEWS

Items for inclusion in this section should be sent to regional representatives before the first of each month for inclusion in the following month's issue. They should not be sent direct to the editor.

The date of publication of the following month's issue, first Tuesday in the month, should be borne in mind so that events are not, in fact, history when the details are published. While regional representatives are pleased to receive clubs' events calendars for several months ahead, they still require monthly events lists so that entries can be confirmed or amended.

REGION 1 **RR B. O'Brien G2AMV**

Merseyside Luncheon Club—First Monday of month, 1230 for 1245, HMS *Landfall*, Please advise G3VQT or G2AMV if you wish to attend.

Ainsdale (ARC)—Members should contact N. Horrocks, G2CUZ, QTHR, for details of the changed meeting arrangements.

Allerton (Liverpool) Scout Amateur Radio Society, North West Region—Meeting arrangements are discontinued temporarily. All enquiries should be addressed to G3VIN, 6 Kenmare Road, Liverpool 15 or G3VKZ.

Blackburn (East Lancs ARC)—First Thursday of month, 7.30pm, Edinburgh House, Shearbank Road, Blackburn. Please note new secretary is W. E. Baxendale, G8FDG, "Juverna", 28 Westland Avenue, Darwen, Lancs.

Blackpool (B & FARS)—Mondays, 8pm, Pontins Holiday Camp, Squires Gate. Morse tuition at 7.30pm.

Bolton (B & DARS)—First and third Wednesday of month, Bolton Recreation Club, Kensington Place. Full details from G3ZQS.

Bury (B & RRS)—Club secretary is G3RSM, 13 Rhiwlas Drive, Bury. On Saturday 29 January the club celebrated the 25th anniversary of its callsign G3BRS by holding a Silver Jubilee Dinner and Dance at the Elton View Hotel, Bury. Thirty-five members, past and present and including one founder, G2GA, along with their wives and friends made a grand attendance of 75 people.

Carlisle (C & DARS)—Mondays, 7.30pm, Currock House, Lediard Avenue, Currock. Secretary A. R. Harper, 23 Roman Way, Stanwix.

Cheshire (Mid Cheshire ARC)—Wednesdays, 7pm, Technical Activities Centre, Winsford Verdin Comprehensive School, Grange Lane, Winsford. Morse practice from 1900 to 2000gmt and on the air working, 160 and 2m, extending later to 80m. Main activities, 2000 to 2130gmt. Net night on 160m is Monday starting at 1900gmt. Tuesdays on 2m at the same time. Full details from G3JWK.

Chester (C & DARS)—Tuesdays except for the first Tuesday of month which is 145·08 2m net night. 8pm, YMCA, Chester. Further details from G8AYW, QTHR. The following officers were elected at the AGM held on 4 January 1972: President, E. Girdler (Mullard Electronics); chairman, D. Wardle, G3EWZ; hon secretary, A. S. Warne, G8AYW/G6AHC/T; hon treasurer, L. Mather; ordinary committee members: P. Jones, G3PYU; B. Poole, G3JAZ; D. Ollerhead, G8ALA and P.White, G8DOF.

Crewe—Local members continue to meet at the QTH of R. Owen, 10 Circle Avenue, Willaston, Nantwich, from whom further details may be obtained.

Douglas (IOM) (D & DARS)—Every Monday and Thursday, 7.30pm, rear of Douglas Holiday Centre, Victoria Road, Douglas. Club callsign is GD3ZCM. Secretary J. Parnell, Cronkbane, Quines Hill, Port Soderick, IOM.

Eccles (E & DARC)—Tuesdays, 8pm, Bridgwater School, Worsley, Manchester. Club 2m net channel 145·7MHz approximately. Secretary S. W. Redfern, G4AEQ, 5 Pinfold Road, Worsley, Manchester M28 5DZ.

Leyland Hundred Amateur Radio Group—Second Monday of month, 7.30pm, Rose & Crown, Ulnes, Walton, Leyland. Net night Saturday at 1900gmt on 145·8MHz. Further details from Frank Harrison, 78 Lancaster Lane, Leyland.

Liverpool (L & DARS)—Tuesdays, 8pm, Conservative Association Rooms, Church Road, Wavertree. Secretary K.Wood, 90 Childwall Valley Road, Liverpool 16.

Liverpool (NLRC)—10, 24 March, 7 April, 8pm, Labour Party Headquarters, 13 Crosby Road South, Liverpool 22. Secretary M. Graham, G3XMG, 14 Albert Road, Waterloo, Liverpool 22.

Manchester (M & DARS)—Wednesdays, 7.30pm, 203 Droylesden Road, Newton Heath, Manchester 10. Secretary G3IOA, QTHR.

Manchester (SMRC)—Fridays. 10 March (Mobile forum)), 17 March (Operation of the Yaesu FT101), 24 March ("Nuclear physics", by J. Sephton, G8DKE), 31 March (Club closed for Easter), 8pm, Sale Moor Community Centre, Norris Road, Sale, Cheshire. The vhf activity night is Mondays, 8pm, with operation of G3UHF on 2m and 70cm from the club "shack", "Greeba", Shady Lane, Manchester 23. Visitors are always welcome on both Mondays and Fridays. Hon secretary D. Holland, G3WFT, QTHR.

Manchester University (ARS)—G3VUM is now operational on all hf bands with a KW2000A into a 6 element beam, G5RV or 160m dipole at 100ft. G8FUM operates on 144MHz with 40W to a 6/6 at 100ft. In addition the club runs a series of visits and lectures and tuition for the RAE and Morse Test. Further details from G8BVF, G3ZNS or GM3YOK, University Union, Oxford Road.

Preston (PARS)—16, 30 March, 13 April, 7.30pm, Windsor Castle (private room), St Paul's Square. Secretary G. Earnshaw, G3ZXC. Morse practice at 7.30pm, main meeting at 8pm.

Salford (Dial House RS)—A society of PO Engineers who meet on Wednesdays, 6pm, 8th floor (river end) Dial House, Chapel Street, Salford 3. Further details from the secretary at this address.

Stockport (SRS)—Second Wednesday of month (Discussion night), fourth Wednesday of month (Lecture night), 8pm, Blossoms Hotel, Buxton Road, Stockport. Secretary G8BCG.

Thornton Cleveleys (TCARS)—First and third Wednesday of month, 8pm, St John Ambulance Brigade HQ, Fleetwood Road

Some of those who attended Bury & Rossendale Radio Society's Silver Jubilee Dinner. L to r: Mr A. Cooper, G3VVQ, chairman; Mrs C. Turner; Mr C. Turner, G8NL; Mrs E. O'Brien, G3WIO; Mr B. O'Brien, G2AMV; Mr T. Platt, G2GA; Mr H. Priestley, G3FLR, treasurer; Mrs. H Priestley, Miss M. Cooper, Mrs H. Cooper

North, Thornton. 15 March (Hot pot supper), 5 April (Film show and Field Day discussion).

Warrington (Culcheth) (CARS)—Fridays, 7.30pm, Chat Moss Hotel, Glazebury. All visitors are welcome. Secretary K. Bulgess, 32 Hendon Street, Leigh, Lancs.

Westmorland (WRS)—First Monday of month, Room 377 (top floor), New Allen Technical College, Milnthorpe Road, Kendal. All visitors welcome. Secretary E. P. Goonan, jnr, "Longridge", Storth, nr Milnthorpe, Westmorland.

Windscale (Cumberland) (WRS & ES)—Fridays, 7pm, c/o Falcon Club, Falcon Field, Egremont. Further details from N. Ramsden, G3RHE.

Wirral (WARS)—First and third Wednesday of month, 7.45pm, Sport and Indoor Recreation Centre (Old Drill Hall), Grange Road West, Claughton, Birkenhead. Secretary G3WSD, 34 Glenmore Road, Oxton, Birkenhead.

Wirral (Wirral DX Association)—Last Thursday of month at members' homes, visitors are welcome, but secretary would like to be advised in advance. March meeting at QTH of G4AHC. The January meeting was highlighted by the presentation of the Wirral DX Association Supreme Award to G3OKA, G3XJZ, G3VZM and G3UFO. The following officers were elected at the January AGM: Chairman, F. Houghton, G3VZM; secretary M. Davidson, G3YSM, 43 Stuart Avenue, Moreton, Wirral L46 9PE; treasurer, C. Sykes, G3XJZ.

REGION 3 — RR R. W. Fisher, G3PWJ

I should like to thank all members in Region 3 for their support in the recent elections.

Birmingham (MARS)—No information. Club meets at the Birmingham & Midland Institute, Margaret Street, Birmingham 2. *G8BHE*.

(Slade)—10 March (Visit to Birmingham Airport), 24 March (QRU? Slade's informal digest), 8pm, Church House, High Street, Erdington, Birmingham 23. *G8EYL*.

(South)—No information. Club meets on the first Wednesday of month, 8pm, Hampstead House, Fairfax Road, West Heath Birmingham.

Bromsgrove (B & DARC)—No information. Club meets at Royal Oak, Barley Mow Lane, Catshill.

Cannock (CCARS)—No information. Club meets at Bridgtown Social Club, Walsall Road.

Coventry (CARS)—10 March (Beginners night), 17 March (Night on the air), 24 March (Visit to Edgbaston Met Observatory), 31 March (Night on the air), 8pm, Coventry Scout HQ, 121 St Nicholas Street, Radford Road, Coventry.

Dudley (DARC)—14, 28 March, 8pm, Central Library, St James' Road, Dudley. *G3PWJ*.

Hereford (HARS)—No information. Civil Defence HQ, Gaol Street, Hereford.

Leamington Spa (MWARS)—Every Monday, 8pm, 28 Hamilton Terrace.

Lichfield (LARS)—No information, Swan Hotel, Lichfield. *G8CNB*.

Nuneaton (NARS)—No information. Club meets at Caldecote Grange. *G8ERM*.

Redditch (RRC)—9 March (Natter night), 23 March (Night on the air), 8pm, Old People's Centre, Park Road, Redditch. *G3EVT*.

Rugby (R & DARAEC)—No information. Club meets at 10 Drury Lane, Rugby.

Solihull (SARS)—21 March (Mini junk sale followed by talk "Test equipment", by G3NXC), 7.30pm, Manor House, High Street. 4 April (Informal), 9pm, Malt Shovel, High Street, Solihull. *G3XPY*.

Shrewsbury (SARS)—Every Thursday, 7.30pm, Harlescott Youth Centre, Sundorne Road, Shrewsbury. *G3VZG*.

Stourbridge (STARS)—7 March (AGM), 7.45pm, Longlands School, Stourbridge.

Stratford (SuA & DARC)—17 March ("Ham radio in the South Pacific", by Les Higginbottom), 31 March (Boaster's evening), 8pm, Halls Croft, Old Town, Stratford. *G3OOQ*.

Sutton Coldfield (SCRS)—13 March ("Problems of rtty", by G3MNV), 27 March (Natter night), 8pm, Clubhouse, Sutton Town Football Club, Coles Lanes. *G8AVH*.

Telford (WARS)—8 March (Natternite), 15 March ("Shf and uhf equipment and observations", G3EEZ), 8pm, Ketley Bank Youth Club, Main Road. Change of officials: Chairman, M. Davies, G4AUZ; secretary, F. Smithson, 32 Vicarage Drive, Manor Park, Shifnal.

Wolverhampton (WARS)—13 March (Natter night), 20 March (Talk by Strumech, or film show), 10 April (Talk by Mr Ansty of Wolverhampton Astronomical Society), 8pm, Neachells Cottage, Stockwell Road, Tettenhall, Wolverhampton. *G3UBX*.

Worcester (W & DARC)—18 March, Crown Hotel, Broad Street, Worcester. G8ASO, telephone Worcester 29208.

REGION 4 — RR T. Darn, G3FGY

Derby (DADARS)—Club meets every Wednesday. 15 March (Film show), 22 March (AGM), 29 March ("RSGB intruder watch", by C. J. Thomas, G3PSM), 5 April (Surplus sale), 7.30pm. 119 Green Lane, Derby. Visitors and radio enthusiasts always welcome. The 1930 net is held every Saturday at 7.30pm on 1,930MHz for club members.

Derby (NHCAARG)—10 March (Surplus sale), 17 March (Visit to Derby Telephone Exchange), 24 March (Late evening preparing for CQ WW Contest—this meeting commences at 10pm), 31 March "Amateur television", by G3OZ), 7.30pm, Room 7, Nunsfield House, Boulton Lane, Alvaston, Derby. *Mrs. V. Holt*.

Chesterfield (CADARS)—Club meets on Wednesdays at Mount Zion Methodist Church, Chatsworth Road, Chesterfield. Further information from G3ZLF.

Grimsby (GARS)—16 March (Debate—"This house believes cw is a dying art"), 30 March (RSGB evening). Club meets at the new clubroom, Red Cross Rooms, Rowston Street, Cleethorpes. *G8EDK*.

Loughborough (LARC)—Every Friday, 7.30pm, Clubroom, Bleach Yard, Wards End. Loughborough. *G3XAZ*.

Melton Mowbray (MMARS)—17 March ("Aspects of the modern (MPT) telephone service", by Jack Bowley), St John Ambulance Hall, Asfordby Hill, Melton Mowbray. *G3NVK*.

North Notts (NNARS)—Alternate Thursdays, 9, 23 March, 7.45pm, Abbey Centre, Potter Street, Worksop. Club net on Sundays at 11am on 2m. At the AGM held on 27 January 1972 the existing club committee was returned unopposed.

Nottingham (ARCON)—9 March ("Chassis bashing", by G3OMK), 16 March (On the air and natter night), 23 March (Bring and buy sale), 30 March (Film show), 20 April (AGM), 7.30pm. *G4AFG*.

REGION 5 — RR P. J. Simpson, G3GGK

Bedford (B & DARC)—9 March (Forum—questions to the panel), 16 March (Demonstration of the Yaesu FTDX 560 by G4ACP), 23 March (Films and members slides—G3XDU), 30 March (Members equipment). Club meets at the Dolphin. The Broadway, Bedford. Hon secretary John Bennett, G3FWA, 47 Ibbett Close, Kempston, Bedford.

Cambridge (C & DARC)—10 March (AGM—election of officers and presentation of awards), 17 March (Informal), 24 March (Film show), 31 March (Informal), 7.30pm, Club HQ, Corporation Yard, Victoria Road, Cambridge. Hon secretary C. Powlesland, G8CQZ, 341 Cherryhinton Road, Cambridge.

Dunstable Downs (DDRC)—10 March (To be arranged), 17 March (Between week), 24 March (hifi demonstration by G3ONS and G3FMO), 31 March (No meeting), 7 April ("Raynet", talk by P. Ballestrini, G3BPT), 8pm, Chews House, High Street, South, Dunstable. Hon secretary A. C. Don, 51 Manor Park, Houghton Regis, Dunstable, Bedfordshire. The annual dinner dance was well attended by 81 members, wives and friends, including the RR for Region 5, and prizes were presented.

Ely (EARS)—Alternate Thursdays. 9, 23 March, 6 April, 7.30pm, Ely Adult Education Centre, St Mary's Street, Ely. At a meeting held on 13 January the following officers were elected: Chairman, G. L. Driver, G3MRN; treasurer, J. Shelley, G3YFZ; hon secretary, P. Brown, A6775, 59 Fieldside, Ely.

Shefford (S & DARS)—9 March (First NFD meeting and junk sale), 16 March (Shf communications), 23 March (RAE questions and answers). Club meets every Thursday, 8pm, Church Hall, Ampthill Road, Shefford, Beds. Hon secretary A. Sullivan, G2DGF, 12 Glebe Road, Letchworth, Herts.

Stevenage (S & DARS)—Meets on the first and third Thursday of month, Senior Staff Canteen, Hawker Siddeley Dynamics Ltd, Gunnelswood Road, Stevenage. It is hoped that an RAE class can be arranged in conjunction with the local Scouting HQ and interested persons should contact the hon secretary Mr F. Collett, G3OVT, 8 Silam Road, Stevenage, or Mr W. Tynan, G3SJR, 29 Elm Walk, Stevenage, Herts.

REGION 6 — RR (Post vacant)

Bicester (BARS)—Every Friday. 10 March (Television principles), 17 March (Black and white tv, part 1), 24 March (Black and white tv, part 2), 31 March (Operating and constructional evening), 7 April (Normal monthly meeting), 14 April (Colour tv, part 1), 21 April (Modulation theory), 28 April (Colour tv, part 2), 7.30 to 8pm, 11

Stoneburge Crescent, Bicester. Morse practice is held at the beginning of every meeting. Hon secretary T. H. Shaw, G8EWS, 5 Langford Gardens, Bicester, Oxon OX6 8NA.

REGION 7 **RR R. S. Hewes, G3TDR**

Acton, Brentford & Chiswick (ABCRC)—21 March (Club's swl activities), 7.30pm, Chiswick Trades & Social Club, 66 High Road, Chiswick. Hon secretary G3GEH, QTHR.

Addiscombe (AARC)—Second and fourth Tuesdays of month, 7.30pm, Prince George Hotel, High Street, Thornton Heath. Further details from the hon secretary, c/o 32 Nursery Road, Thornton Heath, Surrey.

Ashford, Middlesex (Echelford ARS)—13 March (Being arranged), 30 March (AGM), 7.30pm, St Martin's Court, Kingston Crescent, Ashford, Middlesex. Social secretary Derek Holding, G8EDL, QTHR.

Barking (BR & ES)—9 March (No details received), 23 March (Lecture by G. S. Forward, marketing administration executive of Plessey, on the history and development of that company), 7.30pm, Gascoigne Recreation Centre, Gascoigne School, Morley Road, Barking, Essex. Hon secretary H. Davidson, G3FZP, QTHR.

Bexley Heath (NKRS)—9 March (Club project evening—calibration of "puff" box, and discussion on next project), 23 March (Mullard technical film show), 7.30 for 8pm, Congregational Church Hall, Chapel Road, Bexley Heath. Hon secretary M. A. Lee, G8EJH, QTHR.

Burnham Beeches (BBARC)—16 March (Being arranged), 8pm, Hedgerley Scout Hut, Hedgerley, nr Slough, Bucks. Hon secretary Ian Machardie, G3YMV, QTHR.

Cheshunt (CDRC)—Club meets at 7.30pm, Methodist Church Hall, opp Theobalds Station, Cheshunt. Hon secretary K. S. Arnold, G3XNP, QTHR.

Chingford (SRC)—Every Friday, 7.30pm, Friday Hill House, Simmonds Lane, Chingford E4.

Cray Valley (CVRS)—16 March (Natter night), 8pm, Congregational Church Hall, Court Road, Eltham SE9. Further details from J. M. Tripp, G3YWO, QTHR.

Croydon (SRCC)—21 March (No details received), 7.30pm, "Swan & Sugarloaf", South Croydon. Hon secretary S. A. Morley, G3FWR, QTHR.

Crystal Palace (CP & DRC)—18 March ("Converting mobile business radio equipment for vhf use", by G3OOU, G3IIR and G3FZL), 8pm, Emmanuel Church Hall, Barry Road, SE22. Further details from Geoff Stone, G3FZL, QTHR.

Dartford (DF Club)—17 March (No details received), 7.45pm, Clubroom, Broomhill Road, Dartford, Kent. Hon secretary Maureen Worbey, G3XVC, QTHR.

Dorking (DR & DRS)—21 March, "Wheatsheaf", Dorking.

Ealing (E & DARS)—Every Tuesday, 7.30pm, Northfields Community Centre, Northcroft Road, W13. Further details from the hon secretary J. E. Alban, G3JEA, QTHR.

East London (RSGB Group)—19 March (G6HU and others—fringes of radio), 3pm, Wanstead House, The Green, Wanstead E11. Hon secretary A. W. Rix, G3RYF, QTHR.

Edgware (E & DRS)—20 March, 8pm, St George's Hall, 51 Flower Lane, Mill Hill, NW7. The new committee consists of: Chairman, G8DAC; secretary, G3PSP; treasurer, S. W. L. Ling. Further details from G3PSP, QTHR.

Gravesend (GRS)—Wednesdays, 8pm, Northfleet Recreation Centre, Springhill Road, Northfleet, Kent. Further details from A. J. Moules, 166 Darnley Road, Gravesend, Kent.

Greenford (GARS)—Fridays. 17 March (Radio—20 questions), 8pm, Greenford Community Centre, Oldfield Lane, Greenford. Hon secretary J. Hedges, G3MMQ, QTHR.

Guildford (G & DRS)—Fridays. 10, 24 March (No details received), 8pm, Guildford Engineering Society, Stoke Park, Guildford, Surrey.

Hampton Court (TVARTS)—Club meets at 8pm, "The Three Pigeons", Portsmouth Road, Long Ditton. Further details from PRO Rob Muir, G3LHN, QTHR.

Harlow (DRS)—Every Tuesday, 8pm, Mark Hall Barn, First Avenue, Harlow, Essex. Club station is now operational on 80–10m ssb/cw. Club net on Sunday mornings on 28·8MHz, also most nights on same frequency. Further details from hon secretary V. Heard, 106 Vicarage Wood, Harlow, Essex.

Harrow (RSH)—Every Friday, 8pm, Harrow County School for Boys, Sheepcote Road, Harrow.

Havering (H & DARC)—No information received. Club meets at British Legion House, Western Road, Romford. Further details from P. B. Clegg, 148 Heath Park Road, Romford, Essex.

Hemel Hempstead (HH & DARS)—17 March (No details received), 7.30pm, "Addmult" Sports Club, Hemel Hempstead. A. J. Wakefield, 88 Heather Way, Hemel Hempstead, Herts.

Holloway (GRS)—Mondays (RAE), 7pm; Wednesdays (Morse 7.30pm) Fridays (Club), 7.30pm. Club meets at Archway School Annexe, Whittington School, Highgate Hill, N19.

Hounslow (BEAARS)—29 March, 7pm, BEA Training Centre, Southall Lane, Heston, Hounslow. (This club is open to non-BEA employees by invitation, contact David Evans, G3OUF, telephone Amersham 3257, for details.)

Ilford—Every Thursday, 8pm, 50 Mortlake Road (off Ilford Lane), Ilford.

Kingston (K & DARS)—8 March (Junk sale), 8pm, "Penguin Lounge", 37 Brighton Road, Surbiton. For details contact R. S. Babbs, 28 Grove Lane, Kingston.

Loughton—No information received. Club meets at Loughton Hall, Rectory Lane (nr Debden station). For details contact R. Stevens, 66 Wellfields, Loughton, Essex.

New Cross (CARS)—Wednesdays and Fridays. No details received. Club meets at 8pm, 225 New Cross Road, SE14.

Paddington (P & DRS)—Every Wednesday. No details received. Club meets at 8pm, Beauchamp Lodge, 2 Warwick Crescent, W2.

Purley (P & DRS)—Tuesdays. 14, 28 March (No details), 8pm, The Lansdowne Hall, Lansdowne Road, Purley. Hon secretary A. Frost, G3FTQ, QTHR.

Reigate (RATS)—15 March (Informal meeting), "Marquis of Granby", Redhill. Further details from the hon secretary D. Thom, G3NKS, QTHR.

Romford (R & DRS)—Every Tuesday, 8.15pm, RAFTA House, 18 Carlton Road, Romford.

Scouts (ARS)—16 March (No details), 7.30pm, Baden Powell House, Queensgate, Kensington SW7. Contact A. Watts at Baden Powell House for information.

Southgate (SRC)—9 March (First junk sale of 1972), 7.30pm, Civil Defence Hut, Bowes Road, N11 (opposite Arnos Grove Tube Station). Contact PRO Steve White, G3ZVW, QTHR. All visitors welcome.

St Albans (Verulam ARC)—22 March (Talk by Bob Burns, G3OOU, on frequency modulation plus a demonstration of Burns Electronics products), 7.30 for 8pm, St Albans Town Hall. Hon secretary Hugh Young, G3YHY, QTHR.

Sutton & Cheam (SRCS)—21 March (junk sale), 8pm, The Harrow Inn, High Street, Cheam. 25 March (24th annual dinner and ladies festival, to be held at the Crown Inn, Morden, Surrey (just by Morden underground station). Reception 6 for 6.30pm. For tickets, priced £2.25 per person, contact R. Smithers, 16 Derby Road, Cheam.) Hon secretary J. Korndorffer, G2DMR, QTHR.

Welwyn (Mid-Herts ARS)—9 March (Constructors competition and film show), 8pm, Welwyn Civic Centre, Welwyn, Herts.

Wimbledon (W & DRS)—17, 31 March (No details), 8pm, St John Hall, 124 Kingston Road, South Wimbledon, SW19.

Wembley (GECARS)—Every Thursday, 7pm, c/o GEC Hirst Research Centre, Wembley. (This club is open to non-GEC employees by invitation, telephone Dain Evans, G3RPE, at 01-904 1262 for further details.)

Woolwich—Contact G3ZOJ—re-forming this society.

East London Group RSGB

Do you live within 25 miles of the Greater London area from Charing Cross bounded by the River Lea or the River Thames? If so, are you aware that there is a meeting of members of the Radio Society of Great Britain organized for your attendance on the third Sunday of the autumn and spring months at a convenient venue some 300 yards from a Central Line station?

Although I have not made an accurate count of the number of members of the RSGB within this area I cannot help feeling that it must number about 1,000 and yet we only get 25 at our meetings and we are now down to the state that the undersigned, as chairman, also has to act as secretary.

This is a challenge to anyone living within the East London area to send me a postcard or a letter saying whether or not there is any point in holding a meeting at which the affairs of the Society are discussed and at which also members are able to gain from the experience of speakers on a wide variety of subjects in which they may have some interest.

There is no membership fee but those who come to the meetings are expected to pay 10p which just covers the rent of the room which we occupy and occasionally a little over so that we can pay for the travelling expenses of the speakers. The state of affairs which we

have now reached cannot continue and either I am going to be swamped by those who wish me to continue to chair a group locally or I may equally receive many notes stating that members are not aware of the meetings! This last I cannot accept since they are included in *Radio Communication* every month and certainly over the last year or so have regularly featured in the broadcast news bulletins.

Please let me know whether I am to book a larger hall or tell the warden of Wanstead House Community Association that we will not be renewing our booking in September.

R. A. Ledgerton, Chairman, East London Group,
1 Latchington Gardens, Woodford Bridge, Essex.

REGION 8 — RR D. N. T. Williams, G3MDO

Brighton (BTCARC)—Alternate Mondays, Richmond Terrace, Brighton. Details of future meetings from the hon secretary G2CMH.
Canterbury (EKRS)—9 March (Talk by G3DAH), this meeting to be held at the Electronics Building, University of Kent—at Canterbury, in conjunction with the UKCARS. 16 March ("Crystal controlled clock", by G3WAW). Further details of meetings from G3MDO, QTHR.
Crawley (CARC)—Meetings held on the fourth Wednesday of month. 22 March (Constructional contest and film show), 8pm, Trinity Congregational Church Hall, Ifield, Crawley. Details of future meetings from the hon secretary G3YVR, QTHR.
Dover (SEKYMCAARC)—Meetings held every Thursday at YMCA, Leylands Road, Dover.
Eastbourne (SARS)—10 April (Junk sale).
Horsham (HARC)—21 March (Informal), the "Star", Roffey. 4 April (Junk sale).
Maidstone (MYMCAARS)—24 March ("Experiences of seagoing sparks", by G3WZL). Meetings held every Friday, the first and third Fridays being primarily devoted to beginners at "Y" Sports Centre. Further details from the hon secretary G3WXL, QTHR.
Mid-Sussex (MSARS)—Meetings held at Marle Place, Leylands Road, Burgess Hill. Further details of future meetings from the hon secretary G3RXJ.
Thanet (TRS)—Meetings held every Friday, Hilderstone House, Broadstairs, 18 March (Annual dinner and dance).
Worthing W & DARC)—Meetings held every Tuesday, Rose Wilmot Youth Centre, Littlehampton Road, Worthing.

REGION 9 — RR H. W. Leonard, G4UZ

Bristol (City & County RSGB Group)—27 March (Meet the general manager—Mr D. A. Findlay), 7.30pm, Becket Hall, St Thomas Street, Bristol 1. At the recent AGM the following officers were elected: Chairman, G3JMY; vice-chairman, G2ATU; secretary, G3ULJ.
Bristol (BARC)—Tuesdays and Thursdays, 7.30pm, 41 Ducie Road, Bristol 5.
Bristol University—Every Saturday, 2.30pm, Dept of Physics, Royal Fort, Tyndall Park Road, Bristol 8, *G8ADP*.
Bristol (Shirehampton)—Every Friday, 7.30pm, Twyford House. *G3SXY*.
Burnham on Sea (BoSRC)—Contact J. Robertson, G3ZOR, telephone 2333.
Cornish (CRAC)—First Thursday of month. 6 April (AGM, followed by films), 7.30pm, SWEB Social Club, Pool, Camborne. Thanks to all who took part in the Marconi 70th anniversary, club will QSL 100% via RSGB. Any queries to G3VWK. *G3NKE*.
(Newquay)—15, 29 March, 7.30pm, Treviglas School. *G3THT*.
Exeter (EARS)—Every Tuesday. 14 March ("Video tape methods" G3ABU), 7.30pm, Community Centre, St David's Hill, Exeter. Hon secretary A. W. Bawden, 232 Exwick Road, Exeter EX4 2BA.
North Devon (NDRC)—8 March (Talk), 22 March (Ragchew), 7.30pm, "Grinnis". High Wall, Sticklepath, Barnstaple. RAE session at 7pm each date. *G4CG*.
Plymouth (PRC)—First and third Tuesday of month, 7.30pm, Virginia House, Bretonside, Plymouth. In February G5ZT gave a talk and demonstration on slow scan tv and G3SGV spoke on the history of Plymouth Radio Club
Saltash (S & DARC)—First and third Friday of month. Details from G4AJU, 302 St Peter's Road, Manadon.
Torbay (TARS)—Every Tuesday and the last Saturday of month 25 March ("The locals on tape", by Alan Heather), 7.30pm, rear of 94 Belgrave Road, Torquay. 11 March (Annual dinner at Templestowe Hotel). *G3NQD*.
Weston-super-Mare (WsMRS)—Contact G3GNS for details.
Yeovil (YARS)—Thursdays, 7.30pm, Youth Centre, Park Lodge, The Park, Yeovil. *G3NOF*.

REGION 10 — RR D. M. Thomas, GW3RWX

Blackwood (ARC)—Fridays, 7.30pm, during school term time, Oakdale Community Centre, Oakdale, Mon. *GW3TUG*.
Barry College of Further Education (ARS)—Thursdays, 7pm during term time, College of Further Education, Colcot Road, Barry, Glam. All activities at the moment are concentrated on preparations for the Marconi 75th anniversary celebrations. *GW3VKL*.
Cardiff (RSGB Group)—13 March. 7.30pm, BBC Club, Llandaff, nr Cardiff. *GW3GHC*.
Glamorgan Raynet Group—Details of meetings and exercises from GW3ZFG, telephone Cardiff 62411.
Haverfordwest (ARS)—Tuesdays, 7.30pm, HQ Rosemary Lane, Haverfordwest, Pembs. Club callsign GW3XZT. *GW3YBB*.
Hoover (ARC)—Mondays, 7.30pm, Hoover Social Club, Hoover Works, Pentrebach, nr Merthyr, Glam. Hon secretary Mr F. E. Tribe.
Port Talbot (ARC)—Second Tuesday of month, 7.30pm, Trefelin Club & Institute, Trefelin, Port Talbot, Glam. *GW5VX*.
Pontypool (ARC)—Tuesdays, 7pm, Educational Settlement, Rockhill Road, Pontypool, Monmouth, during school terms. *GW3JBH*.
Pembroke (ARC)—Last Friday of month, 7.30pm, Defensible Barracks, Pembroke Dock, Pembs. *GW3LXI*.
Sully & District Shortwave Club—Tuesdays 7pm, The Annexe, Sully Bowls & Social Club, 59 South Road, Sully, Glam. Club callsign GW3ZIT. At the AGM in February Mr C. H. Parsons, GW8NP was elected president of the club. *GW3ZSV*.
Rhondda (ARS)—Meets at Rhondda Transport Employees Club & Institute, Porth, Rhondda, Glam. Details of meetings from GW3PHH.
Swansea Telephone Area (ARS)—Tuesdays, 7.30pm, Telephone Engineering Centre, Gors Road, Swansea. Hon secretary Mr D. E. Connor, 7 Glanmon Road, Sketty, Swansea, Glam.
University College, Cardiff (ARS)—Activities of the society have become broader-based to include general electronic projects. Callsign GW3UWC. Details from the hon secretary, c/o Students Union, Dumfries Place, Cardiff.
University College of Wales, Aberystwyth—This society is very active, and unfortunately due to the earlier publication dates of *Radio Communication*, it is not possible to include in this issue details of the combined Universities and allied societies meeting held on 23 February. Secretary Miss Ruth Bury, c/o Students Union, University College of Wales, Aberystwyth.

REGION 12 — RR A. J. Oliphant, GM3SFH

Aberdeen (AARS)—Fridays, 7.30pm, 6 Blenheim Lane, Aberdeen. GM3HGA, telephone Aberdeen 33838.
Dundee (Kingsway Technical College ARC)—Wednesdays, 7pm, Kingsway Technical College, Old Glamis Road, Dundee.
Inverness (IRS)—Thursdays, 7.30pm, Clubroom, 4 Falcon Square (nr railway station), Inverness. Miss A. Veitch, telephone Drumnadrochit 266.
Lerwick (LRS)—Tuesdays and Thursdays, 8pm, Annsbrae House, Lerwick. *GM3XPO*. telephone Bixter 249.
Lhanbryde (MFARS)—Wednesdays, 7.45pm, St. Andrew's School, nr Lhanbryde, Elgin, Morayshire. *GM3UKG*, telephone Clochan 225.
Thurso (CARS)—Second Tuesday in each month. 7 March ("40m dx working", by D. Robertson, GM3JDR. 11 April (NFD discussion and rag chew) 7.30pm, Scapa House, Thurso. *GM3JUD*.

REGION 14 — RR M. A. Comrie, GM3YRK

Ayrshire (AARG)—12, 26 March, 7.30pm, YMCA, Howard Street, Kilmarnock.
Ayrshire (Ardeer Recreation Club, 9, 16, 23, 30 March, 7.30pm, Ardeer Recreation Club, Amateur Radio Section, Stevenston.
Falkirk & District RSGB Group—10 March, 7.30pm, Temperance Cafe, Lint Riggs, Falkirk.
Glasgow University (GURC)—9, 23 March, 7.30pm, George Service House, University Gardens, Glasgow W2.
Greenock & District (G & DARC)—10, 17, 24, 31 March, 7.30pm, James Watt Library, Union Street, Greenock.

Mid-Lanark RSGB Group—17 March, 7.30pm, YMCA, Brandon Street, Motherwell.

West Scotland (ARS)—10, 17, 24, 31 March, 7.30pm, 81 Virginia Street, Glasgow.

REGION 16 **RR D. F. Beattie, G3OZF**

Chelmsford (CARS)—First Tuesday of month. 4 April ("The RSGB and how it functions", by G3GVV), 7.30pm, Marconi College, Arbour Lane, Springfield, Chelmsford. Details of meetings from G3VPK.

Colchester (CARC)—Wednesdays, 7.30pm, North-East Essex Technical College, Sheepen Road, Colchester. Details of meetings from E. T. Jacobs, 26 Pondfield Road, Colchester.

Ipswich (IRC)—Last Wednesday of month. 29 March (Lecture and demonstration of amateur television by G6AGN/T and G6AEQ/T), 7.30pm, Gippeswyk Hall, Gippeswyk Avenue, Ipswich. Details of meetings from P. J. Hubert, G3YWM.

Southend-on-Sea (SADARS)—Meetings held every other Thursday at new QTH—The Flarepath Canteen, Southend Airport. Next meetings: 9, 23 March, details from G3AXN.

REGION 17 **RR L. N. G. Hawkyard, G3ZKR**

Farnborough (F & DARC)—Second and fourth Tuesdays of month, 7.30pm, Railway Enthusiasts Club, 310 Farnborough Road, Farnborough, Hants. All visitors welcome. G8BIH, QTHR.

Gosport (G & LonSARC)—Monday evenings at 19 Pier Street, Lee-on-Solent. G3UWI, QTHR.

Harwell (AEREARC)—Meetings on the third Tuesday of month, also informal gatherings and junk sales every Friday lunch time, 7.30pm, Social Club, AERE, Harwell, Berks. *G3NNG*.

Maidenhead (MDARC)—21 March (AGM), Victory Hall, Cox Green, Maidenhead, Berks. *G3VMR*.

Southampton (RSGB Group)—11 March ("Transistors in amateur equipment", by G3PLX, to be held at Lanchester Building, Southampton University). Club meets every Wednesday evening at the clubroom, Kent Road. G3ZKR, telephone 73378.

Swindon (SDARC)—15 March (Lecture on "SICs in amateur radio", by J. M. Bryant, G8FNT).

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These low-cost flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed on the last page of each issue of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 25p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No other correspondence concerning this service can be entered into.

The closing date for each issue is the 4th of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

See the current order form on the last page for further details.

FOR SALE

SB102, SB600, HM102, HP23A, Shure 401A, 9 mnths old, £210. G4AIR, The Chapel House, Warfield Street, Bracknell, Berks. Tel Bracknell 5386.

AM-913/TRC, AM-914/TRC 100-400MHz, £20. CV-253/ALR tuning units, 38-136MHz, 290-550MHz, £8. Surplus conversion manuals, vols 1, 2 + 3. Surplus hndbk all Editors & Engineers surplus schematic hndbk. Manuals for AR88D, AR88LF, BC639A. Sae. G3ZCO, QTHR.

OS-2 Heathkit scope, little used in vgc, recently checked to spec by manufacturer, with manual + auxillary socket, cons £25 ono. Hughes, Rose Croft, Glascoed, nr Pontypool, Mon, NP4 5TZ.

ExWD wireless set No 12 tx comp with hndbk + mic etc, buyer must coll. R. Johnson. Tel Warwick 45504 (lunchtime).

Hallicrafter SX62AU rx, wkng, £10. Buyer coll. Manual. G3REX, QTHR. Tel Ringwood 2726.

/M stn: AT5, dc psu, control box, Topmobile, £25, or will split. 898 dial, £2.50. 500W isolating trnsfmr, £3, TCS12 rx £6. Transistor gdo, £6. Number of thyristors, xtals, trnsfmrs, formers etc, offers. G3VUE, QTHR. Tel 01-527 6525.

Trio JR310, as new. Trio JR60 rx for ssb a.m./fm 2m built in. New Pye Cambridge. New Pye Westminster, Tec 18 gdo, CR100, well modded, built in scope. Hudson fm 2m tx/rx, 4 channel. Wanted: KW2000B or sim coverage Yaesu or Somerkamp, at rsnble price. Sheedy, 24 Thornwood Road, London SE13 5RG.

KW Vanguard, 160-10m, gd wkng cond, £20. Ten-Tec tx/rx, 80-40m cw, fb cond, £20. G3VDF, 44 Mowlands Close, Sutton-in-Ashfield, Notts. Tel Sutton-in-Ashfield 2310.

Londex Mercury relays, 25p. HW100, £80. Homebrew psu, £10 230/110V auto trans 60W, £1. 100μA NPL meter, 6in scale, £2. RA1, £23. Transistor Ranger hi-band, £6. G3RUD, QTHR. Tel Coleshill 62222.

TCS12 rx, 160/80/40m, 230V, fb cond, £16. G2DAF rx with Kokusai mech fltr + all xtals, reqs attention on 15 + 10, £22. G3XXJ, QTHR. Tel 021-351 2370.

Surplus to requirement Heathkit spectrum analyser SB620 wired and factory tested for 5,100kHz i.f., other coils with set, £55. Hathaway, Officers Mess, RAF Bawdsey, Woodbridge, Suffolk.

Transmitting valves, 4 4CX250Bs. EIMAC, brand new boxed, £3 ea. 2 silver plated bases, £2 ea. 4 TZ40s, 2 TT21s, 2 813s, £1 ea. 2 805s, £1 ea. GM3YRK, QTHR. Tel 041-942 2767.

Heath SB301, £80. BXI 50ft tilt-over tower, £85. KW p.e.p. meter, £10. Tech 15 gdo, £10. KW2000A + ac and dc, £180. Thurlow, 25 Sandilands, Croydon, Surrey. Tel 01-654 2761.

Low band Pye Rangers: boot mount, 6,4OPA, transistor psu + mod, £14. Dash mount, transistor psu, £8. Sim, vibrator psu, £5. All above comp with control box and/or mic etc. Buyer coll. G3YGD, QTHR. Tel Burnley 22646.

KW Vanguard 160-10m tx, exc cond, £36 ono. Also Eddystone EA12 rx, manual, offers. KW Viceroy Mk 1 + psu, offers. Wanted: KW Viceroy Mk 3. G3NJB, Wamrac HQ, Kendal Road, Tebay, Penrith, Cumberland. Tel Orton 275.

LG300 rf sctn, £14. Suitable psus in 6ft rack, £5. G3HLF, QTHR. Tel Gravesend 4571.

HW30 2m tx/rx, 240V, £20 ono. Codar T28 rx, £12 ono. Minimitter 2—7 tx, 25W input, £15 ono. Wanted: 70cm gear—cnvrtr, aerial, coaxial, tx. Also HRO rx reqd. Exch consd. G8FIK, 25 Newport Road, Wavendon, Bletchley, Bucks.

HRO rx with 7 coils, ac psu, modded valves, productor detector, xtal calib, noise limiter, £20. Mech fltr Kokusai 455kHz ssb with mtchng usb/lsb B7G xtals, £9. G3AEZ, Eastfield, Beare Green, Dorking, Surrey. Tel Newdigate 236.

Swan tx/rx plug in vox unit, £10.50—current price over £18. 2 32ft Telco round 300Ω feeders, K35B, unused, £3.50. Pair TT21s, unused, £3.25. All cp. G3HAF, QTHR. Tel 0482 883095.

G2DAF Mk 2 rx, in wkng order but needs attntn, no circ diag or ls, £20. Phillips Ultraphil health lamp, new, £5. Pi-tank coil and wavechange switch, new, £2.50. 600-0-600V 300mA 4V 7A, 6·3V 2·5A trani, £3. 8H 250mA Gardner chokes, £1. G3OHS, 26 Brixham Gardens, Seven Kings, Ilford, Essex. Tel 01-594 1852

R1155N, gd cond, ls o/p df removed, with heavy duty psu 300V at 500mA etc, fb job, £10 ono. Buyer arrange coll. G4AQY, QTHR. Tel 858 1448 (01).

Pye Cambridge /Ms, fully modded for 2m (rx tunable), sae dets. Jeapes, G2XV, 165 Cambridge Road, Great Shelford, Cambridge.

Linear parts: psu, 1,750V, 813 + base, filament trnsfmr, cab, £10. Wanted: Viceroy, early model will do. G3RUG, QTHR. Tel 061-439 7183.

KW2000, ac psu, manual, late model in gd cond, mods—improved audio with 3·5kHz fltr, KW alc unit fitted, extended irt + switchable avc recently revalved and re-aligned, £110. Codar RQ10 Q mult, £4. G4ACP, QTHR. Tel Hitchin 3054 (after 7pm).

Lafayette HA-500 10-valve amateur band 80-6m rx, vgc, £32 ono. 41ft/29ft vertical aerial, comp + ready to erect, as new, £3.50. Beeson, 63 Ashby Road, Tamworth, Staffs.

BC221-T with stab psu + charts, £11 or swop for KW EZ aerial match. G3BZZ, 8 Derwentwater Gardens, Whickham, Newcastle-on-Tyne.

FT2F 2m fm transistor tx/rx with 5 sets xtals + vfo to tune rx, modded to receive a.m., £70. FP2 ac psu for above, £17.50. G8BPK, QTHR. Tel Aston Clinton 600.

Pye transistor Ranger, 2207V with control unit and mounting tray, £8. Pref buyer coll. G3YNT, QTHR.

Comp /M stn: Codar AT5 tx, T28 rx, dc psu, control unit, cables, manuals. All mint cond. Built into tailor-made console to suit Ford Cortina if reqd. £30 or exch 2m gear. G8FQE, 34 Webbs Way, Stoney Stanton, Leics. Tel Sapcote 3404.

Tv camera with unblemished vidicon wkng 405 line, 1V, comp video output, £40, or would exch for gd rx BRT400 or sim. G3MEO, QTHR. Tel Steeplemorden 465.

2 TT21s, hardly used. 2 TT21s, much used. Wanted: xtal 1,800 H6CU + HRO coils. GW3GHC, QTHR.

4m whips as used on taxis etc, £1.35 ea. Carbon film resistor, 6p ea, most values. Shack clearance of trnsfmrs etc, sae for list. G3YOA, 52 Great Wheatley Road, Rayleigh, Essex.

BC348, £12. WM1191A less charts, £5. SCR522 modded for 2m, £7. TE149 w/m, £8. Pref buyer coll. G3HZW, QTHR.

2m base tx. Tunable 2m Cambridge. 70cm cnvrtrs, 4m cnvrtr. Collins ssb am/pm phasing exciter model 20A. Green 2M1000 70cm 100 90W Companion txs. 23cm gear 10W 70cm tx. Many oddments. G3ZYC, QTHR. Tel Ripley (0773) 3883.

Printer Lorenz T36LO + ZA39384 fsk adaptor, offers? 2 813s with bases, £2 ea. 2 1616s, 50p ea. 3 4CX250Ks, £2 ea. Prof 455kHz wobbulator, crt display, £12. Del poss London area. G3PGN, Steeple View, Peartree Lange, Doddinghurst. Brentwood, Essex. Tel Blackmore 822891.

30ft tower with wkng platform, Cowl Gill motor base driven with remote control unit, Selsyn indicator with psu, offers, Buyer coll. Minimitter Q mult, 450-470kHz, integral psu, £5. G3CEG, QTHR.

SWM 1967-71, 7½p ea or 60p per vol. Also *Radio Communication* March 1970 to date, same price. Vhf tv turret tuner, except valves, 50p. Signey, 50 Sturdee Gardens, North Jesmond, Newcastle-upon-Tyne 2. Tel Gosforth 852020.

AVO valve tester with data and valves, £10. *Radio Constructor* June 1967 to Jan 1969, £1. JXK swr indicator/mod monitor/rf output meter, 450MHz max, £6 ono. *Newnes Radio TV*, £3. Seymour, 25 Ryde Buildings, Webb Street, London SE1 4RX.

Star 550 amateur band rx, 1·8 to 54MHz with EMSAC CN2 2m cnvrtr, £38 carr extra. Murphy hi-band /M, vibrator, psu, £5 carr extra. Kettlety, 106 Denton Road, Audenshaw, Manchester M34 5BD.

Japanese hdphns, 50p ea. Transistors: set of 6 (Japanese), 50p per set. XC131, 25p ea. XB103, XA101, OC81, XB104, XA103, all 10p ea. Plastic transistor set cases, 10p ea. Wanted: Foreign stamps. Harvey, 22 Elm Grove, Norton Bromsgrove, Worcs.

Geloso 80-10m cnvrtr. 4·6MHz i.f. built in psu xtal calib, £10. J-beam 2m 4/4, £2.50. Denco transistor rx coils 1·6MHz i.f., 3 gang tuner, 0·150-30MHz, £2.50. G3MUT, QTHR. Tel 061 485 1217.

Used tested QQVO3-10, 3 for 50p. Pye eqpmnt manuals, a few left, ring for dets. Exch Leak TL25 + pre-amp. Why? G3MOU, QTHR. Tel 01-570 6181.

3 ele 10m Yagi beam folded dipole radiator, 75Ω, 8dB gain, lightweight, £7. KW low pass fltr, 75Ω, channel 1, £3. Bolex C8 8mm cine camera, £10. G3VIE, QTHR. Tel West Forest 4048.

Stable vfo mosfets 3N128, 45p. Pa devices AUY10, £1 pair. BLY17, £1. 5B254M, 75p ea. All unused. 807 (used), 40p pair. FT243 8040kHz, 75p. 10X 8006·67kHz, 40p. Sae lists comps. G3ROG, QTHR. Tel Maidstone 26997.

Valves: QQVO3-20A, 60p. QQVO6-40A, 50p. 829B, 30p. VR150 (4) 20p. 5B254M with base, 40p. New 19 Set control box, 60p. Used but gd 2N3866s, 40p ea. AR88D, £30. 12W audio amp, £4. G3ZTX, QTHR. Tel Slough 21086.

KW2000B, ac psu, perf cond, £165 ono. Can del rsnble dist. G3YYG, 10 Roseheath, Hemel Hempstead, Herts. Tel 57547.

Rotary cnvrtr "Wates", dc/ac, 230/240V, 180W, reconditioned, rewound armature, unused, £3. Plessey recordchanger unit, 78rpm, 10 mixed 10in/12in with polished mahogany mounting board 19in by 19in by ¼in, immac, £2. Glenister, 37 Ashcombe Gardens, Weston-super-Mare, Somerset. Tel 28717.

Parmeko Admiralty pattern trnsfmr, 620-0-620 200MA 580-0-550 200mA 775-0-375 250mA 5V 3A 6V 3A, £3. G4AU, QTHR. Tel 01-460 9478.

150pF 10kV vacuum, £4 ea. OC20, 35p. Parmeko table-top, £5.50. OC35, 40p. AC128 calibrtd, 18p. 35Ts, 70p. 5B/251M 4 at £1. 400V ct 250mA + 5V AVO mod 7 + leather case, £10. Also why? GW3HEU, QTHR. Tel Wrexham (0978) 4507.

Solartron scope CD513-2, £22.50. Airmec waveform analyser, 30kHz-30MHz, £40. Solartron variable psu. 0-500V, £20. Airmec audio sig gen, 30Hz-30kHz, £30. Pulse gnrtr, £5. Fuller dets, send sae. G3ZAJ, QTHR. Tel Challock 441.

Heathkit RF1U sig gen, brand new unused, £19. KW low pass fltr PL259 sockets, unused, £4. BX1 geared hand winch for raising 3 sctn lattice tower, new. £5. Carr pd. G5FH, QTHR. Tel Highcliffe 5974.

Hallicrafter S27, covers 30-143MHz, spare set valves, £20. 5 yrs *SWM*, free to collector. G3VDX, QTHR.

RSGB amateur bands freq meter, vry rigid construction, stable, 600 div HRO type dial, £7.50. Petrol electric gnrtr, output 12V 7A, £17.50 gd cond. G3ADK, QTHR. Tel Luton 27595.

Unica UNR30, less than 1 yr old, as new, £10. Ruffle, 10 Mulberry Hill, Shenfield, Essex. Tel Brentwood 8351.

AVO 8 Mk 3, new gd cond in leather carrying case, sell or exch for 9R59DE/S or gd comm rx. Also Farnell psu, exc cond, mod L3OB 0-30V 1A, offers or exch. Withy, 245 Stourbridge Road, Halesowen, Worcs. Tel 021-550 4550 (evenings or w/ends).

Trio 9R59DE, exc cond, voltage regulator + xtal calib, £30 ono. G4AGJ, 14A Eastgrove Avenue, Sharples, Bolton, Lancs. Tel Bolton 54351 (evenings only).

ATM rtty units. FSY1 + psu, £10. FSR1 + psu, £8. TRR1A electronic regenerative repeater, £10. CRM1 tuning indicator, £12. Full info on all units. Haggle over del over 50 miles. G2AFD, QTHR. Tel Malvern 3242.

SB101, cw ssb fltrs, £160 inc SB600 psu + spkr + manual. G3DYY QTHR. Tel Earith (Hunts) 558.

Practical Wireless May 1967, Jan 1971 inc, offers? *QST* Jan-Dec 1966. Few 1963 issues, offers? Buyer coll. Steinkamp, 1 Grosvenor Road, Wallington, Surrey. Tel 01-647 9883.

Trio TS510 + vfo 5D, £170. G3ENB, QTHR. Tel Scarborough 65093.

4 813s, £1.50 ea. Woden 100V x 10A trnsfmr, £2. Carr extra. 5BF valve bases, 50p. ea G3RWQ, QTHR.

AR88D, £20. Pye Reporter low band tx/rx, £4. AMPRO 16mm sound projector, spare lamps and spools etc, gd cond, £35. G6AGL/T QTHR. Tel 0298 5485.

Dc psu for KW2000B, exc cond, recently checked by KW, £20, plus post. Will exch 10ft fibre glass dinghy for 2m Pye Cambridge comp in gd wkng cond. G3TRK, "Roseville", Bent Lane, Colne, Lancs. Tel Colne 4187.

Trio 9R59DE, vry gd cond, 18 mnths old, £35. Codar AT5, late model, 7 mnths old, £25. Both well cared for, G4ABT, Northern Baptist College, Rusholme, Manchester 14.

Wharfedale RS/12/DD ldspkr, little used, £5. Harrison, 11 Castle Green, Weybridge, Surrey. Tel Weybridge 47112.

TW 160m /M rx, £9. Wanted: Hammarlund HQ-145X or HQ-180 rx. Perrin, 30 Franchise Street, Kidderminster, Worcs. Tel 61752.

2m a.m. tx, 40W, £25 ono. Studio 3-motor tape recorder, needs lubrication, £15 ono. Sae for list of goodies. Wanted: EC10. Lockwood, 7 Northfield Road, Sharlston Common, Wakefield, Yorks. Tel Crofton 862458 (0924).

Power packs, mains trans, chokes, capacitors etc, you collect. G2CD, QTHR. Tel 01-590 4855.

SSB fltr with usb/lsb carrier xtals, £5. Communication rx, 300kHz 4MHz, £10. Top band tx, £5. X band tx, £5. Digital clock and uhf radio, brand new, £15. G3AAJ, 94 Herongate Road, London, E12 5EQ. Tel 01-989 6741.

Woden UM3, £5. Vauxhall vmt mw/lw car radio, 12V —ve earth, wing telescopic aerial, ldspkr, £12. G4AU, QTHR. Tel 01-460 9478.

Racal transistor six digit freq counter SA535 + prescaler SA548, ok to 15MHz, mint cond with manuals, best offer secures. G3HTC, QTHR. Tel Sunbury on Thames 84422.

Contents electronics workshop: capacitors, chokes, xtals, diodes, meters, potrs, rectifiers, resistors, switches, trnsfmrs, tubes, many unused. Sae (large) for list. Walshaw, Sadgill, Longsleddale, Nr Kendal, Westmorland.

Class D wavemeter £5. KW101, £8. Heathkit RF1U, new, £15. KW160 tx, £16. Callers only. Wanted: El bug, must be fb cond. G3WXT QTHR.

Hallicrafters S120A batt/mains gp rx, suit novice, £10. Trio 9R59DE stab cal, immac, £30. Wanted: gd gp rx transistor EC10 Mohican etc. Katsumi speech compressor, audio cw fltr. Will cons exchanges. G3DCS, QTHR.

Self powered top band homebrew a.m./cw tx, £7. Minimitter cnvrtr, mint, 160/10m, own recd ps, i.f. 1·5MHz, £7. Must be collected. Swap or buy fet 2m cnvrtr. G3CDR, 157 Dartford Road, Dartford, Kent. Tel Dartford 26976.

Davco DR30 rx, £120. Pye high band Cambridge, £22. G3UGF, QTHR. Tel Halifax 21885.

J Beam 2m halo on 4ft 1in diam mast with wall mounting bracket + 10ft of uhf coaxial, £2. G3PSH, QTHR. Tel 01-660 2067.

Inoue IC-2F xtals, all 6 channels 144·48-144·8, as new in box with fm a.m. rx, mic, leads, /M mounting bracket, instrctn manual, £55 ono. G3WYQ 10 Western Road, Tring, Herts. Tel Tring 2045.

Heathkit Mohican to Mk 2 standard, £20 with manual. Codar CR45 regen rx, £8. Wanted: EC10 Mk 1. G8DUH QTHR.

Advanced morse record, 9-42wpm, with book, £1.50 inc post. G3VAG, QTHR. Tel Wivenhoe 2243.

2m Pye Cambridge transistor driver, quick heat pa, hndbk, exc cond, £25. Marconi 2m 30W a.m. base, gd cond, £10. Marconi 4m 5W a.m. /M dash mounting 6V 230V psus, exc, £7. G8CSR, QTHR.

Vhf + uhf /M radiotelephones/base stns, fm, several available, £10 to £20. These are modern hybrid eqpmnts just out of commercial service. G8AKA, QTHR. Tel Mortimer 332582.

LG300 II, £20. SB10U, £20. 339 scope, £10. Trnsfmr 4,400V ct 200mA, £3.50. TCC printed circ with cut-out and drilled chassis for 912 fm tuner, £3. All ono. Coll or pay carr. G3JDP, QTHR.

Eddystone 840A , revalved, no mods, gd cond. Wanted: Trio 9R59DE5 pref with calib and stabilized, also 2m convrtr transistor 4-6MHz i.f. G8CUA, 49 Hawthorn Close, Takeley, nr Bishops Stortford, Herts. Tel Takeley 517.

Codar preselector, mains mod PR30, £5. Also No 19 Set Mk 3 + mains psu, no leads, £5. Buyer coll. BRS37301, 14 North Down Road, Chalfont St Peter, Gerrards Cross, Bucks SL9 0LQ.

Cossor double beam oscilloscope type 1049 Mk 3A, vgc, £45. G3TWJ, QTHR. Tel 689 1441 (office).

HP13 psu built +ve earth, £27.50. 4m tx cnvrtr + psu, £7.50, or exch 20m or rtty gear. G3NBU, QTHR. Tel Burghfield Common (073529) 2257.

1·4MHz Snelgrove xtal fltrs ex tx/rx, pair for usb and lsb, cost new £30 pair. DX100U, vgc, slight marks on case. Unused 813, orig GEC packing. Also 3 Q206-20s. Offers with sae. Wallace, 7 River Court, Ferry Lane, Cambridge CB4 1NT.

KW2000B ac psu, 6146B pa valves fitted at recent manufacturers overhaul, exc cond, £185 ono. Dc psu —ve earth, exc cond, £30 ono. Del central Scotland, elsewhere at cost. HP arranged. GM3OGJ, QTHR. Tel Alloa 4653.

AR88D, as new, £45. R1155N, £10, AR77, £10. Cossor scope 1035 Mk 3, £25. AVO model 7, £10. R220, £5. Other misc items, units, and valves. McBride, Tel Maidstone 37165.

GEC brt 400 rx with hndbk, £55. Could del within rsnble distance but pref buyer coll. Will cons part exch for gd vhf domestic radio. G3UXH, 99 Bells Lane, Hoo St Werburgh, Rochester, Kent.

Hudson AM108 Mk 2, £6. Rangers, various types. Pye walkie-phones pair £3.50. PCR rx 5 for £2. CRT100, £3. Uhf rx R. 1965, £2. G3ZVI/ exG8BVI, QTHR. Tel Cheddington 684.

BC221AJ freq meter with audio modulation, stab psu, property late G3HQL, comp with charts + phones, £17 ono. G3MLS, QTHR.

AR88LF, vgc, + hndbk, £40. Will del 20 miles. G4ALR, 26 Newtown, Henlow, Beds, Tel 0462 88 7793.

Four only FL30 radio fltrs, late version of FL8 fltr, new £1.50 ea post pd. Peaks up that dx cw signal. Shepherd, 72 Westerland Avenue, Canvey Island, Essex SS8 8JS.

Eddystone EA12, vgc, £100 no offers, buyer coll. New xtals: 13·5 + 19MHz. £1 ea. Surplus 8 + 14·166MHz, 25p ea. Westwood, 114 Pettits Lane, Romford. Tel Romford 47577.

Joystick VFA (lightweight), £5. Lo-z atu, £6. Battery aircraft band cnvrtr, £1.25. CM70S xtal mic + stand, £1.50. Carr pd. Livermore, Village Farm Cottage, Market Weston, Diss, Norfolk.

Marconi TF144G, 85kHz-25MHz, gd cond, comp dummy aerial etc, £12.50. Nagard oscilloscope £37.50 comp leads + manual. Phillips 6020/2 valve voltmeter, £16.50 ono. Thrussell, 58 Cove Road, Fleet, Hants. Tel Fleet 6483.

Remote VFO48 for KW2000B, little used, £30. EIMAC 4-400A, new, £5. G3POX, QTHR.

Variac in black crackle cab, fully switched, metered, mint, £15. Labgear 5-way coaxial tx/rx aerial switch, £3. Buyer coll. G8LG, QTHR. Tel Ascot 22017.

BC221 wavemeter comp with charts, £10. G3OSE, 62 Copsewood Avenue, Nuneaton, Warks. Tel Nuneaton 67992.

Electroniques 1·6MHz Mk 2 i.f. module, £10. G3PHJ, 9 Bracken Hill, Osbaldwick, York.

Trio JR500S, £45. Codar CR70A, £12. 10·7MHz xtal fltr type 445/ LQU920B, offers? Wanted: manual for Cossor 1035 Mk 2. G3ZUD, QTHR.

RCA AR88D rx with phones + manual, £25. Buyer coll ww reception G3YSZ, QTHR. Tel Eastbourne 0323-32687.

Shack clearance: HA350, spkr, 160m calib, £50. Shure 444, £5.50. KW pepmeter, £9. Resistors ¼W 5%, most values, 1p ea 65p for 100. Sae for list of bits and pieces. G3TWX. QTHR.

FE600 tx/rx, mic, complete, 200W all bands, £135, coll or pay carr. G3RKH, 57A The Close, Salisbury. Tel Salisbury 22473.

Marconi sig gen TF144G, £10. No 13, £18. Psu TF659, £9. Audio sig gen, £10. BD627 picture + waveform monitor with 300V stabilized psu, £8. Absorption wavemeter 20-300MHz, £5. RCA 25W modulator, £4. Homer, 23 Iron Mill Lane, Crayford, Kent DA1 4RR. Tel Crayford 24625.

KW500 linear amp in exc cond, spare 813 + rectifiers, comp c/o relay, £40. Will del 50 miles. G3OOQ, QTHR. Tel Stratford upon Avon 5973.

Heathkit RF-1U sig gen (100kHz-200MHz), few hours use only, £15. Buyer coll. G8DOH, QTHR. Tel Dover 2297.

Heathkit scope Mod 0-12-U, £18. Eagle rf sig gen Mod SG70, brand new, £20. Joystick deluxe, £2. GM3ZTA, 33 Langholm Street, Yoker, Glasgow.

HRO modded front end, 9 coils (2 bandspread), psu and Joystick aerial with atu, all for £28. BSR tape recorder + mic and mixer, £10 complete. 1,200ft reels of tape, 50p ea. Lambert, 37 Douldrewood Road, South Benfleet, Essex SS7 5UA. Tel South Benfleet 54439.

KW/Geloso amateur bands cnvrtr 4·6MHz i.f. output, £10. R1155 gen cov rx, built in psu, o/p stage + product detector, £9. G3OLB, QTHR. Tel Oldbury (Glos) 4559.

T & R Bulletins, 6 bound vols 1935-46 inclusive. Any offers? G8GG, QTHR. Tel 03815 25717.

ARR5 vhf rx airborne version Hallicrafters S27, 27-143MHz a.m./fm, int psu comp with hndbk, £17.50. D-beam scope, Philips PM3230 dc-10MHz, £120 ono. Set comp hndbk, £5. G8AGM, QTHR. Tel High Wycombe 34053.

Two 8A Zenith variac trnsfmrs, £5 ea or £8 the pair + carr. GM3JHL, QTHR.

Eddystone 840C rx, 480kHz 30MHz, exc cond, £30. Robertson, 31 Greenways, Bow Brickhill, Bletchley, Bucks. Tel Bletchley 2463.

2m E88CC cnvrtr i.f. 6-8MHz, £3. 2m 15W tx QQVO3-10 pa EL84 modulator, comp with psu, £10. Xtals 6006·7kHz, 6075·0kHz, 8101·0kHz, 20p ea. Psu compact 300V 60mA 6·3V, £2. Manners, 165 Mayfield Road, Edinburgh EH9 3AY. Tel 031-667 3366.

Everything as new. Eddystone 898 dial, £6.50. 15 Denco transistor coils with bases blue, yellow, white, ranges 1-5, £3.50. Denco IFT 18s, 465kHz, 50p. TAA310 ICs, 80p. MAT121, 20p. Offers consd. McLeod, 30 Norman Road, Ripley, Derbyshire DE5 3QL.

150/150 differential var caps ceramic end plates £1.05. QQVO6-40, QQVO2-6, QQVO3-10, 2C42, 2C39A, 2C26, £1.25 ea. Xtal oven B7G, 60p. 100kHz, 10,000kHz, 1,000kHz, B74 xtals, £1.60 ea post pd. G3WBT, QTHR.

Trio 510A8 new, £135. KW Vanguard 10-160m, exc cond, £35. KW trap dipole 97ft feeder, £8. KW Ezee match, £9, KW swr indicator, £5. KW low pass fltr, £4. TA33jnr, £10. Clingan, 1 Warwick Hall Gardens, Bromgsrove, Worcs. Tel Bromsgrove 76306.

Heathkit RA1 rx with mtchng spkr and Q mult, £30. Heathkit GHIZA mic, £3.50. G3UQZ, QTHR. Tel 021 373 8806.

KW500 linear amp, £40. Heathkit SB301 exc cond with spare valves, £90 ono. G3FXB, QTHR. Tel Brighton 593382.

QY3/125 tetrode pa valve, brand new, pair £5. G3UQH, QTHR. Tel 0743 54096.

Eddystone 770R comm rx 19-165MHz, S meter, hndbk, spkr, practically new hardly used, no rsnble offer refused or part exch to Heathkit SB310, Drake R4A or similar. Shams-Nia, 3 Dane Road, off Norman Road, Ilford, Essex.

Boot mount Ranger, partly modded for 2m with cradle, cables, controls, mic, £8. Command tx, mint, £1. CT82 noise generator, £3. G8CBE, QTHR.

Rx section Pye base stn cnvrtd for 2m, tuneable, gd cond, £7.50 ono. G3OBX, QTHR.

Because of the power crisis this issue has been reduced from 72 to 64 pages. Four pages of Members' Ads are being held over until the April issue.

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2·000 in HC6/U	£1·60	34·500 in HC18/U *	£1·60
3·500 in HC6/U	£1·75	35·000 in HC18/U *	£1·75
5·000 in HC25/U *	£1·60	35·500 in HC18/U *	£1·75
7·000 in HC6/U	£1·50	38·666 in HC18/U *	£1·35
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7·755 in HC6/U	£1.80	42·000 in HC18/U *	£1·60
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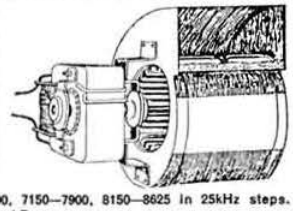

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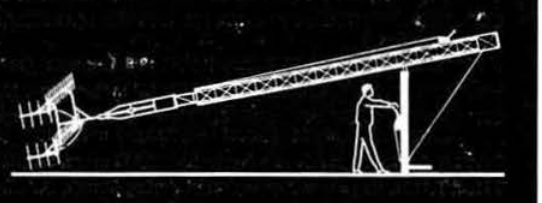

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G3FIK

PLEASE NOTE that we are still fully operative from our usual address as our move to larger premises has been temporarily delayed and for at least six weeks from the date of this advertisement we shall be operating from 518/520 Alum Rock Road. We shall, therefore, continue to give our normal service to all postal and telephone orders/enquiries and even after the changeover, with luck, our telephone numbers should remain unchanged.

At the time of going to press we URGENTLY REQUIRE all classes of Communications equipment, including gear of the most sophisticated type and are particularly anxious to purchase Collins equipment. We do, of course, pay spot cash, are able to settle existing hire purchase accounts and for those readers in the general London area our Southern agents can very often arrange collection.

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144MHz 10 Watt TRANSMITTER (ATK-1).
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PRICE: Kit (Excluding valves) **£7.75**
Kit fully assembled & tested **£10**
Printed Circuit Board & Handbook **£2**

1296MHz VARACTOR TRIPLER
High Power Version. Typical performance: 14watts output on 23cms. 24 watts input on 70 cms. Price (Ex-Stock **£30**
Medium Power Version, Typical performance: 5 watts output on 23 cms. 10 watts input on 70 cms.
Price (Ex-Stock) **£20**

144MHz TRANSISTOR TRANSMITTER (5 watts input)
This 6 channel transistorised transmitter operates on 12 volts supplies, positive or negative earth. Supplied with Microphone and 1 crystal for 145·000MHz (Mobile calling only) PRICE: **£27.50**

70MHz MOSFET CONVERTER
Typical Noise Figure: 2·5dB
Typical Overall Gain: 30dB
I.F.'s 4-6, 14-16, 28-30MHz. Other I.F.'s available to order.
Supplies: 9-15 volts at 20mA postive or negative earth
PRICE: **£15.50**

144MHz MOSFET CONVERTER
Typical Noise Figure: 2·8dB
Typical Overall Gain: 30dB
I.F.'s 4-6, 14-16, 18-20, 28-30MHz. Other I.F.'s available to order.
Supplies: 9-15 volts at 20mA positive or negative earth
PRICE: **£15.50**

432MHz MOSFET MIXER CONVERTER
All RF circuits in Microstrip
Typical Noise Figure: 3·8dB
Typical Overall Gain: 30dB
I.F.'s 14-16, 28-30MHz. Other I.F.'s available to order.
Supplies: 9-15 volts at 20mA positive or negative earth
PRICE: **£18.50**

N.B. We are now using gate protected MOSFETS in our 70 and 144MHz converters to give you improved reliability and performance at no increase in price.

ALL EQUIPMENT GUARANTEED FOR 12 MONTHS, POST and PACKING FREE, PLEASE SEND S.A.E. FOR FURTHER INFORMATION.

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EXTENSION SPEAKERS in rexine covered wooden cabinet, size 9" wide, 5½" high, 3½" deep with internal Newmarket 5 transistor transformerless amplifier type PC4 400 m/w output, 7" × 4" speaker, and volume control, additional components have been added to run from 12 and 100 volt line input these can be removed to use the amp in its original state, requires internal PP9 battery, these units are new but not guaranteed due to lack of time to test them, BARGAIN at **£2.75** (the cabinet and speaker must be worth more).

UHF MINI POWER Tx as previously advertised but less the 10 KHz FM modulator ideal as transistor driver or converter osc. with xtal, frequency around 470 MHz, circuit ex-equipment, two for **£1.50.**

MAINS POWER UNITS 19" rack mounting, mains xformer secondary rated 270 volts @ 420 m/a, separate heater xformer 6·3v 11A, 6·3v 1A, 4v 1½A, 4v 2¾A, H.T. choke 1 H @ 300 m/a res. 7 ohm, transformers made by Gardners Radio, metal bridge rectifiers, transformers individually switched and fused, pilot lamps for both, front panel 19" × 7", chassis only 6" deep, H.T. fully smoothed, in very good condition but regret due to weight these are offered to callers only (by appointment) bargain @ **£3.00.**

DASH MOUNTING RANGERS transistor PSU fully valved and complete in good condition OK for 70 MHz needs retuning ONLY **£7.00** (buyer collects) by appointment.

LABGEAR MICROPHONE COMPRESSOR PRE-AMPS for use in series with mic. lead, P.C. board construction 2 silicon transistors, size screened base 3" × 2" × 1¼" co-ax input and output sockets, requires PP3 battery, brand new, boxed, **£2.50** each.

AM25B VANGUARD RADIOTELEPHONES 17 watts output from QQVO3/20A 12 volt D.C. input part valve/transistor circuit, simple to retune to 70 MHz or 144 MHz (state which required) these are boot mounting units and are LESS control box, cable, speaker, and mic., good condition with circuit and layout **£20.00,** P.P. 75p.

MAINS PSU output 18v approx. 1A, 12v stabilised @ 400 m/a, a few left see last month's R.C. **£3.00** post paid.

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TRANSISTORS:
2N3866 75p or four **£2.50**
2N5109 ft. 1200 MHz **£1.00** or four **£3.00**
P346A 15p
V405A 20p
BFW10 FET similar to 2N3823 **22½p** or five fo **95p**
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NOTE transistors and diodes are not reject types

DIODES:
CG61H 2p or **20p** doz.
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CRYSTAL ovens plug in type with base 80 deg. C. 6/12v suit HC6/U xtals **35p.**

DISC CERAMIC TRIMMERS 7-35 pf ¼" dia. side contacts **25p** doz.

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TAG STRIPS 9 insulated + 2 earth tags 4" long box of minimum of 144 **£1.00.**

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16mfd 450vw wire ended **10p**
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75 ohm "N" type suit UR57 etc. **37p** (plug)
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UNITS FOR BREAKING DOWN weighs about 56lb, mains xformer tapped input to 250v secondary 0 to 285v @ 100m/a twice, 6·3v @ 2A twice, two 100m/a chokes, metal rectifiers, paper smoothing caps, 3" meter 1m/a centre zero, plus many other chokes Rs and Cs, pots, 5 valves, etc. in very good condition. BARGAIN @ **£2.00** but buyer collects by appointment.

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59 Waverley Road, The Kent, Rugby, Warwickshire.

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